IMF Working Paper

WP/97/73 INTERNATIONAL MONETARY FUND

Research Department

Corruption and the Rate of Temptation: Do Low Wages in the Civil Service Cause Corruption?

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June 1997

Abstract

This paper develops and tests two efficiency wage models of corruption in the civil service. Under fair wage models, civil service wages are an important determinant of corruption. Under shirking models, the level of wages is of secondary importance, as potential bribes dwarf wage income. The empirical evidence points to a negative relationship between corruption and wages across developing countries. Tests as to the validity of the two different efficiency wage models are inconclusive.

JEL Classification Numbers: J38, J41, J45, O57
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[1] The authors would like to thank Susan Rose–Ackerman and Vito Tanzi for valuable comments. Manzoor Gill, Philip Polsky and Stacy Maynes provided excellent research assistance.

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SUMMARY

While it is generally agreed that government wage policy has an effect on corruption, the magnitude of this effect is more controversial. It is often argued that "efficiency wages" play a lesser role in government, because income from bribery is likely to overshadow the disciplinary effect of job loss. As a result, the argument goes, raising wages to the high levels required to deter corruption may be prohibitively expensive. In an alternative view, modeled in this paper, which relies on the concepts of "fair wages" and reciprocity, motivational aspects can be strong even in high-bribe environments and corruption can be eliminated at low wage levels.

The main empirical findings of the paper are these:

First, an increase in the ratio of civil service to manufacturing pay from 1 to 2 is associated with an improvement in the corruption index (which ranges from 0 to 6) on the order of 1 point in the "between" (i.e., cross-country) regressions for a sample of 25 developing countries. Second, civil service wages are highly correlated with measures of rule of law and quality of the bureaucracy, and may therefore have additional indirect effects on corruption. Third, relative pay has no significant effect on corruption in "within country" regressions, indicating that pay may not have a contemporaneous effect on corruption. Fourth, quasi-eradication of corruption requires a relative wage of 3-7 times the manufacturing wage. Stronger internal and external controls are associated with lower corruption across countries. These findings are consistent with the "fair wage-corruption" hypothesis only when bribe levels are low or the probability of detection is high.

"The [Singapore] *government believed that an efficient bureaucratic system is one in which the officers are well–paid so the temptation to resort to bribes would be reduced."*

A.T. Rafique Rahman (1986), p. 151.

I. INTRODUCTION

The importance of adequate remuneration to ensure an honest civil service is widely recognized in the policy debate.[2] The issue of optimal government pay or its cost–effectiveness has not yet been settled, however, and a number of recent papers suggest that ensuring an honest civil service may be prohibitively expensive.[3]

These models, which are in the spirit of the "shirking model" of Shapiro and Stiglitz (1984) and build on the early work of Becker and Stigler (1974), assume that civil servants maximize expected income (we will refer to this as self–interested behavior). Corrupt behavior, when detected, is penalized by, inter alia, job loss, hence officials earning higher pay (who therefore have more to lose) tend to be less corrupt. When bribe–levels are high or the probability of detection and fines low, these models predict that the wage at which corruption is eliminated is high. Hence it may be cost–effective for governments to pay "capitulation wages" (wages below reservation wages, which attract only the dishonest) rather than raise wages to the high levels required to deter corruption (Besley and McLaren (1993)).[4] Furthermore, penalties can always be raised to sufficiently high levels so as to lead to the eradication of corruption, hence costly wage increases are not necessary. Extensions which allow for multiple corruption equilibria basically have the same predictions (wage policy may have some effect, depending on the parameters).[5]

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[2]See Myrdal (1968), Gould and Amaro–Reyes (1983), Israel (1987), Cariño (1986a), Klitgaard (1989), Tanzi (1994), and Lindauer and Nunberg (1994).

[3]See Bardhan (1996) and Rose–Ackerman (1996) for overviews of this literature. For a model which comes to opposite conclusions, see Haque and Sahay (1996).

[4]See Mookherjee and Png (1995), Flatters and McLeod (1995) and Haque and Sahay (1996) for alternative models of optimal government pay.

[5]Multiple equilibria result if (1) the profitability of corruption rises or (2) the probability of detection falls, as corruption increases. This occurs through various mechanisms, including the existence of search and auditing costs (combined with fixed budgets for enforcement agencies) and moral scruples (which diminish with the prevalence of corruption). For models with multiple equilibria, see Lui (1986) and Andvig and Moene (1990). Interestingly, models of multiple equilibria raise the possibility that the effect of wages cannot be detected across countries, since a given set of parameters is consistent with various degrees of corruption.

These policy implications are not robust to the formulation of the process of corruption. We show in this paper that relaxation of two assumptions to conform with common views of how the concept of "fairness" affects both the behavior of civil servants and of the population at large which polices them, leads to a larger role for wage–policy. The two assumptions are (1) that civil servants maximize expected income and (2) that the probability of detection of corruption is independent of the wage of civil servants.

First, civil servants may engage in "satisficing" rather than "maximizing" behavior, and hence be only as corrupt as necessary to achieve a "fair" income. In other words, government officials may willingly forego opportunities for corruption, provided proper wages are paid, even if such a response is not in their self–interest. Formally this view can be modeled as the "fair wage–effort hypothesis" (Akerlof and Yellen, 1990). As demonstrated formally in the paper, this hypothesis implies that raising (or reducing) wages has a stronger effect on corruption than when civil servants maximize expected income and that eradicating corruption through wage policy may not be very costly. This view corresponds to that of at least some experts on corruption, such as Peter N.S. Lee[6] (quoted by Alfiler, (1986), p. 66) who notes that "it is not a question of paying sufficient salary to make a man incorruptible but rather of not paying salary on which a man is encouraged to be corrupt in order to meet his reasonable commitments." It is also consistent with recent experimental evidence on the fair wage–effort hypothesis (Fehr et al. 1993).

Second, wages may affect the intensity with which society polices corrupt behavior. Tanzi (1994), for example, notes that "unrealistically low wages always invite corruption and, at times, lead society to condone acts of corruption."[7] Similarly, governments can also sanction corruption, as illustrated by a famous speech by Mobutu where he invited civil servants to "steal a little" ("If you want to steal, steal a little cleverly, in a nice way. Only if you steal so much as to become rich overnight, you will be caught" Kinshasa speech,

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[6] "The Causes and Effects of Police Corruption: A Case in Political Modernization," in Rance P.L. Lee, ed., p. 190.

[7] The anecdotal evidence on the link between tolerance of corruption and civil service wages is mixed. In Tanzania, for example, society was tolerant of private practice by public school teachers: a ban on private tuition in Tanzania drew hostile reactions from the public, notwithstanding the fact that teacher preparations for private tutoring detracted from time to prepare for public schooling, on the grounds that teachers' salaries were too low. "The ban could affect the standard of education further. Let the teachers generate (sic) from tuition as they do not have another source of income ..." (Daily News, 5 January 1991, as quoted by Doriye (1991), p. 14). The practice of diversion of public resources in the area of health and public administration, and of privatization of police protection was less accepted, however.

May 20, 1976).[8] If low civil servant wages lead society (including the civil service, or more narrowly the judiciary) to condone corruption, cooperation with law–enforcement is likely to falter, leading to a lower probability of detection and punishment and higher levels of corruption.[9]

Interestingly, the possibility of a varying policing intensity also suggests that high penalties may not be an effective deterrent to corruption, if, as in Akerlof and Yellen (1994) the community does not indict civil servants (gangs in their model) when the penalty is considered to be "unfair". A similar argument is made by Tanzi and Shome (1993), who note that "the higher are penalties [for tax evasion], the more probable it is that they will not be applied to those who get caught. [...] Many societies would feel uncomfortable about singling out and punishing particular individuals, almost by a lottery process, when many other individuals may have committed the same offenses" (p. 5).[10]

Turning to empirical work, the paper's contribution is to present estimates of the effect of civil service wages on corruption. While certain determinants of corruption, notably opportunities for corruption and external controls (see Ades and Di Tella (1995) and Kaufmann (1997)) have been investigated empirically, this is not the case for wages, in part owing to lack of data. Evidence on the effect of government wage policy in developing countries to date is anecdotal rather than statistical. Some statistical evidence exists for the United States, for the period 1970–83, and suggests that the proportion of government officials convicted of bribery is negatively related to the difference between government wages and the average income of a private sector group of white–collar professionals (middle grade accountants) (Goel and Rich (1989)).

The current paper uses a new data set on civil service and manufacturing wages for developing countries and an existing index of corruption (constructed by Political Risk Services). The empirical evidence covers the relationship between relative civil service pay and corruption both within and across countries. The regressions are subjected to a number of tests of robustness, notably extreme bounds analysis and the sensitivity to inclusion of certain countries. Finally, the regression results are checked against the implications from (calibrated) fair wage and shirking models.

The paper proceeds as follows. Section II provides a theoretical background to the idea that wages can affect performance in the civil service even when bribes are much larger

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[8] Quotation from Gould (1980) , p. xiii.

[9] This requires corruption is observable to some extent.

[10]The Thai experience provides a clear example of how the probability of detection and conviction may adjust to the level of penalties. Thailand had the death penalty for corruption, but this penalty was rarely enforced (see Rahman (1986, p. 133)).

than pay, reflecting "satisficing" behavior on the part of civil servants and/or policing action by society which is a function of how "fairly" civil servants are treated. Section III discusses factors impacting on corruption. It also discusses the concepts underlying the measurement of corruption and a number of control variables. Econometric issues, including the effect of long lags in the corruption process on the bias and efficiency of econometric estimates, are discussed in Section IV. Section V provides and interprets the empirical estimates. Section VI draws out policy implications and concludes. Appendix I describes the wage data collected for this study.

II. THEORETICAL BACKGROUND

This section builds on two distinct models of behavior (maximizing and satisficing) to develop an integrated framework to understand corruption.

A. General Framework

Shirking–corruption in a maximizing framework, complemented by societal standards

The view from the literature on law enforcement (see, for example, Becker and Stigler (1974)), is that government employees maximize (a stream of) expected income. In so doing they balance the benefits from corrupt behavior against the penalties when caught and punished. These penalties are assumed to include dismissal (with a cost equal to the wage differential with the private sector plus bribes foregone) and other penalties. In a one–period model the following simple relationship holds:

$$EI = (1-P(C))\,(CB + W_g) + P(C)(\,W_p - f)) \qquad \textbf{(1)}$$

where EI is expected income, P is the probability of detection followed by punishment, C is the number of corrupt acts (a continuous variable), W_g and W_p are wages in government and the private sector respectively, B is the level of the bribe, and f stands for other penalties or jail terms. Except for C, all variables and the parameters of P(C) are assumed to be exogenous.

Equation (1) expresses expected income as a weighted average of the income when corruption is not detected and when it is detected. When corruption is not detected, income equals income from bribery, CB, plus the government wage. When corruption is detected, income equals the private sector wage minus penalties, f.

In this formulation government wage policy has an effect on corruption, because the penalty includes job loss. However, high wages are not necessary for low corruption, given

that the government can manipulate P(C) and f at will (by assumption). Finally, wage–policy loses effectiveness when the level of bribes is high (this is shown formally below).[11]

Several extensions are possible. First, the probability of detection, P, can be expressed as a negative function of penalties (to include dismissal), based on the idea that *society's monitoring follows fairness* considerations. This could take the form of a withdrawal of the public's or civil service's cooperation with enforcement officers if penalties are considered to be too high (as in Akerlof and Yellen's 1994 model of gang activity) or of a lenient treatment by the judicial system. Society may also sanction corruption when wages in government are low (corruption becoming "understandable").[12] P may also be influenced through bribes paid to enforcers.

Second, the size of the bribe, B, may depend on the profitability of bribery to bribe–givers, the level of penalties, and the probability of detection.[13]

Taking into account most of these extensions, we obtain a more general formulation:[14]

$$EI = (1-P(C,f,W_g-W_p))\,(CB(P, f)+ W_g) + P(C,f,W_g-W_p)(W_p - f) \qquad \textbf{(2)}$$

Under this more general formulation, raising penalties, f, loses much of its ability to reduce corruption, as a result of its effect on society's enforcement (which decreases) as well as on the level of bribes (which increases). A second instrument, P, is no longer under the government's direct control. Government wages, W_g, on the other hand, take on an

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[11]Becker and Stigler examine optimal incentive schemes, broadened to include the posting of bonds and the granting of pension rights, which have the effect of requiring life time payments to law enforcers equal to (not above) what they could get elsewhere.

[12] Whether civil service wages are judged fair or not by society may well reflect the budgetary situation. Telephone surveys conducted by Kahneman et al. (1986) indicate that (1) pay cuts by profitable firms are considered unfair even when unemployment is high; and (2) pay cuts which result from a worsening competitive position of the employer are considered acceptable.

[13]See for example Rose–Ackerman (1975) and Mookherjee and Png (1995) for models where B is determined through simple bilateral bargaining and Flatters and McLeod (1995) for a model with coalition formation; see Bardhan (1996) for a discussion of why bribe levels in practice are small compared to the rents imparted.

[14]We do not consider the possibility that civil servants can influence the probability of detection through bribes to enforcers. See Besley and McLaren (1993) for a brief survey of modeling approaches to this issue. See also Tirole (1986) and Andvig and Moene (1990) for applications.

increasing role, through the effect on society's enforcement activity (which increases with higher wages).

Opportunities to collect bribes are easily modeled in this context, by simply positing that expected income, EI, is maximized subject to the constraint that C, the number of corrupt acts per civil servant, be less than or equal to the number of opportunities per civil servant, O, which are assumed fixed. Opportunities will either be binding, in which case C=O, or not, in which case the first derivative of EV with respect to C provides the solution for C.[15] Under this formulation, wages (and p, B, and f) have an effect on corruption, only if opportunities are not binding and opportunities have an effect on corruption only when other factors have no effect.

Fair wages–corruption in a satisficing framework

Individual behavior may not be appropriately described by the optimizing framework laid out above. According to the psychological literature on "fair wages" (surveyed in Akerlof and Yellen (1990)), "workers who do not receive a fair wage [...] may change actual effort. [...] or their perceived level of remuneration (by redefining the nonpecuniary terms of the job)" (Akerlof and Yellen, p. 257).

We are not aware of experimental or sociological evidence documenting a link between wages and corruption which reflects fairness considerations. There is, however, evidence of such a link for wages and effort. Fehr et al. (1993) find experimental evidence that wages motivate effort even when there are no penalties for shirking.[16] Fehr and Tyran (1996) interpret this finding in terms of "reciprocity," reflecting a desire on the part of

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[15]The level of the bribe for a corrupt act (which is theoretically also linked to opportunities) is assumed to be constant and exogenously given, for simplicity. See above references for an explicit modeling of the level of bribes. The assumption that opportunities are constant is also made for simplicity, and could be relaxed so as to incorporate the idea that bureaucrats *create* opportunities to collect bribes.

[16]The experiments (conducted with Austrian university students) involve a two–stage game between "employers" and "workers." Employers offer wages in the first stage and workers respond by offering effort in the second stage. Monetary gains from the game to employers and workers depend in the usual way on effort and wage–levels. Reputation effects do not exist in this game, as employers change in each game. The results indicate that workers provide more effort when offered higher wages. These results are confirmed in experiments in Russia involving high monetary stakes (Fehr and Tougareva, 1996). One possible concern with the experiments is that reciprocity, while it can be costly to "workers" in absolute terms, is not costly relative to their expected payoffs in the games.

workers to punish low–wage employers.[17] "Lost–letter" experiments (see for example, Yezer, Goldfarb, and Poppen (1996)) suggest that a large fraction of the population may be honest, in the sense of leaving opportunities for theft unexploited.[18] Taken together, these findings indicate the possibility that at least a fraction of civil servants may leave opportunities for corruption unexploited as well provided they feel they are treated fairly.

Formally, the "fair wage–effort" hypothesis can be modeled as follows:

$$e=f(I/W^*)=f((W+N)/W^*)$$

where, e represents effort, I represents actual income, W* represents the "fair" wage, W represents the wage paid by the employer, and N represents nonpecuniary remuneration. According to the theory, workers adjust effort or the actual wage (e.g. through nonpecuniary remuneration on the job) if there is a differential between the wage and the "fair" wage.[19] The "fair" wage could be determined according to a variety of mechanisms: wages of peers within or without the place of employment, societal expectations, the market clearing wage, subsistence requirements, the status of civil servants, etc. Corruption can be understood in this context as somewhat similar to an adjustment in nonpecuniary remuneration, N. With small modifications to reflect the specific context in which we are interested, this theory translates to:

$$e=f(EI/EI^*) \qquad \textbf{(3)}$$

where EI and EI* represent actual and targeted/"fair" expected income, respectively.

For the purpose of comparison with the "maximizing" framework we assume that civil servants are penalized for corruption through dismissal (W_g-W_p), opportunities for corruption foregone (CB), as well as a fine (f). We also assume for simplicity that the probability of detection P is simply the number of corrupt acts (C) multiplied by the probability of detection

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[17] The sociological literature reaches similar conclusions. A classic example is Mathewson (1969) who notes, based in part on his experiences as a participant observer, that "occasionally workers have an idea that they are worth more than management is willing to pay them. When they are not receiving the wage they think is fair, they adjust their production to the pay received" (as quoted by Akerlof and Yellen, p. 261).

[18] In this experiment, 44 percent of undergraduate students who found apparently "lost letters" containing $10, returned the letters.

[19] Interestingly, experimental evidence shows that workers who are overpaid do not necessarily increase their effort, a result which may be explained by cognitive dissonance (Walster, Walster, and Berscheid, 1997, p. 124 as cited by Akerlof and Yellen, p. 258). In terms of the model, workers adjust their perceived effort when overpaid, not their actual effort!

for a single corrupt act (p). This assumption greatly reduces the complexity of the analysis, while also being a reasonable approximation for developing countries.[20]

Substituting P=pC in equation (1), one obtains:

$$EI=(1-pC)\,(CB+W_g)+pC(W_p-f)) \tag{4}$$

This equation will be the basis for the analysis which follows. What we will call the "fair wage–corruption" hypothesis is the hypothesis that workers choose levels of C in an attempt to reach EI=EI*.

$$EI=(1-pC)\,(CB+W_g)+pC(W_p-f))=EI^* \tag{5}$$

The solution for C, as we shall see, is a function of government wages W_g relative to fair income, EI*. EI*, B, p, f, W_g and W_p may be such that there is no solution for C such that EI=EI*, however. When there is no solution, we will posit that effort adjusts downward from "normal" levels, according to equation (3). The incorporation of both corruption and effort in one model fits the stylized facts described in the corruption literature ("The civil servant who does not wish—or does not have the opportunity—to steal, or whose corruption is not sufficiently remunerative, may engage in another behavior strategy: taking on a second job, 'moonlighting'" (Gould, 1980, p.71).

We now trace the precise implications of assuming maximization of equation (4) (which we will refer to for simplicity as the "shirking hypothesis") as compared to the "fair wage–corruption" hypothesis (5).

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[20]When the probability of detection for any individual act is independent of the number of corrupt acts, the probability of detection of at least one act is $1-(1-p)^C$. For low p (below 0.1) and C (below 10), this is well approximated by the expression pC used in the model. For high p and C, the expression pC provides an overestimate of the probability of detection. Hence this model is not applicable to developed countries, as these would tend to have high probabilities of detection. Note also that the assumption of a fixed p abstracts from the possibility of multiple equilibria resulting from having fixed enforcement resources (under those circumstances, the probability of detection of an individual act would decline with the number of corrupt acts).

B. Specific Implications

Fair wage-corruption hypothesis

Solving for C under *satisficing*, and choosing the negative root, one obtains:

$$C=\frac{1}{2}\cdot\frac{B-p\cdot\left(W_g-W_p+f\right)-\sqrt{D}}{p\cdot B} \tag{6}$$

where:

$$D=\left[B-p\cdot\left(W_g-W_p+f\right)\right]^2-4\cdot p\cdot B\cdot\left(EI-W_g\right)$$

As we will see below, the positive root involves more corruption than under maximizing and is therefore Pareto-inferior (both the government and government workers would be better off with less corruption); hence it is ruled out.

Note that when W_g=EI*, C=0; i.e. *corruption is zero when the government pays the fair wage*. It can also be shown from equation (4) that, when a solution exists (with C>0) and being caught is costly (i.e. when $CB+W_g>W_p-f$), income from corruption CB *exceeds* the difference between the fair wage and the government wage, EI^*-W_g. The intuition behind this result is that workers require compensation for the possibility of job loss and other costs associated with detection.

Corruption increases with EI*, as one would expect. However, for sufficiently high EI*, D is negative and there is no solution (i.e. the solution is imaginary). In this situation we posit that the civil servant engages in the number of corrupt acts which maximizes expected value, while also reducing effort so as to satisfy equation (3). The assumption that workers first adjust the number of corrupt acts and then effort is somewhat arbitrary. Modeling the sequence as the reverse, would complicate the analysis, but probably yield similar results.

The ability of the civil service to attract and retain labor is modelled implicitly by assuming that civil servants can vary effort if necessary (civil servants will vary effort so that the utility of a government job is equal or greater than the utility of a private sector job).

Two derivatives are of special interest to the empirical evaluation of the fair wage hypothesis, as we will see: the first derivative of corruption with respect to government wages, and the first derivative of corruption with respect to the probability of detection. Taking the derivative with respect to the government wage one finds:

$$\frac{dC}{dW_g}=\frac{-1}{2\cdot B}\cdot\left[1+\frac{1}{\left(\sqrt{D}\right)}\cdot\left[B+p\cdot\left(W_g-W_p+f\right)\right]\right]$$

This expression also represents the derivative of C with respect to (W_g-W_p) if $EI^*=W_p$, that is if the fair wage equals the private sector wage.

The derivative of corruption with respect to the probability of detection, p, is:

$$\frac{dC}{dp}=\frac{1}{2\cdot p^2}\cdot\frac{\left[\left[B-p\cdot\left(W_g-W_p+f\right)\right]-2\cdot p\cdot\left(EI-W_g\right)\right]-\sqrt{D}}{\sqrt{D}}$$

This derivative is *always greater than or equal to zero* when a satisficing solution exists, contrary to what one might have expected. Intuitively, an increase in the probability of detection reduces expected income of government workers, everything else equal, as long as being fired is something undesirable (to see this use equation (6) and the result that BC>EI*-Wg). Hence, government workers need to resort to more corruption when the probability of detection increases. This is simply the counterpart to the idea that opportunities for corruption are left unexploited. We now compare the solution under satisficing behavior to that when workers choose corruption so as to maximize EI.

Shirking hypothesis

If workers engage in *maximizing* of EI, the solutions for C and first derivatives of C with respect to W_g and p, respectively, are:

$$C=\frac{1}{2}\cdot\frac{B-p\cdot\left(W_g-W_p+f\right)}{p\cdot B} \tag{7}$$

$$\frac{dC}{dW_g}=\frac{-1}{2\cdot B}$$

$$\frac{dC}{dp}=\frac{-1}{2\cdot p^2}$$

Three observations can be made. First, the number of corrupt acts under satisficing is less than the number of corrupt acts under maximizing, for any given wage (at least when a solution exists; compare equations (6) and (7)). In this sense, opportunities for corruption are left "unexploited." The counterpart to this result is that the wage which eradicates corruption is always higher under maximizing than under satisficing.

Second, the derivative of the number of corrupt acts relative to the government wage equals the derivative under optimizing, minus a term, which is negative under most circumstances

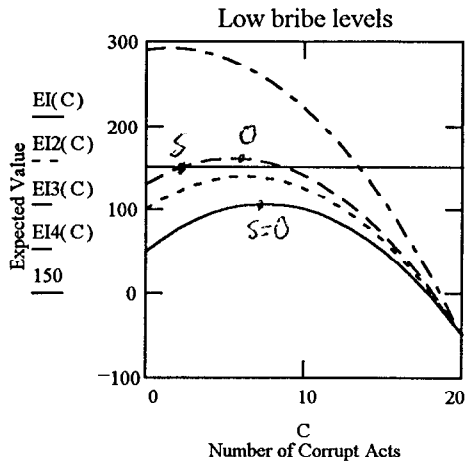
(if $B+p(W_g-W_p+f)$ is positive). Hence the derivative is usually more negative than under optimizing, implying a greater role for wage policy in reducing corruption. Note also that the derivative is smaller for higher levels of the bribe, under both satisficing and maximizing, implying a lesser role for wage-policy (at the margin; see below) when bribes are high.

Third, the derivative of the number of corrupt act relative to the probability of detection is *negative*, in contrast to the finding under satisficing where it was positive (when it existed). This corresponds to the usual intuition, according to which agents become more cautious when the probability of detection increases, ceteris baribus.

Some figures can further illustrate some of the differences between the models. Figure 1 draws the relationship between expected value and the number of acts of corruption, for various levels of wages. Both the optimizing (O) and satisficing (S) solutions are drawn (targeted expected income is indicated by the horizontal line). The satisficing solution corresponds to the first point of intersection between the horizontal targeted expected income line and the function tracing expected income as a function of corruption. The second point of intersection involves more corruption and smaller expected income than the optimizing solution, and is ruled out. *Note that for low wages, no solution exists under satisficing as the targeted expected value line does not intersect the expected income curves.* In this case corruption will equal the level chosen when maximizing expected income, and effort will be less than normal.

Figure 2 draws the relationship between the number of corrupt acts and the civil service wage. The assumptions underlying both panels are that the probability of discovery and punishment of an individual act of corruption is 5 percent, that penalties consist of dismissal, foregone bribes, and additional penalties of 150, that the private sector wage equals 100 and that targeted expected value equals 150. The top panel shows a situation with low bribe levels (a bribe level of 20). The slope of the curve reflecting satisficing (the dotted line) is steeper than the slope of the curve reflecting maximizing, for wages sufficiently high for targeted expected income to be achievable. *For lower wages (when the target can not be achieved) the satisficing outcome equals the optimizing outcome.* Corruption is eradicated when government wages equal 350 under optimizing and 150 under satisficing. The bottom panel shows a situation where bribe levels are large (a level of 100). *Eradication of corruption requires government wages to be raised to as much as 1950* when workers optimize, compared to 150 when workers satisfice (with a probability of detection of 20 percent this figures is 435 under the optimizing strategy).

Figure 1. Expected Value, Corruption, and Wages



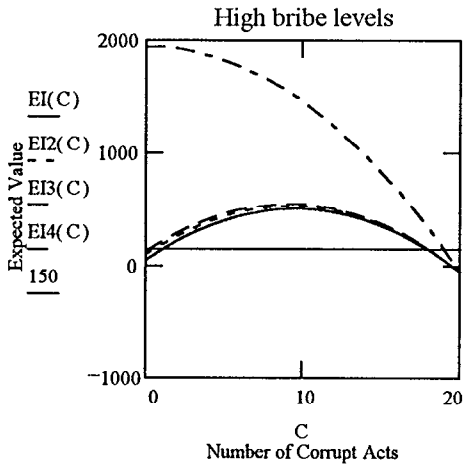
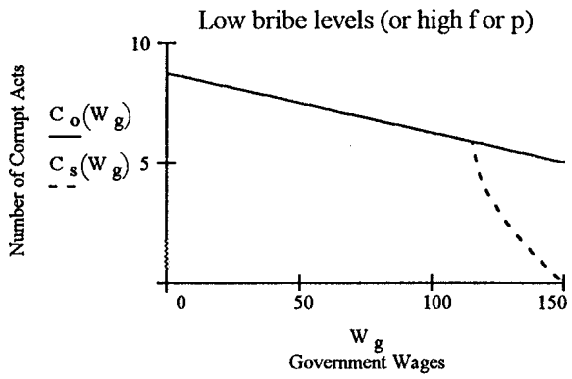
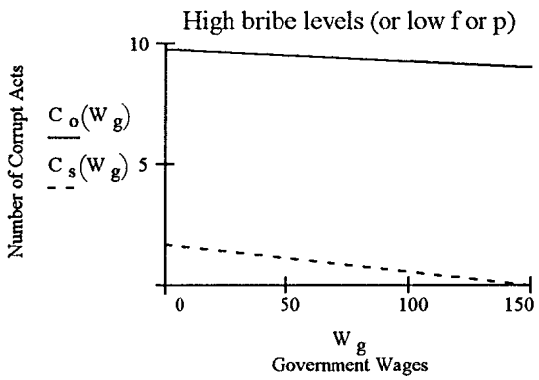


Figure 2. Corruption and Government Wages





The above discussion leads to several testable hypotheses.

If either the fair wage or shirking hypothesis holds, the following must be true:

Hypothesis 1. Corruption is negatively related to civil service wages relative to the private sector wage.

If the **fair wage hypothesis** holds the following hypotheses must hold as well:

Hypothesis 2. Corruption disappears when wages equal the fair wage (which one would not expect to exceed 2-3 times the private sector equivalent).

Note that an inability to reject this hypothesis does not lead to rejection of the alternative hypothesis of shirking. For low bribe levels and/or high fines and/or a high probability of detection and punishment, corruption disappears at relatively low wage levels under the shirking hypothesis as well.

Hypothesis 3. When wages are sufficiently high (so that a solution exists under satisficing), a higher probability of detection and punishment is associated with higher corruption, not lower corruption.

Note that a finding of a negative association between the probability of detection and punishment and corruption is fully consistent with the fair wage hypothesis if wages are low and civil servants' environments are characterized by low bribe levels and/or high penalties and/or a high probability of detection and punishment.

Under the **shirking hypothesis**, the following hypotheses hold:

Hypothesis 4. When the environment of civil servants is characterized by high bribe levels and/or low penalties and/or low probabilities of detection and punishment, wages at which corruption disappears will be a large multiple of the private sector wage.

Hypothesis 5. A higher probability of detection is associated with lower corruption.

Note again that an inability to reject this hypothesis does not lead to rejection of the alternative hypothesis of fair wages, if wages are low.

Unfortunately, existing data are not sufficient to test hypothesis 4 (see Section III.A. below), while the fact that most civil services pay poorly makes it difficult to assess hypotheses 2, 3, and 5. We now turn to a survey of the variables which a general theory of corruption must consider and to a description of empirical proxies to be used in the regression analysis.

III. EMPIRICAL IMPLEMENTATION, DEFINING CORRUPTION AND ITS CAUSES

A. Dependent Variable, Definition of Corruption

The term corruption is applied to a wide range of phenomena. They range from "tips" and "speed money" to complicated schemes of exchanges of favors between businessmen and politicians or civil servants, some of which may not even involve direct monetary transactions. In one of the weakest forms, public officials may just be using personal favors in order to be able to alternate between public and private employment through a "revolving door". The measurement of corruption is therefore complicated in the first instance by the chosen definition of a corrupt act. More fundamentally, the illegal character of corruption makes it inherently difficult to quantify.

To test our hypothesis about the role of pay (specifically hypothesis 4 above), micro data on corruption incidence in the parts of public administration which offer high bribes would be necessary. Information pertaining to low bribe environments is less interesting, because the two efficiency wage theories would tend to be observationally equivalent. In a high bribe environment, civil servants do not have to resort to effort reduction to achieve "fairness" given that bribes are large compared to wages. Hence the level of corruption will be different depending on which efficiency wage hypothesis applies. The amount of corruption can be checked with that predicted by the two efficiency wage models to assess which model best describes the data. In a low–bribe environment, on the other hand, civil servants who follow the fair wage–corruption hypothesis will be as corrupt as their maximizing counterparts, as long as civil service wages are relatively low.

Corruption in public procurement and tax administration are more likely to be characterized by large bribe size, suggesting that these are fertile areas for testing the "fair wage–corruption" hypothesis. On the other hand, bribes paid to police officers and teachers are probably small in size, while bribes paid to civil servants who issue licenses are likely to vary depending on how lucrative the license is (e.g import licenses and site allocation tend to be lucrative areas).

The available data on corruption does not distinguish between high and low bribe environments, however, making interpretation of corruption in terms of the two efficiency wage models less clear–cut.

Data on corruption are available in the form of an index based on surveys by Political Risk Services, a private international investment risk service.[21] The variable attempts to capture the extent to which "high government officials are likely to demand special payments"

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[21]Published by Political Risk Services in the *International Country Risk Guide* (ICRG), for the period 1982–95. This data set was assembled by the IRIS Center (University of Maryland) from hard copies of the International Country Risk Guide.

and "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, police protection, or loans.[22]

The index is not ideal for our purposes, as it is geared to assessing the business climate for **international** businesses and may be tainted by a concern for the political consequences of corruption. In the view of Political Risk Services "Foreign lenders and investors may find it difficult to conduct business effectively in countries where there is widespread financial corruption [...]. The greatest risk in such corruption is that at some time it will become so overweening, or some major scandal will be suddenly revealed, which will provoke a popular backlash, resulting in a fall or overthrow of the government, a major reorganizing and restructuring of the country's political institutions, or, at worst, a breakdown in law and order, rendering the country ungovernable [...]. One possible early indicator of potential corruption is the length of time a government has been in power continuously" (Coplin, O'Leary, and Sealy, 1991, p. 46).

A great advantage of the index compared to other corruption indexes available is that it is reasonably consistent across countries and time, as it is produced by a single organization, which presumably instructs its experts uniformly as to how to rate countries.

B. Independent Variables

In addition to pay, a long list of variables which impact on corruption have been suggested in the literature. Most variables neatly fit into the framework developed in Section II). Below is a list of factors which is largely based on Alfiler (1986), p.66 and 94. The classification is ours:

[22]See Knack and Keefer (1995) for exact definitions.

Factors Impacting on Corruption

(1) ***Pay (W)***
-inadequate pay
-fringe benefits and other financial incentives (pensions)

(2) ***Inefficient internal control (p)***
–inadequate supervision and control systems
–lack of explicit standard of performance for employees and organizations
–poor recruitment and selection procedures for personnel
–too few or too many (and nontransparent) rules and procedures (red tape)

(3) ***Insufficient external controls (p)***
– law and order tradition, checks and balances
– lack of information made available to the public and freedom of press
– mechanisms for citizens participation and complaint
– difficulty of proving cases in court
– high social acceptance of corruption

(4) ***Statutory penalty rate (f)***
–amount of fine, prison sentence
–administrative sanctions
–prohibition of being ever reemployed in the public sector
–penalties for relatives

(5) ***Amount of distortions or opportunities in the economy (O)***
– pervasive government regulation
– high statutory tax rates, nontransparent tax regulations
– provision of government services short of demand (government monopolies)

(6) ***Other factors***
–cultural determinants
–culture of bureaucratic elitism and education of civil servants
–leadership
–ethnic diversity

Pay

In the empirical implementation of the framework developed above, corrupt behavior is postulated to be a function of the current civil service wage relative to that in the private sector. In a more general interpretation other factors would also be considered. First, the expected future rewards linked to employment in the civil service would be taken into account. For example, government employment may be more stable than employment in the private sector, civil service pensions may be relatively generous and fringe benefits may play an important role in remuneration. In a few cases our wage data includes in kind benefits but in general we cannot quantify the total monetary value of civil service employment and compare it to total rewards in the private sector. Second, benchmarks other than the alternative wage in the private sector may be relevant, if fairness considerations dictate so. These benchmarks could include past wages, wages in civil services abroad, an "adequate" standard of living, etc.[23]

For the wage variable we use the *ratio of government wages relative to manufacturing wages.* The manufacturing sector has the advantage of being relatively comparable across countries in terms of skill content (GDP per capita would not be).[24] The skill–content in the manufacturing sector is probably lower than that in government, so that it should not be considered as a measure of alternatives available to government employees. The aim is simply to have a consistent benchmark. Follow–up research may test the relevance of other measures of "fair wages". Our data set and sources are set out in Appendix I.

Internal controls

The probability of detection of a corrupt act depends critically on the effectiveness of control systems and incentives within the administration. Corruption is likely to breed in an administration characterized by inadequate controls, lack of explicit standards of performance

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[23]See Dumont in Ekpo, ed. (1979) for a persuasive account of how wages of expatriates and funds needed to "receive guests properly" appeared to be the appropriate benchmarks for civil service wages following independence of a number of French–speaking African countries (p. 402 and 406). See Lee (1986) for a discussion of the role of "personal status–discrepancy", i.e., a person's comparison between his or her social and economic statuses in creating "wants" for corruption (p. 95).

[24]Relative skill content in manufacturing may be expected to be higher in more developed countries. This turns out not to be the case for our sample of developing countries, as indicated by a regression of the relative civil service wage on GDP per capita and enrollment in secondary education, though it is true for a sample of industrial and developing countries combined.

for employees and agencies, and poor recruitment and selection procedures for personnel. For instance, a public administration where recruitment is based mainly on personal preferences is likely to be prone to nepotism and collusive behavior.[25] Collusion can subvert controls even if they are designed well on paper. For instance, a corrupt official can buy off his superior or peer for not denouncing him by sharing the bribe. Sharing mechanisms ensure that those official who do not have direct access to bribes also share in the proceeds. Advanced stages of collusive behavior render internal controls ineffective. Internal controls can also be weakened through excessive and/or insufficiently transparent regulations and procedures. Red tape awards officials with discretionary powers which can be abused for personal gain. The classic example is the bureaucrat who has the power to either "forget" about a document on the bottom of his pile or alternatively accelerate the process by dealing with the request immediately.[26]

Our proxy for internal controls captures only some of the factors discussed above. We use an index of "**quality of the bureaucracy**" available from ICRG which indicates "autonomy from political pressure" and "strength and expertise to govern without drastic changes in policy or interruptions in government services," as well as the existence of an "established mechanism for recruiting and training."

External controls

External controls are another determinant of the probability that corruption is detected and punished. In a system with well working checks and balances, external controls are exercised by other branches of the government. However, in countries where checks and balances are subverted by collusion and systemic corruption such controls may be weak. Society at large can play an important role in denouncing corruption and pressuring for punishment. For instance, Singapore established citizens committees which enable citizens to vent their grievances and seek redress.[27] Well informed citizens and a free press can exercise some constraints on corruption, in particular on high–level corruption. On the other hand, societal attitudes can be detrimental to the discovery and prosecution of corruption when there is a high social acceptance of bribery. Social acceptance, in turn may be linked to the level of civil service wages; corruption becoming "understandable" for low wage levels.

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[25]Recent work by Evans and Rauch (1996) suggests that relying on internal promotions rather than political appointments for high–level positions tends to reduce corruption.

[26]This is the typical kind of bribe called "speed money". Some authors have implied that "speed money" may be efficiency enhancing because requests will be processed according to their opportunity cost. However, this argument ignores, the fact that bureaucratic red tape may not be completely exogenous. Bureaucrats may actively search to complicate procedures and increase red tape in order to increase their rents. (See Rose–Ackerman, 1997)

[27]See Rahman (1986) p. 151

Alternatively, social acceptance may be just an expression of "social capitulation". If the state apparatus is not trusted to act against corruption, people don't bother to denounce corruption. Finally, as suggested in the theoretical section, people may be unwilling to denounce a corrupt official, and the judiciary to convict or apply statutory penalties, if penalties for corruption are perceived as unfair or unduly strict.

We use several proxies for external pressures. The index of the "**rule of law**" from ICRG reflects the degree to which "citizens of a country are willing to accept the established institutions to make and implement laws and adjudicate disputes" and the presence of "sound political institutions, a strong court system, and provisions for an orderly succession of power."[28] The index of "**political rights and civil liberties**", a simple average of the index of political rights and the index of civil liberties compiled by Freedom House and published in *Freedom in the World*, captures factors such as the right to vote, the right to organize political parties, fair elections, meaningful representation by elected representatives, freedom of the press, freedom of assembly and demonstration, an independent judiciary, and the absence of political terror and torture.[29] Finally **PPP adjusted per capita GDP** and **secondary school enrollment** (from the Summers–Heston v. 5.6 data–set) were also included as proxies for external controls, under the assumption that social pressures against corruption may be higher the higher the general level of income and education. These variables have the advantage of being continuous measures, while also being more useful for comparisons with other work.

Statutory penalty rate

The penalty rate is probably the instrument governments use most frequently when attempting to combat corruption. As shown in the theoretical section, in an optimizing model the penalty rate can directly substitute for wage increases and sufficiently high penalties would eradicate corruption even in the presence of low detection probabilities. However, in an environment of high bribes this optimal penalty may be very high—some countries have even passed the death sentence for corruption. More frequently the legal sentences include prison sentences, fines, and requirements to redeem funds acquired illegally.

In general, a civil servant who is convicted of corruption will be dismissed from public office. In Korea, the Suhjongshoeshin movement (General Administrative Reform Movement) of 1975 went one step further by prohibiting reemployment even in the private sector of officials dismissed from public service on charges of corruption. Korea has a tradition of harsh

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[28]The original variable name in ICRG is "law and order tradition." Scored 0–6.

[29]We use an unweighted average of the index of political liberties and the index of civil rights (redefined so that an increase in the index reflects an improvement). Raw scores—corresponding to affirmative actions on a well–defined questionnaire—are translated into an index, which ranges from 1 to 7 (7 represents the least free).

anticorruption laws. During the Yi Dynasty (1392–1910) a number of measures were used to magnify the penalty for corruption. For instance, the person who initially recommended the official later found guilty of corruption was also dismissed. The prohibition from reemployment in the public service was extended to the sons and grandsons of a person found guilty of corruption (Rahman, 1986, pp. 118–21).

Cross country data on statutory penalty rates were not available to us; therefore this variable is not included in the empirical analysis below.[30]

Distortions in the economy

The more governments intervene in the economy the more there is likely to be room for discretionary interpretation of regulations and allocation of resources. Tanzi (1994) argues that a country characterized by large government involvement is more likely to experience high levels of corruption. Government monopolies in the provision of goods and services, as well as foreign exchange controls, give bureaucrats the power to appropriate the rents that shortages create. Similarly, complicated tax regulations and a large number of them provide tax officials with arbitrary leeways. Although the level of distortions may be related to the overall size of government, this is not necessarily so—even a government that is not large in terms of its share of GDP can exercise a large influence on the private sector, e.g. by regulating prices, exchange rates, interest rates, or by requiring licences etc. In a recent set of papers, Ades and De Tella (1995a,1995b) have shown that the degree of competition[31] and industrial policy[32] have a significant effect on corruption. In their view this occurs through the rents which absence of competition and active industrial policies create, by way of more profitable or favored domestic firms, which bureaucrats and politicians then extract. Kaufmann (1997) has found a very strong correlation between bribery to public officials and

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[30]The experience in tax administration suggests that the timeliness by which penalties are applied is of paramount importance to their effectiveness. This would have to be taken into account in comparisons involving statutory penalty rates across countries and over time.

[31]The degree of competition is measured by a number of indicators: merchandise imports as a share of GDP, an index of import restrictions, "trade distance"—average distance to capitals of the world's 20 major exporters, weighted by value of bilateral imports, land area, road density, an index of market dominance and an AntiTrust Laws index. The latter indexes are from the *World Competitiveness Report*, a publication of the EMF Foundation (Geneva).

[32]Industrial policy is measured by a procurement index measuring "the extent to which public procurement is open to foreign bidders;" a fiscal index measuring "the extent to which there is equal fiscal treatment to all enterprises;" and subsidies to private and public enterprises. The first two indexes are from the *World Competitiveness Report*, a publication of the EMF Foundation (Geneva).

"regulatory discretion" for a sample consisting mostly of Latin American and Asian countries, using survey responses by businesses.

We use the **black market premium** for foreign exchange as an indicator of the level of distortions in the economy, following common practice in the growth literature.[33] Presumably, economies experiencing exchange controls are subject to a number of other controls generating shortages and providing opportunities for corruption. The correlation between the black market premium and the level of distortions in the economy is admittedly rather imperfect (this is even more so for the level of opportunities for corruption): while highly distorted economies are likely to have exchange controls, the absence of foreign exchange controls does not imply the absence of distortions.

Other factors

In addition to the variables discussed above corruption is often attributed to purely cultural factors or lack of leadership. For instance, Tanzi (1994) argues that the absence of a culture of arms–length relationships may lead to corruption becoming ingrained and systemic. Lee (1986, p. 97) suggests that a culture of bureaucratic elitism may lead to a dissociation of civil servants with the rest of society and breed corruption. Alternatively, the level of education of civil servants can be a factor which reduces corruption. Cultural factors and leadership are inherently difficult to measure; they are not included in the empirical analysis for lack of plausible proxies. Shleifer and Vishny (1993) suggest that more ethnically diverse countries are prone to a disorganized form of corruption. Mauro (1995) finds evidence of a link between corruption and an index of "**ethnolinguistic fractionalization**".[34]

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[33]The sources for the black market and the official exchange rate are, respectively, International Currency Analysis, Inc., *World Currency Yearbook* (New York, various issues, December figures) and the IMF's *International Finance Statistics* (Washington, various issues) line "ae".

[34]This index measures the probability that two randomly selected persons from a given country do not belong to the same ethnolinguistic group. This index is calculated by Taylor and Hudson (World Handbook of Political and Social Indicators, 1972) and is constructed based on raw data in *Atlas Narodov Mira* (Department of Geodesy and Cartography of the State Geological Committee of the USSR, Moscow, 1964) and refers to 1960. We would like to thank Paulo Mauro for sharing this data.

IV. ESTIMATION: ECONOMETRIC ISSUES

A. Omitted Variables

One key econometric issue is the choice of estimator. As is well–known, unbiasedness of the OLS, "between" (i.e. cross–country), and "random effects" estimators requires that the independent variables not be correlated with the country–specific effects (often reflecting omitted variables) subsumed in the error term. Even "fixed effects" (i.e. including country dummies) estimation is biased for short panels, in the absence of strict exogeneity. The econometrician's solution to these problems is often to first difference the data and estimate a relationship for the first differenced data using instrumental variables.

We are reluctant to apply this procedure here, however, for two reasons. On the one hand, our measure of relative wages exhibits very little variation over time. The share of the variation within countries in the total variation in relative wages is 27 percent for a sample of developing 25 countries. Hence the information content of the data corresponds in large part to the cross–country variation in the data.[35] Estimation based on first differencing (or fixed effects) will therefore suffer from low power, compared to estimation based on OLS or country–means.

On the other hand, the timing with which wage–policy and other variables affect corruption could be subject to long lags because of institutional inertia and societal attitudes. The lack of variation in the corruption index we use (the coefficient of variation over time averages 0.2 for the 25 countries in our sample) indicates that corruption may be generated by a moving average process with long lags. Hence, wage increases might not produce lower corruption contemporaneously, whereas a sustained policy of high civil service pay could over time produce lower corruption. When an inappropriate lag–structure is specified, first differencing of the data (or using fixed effects), which eliminates the cross–country variation, produces inconsistent estimates of the long–run relationships between the variables.[36] Estimation based on a cross–section or OLS would also provide biased results. Estimation based on cross–country means (where the raw data cover a reasonably long time–span), on

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[35]This applies to most independent variables. The shares of the within country variation is 12 percent for the "rule of law", 12 percent for "quality of the bureaucracy", 16 percent for "political rights and civil liberties", 1 percent for real GDP per capita, and 82 percent for the black market premium.

[36]When the true model involves a distributed lag, but only contemporaneous terms are included (for example), fixed effects estimation will provide an unbiased estimate of the contemporaneous term. This estimate will bear no relationship with the long–run multiplier on wages, which is the coefficient of interest, however.

the other hand, would provide a consistent estimate of the long–run relationships in the data (i.e. an estimate "robust to dynamic misspecification" (Pesaran and Smith, 1995, p. 88)).[37]

In view of the issues of power and uncertainty surrounding the correct lag specification, the strategy adopted in this paper is to estimate a number of estimators, including "between" and fixed effects. As we will see, the estimates vary greatly depending on the technique used. This could be a sign of misspecification, resulting either from a misspecified lag structure or from omission of relevant independent variables correlated with wages. Under the first interpretation, the fixed effects results pertain to the contemporaneous effect of wages on corruption and the "between" results to the long–run relationship between wages and corruption.

Under the second interpretation, the coefficient on wages in "between" regressions would be biased because of the correlation between the omitted variables and wages, and the results inconclusive as to the role of wages. To temper such fears, we include a large number of independent variables, notably internal and external controls, as well as distortions, and subject the regressions to Extreme Bounds Analysis (EBA).

We could not capture all relevant variables discussed in Section III, however. The variables which could not be captured are (1) the size of penalty; (2) "leadership"; (3) education of civil servants; (4) the degree of social acceptance of corruption; and (5) and truly cultural determinants. Of these variables, two variables—education of civil servants and social acceptance—are likely to be correlated with relative wages, for a number of reasons.[38] The remaining variables—size of penalty, "leadership", and "culture"—do not appear to be related to relative wages a priori, and are therefore not problematic. The possibility of omitted variables poses difficulties in interpreting the regression results and in drawing policy recommendations (should pay be raised for all personnel or used to increase the qualification level in the civil service? Can higher pay be relied on to ensure more adequate policing by society or should society's acceptance be tackled more directly?).

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[37]The between estimator could nevertheless have a higher mean squared error than the OLS estimator given that the variance of the OLS estimator, being inversely proportional to the total variance of the independent variables, is smaller than the variance of the between estimator, which is inversely proportional to the (smaller) variance of the mean of the independent variables.

[38] Thus, pay is likely to be related to the education of civil servants through either a compositional effect (a civil service which relies more or less on highly qualified staff) or the effect of pay on the ability to recruit well–educated personnel. Low pay acts on society's willingness to accept corruption. Yet the causality could also be the other way around, with government pay decisions influenced by possibilities of corruption on account of society's lack of policing.

Estimates are derived after weighing the data by a function of the number of observations to correct for heteroscedasticity resulting from using an unbalanced panel and "White–correction" of the standard errors to ensure robustness of the standard errors to heteroscedasticity.[39] Only countries with at least 5 consecutive observations are included in the regression. 86 percent of the countries in our sample have 7 or more consecutive observations, while 43 percent of the countries have 10 or more consecutive observations.

B. Other Issues

Measurement error

Definitions of wages vary substantially across countries (see Appendix I). This by itself causes bias in the "between" regressions (probably leading to an underestimate of the coefficient on relative wages), since it generates a (negative) correlation between relative wages, measured with error, and the error term. Fixed effects estimation suffers less from measurement error, since the variance of the measurement error is likely to be small within countries (as least compared to the variance of the measurement error across countries).[40] Of equal concern is mis–measurement of the "fair" wage. Under the "fair wage–corruption hypothesis," the relevant wage variable is government wages relative to fair wages. However, since benchmarks for what constitutes fair wages may vary across countries, fair wages may depart more or less from manufacturing wages depending on the country (in countries where civil servants have high opinions of what constitutes a fair wage, the manufacturing wage may

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[39]Specifically, correction for heteroscedasticity on account of differing number of observations across countries is carried out in three steps. First, between estimation is carried out on the raw data. Second, the squared residuals from this regression are regressed on a constant and the number of observations available in a country. Third, the raw data is divided by the square root of the fitted values of the previous regressions (i.e. the estimated country–specific error variances), and between estimation carried out, with White–correction, using this weighted data.

[40]In addition, the measurement error could be correlated with indicators of development and generate bias on the coefficients for these variables, if the manufacturing wage data capture child labor (given the likely correlation between indicators and development and the incidence of child labor). The scope of the manufacturing data is not sufficiently known to form a judgment on this.

seriously underestimate the fair wage). To the extent that extraordinary concepts of fairness are a function of the level of development (higher aspirations in less developed countries) controlling for GDP per capita may solve this problem.[41]

Simultaneity bias

In brief, two arguments for reverse causality could be made: (1) corrupt countries have poor tax collection and therefore pay less well; and (2) corrupt countries pay less purposefully arguing that civil servants already have incomes from corruption. These possibilities prevent one from drawing firm policy conclusions from the regression results.

V. RESULTS

Before turning to the results, let us recapitulate the different implications of the two efficiency wage models under consideration. As explained in the theoretical section, the two versions of efficiency wage theory have differing implications for (1) the wage at which corruption disappears; and (2) the role for internal and external controls.

The shirking model predicts that corruption will disappear at relatively high levels of wages (except when opportunities are the binding constraint), as long as bribe–levels are sufficiently high and the probability of detection and punishment as well as penalties are sufficiently low. In the fair wage model, the wage at which corruption disappears equals the fair wage, irrespective of the level of the bribe. Identifying the wage at which corruption disappears is likely to be difficult in practice, however, as behavior under the fair wage hypothesis "collapses" to that under the shirking hypothesis *for low relative wages*—the typical situation in developing countries—when bribe levels are low as well. In this case targeted income cannot be achieved, and effort will be low as well.

As to the role of internal and external controls, the theories predict different signs under certain circumstances. In the shirking model, stronger controls imply fewer corrupt acts. In the fair wage model, stronger controls imply more corrupt acts, except again when civil service wages are low, in which case behavior under the fair wage hypothesis may "collapse" to that under the shirking hypothesis (when bribe levels are low as well).

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[41]Using government wages *relative to GDP per person in the labor force* would compound the problem of measurement error, if the level of development is not adequately controlled for in the regressions. This is because wages relative to GDP per person in the labor force tend to be higher in less developed economies (Kraay and Van Rijckeghem, 1995), where GDP per person in the labor force reflects productivity in agriculture and the human capital required in government is scarce. Thus this ratio tends to be very high in Africa where government employees are skilled relative to the average. There is no such correlation for government wages relative to manufacturing wages across the countries in our sample.

The literature on fairness surveyed in Section I suggests that wages may be acting indirectly to strengthen or weaken internal and external controls. Some light can be shed on this possibility by checking the correlation between relative wages and internal and external controls.

A. Basic Results

We find a close negative association between relative civil service wages and corruption across the developing countries in our data–set.[42] Figure 3 shows the scatterplot of relative wages and corruption (for clarity we have redefined the ICRG corruption index, so that an increase in the index indicates worsening corruption). We also find that relative wages are closely related to measures of the quality of the bureaucracy and of the rule of law.

We start by investigating which developmental and institutional indicators, other than relative wages, are to be included in the regressions. Column 1 in Table 1 indicates that GDP per capita exhibits the expected negative relationship with the corruption index in a between regression, but secondary school enrollment does not. GDP per capita does not withstand the introduction of direct measures of external and internal controls—the indexes of law and order, quality of the bureaucracy, and political rights and civil liberties—and of the index of ethnographic fractionalization (column 2). The relative wage, by itself, is a highly significant explanatory variable (the t–statistic is 5, column 3). Column 4 presents the results of a regression where the independent variables consist of the two variables with significant coefficients in column 2 ("law and order" and "quality of the bureaucracy"), supplemented by the relative wage variable. These variables continue to be significant, as does the relative wage, provided two dummy variables (for Korea and Nicaragua) are added to the regressions.

Column 5 (the "full specification") adds the black market premium, as well as a dummy variable for Singapore to test whether this outlier influences the results significantly (Singapore has both very low corruption and very high civil service pay). It also reintroduces GDP per capita, secondary school enrollment rates, "political rights and civil liberties", and "ethnolinguistic fractionalization". The black market premium is not significant in this regression (and it has the "wrong" sign), while the Singapore dummy is insignificant. It also appears from a comparison of columns 2, 4 and 5, that the "quality of the bureaucracy", "political rights and civil liberties" and "ethnographic fractionalization" are not robust to specification and/or sample.[43] This preliminary analysis suggests a parsimonious formulation for the Extreme Bounds Analysis to follow, with only the relative wage, "law and order", and the dummy variable for Korea as fixed regressors (Nicaragua is dropped from the sample

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[42] The sample size varies from 22 to 28 depending on the specification.

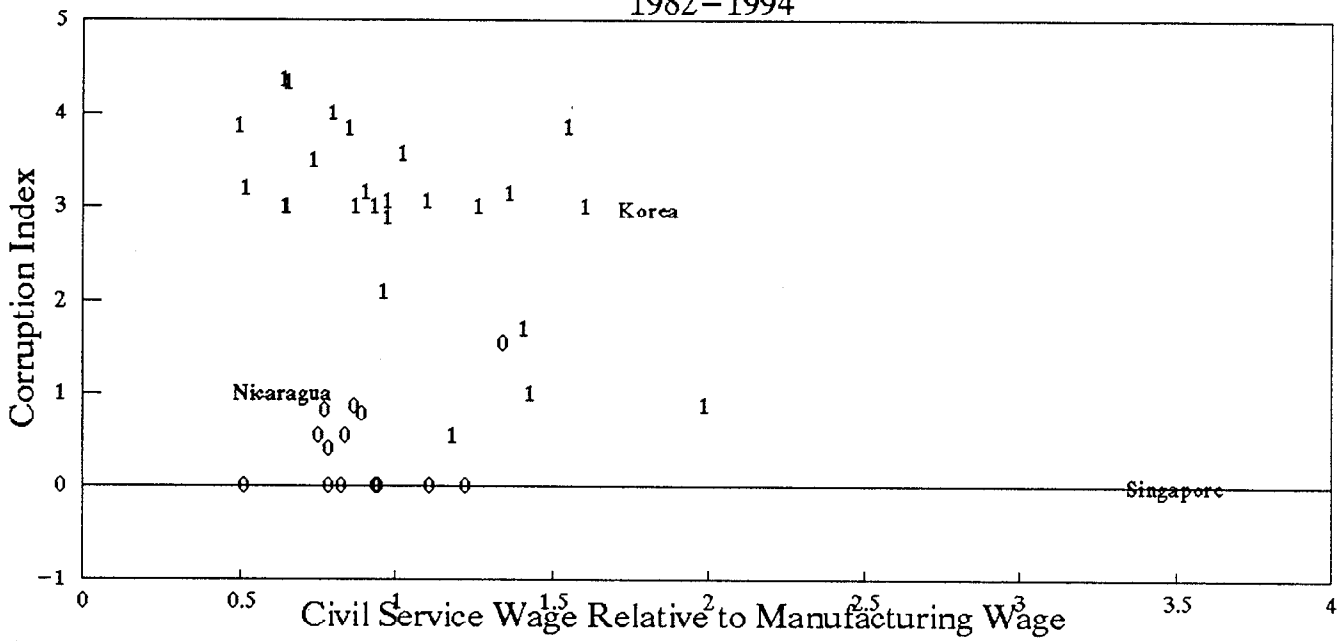
[43]The significance of "political rights" in the existing literature also varies depending on specification (see Ades and Di Tella (1995a) and Ades and Di Tella (1995b)).

Table 1. Determinants of Corruption Index: Regression based on Country Averages 1/

	Development Indicators (1)	Institutional Indicators (2)	Relative Wages (3)	Union (2)–(3) (4)	Full Specification (5)	Excluding City–states (6)
Constant	7.25	4.96	4.12	5.20	7.92	8.16
	3.18	1.54	14.87	18.03	3.15	2.55
Ratio of Civil Service Wage			−1.18	−0.65	−0.81	−0.82
Relative to Manufacturing Wage			−5.16	−5.22	−3.15	−2.64
Log of Real GDP per	−0.57	−0.16			−0.35	−0.38
Capita in Constant US$	−1.61	−0.45			−1.30	−1.06
Secondary School	0.01	0.02			−0.01	−0.01
Enrollment (percent)	0.73	1.58			−1.92	−1.87
Index of		−0.42		−0.40	−0.28	−0.29
Law and order		−2.92		−2.35	−3.23	−3.10
Index of		−0.30		−0.17	−0.19	−0.19
Quality of Bureaucracy		−2.47		−1.16	−2.85	−2.39
Index of Political Rights		−0.02			−0.25	−0.25
and Civil Liberties		−0.13			−1.91	−2.07
Index of Ethnographic		0.01			−0.01	−0.01
Fractionalization		1.51			−0.89	−1.01
Black market					−0.001	−0.001
Premium (percent)					−1.61	−1.07
Korea				1.10	1.81	1.83
Dummy				5.03	8.94	5.38
Nicaragua				−2.58	...	...
Dummy				−15.53	...	...
Singapore					0.50	...
Dummy					0.85	...
Number of Countries	33	32	28	28	22	20
Adjusted R2 3/	0.13	0.53	0.34	0.67	0.80	0.50

1/ T–statistics below estimate.
2/ For countries with 5 or more observations; standard errors white–corrected for heteroscedasticity.
Based on weighted least squares, where weights are a function of the number of bservations (see text).
3/ Based on untransformed data.

Figure 3. Correlation between Relative Civil Service Wages and Corruption 1982–1994



Legend: "0" indicates industrial country; "1" indicates developing country.
Notes: Only countries for which at least 5 observations are available are included.
Developing countries include Bolivia, Botswana, China, Colombia, Costa Rica, Egypt, El Salvador, Ghana, Guatemala, Hong Kong, India, Jordan, Kenya, Korea (South), Mexico, Morocco, Nicaragua, Panama, Peru, Singapore, South Africa, Sri Lanka, Suriname, Thailand, Trinidad and Tobago, Turkey, Uruguay, Zimbabwe.
Industrial countries include Austria, Belgium, Canada, Denmark, Finland, France, Iceland, Ireland, Netherlands, Norway, Spain, Sweden, United Kingdom, and United States.
Industrial countries are not discussed in this paper. Because of a high skill content in manufacturing, relative wages are not comparable to those in developing countries.

because not all variables are available). Finally, column 6 indicates that the results continue to hold when the sample excludes the city–states, Hong Kong and Singapore.

The strong significance of both the relative wage and "law and order" reflect the cross–country correlation in the data only. Turning to the time–series dimension of the data, we find no evidence of a "within" effect (Table 2). Based on this, we would tend to reject the hypothesis that higher pay leads to reduced corruption in the short run, while recalling that the power to reject this hypothesis is very low given the low variance of relative wages within countries. The "quality of the bureaucracy" and the black market premium are significant in the within regressions, though the latter is not economically significant (Table 3).[44]

Table 4 provides information on the simple correlation between our measure of relative wages and the other independent variables included in the regressions. To the extent that there is an important correlation, it is possible relative wages also operate through additional channels to reduce corruption. The correlations with the quality of the bureaucracy and the rule of law are of particular interest. These are quite high (42 and 51 percent respectively, for the full sample), indicating that relative wages could influence corruption through these channels.

B. Sensitivity Analysis

To test the sensitivity of the results to the exclusion of omitted variables, we conducted EBA, that is, we added a number of ("free") regressors (all possible combinations of 5 additional regressors) to our basic specification and evaluated the robustness of the results to inclusion of these variables. EBA itself can be used as a data–mining tool by restricting the set of doubtful ("free") variables (see McAleer et al. (1985) for a critique of this method). We include representatives of each major class of variables discussed in the literature (with the exception of penalties), notably internal and external controls, as well as opportunities.

The results are presented in Table 5. The "fixed" variables consist of relative civil service wages, "law and order", and a dummy variable for Korea. The "free" variables consist of all 25 combinations of GDP per capita, "quality of the bureaucracy", "political rights and civil liberties", the black market premium, and a dummy variable for Singapore. We find that zero lies outside of the "extreme bounds", defined as the lowest value of "the estimate minus two standard deviations" (-1.96) and the highest value of "the estimate plus two standard deviations" (-0.07).

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[44]Other work also finds a relationship for opportunities (measured inter alia by an index of market dominance, an Anti–Trust Laws index, and an index indicating whether public procurement is open to foreign bidders. See Ades and Di Tella (1995)).

Table 2. Determinants of Corruption Index: Within Country Estimation 1/

	All Countries
Constant	. . .
Ratio of Civil Service Wage	−0.02
Relative to Manufacturing Wage	−0.74
Log of Real GDP per	0.04
Capita in Constant US$	0.12
Secondary Enrollment	−0.01
Rate	−1.64
Index of	0.02
Law and order	0.25
Index of	−0.27
Quality of Bureaucracy	−2.98
Index of Political Rights	−0.05
and Civil Liberties	−1.49
Black market	0.0002
Premium (percent)	4.06
Number of Observations	202
Number of Countries	25
Adjusted R2	0.93

1/ T−statistics below estimate.
2/ For countries with 5 or more observations; standard errors are White−corrected for heteroscedasticity.

Table 3. Economic Significance of Results

Variable	Standard Deviation 1/	Coefficient in Full Specification In Between Regression	Effect of One Standard Deviation Change On Corruption Index
Corruption index	1.15	...	...
Ratio of Civil Service Wage Relative to Manufacturing Wage	0.72	−0.81	−0.58
Log of Real GDP per Capita in Constant US$	0.65	−0.35	−0.23
Secondary School Enrollment	19.40	−0.01	−0.21
Index of Enthnolinguistic Fractionalization	27.90	−0.01	−0.20
Index of Law and order	1.26	−0.28	−0.35
Index of Quality of Bureaucracy	1.37	−0.19	−0.26
Index of Political Rights and Civil Liberties	1.34	−0.25	−0.34
Black market Premium (percent) 2/	332.90	0.0002	0.07

1/ Pertains to sample for which all variables are available (168 observations).
2/ Pertains to within regression coefficient.

Table 4. Data Description and Simple Correlations

Variable	Intersection				Full Sample			
	Mean	Standard Deviation	Simple Correlation with Corruption	Simple Correlation with Relative Wages	Mean	Standard Deviation	Simple Correlation with Corruption	Simple Correlation with Relative Wages
	Number of observations below estimate							
Corruption index	3.08	1.15	1		2.93	1.13	1	
	168	168	168		430	430	430	
Ratio of Civil Service Wage Relative to Manufacturing Wage	1.10	0.72	−0.52	1	1.16	0.69	−0.46	1
	168	168	168	168	395	395	253	395
Log of Real GDP per Capita in Constant US$	7.81	0.65	−0.51	0.40	7.69	0.76	−0.33	0.47
	168	168	168	168	783	783	335	362
Secondary School Enrollment	50.05	19.43	−0.19	0.21	42.79	21.53	−0.14	0.24
	168	168	168	168	604	604	300	321
Index of Enthnolinguistic Fractionalization	37.42	27.95	0.20	−0.19	43.84	29.04	0.18	−0.19
	168	168	168	168	814	814	412	359
Index of Law and order	2.81	1.26	−0.63	0.37	2.80	1.28	−0.58	0.42
	168	168	168	168	440	440	433	259
Index of Quality of Bureaucracy	2.34	1.37	−0.75	0.41	2.66	1.30	−0.56	0.51
	168	168	168	168	440	440	433	259
Index of Political Rights and Civil Liberties	3.76	1.34	0.35	−0.04	4.20	1.62	0.07	−0.05
	168	168	168	168	903	903	433	395
Black market Premium (percent)	60.00	332.90	0.12	−0.06	161.53	1908.1	−0.09	−0.10
	168	168	168	168	714	714	339	358

Note: Countries included are those for which all data are available in the full specification.

Table 5. Determinants of Corruption Index: Extreme Bounds Analysis 1/

	Basic Specification (1)	Extreme Bounds Analysis Lower Bound 3/ (2)	Upper Bound 4/ (3)
Fixed variables			
Constant	5.28	5.60	7.74
	19.62	16.24	4.77
Ratio of Civil Service Wage	−0.76	−1.05	−0.94
Relative to Manufacturing Wage	−4.27	−2.30	−2.16
Index of	−0.53	−0.55	−0.56
Law and order	−5.23	−4.78	−5.42
Korea	1.85	2.14	2.20
Dummy	11.14	4.92	5.31
Free variables			
Log of Real GDP per			−0.28
Capita in Constant US$			−1.31
Index of Quality of Bureaucracy			
Index of Political Rights and Civil Liberties			
Black market			−0.0004
Premium (percent)			−0.29
Singapore		0.94	1.01
Dummy		0.88	1.02
Number of Countries	25	25	25
Adjusted R2 3/	0.73	0.74	0.73

1/ Based on Cross–country averages. T–statistics below estimate.
2/ For countries with 5 or more observations; standard errors white–corrected for heteroscedasticity. Based on weighted least squares, where weights are a function of the number of bservations (see text).
3/ Based on untransformed data.
4/ Based on lowest value of estimate minus two standard deviations.
5/ Based on highest value of estimate plus two standard deviations.

From Tables 1 and 3, we find that the estimate for the coefficient on the relative wage ranges from -0.65 (equation 4 in Table 2) to -1.05 (equation 2 in Table 3), in equations which control for other factors.

How are these results then to be interpreted? The estimated regression equations can be used to calculate the relative wage at which corruption disappears (Table 6). This value ranges from 2.8 to 7.4, values which are difficult to reconcile with the conceivable level of fair wages (maximum 2–3). It is however important to recall that few countries had civil service wages in the range of 2–3 so that the hypothesis that corruption is zero for that wage range cannot be tested directly; the results rely instead on extrapolation of a linear relationship estimated for low relative wages.[45] And as shown in Section II, behavior under the fair wage hypothesis will "collapse" to that under the shirking hypotheses when wages are low if bribe levels are also low and/or the probability of detection and penalties are high.

Not much can be concluded on the shirking hypothesis, unless one is willing to make a judgment that bribe levels are high (or probabilities of detection and penalties low) in civil services in developing countries generally. In that case, the coefficients spanning the range 2.8–7.4 may be considered as low compared to what the shirking hypothesis would predict. The finding of a negative coefficient (which is statistically and economically significant) on "law and order" is inconsistent with the fair wage hypothesis in a high–bribe (or low probability of detection and penalties) environment, but consistent with both the shirking hypothesis and the fair wage hypothesis in a low–bribe environment, if civil service wages are low, which is the case for most of the countries in our sample.

It therefore doesn't appear possible to differentiate empirically between the two efficiency wage hypotheses with any degree of certainty. It is reasonably clear that there is an economically meaningful negative relationship between relative wages and corruption, however. The results imply that an increase in civil service pay from 100 to 200 percent of the manufacturing wage, is associated with an improvement in the corruption index on the order of about 0.7 to 1 point of the index (excluding indirect effects through variables such as the quality of the bureaucracy and rule of law). Finally, the simple correlation between relative wages and the quality of the bureaucracy and rule of law indeces suggests that large indirect effects could be present.

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[45]Few countries have relative wages at or above 1.7. Hong Kong and Singapore, with relative wages of 1.8 and 3.5, exhibit very little corruption. El Salvador and Korea, with relative wages of 1.7 and 1.9, exhibit relatively high corruption.

Table 6. Actual Wages and Wages to Ensure No Corruption

Country	Actual Relative Wage	Relative Wage without Corruption 1/
Turkey	0.92	5.38
Bolivia	0.61	6.95
Colombia	0.64	4.87
Costa Rica	1.40	2.81
El Salvador	1.74	7.37
Guatemala	0.76	6.39
Mexico	0.50	5.04
Panama	0.85	6.22
Peru	0.79	5.01
Uruguay	0.92	5.15
Jordan	1.24	5.47
Egypt	0.49	6.51
Sri Lanka	0.85	5.07
Hong Kong	1.79	2.85
India	1.09	5.40
Korea	1.91	7.08
Singapore	3.49	3.49
Botswana	1.29	3.96
Ghana	0.63	6.77
Kenya	0.90	5.36
Morocco	1.01	6.04
Zimbabwe	0.97	5.13

1/ Relative wage which ensures lowest score on corruption index. Excludes indirect effect of wages on other independent variables. Based on full specification.

VI. Policy Implications and Directions for Future Research

The model developed in this paper, which introduces various mechanisms through which concepts of fairness can impact corruption, suggests that the relationship between civil service wages and corruption may be stronger, and wages at which no corruption occurs lower, than predicted by models postulating self–interested behavior (i.e. shirking models), especially when bribe levels are high. This result has obvious implications for optimal wage policy, whether the government's goal is to maximize social welfare or cost–effectiveness. If the "fair wage–corruption" hypothesis holds, paying wages which ensure low corruption may not necessarily be very costly (though this would depend on civil servants' standards of fairness), and paying wages which ensure an honest civil service may be cost–effective.

While the "fair wage–corruption" hypothesis could not be fully tested—this requires micro–level data pertaining to environments with high levels of bribes and/or low probabilities of detection—the paper does provide some empirical evidence on a negative relationship between corruption and civil service wages across countries, though not within countries over time. The "between" regressions for a sample of 25 developing countries indicate that increasing relative pay from 1 to 2, is associated with an improvement in the corruption index on the order of 1 point of the index. To the extent that civil service wages have an indirect effect on corruption, say by improving the quality of the judiciary or society's policing action, the effects would be larger.

The paper presents some weak evidence against the fair wage hypothesis and in favor of the shirking hypothesis. Linear extrapolation indicates that quasi-eradication of corruption requires a relative wage of 3-7 times the manufacturing wage. This magnitude is not consistent with the "fair wage-corruption" hypothesis, unless civil servants have inflated opinions of their worth. It is consistent with the shirking hypothesis, provided bribe levels are low and/or probabilities of detection are high. At the same time, the paper finds evidence that stronger internal and external controls are associated with lower corruption across countries. This finding is not consistent with the fair wage hypothesis, which predicts a positive relationship between the probability of detection and corruption. These results are not conclusive, however, as behavior which appears to be consistent with the shirking hypothesis need not rule out the fair wage hypothesis, since the two efficiency wage hypotheses are observationally equivalent for low bribe levels and/or high probabilities of detection and penalties *when relative wages are low*, as is indeed the case in most countries.

Some caution is needed in drawing policy implications or carrying out cost–benefit analysis based on the estimated relationship between corruption and relative pay. First, the absence of confirmation of a relationship based on within estimates could mean the cross–country results reflect a spurious correlation notwithstanding our attempts to control

for other factors.[46] Second, the cross-country correlation need not reflect a causal link from government wages to corruption. The fact that corrupt countries tend to have poor budgetary performance and face strong budgetary pressures, or may subscribe to the view that civil servants already earn sufficient income from corruption, may lead them to pay less well. We believe that, these caveats notwithstanding, our results support the presumption that an active wage policy can help in fighting corruption. This is not to say that other instruments are not important. Indeed the results of the paper suggest that strengthening the rule of law and reducing distortions will also have beneficial effects on corruption.

Further research could provide more definitive guidance to wage policy. A sizeable number of countries have carried out pay reforms in their public administrations, notably in their revenue administrations. This provides a fertile ground for testing for the presence of an effect of pay on corruption over time and for carrying out a cost-benefit analysis of pay reform (corruption can be proxied by government revenues, adjusted for changes in potential revenues reflecting tax rate or tax base changes; other changes in the policy environment, such as improved auditing, may be more difficult to control for). Narrowing the field of study to areas where wage increases clearly reflect a policy decision circumvents the problem of simultaneity bias referred to above.

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[46]As explained in Section IV, the fact that the within estimates are not significant could also reflect a lack of power to reject the null or the omission of dynamics (reducing corruption through wage-policy is likely to require a consistent policy of high pay rather than one-time pay increases).

WAGE DATA

The relative wage concept used in the empirical work is that of **government wages relative to manufacturing wages**. The manufacturing sector has the advantage of being relatively comparable across countries in terms of skill content (GDP per capita would not be).[47] The skill-content in the manufacturing sector is probably lower than that in government, so that it should not be considered as a measure of alternatives available to government employees. The aim is simply to have a consistent benchmark.

The wage data cover 28 developing countries over the period 1982-94, gathered from REDs, statistical yearbooks, and central bank bulletins. Care was taken to ensure that only data of relatively high quality was included. For some countries, the government wage bill was divided by government employment to obtain the average wage, but only if there was a clear indication that the numerator and denominator had the same coverage (i.e. both included or excluded military personnel, casual employees, personnel in semi-autonomous bodies, such as universities and hospitals, whose wage expenditures are often financed through transfers from the central government rather than recorded directly as government wages in the budget). Data sources and definitions are given in Table A1.

The data must nevertheless be interpreted with care as the definitions for government wages are not always comparable across countries. They differ in the types of employees covered (from the broadest concept, including military, education and health, local government, autonomous institutions, and casual employees to the narrowest concept covering only cadres in the core civil service) as well as with respect to inclusion of in-kind benefits (housing, cars, etc.) and allowances. The scope of government also varies across countries and time (for example, after privatization of services formally provided by general government), causing further problems for comparisons. Better data are unfortunately not available, in the absence of a well–designed surveys which gather information on pay by occupation.

Similar problems of comparability mar the **manufacturing data**, which sometimes refer only to salaried employees, or only to workers, rather than to all employees. In some cases the manufacturing data refer to the wage rate rather than earnings. Sources and definitions for the countries in the sample are given in Table A2 below. Adjustments were made (for 5 countries) to the data using the relationship of 1:2 between wages for workers and salaried employees, as observed in countries where information on both was available, and assuming (again based on the data) that average manufacturing earnings are 50 percent above earnings for workers. When data referred to wage rates rather than earnings (this was the case

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[47]Homogeneity in terms of ownership structure (private or public) is not important for our purposes.

in one country), an upward adjustment of 50 percent was also made (based on the pattern in available data). The type of adjustment made is explained under "remarks" in Table A2.

It should be noted that in many cases problems of comparability are mitigated by the use of similar coverage for manufacturing data as for civil service data (e.g. both include in-kind benefits).

Table A1. Annual Wages in Central or General Government: Sources and Remarks

Country	Source	Remarks
Bolivia	GFS and RED	Central government wage bill divided by central government employment; employment includes decentralized institutions and autonomous entities.
Botswana	Economic Bulletin	Citizens
China	China Statistical Yearbook	Average of rate in education and government agencies for staff and workers in state-owned units; average annual wage; including in-kind benefits
Colombia	Boletin de Estadistica, DANE No. 468 (March 1992)	Employees under general compensation regime
Costa Rica	RED	Refers to June of each year
Egypt	Employment and Structural Adjustment in Egypt; RED from 1991 onwards	
El Salvador	RED	
Ghana	Quarterly Digest of Statistics	Community, social and personal services under public ownership
Guatemala	Boletin Estadistico	Wagebill divided by employment from social security records; refers to public administration and other services

Hong Kong	Hong Kong Annual Digest of Statistics	Wagebill divided by adjusted employment (removed Housing and Urban Authorities, and Hospital authority from 1992 (break))
India	RED	Central government wagebill divided by central government employment
Jordan	WP PER 1990; IMF desk economist for 1991-94	1991-94: based on wagebill divided by employment
Kenya	RED	
Korea (South)	Economic Statistics Yearbook	General government wagebill divided by general government employment
Mexico	RED, OECD Stars database	General government wagebill divided by general government employment
Morocco	World Bank memo	
Nicaragua	Indicadores Economicos	
Panama	Estadistica Panamena. Situation Social, Estadisticas del Trabajo	
Peru	RED	
Singapore	GFS	Central government wagebill divided by central government employment; wagebill includes social security payments

South Africa	Bulletin of Statistics	June employment and annual wagebill; includes casual employees; includes part-time workers; excludes social security contributions (except from 1991); excludes Post and Telecommunications; excludes universities
Sri Lanka	RED and GFS	Extrapolating from 1979 wage level; using central government wagebill adjusted upwards by 32 percent on account of excluded education employees
Suriname	RED for percent change; Central Bank Bulletin for initial levels	
Thailand	GFS and Statistical Yearbook	General government wagebill divided by employment (including teachers but excluding defense); Includes travel expenses
Trinidad & Tobago	Quarterly Economic Report; from '87: Labor Force Report	May; non-manual workers
Uruguay	Anuario Estadistico	General government wagebill including defense, divided by general government employment including defense
Turkey	Statistical Yearbook and RED	Based on daily or monthly (RED) wage
Zimbabwe	RED	Annual average

Table A2. Annual Wages in Manufacturing: Sources and Remarks

Country	Source	Remarks
Bolivia	ILO	Wage rate; adjusted upward by 50 percent
Botswana	ILO	
China	China Statistical Yearbook	Average annual wage; total remuneration, including in-kind benefits
Colombia	Colobia Estadistica and Revista del Banco de la Republica	Based on daily wage; assumes 240 paid days per year
Costa Rica	RED	Based on June of each year
Egypt	ILO	Wage earners; adjusted upward by 50 percent
El Salvador	RED	
Ghana	ILO	
Guatemala	ILO	Wagebill divided by employment (both refer to social security records)
Hong Kong	Hong Kong Annual Digest of Statistics	
India	ILO	Wage earners; adjusted upward by 50 percent
Jordan	ILO	Based on October each year, excluding overtime payments; assumes 300 paid days
Kenya	RED	Includes in-kind benefits
Korea (South)	ILO, Economic Statistics Yearbook	Includes family allowances, overtime payments, and bonuses

Mexico	ILO	Wage earners; adjusted upward by 50 percent
Morocco	Industrial Labor Force Survey	Includes temporary employees
Nicaragua	Indicadores economicos	covered by social security records
Panama	ILO	
Peru	ILO	Based on June each year; Salaried employees; adjusted downward by 33 percent
Singapore	ILO	
South Africa	Bulletin of Statistics	June employment and annual wagebill; includes casual employees
Sri Lanka	ILO	Wage earners; adjusted upward by 50 percent; assumes 300 paid days per year
Suriname	RED	Industry labor cost per worker
Thailand	RED	Average for Kingdom
Trinidad and Tobago	Labor Force Report	Other manufacturing
Turkey	ILO	Based on September data; assumes 300 paid days per year
Uruguay	ILO for percent changes Schiavo-Campo et.al. for 1993 level	
Zimbabwe	ILO	Includes in-kind benefits

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