



## Volume 33, Issue 4

### Does a Salary Hike Reduce Corruption?

Vivekananda Mukherjee

*Department of Economics, Jadavpur University*

Siddhartha Mitra

*Department of Economics, Jadavpur University*

#### Abstract

Since the empirical evidence about the relation between higher salary and corruption in a bureaucracy is ambiguous, the paper theoretically explores the relation between the two. It constructs a model where at the initial equilibrium both the honest and corrupt bureaucrats coexist and shows that the effect of a salary hike crucially depends on the preference pattern of the bureaucrats. The results underline the importance of including the fixed effects in any empirical analysis studying the relation between the two variables.

---

The paper has benefited from helpful comments by Marc Dubois. The usual disclaimer applies.

**Citation:** Vivekananda Mukherjee and Siddhartha Mitra, (2013) "Does a Salary Hike Reduce Corruption?", *Economics Bulletin*, Vol. 33 No. 4 pp. 2540-2544.

**Contact:** Vivekananda Mukherjee - mukherjeevivek@hotmail.com, Siddhartha Mitra - mitsid@yahoo.com.

**Submitted:** June 27, 2013. **Published:** October 04, 2013.

## 1. Introduction

A widely received wisdom in the literature on corruption is that an increase in salary of bureaucrats tends to reduce their incentive to be corrupt. Myrdal (1968) identified low salary of the government officials as one of the factors explaining the high corruption level in the post-colonial Asian economies. Becker and Stigler (1974) suggested design of an efficiency wage mechanism for garnering honesty among the corrupt officials.

Svensson (2005) surveyed the corruption literature and reported that in cross country data the relation between high per capita income and low corruption is quite robust. Now the causality in such a relation can go in either direction. Poor institutions when they persist, lead to low growth and come to be associated with low levels of per capita income<sup>1</sup>. The important question here is whether growth of income, however, slow or small, has an impact on corruption and through it on the pace of income growth in the future. For example, if growth of income tends to enhance corruption then in future growth will be even lower and it would be difficult to dislodge the country from a low level equilibrium of low per capita income and high corruption. If income growth, howsoever small, as hoped in the literature cited above tends to produce tendencies that reduce corruption then with income growth any low level equilibrium of low per capita income and high corruption would only be a transitory one.

Contrary to the work of Svensson cited above some empirical works cast doubt on the result that corruption decreases with an increase in salary. Easterly (1999) used panel data covering four time points (1960, 1970, 1980, 1990) to separate out country-specific effects in deducing the pure impact of per capita income on corruption and found the impact to be positive. Given the mixed evidence, the present paper explores the theoretical relationship between the two and argues that in an economy where everyone is not corrupt at the initial equilibrium the effect of a salary hike on corruption frequency can be largely guided by the preference pattern held by the bureaucrats. If goods are complements to each other then an increase in consumption of various goods induced by a rise in salary results possibly in an increase in marginal utility of income and thus rising corruption. If goods are strong substitutes then rising income will lead to its marginal utility falling and corruption decreasing.

The next section presents the model. The modelling is close to Bakshi, Bose and Pandey (2009) and Mitra (2012). The section following concludes.

## 2. The Model

We consider the preference pattern of bureaucrat  $i$  is represented by the utility function:

$$U_i = u(x_1, \dots, x_k, \dots, x_K) - D_i c_i \quad (1)$$

where  $x_k$  is the consumption of the  $k$  th commodity for all  $k = 1, \dots, K$ . The variable  $D_i = 1$  if the  $i$ th individual is corrupt and  $D_i = 0$  if she is honest. The moral cost of the bureaucrat for being corrupt is given by  $c_i$  which is her private information. However it is known that  $c_i$  is uniformly distributed in the interval  $[a > 0, b > 0]$ . We assume the preference pattern is increasing and strictly concave with  $\frac{\partial u}{\partial x_k} > 0$  and  $\frac{\partial^2 u}{\partial x_k^2} < 0$ . The income of bureaucrat is given

by  $m$  defined as:

$$\begin{aligned} m &= S + B \quad \text{if } D_i = 1 \\ &= S \quad \quad \text{if } D_i = 0 \end{aligned} \quad (2)$$

---

<sup>1</sup> Mauro (1995).

where  $S$  is the salary of the bureaucrat and  $B$  is the bribe she can receive by being corrupt. If  $p_k > 0$  is the price of the  $k$ th commodity prevailing at the market, the bureaucrat's budget set can be written as:

$$\sum_{k=1}^K p_k x_k \leq m$$

where  $m$  is given by (2). The bureaucrat maximizes her utility subject to her budget constraint. We assume an interior solution  $x^* = (x_1^*, \dots, x_k^*, \dots, x_K^*)$  exists to the bureaucrat's problem. Her indirect utility function is written as:

$$v_i(S + B) = u(x^*(S + B)) - c_i \quad \text{if } D_i = 1 \quad (3)$$

and

$$v_i(S) = u(x^*(S)) \quad \text{if } D_i = 0. \quad (4)$$

The marginal utility of income is given by:

$$\lambda^* = \frac{\partial v_i(m)}{\partial m} = \frac{1}{p_k} \frac{\partial u(x^*)}{\partial x_k} > 0. \quad (5)$$

We assume in this model that a change in bureaucrats' income either fails to influence the market prices or even if there is a change, the prices change proportionately. This is the reason we suppress the price vector in writing equations (3) and (4). We also assume all the commodities are normal commodities<sup>2</sup>. Therefore,  $\frac{\partial x_k^*}{\partial m} > 0$  for all  $k = 1, \dots, K$ .

Note bureaucrat  $i$  decides to be corrupt if and only if the inequality:

$$v_i(S + B) > v_i(S) \quad (6)$$

is satisfied. Substituting values from equations (3) and (4), we can use inequality (6) to derive the following condition for the  $i$ th bureaucrat to be corrupt:

$$c_i < \bar{c} \quad \text{where } \bar{c} = u(x^*(S + B)) - u(x^*(S)). \quad (7)$$

Note since  $\lambda^*$  is positive (from (5)),  $\bar{c} > 0$ .

At the initial equilibrium we assume  $a < \bar{c} < b$  so that while all the bureaucrats having their  $c_i$  lying in the range  $[a, \bar{c})$  choose to be corrupt, all the bureaucrats having their  $c_i$  lying in the range  $[\bar{c}, b]$  choose to be honest.

Now we ask the question: what happens to the corruption frequency if salary ( $S$ ) of the bureaucrats is increased? Note whether corruption rises or falls with the rise in salary entirely depends on the sign of  $\frac{\partial \bar{c}}{\partial S}$ . While if  $\frac{\partial \bar{c}}{\partial S} > 0$ , corruption rises with salary hike; it remains unchanged if  $\frac{\partial \bar{c}}{\partial S} = 0$  and it falls if  $\frac{\partial \bar{c}}{\partial S} < 0$ . Proposition 1 below derives the conditions under which a particular sign of  $\frac{\partial \bar{c}}{\partial S}$  is observed.

**Lemma 1:**  $\frac{\partial \bar{c}}{\partial S} > 0$  if and only if  $\frac{\partial \lambda^*}{\partial m} > 0$ ;  $\frac{\partial \bar{c}}{\partial S} = 0$  if and only if  $\frac{\partial \lambda^*}{\partial m} = 0$  and  $\frac{\partial \bar{c}}{\partial S} < 0$  if and only

<sup>2</sup> In the consumption basket of a consumer all the commodities cannot be inferior at the same time. The normality of the commodities is not a restrictive assumption as products can be suitably defined so that all of these are normal. For example, even if some varieties of food grains are inferior they can be clubbed together with other non-inferior food grains under the label of 'foodgrains' which can then be classified as a normal product.

if  $\frac{\partial \lambda^*}{\partial m} < 0$ .

**Proof:** Differentiating  $\bar{c}$  with respect to  $S$  and using the definition of  $\lambda^*$  from equation (5) we obtain:

$$\frac{\partial \bar{c}}{\partial S} = \lambda^*(S + B) - \lambda^*(S)$$

and the statement of the lemma follows.  $\square$

**Lemma 2:** For all  $k, l = 1, \dots, K; k \neq l$

- (i)  $\frac{\partial \lambda^*}{\partial m} < 0$  if  $\frac{\partial^2 u}{\partial x_l \partial x_k} \leq 0$ ;
- (ii) if  $\frac{\partial^2 u}{\partial x_l \partial x_k} > 0$ ,
  - a.  $\frac{\partial \lambda^*}{\partial m} > 0$  if and only if  $\sum_{l=1}^K \frac{\partial^2 u}{\partial x_l \partial x_k} \frac{\partial x_l^*}{\partial m} > -\frac{\partial^2 u}{\partial x_k^2} \frac{\partial x_k^*}{\partial m}$ ,
  - b.  $\frac{\partial \lambda^*}{\partial m} = 0$  if and only if  $\sum_{l=1}^K \frac{\partial^2 u}{\partial x_l \partial x_k} \frac{\partial x_l^*}{\partial m} = -\frac{\partial^2 u}{\partial x_k^2} \frac{\partial x_k^*}{\partial m}$ ,
  - c.  $\frac{\partial \lambda^*}{\partial m} < 0$  if and only if  $\sum_{l=1}^K \frac{\partial^2 u}{\partial x_l \partial x_k} \frac{\partial x_l^*}{\partial m} < -\frac{\partial^2 u}{\partial x_k^2} \frac{\partial x_k^*}{\partial m}$ .

**Proof:** From (5) differentiating  $\lambda^*$  with respect to  $m$  we obtain:

$$\frac{\partial \lambda^*}{\partial m} = \frac{1}{p_k} \left[ \frac{\partial^2 u}{\partial x_k^2} \frac{\partial x_k^*}{\partial m} + \sum_{l \neq k} \frac{\partial^2 u}{\partial x_l \partial x_k} \frac{\partial x_l^*}{\partial m} \right]. \quad (8)$$

Since  $p_k > 0$ ,  $\frac{\partial^2 u}{\partial x_k^2} < 0$  and  $\frac{\partial x_k^*}{\partial m} > 0$  for all  $k = 1, \dots, K$  the statement of the lemma follows from (8).  $\square$

So we propose the following:

**Proposition 1:** (i) The corruption falls with the salary hike if  $\frac{\partial^2 u}{\partial x_l \partial x_k} \leq 0$ .

(ii) If  $\frac{\partial^2 u}{\partial x_l \partial x_k} > 0$ ,

- a. The corruption falls with the salary hike if and only if  $\sum_{l=1}^K \frac{\partial^2 u}{\partial x_l \partial x_k} \frac{\partial x_l^*}{\partial m} < -\frac{\partial^2 u}{\partial x_k^2} \frac{\partial x_k^*}{\partial m}$ ;
- b. The corruption remains unaffected by the salary hike if and only if  $\sum_{l=1}^K \frac{\partial^2 u}{\partial x_l \partial x_k} \frac{\partial x_l^*}{\partial m} = -\frac{\partial^2 u}{\partial x_k^2} \frac{\partial x_k^*}{\partial m}$ ;
- c. The corruption rises with the salary hike if and only if  $\sum_{l=1}^K \frac{\partial^2 u}{\partial x_l \partial x_k} \frac{\partial x_l^*}{\partial m} > -\frac{\partial^2 u}{\partial x_k^2} \frac{\partial x_k^*}{\partial m}$ .

**Proof:** Since if  $\frac{\partial \bar{c}}{\partial S} > 0$ , corruption rises with salary hike; it remains unchanged if  $\frac{\partial \bar{c}}{\partial S} = 0$  and it falls if  $\frac{\partial \bar{c}}{\partial S} < 0$ , the statement of the proposition follows by implications of lemma 1 and 2.  $\square$

### 3. Conclusions

The paper theoretically explores the relation between higher salary and corruption in a bureaucracy and unlike the monotonic observations found in the existing empirical literature shows that it may crucially depend on fixed factors like the preference pattern of the bureaucrats. The result provides a theoretical support behind the empirical methodology adopted by papers like Easterly (1999) in studying the relation between the two variables.

Driving the results in the paper is our assumption that all goods are normal. This should not be taken as a restrictive assumption. Rather classification of all goods such that they are normal is possible and our analysis rests on such a classification. Our assumption of goods being normal implies that an increase in income will cause the consumption of all commodities to increase. This will have two effects on the marginal utility of a product in equilibrium and therefore on the marginal utility of income: (a) a positive or negative effect due to an increase in consumption of other products depending on whether these goods are complements or substitutes; and (b) a negative effect due to an increase in consumption of the product itself. If (a) is negative then marginal utility of income in equilibrium falls with a rise in income, and thus corruption falls with an increase in salary. If (a) is strongly positive then marginal utility of income rises in equilibrium with an increase in income and thus corruption increases with an increase in salary.

### References

- Baksi, S., P. Bose and M. Pandey (2009) "The Impact of Liberalization on Bureaucratic Corruption" *Journal of Economic Behavior and Organization* **72**, 214 – 224.
- Becker, G. and G. Stigler (1974) "Law Enforcement, Malfeasance and Compensation of Enforcers" *Journal Legal Studies* **3**, 1 – 18.
- Easterly, W. (1999) "Life during Growth" *Journal of Economic Growth* **4**, 239-275.
- Mauro, P. (1995) "Corruption and Growth" *Quarterly Journal of Economics* **110**, 681 – 712.
- Mitra, S. (2012) "Corruption Re-examined" *Trade and Development Review* **5**, 52 – 63.
- Myrdal, G. (1968) *Asian Drama: An Inquiry into the Poverty of Nations*, Allen Lane the Penguin Press: London.
- Svensson, J. (2005) "Eight Questions about Corruption" *Journal of Economic Perspective* **19**, 19 – 42.