International Differences in the Level of Relative CEO Compensation

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Abstract

Relative CEO compensation, as measured by the ratio of average CEO compensation to the average wage in a country shows great variation across countries. By 2004, this ratio varied from anywhere between 10 (Netherlands) and 246 (Mexico). While it is impossible to account for such variation through a traditional Hecksher-Ohlin model by itself, incorporating the differences in the levels of corporate governance in these countries provide a clearer understanding. This paper provides a theoretical model that builds on the Lucas (1978) model of firm-size distribution. It proposes three main underlying forces behind the observed variation in this ratio: (i) Scale (Size) Effect; (ii) Relative Endowment Effect (Capital Labor Ratio of the country) and (iii) Rent Seeking Effect (inversely related to the level of Corporate Governance). The main conclusions are: (a) The bigger the scale of operation; the greater the ratio of CEO pay to that of average wage; (b)

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Improvement in the level of corporate governance reduces this ratio; (c) Greater dispersion in firm ownership lowers relative CEO compensation and (d) A higher capital-labor ratio increases this ratio. A panel data set is constructed using data on 27 countries for 15 years and an error components model is estimated. The results confirm the testable implications of the model.

1 Introduction

Labor earnings data in most countries suggest a significant right skew which has become even more prominent over time. Several papers have studied the evolving growth of skill premium across countries. In one of these attempts to explain the premium, Leamer (1996) put forward the Heckscher-Ohlin argument suggesting that wages of unskilled workers went down due to a decline in the price of labor-intensive tradables. By the same argument if the price of skill-intensive good increases, then skill premium would rise. However, this argument fails to provide a complete explanation of facts since the prices of skill intensive goods have not increased significantly in real terms. Some others have tried to explain the increasing skill premium through human capital formation (e.g. Zanden, 2006) while some others have claimed that introduction of new goods can provide valid explanations for this trend (e.g. Xiang, 2006).

A parallel issue that receives much attention is the increase in CEO compensation, not just in the United States but in most other countries across the world. Several authors have documented their opinion that the CEO's are overpaid, especially in U.S.A. This notion was vehemently emphasized in the book by Graef Crystal (1991), where he mentions that this overpayment is further reinforced due to long-run incentives in the form of stock options. Jensen and Murphy (1990) suggested that any debate over CEO compensation can be misguided given the nature of payment, since the total compensation depends

significantly on the performance of the firm. Moreover this nature of dependence would vary widely across countries depending on the specifics of the compensation contract. However, what is more intriguing is how the position of the these executives in any given country evolved over time compared to any average wage earner in that country, and what kind of variation can be observed across countries. Data suggest a great deal of variability in this ratio of average income of the CEO in a country to that of the average wage in that country, with a pronounced trend to move upwards over time taking values anywhere within the range of 10 and 246 by 2004. This ratio is far greater in magnitude than the regular skill premium and hence more challenging to explain.

Abowd and Bognano (1995) documented a cross country comparison of the level and composition of executive compensation and traced its variation over time from 1984 to 1992. They concluded that for comparable sized companies, the income of any CEO in the U.S. is significantly more than that of the other OECD countries, without broaching the issue whether it is justified. In a later work Abowd and Kaplan (1999) studied the differences between the U.S. CEO compensation policies and that of the other OECD countries. They concluded that empirical research fails to explain much about the structure of the optimal contract. According to Jensen and Murphy (1990), overpayment of CEO's is a problem secondary to the real problem of "how" the CEO's are paid in the U.S. Their analysis used data on over two thousand CEO's from 1974 to 1988 documenting information on salaries, bonuses, stock options and stock ownerships, revealing that the compensation of top executives had very little dependence on performance. However, using a completely different approach, Aggarwal and Samwick (1999) confirmed that in the United States, CEO's pay-performance sensitivity decreases with increase in the variance of the firm's performance. Although their finding somewhat reinforces the principal-agent model of executive-compensation, it does not address the issue of the observed changes over time.

Among other arguments related to CEO compensation, Murphy and Zábojník (2004) focus on the rising trend in the pay levels of the CEO's in the U.S. and the increase in CEO appointments through external hiring and not so much through internal promotion. Their model explains these phenomena through an increase in the relative importance of managerial abilities which can be transferred across firms compared to firm-specific skills. In a competitive market for CEO's, this bids up the value of relatively general abilities as opposed to firm specific abilities. On a different note, several researchers have identified the existence of rent-seeking behavior of managers as the main reason of the observed compensations, instead of optimal incentives through contracts (examples are Blanchard, Lopez-de-Silanes and Shleifer, 1994, and Bertrand and Mullainathan, 2001). In the context of the pay setting behavior of the executives, Schwab and Thomas (2005) studied the nature of 375 corporate contracts of CEO's and concluded that they have significant bargaining power while negotiating the terms of their employment contract.

Bebchuk et. al. (2002) and Bebchuk and Fried (2003) had similar conclusions claiming that managerial power had substantial effect on the design of the executive compensation in the presence of separation of ownership and control. Hence the level of corporate governance within companies will have a significant role in controlling this rent-seeking activity. In another paper, Leuz, Nanda and Wysocki (2003) conducted an international comparison of earnings in management across 31 countries. They concluded that managerial income was lower for economies with relatively dispersed ownership, strong investor protection, and large stock markets. This provides more evidence in favor of the rent-seeking behavior of management in the presence of weak corporate governance.

This chapter puts forward an entrepreneurial model of rent-seeking which explains the observed pattern of movement of average CEO compensation relative to average wage.[1] The value of relative CEO compensation is much more significant compared

[1]Median wages would have been preferable since they are more robust to truncation but this data is

to the typical skill premium. Given that the capital-labor ratio in any country fails to explain the skill premium satisfactorily, it is only natural that it will be inadequate for explaining the trends in relative CEO compensation. In this model, the channels through which this ratio is affected are the scale of operation of the firm, the size of the country, the relative capital abundance of the country, the level of corporate governance in the country and the extent of dispersion of cash-flow ownership. The basic structure is developed in Lucas (1978) model with the additional features of corporate governance and concentration of ownership by the entrepreneur. The following section describes the model and Section 2.3 derives the testable implications. Data and the results confirming the testable implications are discussed in Section 2.4 and Section 2.5 concludes this chapter.

2 The Model

This model considers an economy with a fixed endowment of homogenous capital, K and a labor force of size L. There is only one sector producing a homogenous good. Let the production technology $f(n, k)$, follow a CRS production function in labor and capital,

$$f(n, k) = k^{\alpha} n^{1-\alpha}.$$

Here n and k are the amounts of labor and capital respectively, which a firm uses and where $0 < \alpha < 1$. Each agent has one unit of labor with homogeneous productivity for production and a managerial talent, x. This managerial talent is drawn from a fixed distribution $\Gamma : R^{+} \rightarrow [0, 1]$. This incorporates two aspects: talent and diminishing returns. The *span of control* is defined as the amount of labor and capital which an

not available.

entrepreneur with talent x can manage. If a manager of talent x, manages the resources n and k, then the final output level of the firm will be

$$xg[f(n,k)] = xA\left[k^{\alpha}n^{1-\alpha}\right]^{\beta},$$

where $0 < \beta < 1$. Here g is increasing and strictly concave and hence shows decreasing returns to managerial talent. It assures that in equilibrium there is more than one manager, and it is not efficient for the most talented manager to employ the entire capital and labor endowment of the country. Moreover the firm's output is an increasing function of the entrepreneurial skill level of the CEO.

Now, since $f(\cdot)$ is homogeneous of degree one it can be expressed as:

$$f(n,k) = n\phi(h) = nh^{\alpha},$$

where $h \equiv \frac{k}{n}$. In an efficient equilibrium, only the agents with a higher level of managerial skill will become entrepreneurs. Suppose that the ownership is exogenously fixed in the economy, ie., by becoming a manager, the entrepreneur will have the right to a fraction θ of the cash flow of the firm. The rest of the cash flow is uniformly spread out among all the regular wage earners who can be interpreted as minority shareholders. Let z be the cutoff level of the managerial talent such that any agent with $x < z$ is better off being a regular laborer and the ones with $x > z$ become entrepreneurs and manage the labor and capital of their respective firms. Hence for a certain $z > 0$, we have

$$\begin{cases} n(x) = k(x) = 0 & \text{for} \quad x < z \\ \\ n(x), k(x) > 0 & \text{for} \quad x \geq z \end{cases}$$

Hence for a manager with skill level x, the total output of his firm will be given by:

$$xg[f(n(x), k(x))] = xA\left[k(x)^{\alpha} n(x)^{1-\alpha}\right]^{\beta}.$$

Given the total endowment of labor (L) and capital (K) in the country, any efficient allocation needs to satisfy all the resource constraints. The constraint for the workforce requires that the sum of the population absorbed as labor and the agents who choose to be managers cannot exceed L.

$$1 - \Gamma(z) + \int_{z}^{\infty} n(x) d\Gamma(x) \leq 1. \tag{1}$$

Hence total demand for labor has to be equal to total supply of labor. Here $1 - \Gamma(z)$ in the fraction of people who have $x > z$ and they choose to become entrepreneurs. $\int_{z}^{\infty} n(x) d\Gamma(x)$ gives the total percentage of labor demanded by these entrepreneurs. A similar resource constraint for capital can be written where the total amount of capital demanded by the entrepreneurs cannot exceed K. Hence,

$$\int_{z}^{\infty} k(x) d\Gamma(x) \leq \frac{K}{L} = H. \tag{2}$$

The efficient allocation should ideally maximize the total output per capita ($\frac{Y}{L}$) of the economy where,

$$\frac{Y}{L} = \int_{z}^{\infty} xg[f(n(x), k(x))] d\Gamma(x). \tag{3}$$

However maximization of per-capita output will have to be subject to the labor and capital constraints of the economy. If the Lagrange multipliers for the labor constraint and the capital constraint be denoted by w and r respectively, then they can be interpreted as the wage rate and the rental on capital respectively and their values will

depend on K and L. Efficiency entails that factors receive payments equal to their marginal products. Any person with $x < z$ receives a wage rate w. Agents with $x \geq z$ are the entrepreneurs and should ideally be entitled to a θ share of the residual cash flow Π, or remuneration obtained from the firm he is managing. Total profit from a firm can be expressed as:

$$\Pi(x) = xA\left[k^{\alpha}(x)n^{1-\alpha}(x)\right]^{\beta} - wn(x) - rk(x) \tag{4}$$

The amount of capital and labor for the firm is chosen by the entrepreneur, who is in charge of the management of that firm. One should also note that if the manager had the sole ownership to the residual cash flow of the firm then his optimization problem would be to choose labor and capital to maximize (4).

However, this model involves countries with imperfect corporate governance. Let η be the level of corporate governance in the country. It is a measure of the level of transparency within the firms in the economy and the level of investor protection. A higher value of η will imply better level of governance and hence better investor protection. The weaker the level of governance, the higher is the ability of the manager to appropriate resources for personal benefits. Since the manager does not own the entire cash flow, he has an incentive to misrepresent it and obtain a higher share for himself. Let s be the fraction of profit which the manager appropriates. Hence the amount of profit that will actually be reported is $(1-s)\Pi$ (For simplifying the notation, x is dropped from the notation when not required.); In that case the total amount received by the manager will be $s\Pi + \theta(1-s)\Pi$. This consists of the amount he appropriates and his rightful share from the remaining profit. For simplification purpose it is assumed that the remaining unappropriated profit of any firm, i.e. $(1-\theta)(1-s)\Pi$ gets evenly distributed among all agents that chose to be the normal worker, irrespective of their firm of employment. In this way, there is no discrepancy between the total amount received by any individual

who chooses to be the regular wage earner.

However, for the entrepreneur, diverting resources will not be costless since a lot of effort is required to manipulate the system. Let the cost involved of appropriation be given by $C = \frac{\eta}{2}s^2\Pi$, where η is the level of corporate governance and Π is defined by (4). In this cost structure, for a higher level of corporate governance, the cost involved in appropriating resources is higher. Moreover higher amount of resource diversion involves higher cost. Therefore, the final amount he is left with will be what he receives net of this cost. So the total compensation of the entrepreneur EC, is the sum of $s\Pi$ and $(1-s)\theta\Pi$ minus the cost $\frac{\eta}{2}s^2\Pi$. This measure of executive compensation includes the amount of resources appropriated by the entrepreneur. Some might question whether the appropriated amount actually shows up in the reported compensation. Bebchuk and Fried (2003) argued that the executives obtain their rent through influencing the right authorities and bargaining for better compensations packages which actually show up in the reported proxy statements. Hence we consider the expression EC as the correct representation of the entrepreneur's compensation. So the entrepreneur will maximize EC subject to the labor and capital constraints:

$$\max_{s,n(x),k(x)} EC(x) = \max_{s,n(x),k(x)} s\Pi + (1-s)\theta\Pi - \frac{\eta}{2}s^2\Pi$$

$$-w\left[1-\Gamma(z)+\int_z^\infty n(x)d\Gamma - 1\right] - r\left[\int_z^\infty k(x)d\Gamma(x) - H\right]$$

where he simultaneously chooses the amount of labor (n), capital (k), and the fraction of profit (s) he extracts through his influence on the pay-setting authorities.

For any agent with $x \geq z$, this problem can be used to obtain the first order conditions for n, k and s as follows:

$$xA\beta\left[k^{\alpha}n^{1-\alpha}\right]^{\beta-1}k^{\alpha}(1-\alpha)n^{-\alpha}=w \tag{5}$$

$$xA\beta\left[k^{\alpha}n^{1-\alpha}\right]^{\beta-1}\alpha k^{\alpha-1}n^{1-\alpha}=r \tag{6}$$

$$1-\theta-\eta s=0\Rightarrow s^{*}=\frac{1-\theta}{\eta} \tag{7}$$

In this formulation, introducing rent seeking behavior on the part of the entrepreneur does not alter the equilibrium allocation of labor and capital from their efficient levels. Both are employed so that their marginal products are equal to their marginal costs, i.e. wage and rental on capital respectively. Pagano and Volpin (2005) argue that management has a tendency of providing stronger employment protection, since retaining the laborers is useful for entrenching itself within a firm. However, this has implications for the rate of labor turnover in the firm and not so much for scale of employment. Moreover, in several European countries, for example France, the cost associated with firing of any worker is so high that the initial level of employment is not very high with significant unemployment in the economy. So this model has a better intuition than model which argue that entrepreneurs would prefer to choose a higher labor to capital ratio.

Equation (7) yields that the amount of resources diverted from actual profit[2] decreases as the share of the manager in the profit goes up. This means that with highly dispersed ownership, the manager has a smaller share in the profit and hence will try to steal more from non-controlling shareholders. One important thing is that since s is the fraction of profit diverted by the manager, it is always between 0 and 1. In order to maintain that, the model requires the restriction $\eta \geq 1$. Another aspect of this relationship is the dependence of s on the measure of corporate governance, η. The better the governance, the more costly it is for the entrepreneur to divert resources and hence the lower is s.

[2]Profits can be nonzero as the managerial factor is fixed.

The first order conditions for labor and capital can be used to obtain:

$$\frac{k(1-\alpha)}{n\alpha} = \frac{w}{r} \Rightarrow h = \frac{\alpha w}{(1-\alpha)r} \tag{8}$$

What is worth noticing here is thats irrespective of the values of x and θ, in equilibrium the capital labor ratio is equated across all firms, determined by the production technology and the wage rental ratio. So in equilibrium, every manager will employ capital and labor in the same ratio. Utilizing equation (6), one can obtain an expression for equilibrium amounts of labor and capital employed by a manager with skill x, given the wage rate and the return rate on capital.

$$xA\beta[nh^{\alpha}]^{\beta-1}\alpha h^{\alpha-1} = r \tag{9}$$

Further manipulation yields the following expression:

$$n^{*}(w,r,x) = (xA\beta)^{\frac{1}{(1-\beta)}}\alpha^{\frac{\alpha\beta}{1-\beta}}(1-\alpha)^{\frac{1-\alpha\beta}{1-\beta}}w^{\frac{\alpha\beta-1}{1-\beta}}r^{\frac{\alpha\beta}{\beta-1}}$$

This expression shows that the employment of labor goes up with an increase in the level of talent. This means that the more able the management is, the greater is the scale of operation or "span of control". That is, an agent with a higher level of managerial skill will employ more capital and labor than a manager with a lower skill level, other things remaining constant. Moreover, for a given level of talent, employment will fall with an increase in either wage or interest rate.

The next step will be to take a look at the cut off level of talent, z. Intuitively, the marginal entrepreneur should be indifferent between being an entrepreneur and an employee. If the CEO had the right to the entire cash flow and did not have to distribute $(1-\theta)$ share to the non-controlling share holders, then we can solve for his skill level

z from $\Pi(z) = w$. However, he owns the right to only θ fraction of the cash flow. Moreover imperfect governance gives him the opportunity to appropriate resources and the remaining profit gets evenly distributed among all the workers. Given these, an agent with talent z will be indifferent between opting to be a manager or a laborer if:

$$\left[s + (1-s)\theta - \frac{\eta}{2}s^2\right]\Pi(z) = w + (1-s)(1-\theta)\frac{\int_z^\infty \Pi(x)d\Gamma(x)}{\int_z^\infty n(x)d\Gamma(x)}. \tag{10}$$

In this above equation, the left hand side represents the income of the marginal entrepreneur, including his appropriated rent net of the cost of appropriation. The right hand expression captures the income of any agent as a regular worker. The first term is the wage income. The second term captures the share of the residual profit from all the firms which get distributed among all the workers. Using the relation obtained from the first order conditions, i.e. equation (8), the above relation simplifies to:

$$\Pi(z)\left[\theta + \frac{(1-\theta)^2}{2\eta}\right] = w + \left((1-\theta) - \frac{(1-\theta)^2}{\eta}\right)\frac{\int_z^\infty \Pi(x)d\Gamma(x)}{\int_z^\infty n(x)d\Gamma(x)}.$$

Comparing this with a situation where the manager receives the entire profit, one can conclude that equation (10) will predict a higher value for z. The intuition is that being an entrepreneur does not entitle the agent to the entire cash flow Π, but just a fraction of it. Hence only the more talented agents will find it profitable to forgo the wage w and the share of residual cash to become entrepreneurs. Therefore, compared to a situation of complete ownership, in this case fewer agents will opt to be entrepreneurs. In order to obtain the optimal expressions for labor and capital. Equation (2.9) can be rewritten as:

$$n(x, w, r) = \frac{1}{h^\alpha}\left[\frac{r}{xA\beta\alpha h^{(\alpha-1)}}\right]^{\frac{1}{(\beta-1)}}. \tag{11}$$

Since $h = \frac{k}{n}$, the optimal choice of capital is:

$$k(x, w, r) = \frac{1}{h^{\alpha-1}} \left[\frac{r}{xA\beta\alpha h^{(\alpha-1)}} \right]^{\frac{1}{(\beta-1)}}. \tag{12}$$

Combining (11), (12) with the resource constraint (1) one gets total labor employment in terms of the equilibrium capital-labor ratio.

$$\Gamma(z) = \frac{1}{h^{\alpha}} \left[\frac{r}{xA\beta\alpha h^{(\alpha-1)}} \right]^{\frac{1}{(\beta-1)}} L(z) \tag{13}$$

where

$$\int_z^{\infty} x^{\frac{1}{1-\beta}} d\Gamma(x) = L(z). \tag{14}$$

The second resource constraint given by (2) provides a similar expression for the total amount of capital employed. Hence,

$$\int_z^{\infty} \frac{1}{h^{\alpha-1}} \left[\frac{r}{xA\beta\alpha h^{(\alpha-1)}} \right]^{\frac{1}{(\beta-1)}} d\Gamma(x) = H. \tag{15}$$

Combining equations (2.13) and (2.15) gives the equilibrium capital-labor ratio as a function of the capital-labor endowment ratio of the economy.

$$h\Gamma(z) = H \tag{16}$$

This relation (16) allows us to express output per capita as a function of z and H which would be the simplest way of obtaining output per-capita in terms of the parameters of the model. The next section is devoted to further study its implications.

3 Testable Implications

This section is devoted to identifying the various relations that can be obtained from the model in the previous section and validate those relations empirically. Since the main target is to look at the variation in the ratio of executive compensation to the average wage, the variables of interest are w and executive compensation, $EC(x)$.

Combining relations (15) and (8) one can obtain:

$$w = A\beta \left[\frac{L(z)}{\Gamma(z)}\right]^{1-\beta} (1-\alpha) \left[\frac{H}{\Gamma(z)}\right]^{\alpha\beta} \tag{17}$$

This relation can be log-linearized and expressed in very simple terms for ease of interpretation.

$$\log w = Const. + Z(z) + \alpha\beta \log H.$$

This relation can be explained very intuitively. The last term is a function of the capital and labor endowment of the economy. If there is any increase in the endowment of capital with respect to labor in any country, at any point in time, with everything else held constant, the productivity of labor will also increase and hence the wage rate will go up. This will also lead to a higher cutoff level of managerial talent. The second term is a function of z, which depends on both the capital-labor ratio and level of corporate governance. Since the effect of change in the capital-labor endowment is already discussed, one can study the effect of a change in corporate governance on the wage rate of the economy. A higher level of corporate governance increases the value of the firms output which in turn raises the marginal physical product of labor, and thus pushes up the wage rate.

Another step would be to find the effect of these same variables on the level of executive compensation. Here again following Bebchuk and Fried (2003), we consider

EC as the appropriate measure of compensation since it captures the amount of rent the entrepreneur is successful in extracting as extra pay subject to the weakness in the firm's corporate structure. Using the previous equations, executive compensation can be written as

$$EC(x) = \Pi(x)\left[\theta + \frac{(1-\theta)^2}{2\eta}\right] = \left[xA\left(nh^{\alpha}\right)^{\beta} - wn - rnh\right]\left[\theta + \frac{(1-\theta)^2}{2\eta}\right] \tag{18}$$

One immediate result that follows from this relation is that the executive compensation increases with an increase in θ. Other things being constant, an increase in θ raises the entrepreneur's right to the residual cash-flow and hence although he diverts fewer resources, his total compensation goes up. This is a situation in which the firm has very low dispersion in share-holding and the main bulk belongs to the entrepreneur. This result converges with the findings of Leuz, et al (2003). In this case as he comes closer to getting the complete profit, his decisions would converge with maximizing the firm profit and not his compensation. The other very obvious result is that all else held constant, a country with a higher level of corporate governance will have a lower level of executive compensation. For a given value of θ, as η goes up, it is more costly for the entrepreneur to divert resources, or with better transparency, it becomes more difficult for him to influence his pay, and hence his compensation is lower.

To get direct implications of changes in the ratio of executive compensation to wage, the equations can be manipulated to yield the following expressions:

$$\frac{EC(x)}{w} = \left[\theta + \frac{(1-\theta)^2}{2\eta}\right]\frac{(1-\beta)}{\beta(1-\alpha)}\left[\frac{xA\beta\alpha}{r}\right]^{\frac{1}{1-\beta}}\left[\frac{H}{\Gamma(z)}\right]^{\frac{(\alpha\beta-1)}{1-\beta}} \tag{19}$$

The main testable implications that can be obtained are as follows

- Implication 1:

$$\frac{\partial\left(\frac{EC(x)}{w}\right)}{\partial\theta} > 0 \tag{20}$$

What one can infer from this relation is that the ratio of executive pay to wage goes up with increase in ownership concentration in the hands of management. As the entrepreneur's right to the residual cash flow increases, he gets a bigger share of the profit, diverts fewer resources and hence incurs less cost. Therefore executive compensation increases with respect to wage.

- Implication 2:

$$\frac{\partial\left(\frac{EC(x)}{w}\right)}{\partial\eta} < 0 \tag{21}$$

This relation shows that everything else remaining the same, if the level of corporate governance in the country improves, the ratio of executive compensation to wage is going to go down. In this case, with an increase in the investor protection, managers are less able to appropriate resources, hence their compensation falls.

- Implication 3:

$$\frac{\partial \int_z^\infty EC(x)d\Gamma x}{\partial\left(\frac{K}{L}\right)} > 0 \tag{22}$$

As the capital-labor ratio in the country goes up, given a fixed level of corporate governance, the productivity of labor goes up leading to an increase in wages. As this leads to an increase in the opportunity cost of being a CEO, only the best agents will decide to opt for the managerial position and hence their average compensation of the CEO's goes up in comparison to the wage.

Hence from the above discussion, the following testable implications can be derived:

- An increase in η reduces the ratio of executive pay to wages.

- An increase in the scale of operation increases the ratio of executive pay to wages, since in this model, agents with higher ability manage bigger firms, obtaining higher profits.

- Higher capital dispersion(i.e. a fall in θ) closes the gap between average wage and executive compensation.

- An increase in capital-labor ratio of the country leads to a rise in average CEO compensation.

Most of these implications can be tested directly from the data. The next section describes how the data set is constructed and then explains the tests and discusses the results.

4 Data and Results

The first half of this section describes the data sources and methods used to construct some of the variables. In the last half, the most significant results are presented with a discussion of how they confirm the model's implications.

To measure CEO compensation, data is used from from Towers Perrin's Worldwide Total Remuneration Report. Specifically we use Total Remuneration for the Chief Executive Officer, in local currency and at current prices, taken from the 1984, 1988-1992, and 1994-2003 reports. This consists of data on 27 countries.[3] As the data set consists of firms with annual sales of at least \$250 million, we are aware that, at least for some countries, the sample is somewhat biased towards (a few) very large firms. However, this

[3]Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong, India, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Taiwan, U.K., U.S.A., Venezuela.

was the only available source of data which accounted for all the elements in executive compensation for countries other than the US.

Data on wages are collected from the International Labor Organization and supplemented by a variety of other sources: Bureau of Labor Statistics, Eurostat, Banco Central de Venezuela, Ministry of Manpower of Singapore, National Statistical Office of the Republic of Korea, and National Statistics of Taiwan. Data on median wages would have been preferable since it is robust to minimum wage truncation but was not available for most countries. This way, mean wages are used. All data on wages are in national currency and current local prices.

Capital stocks are taken from the Penn World Tables 5.6, until 1990 and calculated after that using Gross Fixed Capital Formation from the World Development Indicators. Estimation of depreciation rates was done running the following OLS regression:

$$K_{it} - I_{it-1} = (1 - \delta)K_{it-1} + \varepsilon_{it}$$

where I_{it} is Gross Fixed Capital Formation appropriately deflated. All data on capital are in constant 1987 US dollars. GDP per capita was taken from the World Development Indicators and is in constant 1995 US dollars.

Dispersion of capital ownership was taken from La Porta et al. (1998), henceforth LLSV. This is the median percentage of ownership by the three largest shareholders of the ten largest nonfinancial domestic firms (LLSV, Table 7). The measure of Corporate Governance used here was computed by Kaufmann (2004) based on data from the Executive Opinion Survey conducted by the World Economic Forum in 2004. For both corporate governance and capital ownership we have data for only one year so by assuming that these variables do not change over time we are aware of some measurement error. However, as these features change only gradually over time we trust that the error

in variables problem to be small. So we have the following variables:

- $\frac{xcomp_{it}}{w_{it}}$ is the ratio of total executive compensation to mean wage in manufacturing sector for country i at year t.
- CGI_i is the Corporate Governance Index for country i.
- $\frac{K_{it}}{L_{it}}$ is the aggregate capital-labor ratio in country i at year t.
- own_i is intended to measure capital ownership by CEO in country i.
- GDP_{it} is Gross Domestic Product per capita, at 1995 prices.

For purposes of estimation we use the following error components specification:

$$\frac{xcomp_{it}}{w_{it}} = \beta_0 + \beta_1 CGI_i + \beta_2 own_i + \beta_3 \frac{K_{it}}{L_{it}} + \beta_4 GDP_{it} + \nu_i + \varepsilon_{it} \tag{23}$$

This relation from equation (23) is estimated using the random effects GLS estimator. Before estimating the final specification including all the variables anticipated to be effective from the model, we try out some other relations and then compare the explanatory power of those relations with the model specification. First and foremost since in this model, the main contribution is the effect of corporate governance on executive compensation, we try to see what percentage of the variation in the relative CEO compensation can be explained by the variation in the level of corporate governance across these countries. So we report the estimation results of a pooled OLS regression with CGI as the only explanatory variable.

The constant term used in Table 1 is a fixed constant that does not include any country specific effect. The estimates, t-stats for the null of no significance for each variable, and the adjusted R^2 for this OLS regression and the other GLS regressions

Table 1: Explanatory Power of Corporate Governance

Variable	Coefficient	t-statistic
Constant	133.9920^{***}	8.704380
CGI	-1.315231^{***}	-7.114956
$\bar{R}^2$	0.297356	

are reported. The superscripts (*), (**), and (***) stand for significance at the 1%, 5%, and 10% level, respectively. By looking at the adjusted R^2, it seems that the corporate governance levels across countries can account for approximately 30% of the variation in relative CEO compensation. The result suggests a significant negative effect of the level of corporate governance on CEO remuneration. A country with a stronger level of investor protection will have a firmer control on the CEO's actions and hence lesser appropriation of the minority shareholders.

The scatter plot for the Corporate Governance Index and the relative CEO compensation for the year 2004 shows prominent negative correlation. This indeed suggests that more effective corporate governance keeps a tighter bound on the CEO compensation.

In order to evaluate the effectiveness of the capital labor ratio in explaining the variation in relative CEO compensation, another specification is considered. Column (1) in table 2 estimates the error components regression to explain the variation in relative CEO compensation using the variations in capital-labor ratio of the countries and their GDP. Its interesting to observe that the country specific constants capture most of the variation in this relation and the other two variables have no significant power in explaining this variation. In fact, a random effects regression only on the country effects and a common intercept (not shown here) has a R^2 of 80.43%. Hence a conventional Hecksher-Ohlin argument by itself fails to provide a satisfactory explanation for the variation in

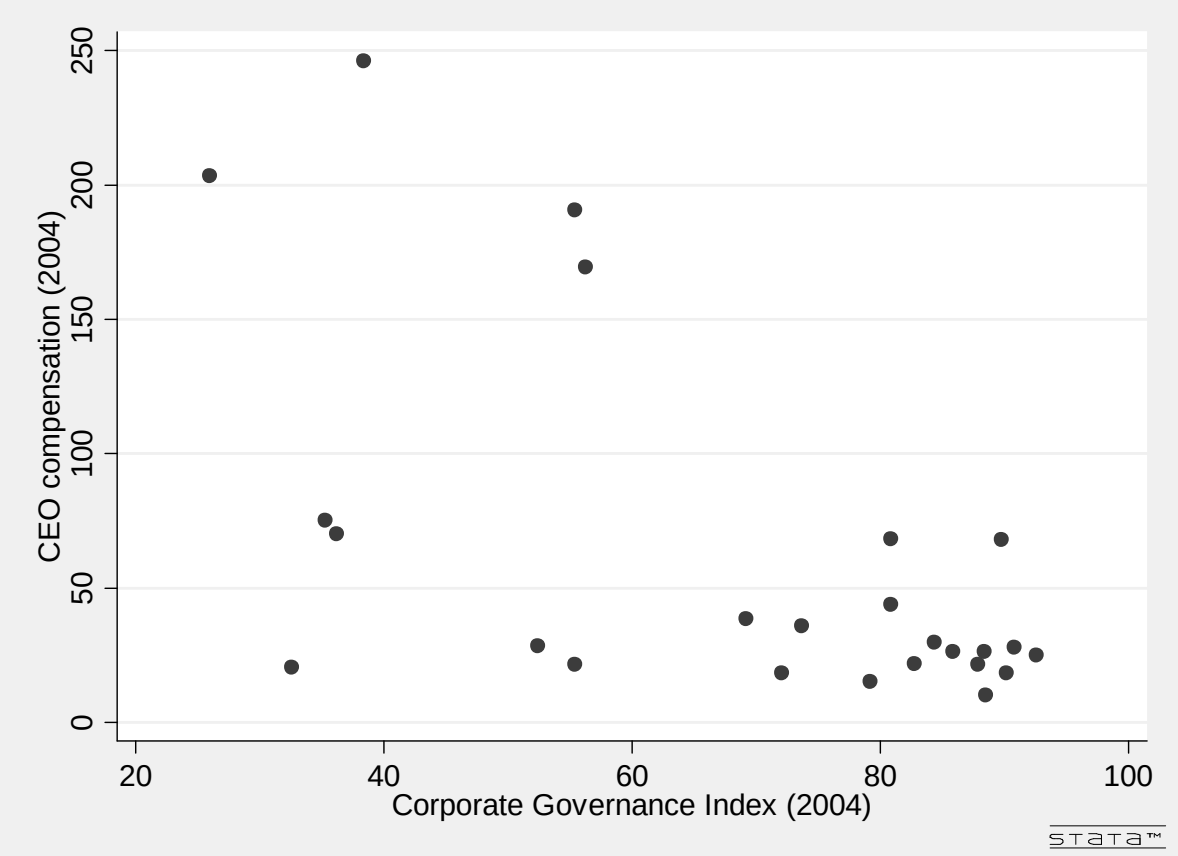

Figure 1: Scatter Plot for level of Corporate Governance Index and Relative CEO Compensation for 2004

Table 2: Model Specification

Variable	Column 1	Column 2	Column 3
Constant	27.7271*	128.6202***	95.7786*
	(1.86)	(4.18)	(1.68)
Cap-Lab Ratio	0.0004***	0.0002*	0.0002*
	(2.88)	(1.74)	(1.73)
GDP per Capita	0.0008	0.0006	0.0006
	(0.30)	(0.68)	(0.68)
CGI		−1.6844***	−1.5039***
		(-3.58)	(-2.88)
Ownership			47.6261
			(0.69)
$\bar{R}^2$	0.802425	0.808411	0.807329

the relative CEO compensation.

The second column in table 2 adds the country specific corporate governance index in the previous specification. One can see, by comparison of the adjusted R^2, that introducing corporate governance as an explanatory variable increases, albeit by a small amount, the explanatory power of the regression. To see that this increase is still important, note that most of the explanatory power in the GLS regression is coming from the country-specific effects. Hence the only way to improve the explanatory power in these specification is through the incorporation of the corporate governance variable.

Finally the results of estimating the equation specified by the model is reported in the third column of Table 2. It is surprising to see that the explanatory power of the model slightly goes down with the introduction of the Ownership variable. One reason could be that the measure of the ownership used in this chapter is not too accurate and

more refined data could have a different effect. However, there are two things to be noted here. First, the variable measuring corporate governance continues to be significant in each specification that we have estimated here. Second, all the coefficients estimated have the correct signs, as in the signs that are consistent with the model predictions.

Although some of the estimates are not statistically significant, the results are all consistent with the testable implications derived in the previous section. The most significant coefficient is the one for Corporate Governance, CGI. The estimate is negative and significant, implying that a higher level of corporate governance lowers the ratio of executive compensation to the average wage in the country. This variable continues to be strongly significant in every specification of the model. The Ownership variable is not significant but has the right sign implying that a higher level of concentration of wealth in the hands of the entrepreneur leads to an increase in the ratio. The capital-labor ratio in the country comes out positive and significant implying that the ratio of executive compensation to average wage is increased with an increase in relative capital abundance in the economy. GDP per capita in used for capturing the scale effect. Since the data on executive compensation looks only at the bigger firms in the economy, the scale effect does not come out significant in these results, though it has the right sign.

So one can conclude that in spite of the attenuation bias most likely present for the corporate governance index (because of the error in variables problem) we still have that this is a highly significant variable in explaining the total variation of CEO compensation.

5 Conclusion

This chapter recognizes the significant variation and magnitude that is observed for relative CEO compensation. Compared to usual skill premium, this ratio takes much bigger values and shows far greater variation. Since capital-labor endowment ratios of

the countries do not suffice to explain this pattern, this chapter attempts to identify the driving forces behind this observation. The model suggests features like size of a country and the relative capital abundance along with key factors like corporate governance, concentration of ownership as the driving forces behind the observed differences. A panel data set based on data from 27 countries over 15 years is constructed to estimate an error components model. The results broadly confirm with the model implications though ownership dispersion does not show significantly.

In this chapter, concentration of corporate ownership is considered to be exogenously given, and thus all the possible dynamic effects from strategic decision making are ignored. Presently the authors are working on a version in which the ownership structure is endogenously determined. A dynamic version would be more capable of answering the issues of the high rate of CEO turnover. It will give a better insight to investment decisions of the manager based on past performances. Moreover, adding uncertainty will introduce insurance value to the compensation contract for risk averse CEO's. The next version of this exercise is being worked on, to take care of these issues. Despite its shortcomings, this is the first attempt to explain the cross-country differences in the ratio of executive compensation and average wage, and the model successfully singles out the most important factors behind the observed pattern in this ratio which are validated using data.

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