

VICARIOUS AGENCY: Dynamics of Excessive CEO Compensation

Abstract:

This study examines mechanisms that affect CEO compensation. Whereas the agency theory based explanations have only been able to explain a small fraction of the global increase in CEO pay, we broaden the existing approach by addressing how CEO pay practices are transferred between firms – and finally aggregated at the national level. Specifically, we suggest that based on learning theory and agency theory, CEOs adapt behavior in line with the rewards given to peer CEOs. Through imitation and social learning, the observing CEOs seek similar rewards for themselves, and this produces the “vicarious agency” effect. We apply experimental tests and empirical data from a 22-country dataset – and our results support the notion that “vicarious agency” can help to explain the global increase in CEO pay.

I. Introduction

There have been numerous efforts to examine the relation of executive compensation to firm performance, especially with regard to the issue of CEO compensation (Murphy 1999; Tosi, Werner, Katz & Gomez-Mejia, 2000). Over the last decade numerous studies have sought to understand the rationale of large CEO compensation incentives, such as stock options, even in the face of mediocre firm performance. Such large incentive compensation has been especially true in the U.S. during the last decade, and recently has become a global issue. Firms like AIG and Merrill Lynch exemplify the darker side of incentive compensation, as both firms made headlines in 2008 for borrowing money at the Federal Reserve's window to keep from fading out of existence through bankruptcy, and then using Federal borrowings to pay incentive and retention bonuses to managers whose decisions had brought the firm to the verge of bankruptcy.

A tenet of agency theory is that firms should index executive compensation to remove market-wide effects, i.e., Relative Performance Evaluation or RPE. RPE posits that executive compensation should reward only the firm's performance for which the executive can claim some control responsibility and not reflect the benefit or loss arising from recent prior performance of the market, over which the executive has had no control.

Solid research has investigated explanations of excessive CEO compensation (from the point of view of firm performance) which have ranged from managerial skimming (Bebchuk & Fried (2003)), to oligopoly (Aggarwal & Samwick (1999)), and to

asymmetric benchmarking (Bertrand & Mullainathan (2001), Garvey and Milourn (2004)). Oyer (2004) posits that an absence of RPE is optimal if the executive's reservation wages from outside employment opportunities vary with the economy's fortunes. Rajgopal, Shevlin, & Zamora (2006) support Oyer's (2004) theory, as they argue that CEO's outside opportunities are dependent upon the perceived talent of the CEO, which they approximate by indexing the CEO's financial press visibility. With 1993 – 2001 S&P 500 firm data from the U.S., they demonstrate that the sensitivity of CEO compensation to industry-wide, and market-wide performance, is systematically higher for CEOs who enjoy greater press visibility and superior industry-adjusted return on assets during the prior three years.

The above set of findings suggest that CEOs, who are perceived to be highly talented by competing firms, are more in demand by these firms and therefore accrue, as a consequence of competitive rivalry, higher wages from their own firm than might be justified by the performance their firm has achieved under their leadership. These findings open the analysis to consideration of the determination of the CEO's compensation not only with respect to his/her own firm's performance, but also to the behavior of other competing firms. The basic tenet of agency theory is to link CEO effort to his/her own firm's performance by rewarding superior firm performance with incentives. The basic additional tenet of RPE is to remove the effect of general market performance from the CEO's compensation package – or to put it simply: to separate the effect of effort from the effect of luck. Neither theoretical tenet fully considers the impact of the behavior of competing firms upon CEO compensation, as considered in the

research of Oyer (2004), Rajgopal, Shevlin, & Zamora (2006) and of Oxelheim et al. (2008).

II. Executive pay theory and past research

In this paper we suggest that existing executive pay studies have been too narrow in their theoretical scope. To visualize our criticism we conceptualize in Figure 1 executive pay theory in relation to two dimensions: level of analysis and the extent that executive incentives “works” – i.e., affect behavior of executives in the intended fashion. Agency theory represents the grandfather of executive pay theory, and it concerns how incentive works *within* the firm to align the interest between owners and managers. On the other hand, managerial power theory presents an alternative linkage between owners and managers (again at the firm level of analysis), and suggest that executive incentives do not alter executive behavior in the intend direction. These two theories have dominated the executive pay literature.

Figure 1: Conceptual categorization of executive pay theory

		Executive incentives affect behavior as intended	
		Yes	No
Level of analysis	Between-firms	Vicarious agency theory	Ratchet effect (theory)
	Within-firm	Agency theory	Managerial power theory

Recently researchers have started looking at the *between-firm* effects of pay practices (e.g., Oxelheim & Wihlborg, 2008). The ratchet effect makes the case that executive pay is affected by the pay of other executives – typically within the same country. In 2005 German authorities changed regulation and forced German listed firms to disclose executive pay specified for each of the executive members. This new disclosure requirement can be seen as a natural experiment on this bidding-up or ratchet effect. Stadtmann & Wissmann (2008) empirical analysis confirms such a pay increase effect from larger pay transparency in Germany. The underlying reason for the ratchet effect is that common benchmarking of pay across firms, and the common usage of pay consultants to facilitate these practices. Similar to managerial power theory, the ratchet effect is more driven by “what the CEO can get” (managerial power at the between-firm level) – rather than how it affects motivation and incentive alignment (the agency theory argument). Finally, we argue that the pay incentives in other firms (typically in its proximity – such as within the same country), might have powerful affect on executive behavior in other firm (within its proximity) that we label the vicarious agency effect.

While the relation between CEO long-term incentives and the financial performance of that CEO’s firm has been found by past research to be a weak link at best, this study supports the notion that aggregate firm performance within a country may be enhanced by ubiquitous implementation of CEO pay incentives within that country. These results have led us to propose the hypothetical construct of “Vicarious Agency”.

The dynamics of the relation between high CEO incentive pay and aggregate firm performance within a country are surely complex. Certainly there may be a link between a CEO’s motivation to enhance the financial performance of his/her firm and the carrot of

future incentives and other rewards for having done so. We hypothesize that when CEO “A” sees CEO “B” richly rewarded by the pleased Board of Directors, then CEO “A” may come to believe that he/she too may be similarly rewarded, and therefore motivated to achieve results comparative to those achieved by CEO “B”. Vicarious agency is the term we have chosen to describe the dynamics of CEO “A” being motivated as a consequence of observing CEO “B” receive a large bonus in compensation. In so doing, we have borrowed the term “Agency” from classic economic agency theory (Jensen & Meckling, 1976) and the term “Vicarious” from classic social learning theory in psychology (Bandura, 1977). The notion is that CEOs learn vicariously, by observing the consequences of other CEO’s behavior. This is an argument that previously has been used to describe learned incentive effects *within* firms – as proposed by tournament theory – whereas we focus on the *between* firm effects. Bandura’s concept of social learning theory posits that individuals will learn from observing the consequences of other individual’s behavior. Through imitation and modeling behavior, the observing individual seeks a similar reward for themselves. This is an argument that previously has been used to describe learned incentive effects *within* firms – as proposed by tournament theory (e.g., Lazear & Rosen, 1981) – whereas we focus on the *between* firm effects. By combining the dynamics of Agency Theory and Social Learning Theory, we have arrived at our hypothetical construct: Vicarious Agency.

That is, we hypothesize that, within a national network, incentive rewards to one CEO may have the cascading effect through Vicarious Agency, and thus motivate numerous other CEOs to work with greater vigor in pursuit of enhanced performance of their firms. Not all of the CEOs will be successful, and so not all firms will enjoy increased

prosperity. But the overall enhanced motivation of multiple CEOs will result in overall enhancement of prosperity within the national setting. Thus, our hypothesis is somewhat akin to what happens in a chain reaction in physics. Two, or three CEOs see rewards given to CEO "B". They then enhance their effort in hopes of similar rewards. Some succeed, and, in turn, their rewards are noted by other CEOs, who then enhance their efforts, and so the chain reaction grows. Not all CEOs succeed, not all firms prosper. But more do prosper than might have had not the incentives been introduced. The chain reaction reaches a critical mass, and the nation prospers overall.

Consistent with the findings of Oyer (2004) Rajgopal, Shevlin,& Zamora (2006) and Oxelheim & Wihlborg (2008), our own research, using data not only from the U.S., but also from Europe, Asia, and Latin America, suggests there may be a more complex relation between CEO compensation in one firm and the behavior of competing firms and the actors within those firms. It appears that high CEO compensation incentives not only motivate the CEO who receives it, but may also motivate the CEOs of competing firms in their anticipation of receiving similar incentives should their firms match or exceed the performance of their rival(s). That is, we propose that higher CEO incentive compensation not only influences the behavior of the firm whose executive receives these incentives, but may also motivate executives in competing firms, and thus may enhance the competitive rivalry within the industry and perhaps enhance the level of competition within other industries and the economy as a whole. If this is the case, then we expect to find a positive relation between the frequency of the use of compensation incentives in one economy and the overall economic robustness of that economy in the following time period.

We will next demonstrate what is meant by the dynamics of the Vicarious Agency by undertaking an experiment. After the experiment we make a real life test on data from 22 countries.

III. The experiment

To test our hypothetical construct described above, we undertook a pilot study in which we designed an experiment in behavioral economics. With student volunteers from two sections of a senior-year strategy class, we created a laboratory setting in which we established four nine person simulated management teams. Two of the firms were in the first class section, which we designated the experimental industry group. The two firms in the second class section were designated the networked industry group¹ (not within the experimental industry). The external validity of the experiment is supported by the fact that a recent study suggests that business students provide good proxies for the preferences of actual CEOs (List & Mason, 2009).

Each firm had a CEO who was selected by popular vote of each of the firm's management teams. Each firm had a task, which was overseen and managed by their CEO. The task required each firm to offer a two hour oral presentation once during each of the two quarters. The oral presentation took the form of a consultant report reviewing the strategic situation faced by the assigned case of a large international corporation. The tasks required the CEOs to use e-mail extensively with the other firm members, as arranging meetings of the nine person teams outside of class time proved to be

¹ The term "networked" refers to executives that may come to know about incentives and rewards through a social network.

logistically difficult. The quantity of e-mail messages from each CEO to his/her firm members is used as a measure of CEO effort (the dependent variable).

After one quarter of task activity of the firms, the CEO who had written the largest number of pages of e-mail to his/her firm's employees in the experimental industry class section was given a large bonus, six times (30 versus 5 extra credit points) than given to the CEO of the second firm in that class (the disparity of bonus was the independent variable). In the experimental industry group, public announcement to the class shared the amount of bonus awarded to CEOs of both firms in that class section, but not the bonus awarded in the second class section. In the networked industry class section, both CEOs receive the same bonus, a bonus equal to that given to the CEO receiving the lower bonus in the experimental industry group (five points are rewarded). Public announcement of the two bonuses given are made, but no mention of the bonuses given in the experimental group is given. The firms (student teams) in both sections were told that a second distribution of bonuses will be forthcoming at the end of the second quarter of task activity.

The number of pages of e-mails issued by each CEO for all four firms is recorded both before the bonuses were given (during the first quarter of firm performance) and again after the first quarter bonuses were awarded (during the second quarter of firm performance). At the end of the second quarter of firm task activity, each of the four CEOs is individually and privately interviewed and asked if their behavior as a manager was influenced by the amount of bonus awarded in quarter one to other CEOs.

III.1. Hypothesis

In the experimental industry, we hypothesize that the CEO receiving the lower bonus, and having had knowledge of the higher bonus given to the other CEO, will demonstrate enhanced effort increasing the quantity of his/her e-mail output during the second quarter. It is predicted to be significantly greater than his/her e-mail output in the first quarter.

In the networked industry group, any CEO who may have learned through rumor of the large bonus awarded in the experimental group are expected to behave similar to the CEO who receiving the lower bonus in the experimental group with respect to the quantity of e-mail, whereas, any CEO who did not learn of the large bonus in the experimental group is expected to exhibit no increase the quantity of their e-mail output during the second quarter of firm task activity.

III.2 Experiment results

The results displayed in Tables 1 through 6 below support our hypothesis of VICARIOUS AGENCY, i.e., enhanced motivation of CEO's who observe excessive bonus pay-outs to other CEOs.

Table 1

E-mail activity and bonus points in the experimental industry.

Firm	CEO e-mail pages 1 st quarter	Bonus points	E-mail pages 2 nd quarter
A	15	30	9
B	11	5	26

Table 2

E-mail activity and bonus points in the networked industry

Firm	E-mail pages 1 st quarter	Bonus points	E-mail pages 2 nd quarter
C	11	5	5
D	7	5	13

Table 3

Answer to the following question in the CEO interview after the second quarter, “Did you know the amount of bonus points awarded in the first quarter to all CEOs and did that knowledge influence your behavior in the second quarter?”

Firm	Answer
A	No
B	Yes
C	No
D	Yes

In Table 1, we observe that the CEO of firm B, after learning of the high bonus paid to the CEO of firm A, increases her e-mail output to her firm members from 11 pages in the first quarter to 26 pages in the second quarter. At the same time it is interesting to note that the CEO who received the large bonus (firm A) does not continue to produce 15 pages of e-mail output in second quarter, but rather decreases her output to nine pages.

In the networked industry, the CEO (firm D) who learned via rumor of the high bonus given to a CEO in the experimental industry, increased her e-mail output from seven to 13 pages between the first quarter and second quarter. The CEO of firm C was unaware of the large bonus paid in the other industry, but knew only of the equal and low bonuses paid in her industry, produced only five pages of e-mail in the second quarter as opposed to seven pages of e-mail in the first quarter.

To test the statistical significance of these results, our small sample requires we turn to non-parametric statistics. The chi-square test is used to determine the significance of the difference between the number of e-mail pages of the CEOs in the experimental industry before and after the awarding of the quarter one bonuses:

Table 4

This table reports the e-mails of the CEOs during the first quarter of the study.

	E-mail pages before 1 st quarter bonus	E-mail pages after 1 st quarter bonus
CEO A	15	9
CEO B	11	26

A chi-square 2x2 contingency test for the above Table 4 yields a chi-square of 6.39, $p < .02$ with degrees of freedom equal to one. This statistical result is consistent with our hypothesis. The public knowledge of a generous bonus to one CEO (A) has resulted in greatly enhanced effort by the second CEO in the experimental industry. Similarly, a chi-square statistical analysis may be undertaken for the e-mail output data of the CEOs in the networked industry. Table 5 below yields this data.

Table 5

This table describes the number of e-mails before and after the first quarter.

	E-mail pages before Q1 bonus	E-mail pages after Q1 bonus
CEO C	11	5
CEO D	7	13

The chi-square statistic for the above 2x2 contingency for Table 5 is 4.05, $p < .05$ with degrees of freedom equal to one. This finding is consistent with our hypothesis in that the CEO within the networked industry who became aware of the high bonus compensation of another CEO through the rumor mill increased his output of e-mail during the second quarter. The counterpart CEO in the networked industry who did not learn of the high bonus award of another CEO did not increase the number of pages of e-mail produced after the bonus awards.

It is also worthwhile to note that the CEO who did receive the large bonus compensation after quarter one actually reduced her e-mail output during the second quarter. It appears bonus compensation may be more efficient as a motivation tool when used as an incentive to be anticipated than when used as a reward for outstanding performance. That is, if the CEO is not anticipating a future bonus, then their motivation for enhanced effort may be diminished even though they have been rewarded handsomely in the past for their outstanding performance.

Table 6 allows examination within the experimental industry versus the networked industry (control class). The randomization test with alpha equaling 9.29% shows a significant difference (at the 10% level) in the mean efforts put forth by the CEOs. Setting up a one sided test, the mean CEO effort is significantly higher in the experimental industry rather than the networked group, which fits with the notion that the motivation of the higher CEO pay is a greater motivator within the same industry than outside the industry.

Table 6: Randomization test of the pages of email sent:						
Pages of email sent:						
Experimental:	26, 15, 11, 9					
Control:	5, 7, 11, 13					
Experimental:		Networked:				
most extreme - high:		most extreme - low:		Sum of E - Sum of C:		
26, 15, 13, 11'		5, 7, 9, 11		65 - 32 = 33		
26, 15, 13, 11		5, 7, 9, 11'		65 - 32 = 33		
26, 15, 13, 9		5, 7, 11, 11'		63 - 34 = 29		
26, 15, 11, 11'		5, 7, 9, 13		63 - 34 = 29		
26, 15, 13, 7		5, 9, 11, 11'		61 - 36 = 25		
26, 15, 11, 9		5, 7, 11', 13		61 - 36 = 25	Actual Distribution	
26, 15, 11', 9		5, 7, 11, 13		61 - 36 = 25		
26, 13, 11, 11'		5, 7, 9, 15		61 - 36 = 25		

$$\alpha = \frac{6.5}{\left(\frac{8}{4}\right)} = \frac{6.5}{\left(\frac{8!}{4! \cdot 4!}\right)} = \frac{6.5}{\left(\frac{8 \cdot 7 \cdot 6 \cdot 5}{4 \cdot 3 \cdot 2 \cdot 1}\right)} = \frac{6.5}{70} = 0.0929$$

IV. Vicarious agency effects – an empirical study

The above experiment indicates that CEOs take notice (or learn) from the incentives of CEOs of other firms – and that this produces an indirect effect – contributing to an effect similar to the one suggested by tournament theory (but then not within firms, but between firms). At the country level this vicarious agency phenomena produce enhanced economic prosperity for the overall economy, but not necessarily the firm that provides the incentives. In this section of the paper, we address the same issue at the country level: is there a linkage between incentive systems commonly used in a country and economic growth. Table 7 reports descriptive statistics on the variables we examine on a country by country basis, as well as distinguishing the sub-samples of nine European countries vs. 13 non-European countries. The percentage of firms with long term incentive remuneration ranges from 100% in Canada (97% in the US) to 16% in India. The descriptive show how European countries are significantly from non-European firms – as the percentage of firms with long-term executive incentive pay is higher, the real GDP growth is lower, and the level of corruption is lower. However, no significant difference exists in terms of percentage of annual growth of new invested capital.

Table 7: Descriptive statistics on Long Term Incentive Remuneration and Economic Statistics for 2001 to 2005.

		Percentage		Percentage	Transparency
		of Firms with	Percentage	Growth of	International
		Long term	Annual	New	Corruption
		Incentive	Real GDP	Invested	Perception
		Remuneration	Growth	Capital	Index
Country		(LTIREM)	(GDPGR)	(INV)	(TI_CPI)
Panel A: European Countries: (N = 9)					
Belgium	Mean	87,00 %	1,48 %	7,82 %	7,2400
	Std. Deviation	8,69 %	0,77 %	11,55 %	0,4037
France	Mean	93,00 %	1,63 %	9,33 %	6,9000
	Std. Deviation	2,17 %	0,60 %	11,20 %	0,4472
Germany	Mean	73,00 %	0,56 %	2,75 %	7,7600
	Std. Deviation	10,03 %	0,66 %	11,42 %	0,4278
Italy	Mean	69,00 %	0,69 %	9,39 %	5,1600
	Std. Deviation	14,32 %	0,77 %	12,46 %	0,2702
Netherlands	Mean	96,00 %	1,22 %	6,25 %	8,8000
	Std. Deviation	4,35 %	0,96 %	9,99 %	0,1581
Spain	Mean	62,00 %	3,27 %	16,27 %	7,0200
	Std. Deviation	8,69 %	0,39 %	13,17 %	0,0837
Sweden	Mean	66,00 %	2,36 %	6,73 %	9,2000
	Std. Deviation	3,84 %	1,19 %	14,45 %	0,1225
Switzerland	Mean	79,00 %	1,27 %	5,94 %	8,7800
	Std. Deviation	14,32 %	1,20 %	11,32 %	0,3271
U.K.	Mean	97,00 %	2,46 %	8,78 %	8,5800
	Std. Deviation	2,17 %	0,57 %	9,31 %	0,1643

Table 7: Descriptive statistics on Long Term Incentive Remuneration and Economic Statistics for 2001 to 2005.

		Percentage of Firms with Long term Incentive Remuneration (LTIREM)	Percentage Annual Real GDP Growth (GDPGR)	Percentage Annual Growth of New Invested Capital (INV)	Transparency International Corruption Perception Index (TI_CPI)
Country					
Panel B: Non-European Countries: (N = 13)					
Argentina	Mean	52,00 %	2,35 %	19,38 %	2,8200
	Std. Deviation	8,69 %	9,41 %	69,12 %	0,4087
Australia	Mean	88,00 %	3,16 %	15,98 %	8,7000
	Std. Deviation	2,17 %	0,78 %	19,60 %	0,1414
Brazil	Mean	53,00 %	2,75 %	8,11 %	3,9000
	Std. Deviation	10,03 %	1,83 %	24,05 %	0,1225
Canada	Mean	100,00 %	2,55 %	11,26 %	8,7000
	Std. Deviation	0,00 %	0,65 %	8,53 %	0,2550
China	Mean	25,00 %	9,58 %	18,04 %	3,4000
	Std. Deviation	5,89 %	0,86 %	4,55 %	0,1225
China (Hong Kong)	Mean	62,00 %	4,36 %	-3,24 %	8,0800
	Std. Deviation	11,51 %	3,51 %	8,57 %	0,1643
India	Mean	16,00 %	6,45 %	17,64 %	2,7800
	Std. Deviation	4,35 %	2,20 %	18,49 %	0,0837
Japan	Mean	27,00 %	1,30 %	-2,19 %	7,0800
	Std. Deviation	8,69 %	1,09 %	10,45 %	0,1483
Mexico	Mean	37,00 %	1,84 %	4,87 %	3,6000
	Std. Deviation	16,47 %	1,68 %	6,99 %	0,0707
South Africa	Mean	64,00 %	3,89 %	16,50 %	4,6200
	Std. Deviation	6,52 %	1,04 %	29,07 %	0,1789
Singapore	Mean	78,00 %	4,06 %	-1,09 %	9,3200
	Std. Deviation	7,67 %	4,23 %	8,92 %	0,0837
South Korea	Mean	66,00 %	4,57 %	7,87 %	4,5000
	Std. Deviation	3,84 %	1,47 %	11,80 %	0,3082
U.S.	Mean	97,00 %	2,31 %	4,18 %	7,5800
	Std. Deviation	2,17 %	1,15 %	7,33 %	0,0837

Table 7: Descriptive statistics on Long Term Incentive Remuneration and Economic Statistics for 2001 to 2005.

Country		Percentage of Firms with Long term Incentive Remuneration (LTIREM)	Percentage Annual Real GDP Growth (GDPGR)	Percentage Annual Growth of New Invested Capital (INV)	Transparency International Corruption Perception Index (TI_CPI)
Panel C: Summary					
Whole Sample	Mean	67,59 %	2,91 %	8,66 %	6,5691
(N = 22 countries)	Std. Deviation	25,45 %	3,06 %	19,06 %	2,2331
European	Mean	80,22 %	1,66 %	8,14 %	7,7156
(N = 9 countries)	Std. Deviation	15,14 %	1,13 %	11,19 %	1,2526
Non-European	Mean	58,85 %	3,78 %	9,02 %	5,7754
(N = 13 countries)	Std. Deviation	27,49 %	3,63 %	23,07 %	2,4188
Panel D: Tests of Equality of Mean between European countries and Non-European countries					
t-test value		4,7376	3,7909	0,2377	4,9372
p-value		0,0000	0,0002	0,8126	0,0000
Anova F-test value		22,4452	14,3708	0,0565	24,3760
p-value		0,0000	0,0002	0,8126	0,0000

Descriptive statistics of the dependent and independent variables used in the fixed firm effects analysis are presented. The dependent variable is the annual real GDP growth obtained from the IMF. The independent variables are the percent of firms with long-term incentive remuneration from Towers Perrin, the annual growth rate of new invested capital from Datastream, and the corruption perceptions index from Transparency International which relates to the degree of corruption as seen by business people and country analysts and ranges between 10 (highly clean) and 0 (highly corrupt). The five year sample period is 2001 to 2005.

In this study we look at whether there is a positive relation between the proportion of firms within a country where CEOs have long term incentives and the economic prosperity of that country. We use panel data and perform a cross-sectional, time series

regression of individual countries' real GDP growth rates, the dependent variable, against the existence of long-term incentive remuneration for CEOs. The dependent variable is calculated from the percentage change in annual GDP in constant national currency. We use “hard” economic control factor; the growth rate in new investment (Levine & Renelt, 1992; Sala-i-Martin et. al., 2004), and a “soft” control variable, the Fraser Institute's labor freedom index (Karabegovic, Samida, Schlegel, & McMahon, 2003). The freedom index labor regulation scale is used as a surrogate for a measure of labor's impact upon CEO freedom of action and discretion. The higher the index value, the less the regulatory constraints are upon CEOs and such discretion may be particularly important to economic growth. The model used is:

$$\text{GDPGR}_{it} = \gamma_0 + \gamma_1 \text{LTIREM}_{it} + \gamma_2 \text{INV}_{it} + \gamma_3 \text{LABOR}_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

where LTIREM is the percentage of firms in a country providing long-term incentive remuneration to their CEOs, INV the growth rate of newly invested capital and LABOR the labor freedom index measuring labor market regulation.² In the model, i represents the i -th country, t denotes years 2001 to 2005 and the α_i s are the fixed effects' country dummies that allow different regression intercepts for each country.

The regression intercept for the base country, γ_0 , is either the U.S. or the U.K.³

² Other models incorporating other Fraser Institute economic freedom indices, individually and in combinations, including capital control, legal market regulations, monetary policy, openness to trade and business regulations, as well as a composite economic freedom index based on 23 sub-indices were analyzed as alternates or additions to the economic freedom index for labor market regulation. The results are qualitatively the same regarding the coefficients and statistical significance for the LTIREM and INV variables. With our small total sample of 110 observations, from five annual observations for 22 countries surveyed by Towers Perrin, a model with fewer independent variables is preferable to enable us to have sufficient degrees of freedom to use the fixed effects model for smaller sub-samples including six, seven, nine and 13 countries.

³ Unreported cross-sectional tests support our selection of the fixed effects model by indicating significant differences between the regression intercepts for the whole sample of 22 countries as well as the

We have obtained information on the existence of CEO long-term incentive plans from Towers Perrin, a consulting firm known for its expertise in the area of executive compensation. The firm surveyed their clients in 22 countries for the years 2001, 2004 and 2005 and measures the percentage of firms providing CEOs with long-term incentive remuneration. Their clients are likely to be large firms. Hence, the sample have a potential bias toward large firms. Since the Towers Perrin data on long-term incentive plans is missing for the years 2002 and 2003, we observe the country-by-country trends and approximate the missing values by interpolation.⁴ The Fraser Institute produces extensive measures of economic freedom for 142 countries. Based on the 2007 report written by Gwartney, Lawson, Sobel and Leeson, we use the Fraser Institute index for Labor Market Regulations for the five years of 2001–2005 to match the years of the Towers Perrin data on long-term executive incentives. The Fraser Institute ratings range from one to ten with ten denoting the highest level of economic freedom.

The annual real GDP growth rate, GDPGR, was from the International Monetary Fund (IMF) Economic Outlook and was in constant (i.e., real) national currency. The annual growth rate in newly invested capital was calculated

subsamples of nine European countries, 13 non-European countries, seven non-European developed countries, and six non-European developing countries.

⁴ In analyzing the Towers Perrin data for 2001, 2004, and 2005 it is clear that the percentage of firms providing long term incentive pay to their CEOs does not vary wildly from year to year, but changes slowly and gradually; clear trends are visible from 2001 to 2004 on a country by country basis. Using interpolation assumes a linear trend from 2001 to 2004 which keeps our errors of approximation small, since most countries experience only a five to 20% change from 2001 to 2004. Without interpolation, our estimators will be less efficient and the standard errors larger as the information from 2002 and 2003 regarding the covariance between our independent variables, the annual growth rate of newly invested capital and labor market regulation, and the dependent variable, real growth in gross domestic product, is lost.

from figures obtained from Thomson–Reuter’s DataStream.

Table 8: Panel least squares regression results on GDP growth.

	All countries (N = 22)	European countries (N = 9)	Non-European countries		
			All (N = 13)	Other developed (N = 7)	Developing countries (N = 6)
Intercept	-0,0282	-0,0047	-0,0510	-0,1357	0,0305
t-statistic	-1,2498	-0,3590	-1,4239	-2,8808	0,5250
p-value	0,2148	0,7219	0,1608	0,0008	0,6051
LTIREM	0,0695	-0,0169	0,1337	0,1682	0,1137
t-statistic	2,4384	-0,8249	3,2782	3,1602	1,8286
p-value	0,0168	0,4154	0,0019	0,0041	0,0817
INV	0,0710	-0,0051	0,0784	0,0579	0,0778
t-statistic	6,3975	-0,4257	5,8428	1,9003	4,2430
p-value	0,0000	0,6731	0,0000	0,0690	0,0004
LABOR	0,0008	0,0070	0,0005	0,0061	-0,0087
t-statistic	0,1929	2,3304	0,0959	1,0727	-0,7942
p-value	0,8475	0,0260	0,9240	0,2936	0,4360
Number of panel observations	110	45	65	35	30
Adjusted R ²	0,5977	0,5116	0,6511	0,5005	0,6810
F-Statistic	7,7470	5,1903	8,9632	4,7856	8,7378
Durbin-Watson statistic	1,7148	2,4679	1,8333	2,3171	1,9036

This table presents the panel least squares regression results for all countries (22 cross-sections), European countries (nine cross-sections), and non-European countries (13 cross-sections). For the non-European countries, the data is further divided into seven developed countries (Australia, Canada, China (Hong Kong), Japan, Singapore, South Korea, and the U.S.) and six developing countries (Argentina, Brazil, China, India, Mexico, and South Africa). The nine European countries are: Belgium, France, Germany, Italy, Netherlands, Spain, Sweden, Switzerland, and the U.K. All regressions are run with five years of data, 2001 - 2005. The dependent variable is the annual growth rate in real GDP, LTIREM is the annual percent of firms with long-term incentive remuneration, INV is the annual growth rate of newly invested capital, and LABOR is the average labor regulation index. The coefficients are time-series means of cross-sectional regression estimates with cross-section fixed dummy variables on 22, 9, 13, 7, and 6 countries, respectively. The coefficients for the fixed effects dummies are not reported since they sum to one and are not relevant to the discussions.

In Table 8 we report Model 1 results. Our results indicated that long-term incentives for executives enhance national economic prosperity. Specifically, the results support the Hypothesis in the whole sample, as well as all sub-samples, except for the nine European countries. In the 22-nation sample they find a positive and statistically significant relation between the prevalence of long-term incentives for high-level executives and national economic prosperity.

We extend our results by introducing a new control variable, TI_CPI, the corruption perceptions index from Transparency International, which relates to the degree of corruption in a country as surveyed from business people and country analysts. Transparency International's corruption perception index ranges from 10 for a highly clean country to 0 for a highly corrupt country. We examine two additional models, model (2) which adds TI_CPI to model (1) and model (3) which replaces model (1)'s labor regulation variable with TI_CPI:

$$\text{GDPGR}_{it} = \gamma_0 + \gamma_1 \text{LTIREM}_{it} + \gamma_2 \text{INV}_{it} + \gamma_3 \text{LABOR}_{it} + \gamma_4 \text{TI_CPI}_{it} + \alpha_i + \varepsilon_{it} \quad (2)$$

We show the result from model (2) in Table 9 – and the results from model 3 in Table 10. Our main results are not altered by the inclusion of the corruption index. Whereas, excluding the LABOR variable (model 3) enhance the significance level of the effect of long-term incentives (to less than 1%).

Table 9: Panel least squares regression results on GDP growth.

	All countries (N = 22)	European countries (N = 9)	Non-European countries		
			All (N = 13)	Other developed (N = 7)	Developing countries (N = 6)
Intercept	0,0075	-0,0621	-0,1019	-0,1163	-0,0376
t-statistic	0,1288	-1,8187	-0,9902	-0,8557	-0,2541
p-value	0,8978	0,0783	0,3270	0,4006	0,8020
LTIREM	0,0703	-0,0253	0,1379	0,1685	0,1281
t-statistic	2,4571	-1,2417	3,2950	3,1013	1,8429
p-value	0,0161	0,2234	0,0019	0,0049	0,0802
INV	0,0701	-0,0091	0,0803	0,0579	0,0821
t-statistic	6,2498	-0,7676	5,7410	1,8644	4,0007
p-value	0,0000	0,4483	0,0000	0,0745	0,0007
LABOR	0,0012	0,0070	-0,0002	0,0063	-0,0092
t-statistic	0,3003	2,3847	-0,0393	1,0586	-0,8160
p-value	0,7647	0,0232	0,9688	0,3003	0,4241
TI CPI	-0,0059	0,0084	0,0091	-0,0027	0,0181
t-statistic	-0,6653	1,8088	0,5286	-0,1530	0,5018
p-value	0,5077	0,0799	0,5995	0,8797	0,6213
Number of panel observations	110	45	65	35	30
Adjusted R ²	0,5950	0,5431	0,6459	0,4802	0,6692
F-Statistic	7,4061	5,3579	8,2969	4,1412	7,5182
Durbin-Watson statistic	1,7355	2,7151	1,8153	2,3226	1,8210

This table presents the panel least squares regression results for all countries (22 cross-sections), European countries (nine cross-sections), and non-European countries (13 cross-sections). For the non-European countries, the data is further divided into seven developed countries (Australia, Canada, China (Hong Kong), Japan, Singapore, South Korea, and the U.S.) and six developing countries (Argentina, Brazil, China, India, Mexico, and South Africa). The nine European countries are: Belgium, France, Germany, Italy, Netherlands, Spain, Sweden, Switzerland, and the U.K. All regressions are run with five years of data, 2001 - 2005. The dependent variable is the annual growth rate in real GDP, LTIREM is the annual percent of firms with long-term incentive remuneration, INV is the annual growth rate of newly invested capital, LABOR is the average labor regulation index, and TI_CPI is the corruption perceptions index Transparency International which relates to the degree of corruption as seen by business people and country analysts and ranges between 10 (highly clean) and 0 (highly corrupt). The coefficients are time-series means of cross-sectional regression estimates with

cross-section fixed dummy variables on 22, 9, 13, 7, and 6 countries, respectively. The coefficients for the fixed effects dummies are not reported since they sum to one and are not relevant to the discussions.

In all our panel least square regressions (Tables 8-10) we find a significant positive relationship between the annual real rate of GDP growth and the percent of firms offering long-term incentive remuneration for all samples except the nine European countries. For the European sample we find a significant positive relationship between the annual real rate of GDP growth and TI_CPI, which means the lack of (as perceived) corruption promotes national economic prosperity.

Table 10: Panel least squares regression results on GDP growth.

	All countries (N = 22)	European countries (N = 9)	Non-European countries		
			All (N = 13)	Other developed (N = 7)	Developing countries (N = 6)
Intercept	0,0091	-0,0529	-0,1020	-0,1177	-0,0726
t-statistic	0,1570	-1,4585	-1,0017	-0,8643	-0,5163
p-value	0,8756	0,1542	0,3214	0,3956	0,6110
LTIREM	0,0736	0,0060	0,1376	0,1812	0,1202
t-statistic	2,8050	0,3575	3,4070	3,4144	1,7606
p-value	0,0062	0,7230	0,0013	0,0022	0,0929
INV	0,0696	-0,0163	0,0803	0,0669	0,0856
t-statistic	6,3077	-1,3376	5,8047	2,2318	4,2946
p-value	0,0000	0,1902	0,0000	0,0348	0,0003
TI CPI	-0,0054	0,0086	0,0089	0,0016	0,0159
t-statistic	-0,6273	1,7228	0,5412	0,0918	0,4442
p-value	0,5321	0,0943	0,5908	0,9276	0,6614
Number of panel observations	110	45	65	35	30
Adjusted R ²	0,5994	0,4782	0,6531	0,4777	0,6745
F-Statistic	7,7943	4,6654	9,0340	4,4553	8,5101
Durbin-Watson statistic	1,7517	2,4718	1,8121	2,2865	1,5944

This table presents the panel least squares regression results for all countries (22 cross-sections), European countries (nine cross-sections), and non-European countries (13 cross-sections). For the non-European countries, the data is further divided into seven developed countries (Australia, Canada, China (Hong Kong), Japan, Singapore, South Korea, and the U.S.) and six developing countries (Argentina, Brazil, China, India, Mexico, and South Africa). The nine European countries are: Belgium, France, Germany, Italy, Netherlands, Spain, Sweden, Switzerland, and the U.K. All regressions are run with five years of data, 2001 - 2005. The dependent variable is the annual growth rate in real GDP, LTIREM is the annual percent of firms with long-term incentive remuneration, INV is the annual growth rate of newly invested capital, and TI_CPI is the corruption perceptions index Transparency International which relates to the degree of corruption as seen by business people and country analysts and ranges between 10 (highly clean) and 0 (highly corrupt). The coefficients are time-series means of cross-sectional regression estimates with cross-section fixed dummy variables on 22, 9, 13, 7, and 6 countries, respectively. The coefficients for the fixed effects dummies are not reported since they sum to one and are not relevant to the discussions.

VII. Conclusion

The results from our empirical study on 22 countries (Table 7-10) support the findings in our experiment of the vicarious agency effects and the notion that long-term executive incentives enhance national economic prosperity. Hence our experiments provide an indication that such prosperity is driven by the indirect effect of vicarious agency – as CEOs observe and learn from the incentives given to peer CEOs. A similar argument has previously been presented for within-firm effects of CEO incentives – the managerial tournament theory – whereas we broaden the argument to between-firm effects.

Our results have implications for both corporate decision-makers (particularly compensation committees) and public policy makers. The results suggest that companies do not necessary need to have strong incentives in order to maximize CEO effort - but that there is a need for CEOs to believe that they will be rewarded in line with industry or country peers in the long term. From a public policy view, this study suggests that the national economic rewards from incentives based CEO pay is beyond its effect on the individual firm – and that significant impediments to such incentive systems (which is currently discussed in a number of countries) – might come at the cost of lower economic growth.

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