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The Economic Psychology of Incentives: An International Study of Top Managers

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ABSTRACT

The world-wide inflation in executive compensation in recent years has been accompanied by an increase in the prevalence of long-term incentives. This article demonstrates how the subjectively perceived value of long-term incentives is affected by risk aversion, uncertainty aversion, and time preferences. Based on a unique empirical study which involved collecting primary data on executive preferences from around the world, and using a theoretical framework which draws on behavioral agency theory, we conclude that, while long-term incentives are perceived by executives to be effective, they are not in fact an efficient form of reward. This outcome is not significantly affected by cross-cultural differences. We conjecture that boards of directors, acting on behalf of shareholders, increase the size of long-term incentive awards in order to compensate executives for the perceived loss of value when compared with less risky, more certain and more immediate forms of reward.

Keywords: Agency Theory, Behavioral Economics, Executive Compensation, Motivation, Long-term Incentives

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1. Introduction

In parallel with the widely reported inflation in executive pay around the world during the last twenty years (Boyd, Santos, & Shen, 2012), long-term incentives have come to represent an increasingly large proportion of total compensation. Although long-term incentives take many forms, they typically comprise a deferred award of company stock whose vesting is contingent upon the satisfaction of a time condition (for example, that the holder is still employed by the company on the third anniversary of the date of award) and sometimes also on a financial performance condition (for example, that the total shareholder return of the employing company outperforms that of comparator companies) (Milkovich, Newman, & Gerhart, 2011; Pepper, 2006). For the purposes of this paper, we define long-term incentives broadly, to include share-based incentives such as stock options, restricted stock and performance shares, as well as equity-linked cash-based incentives such as phantom options, and stock appreciation rights.

In the United States, long-term incentives comprised 47.8% of the total earnings of top executives in Fortune 500 companies in 2010, up from 44.7% in 2006; in the United Kingdom the corresponding percentages in FTSE350 companies were 49.6% in 2010 and 39.7% in 2006[1]. In recent years there has been a new emphasis on long-term incentives in Germany (Heimes & Seemann, 2011), France and other parts of Western Europe, and they have also become increasingly common among large companies in both China (Conyon & He, 2012) and India (Chakrabarti, Subramanian, Yadav, & Yadav, 2012). Among the major developed nations, only Japan continues to play down the importance of long-term incentives

(Sakawa, Moriyama, & Watanabel, 2012). Bebchuk and Grinstein (2005) maintain that the increased acceptability and use of equity-based compensation is a significant cause of the overall rise in executive pay. Similarly, Gayle and Miller (2009) argue that much of the recent growth in managerial compensation is attributable to increases in option grants and stock awards.

Long-term incentives also represent an important application of agency theory, which postulates that incentive contracts are a key moderator of agent performance. According to standard agency theory (Jensen & Meckling, 1976), the relationship between pay and performance is essentially a linear one: the greater the proportion of executive pay which is delivered in the form of incentives, the better the alignment of interests between shareholders and their agents, and the better (other things being equal) executive performance. Given the apparent force of the academic underpinning, it is no coincidence that in western capitalist economies long-term incentives have come to comprise such a significant proportion of executive pay. However, it has been apparent for some time that agency theory has shortcomings. In the 1990s, empirical work carried out by Jensen and Murphy (1990) failed to establish a conclusive link between CEO pay and stock price performance. Ten years later, in a meta-analysis of 137 empirical studies, Tosi, Werner, Katz and Gomez-Meija (2000) similarly found that incentive alignment as an explanatory agency construct for CEO pay was at best weakly supported by the evidence. More recently, Frydman and Jenter (2010) have argued, based on a review of U.S. executive compensation data covering the period 1936 to 2005, that neither optimal contracting (agency theory) nor the managerial power hypothesis is fully consistent with the available evidence. John Roberts, another agency theorist, has commented that agency theory performed poorly during the 2008-9 financial crisis, arguing that strong incentives may have exacerbated some of the behaviors which contributed to the crisis (Roberts, 2010). We conclude, like others (e.g., Cuevas-Rodriquez,

Gomez-Mejia, & Wiseman, 2012) that the time is now ripe for new empirical research and for a re-theorizing of the principal-agent model as it applies to executive compensation.

This paper reports the findings of an international empirical study of long-term incentives, drawing on concepts and methods from the behavioral economics literature, especially behavioral-agency theory (Pepper & Gore, 2012; Rebitzer & Taylor, 2011; Sanders & Carpenter, 2003; Wiseman & Gomez-Mejia, 1998). It builds on an earlier study by (Pepper, Gore, & Crossman, 2013), and employs a new, much larger, international data set. We pose the question: "Are long-term incentives perceived by executives to be effective, and are they in fact an efficient way of compensating agents?" We define effectiveness and efficiency in the following terms. A plan, program or policy is considered to be "effective" if it achieves its intended objectives, which in the case of long-term incentives are to motivate executives and to align their interests with those of shareholders. A plan, program or policy is "efficient" if it causes inputs to be minimized for a given level of outputs, or outputs to be maximized for a given level of inputs. We place particular emphasis on agent motivation, following Leibenstein (1966) in arguing that, where labor is an input, a choice or allocation is not efficient if the available amount of labor is not fully motivated to provide maximum effort and give high performance.

By adopting effectiveness as well as efficiency as criteria of assessment, we follow a long line of management theorists dating back to Barnard (1938 |1968)[2]. Simon (1945 |1997) pointed out that the terms "effectiveness" and "efficiency" were considered to be almost synonymous until the end of the 19th century and were generally thought to mean the power to accomplish the purpose intended. The meanings of the two words subsequently diverged and efficiency, defined in terms of the relationship between inputs and outputs, came to be used, first in engineering and subsequently in economics, as the main criterion of assessment. We argue that there is a logical connection between effectiveness (F) and efficiency (E).

While something can be "effective and efficient" (i.e., F $\wedge$ E, such that {p: p $\in$F and $\in$E}) or "neither effective nor efficient" (~ F $\wedge$ ~E; {p: p $\notin$F and $\notin$E}), we argue that it is not meaningful to say that something is "efficient but not effective" (~F $\wedge$ E; i.e.,{p: p $\in \emptyset$}): formally $\forall$x(Ex $\rightarrow$ Fx, i.e., a lower cost, or no cost at all, could always be incurred while still failing to achieve the desired objectives; the concept of effectiveness is already implied by the concept of efficiency). It is, however, entirely possible for something to be "effective but not efficient" (F $\wedge$ ~E; {p: p $\in$F and $\notin$E}), a logical possibility the importance of which will be apparent in the latter part of this paper.

In this article, we advance the proposition that the widespread use of long-term incentives may have contributed to inflation in executive pay. Although based on a fundamentally different logic, this is consistent with previous research by Lambert, Larcker and Verrechia (1991), Meulbroek (2001), Hall and Murphy (2002) and Buck, Bruce, Main and Udueni (2003), on which we comment further in the theory and discussion sections. The paper proceeds as follows. It begins by setting out a theoretical framework based on behavioral-agency theory, from which three research propositions are derived. We explain our research methodology, before reporting the results generally, and then by country, under the headings of risk and uncertainty aversion, time discounting and the perceived effectiveness of long-term incentives. We correlate our results with Hofstede's cross-cultural measurement framework (Hofstede, 1981 | 2001). We also examine the data by reference to sex, age and industry sector. A discussion section follows, in which the results are analyzed by reference to the three research propositions, before the article concludes.

2. Theoretical framework

Behavioral-agency theory (Pepper & Gore, 2012) places the relationship between executive compensation, agent performance and firm performance at the center of the agency

relationship. It assumes bounded rationality (Simon, 1987 |1997), which Foss (2010) has described in terms of: (1) limitations in the human capacity to process information; (2) attempts to economize on mental effort by relying on short-cuts or heuristics; and (3) a consequence of the fact that cognition and judgement are subject to a wide range of biases and errors. Behavioral-agency theory models the performance of an agent (ā) as a manager of a large firm in terms of his or her ability (A), motivation (M) and work opportunity (O). This is sometimes known as the "AMO" model after Appelbaum, Bailey, Berg & Kalleberg (2000) and Boxall & Purcell (2003). Agents will perform if they have the ability (the necessary knowledge, skills and aptitude), the motivation, and the right opportunities (including the necessary work structures and business environment). The mechanism which links the job performance of an individual agent with the performance of the firm is explained by incorporating upper-echelons theory (Carpenter, Geletkanycz, & Sanders, 2004; Finkelstein, Hambrick, & Cannella, 2009; Hambrick & Mason, 1984). This postulates a causal connection between business performance (the dependent variable), the cognitive skills of top managers, their observable personal characteristics (e.g., age, education, experience, socio-economic background etc.), their strategic choices, and the objective situation (independent variables). Behavioral-agency theory simplifies the upper-echelons approach in the interests of theoretical parsimony by taking the financial performance of a firm to be a function of the performance of the first agent ($P_{\bar{a}}$), the performance of other agents in the firm's top management team (P_n), and the external business environment (B). A tacit assumption is that a firm's business strategy is devised and implemented by the top management team. "Top managers" (and hence the "top management team") are defined as the most senior executives of a company who are responsible for defining and executing a firm's strategy and who, through their actions, are capable of affecting the company's profits, share price, reputation and market positioning (Carpenter *et al.*, 2004; Pepper, 2006).

Behavioral-agency theory places much greater emphasis on agent motivation than the standard agency model, which focuses primarily on the alignment of the interests of principals and agents (Eisenhardt, 1989). The underlying assumptions in the standard agency model are that organizations are profit-seeking, agents are rent-seeking and there is no non-pecuniary agent motivation (Besley & Ghatak, 2005). It is also assumed that an agent's utility is positively contingent on pecuniary incentives and negatively contingent on effort, that motivation and effort both increase monotonically with additional rewards, and that the pay-effort function is a straight line with a positive gradient proceeding from bottom left to top right. Effort is considered to be a key identifier of motivated behavior (Ebert, 2010), so "effort" and "motivation" are frequently used interchangeably, although strictly speaking the former (effort) is a visible manifestation of the latter, a mental state (being motivated).

The theory of work motivation most commonly used by psychologists in investigations into the motivational impact of pay and monetary incentives is expectancy theory (Vroom, 1964). According to expectancy theory, motivational force is a function of valence, instrumentality and expectancy. Vroom expressed his central theory in two linked propositions: first, an outcome (j) acquires valence (V_j) because of its perceived instrumental connection (I_{jk}) to another valent outcome (V_k); secondly, the motivational force (M_i) on a person to act is equal to the product of the expectancy (E_{ij}) that an action (i) will be followed by a particular outcome (j), and by the valence of that outcome (V_j). Expectancy (a measure of expected probability) takes values between 0 and +1, while valence (a measure of subjectively perceived value) takes values from +1 (positively desired) to -1(positively not desired).

In this article, we adopt a variation of expectancy theory first proposed by Steel and König (2006) as part of an integrative theory of motivation which they call "temporal motivation theory". Steel and König argue that extrinsic motivation can best be understood in

terms of expectancy and valence, weakened by delay, influenced by risk and uncertainty, with different valences for perceived gains and losses. Expectancy and valence are both calculated in accordance with prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). Time effects are determined by a hyperbolic discount function after Ainslie (1991), rather than the more conventional exponential discounting function used in finance and discounted utility theory. Hyperbolic discounting has been extensively tested in experiments and in field research (Frederick, Loewenstein, & O'Donoghue, 2002) and is the dominant theory of inter-temporal choice favored by behavioral economists (see Graves & Ringuest, 2012). Stated formally:

$$M_i = \left\{ \frac{E_{ik}^{pt} \times V_k^{pt}}{1+ \delta t} \right\} \quad (1)$$

where M_i is the motivational force to perform act i, E_{ik}^{pt} is the expectancy that act i will lead, via j, to outcome k, V_k^{pt} is the valence for outcome k, δ is the personal discount factor for the delay between act i and outcome k, and t represents the time-lag. Economists will recognize this equation as an expected utility function. Vroom's contribution in the 1960s was to turn an economic theory of rational choice (expected utility theory) into a psychological theory of motivation (expectancy theory) (Pepper & Gore, 2012).

A number of scholars, working deductively in a rational choice framework, have argued that the cost of equity incentives will often significantly exceed the value of those incentives as calculated by risk-averse, undiversified executives who are unable to sell stock or hedge their risk (Buck *et al.*, 2003; Hall & Murphy, 2002; Lambert *et al.*, 1991; Meulbroek, 2001) . We also argue that the subjectively perceived value of long-term incentives is systematically underestimated by senior executives, but for reasons of economic psychology (drawing on behavioral-agency theory) rather than rational choice. An important implication of Equation (1) is that subjectively perceived value, or "valence", as we call it after Vroom (1964), will be affected by risk aversion, uncertainty aversion, and time discounting. Accordingly, we use

the behavioral-agency framework to generate a number of research propositions about executive compensation. The first two propositions, which both relate to the efficiency of long-term incentives, are as follows:

> *Proposition 1: The valence of long-term incentives is systematically under-estimated by senior executives because of the way that risk is subjectively assessed (i.e., risk aversion) and as a result of the cognitive response to uncertainty (i.e., uncertainty aversion).*
>
> *Proposition 2: The valence of long-term incentives is systematically under-estimated by senior executives because of the way that time preferences are discounted.*

Previous empirical work on long-term incentives has tended to focus on single-country or sometimes dual-country data sets. One criticism of executive compensation research in general is that there has been a relative absence of many genuinely international studies (Boyd *et al.*, 2012). This is possibly because of problems in obtaining comparable multi-country datasets. The current research is, however, truly international, involving participants from more than 17 countries. The impact of cultural differences on risk, uncertainty and time preferences is an important part of the analysis. Empirical investigations into prospect theory and time discounting, both of which are embedded in the behavioral-agency model via Equation (1), appear to indicate that, while there are measurable differences between countries, cultural differences do not cause risk, uncertainty and time preferences to depart from the general precepts of prospect theory and hyperbolic discounting. In other words, the behavior of people in most countries tends to be in accordance the general predictions of prospect theory and hyperbolic discounting (Rieger, Wang, & Hens, 2011; Wang, Rieger, & Hens, 2010). There are, nevertheless, measurable differences between national cultures. In anthropological terms, the behavioral-agency theory account is therefore etic not emic. Accordingly, we frame the third research proposition as a null hypothesis:

Proposition 3: Notwithstanding measurable differences between national cultures, the outcomes of propositions 1 and 2 are not significantly affected by cross-cultural variations.

To summarize: we argue that, when long-term incentives are examined in the context of a new set of assumptions about agent behavior derived from behavioral-agency theory, a number of important questions are raised about how long-term incentives are subjectively valued by senior executives, the extent to which this is affected by the national culture of the agent, and the implications for executive behavior. These lead us to question whether long-term incentives are in practice an effective and efficient way of compensating executive agents.

3. Methods

3.1. Data collection

Primary empirical data on the preferences and attitudes of managerial elites are notoriously hard to gather (Pettigrew, 1992). Accordingly, the authors entered into an arrangement with an international research firm, part of an international business news and financial information group. The research firm gathered data from its global panel of independent senior executives, using a questionnaire designed by the authors. The data were collected during October and November 2011. The panel is built around the subscriber network of an international business magazine and website (Forbes magazine and Forbes.com). The sample was selected from the panel by identifying potential survey respondents based on a list of pre-selection criteria (earnings, job title, company size etc.) to ensure as far as possible that only "top managers" as defined for the purposes of the study were included within the sample. A panel-screener questionnaire was used to ensure that only panelists who met the pre-selection criteria were targeted. Participants were subsequently re-qualified according to the pre-

selection criteria by including further screening questions within the survey instrument itself. Invitations were issued to 12860 executives by email, and 756 people agreed to participate, a response rate of around 6%. While this was disappointing, low response rates are a common problem when surveying senior executives , particularly on a sensitive topic like executive pay (Cycyota & Harrison, 2006; Pepper *et al.*, 2013). Cross-national industrial surveys are also prone to low response rates (Harzing, 2000). These factors have a tendency to compound. As a result, while response rates of 30-35% can be expected in single country surveys of top managers (e.g., Collins & Clark, 2003), response rates in international studies are often significantly lower (e.g., Geletkanycz & Black, 2001; Schlegelmilch & Robertson, 1995). A consequence is that non-response bias is a risk in the present case. Cascio (2012 p.2541) describes this as occurring: "in a statistical survey if those who respond to the survey differ in important respects from those who do not respond (e.g., employee or asset size and industry representation of organizations; respondents from HR vs. those from finance, accounting, or sales). While we note this point below in the limitations section, we have addressed the issue in part by a careful examination of the sample demographics, which showed that a wide range of ages, senior roles, company types, company sizes, industries and countries were represented in the sample. A chi-squared (χ^2) test for goodness of fit was used to test the sample against the panel demographics. The results demonstrated that there was no significant difference between the demographic profile of the sample and the panel data: χ^2 (df = 62, N =756) = 2.57, $p < 0.005$, indicating, with a high degree of probability, that the sample was representative of the panel. χ^2 tests at individual factor level (i.e., age, gender, job title etc.,) were also calculated and the results were consistent with this conclusion. The main demographics are summarized in Table 1. Of the 756 participants, 365 had long-term incentives, representing 48.3% of the total sample. This is in line with the industry averages for the U.S. and U.K., as described in the introduction.

TABLE 1 ABOUT HERE

The results were analyzed in aggregate, comparing participants with and without long-term incentives, and by segmenting the data into 17 country groups. Participants were categorized into three earnings bands: $350,000 and under (n = 506); $350,000 - $724,999 (n = 178); $725,000 or more (n = 72). Further segmentation was carried out by gender, age and, given the significance of incentives in banking, insurance and asset management, by comparing the results for participants employed in the financial-services industry with those of participants employed in other industry sectors.

3.2. Questionnaire

The questionnaire contained 18 questions on the behavioral aspects of senior executive reward systems, of which 11 questions related to risk, uncertainty, time discounting and the effectiveness of long-term incentives. Other parts of the questionnaire were designed to investigate intrinsic motivation and inequity aversion and will be the subject of a separate paper. The survey instrument was translated from English by a professional translation service into Chinese, Spanish, Portuguese, German, French, Russian and Polish. All monetary amounts were stated in U.S. dollars. Separate questionnaires were issued to participants in the three earnings brackets. In the lowest earnings bracket ($350,000 and under) the questionnaire began with a question on risk which invited participants to choose between a gamble (50% chance of winning $5,250; otherwise nothing), a fixed amount ($2,250 for certain), or to indicate that they were indifferent between the two options. The second question reframed this as a choice between a bonus of $90,000 (with a 50% chance of receipt) or a fixed payment of $41,250. In both cases, the fact that a fixed probability was

provided meant that participants could calculate the expected values and risk premiums of the gambles. In the first case, the expected value of the gamble is $2,625, representing a risk premium on the certain option of 16.7%. In the second case the expected value of the gamble is $45,000, representing a risk premium of 9.1%. To put this in context, rational choice risk premiums are estimated by Conyon, Core and Guay (2011) at between 5.8% (for an executive with a relative risk aversion factor of 2 and 50% of his or her wealth tied-up in firm equity) and 11.0% (risk aversion factor 3, 67% of wealth in firm equity). The risk premiums implied by the questions in the present questionnaire were therefore above, or at the upper end of, this range

The three questions on uncertainty invited participants to choose between more certain and less certain outcomes where the expected value of one of the options could not be accurately calculated. For example, one of the questions was framed as follows:

> *Given that the annual bonus of a senior executive a large company is around $45,000 and the median long-term incentive award is around $67,500 per year per year, which of the following choices would you prefer? (A) A guaranteed bonus of $45,000 payable in three years' time. (B) A guaranteed bonus of 10,000 shares deliverable in three years' time. The current share price is $4.50. In the last 12 months the share price has fluctuated between $2.25 and $6.75. (C) Indifferent between A and B.*

Assuming a risk free rate of, say, 1% (on the basis that when the questionnaire was issued in 2011 U.S. Treasury yields for were 0.05% for 3 month bonds, 0.75% for 3 year bonds and 2.78% for 10 year bonds), stock volatility of 50%, no dividends, and a nominal strike price (as this is restricted stock) the Black-Scholes value of the share award in choice (B) was calculated to be $4.50. This is also the value which participants were expected intuitively to calculate based on the limited data available in the question.

Three questions were designed to investigate the rate at which participants discounted future receipts. For example, one of these questions asked:

> *Given that the median long-term incentive award of a senior executive of a large company is around $67,500 per year, which of the following choices would you prefer? (A) A chance of receiving $37,500 tomorrow with a probability of 75%; otherwise nothing. (B) A chance of receiving $90,000 in three years' time with a probability of 75%; otherwise nothing. (C) Indifferent between A and B.*

The discount rate implied in this question (the rate at which $90,000 must be discounted in order to equate to a net present value of $37,500) is 34%. The question was then repeated, except that the amount in (A) was increased to $56,250, representing a discount rate of 17%. These two discount rates were chosen to provide separate triangulation points from which median discount rates could be estimated. The 75% probability factor was inserted into both options in order to ensure that participants did not reframe the choice as a certain sum received (more or less) immediately with a risky sum received in future. Thus the question was designed as far as possible to ensure that participants were assessing temporal factors, not risk.

Three questions examined the motivational impact, perceived value and perceived effectiveness of long-term incentives by asking survey participants to comment on three pairs of statements (e.g., "I am strongly motivated by the opportunity to participate in my firm's long-term incentive plan" vs. "I am not particularly motivated by the opportunity to participate in my firm's long-term incentive plan"), with answers being recorded on a five-point Likert scale.

Questions of identical form to the above were used for participants in the two higher earnings brackets ($350,000-$725,000 and $725,000 or more) but the amounts at stake in each question were benchmarked at a higher level, appropriate for the relevant earnings band.

For example, the bonus gamble in the second question ($90,000 vs. a fixed payment of $41,250) compares with an amount of $320,000 vs. a fixed payment of $145,000 in the middle earnings bracket and $555,000 vs. $247,500 for certain in the highest earnings bracket.

3.3. Data analysis

The data were analyzed using IBM SPSS Statistics version 19. Reliability (internal consistency) was assessed at an individual level of analysis by calculating Cronbach's α in the case of questions arranged in triplets, and inter-item correlations for questions arranged in pairs where Cronbach's α is not normally appropriate (Pallant, 2007). As well as providing descriptive statistics, indices for risk aversion and uncertainty were calculated at a country level of analysis by dividing the difference between the total number of participants choosing options A and B by the sum of the total number of responses to A plus B. Participants who were indifferent to the outcome and selected option C were ignored. The range of possible results varied between +1 (less risk averse, more tolerant of uncertainty) to -1 (more risk averse, less tolerant of uncertainty). A similar approach was taken in calculating an index of the perceived effectiveness of long-term incentives by taking 1 and 2 in the Likert scale as positive (i.e., index = +1), 4 and 5 as negative (i.e., index = -1), and 3 as the midpoint (i.e., index = 0). A temporal discount factor was calculated using the results of question 2 on time (in which a discount rate of 34% is implied), question 3 (implied discount rate 17%) and adopting linear algebra to estimate the median rate.

In order to assess reliability (external equivalence), country results were correlated with Hofstede's cross-cultural measurement framework. Risk aversion, uncertainty aversion and time discounting were tested for correlations with Hofstede's four original cultural dimensions, plus long-term versus short-term orientation, using Hofstede's most recent data

matrix. Two of the cultural dimensions identified by Hofstede (1981 | 2001) and Hofstede and Bond (1988) were predicted to be particularly relevant. First, individualism-collectivism (IDV): Weber and Hsee (1998) argue that collectivism acts as mutual insurance against losses, such that members of a collectivist culture, like China, perceive the risk of risky options to be smaller than members of an individualistic culture, like the United States. Therefore, according to Weber and Hsee, the rank-order of country individualism should predict rank-order differences in risk aversion. Secondly, long-term versus short-term orientation (LTO), the fifth dimension of national cultures identified by Hofstede and Bond (1988), was, for self-evident reasons, predicted to be associated with the rank-order of temporal discounts (Wang *et al.*, 2010).

A third cultural dimension identified by Hofstede, uncertainty avoidance (UAI), might also have been expected to be relevant to the current enquiry. However, the term "uncertainty aversion" is used in this paper in the sense defined by Knight (1921 | 2006) i.e., indeterminable probability. This is not the same as UAI, which Hofstede defines in terms of employment stability, rule orientation and aversion to stress (Hofstede, 1981 | 2001). The two items are not, therefore, correlates. Bontempo, Bottom and Weber (1997) have, alternatively, associated uncertainty avoidance with risk aversion, but Hofstede explicitly states that uncertainty avoidance is not the same as risk avoidance (Hofstede, 1981 | 2001: 148). For these reasons, correlations between UAI and the measures employed in the study were not assumed.

The results of the study are reported below, first in aggregate, then by country, and finally for the major variables (risk aversion, uncertainty aversion, time discounting and perceived LTI effectiveness). We also comment on the differences arising by reference to sex, age and industry sector in which the survey participants were employed. A discussion section follows.

4. Results

The aggregate results of the study are set out in Table 2. For convenience, the findings are reported by reference to the amounts set out in the questionnaire which covered the lowest earnings bracket. The results shows a distinct skew towards smaller, less risky options, indicating risk aversion (the average risk index for all participants was -.24), smaller more certain choices (average uncertainty index of -.10), and more immediate outcomes, evidenced by very high average temporal discount rates (the average estimated time discount rate for all participants was 33%). There was no significant difference in risk and time preferences between participants who had long-term incentives and those who did not which, given the focus of the study on incentives, contributes to the validity of the results. Participants with long-term incentives had less pronounced uncertainty index scores (-.04) than all participants (-.10), but the index was still negative. Notwithstanding these results, long-term incentives were generally perceived to be quite effective, with an average effectiveness index for all participants of .14.

TABLE 2 ABOUT HERE

Comparative results by country are set out in Table 3 and examined in more detail below. Skewness (scores of < 1.0), kurtosis (scores of < 1.2) and the results of a Shapiro-Wilk test ($p > .05$) were all indicative of approximate normality (Hatcher, 2013). The distribution of the risk index was positively skewed (i.e., the mass of the distribution was concentrated on the left of the median) with a median score of -.24 and a 95% probability upper bound of -.11. In a similar way, distribution of the uncertainty index was positively skewed around a median of -.09 with an upper bound of -.05. Taken together, these results are consistent with

the first research proposition: senior executives systematically under-estimate the valence of long-term incentives as a result of their aversion to risk and uncertainty.

The time discount score was positively skewed around a median of 31.0%, with a 95% lower bound of 24.6%, indicative of time discount rates significantly in excess of both inflation and standard financial discount rates. This is consistent with the second research proposition that senior executives systematically underestimate the valence of long-term incentives because of the way that time preferences are discounted. In contrast, the LTI effectiveness index was negatively skewed (i.e., the mass of the distribution was concentrated on the right of the median) with a median score of .13 and a 95% probability lower bound of .09, indicating that for most participants long-term incentives were perceived to be quite effective.

While it is evident that there are indeed measurable differences between countries, what is also apparent is that cultural differences do not appear to cause risk, uncertainty and time preferences to depart from the general precepts of prospect theory and hyperbolic discounting, supporting the general argument of Rieger *et al* (2011) and Wang *et al* (2010).

TABLE 3 ABOUT HERE

4.1. Risk and uncertainty aversion

On average participants preferred smaller, less risky outcomes to larger, more risky ones. This tendency becomes more marked in response to the second question when the amount involved (described as a bonus) was larger. The overall results (risk index for all participants = -.24, country mean = -.23, standard deviation = .23) were consistent with prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992), and support Proposition 1.

Outliers included France (risk index = .01), China (.08) and Mexico (.32), suggesting a greater than average appetite for risk among senior executives in these countries. The results for participants with Chinese cultural roots were consistent with Weber and Hsee (1998) and Hsee and Weber (1999), who found that the Chinese were significantly less risk averse than members of Anglo-Saxon cultures. Hsee and Weber attribute this to "cushioning" – the expectation of family and community support in the event that a loss is realized after selecting a risky option. Other collectivist cultures in Central and South America also show a significant degree of risk tolerance, consistent with our results for Mexico.

Attitudes towards uncertainty (i.e., indeterminable expected values) were similar to, though less pronounced than, attitudes towards risk. The overall result for participants indicated a degree of aversion to uncertainty (uncertainty index for all participants = -.10, country mean = -.08, standard deviation = .07) with a range from .08 (Argentina) to -.19 (Netherlands and the United Kingdom). This is also consistent with Proposition 1. The Chinese aversion to uncertainty (unknown probabilities) contrasts with their comparative tolerance of risk (known probabilities).

4.2. Time discounting

According to standard financial theory, individuals should discount future receipts at rates which are consistent with the return on comparably risky future cash flows, adjusted for inflation. In the present case, time discount rates should, therefore, have been close to the risk-free rate of around 1% per annum, subject to local inflation, which in 2011 varied between under 1% (Switzerland) to over 9% (Argentina) (see Table 3, column 3). Evidence from our study indicates that executives discount at much higher rates (median time discount rate for all participants = 33%, country mean = 33%, standard deviation = 15%). There was no significant correlation between time discounts and country inflation rates (r = .096, n =

17). This was no great surprise given our thesis that subjective time discount rates owe more to psychological factors than to rational choice responses to inflation. Participants in all countries discounted highly, with estimated median time discount rates varying from 14.6% in Germany to 69.7% in Mexico. These results support Proposition 2.

4.3. Perceived effectiveness of long-term incentives

The LTI effectiveness index was constructed from responses to three questions which asked participants how motivational, valuable and effective they perceived long-term incentives to be. The results were generally positive (LTI effectiveness index for all participants = .14 country mean = .13, standard deviation = .09) and, with the exception of Poland, country indices ranging from .04 (Russia and Mexico) to .28 (Australia). Poland was the only outlier, with an effectiveness index of only -.06. Poland aside, the results indicate that long-term incentives are generally perceived by plan participants to be effective, notwithstanding survey participants' attitudes to risk and uncertainty, and the high temporal discount rates applied to future receipts.

4.4. Hofstede correlations

The results of the correlation testing with Hofstede's five cultural dimensions are set out in Table 4. As predicted, there was a very significant correlation (-.642, $p < .01$, $n = 17$) at a country level of analysis between risk aversion and Hofstede's IDV dimension, as well as a significant correlation (-.596, $p < .05$, $n = 17$) at a country level of analysis between time discounting and Hofstede's LTO dimension. These data provide external support for the reliability of the risk aversion indices and time discounts. In Hofstede's framework, higher scores indicate greater individualism and a longer-term orientation, whereas in our framework a score of less than zero indicates greater risk aversion, and higher time discount

rates implying a shorter time horizon, hence in both cases the correlations are negative. The absence of any correlation between UAI and either the risk or uncertainty indices was also as predicted, given the difference between Knight's construction, which we have employed in this paper, and Hofstede's construction of uncertainty (see section 3.3 above).

TABLE 4 ABOUT HERE

4.5. Sex, age and industry sector

Although in some ways incidental to the main study, the data were also analyzed by gender (male vs. female), by age (in six age brackets: below under years, 40-44 years, 45-49 years, 50-54 years, 55-59 years, 60-64 years, and 65 years and over), and by industry sector in which survey participants were employed. Some interesting patterns were observed. There were noticeable differences between the sexes when it came to risk. Female executives (n = 137, risk index -.30) were significantly more risk averse than male executives (n = 619, risk index = -.23. This is consistent with the conclusions of Croson and Gneezy (2009) who reviewed the experimental economics literature and found strong support for the proposition that women are more risk averse than men (although they also note that observed differences in risk preferences are attenuated in the case of female managers, especially those who have professional investment expertise). An earlier review of the psychology literature on gender differences in risk-taking (Byrnes, Miller, & Schafer, 1999) reached a similar conclusion that women are generally more risk averse than men. There were also significant differences when it came to time preferences: women (time discount rate = 39%) discounted future receipts at a higher rate than men (time discount rate = 32%). When it came to uncertainty, there were only marginal differences between men (uncertainty index = -.11) and women

(uncertainty index = -.10). However, men (effectiveness index = .14) thought long-term incentives were more effective than women (effectiveness index =.11).

Secondly, executives aged between 55 and 59 (n = 80, risk index = -.38) were noticeably more risk averse than both younger and older executives. Indeed, but for the peak between 55 and 59, risk aversion gradually declined from -.28 under age 40 to -.12 at 65 years and over. The profile for uncertainty aversion fluctuated around -.11 (plus or minus .05) between the ages of under 40 and 64, before suddenly dropping below zero for executives of 65 years and over. Time discount rates started at 38% (for ages 40 and under) and remained relatively high, before eventually declining to 28% for those aged 65 years and over.

The pattern which emerged was that young executives were, relatively speaking, less risk averse but higher time-discounters than older executives. Executives in the middle age bracket appeared to be relatively conservative in their risk, uncertainty and time preferences. Older executives (aged 65 and over) were less averse to risk and uncertainty than younger executives, as well as being lower time-discounters. On the other hand, the perceived effectiveness of long-term incentives increased with age (under 40 years = .10; 60-64 years = .19) before falling away sharply for those aged 65 and over, presumably because at that age career expectations are generally shorter than the three year term of a typical long-term incentive plan.

Thirdly, executives working in the financial-services industry (n = 107, risk index = -.36) were more risk averse than those working in other industries, with the exception only of retail (n = 60, risk index = -.38). Financial-services executives were also high time-discounters (36% discount rate), but had a lower than average aversion to uncertainty (uncertainty index = -.04). Nicholson, Soane, Fenton-O'Creevy and Willman (2005) have found that people working in the finance sector are, in most domains of risk, relatively risk averse compared with people working in other industries (see also Fenton-O'Creevy, Nicholson, Soane, &

Willman, 2005). The other noticeable outlier was industrial manufacturing (n = 54), where executives participating in the study had a very balanced perspective on risk (risk index = .00), uncertainty (uncertainty index = .02), and were lower than average time-discounters (discount rate = 28%). Manufacturing executives were also the most positive about the effectiveness of long-term incentives (effectiveness index = .22).

5. Discussion and conclusions

The economic cost to a company of providing a long-term incentive is the amount that would be received were the company to sell an equivalent equity instrument to an outside investor rather than making an equity award to an executive (Hall & Murphy, 2002). In this article, we have demonstrated that the value of long-term incentives, as subjectively perceived by senior executives, is less than the economic cost to the company. We have already noted that this is not the first time that the efficiency of stock-based rewards has been questioned (Buck *et al.*, 2003; Hall & Murphy, 2002; Lambert *et al.*, 1991; Meulbroek, 2001). Previous arguments have assumed risk averse, non-diversified, but fully rational executives and have largely been based on the portfolio effect: rational investors seeking to balance their investment portfolio will discount disproportionate holdings of a single stock, especially when that stock is closely linked to their employment. We contend, in a way that is consistent with these earlier arguments but based on a fundamentally different logic, that senior executives underweight the value of their long-term incentives because of both risk and uncertainty aversion, as well as time-discounting effects, connected with their bounded rationality. We provide empirical evidence that indicates that executives' subjective perceptions of value in practice are, if anything, less than the values calculated deductively by rational choice theorists: put formally, we argue that: $C > V_r \geqslant V_b$, where C is the economic cost of an long-term equity incentive, V_r is the value to an executive calculated on a rational

choice basis and V_b is the subjectively perceived value to the executive computed on a bounded rationality basis.

The economic cost of a long-term incentive is also the amount which must be expensed in a company's accounts. Under the provisions of international generally accepted accounting principles (hereafter "international GAAP"), specifically U.S. FAS 123 (Revised) and IFRS2 (both entitled "Share-based payment") a company is required to measure the fair value of all equity instruments awarded in return for services received. They must charge this fair value against earnings over the period during which services are provided. The service period is normally the same as the vesting period of the award, typically three years. Fair value is calculated at the date that the award is granted and is defined for the purposes of IFRS2 as "the amount for which an asset could be exchanged, a liability settled, or an equity instrument granted could be exchanged, between knowledgeable willing parties in an arm's length transaction". In practice, share-based payments are often valued using the Black-Scholes method. Performance conditions relating to vesting, such as relative total shareholder return, are also taken into account in assessing fair value, with complex rules applying if estimates change. The overall effect is to ensure that, in aggregate, an amount corresponding to fair value at the grant date is charged against earnings over the vesting period of the instrument.

The calculations required by international GAAP demand an objective assessment of probabilities and value. Subjective factors that affect the way that the recipient of the share-based award estimates probabilities or value are not taken into account; yet the results of our research have demonstrated that the way senior executives assess valence is affected by risk aversion, uncertainty aversion and temporal discounting. The subjectively perceived value of a long-term incentive (i.e., the valence), to a senior executive, is inevitably less than the amount which the company providing the incentive has to account for as a cost.

Value is created in product markets when the amount a customer is willing to pay for a product or service is greater than the cost of providing that product or service, the surplus being shared between the supplier (profit) and the buyer (the customer's surplus). In a similar way, to the extent that a principal remunerates an agent such that the value of an award perceived by the agent is greater than the cost to the principal, then value is created (i.e., there is an efficiency surplus); conversely, if a principal remunerates an agent in such a way that the cost to the principal is greater than the value perceived by the agent, then value is destroyed (i.e., there is an inefficiency cost). Hall and Murphy (2002) argue that long-term incentives might still be efficient if the "incentive benefits" of the awards (the retention and pay-for-performance effects) exceed the inefficiency costs. By focusing on valence and incorporating agent motivation in our assessment, it is difficult to see in practice how this could ever be the case.

In summary, the evidence obtained from the current research has demonstrated that executives will typically perceive the value of long-term incentives to be less than the cost to the company, that the destruction of value this entails undermines agent motivation, that this in turn affects agent performance, and hence that providing long-term incentives entails a significant inefficiency cost for shareholders. In terms of the research propositions, we conclude that the empirical evidence provides support for both Proposition 1 (the valence of long-term incentives is systematically under-estimated by senior executives because of the way that risk is subjectively assessed and as a result of the cognitive response to uncertainty) and Proposition 2 (the valence of long-term incentives is systematically under-estimated by senior executives because of the way that time preferences are discounted). We further conclude, notwithstanding measurable differences between countries, that these results are not significantly affected by cross-cultural differences, thus supporting Proposition 3. In particular, it should be noted here that the relative degree of risk tolerance found in Mexico

and China is offset by conspicuous uncertainty aversion and high temporal discount rates. Our results indicate that the behavior of executives in the various countries studied tends to follow the general precepts of prospect theory and hyperbolic discounting. We conclude that long-term incentives are not an efficient way of motivating senior executives, irrespective of national culture.

It is also apparent from the generally positive responses in the survey to the questions about the motivational impact, attributed value, and perceived effectiveness of long-term incentives, underlined by the overall LTI effectiveness index score of .14, that long-term incentives *are* perceived by participants to be effective. As we have previously stated, efficiency is not the same as effectiveness. Long-term incentives could be effective even if they were not efficient. It is evident, therefore, in the formal language used in the introduction, that F∧ ~ E is true in the present case. We are left to consider why this slightly surprising result has been obtained: if long-term incentives are as inefficient as our data imply, how is it that they are, nevertheless, perceived to be effective in their twin objectives of motivating executives and aligning the interests of shareholders with their agents? Three possible answers to this question occur to us: (1) perhaps it is because the recognition which follows from being awarded a long-term incentive is more important to executives than the value of a long-term incentive; (2) perhaps it is because there are some further psychological heuristics and biases which cause executives to value their long-term incentives, taken as a whole, more highly then a deconstructed sum-of-the-parts calculation of individual components might suggest; or (3) perhaps companies have to increase the size of long-term incentive awards in order to compensate for the discounts which executives mentally apply. Although the first and second explanations are possible, the inflation in executive pay over recent years, combined with the increasing proportion of total compensation represented by long-term incentives which was referred to in the introduction, leads us favor the third

explanation. Accordingly, we advance the following conjecture: boards of directors, acting on behalf of shareholders, increase the size of long-term incentive awards to executives to compensate them for the perceived loss of value when compared with less risky, more certain and more immediate forms of reward. In other words, we argue that part of the explanation for the inflation in executive compensation is a consequence of the form in which compensation is provided. This is not the same as the managerial power or "board capture" hypothesis (Bebchuk & Fried, 2004; Bebchuk, Fried, & Walker, 2002) which proposes that executives exercise undue influence over boards, thereby encouraging non-executive directors to allow executive compensation to be inflated over and above the market clearing wage. Our argument is more subtle. We contend that boards of directors have unwittingly been caught in an isomorphic system, recommending the use of inefficient long-term incentives in the name of "best practice" and in accordance with the wishes of regulators, yet at the same time compensating executives for the perceived loss of value by increasing the size of awards, thus contributing to the overall inflation in executive pay. This is, we emphasize, a conjecture, by which we mean a statement which is thought to be true, has face validity, is internally consistent, and has not to date been demonstrated to be false (Popper, 1963). More evidence is required, but the conjecture is consistent with the phenomenon of executive pay inflation during the period that long-term incentives have come to comprise an ever greater proportion of total compensation. It is also, as we have already pointed out, consistent with the arguments based on rational choice theory and deductive logic advanced by Lambert, Larcker and Verrechia (1991), Meulbroek (2001), Hall and Murphy (2002) and Buck, Bruce, Main and Udueni (2003).

5.1. Contribution

We contribute to the literature on international executive compensation in various ways. In particular, by employing a unique set of primary data gathered from executives around the world, we demonstrate a number of problems with standard agency theory. Although our propositions are consistent with arguments previously advanced by some rational choice theorists (see above), framing these propositions in terms of preferences, perceptions, motivation and bounded rationality, and incorporating a reference (in Proposition 2) to time discounting, is entirely new. We also add to the growing literature on the behavioral-agency model and put forward further evidence that this provides a better framework for theorizing about executive compensation.

5.2. Limitations

There is a developing literature on methodological issues in international management research, notable examples being Schaffer and Riordan (2003) and Cascio (2012). This has identified a number of common problems, including in particular translation (or semantic), conceptual and metric (or scale) equivalence. We have relied heavily on the professional expertise of the research firm, which has extensive experience in carrying out multi-language global surveys, for the international validity of the research instrument. The fact that the survey participants are international senior executives, a relative sophisticated user group, is also helpful in this respect. Nevertheless, we recognize the residual risk of translation, conceptual and metric bias in our results.

The other limitation of the study relates to the low response rate, already commented on above, with the resulting risk of selection bias. We would argue that this was substantially compensated for by assembling a relatively large sample which was representative of the relevant population in terms of nationality, job function, age, sex and industry.

5.3. Managerial relevance

The principal application of our research is in rethinking the way that long-term incentive plans are designed by revisiting the psychology of incentives. As a minimum, we would recommend that compensation committees should consider how they can best communicate the value of long-term incentives to participants: might it be possible to reduce the gap between the perceived value and economic value of long-term incentives by explaining the benefits more effectively? More significantly, is it possible to alter certain features of long-term incentives in order to increase their perceived value? For example, complex performance criteria appear to increase the level of risk and uncertainty in long-term incentives and hence to reduce their perceived value. Executives might be more effectively motivated by receiving smaller awards which do not have complex performance conditions attached. Most radically, might it prove to be both more effective and efficient to arrest the trend of placing increasing reliance on high-powered long-term incentives? Roberts (2010) has argued that there are many circumstances when weak incentives may be more efficient and effective than strong incentives, including when good measures of an agent's effort or performance are not available, when multi-tasking is required, and when cooperation between different agents is necessary. These are, of course, all common situations where top management teams are concerned. We concur with this view. However, it runs counter to the current conventional wisdom about executive compensation which advocates that, because of inflation in executive pay, an increased proportion of compensation should be deferred and paid via long-term incentives.

Our argument is that causality may in fact be operating in reverse, that the increase in the proportion of pay which is delivered via long-term incentives may actually be contributing to inflation in executive compensation, and that a fundamental review of the form in which compensation is provided to senior executives is therefore required.

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Table 1
Demographics

Variable	All participants [a] N = 756		Panel N = 12860	
	Number	%	Number	%
Job title: [b]				
Chairman	61	8.0%	396	3.1%
CEO/President/Managing Director	293	38.8%	1703	13.2%
CFO/Treasurer/Comptroller	64	8.5%	465	3.6%
CIO/Technology Director	90	11.9%	404	3.1%
Other C-level Executive	72	9.5%	663	5.2%
Senior Vice-President/Vice-President/Director	144	19.0%	690	5.4%
Head of Business Unit	5	0.7%	915	7.1%
Head of Department	11	1.5%	1303	10.1%
Senior Manager	3	0.4%	2824	22.0%
Other Senior Executive	13	1.7%	3497	27.2%
Age: [c]				
Under 39	194	25.7%	3761	29.2%
40-44	142	18.8%	2550	19.8%
45-49	143	18.9%	2296	17.9%
50-54	115	15.2%	1783	13.9%
55-59	80	10.6%	1301	10.1%
60-64	51	6.7%	770	6.0%
65 +	31	4.1%	399	3.1%
Gender: [d]				
Male	619	81.9%	9824	76.4%
Female	137	18.1%	3036	23.6%
Industry sector: [e]				
Aerospace	12	1.6%	142	1.1%
Defense	6	0.8%	92	0.7%
Asset Management	9	1.2%	189	1.5%
Automotive	14	1.9%	337	2.6%
Banking and Capital Markets	38	5.0%	586	4.6%
Business services	55	7.4%	1053	8.2%
Capital Projects and Infrastructure	17	2.2%	178	1.4%
Chemicals	20	2.6%	263	2.0%
Communications	18	2.4%	426	3.3%
Energy, Utilities and Mining	23	3.0%	361	2.8%
Engineering and Construction	53	7.0%	950	7.4%
Entertainment and Media	22	2.9%	399	3.1%
Financial Services	37	4.9%	586	4.6%

Forestry, Paper and Packaging	12	1.6%	101	0.8%
Government and Public Services	10	1.3%	414	3.2%
Healthcare	34	4.5%	547	4.3%
Hospitality and Leisure	22	2.9%	450	3.5%
Industrial Manufacturing	54	7.2%	888	6.9%
Insurance	23	3.0%	331	2.6%
Metals	14	1.9%	183	1.4%
Oil and Gas	17	2.2%	281	2.2%
Pharmaceuticals and Life Sciences	15	2.0%	308	2.4%
Retail and Consumer	60	7.9%	1024	8.0%
Technology	69	9.1%	840	6.5%
Transport and Logistics	26	3.4%	411	3.2%
Other	76	10.1%	1520	11.7%
Country: [f]				
United States	123	16.3%	1417	11.0%
United Kingdom	34	4.5%	826	6.4%
France	35	4.6%	976	7.6%
Netherlands	55	7.3%	255	2.0%
Switzerland	40	5.3%	325	2.5%
Germany	31	4.1%	340	2.6%
Spain	30	4.0%	270	2.1%
Russia	45	6.0%	380	3.0%
Poland	30	4.0%	275	2.1%
Brazil	52	6.9%	395	3.1%
Mexico	28	3.7%	536	4.2%
Argentina	14	1.9%	170	1.3%
China	51	6.7%	1602	12.5%
India	31	4.1%	1161	9.0%
Australia	31	4.1%	626	4.9%
Middle East	75	9.9%	431	3.3%
South Africa	31	4.1%	410	3.2%
Other	20	2.6%	2463	19.2%

[a] Goodness of fit with the demographics of the underlying panel was tested using a χ^2 test, the overall result being χ^2 (62 df, N =756) = 2.57, $p < 0.005$, indicating a significant degree of fit. Goodness of fit at individual factor level are shown in the following notes b to f. [b] χ^2 (9 df, N =756) = 1.85, $p < .001$; [c] χ^2 (6 df, N =756.) = .011, $p < .005$; [d] χ^2 (1 df, N =756) = .017, $p < .25$; [e] χ^2 (25 df, N =756.) = .055; $p < .005$; [f] χ^2 (17 df, N =756) =.637, $p < .005$

Table 2
Aggregate results

Question		All participants N = 756			Participants with LTIs n = 365		
		A	B	C	A	B	C
Risk							
1	(A) Gamble $5,250 (p=0.50); (B) $2,250 (p=1.00); (C) Indifferent between A and B	284	363	109	145	170	50
		37.6%	48.0%	14.4%	39.7%	46.6%	13.7%
2	(A) Bonus $90,000 (p=0.50); (B) $41,250 (p=1.00); (C) Indifferent between A and B	222	473	61	103	231	31
		29.4%	62.6%	8.1%	28.2%	63.3%	8.5%
	Cronbach's α		.671			.653	
	Inter-item correlation		.512**			.492**	
	Risk aversion index		-.24			-.23	
Uncertainty							
1	(A) Winning $5,250 (p=0.50); (B) Winning $5,250 ($0.25 \leq p \leq 0.75$); (C) Indifferent between A and B	355	268	133	162	144	59
		47.0%	35.4%	17.6%	44.4%	39.5%	16.2%
2	(A) Bonus $45,000 in three years (p=1.00) (B) Bonus of 10,000 × P shares in three years ($\$2.25 \leq P \leq \$6.75$); (C) Indifferent between A and B	352	340	64	169	162	34
		46.6%	45.0%	8.5%	46.3%	44.4%	9.3%
3	(A) Bonus of $52,500 in three years if EPS growth is > RPI + 3%; (B) Bonus of 11,650 shares subject to relative TSR performance; (C) Indifferent between A and B.	382	284	90	174	158	33
		50.5%	37.6%	11.9%	47.7%	43.3%	9.0%
	Cronbach's α		.577			.626	
	Inter-item correlation	.271**	.278**	.406**	.303**	.340**	.444**
	Uncertainty aversion index		-.10			-.04	

Time								
1	(A) Winning $2,250 tomorrow (p=0.75); (B) Winning $5,250 in three years (p=0.75); (C) Indifferent between A and B	387	265	104	182	140	43
		51.2%	35.1%	13.8%	49.9%	38.4%	11.8%
2	(A) Bonus $37,500 tomorrow (p=0.75); (B) Bonus $90,000 in three years (p=0.75); (C) Indifferent between A and B	329	337	90	158	169	38
		43.5%	44.6%	11.9%	43.3%	46.3%	10.4%
3	(A) Bonus $56,250 tomorrow (p=0.75); (B) Bonus $90,000 in three years (p=0.75); (C) Indifferent between A and B	398	272	86	196	132	37
		52.6%	36.0%	11.4%	53.7%	36.2%	10.1%
	Cronbach's α		.783*			.755*	
	Inter-item correlation		.549** .474** .622**			.495** .432** .598**	
	Estimated median time discount rate		33%			32%	
LTI effectiveness							
1.	"I am strongly motivated to participate in my firm's LTIP": (A) Yes; (B) Neutral; (C) No	226	77	62	226	77	62
		61.9%	21.1%	17.0%	61.9%	21.1%	17.0%
2.	"I value the opportunity to participate in my firm's LTIP": (A) Yes; (B) Neutral; (C) No	229	66	70	229	66	70
		62.7%	18.1%	19.2%	62.7%	18.1%	19.2%
3.	"My firm's LTIPS in an effective incentive": (A) Yes; (B) Neutral; (C) No	191	100	74	191	100	74
		52.3%	27.4%	20.3%	52.3%	27.4%	20.3%
	Cronbach's α		.872 *			.872*	
	Inter-item correlation		.738** .648** .696**			.738** .648** .696**	
	LTI effectiveness index		.14			.14	

Reliability was assessed for pairs of questions by calculating inter-item correlations and for triplets using Cronbach's α. Optimal inter-item correlations are in the range .2 to .5 and the Cronbach's α scale should be above .7. In the case of the three questions on uncertainty Cronbach's α was between .5 and .7, but this was compensated for by satisfactory inter-item correlations. * α > .7 is acceptable (Pallant, 2007) ** Inter-item correlation is significant, p<.01, n = 365

Table 3
Country indices

Country	N = 756	Inflation rate[a]	Risk aversion index	Uncertainty aversion index	Time discount rate[b]	LTI effectiveness index
Argentina	14	9.5%	-.08	.08	31.2%	.07
Australia	31	3.4%	-.54	.03	44.4%	.28
Brazil	52	6.6%	-.12	-.07	43.0%	.12
China	51	5.4%	.08	-.04	30.5%	.16
France	35	2.1%	.01	.00	24.4%	.19
Germany	31	2.3%	-.38	-.07	14.6%	.26
India	31	8.9%	-.17	-.08	17.2%	.10
Mexico	28	3.4%	.32	-.16	69.7%	.04
Netherlands	55	2.4%	-.25	-.19	15.3%	.06
Poland	30	4.2%	-.24	-.12	48.2%	-.06
Russia	45	8.4%	-.38	-.09	34.0%	.04
South Africa	31	5.0%	-.30	-.09	52.1%	.15
Spain	30	3.2%	-.25	-.09	18.2%	.19
Switzerland	40	0.2%	-.29	-.17	15.0%	.12
United Arab Emirates	75	0.9%	-.38	-.12	39.4%	.13
United Kingdom	34	4.5%	-.62	-.19	27.4%	.26
United States	123	3.2%	-.34	-.10	30.8%	.17
Other	20	4.9%	-.21	-.90	49.0%	.27
Mean			-.23	-.08	33.0%	.13
Median			-.24	-.09	31.0%	.13
Standard deviation			.23	.07	15.0%	.09
95% confidence limit:						
Lower bound			-.35	-.12	24.6%	.09
Upper bound			-.11	-.05	40.5%	.18
Skewness			.70	.64	.83	-.22
Kurtosis			1.04	.35	.54	.05
Shapiro-Wilk test			p = .96	p = .94	p = .92	p = .97

[a] Source: World Bank, index of consumer price inflation, http://data.worldbank.org/indicator/FP.CPI.TOTL.ZG, downloaded 2nd April 2013.

[b] There was no significant correlation between time discount rates and the inflation: r = .096, n = 17

Table 4
Hofstede[a] correlations

	PDI	IDV	MAS	UAI	LTO
Risk index	.520	-.642**	.009	.267	.004
Uncertainty index	.067	-.123	.049	.193	-.198
Time discount rate	.369	-.290	.408	.242	-.596*

[a] The five Hofstede dimensions are abbreviated as follows: PDI = power distance, IDV = individualism vs. collectivism, MAS = masculinity vs. femininity, UAI = uncertainty avoidance, and LTO = long-term orientation.

* Correlation is significant $p<.05$, $n = 17$. ** Correlation is significant $p<.01$, $n = 17$

Notes

1. Based on data provided by The Conference Board ("The US Top Executive Compensation Report" 2006 and 2011) and Income Data Services ("Directors' Pay Report" 2006 and 2011).

2. It should be noted that Barnard used the term efficiency in a different way to that used here. To Barnard an organization was "efficient" if it satisfied the motives of its members.

3. http://www.geerthofstede.com/dimension-data-matrix (downloaded 3rd April 2013)