New theory on fairness in economics targets CEO pay

November 3 2009

(PhysOrg.com) -- Chief executives in 35 of the top Fortune 500 companies were overpaid by about 129 times their "ideal salaries" in 2008, according to a new type of theoretical analysis proposed by a Purdue University researcher to determine fair CEO compensation.

"One of the most pressing economic and corporate governance issues of the day is how to determine fair pay packages for CEOs," said Venkat Venkatasubramanian, a professor of chemical engineering. "The proposed theory allows us to compute what the fair pay is for a CEO, including bonuses and stock options, under ideal conditions."

The ratio of CEO pay to the lowest employee salary has gone up from about 40-to-1 in the 1970s to as high as 344-to-1 in recent years in the United States. However, the ratio has remained around 20-to-1 in Europe and 11-to-1 in Japan, according to available data, he said.

Using the new analysis method, Venkatasubramanian estimated that the 2008 salaries of the top 35 CEOs in the United States were about 129 times their ideal fair salaries. CEOs in the Standard & Poor's 500 averaged about 50 times their fair pay, raising questions about the efficiency of the free market to properly determine fair CEO pay, he said.

"You might ask why a chemical engineer is concerned with economics and CEO salaries," Venkatasubramanian said. "Well, it turns out that the same concepts and mathematics used to solve problems in statistical

thermodynamics and information theory also can be applied to economic issues, such as the determination of fair CEO salaries."

A key idea in his theory is the economic interpretation of the concept of entropy.

"There have been many attempts to find a suitable interpretation of entropy for economic systems without much success," Venkatasubramanian said. "Just as entropy is a measure of disorder in thermodynamics and uncertainty in information theory, what would entropy mean in economics?"

Venkatasubramanian identified entropy as a measure of "fairness" in economic systems, revealing a connection between statistical thermodynamics, information theory and economics.

"As we all know, fairness is a fundamental economic principle that lies at the foundation of the free and efficient market system," he said. "It is so vital to the proper functioning of the markets that we have regulations and watchdog agencies that break up and punish unfair practices such as monopolies, collusion and insider trading. Thus, it is eminently reasonable, indeed reassuring, to find that maximizing fairness, or maximizing entropy, is the condition for achieving economic equilibrium."

Using the new theory, the ideal pay distribution is determined to be "lognormal," a particular way of characterizing data patterns in probability and statistics.

"This is the economic equivalent of the Boltzmann distribution for ideal gases, which describes how the gas molecules are distributed at various energy levels," Venkatasubramanian said. "One may view our result as an 'economic law' in the statistical thermodynamics sense. The free

market will 'discover' and obey this economic law if allowed to function freely and efficiently without collusion-like practices or other unfair interferences."

The publication comes at a time when Congress is grappling with the issue. The Federal Reserve announced a plan on Oct. 22 to eliminate excessive pay packages that might encourage bankers to take reckless risks. The Obama administration pay czar, Kenneth R. Feinberg, has announced plans to reduce executive pay at companies that received the most federal bailout money, slashing the base salaries of those top executives and setting top pay at $200,000 for AIG executives in the financial products division.

Until now, however, there has been no scientific way of determining executive pay.

"We now have a rational quantitative basis for setting the fair base pay scales for the top management, and any added incentive pay package might then be linked to measureable and meaningful performance metrics that promote long-term survival and growth for the organization," Venkatasubramanian said.

Fair pay for an average S&P 500 CEO should ideally be in the range of 8 to 16 times the lowest employee salary, Venkatasubramanian said.

"It's interesting to note that Warren Buffett, CEO of Berkshire Hathaway and an outspoken critic of executive pay excesses, drew an annual salary of $200,000 in 2008," Venkatasubramanian said. "This makes his pay ratio 8-to-1, assuming a minimum employee salary of $25,000 per year, which fits the ideal benchmark estimate for fair CEO pay almost exactly. Mr. Buffett's instincts about fairness seem to be amazingly accurate. The top pay set by Mr. Feinberg for the AIG executives is almost exactly the amount recommended by the new

theory."

As a contrast to the United States, average CEO pay ratios were about 11-to-1 in Japan, 15-to-1 in France, 20-to-1 in Canada, and 22-to-1 in Britain in 2006.

"These ratios are not that far off, when compared to U.S. ratios, from the ideal benchmark estimates from my theory," Venkatasubramanian said. "Even in the United States, the CEO pay ratios in the 1960s and 1970s were much more reasonable and in general agreement with the ideal values. So the executive pay excesses appear to be a recent phenomenon. This appears to be another valuation bubble - the CEO valuation bubble - much like the ones we have witnessed in stocks, real estate, commodities, etc."

More information: "What is Fair Pay for Executives? An Information Theoretic Analysis of Wage Distributions," *Entropy*, www.mdpi.com/1099-4300/11/4/766

Source: Purdue University