



# Dynamic incentives and retirement<sup>☆</sup>

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## Abstract

This paper examines multi-period compensation contracts when retirement is anticipated. Short-term contracts in long-term employment relationships are equivalent to a long-term renegotiation-proof contract. The dynamic of incentive rates is determined by (i) how and in which periods managerial effort affects the contractible performance measures; and by (ii) the time-series correlation of error terms in performance reports. The model explains why long-term investments can decrease while incentive rates increase as managers approach retirement. Earnings persistence is negatively associated to earnings-based incentive rates but, towards retirement, high earnings persistence implies increasing earnings-based incentive rates.

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## 1. Introduction

This paper presents a LEN (linear contracts, exponential utility, normal distributions) model of multi-period compensation contracts subject to renegotiation when the manager's retirement date is fixed. The incentives are characterized by either a long-term renegotiation-proof contract or by an equivalent sequence of short-term contracts subject to interim participation constraints. The optimal incentives are subject to a renegotiation-proofness constraint and are determined by two key characteristics of the performance measures used in contracting: (i) how and in which periods managerial effort affects the performance measures; and (ii) the time-series correlation of error terms in the performance measures.

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The impact of performance measures' characteristics on multi-period compensation arrangements with a fixed retirement date reflects institutional features not properly considered in the existing compensation literature.

First, managerial effort in one period may affect cash flows and performance measures in the current and future periods. This is explicitly modelled as *long-term effort*, defined as effort in one period that affects performance measures in subsequent periods. For example, managers seek and decide on new capital investments, new directions for research and product development, strategies for developing brands and customer relations, and employee training programs. The manager's effort leads then to the corresponding investment in capital assets, R&D, etc. Stock prices are more timely than earnings in recognizing the impact of these investments on firm value. Furthermore, under U.S. GAAP, accounting asset recognition rules determine how investments are treated for financial reporting purposes: investments in property, plant, and equipment are capitalized and expensed over time, investments in R&D, advertising, and human capital development are immediately expensed.<sup>1</sup> Modelling long-term effort allows exploration of the dependence of compensation arrangements on the effects of current effort on future cash flows, the timeliness of the performance measure, and the time until the agent retires.

Second, the persistence in performance measures of random factors outside the manager's control is modelled as autocorrelation of error terms in the performance measures. For example, earnings can be highly persistent, with error terms following a random walk, but can also have low persistence due to reversing accrual estimation errors (such as underestimates of the allowance for bad debts, or conservative biases in estimating future gains/losses, which are later corrected). Modelling the autocorrelation of error terms in performance measures allows exploration of the dependence of compensation arrangements on earnings persistence and the time until the agent retires.

Third, while CEO contracts are renewed after an interval of one to five years, employment relationships extend over multiple periods, and a majority of turnovers are retirements.<sup>2</sup> Finally, compensation committees set salary and bonus payments every year, while long-term compensation such as stock option grants are subject to renegotiation. Even when long-term contracts are used, their three to five year terms are generally shorter than a CEO's tenure with the firm; while the CEO can, in principle, leave, he rarely does so, and the board ensures retention by benchmarking of salary and other compensation.<sup>3</sup> These various compensation arrangements are explicitly modelled as either a sequence of short-term contracts or as a long-term contract subject to renegotiation, with a fixed retirement date for the manager. This allows exploration of explicit and effective incentives in multi-period compensation arrangements as a function of the performance measures characteristics discussed above and the time until the agent retires.

The key results are as follows. First, short-term contracts and implicit commitment to long-term employment provide the same effective incentives and induce the same managerial effort as a renegotiation-proof contract. As a result, renegotiation-proof incentive rates are independent of how compensation is paid over time through short-term contracts. Second, limited commitment arising from institutional restrictions on contract form or duration, or from the inability of contracting parties to commit *ex ante* not to renegotiate *ex post* to an efficient contract has three key consequences for incentives: learning, effort externalities, and compensation risk externalities. I discuss these consequences of renegotiation next.

Performance measures can be used to update beliefs, or learn, about persistent uncertain components of performance (such as managerial ability). Renegotiation offers are therefore based on more precise updated beliefs about the contractible performance measures; decreasing posterior variances then allow the principal to

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<sup>1</sup>The Canadian (CICA Section 3450) and the international (IAS38) standards allow capitalization of some investments in intangible assets, such as development costs that have the characteristics and meet the definition of assets.

<sup>2</sup>Retirements are the majority of CEO turnovers: 60% in the 1989–1993 sample of Brickley et al. (1999) and 64% in the 1975–2000 sample of Engel et al. (2003). Brickley et al. (1999) show that most executives continue to serve on their firm's board after retirement and pre-retirement stock performance is positively related to the likelihood of being retained on the firm's board. However, membership on the firm's board is qualitatively different from being the CEO and the compensation is significantly smaller.

<sup>3</sup>Other institutional features are outside the scope of the paper: forced turnovers and the board's retention decision, as in Hermalin and Weisbach (1998); CEO turnover due to raiding of managerial talent, as in Hayes and Schaefer (1999); implicit contracting on privately observed performance measures, as in Hayes and Schaefer (2000); and multiple performance measures and their link to CEO turnovers, as in Engel et al. (2003).

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