



# Incentive effects of bonus taxes in a principal-agent model<sup>☆</sup>



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## ABSTRACT

Several countries have implemented bonus taxes for corporate executives in response to the current financial crisis. Using a principal-agent model, this paper investigates the incentive effects of bonus taxes by analyzing the agent's and principal's behavior. Specifically, we show how bonus taxes affect the agent's incentives to exert effort and the principal's decision regarding the composition of the compensation package (fixed salary and bonus rate). We find that, surprisingly, a bonus tax can increase the bonus rate and decrease the fixed salary if the agent is highly risk averse. Additionally, a bonus tax can induce the principal to pay higher bonuses even though the agent's effort unambiguously decreases. Nevertheless, a bonus tax reduces the overall salary of the agent. Further results are derived with respect to the existence and uniqueness of the equilibrium for a general effort cost function.

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## 1. Introduction

In response to the current financial crisis, several countries have implemented bonus taxes for corporate executives in firms that received large amounts of federal bailout funds. For example, the US House of Representatives approved a 90% tax on bonuses in such firms. Similarly, Ireland introduced in January 2011 a 90% tax on executives' bonuses in banks that received government support. Moreover, in the UK, a bonus tax of 50% was imposed on bankers' bonuses for a period of several months in 2010. In Switzerland, the Council of States discussed proposals to introduce a tax on executive bonuses above CHF 3 million.

Despite their political relevance, the economic effects of bonus taxes have received little attention in academic research. This paper tries to fill part of this gap by developing basic insights into the functioning and consequences of bonus taxes on executive pay based on the principal-agent model of Holmstrom and Milgrom (1987). We introduce a tax that is levied on the agent's bonus to analyze how it affects the agent's incentive to exert effort, the composition of executives' compensation packages (fixed salary and bonus rate) as well as the agent's bonus payment and overall salary. The objective of our paper,

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however, is not to provide a normative analysis about the desirability of bonus taxes but rather, given their existence in the real world, to analyze the incentive effects of such taxes.

In our model, the principal chooses the fixed salary and the bonus rate by satisfying the agent's participation constraint and anticipating the agent's optimal effort level. For a general effort cost function, the agent unambiguously reacts to a higher bonus tax with lower effort, while the behavior of the principal depends on the agent's degree of risk aversion and the variance in the firm value. Basic intuition might suggest that by taxing the agent's bonus, the compensation package is shifted to the fixed salary. However, the opposite can occur if the agent is highly risk averse and/or the variance in the firm value is large. Moreover, a bonus tax can lead to the counterintuitive result that both the fixed salary and the bonus rate increase. Surprisingly, a higher bonus tax can induce the principal to pay higher bonuses even though the agent exerts less effort. However, the overall salary of the agent unambiguously decreases through a bonus tax. Further results are derived with respect to the existence and uniqueness of the equilibrium for a general effort cost function.

The remainder of the paper is structured as follows. Section 2 briefly reviews the related literature. Section 3 introduces our principal-agent model with its main assumptions and notations in Section 3.1. In Section 3.2, we solve the model and present the optimality conditions and equilibria. In Section 3.3, we compute the effects of bonus taxes on the equilibrium outcomes. Finally, Section 4 discusses the main insights and presents our conclusions.

## 2. Related literature

Despite the large body of literature and numerous theoretical and empirical studies on executive compensation, only a few papers have addressed the consequences of executive compensation regulation in general and the effects of bonus taxes in particular. For example, Dew-Becker (2009) reviews the history of government rules and regulations in the US that affects executive compensation. By discussing disclosure rules, advancements in corporate governance, and say-on-pay, Dew-Becker analyzes the evolution of pay regulation and concludes that mandatory say-on-pay could be the most effective and least harmful measure of controlling executive compensation. Knutt (2005) examines diverse regulatory issues from a legal point of view. He claims that the various attempts to regulate executive compensation, such as the disclosure and tax regulations, have not yet been effective.

Hall and Liebman (2000) analyze the extent to which tax policy influences the composition of executive compensation and discuss the consequences of rising stock-based pay.<sup>1</sup> Their empirical study shows that the dramatic explosion in executive stock-option pay since 1980 cannot be attributed to tax rate changes. Moreover, the so-called million dollar rule induced a substitution from fixed salary toward performance-related pay. Unlike Hall and Liebman (2000), who concentrate on a tax on stock-based pay, we study a tax that is levied on the agent's bonus.

Radulescu (2010) analyzes the effects of bonus taxes in a two-country, principal-agent model with relocation possibilities for the managers. The paper focuses on tax incidence and analyzes the effects of bonus taxes on firm profits, dividends and welfare in the case of a quadratic effort cost function. The paper shows that a bonus tax induces lower profits and dividends so that the incidence is borne by the shareholders. The welfare implications of bonus taxes depend on the relocation possibilities for the managers. In contrast to our model, in which we focus on the incentive effects of bonus taxes for a general cost function and derive an ambiguous effect of a bonus tax on the fixed and variable salary, Radulescu (2010) finds that the effort-based compensation component (bonus) unambiguously increases with a higher bonus tax.<sup>2</sup>

Finally, there is now a growing literature on regulating incentive pay in the financial sector.<sup>3</sup> For example, Hakenes and Schnabel (2012) show that the presence of bailout guarantees induce bankers to increase their risk-taking behavior and lead to a steeper compensation scheme. An upper limit on the bonus could alleviate these problems. Bolton et al. (2010) develop a theoretical model to show that the credit default swap reduces risk taking of executives at highly levered financial firms. Based on a model of workers in the financial sector, Besley and Ghatak (2011) show that bailouts induce lower effort and higher risk taking.

## 3. Model

### 3.1. Notations and assumptions

Our model is based on the principal-agent model of Holmstrom and Milgrom (1987) and introduces a tax denoted by  $\tau \in (0, 1)$  that is levied on the agent's variable salary (bonus). We consider a single-period employment relationship in a firm between a risk-neutral principal (e.g., a firm's owner) and a risk-averse agent (e.g., CEO). The agent chooses the unobservable

<sup>1</sup> Based on a large sample of US firms during 1994–2004, Tzioumis (2008) empirically analyzes how the adaptation of CEO stock option plans is influenced by CEO and firm characteristics. Palmon et al. (2008) determine the optimal strike prices of stock options for executives in a simulation model.

<sup>2</sup> Cunat and Guadalupe (2009) utilize a panel of US executives and find that an increase in the financial sector through deregulations in the 1990s induced an increase in the variable and a decrease in the fixed components of executive pay. Using data from Germany, Kraft and Niederprüm (1999) show that a higher variance in firm profits decreases the variable salary component. Finally, Graziano and Parigi (1998) show in a principal agent model that more competition represented by a higher number of firms induces the agent to decrease efforts in the case of a low product differentiation.

<sup>3</sup> Bebchuk and Spamann (2010) identify the underlying mechanisms regarding the compensation structures for bankers that have produced incentives for excessive risk-taking.

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