



Bankers' stock options, risk-taking and the financial crisis[☆]



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ABSTRACT

This study investigates the relationship between the use of stock options and bank risk in the context of the 2007–2008 financial crisis for banks that are authorised to accept deposits in the United Kingdom. These banks are affected by the European regulation on variable pay, but, to our knowledge, their usage of stock options has not been examined in previous studies. Paying bankers with stock options can generate two types of managerial incentives, namely, incentives to improve performance and incentives to take risk. Controlling for incentives to improve performance, we find that banks' total risk and insolvency risk increase with the risk-taking incentives induced by stock options. We also find that this relationship is more pronounced surrounding the crisis period. The findings of this study can serve as institutionally relevant empirical support for the European regulation on variable pay.

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1. Introduction

There has been widespread concern that bankers' variable pay has encouraged excessive risk-taking at financial institutions; this was claimed to have precipitated the 2007–2008 financial crisis (Bebchuk and Spamann, 2010; Financial Services Authority (FSA), 2009). According to the European Banking Authority (EBA) (2010, 2014), the ratio of variable-to-fixed pay of high earners (with pay brackets of EUR 1 million or more) at financial institutions in the United Kingdom (UK) was as high as 611% in 2010, 346% in 2011 and 370% in 2012. In 2013, Capital Requirements Directive IV (Article 94, Directive 2013/36/EU) was introduced to limit the ratio of

variable-to-fixed pay of bankers to 100% (or 200% with the backing of a supermajority of shareholders).

However, in the absence of relevant empirical evidence on the net risk-taking effect of variable pay, limiting variable pay can be seen as a contentious regulatory response to the issue of excessive risk-taking by financial institutions (Murphy, 2013). Such regulation was also challenged by the UK Treasury. Our study contributes relevant empirical evidence to rationalise the need for regulation.

The Directive defines variable pay as payments or benefits that depend on performance, which certainly includes cash bonuses and stock options. While the regulation on cash bonuses necessarily assumes that bonuses must drive bank risk,¹ there is very limited empirical evidence on the role of other components of variable pay, such as stock options, that can be linked to the latest financial crisis. We feel that providing empirical evidence that relates to the crisis period will be useful in rationalising the European regulation on variable pay, especially when the use of stock options is claimed to have provided bankers with incentives to take excessive risks during the time leading up to the financial crisis (Bebchuk and Spamann, 2010).

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¹ For example, the FSA (2009: 18) highlights that "Our concern in our review was, however, as much with the treatment of cash bonuses, which as noted above remain a significant proportion of total bonuses and typically not deferred."

Our study differs in several ways from prior studies that examine stock options use and bank risk-taking in the United States (e.g., [Belkhir and Chazi, 2010](#); [Chen et al., 2006](#); [Fahlenbrach and Stulz, 2011](#); [Houston and James, 1995](#)). First, we examine a sample of banks incorporated in 29 countries that are authorised to accept deposits in the United Kingdom (UK). From a policy-making perspective, these are the banks that are affected by the recent regulatory reform, because these banks are involved in managing deposits in the UK.² To our knowledge, the use of stock options across banks operating in the UK has not been previously investigated; hence, empirical evidence in this area is currently non-existent. There is a real need to enrich the literature with empirical evidence derived from these banks, as they are relevant regulatees who are affected by the European regulation on variable pay. Our study contributes to filling this gap.

Second, the data used in previous studies on bank risk-taking are either significantly outdated (e.g. [Chen et al., 2006](#); [Houston and James, 1995](#)) or do not include the crisis years (e.g. [Belkhir and Chazi, 2010](#); [Fortin et al., 2010](#)). Therefore, the link between the use of stock options in bankers' pay and the latest financial crisis cannot be directly inferred from their findings. It remains largely unknown whether the financial crisis was due in part to the use of stock options in bankers' pay. If the statistically positive relationship between banks' risk and the use of bankers' stock options can be observed over time, one may question why the crisis occurred when it did. To address this question, data for non-crisis, pre-crisis and crisis periods are examined. Analysing different periods will provide clearer insight into the dynamic and significance of the relationship between banks' risk and the use of bankers' stock options over different economic climates. We do not underestimate the relevance of crisis period that triggered policy makers to regulate variable pay. Our study enriches the literature with empirical evidence that is relevant and generalisable to the context and time period in question.

Our study documents three important findings. First, we find that banks' total risk increases as bankers' risk-taking incentives (generated through stock options) increases. Second, as a novel contribution of this study, we find that banks' z-scores decrease as bankers' risk-taking incentives increase, which suggests that banks' greater insolvency risk is related to bankers' higher risk-taking incentives induced by stock options. The empirical results are robust after controlling for potential endogeneity of risk-taking incentives. Risk-taking incentives also appear to determine banks' risk when lagged values are used as part of robustness checks. Third, we also find that the relationship between banks' risk and option-induced risk-taking incentives is more pronounced surrounding the crisis period. Overall, our findings are consistent with previous empirical evidence that suggests stock options induce bankers to increase bank risk-taking. They are also consistent with the commonly held view that bank failures and the financial crisis are unintended consequences of such perverse incentives ([Bebchuk and Spamann, 2010](#)). Therefore, we suggest that there is a case for regulators to regulate bankers' variable pay, such as stock options.

The remainder of the paper is organised as follows. Section 2 discusses the relevant literature. Section 3 presents the hypotheses. Section 4 describes the empirical tests. Section 5 describes the data and descriptive statistics. Section 6 reports the empirical results. Section 7 provides conclusions.

² Given the global reach of major banks and the very significant role of major non-UK-listed banks in London, the [Walker Review Secretariat \(2009\)](#) considers it is appropriate and necessary for broadly comparable disclosure on risk and remuneration to be implemented by FSA-authorized banks that are UK-domiciled subsidiaries of non-resident entities.

2. Literature review

2.1. Risk-related incentive problems

Studies on executive compensation have recognised that the use of stock options in executive pay can help mitigate risk-related incentive problems that arise between managers and shareholders of a firm ([Guay, 1999](#)). Risk-related incentive problems manifest when managers forego investment in risky projects due to their risk aversion, which is incongruent with the interests of firm shareholders who are less risk-averse ([Rajgopal and Shevlin, 2002](#)). In discussing the moral hazard problem of banks, [Bebchuk and Spamann \(2010: 255\)](#) argue that "those who provide equity capital have an excessive incentive to take risk" with a view to maximising return.³ Stock options can be used to get bank managers to efficiently pursue shareholders' interests in this way.

2.2. Stock options as bankers' risk-taking incentives (vega)

The use of stock options not only mitigates risk-related incentive problems, but also discourages option holders from hedging against risk (e.g., [Aretz and Bartram, 2010](#); [Rajgopal and Shevlin, 2002](#)). This is because stock options have an important feature that can influence bankers' attitudes towards risk. This feature is described as stock options' vega, which is used in this study to measure bankers' risk-taking incentives.

As in previous studies (e.g., [Belkhir and Chazi, 2010](#); [Rajgopal and Shevlin, 2002](#)), a stock option's vega is defined as the sensitivity of a stock option to a change in stock price volatility. [Guay \(1999\)](#) establishes that stock options will significantly increase the sensitivity of a manager's pay-related wealth to the underlying firm's stock return volatility, which he describes as equity risk. Given that stock options' value increases with firms' equity risk, managers with stock options will have a greater incentive to undertake all risky positive NPV investments with a view to increasing the underlying firm's equity risk and consequently the value of their stock options. The incentive to increase equity risk arises due to stock options' asymmetric payoffs, whereby managers can cash out profit when the underlying firm's share price increases as a result of successful risky investment, but will not suffer material cash outflow if the risky project fails.

The relation between executive stock options and risk-taking by non-financial firms has been documented in several studies ([Coles et al., 2006](#); [Rajgopal and Shevlin, 2002](#)). By examining a sample of oil and gas producers, [Rajgopal and Shevlin \(2002\)](#) find that option-induced risk-taking incentives are positively related with risky future exploration activities. They also find that such risk-taking incentives are negatively related with oil price hedging. Their findings suggest that stock options can induce managers to increase risk rather than manage risk. In addition, [Coles et al. \(2006\)](#) find that option-induced risk-taking incentives motivate riskier policy choices, such as more investment in research and development, low investment in property, plant and equipment, fewer lines of business and higher leverage.

However, not many studies in banking examine the potential moral hazard arising from the use of stock options in bankers' pay.

³ [Gorton and Rosen \(1995\)](#) argue that similar attitude can be held for bank executives who are also shareholders of the bank they manage. Several factors may explain why banks' shareholders will have great incentives to encourage their managers to pursue risky investments. These factors have been widely discussed under the 'moral hazard' theme in the banking literature (e.g., [Bebchuk and Spamann, 2010](#); [Ponce, 2010](#); [Jeitschko and Jeung, 2005](#); [Gorton and Rosen, 1995](#); [Merton, 1977](#)). The presence of limited liability coupled with deposit insurance (e.g., the Financial Services Compensation Scheme in the UK) and lenders of last resort (e.g., government bailouts) are factors that can induce banks' shareholders (and managers with aligned interests) to bear excessive risk with a view to maximising return.

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