Optimising Pay Regulations To Correct For Too-Big-To-Fail

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Introduction

- In the recent crisis, many banks accumulated large losses while their CEOs and other senior employees were paid bonuses to that point.
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- It is argued that such equity-linked bonus pay encouraged short-termism and excessive risk. (e.g. PCBS 2013).
- Pay has been the focus of global regulatory attention:
  - US: Say-on-pay implemented and clawback considered;
  - UK: pay deferral for 3 - 7 years, and clawback with 7 - 10 year window;
  - EU: 1-to-1 bonus caps;

These are all different responses to the FSB *"Principles for Sound Compensation Practices."*

Methodology

Study the optimal design of remuneration regulation for banks that are *too-big-to-fail*, using a principal-agent framework.

Main Results 1 of 2

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- If a bank might be *too-big-to-fail*, then shareholders' optimal compensation contract encourages the executive to risk-shift on to the taxpayer.
- Part-payment in debt fails to correct this distortion when debt markets are informed.
- Clawback regulations can incentivise the executive to make society's first-best risk choices, but only if accompanied by appropriate restrictions on the curvature of pay: including therefore rules on the use of options.
- Without this, optimising bank shareholders can neutralise the effect of clawback and keep profits maximised from the too-big-to-fail distortion.

Main Results 2 of 2

- Linking remuneration appropriately to interest rates can also deliver society's first best project choice, but only if implemented with similar pay curvature restrictions.
- Linking to interest rates has the advantage that there is no requirement to reclaim money already paid to the executive.

Review of Most Closely Related Literature

- Corporations in general use debt in pay to correct risk-shifting from shareholders to private sector creditors.

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- But not effective against too-big-to-fail.

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- Bolton, Mehran and Shapiro (2015) propose adding in a linear adjustment for credit risk to executive's pay.
  We'll show that if bank can optimise against this, then further pay controls are required.

The Model Timeline

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  End: bank issues debt at market interest. Executive paid.
- $t = 2$: Returns realised, debt holders are repaid if the bank is solvent. If it is insolvent, the government bails out the debt holders with probability μ and compensates them in full.

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The **High** Volatility Project

Expected return Z; private information to executive.
The project succeeds with probability χ. In this case return is Z/χ so the payoff will be $\frac{Z}{\chi}(1+D)$.
Or the project fails; i.e. with probability $1-\chi$. In this case return of 0.

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The **Low** Volatility Project

Certain return r.
In this case the payoff is $r(1+D)$.

Compensation contracting environment

- Market sets bank's capitalisation, K, and interest payable i_1.
- Compensation function $s(K)$
- Require $s'(K) \geq 0$.
- Outside option u, discount rate for banker is $\delta \leq 1$, and 1 for bank.
- Hard to solve – Rochet and Stole (2003) – will focus on limit $u/(1+D) \rightarrow 0$.

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High volatility project chosen too readily – distortion grows in μ and D.

Pay linked to performance delivers excessive risk

Pay Without Regulation

The bank owner can maximise her profits by offering a linear equity-linked compensation contract, $s(K) = bK$, which gives the executive a proportion b of the bank's equity at $t = 1$. The project choice rule will be given by the owner's first best.

Compensation Regulation

A change of variables is helpful

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Regulator's preferred decision rule is high risk project if

$$K_H > K_L + D\frac{\mu(1-\chi)}{\chi + \mu(1-\chi)} \equiv K_L + \omega.$$

Debt in pay

It has been proposed that excessive managerial risk-taking can be mitigated by remunerating the executive in part through debt.

For example, AIG declared in its 2010 SEC filing that, for some of their executives, 80% of their bonus will be based on the value of the bank's junior debt, and 20% on its stock.

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Mandatory Debt-in-pay Rule:

If the bank owner offers compensation contract $s(K)$ to the bank executive, then the regulator allows only the fraction $(1-c)s(K)$ to be paid out (in cash) at $t = 1$; the remainder has to be paid in debt which matures at $t = 2$.

Proposition: pay-in-debt irrelevance

Under a mandatory debt-in-pay rule:

1. Any remuneration contract in which the executive's pay is strictly increasing in shareholder value K will deliver the owner's first best project choice rule.
2. If the ratio of the executive's outside option u to the bank's balance sheet value $(1 + D)$ tends to zero, then the bank owner can secure profit arbitrarily close to the maximum. The owner's preferred project choice rule is implemented.

Insight

- Literature has shown that in some models payment in debt can move the interests of the firm owner towards those of the private sector creditors, so reducing the incentives to risk-shift (e.g. Edmans and Liu (2011)).
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  1. Can compensation functions be committed to in advance of debt being secured;
  2. For the debt secured after a compensation function is committed to, whether the debt markets are less informed than the executive about the risks being taken at the moment when compensation is paid.

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  2. For the debt secured after a compensation function is committed to, whether the debt markets are less informed than the executive about the risks being taken at the moment when compensation is paid.

With an informed debt market, the expected return on debt capital to debt holders is independent of project choice. Hence, the presence of debt in the executive's remuneration does not alter the project selection incentives.

Clawback

Clawback is a contractual agreement whereby the staff members agree to return ownership of an amount of remuneration that has already been paid to the institution under certain circumstances.

In the United Kingdom the variable remuneration of material risk takers will be subject to clawback for a period of seven to ten years, depending on the individual's responsibilities.

The intended aim of these policies is to discourage excessive risk-taking and encourage more effective risk management.

Clawback pay regulation

If the bank owner offers compensation contract $s(K)$ to the bank executive then the regulator permits this amount to be paid at $t = 1$. However, in the event of bank insolvency at $t = 2$, the bank executive must pay back a proportion $p \leq 1$ of his prior earnings.

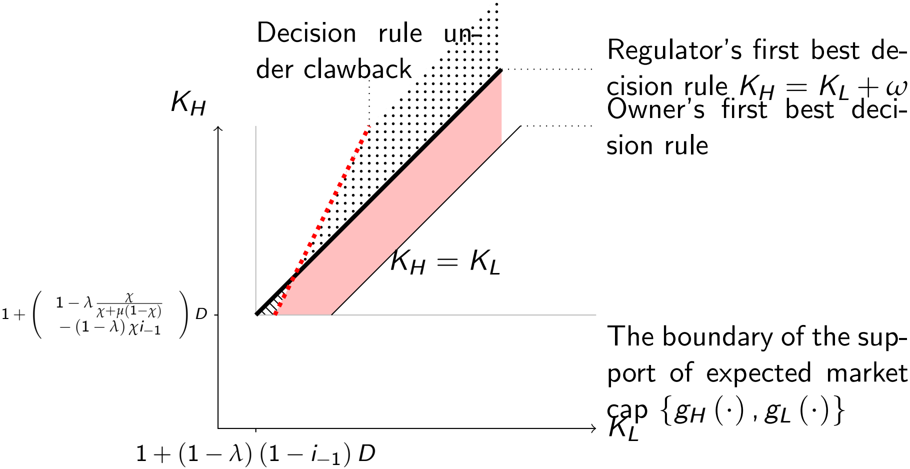
The reduced clawback rate p can capture the probability the money is actually clawed back, or the proportion of payment which is liable to clawback, or the product of both.

Clawback with equity-linked pay

- Suppose pay is equity linked: $s(K) = bK$
- So risky project chosen if

$$(1 - \delta(1 - \chi)p)K_H > K_L$$

Project choice regions under linear equity based pay



Optimal contracting under clawback

Proposition

Suppose the regulator enforces the clawback regulation on compensation. If the ratio of the executive's outside option u to the bank's balance sheet $(1 + D)$ tends to zero, then the bank owner can secure within ε of the maximum surplus even in the presence of clawback, through the use of a sufficiently curved compensation schedule. The owner's preferred project choice rule is implemented.

Clawback loophole

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Suppose the regulator would like a low volatility project with expected value of 90 to be chosen over a high volatility project with expected market value of 100.

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If the bank uses equity pay $(s(K) = \tilde{b} \cdot K)$, this could be achieved with a probability of clawback of $p = 1$ in the case of bank failure.

- If the agent selects the high volatility project she receives payment $\tilde{b} \cdot 100 \cdot \left(1 - \frac{1}{10}\right) = \tilde{b} \cdot 90$.
- If the agent selects the low volatility project of worth 90 she receives payment $\tilde{b} \cdot 90$.
  If the low volatility project is worth more it will definitely be chosen.

Clawback loophole

However the principal would like to undo the clawback effects.

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- If the agent selects the high volatility project she receives payment $b \cdot 100^{\beta} \cdot \left(1 - \frac{1}{10}\right)$.
- If the agent selects the low volatility project of worth 95 she receives payment $b \cdot 95^{\beta}$.

Clawback loophole

The high volatility project of worth 100 is selected over the low volatility project of worth 95 if

$$\beta > \frac{\ln(10/9)}{\ln(100/95)} = 2.05.$$

By increasing the curvature (β) further, the decision rule can be pushed closer to the owner's preferred decision rule.

Note that the parameter b is free so the level of the payments can be adjusted to keep expected pay down.

A general point

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Curvature can be generated from options: hence judicious use of options can essentially bribe the executive to run the risk of clawback.

As curvature of pay, not level of pay, is important, this need not be more expensive for the principal.

Regulator Optimal Implementation of Clawback

Addendum to Clawback Pay Regulation

In addition to the clawback pay regulation above, the regulator requires a restriction on the executive's pay function $s(K)$, such that:

$$\frac{s\left(K+\omega\right)}{s\left(K\right)} \leq \gamma$$

for given parameters ω and γ, at all market capitalisations K.

This is a pay curvature restriction.

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The best outcome arises if the regulator sets:

$$\omega = D\mu\left(1-\chi\right) / \left(\chi + \mu\left(1-\chi\right)\right) \text{ and } \gamma = 1/\left(1-\delta\left(1-\chi\right)p\right). \quad (3)$$

Regulator Optimal Implementation of Clawback

Proposition

Suppose the curvature addendum to the clawback pay regulation applies with the curvature parameters set as above. In the limit of the ratio of the bank executive's outside option u to total bank balance sheet value $(1 + D)$ tending to zero, the bank owner will incentivise society's first best project choice rule.

Forced use of clawback with pay curvature restriction

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An appropriate use of pay curvature, staying within the rules, allows this upper bound for the principal to be attained.

Linking compensation to Interest Rates

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Regulatory Pay Rule

The remuneration package must be decreasing in interest rates i_1 such that if $i_1 > 1$,

$$s(K, i_1) \leq \eta \cdot s(K, 1) \tag{4}$$

for some $\eta < 1$ and for all K.

- If promising, other proxies for the interest rate (e.g. premia on credit default swaps) could be used.

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Without further caveats a bank can entirely circumvent such a regulation.

The Same Loophole – Closed in the same way

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Addendum to Regulatory Pay Rule

The regulator adds to the pay regulation the requirement that the curvature of the bank executive's pay function must satisfy

$$\frac{s\left(K+\omega,1\right)}{s\left(K,1\right)} \leq \frac{1}{\eta}.$$

for given parameter ω and at all market capitalisations K.

- Use η and ω as above.

Illustration with a simple example

- Assume again that high volatility project has a 1/10 chance of failure and that the regulator's preference is that a low volatility project delivering a $t = 1$ bank value of 90 should be chosen over a high volatility project creating a $t = 1$ bank value of 100.
- So $\omega = 10$, and regulator's preference is high volatility project iff $K_H > K_L + 10$.
- Achieved by setting $\eta = 9/10$.

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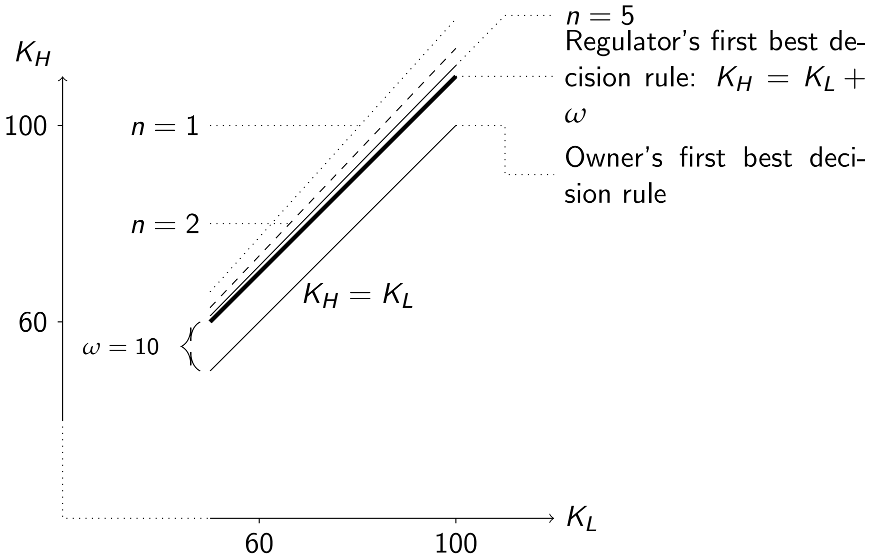
A class of pay functions satisfying this is:

$$s(K, 1) = b_n \left(1 - \frac{(K/10)\ln 0.9}{n}\right)^n \text{ for } n > 1 \text{ and constant } b_n.$$

This is more curved the higher is the index n.

Project selection boundaries with interest rate linkage



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  - Regulator must observe full pay schedule, $(s(K))$.
  - Regultor must control instruments used to generate curvature. That includes options, bonuses, and perhaps promotion policy.
- Clawing back pay may be hard – it might have been spent. Linking pay to interest rates avoids this problem.
  - Though there exist multiple interest rates.
  - And if CDS is used then the market may be illiquid and implied default probabilities inaccurate at a critical time.

Testing the theory

1. Exploit the fact that application of clawback differs across jurisdictions: with London invoking the practice and Hong Kong less so.
    - Compare trading desks based in these two jurisdictions which differ in the pay regulations but for whom the universe of investment projects is not materially different.
    - In the short-run, before pay functions adapt to clawback, we predict that both risk and return should be reduced on average in the clawback-using jurisdiction.
    - In the longer-run our analysis predicts that the risk and return characteristics should re-converge across jurisdictions, but pay arrangements in the clawback-using jurisdiction should become more convex.

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    - In the longer-run our analysis predicts that the risk and return characteristics should re-converge across jurisdictions, but pay arrangements in the clawback-using jurisdiction should become more convex.
2. It may be possible to test the theory through a lab experiment in order to examine whether convex pay can indeed incentivise risk-taking even in the presence of clawbacks.

Conclusions

Our work suggests that passive remuneration regulation alone is unlikely to effectively mitigate bank managers' risk-taking incentives.

To be effective, pay regulations would need to be complemented by active monitoring of gaming of remuneration regulation, for example through additional data collection on pay schedules.

Regulators will therefore need to determine whether such restrictions are both feasible and cost-effective.