

Hughes, Joseph P.

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Capital regulation: Less really can be more when incentives are socially aligned. Comments on Richard J. Herring "The Evolving Complexity of Capital Regulation". "The Interplay of Financial Regulations, Resilience, and Growth", Federal Reserve Bank of Philadelphia June 16-17, 2016

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# **Capital Regulation: Less Really Can Be More When Incentives Are Socially Aligned\***

**Comments on Richard J. Herring  
“The Evolving Complexity of Capital Regulation”**

**“The Interplay of Financial Regulations, Resilience, and Growth”**

**Federal Reserve Bank of Philadelphia**

**June 16-17, 2016**

**Joseph P. Hughes**

**Rutgers University**

## **Abstract**

Capital regulation has become increasingly complex as the largest financial institutions arbitrage differences in requirements across financial products to increase expected return for any given amount of regulatory capital, as financial regulators amend regulations to reduce arbitrage opportunities, and as financial institutions innovate to escape revised regulations – a regulatory dialectic. This increasing complexity makes monitoring bank risk-taking by markets and regulators more difficult and does not necessarily improve the risk sensitivity of measures of capital adequacy. Explaining the arbitrage incentive of some banks, several studies have found evidence of dichotomous capital strategies for maximizing value: a relatively low-risk strategy that minimizes the potential for financial distress to protect valuable investment opportunities and a relatively high-risk strategy that, in the absence of distress costs due to valuable investment opportunities, “reaches for yield” to exploit the option value of implicit and explicit deposit insurance. In the latter case, market discipline rewards risk-taking and, in doing so, tends to undermine financial stability. The largest financial institutions, belonging to the latter category, maximize value by arbitraging capital regulations to “reach for yield.” This incentive can be curtailed by imposing “pre-financial-distress” costs that make less risky capital strategies optimal for large institutions. Such potential costs can be created by requiring institutions to issue contingent convertible debt (COCOs) that converts to equity to recapitalize the institution well before insolvency. The conversion rate significantly dilutes existing shareholders and makes issuing new equity a better alternative than conversion. The trigger for conversion is a particular market-value capital ratio. Thus, the threat of conversion tends to reverse risk-taking incentives – in particular, the incentive to increase financial leverage and to arbitrage differences in capital requirements across investments.

\*The author thanks Christine Cumming and William Lang for their helpful comments and conversations. Correspondence should be addressed to Joseph P. Hughes, Professor, Department of Economics, Rutgers University, New Brunswick, NJ 08901-1248, [jphughes@rci.rutgers.edu](mailto:jphughes@rci.rutgers.edu).

## 1. Introduction

When one is looking for a well informed and well reasoned analysis of a particular issue in banking, I would recommend googling “Richard Herring.” Even if he has not written on the subject in question, much can be learned from reading about other issues he has considered in print. In this case he brings his considerable expertise and good judgment to the issue of capital regulation.

Herring notes that the complexity of capital regulation imposes heavy deadweight economic costs and undermines efforts to strengthen financial stability. Complexity results from attempts to revise capital requirements to reduce the potential for arbitrage. Ironically, complexity facilitates arbitrage because it makes the supervisors’ job of monitoring the risk of investment decisions more difficult. Consequently, increasing complexity does not necessarily improve the risk sensitivity of measures of capital adequacy.

Rather than review technical issues, I shall instead focus on the broader questions: the incentive of financial institutions to arbitrage differences in capital requirements across different types of investments and the mounting complexity of capital regulation in response to this arbitrage. I shall offer evidence that market incentives encourage regulatory capital arbitrage, and I shall point to a method of reversing those risk-taking incentives. Several studies have found evidence of dichotomous capital strategies for maximizing value: a relatively low-risk strategy that minimizes the potential for financial distress to protect valuable investment opportunities and a relatively high-risk strategy that, in the absence distress costs due to valuable investment opportunities, “reaches for yield” to exploit the option value of implicit and explicit deposit insurance. In the latter case, market discipline rewards risk-taking and, in doing so, tends to undermine financial stability. The evidence points to the largest financial institutions as those with the incentive to “reach for yield.” On the other hand, the expected cost of financial distress of institutions with relatively valuable investment opportunities tends to discourage their adopting risky investment strategies. The incentive to reach for yield can be reversed by requiring the largest

financial institutions to hold contingent convertible debt that converts to equity when the market equity capital ratio falls to a specified level far short of non-viability. The dilution of existing shareholders and the addition of new sophisticated shareholders create substantial costs to management and provide the incentive to recapitalize or shrink assets long before the conversion ratio is reached. Thus, the threat of conversion tends to reverse risk-taking incentives – in particular, the incentive to increase financial leverage and to arbitrage differences in capital requirement across investments.

## 2. Risk-Expected-Return Choices under Capital Regulation

Arbitrage of differences in capital requirements arises from the incentives of financial institutions to take risk to enhance shareholder value. Koehn and Santomero (1980) show that the imposition of a stricter standard of capital adequacy may result in a financial institution's adopting a riskier investment strategy. A bank's efficient investment options are illustrated in Figure 1. A lower minimum capital ratio yields the higher risk-expected-return frontier while a higher minimum capital ratio results in the lower frontier. Suppose, under the lower ratio, an institution operates at point  $Z_0$ .

The slope of the ray passing through  $Z_0$  gives the risk of insolvency of this investment strategy. Letting  $\pi$  represent profit and  $k$ , equity capital, the number of standard deviations from insolvency represented by the expected profit and the standard deviation of profit of a particular investment strategy is given by

$$Z = \frac{E(\pi) + k}{S(\pi)} = \frac{E(\pi/k) + 1}{S(\pi/k)} \quad (1)$$

Let the distance from default be given by a particular value,  $Z_0$ . The equation of the line where all investment strategies give the same risk of default,  $Z_0$ , is given by  $E(\pi/k) = S(\pi/k)Z_0 - 1$ , and its slope is the distance from insolvency,  $Z_0$ :  $\partial E(\pi/k)/\partial S(\pi/k) = Z_0$ . Operating under the higher

capital standard along the lower frontier, the bank may adopt the investment strategy at  $Z_1$  where the higher slope of the ray through this point indicates a lower risk of insolvency, which achieves the objective of imposing the higher minimum capital ratio. Note that the return risk of this strategy is also less than the return risk at  $Z_0$ . However, the bank with a greater appetite for risk may choose point along the lower frontier with the same risk of insolvency as that of  $Z_0$ , say,  $Z_2$ . Note that return risk is still reduced from that of  $Z_0$ . On the other hand, the investment strategy at  $Z_3$  entails less return risk than  $Z_0$  but more than  $Z_2$ . Moreover, it falls on a line with a smaller slope than that of the line passing through  $Z_0$  – hence, a greater risk of insolvency. A bank with even greater appetite for risk may adopt the investment strategy at  $Z_4$  where both the return risk and the risk of insolvency is higher than at  $Z_0$ , which defeats the purpose of imposing the higher standard of capital adequacy.

### **3. Dichotomous Risk-Taking Incentives**

McConnell and Servaes (1995) and Marcus (1984) describe dichotomous investment strategies for maximizing shareholder value that depend on the value of firms' investment opportunities. Marcus notes that the value of banks' investment opportunities influences the expected costs of financial distress. For banks that become insolvent and lose their charter, losses include the expected value of these opportunities. Thus, banks with relatively valuable investment opportunities maximize shareholder value by pursuing low-risk investment strategies to reduce the probability of financial distress and expected distress costs. On the other hand, banks with relatively low-valued investment opportunities maximize value by pursuing high-risk investment strategies that exploit the option value of explicit and implicit deposit insurance. Even for financial institutions that do not expect to obtain direct benefits from the federal safety net, "reaching for yield" may be a value-maximizing strategy when operating in highly competitive markets. For banks, Marcus (1984) notes that, in terms of risk, mid-range investment strategies are suboptimal.

A number of papers have reported evidence of these dichotomous investment strategies. Hughes, Lang, Moon, and Pagano (1997) examine 1994 data on publicly traded bank holding companies and find that sub-par performers among banks in the third of the sample with the lowest capital ratios could improve market value by reducing the capital ratio and asset quality. On the other hand, sub-par performers among banks in the two-thirds of the sample with the highest capital ratios could improve market value by increasing the capital ratio and asset quality. In the case of banks with the lowest capital ratios, market discipline appears to work against financial stability. Keeley (1990) considers a period when restrictions on interstate banking in the United States were being eliminated. The resulting increase in competition eroded banks' charter values and, according to Keeley, led to a "reach for yield" through a reduction in banks' capital ratios. Grossman (1992) finds that, among thrifts in the United States, the introduction of deposit insurance in 1934 led to the adoption of more risky investment strategies that entailed higher expected loan losses.

Calomiris and Nissim (2007) measure banks' performance by the ratio of the market value of equity to the book value while DeJonghe and Vander Venet (2005) use Tobin's  $q$  ratio, adjusted to eliminate statistical noise. Both investigations find qualitatively the same evidence of dichotomous investment strategies. For banks with a lower capital ratio, financial performance and the capital ratio are negatively related, and for banks with a higher capital ratio, positively related. Thus, banks with a lower capital ratio appear overcapitalized while those with a higher ratio, undercapitalized. In the former case, market discipline again appears to work against financial stability.

Based on 2013 publicly traded U. S. bank holding company data, preliminary findings of Hughes, Mester, and Moon (2016) provide further evidence of dichotomous investment strategies. Market value and the capital ratio are negatively related for 35 of the 167 companies – an indication that sub-par performance is related to overcapitalization. The estimate of this relationship differs

from zero at 10 percent or better for 15 of the 35 companies. This group of 15 financial institutions showing statistically significant evidence of overcapitalization includes 15 of the 21 institutions subject to heightened supervision by the Dodd-Frank Act – those with consolidated assets greater than \$50 billion. For these largest companies, market discipline appears to create incentives for capital structure that conflict with social goals for capital adequacy and financial stability. On the other hand, for the remaining 132, the relationship is positive – consistent with sub-par performance resulting in part from undercapitalization. The estimate of this relationship differs from zero at 10 percent or better for 97 of the 132. On average, banks in the group showing statistically significant evidence of overcapitalization are larger and operate with relatively less valuable investment opportunities.

The data representing 2007 tell a more dramatic story. Market value and the capital ratio are positively related for 33 of the 142 companies – consistent with sub-par performance resulting in part from undercapitalization. However, *none* of these positive-valued estimates is statistically different from zero at stricter than 10 percent. Thus, market discipline that encourages enhanced capitalization appears weak.

On the other hand, financial performance and the capital ratio are negatively related for 109 of the 142 companies – an indication that sub-par performance is related to overcapitalization. Of these 109 banks, the negative-valued estimate of this relationship is statistically significant at stricter than 10 percent for 29 institutions. This group of 29 financial institutions includes all 17 of the institutions with consolidated assets greater than \$50 billion. For these largest companies, market discipline appears to create incentives for capital structure that conflict with social concepts of capital adequacy and financial stability. Like banks in 2013, those in 2007 for which market discipline encourages riskier capital strategies are on average larger and experience less valuable investment opportunities than other banks.

#### **4. The Incentive to Reach for Yield and Agency Conflicts**

As Marcus (1984) notes, the expected cost of financial distress plays a crucial role in determining the investment strategy of financial institutions. The largest financial institutions generally operate in highly competitive markets that encourage risky investment strategies to maximize shareholder value. Laeven and Levine (2009) note that debtholders and managers at these large financial institutions would inherently prefer less risky strategies, but large, diversified shareholders prefer value-maximizing risky strategies and can exercise sufficient corporate power to obtain these strategies. Laeven and Levine (2009) provide international evidence that the effectiveness of various regulatory restrictions on risk-taking is often reversed when the ownership structure of the financial institution involves a large, diversified shareholder. As Koehn and Santomero (1980) observe, regulatory restrictions can encourage some institutions to “reach for yield” and reverse the intent of the regulatory restrictions. Cheng, Harrison, and Schneinkman (2015) provide similar evidence that institutional investors are able to put in place compensation schemes that encourage managers’ risk-taking.

#### **5. Reversing the Incentive to Reach for Yield and to Arbitrage Capital Requirements**

The dichotomous investment strategies for maximizing shareholder value that Marcus (1984) describes result in part from a dichotomy in the expected costs of financial distress. Risky strategies follow from relatively low expected distress costs.

Restrictions designed to improve capital adequacy attempt to constrain risk-taking in such an environment, but the incentive to “reach for yield” encourages the arbitrage of differences in capital restrictions across investments. The intensifying complexity entailed by amending capital restrictions and the self-defeating nature of the complexity suggest that ensuring capital adequacy requires a different approach – one which overhauls the market discipline that encourages risk-taking by the largest financial institutions. First, requiring these institutions to issue contingent



convertible debt (“CoCos”) that converts to equity when the market equity-to-asset ratio falls to a level well short of insolvency could be structured so that the conversion creates a significant cost to existing shareholders and management similar to the “financial distress cost” that makes low risk investment strategies optimal for institutions with relatively valuable investment opportunities. Second, holding back a portion of top management’s compensation for a period of years where the deferred compensation is lost if the contingent convertible debt converts generates a managerial distress cost distinct from that of the institution and an incentive to avoid the sort of risk-taking likely to erode equity and trigger conversion.

### **5.1 Contingent Convertible Debt to Create Costly Near Financial Distress**

Flannery (2002) and Calomiris and Herring (2013) provide a detailed analysis of the workings of contingent convertible debt (“CoCos”). This debt would convert to equity when triggered by a specified event usually defined in terms of a capital ratio. As the capital ratio declines and reaches the trigger point, the conversion of the CoCos to equity would recapitalize the institution well before the point of insolvency and, thus, before the need for resolution. After conversion, the institution would be required to replace the converted debt with new CoCos. Calomiris and Herring (2013) propose that the largest institutions hold CoCos equal to 10 percent of the book value of their assets, and they define the trigger at a market-value capital ratio of 8 percent given by a 90-day moving average of the ratio of the market value of equity to the sum of the market value of equity and the face value of debt. Holders of CoCos would be nonbank institutional investors with no short position in the underlying stock.

A key part of their proposal requires a conversion ratio such that the face value of the debt constitutes a “substantial proportion of the face value of equity.” The trigger should be at a point well before insolvency to maintain the face value of the CoCos in terms of the market value of the new equity. The resulting dilution of the previous shareholdings would provide a strong incentive

to management to avoid reaching the trigger by controlling risk and, if necessary, issuing new equity or selling assets. They note that others have shown “. . . the voluntary issuance of equity above the trigger point is likely to be more favorable to shareholders than the conversion of CoCos, even under extreme assumptions about the potential decline in share prices in reaction to the announcement of an equity offering.”<sup>1</sup> In short, the CoCo requirement creates a potential cost to management and shareholders that would reverse to some degree the risk-taking incentives of the largest financial institutions.

## **5.2 Contingent Compensation**

As previously noted, Cheng, Harrison, and Schneinkman (2015), drawing on data recorded prior to the recent crisis, provide evidence that institutional investors put in place compensation schemes that encourage risk-taking. On the other hand, Bailey et al. (Squam Lake Group, 2013) report that UBS put in place in 2013 a compensation scheme for 6500 highly compensated employees that awards them “bonus bonds” that would be forfeited if the bank did not meet its capital requirements. They suggest that managers need to think more like bondholders than stockholders. To achieve this objective, they propose holding back a substantial proportion of the compensation of top managers over a period of years and, combining it with a CoCo requirement, make forfeiture of the held-back compensation the result of triggering the CoCo conversion.

## **6. Conclusions**

Market discipline has historically rewarded risk-taking by the largest financial institutions while it has discouraged the risk-taking of smaller institutions whose relatively high valued investment opportunities constitute a substantial cost of financial distress. This expected high cost of distress makes less risky investment strategies that reduce the probability of financial distress value-maximizing. Evolving complexity may seem inevitable. The incentive to arbitrage capital

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<sup>1</sup> The quotations in this paragraph are found on p. 29 of Calomiris and Herring (2013).

requirements arises from the market's rewarding risk-taking. If substantial distress-like costs can be imposed on the largest financial institutions when their market capital ratio falls, less risky investment strategies can be made value-maximizing. First, issuing contingent convertible debt that converts to equity at a capital ratio well above the level of insolvency to recapitalize the institution can be structured to dilute existing shareholders and create the incentive to recapitalize before the conversion trigger is reached – long before insolvency and resolution. And, second, some portion of the compensation of key employees can be withheld for a period of years where triggering the conversion of the debt to equity results in the forfeiture of the withheld compensation.

In short, policies that create potential costs triggered by eroding capital – well short of insolvency, can reverse the incentive to increase leverage and to arbitrage differences in capital regulation. Market discipline can be harnessed to promote financial stability, and capital regulations can be simplified accordingly.

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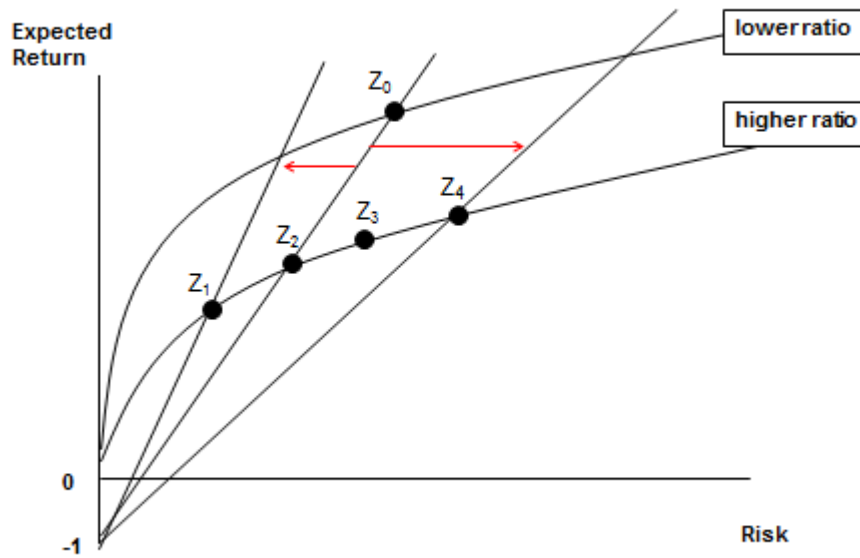
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**Figure 1**

The higher risk-expected-return frontier represents the investment strategies of a financial institution that operates under a given definition of capital adequacy defined by a particular ratio of equity capital to assets. The lower frontier results from imposing a higher capital ratio on the bank. Under the lower ratio, the institution operates at point  $Z_0$ . The slope of the ray passing through  $Z_0$  gives the risk of insolvency of this investment strategy. Letting  $B$  represent profit and  $k$ , equity capital, the number of standard deviations from insolvency represented by the expected profit and the standard deviation of profit of a particular investment strategy is given by

$$Z = \frac{E(\pi) + k}{S(\pi)} = \frac{E(\pi/k) + 1}{S(\pi/k)}$$

Let the distance from default be given by a particular value,  $Z_0$ . The equation of the iso- $Z$ line is given by  $E(\pi/k) = S(\pi/k)Z_0 - 1$ , and its slope is the distance from insolvency,  $Z_0$ :  $\partial E(\pi/k)/\partial S(\pi/k) = Z_0$ . Operating under the higher capital standard along the lower frontier, the bank may adopt the investment strategy at  $Z_1$  where the higher slope of the ray through this point indicates a lower risk of insolvency. However, the bank with a greater appetite for risk may choose point  $Z_4$  where the slope is less and, consequently, the risk of insolvency is higher.



Source: Koehn and Santomero (1980)