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Central Bank Regulation: A Financial and Macroeconomic Tradeoff

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Abstract

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As a result of the devastation from the 2008 global crisis, many nations have enacted financial regulatory reforms in an attempt to increase stringency in bank supervision. In response to this wave of new laws, widespread debate has emerged on whether banks are too constrained or if the reforms are not demanding enough. However, the stringency of regulations is contingent upon the level of enforcement used by regulators. Examining relationships between domestic regulatory structures and financial regulatory quality can help shed insight into what type of regulators are more risk-averse and likely to strictly supervise banks. Thus, regardless of the actual stringency of new regulations, the only way they will have traction when implemented is if the financial regulator is capable or willing to effectively enforce them.

Recent research indicates that placing regulatory authority outside of the central bank correlates with less inflation, because the central bank can solely focus on price stability when deciding the interest rate (Copelovitch and Singer, 2008). Regulatory central banks have additional concerns about financial sector health when deciding monetary policy, swaying them to implement relatively lower interest rates because higher rates are more costly for their banks. As a result, the lower interest rates cause more inflation in the domestic economy. This conclusion does not stipulate that the regulatory authority outside of the central bank will supervise with similar stringency, but increased bank instability could still create vulnerabilities for the economy.

In this thesis, I argue that regulatory central banks have a higher standard for stability than separate regulatory agencies because of the central bank's additional macroeconomic concerns. The results of my analysis indicate that banks supervised by central banks have higher capital ratios and a smaller chance of insolvency, making the regulatory regimes into a tradeoff: regulatory central banks may set lower interest rates, but they are more stringent in regulating financial firms.

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CENTRAL BANK REGULATION: A FINANCIAL AND MACROECONOMIC TRADEOFF

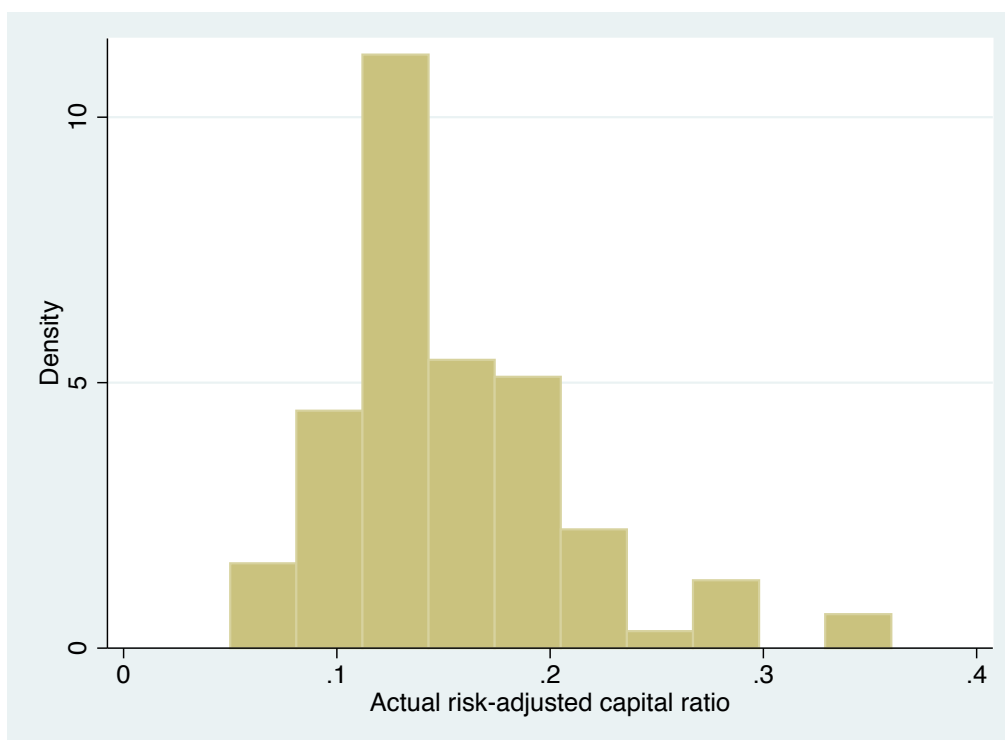
Introduction:

What explains the variation in the quality of financial regulation across countries? “Quality” not in the sense of better or worse, but in terms of a regulator’s concern for different aspects of the banking system, such as stability or profitability. Regulators must ensure their banks are capable of growth, while prohibiting risk-taking that may produce higher profits at the expense of market stability. The outbreak of the 2008 financial crisis indicated that regulators from around the world had not realized the level of risk banks were assuming, causing a myriad of criticisms for their supervision in the preceding years (Friedman and Kraus 2011). As a result, many nations have undergone domestic regulatory reforms in an attempt to increase stringency. Internationally, the Basel Committee of Banking Supervision (BCBS), which is comprised of central bankers from the G-10 countries, published a set of international financial standards known as Basel III in 2010. Basel III requires stricter capital regulations than its predecessors and newly establishes liquidity minima, along with an array of other new measures. Basels I and II required a total of 8% regulatory capital, while Basel III requires banks to retain an additional 2.5% conservation buffer, increasing the minimum to 10.5%.

Despite the increase, in the most recent World Bank Regulation and Supervision Survey, using Basel’s risk calibration, US banks in general had a risk-adjusted capital to

asset ratio of 12.33% in 2005. Conversely, Chinese banks, which were relatively unscathed from the recession, had a ratio of 4.9%. In fact, most countries had a capital ratio exceeding .08, as shown in Figure I below:

Risk-adjusted Capital Ratios as of Year-End 2005



Source: 2008 World Bank Regulation and Supervision Survey

Out of the 101 survey participants, the average ratio was 15.2%, and almost 90% of the respondents said their banking systems had 11% or more of regulatory capital. If most banking systems were compliant with Basel II, and many were already in compliance with the 10.5% of Basel III, then adherence to the increased stringency of Basel III does not necessitate less systemic risk in global finance. Stringency of regulations are only relevant insofar as regulators effectively implementing and enforcing them. Studying patterns between different regulatory regimes and bank system

characteristics that indicate various regulatory interests can aid in understanding which regulatory structures implement stricter regulations.

Studying the qualitative differences of regulators' concerns is especially relevant for Basel III because the regulation introduces a discretionary "countercyclical capital buffer". Regulators are permitted to impose this additional buffer when they are worried about excess credit in their economies. Up to 2.5% of regulatory capital may be added to banks' cushions, depending on the level of regulators' concern. However, if regulators in different countries have different responsibilities, then they may react to similar risks divergently, causing disparities in the stringency of regulations.

Increased attention has been given to the relationship between a country's financial regulatory regime and the effects on the economy (Quintyn and Masciandaro 2009). For example, central banks that also have regulatory responsibilities are in countries that typically experience more inflation. Scholars argue that regulatory central banks are more concerned about financial sector health when setting monetary policy, causing them to set lower interest rates. Conversely, central banks that are only in charge of monetary policy typically set higher rates and facilitate less inflation (Copelovitch and Singer 2008). Thus, different regulatory dynamics can influence the risk management of regulators.

I hypothesize that regulatory central banks impose a quality of financial regulation that is geared more towards stability than the quality of regulation implemented by other regulatory regimes. Regulatory central banks have a larger concern for stability because of their additional concerns with macroeconomic factors, such as inflation and unemployment. I agree with the logic that a regulatory central bank

has more concern for the domestic banking system and is more likely to set a lower interest rate, but this reasoning does not imply that a separate supervisory agency will be equally as capable as a central bank in facilitating market stability. The specialized nature of a separate agency makes the entity less likely to implement strict regulations that promote general market stability, because the agency's specific mandate is to focus on the health and growth of financial firms, not on macroeconomic effects. Thus, there might be less inflation with a central bank that is only responsible for monetary policy, but there could also be less bank stability because of the separate agency's less stringent supervision, still increasing vulnerability for the general economy.

To test this argument, I collected data spanning the years 2001-2010 from various World Bank datasets and ran regressions comparing the location of regulatory authority, either in the central bank or in a separate supervisory agency, with different measurements of a banking system's stability. The results indicate that regulatory central banks tend to oversee banking systems that have more stability, and the level of bank concentration is a significant explanatory variable affecting bank stability.

An implication of this finding is additional evidence confirming the theory that different regulatory structures create differences in the quality of enforced regulations. These differences in quality do not make certain regimes better or worse; instead, they indicate tradeoffs when selecting a particular financial regulatory structure.

Background:

A bank's balance sheet is comprised of its assets, liabilities, and equity. Assets are the amount of funding a bank has, such as investments or property. Liabilities equate to what the bank owes. Subtracting liabilities from assets calculates a bank's equity, or net worth. Equity is what drives a bank's stock, and for a publicly traded bank, the ability to generate more equity produces larger yields for their executives and shareholders. An inherent characteristic of banking is risk-taking, and risks with higher stakes produce the chance for higher profits. With banks from all over the world operating in the same global financial system, the variation and magnitude of risk-taking in different markets can make effective regulation quite difficult.

The amount of capital banks retain is usually a result of the regulatory policies and practices of their domestic regulators (Copelovitch and Singer 2008, 667). A regulator's ability to prudently supervise banks and minimize insolvency is integral to the long-term success of a country's economy. However, if one particular country permits riskier financial activity, banks around the world have an incentive to conduct business there; this concentration of risk can still cause harms to other economies: if a bank collapses, the liabilities it owes to foreign banks no longer exist, which puts those banks in jeopardy of honoring their liabilities to other banks, thus causing a devastating domino effect (Singer 2004, 547).

Thus, political institutional factors are closely related to the health of the financial sector (Klomp and Haan 2009). All financial regulators across countries are subject to political pressures, but the type and degree of pressures are varied. Nearly every nation has a central bank that sets the interest rate, but the level of a central bank's regulatory

responsibility ranges from non-existent to heavy involvement, causing noticeable differences in regulatory quality (Freytag and Masciandaro 2006, 9). This study seeks to examine patterns between different regulatory regimes and the quality of financial regulation, specifically, if the location of regulatory authority within the central bank has an effect on the stability of the banking system. Rather than evaluating the needs of the financial sector, this explanation offers a political economy view of banking supervision, as a function of the political factors that drive banking regulation.

Literature Review:

During the 1970s, banking began to rapidly globalize and many nations became financially interconnected. This interdependence, however, meant that economies also shared systemic risks. The first modern global crisis occurred in 1974, when a mid-sized German bank collapsed and caused a brief shutdown in international payment systems (Friedman and Kraus 2011, 16). Bank regulators of industrialized nations realized the fragility of an unregulated international financial system, and the G-10 countries formed the Basel Committee on Banking Supervision in 1975. Initial negotiations did not facilitate any formal standards; disagreements over the definition of capital, let alone capital minima themselves, prevented any substantive drafting (Singer 2004, 546).

Over the next decade, the world experienced several more financial crises. One of the more severe shocks was in 1987, when US economic growth slowed and the Fed announced it would increase interest rates to curb inflation. This ended up causing significant damage to the US financial sector, especially Savings & Loans (S&L) institutions, which were highly profitable at the time (Copelovitch and Singer 2008, 667).

These firms were regulated by the Federal Home Loan Bank Board and accrued significant wealth by issuing long-term fixed-rate mortgages. The increased interest rates were problematic for S&Ls because the costs for short-term funding now became higher, but they depended on the steady returns of their long-term mortgages. Thus, the higher costs increased their liabilities while the funding from their assets remained the same. Many S&Ls had not calibrated their portfolios to be able to handle the risk of an increased interest rate, and a large share of them collapsed.

The firms were loosely regulated and did not have the capital cushions to absorb the losses for their sudden increase in liabilities. The wave of defaults created a stock market crash that caused significant instability throughout the world economy (Copelovitch and Singer 2008, 668). Subsequently, US regulators and lawmakers collaborated to reform financial regulations, such as abolishing the Federal Home Loan Bank Board and replacing it with the Office of Thrift Supervision (OTS).

The UK and US saw the S&L crisis as a springboard to create international financial standards of capital adequacy. Both countries had been concerned with the rising prominence of Japanese banks throughout the 1980s, which was primarily a result of Japanese regulators requiring lower capital levels (Singer 2009, 24). This gave Japanese firms the ability to take larger risks for the chance of higher profits, disadvantaging other multinational banks. After the crisis, the UK and US forged a bilateral treaty outlining specific standards of capital minima, which created the momentum for the Basel Committee to converge again and formulate international regulations. Closely resembling the requirements of the treaty, the Basel Accord was published in 1988 (Singer 2009, 25).

The regulation required banks to retain at least 8% capital for their financial activity. Capital was organized into tiers, with specific requirements for each tier. “Tier 1 capital” consisted of a bank’s least risky instruments, and had a minimum of 4%. The rest of the 8% could be satisfied with Tier 2 and some Tier 3 capital, considered “supplemental”, and were types of capital that were not as safe as Tier 1 capital but relatively stable.

Assets were categorized by “risk-weights”, or “risk-buckets”, depending on the level of risk associated with them (Friedman and Kraus 2011, 62). For example, banks had to retain the full 8% capital for all loans to businesses, but only half of that capital was required for mortgages, and no capital was required for the amount of gold or government bonds on a bank’s balance sheet. Figure 2 is a chart illustrating the original Basel “risk-weights”:

Risk-Weighted Assets of the Basel Accord

Asset Type	Basel risk-weight ratio
Cash, gold, government bonds	0
Public-sector entity obligations and bonds	.2 (1.6% capital)
Unsecuritized mortgages	.5 (4% capital)
Other assets (e.g. loans to businesses and consumers, corporate bonds, etc.)	1 (full 8% capital)

Imagine a bank that wishes to invest \$1,000 of its assets. If this bank devoted all of the funding to business loans, which would fall into the last category of the table, the Basel Accord would require the bank to allocate capital equating to the full 8%, or \$80.

However, if the bank chose to issue mortgages instead, it would only need half of the 8%, or \$40, because unsecuritized mortgages are in the 50% risk bucket. This would allow the bank to still comply with the Basel framework, and have an additional \$40 to invest with. Alternatively, purchasing bonds sold by Fannie Mae or Freddie Mac, which are government-sponsored enterprises (GSEs) of the US, would require \$16 of capital, only one fifth of the amount required for business loans (Friedman and Kraus 2011, 65).

After the Basel Accord's publication, the capital minimum of 8% soon became implemented on a widespread scale and became the standard for bank stability, despite several key issues. For example, the risk-weight framework did not account for differences in specific assets, so \$1,000 in government bonds from the US or Portugal had the same risk-weight of 0% (Friedman and Kraus 2011, 63).

The BCBS worked throughout the 1990s and 2000s drafting amendments to the original Basel agreement; these amendments accumulated into a new set of regulations that were published in 2004 and labeled "Basel II". Basel II re-worked the rules-based approach of Basel I by emphasizing principles and discretion. Large banks could use internal risk models instead of standardized formulas to determine capital levels, subject to the approval of their domestic regulators (Borio and Zhu 2012, 4). The new regulations did not increase the 8% minimum or reform the Tier definitions, but sought to modernize risk calibration by increasing sensitivity towards different types of assets. Basel II delineated the required capital for assets based on their credit rating in addition to their risk-weight category. Thus, a AAA sovereign bond had a risk-weight of 0%, while a BBB+ sovereign bond was 50%. Similarly, a private label mortgage-backed

security rated AAA required 20%, compared to 50% for A+ and 100% for BBB+ (Friedman and Kraus 2011, 76).

Also during this time period, many nations comprehensively reformed their own financial regulatory regimes to improve oversight on the rapidly expanding banking sector. One of the most prominent reforms was when the United Kingdom separated its monetary authority and regulatory authority in 1998. The advent of global banking had caused significant instability for the British economy: many commercial banks failed in the 1970s as a result of the country's rapidly changing macroeconomic conditions (Copelovitch and Singer 2008, 676). Inflation rates reached as high as 10% in the 1980s and remained high throughout the decade. The high rate forced the UK to abandon the European Exchange Rate Mechanism (ERM) in 1992 because the pound had breached the currency value minimum required by the exchange rate system (Copelovitch and Singer 2008, 675).

The Labour Party assumed control of Parliament in 1997; their solution for the severe inflation was to place monetary authority solely with the Bank of England and to delegate nearly all financial regulatory responsibilities to a separate agency called the Financial Services Authority (FSA). The reasoning for the separation was to allow the Bank of England to enact monetary policies focused only on price stability (Copelovitch and Singer 2008, 676). This reform was the first time a country with a major financial hub re-structured supervision to a single entity other than the central bank. Since then, dozens of countries have pursued similar reforms: Austria, Belgium, Germany, Japan, among others, have all delegated regulatory power to a separate agency between 1997 and 2004 (Masciandaro 2009, 2).

Despite the publication of Basel II and string of domestic reforms, the 2008 crisis was a result of systemic risk concentrating into relatively less regulated financial markets. The downturn was significantly more devastating than the S&L crisis, which was the impetus for the original Basel Accord. Regulators quickly reconvened to create an even more updated set of regulations. In 2010, Basel III was released.

The Basel III requirements are being imposed incrementally until 2019 in order to ensure a smooth transition for markets. Tier 1 capital is newly defined with higher requirements and delineated between “Common Equity Tier 1” and “Tier 1 capital” (BCBS 2011, 28). Common Equity Tier 1 is far more stringent than the criteria of the previous Basels, and is essentially comprised a bank’s equity, such as common shares and retained earnings, while Tier 1 capital includes Common Equity Tier 1 along with a limited amount of other equity-like instruments. Basel II required 4.0% of Tier 1 capital and 2.0% of Tier 1 equity. Basel III requires minimum of 6.0% of Tier 1 capital and 4.5% of Common Equity Tier 1. The remaining difference between the amount of Tier 1 capital and the total 8.0% may be satisfied by Tier 2 capital. Tier 3 capital has been eliminated.

In addition to the minimum, there is a 2.5% “capital conservation buffer” of Common Equity Tier 1 that is designed to alert bankers and regulators before the 8.0% cushion is breached (BCBS 2011, 54). As stated in the introduction, Basel III also introduces a discretionary “countercyclical capital buffer” of up to 2.5% of Common Equity Tier 1 that regulators can impose during credit booms. Figure III is a matrix published by the Basel Committee to explain the interaction between the different buffers and tiers of capital:

Matrix of Capital Framework for Basel III

Calibration of the capital framework

Calibration of the Capital Framework			
Capital requirements and buffers (all numbers in percent)			
	Common Equity Tier 1	Tier 1 Capital	Total Capital
Minimum	4.5	6.0	8.0
Conservation buffer	2.5		
Minimum plus conservation buffer	7.0	8.5	10.5
Countercyclical buffer range*	0 – 2.5		

Source: Bank of International Settlements (BIS)

Thus, depending on regulators' concerns of excess credit, banks must retain a minimum of Common Equity Tier 1 capital between 7.0% and 9.5%, a Tier 1 capital minimum between 8.5% and 11.0%, and a total capital minimum between 10.5% and 13.0% of risk-weighted assets (BCBS 2011, 64).

Basel III is distinct from the previous two agreements because it also stipulates requirements for liquidity in banks. The newfound liquidity facet creates standards with short-term and long-term requirements. In terms of short-term regulation, banks must hold enough high-quality liquid assets to cover its total net cash flows for 30 days at any given time. The long-term regulation requires banks to have enough stable funding to exceed the required liquidity to withstand a one-year period of prolonged economic stress (BCBS 2011, 8).

In an effort to better manage banks that are “too big to fail”, Basel III recognizes 29 “systemically important financial institutions”, or SIFIs. These firms, such as Goldman Sachs and Credit Suisse, are subject to even higher capital minima due to their pivotal role in the world economy. Most of the firms are in the US and Europe, and four are in Japan and China.

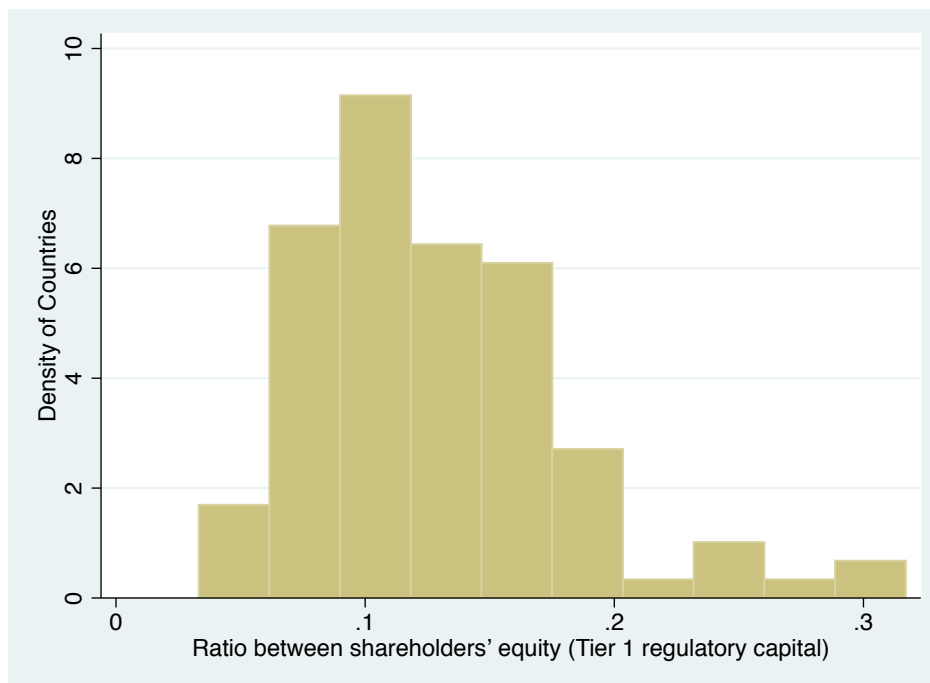
Despite the increases in stringency, some scholars posit that capital regulation and other financial constraints are not inherently conducive to effective risk management (Friedman and Kraus, 2011). As stated earlier, the early Basel framework categorized GSE bonds and mortgages as less risky than small business loans, which proved to be a misguided hierarchy. Nonetheless, regulators argue that increasing the amount of regulatory capital assists banks because it provides a cushion during times of stress.

Daniel Tarullo, a member of the US Federal Reserve Board of Governors, testified at a Senate Banking Committee hearing on March 22, 2012, stating:

Strong capital requirements remain the cornerstone of prudential regulation because capital can provide a buffer against losses at financial firms from any source or activity. The best way to safeguard against taxpayer-funded bailouts in the future is for our large financial institutions to have adequate capital buffers, sized to reflect their own risk profiles and the damage that would be done to the financial system were such institutions to fail (U.S. Senate 2012, 2).

Basel III seeks to amend the previous regulations by only permitting bank equity, a very expensive and valuable form of capital, to be the crux of the regulatory cushion. However, the World Bank Regulation and Supervision survey mentioned in the introduction also asked regulators for the ratio of Tier 1 equity relative to risk-weighted assets for their banks. The average response was 12.9% in 2005, which is almost compliant with Basel III’s highest standard of 13.0%. Figure IV illustrates the regulatory capital levels of bank equity across countries in 2005:

Tier 1 Equity Capital Ratios as of Year-End 2005



Source: 2008 World Bank Regulation and Supervision Survey

Despite the high levels of risk-adjusted Tier 1 capital, they were not strong enough for some banks to effectively withstand the shocks of the 2008 crisis. Regardless of the increased stringency, a large concern is how effective regulators will be in implementing Basel III, especially if domestic policies conflict. Dr. Hal Scott, the Harvard Law Nomura Professor of International Financial Systems, stated in a House Financial Services hearing testimony on June 16, 2011:

A crucial question is whether the decline in GDP will be higher in some countries than others and whether some countries' banks will be more affected than others. This depends in part on whether the Basel rules will be implemented uniformly in each country. It is far from clear that they will be...Further, even if countries have the same nominal rules, adopted at the same time, they might enforce them differently. For example, for the largest international banks, Basel permits the use of internal ratings through credit models. Will such models be subject to the same scrutiny in all countries? On the other hand, some countries question whether the U.S. will implement Basel III on schedule, considering we never fully implemented Basel II and that the Dodd-Frank Act's ban on references to credit ratings will make it difficult to implement the securitization risk-weightings adopted in Basel III (U.S. Congress 2011, 17).

The variation in enforcement, along with the diversity in banking systems across countries and complexity of global finance in general, makes predicting the impacts of new financial regulations difficult. The Basel Committee, International Monetary Fund, Federal Reserve Bank of New York, the Institute of International Finance (IIF), amongst others, have all published studies attempting to quantify the implications of Basel III (U.S. Congress 2011, 14). These studies have all taken different assumptions and produced conflicting results as varied as the Basel Committee's conclusion of world GDP decreasing by .17% for every extra percent of regulatory capital, to the IIF's conclusion that the US, Japan, and Europe will face GDP decreases of over 3% due to Basel III (U.S. Congress 2011, 17).

The incremental implementation of Basel III means the effects of the regulation will not be seen for years to come. However, studying compliance with Basel III in and of itself is inadequate: there will almost certainly be widespread variation in implementation, which no set of assumptions can account for, but regulations' effects are contingent upon the regulator's ability to implement them. Thus, a specific type of regulatory regime that is shown to facilitate more financial stability would be likely to enforce new regulations more stringently. If implementation is a key component to the quality of financial regulation, whether domestic or international, what factors alter regulators' abilities to supervise banks, ultimately affecting banking systems themselves?

Theory:*The Politics of Financial Regulation:*

A benefit of examining the political aspects of financial regulation is the lower level of difficulty in accounting for variation in cross-border banking practices (Djankov McLiesh and Shleifer 2006, 2). Political factors are relatively easier to measure and compare: theoretically, all regulators are responsible for facilitating a healthy and stable financial sector, but they are susceptible to different pressures that possibly conflict and potentially affect their obligations and concerns.

Regulators are accountable to the government, thus variation in regulatory political dynamics can influence the type of regulations implemented. Legislatures enact financial regulatory laws that permit regulators to construct rules as they see fit, with the assumption that the regulations will be consistent with the legislature's directives. If the policies are contrary to the lawmakers' desires, then the legislature can either strike them down or enact amendments (Singer 2004, 535). For example, if a legislature believes domestic banks are more constrained than their foreign counterparts, and therefore less profitable, it might intervene and loosen restrictions to increase their competitiveness. Conversely, if banks are engaging in excessive risk-taking that causes damages to the economy, new regulations will tighten oversight to increase stability and confidence (Singer 2004, 536).

Regulators strive to avoid legislative intervention because it undercuts their authority and increases the chance of repercussions, such as the disbanding of the Federal Home Loan Bank Board after the S&L crisis in the US. Thus, regulators operate in a spectrum that balances bank competitiveness and economic stability. Stricter regulations

increase stability and decrease competitiveness, whereas looser regulations decrease stability and increase competitiveness. Assuming this dynamic is true, what type of regulator facilitates more stability over competitiveness, or vice versa?

Regulatory Central Banks and Separate Supervisory Agencies

The specific variation in regulatory regimes that my study pertains to is the presence of regulatory authority within the central bank. There are two theories that attempt to explain the reasoning behind governments delegating regulatory authority to a separate agency: the “blurring effect” of finance and price stability.

The blurring effect theory attributes regulatory regime reform as the government’s response to banks diversifying financial activity. Banks’ expansion into different industries caused certain markets, such as securities and insurance, to recently become integrated with banking (Masciandaro 2004). Multiple regulatory agencies with different sets of regulations create inefficiencies for financial conglomerates that engage in varied businesses. Thus, banks are more likely to be better off if they are supervised by a consolidated entity. This trend of placing financial authority in a single agency can particularly be seen in countries belonging to the European Union, where many banks regularly engage in various financial activities with other banks in different member-states (Masciandaro 2004, 3).

However, in 2008, Mark Copelovitch and David Singer published an article contending that the United Kingdom’s transfer of regulatory authority to the FSA was not a result of the blurring effect, but because of the government’s desire to ensure the country’s monetary authority, the Bank of England, was not concerned about

destabilizing banks when deciding monetary policy. Financial conglomerates materialized in the UK in the 1970s and suffered instability for several decades thereafter. Thus, the decision to react with reforms in 1997 would not make sense (Copelovitch and Singer 2008, 677). Instead, the Labour Party implemented the separation to allow the Bank of England to mainly focus on price stability. After the reform was implemented, the average annual inflation rate for the country did not exceed 3% between 1999 and 2005 (Copelovitch and Singer 2008, 676).

The price stability theory argues that monetary policymakers with regulatory responsibilities have a relatively closer relationship with their banks than monetary policymakers without such responsibilities. Thus, regulatory central banks may be inclined to set a lower interest rate to reduce subsequent bank instability. Higher interest rates increase the costs for borrowing, requiring banks to implement different cost-adjusting measures, such as increasing deposit rates (Copelovitch and Singer 2008, 677). Conversely, banks have a vested interest in a lower interest rate because a larger money supply allows them to conduct financial activity with more funding.

The incentive for creating an independent monetary authority is insulating regulators from the interests of the financial sector, which could compromise the central bank's ability to implement monetary policies truly centered on price stability. To test this theory, Copelovitch and Singer demonstrated a relationship between real interest rates and whether or not a central bank has regulatory responsibilities. By studying 25 industrialized countries from 1975-2005, their results indicated that real interest rates were lower and inflation was higher when central banks had regulatory powers (Copelovitch and Singer 2008, 672). However, countries with regulatory central banks

might be more likely to experience higher rates of inflation, but that does not mean separate supervisory agencies are necessarily equally or better poised to supervise the banking system.

Power of the Banking Sector

The stability of large banks in concentrated markets means they are likely to have systemic relevance to the country's economy, and therefore more political power. If a few banks wield significant control of the financial sector, they are more likely to be able to coalesce and advocate for bank-friendly regulations. Legislatures are inclined to be sympathetic towards banks' arguments for facilitating growth because the financial sector is an essential component of any economy, especially industrialized ones. Moreover, financial firms are often primary actors in campaign contributions, so their agenda closely relates to elected officials that are pro-banks, especially if banks are organized in their lobbying (Singer 2004, 535). Banks in a concentrated financial sector are more likely in overcoming collective action problems to effectively lobby against stricter regulations.

Evidence points to a relationship between a country's market structure and risk-taking done by banks. Nations with more concentrated banking systems tend to have decreased access to credit throughout the economy, along with interaction between bank concentration and regulatory characteristics (Beck, Kunt, and Maksimovic 2003, 628). A high concentration means large banks do not have to be particularly risky to generate profits. For example, compared to banks in industrialized countries, commercial banks in developing countries allocate relatively more funds to stable investments like government

bonds, which contributes to the lack of credit and slow growth in some of those nations (Freedman and Click 2006, 283).

Thus, large banks in concentrated financial sectors are systemically important to their country, increasing their likelihood of stability and effective political sway. They are likely to have relatively lower capital ratios because they can reasonably convince domestic regulators that they refrain from engaging in types of risks that would require a large cushion. The large banks will also probably have a higher z-score, because return on assets is based on the role of the financial sector in a country and market conditions. As a result, a higher concentration would lead to higher ROA because large banks can consistently maintain high returns, also increasing the z-score.

Hypothesis:

I hypothesize that banking systems with regulatory central banks exhibit more stability. Central banks are responsible for macroeconomic factors, such as inflation and unemployment, whereas separate supervisory agencies are only in charge of regulating banks. Thus, central banks have a larger scope of evaluation when supervising, giving them the incentive to facilitate a more stable banking system that would cause less volatility for the general economy. I also hypothesize that a higher bank concentration positively affects stability, because large banks in concentrated financial sectors are not as inclined to take risks, making them more stable.

Data:

The data for my analysis is a combination of datasets from the World Bank World Development Indicators (WDI), the second and third World Bank Regulation and Supervision surveys published in 2003 and 2008, respectively, and the World Bank Financial Development and Structure Database by Thorston Beck and Asli Demirguc-Kunt. The World Development Indicators and Financial Structure Database have annual data from 1960 up until 2011, and pertain to measurements of the banking system. The surveys are cross-sections of the years 2001 and 2005, with questions covering various aspects of financial regulation.

I also created a separate sample group of the twelve countries that have SIFIs, to see if there are qualitative differences in regulation between nations that have established banks and the rest of the world. These countries are: Belgium, China, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, United Kingdom, and the United States. Although the “SIFI” categorization was created in 2010 through Basel III, the point of the sample size is to see if there are any correlations for regulating banking systems that have banks with crucial importance for the world economy.

Dependent variables:*Capital to asset ratio (CAR)*

The data for this variable can be found in both the World Bank Regulation and Supervision surveys and the World Bank’s World Development Indicators dataset.

Question 3.1 of both surveys reads, “What is the minimum capital to asset ratio requirement?” Question 3.4 of the second survey asks, “What is the actual risk-adjusted

capital ratio in banks as of year-end 2001, using the 1988 Basle Accord definitions?”

The third survey asks the same question about year-end 2005. 128 countries responded to Question 3.1 of the third survey, with an average minimum of 9.1%. The risk-adjusted capital ratio for 2005 had answers as low as 5% and as high as 36%. The survey data is only cross-sectional, thus the n-sizes of the regressions will be much smaller in comparison to the dependent variables from the other datasets.

The World Development Indicators data measures capital to asset ratios in terms of funds contributed by owners, retained earnings, general and special reserves, provisions, and valuation adjustments. The WDI data is distinct from the survey data because the WDI ratios are denominated by total assets instead of risk-adjusted assets; however, this difference does not prevent the variable from being used to gauge the stability of a country's banking system.

The capital to asset ratio is an indirect measurement of the quality of financial regulation in a banking system, because regulation shapes the capital levels banks retain as a cushion. The ratio serves as a helpful indicator because retaining capital increases bank resilience at the expense of financial activity. A higher ratio implies regulators are closer to the confidence side of the spectrum. Thus, I hypothesize that the results will depict central banks with regulatory powers correlating with higher capital to asset ratios.

Bank z-score

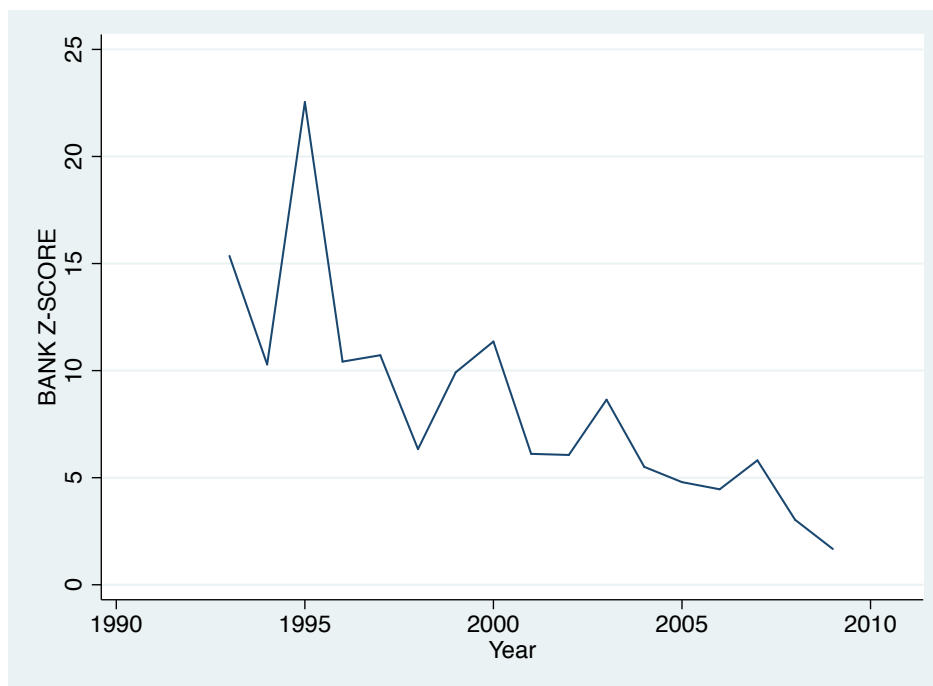
The bank z-score is from the Financial Structure dataset. The score is a ratio calculated by adding the return on assets (ROA) and the capital to asset ratio, then dividing by the standard deviation of return on assets. The standard deviation of ROA

serves as an indicator for volatility in bank profits. The “z” denotes the number of standard deviations a bank’s ROA must decrease by to eliminate equity and cause a bank to become insolvent. Thus, the z-score is inversely related to the probability of insolvency, so a higher z-score implies more stability (Beck and Kunt 2009, 12).

Using the z-score adds a dimension to the capital to asset measurement by also assessing the banking system’s volatility in profits. A potential criticism to this variable is the formula’s inclusion of the capital to asset ratio, so a pattern in capital to asset ratios might also cause a pattern in the z-score. However, the variable functions as a supplemental measurement to the capital ratios, thus the significance of both capital ratios and z-score would not undermine the general hypothesis that banking systems supervised by regulatory central banks exhibit more stability.

Although inflation significantly decreased for the United Kingdom after the 1997 reform, bank instability steadily decreased throughout the 2000s, as shown in the following Figure V:

Z-Score Measurement of Stability in UK Banking System 1992-2011



The absence of concern for financial sector health may allow monetary central banks to set higher interest rates, but the new regulatory entity does not automatically facilitate the same amount of stability in the banking system as a regulatory central bank.

Independent variables:

Location of regulatory authority

This independent variable is based on the binary variable used by Copelovitch and Singer, although their data is from the second World Bank Regulation and Supervision survey released in 2003 and mine is from both the second and third surveys. Question 12.1.1 of the third survey asks, “Does the Central Bank supervise banks?” with respondents answering either “Yes” or “No”. The subsequent questions ask if a single supervisory agency supervises banks or if there are multiple agencies, but my study seeks

to examine the variation between central bank regulation and non-central bank regulation. The survey has only cross-sectional data for 2005, but most countries reformed their regulatory structures by 2004. I then expanded the respondents' answers to cover the years 2005-2010 in the aggregate dataset.

Out of 131 respondents to the question, 51 countries have a separate regulatory agency and 80 countries depend on the central bank for supervision. There is also variation amongst nations with SIFIs, as shown in the following Figure VI:

Location of Regulatory Authority in Countries with SIFIs as of 2005

Separate Agency	Central Bank
Belgium China France Japan Sweden Switzerland United Kingdom	Germany Italy Netherlands Spain United States

I also went through the second survey used by Copelovitch and Singer to expand my sample size. The survey is a cross-section of 2001, thus I coded respondents' answers for the years 2001-2004. Question 12.1 of the second survey asks, "What body/agency supervises banks?" with respondents providing categorical answers (e.g. "Bank of Spain" or "Hungary Financial Supervision Authority"). There are 17 countries that altered their regulatory regimes between the administrations of the two surveys; however, my coding does not precisely mark the year when those countries implemented reforms. The inclusion of the second survey answers created a sample size spanning

2001-2010.

Bank concentration

Bank concentration is from the Financial Structure dataset, and is based on information from BankScope, a global database of banks' financial statements and statistics. The variable is a ratio measuring assets belonging to the three largest banks in a country over the aggregate total of assets in the financial sector, which serves as an indicator of a country's market structure (Beck and Kunt 2009, 11). A higher ratio means that the three banks own a larger share of the market, making it more concentrated. The authors of the Financial Structure dataset warn that BankScope's coverage is not 100%, thus the representation of the market structure may not be completely accurate (Beck and Kunt 2009, 11). However, BankScope has over 90% of bank information, so the measurement is still fairly valid (Beck, Kunt, and Maksimovic 2003, 635).

Control variables:

The control variables used are log of GDP and GDP per capita, GDP growth, liquid liabilities of the financial sector relative to GDP, and whether the country has recently experienced a banking crisis or is experiencing a banking crisis. Liquid liabilities as a share of GDP comes from the Financial Structure dataset and controls for the size of the banking system. The measurement has significant variation, with ratios as low as below 1% and as high as 478%. The banking crisis control variables come from a dataset constructed by Luc Laeven, an economist at the International Monetary Fund (Laeven 2008). The two crisis controls measure whether a country was undergoing a

crisis or had experienced a crisis within 5 years of the time period studied. Controlling for crises is important because they affect the risk management of a country: regulations are usually loosened during times of stress to help banks recover, but then increase in stringency after the crisis subsides.

Results:

The results do not reject the hypothesis that central bank regulators prefer more stability in their banking systems:

Figure VI: First Table of Regression Results

	(1)	(2)	(3)	(4)
	WDI Capital to asset ratio	Bank Z-Score	Legal regulatory minimum	Risk-adjusted capital ratios in 2005
Location of regulatory authority	0.818*** (0.236)	1.883*** (0.546)	0.00839*** (0.00221)	0.0228** (0.00743)
Bank concentration	-3.951*** (0.680)	4.399** (1.600)	-0.0226*** (0.00572)	-0.0172 (0.0198)
ln of GDP	-0.754*** (0.0953)	-0.437* (0.201)	-0.00274*** (0.000726)	-0.0114*** (0.00276)
ln of GDP per capita	0.131 (0.144)	0.793* (0.308)	0.00332** (0.00118)	0.00594 (0.00442)
GDP growth	0.0874** (0.0265)	-0.0117 (0.0671)	0.000487 (0.000369)	0.00158 (0.00194)
Liquid liabilities over GDP	-1.911*** (0.301)	1.378 (0.779)	-0.00888*** (0.00255)	-0.0137 (0.00769)
Currently	-1.454* (0.301)	-2.354* (0.779)	0.00652 (0.00255)	-0.0142 (0.00769)

experiencing crisis				
	(0.611)	(1.066)	(0.00511)	(0.0235)
Experienced crisis in the past 5 years	0.801*	-1.893**	-0.00183	0.0234
	(0.354)	(0.648)	(0.00311)	(0.0176)
Constant	30.21***	17.21**	0.166***	0.421***
	(2.484)	(5.344)	(0.0195)	(0.0733)
<i>N</i>	656	773	194	162
Adjusted R^2	0.337	0.058	0.120	0.133

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A country with a regulatory central bank generally has a banking system with an unweighted capital ratio that is .82 higher and a larger z-score by 1.9. In 2005, regulatory central banks required slightly more stringent regulatory minima and had a higher risk-adjusted capital ratio by .02. Bank concentration is also significant for some variables, decreasing the unweighted capital ratio by 3.95, increasing the z-score by 4.40, and slightly lowering the regulatory minimum. The smaller n-values for the third and fourth variables are because they are based on cross-sectional data, offering only ratios for only 2001 and 2005. Thus, their significance adds slightly more credence to the relationships found in the WDI ratios and z-score.

Bank concentration's positive relationship with the z-score could be a result of the small variation in return on assets large banks have in concentrated financial sectors, which would make sense due to their dominant role in the domestic economy. A bank with a very small variation in profitability would therefore noticeably increase the z-score. However, interpreting the data should still be done with caution. There are limitations in concluding regulatory differences based on characteristics of the banking system, because certain elements may be a result of bank behavior or other economic

factors.

Log of GDP is negatively significant, possibly because governments primarily concerned with growth require their regulators to facilitate profits over stability. The positive significance of GDP growth could mean that regulators in profitable banking systems feel less concerned about growth and require more stability. Liquid liabilities over GDP is significant for capital ratios because a larger financial sector is more diverse and would reduce the need for higher risk-aversion. Copelovitch and Singer use “domestic credit provided by banking sector over GDP” from the WDI dataset to control for the size of the financial sector in their study. I used this variable as an alternative control and the regressions yielded similar results and significance.

The presence of a banking crisis is also significant, as predicted: countries undergoing crises had lower capital ratios by 1.45, presumably because of the stress banks were under. Countries that had recently experienced crises had higher regulations by .80, which is most likely a result of more stringent regulations being implemented. Both crisis coefficients for the z-score were negative, but the z-score is distinct from capital ratios because capital ratios can be altered relatively quickly, whereas a bank recovering profitability after a crisis can take at least several years. Indeed, there is more stability in financial sectors after crises than during crises.

I also ran a regression comparing the level of influence from neighboring countries and the regulatory quality of SIFI nations with non-SIFI nations. To examine the influence from neighboring countries, I averaged the capital levels of countries and inputted them into the previous year to see how a regulator would react to other countries altering capital minima:

Figure VIII: Second Table of Regression Results

	(1)
	WDI Capital to asset ratio
Location of regulatory authority	0.805*** (0.238)
Bank concentration	-3.804*** (0.695)
Responsiveness to other countries' capital ratios	0.165 (0.0908)
ln of GDP	-0.684*** (0.117)
ln of GDP per capita	0.146 (0.143)
GDP growth	0.0866*** (0.0256)
Liquid liabilities over GDP	-1.885*** (0.298)
Currently experiencing crisis	-1.279* (0.625)
Experienced crisis in the past 5 years	0.746* (0.349)
Constant	26.88*** (3.672)
<i>N</i>	656
Adjusted R^2	0.339

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results for competitive pressures are not significant, suggesting that regulatory central banks impose higher capital standards regardless of international trends by other countries. The only years that had significance for responsiveness were 2008 and 2009, which were increases and probably caused by the onset of the financial crisis.

As an additional test for the political power of the banking sector, I ran a regression using a sample size of only countries with SIFIs in comparison to countries without SIFIs. The Basel Committee's designation of systemic importance was not introduced until 2010, thus the sample retroactively assigns the label, but the regression can still indicate if banks with global importance cause changes in any correlations:

Figure IX: Third Table of Regression Results

	(1)	(2)
	WDI Capital to asset ratio for non-SIFI countries	WDI Capital to asset ratio for SIFI countries
Location of regulatory authority	0.719*	0.832
	(2.52)	(1.64)
Bank concentration	-3.239***	-0.923
	(-3.85)	(-0.58)
ln of GDP	-0.769***	0.764**
	(-6.30)	(2.70)
ln of GDP per capita	0.170	1.079
	(1.09)	(1.38)
GDP growth	0.0813**	0.0359
	(3.15)	(0.18)
Liquid liabilities over GDP	-1.871***	-1.437***
	(-5.35)	(-3.62)
Currently experiencing crisis	-1.772	0.503
	(-1.95)	(0.83)
Experienced crisis in the past 5 years	0.868*	-0.836
	(2.15)	(-1.36)
Constant	30.17***	-17.29*
	(9.41)	(-2.03)
<i>N</i>	557	99

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The SIFI sample size is much smaller, which may contribute to the statistical insignificance, however, there is no dramatic change in the coefficient for location of regulatory authority, .832 compared to .719, indicating some consistency in preferences of stability by regulatory central banks. The bank concentration coefficient dramatically decreases for SIFI nations, along with becoming quite statistically insignificant, suggesting that regulators of those countries are not as noticeably affected by private influences.

Implications for Future Studies:

There are several avenues of further research regarding the relevance of regulatory regimes. First, my study does not investigate an interaction effect between location of regulatory authority and bank concentration; a subsequent analysis testing for such a relationship could help further specify the way these variables affect regulatory preferences. Second, factoring in variation of party politics could also assist in explaining how regulators respond to ideological transitions of the government. This would be a relevant consideration, since the Labour Party obtained government control in the 1997 elections that preceded the Bank of England reform. Third, even if separate agencies regulate banking systems with less stability, the reasoning for the agency's creation was to consolidate supervision of different financial activities into a single entity, a reaction to the so-called "blurring effect" of financial activity. Thus, there may be benefits for the banking system in terms efficiency in financial intermediation that is a result of the regulatory authority's comprehensive supervisory structure.

Conclusion:

The regression results indicate a tradeoff in regulatory quality: a central bank that only sets monetary policy may facilitate less inflation for the general economy, but the separate supervisory agency tends to facilitate less stability in the banking system. This does not imply that one regulatory regime is superior to the other, but that they both have strengths as well as weaknesses in their regulation. The data also generally suggests that domestic factors are more related to the quality of financial regulation than the global environment. Although central bank regulation correlates with more banking stability, bank concentration has a larger effect on capital ratios and z-scores, -3.24 compared to .719. Thus, the power of the banking sector affects regulators' concerns towards growth more powerfully than regulatory central banks' effect towards stability. However, for countries with SIFIs, bank concentration has no measurable effect, and the location of regulatory authority still appears to push regulators to focus on facilitating stability.

The results could shed insight into potential variation in implementation of Basel III's countercyclical buffer: if two regulators in two different regulatory regimes have the same level of concern with excess credit in their markets, they may implement buffers of differing sizes because of their divergent concerns. This could create inequalities in bank risk-taking and bank regulation, which are disparities that international financial regulations seek to reduce in the first place. However, such a policy has never been implemented before, and the variation has yet to be seen. What can be concluded is that the political structure of a financial regulatory regime bears consequences for a country's economic and financial characteristics, for better or for worse.

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