PICK YOUR POISON: BANKING REGULATIONS, MACROECONOMIC MANAGEMENT, AND MORAL HAZARD IN OECD ECONOMIES

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ABSTRACT

WILLIAM KINDRED WINECOFF: Pick Your Poison: Banking Regulations, Macroeconomic Management, and Moral Hazard in OECD Economies
(Under the direction of Layna Mosley.)

This paper argues that banks operating in systems where monetary and regulatory authority are unified in a central bank expect and receive preferential policies, and so act less prudently than do banks in other systems. This moral hazard arises when the natural tension between counter-cyclical monetary policy and pro-cyclical regulatory policy is relaxed. I test the hypothesis using a time series cross-sectional econometric analysis of OECD countries from 1990-2007. The results strongly support the claim that there is a relationship between prudential behaviors of banks and the location of regulatory authority, and provides evidence that moral hazard exists when regulatory and monetary authority are unified. I conclude by discussing the implications of the analysis for governance at the domestic and international levels.

TABLE OF CONTENTS

LIST OF TABLES iv

LIST OF FIGURES v

Introduction 1

Policy Tension and the Creation of Moral Hazard 4

Data Analysis 8

Model and Method 14

Results 15

Conclusion 18

APPENDIX 21

References 25

LIST OF TABLES

Table

1 Common Risk Weights by Asset Type 9

2 Location of Bank Regulatory Authority in the OECD 10

3 Capital Adequacy Ratios Before and After Transition to Separate Regulator . . 11

4 Predicted relationships between independent variables and CAR 13

5 Determinants of Bank Capital Adequacy Ratios 16

6 Determinants of Bank Capital Adequacy Ratios, including Regime Type 21

7 Determinants of Bank Capital Adequacy Ratios, Excluding Japan 22

8 Determinants of Bank Capital Adequacy Ratios, Different Measure of Openness 23

9 Determinants of Bank Capital Adequacy Ratios, Excluding *Bank Crisis* 24

LIST OF FIGURES

Figure

1 Mean *CAR* and Location of Regulatory Authority 3

Introduction

> *"At our board level, we never had a conversation, ever, that we should rely on the government to do anything."*
>
> – Jamie Dimon, Chairman and CEO of JPMorgan Chase, in testimony before the Financial Crisis Inquiry Commission of the United States Congress, January 13, 2010.

Policy makers must choose whether to give regulatory authority over the banking sector to central banks or to a separate agency. This decision is important: financial crises have grown in frequency and severity since the collapse of the Bretton Woods system (Bordo and Eichengreen 1999), and the recent crisis that originated in the subprime mortgage sector in the United States is "likely to be judged the most virulent global financial crisis ever" (Greenspan 2010). The average fiscal cost of recoveries from financial crises is about 13% of GDP, and the average output loss is about 20% of GDP (Laeven and Valencia 2008). Policy makers operating in this economic environment must maximize the stability of their banking sectors without choking off economic growth. Failure to achieve one goal or the other will adversely affect their chances of remaining in office.

Policy makers may choose to locate regulatory authority in central banks. Central banks manage macroeconomies by controlling the money supply through interest rate adjustments and open market operations. These policy tools affect the cost of funds available to banks, which then affects the cost of funds available to businesses and consumers. Since monetary policy works on the macroeconomy indirectly, with banks as intermediaries between the central bank and the macroeconomy, a healthy banking sector is a prerequisite for central banks to be effective in promoting economic growth (Schumpeter 1911; King and Levine 1993). As a technocratic institution at the center of the financial industry, a central bank has the requisite knowledge to regulate the banking sector in ways that improve economic performance.

By unifying regulatory authority and monetary authority in a central bank, policy makers may intend to address two policy goals – strong macroeconomic performance and financial stability – with one stroke. But macroeconomic and regulatory policy goals are in tension. Standard monetary policy is counter-cyclical: central banks expand the money supply when an economy is

sluggish, and restrict money growth when an economy begins to over-heat and inflationary pressures mount. Prudential regulatory policies such as minimum capital adequacy ratios (CAR), which require banks to maintain a minimum level of capital as protection against default risk in their asset portfolios, are pro-cyclical. A slowdown in economic activity leads to an increase in defaults, which adversely affects bank earnings and erodes its capital base. In this environment banks must take action to boost their capital base or risk liquidation. Banks can improve their capital ratios by issuing new equity, selling assets, borrowing from the government, and scaling back issuance of new loans. In other words, banks protect against insolvency by decreasing normal banking activities. Such actions can lead to a self-perpetuating pro-cyclical pattern, whereby banks decrease lending, which further depresses an economy, leading to more defaults and a corresponding decline in capital ratios.

A study by Federal Reserve economists put it this way: "So long as bank rating systems are responsive to changes in borrower default risk, capital requirements will tend to increase as an economy falls into recession and fall as an economy enters an expansion. To the extent that banks curtail (expand) lending in response, recessions (expansions) will be amplified" (Gordy and Howells 2006). Thus, by restricting bank activity when it is most needed to spur economic activity, pro-cyclical regulatory policies present an obstacle for policy makers in managing their national economies.

Copelovitch and Singer (2008) highlight this tension between macroeconomic and regulatory goals, and claim that "the presence of regulatory responsibility in the central bank's institutional mandate introduces an important bias into its monetary policymaking calculus". Because their mandate includes conflicting aims, they argue, at the margin regulatory central banks must choose to privilege one policy goal over another. Faced with this choice, they are that regulatory central banks will pursue policies that emphasize bank stability over price stability by allowing higher inflation, which is associated with bank profitability. The implication from their analysis is that while regulatory central banks trade off some macroeconomic performance by allowing higher inflation, the financial system will be more stable as a result. They conclude by asking, "Are central banks more stringent bank regulators than stand-alone regulatory agencies? This question is beyond the scope of the literature on the political economy of monetary policy, but nonetheless important for the expanding literature on comparative financial regulation."

This paper offers theoretical and empirical answers to that question. I argue that the same policymaking bias that leads regulatory central banks to tolerate higher inflation than nonregulatory central banks also restricts their ability to serve as a strict regulator of banks. Specifically, I claim that the fact that regulatory central banks privilege the needs of the banking sector more than nonregulatory central banks creates moral hazard: if banks expect preferential policies from

regulatory central banks, then they will take fewer steps to insure themselves against default risk. This, in turn, makes a banking sector more susceptible to crisis, and increases the likelihood that government support of the financial sector will become necessary. Therefore, unifying macroeconomic and regulatory authority in central banks contributes to financial instability in avoidable ways.

Fig. 1: Mean *CAR* and Location of Regulatory Authority

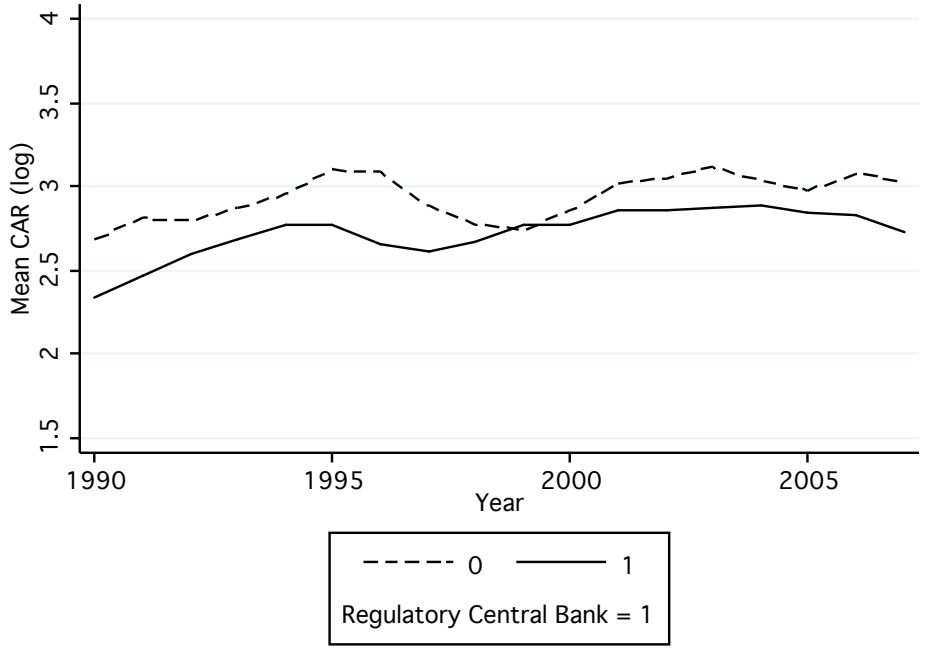

Figure 1 provides a glimpse of the relationship between capital adequacy ratios (CAR) and location of regulatory authority in OECD economies over time. CAR are a common measure of banks' precautions against default risk, and have been largely harmonized among advanced economies by the Basel Accords. At nearly every point in the time series, mean CAR are lower in states with regulatory central banks, meaning that those banks are less capable of absorbing defaults while remaining solvent. This relationship persists over the sample period, although the gap tightened beginning in the late-1990s[1] . The theory developed below argues that the gap is attributable to the moral hazard which exists when monetary and regulatory authority are unified.

By focusing on how institutional mandates affect policy outcomes, this paper contributes to two theoretical literatures. First, the previous political economy literature on banking regulation has focused on how domestic political institutions affect the creation of regulatory standards, or on principal-agent dynamics between regulatory institutions and governments, but has not

[1] This tightening is perhaps attributable to the accession to the European economic and monetary union of 40% of OECD countries during that period. I explore that question in greater detail below.

taken a close look at how different regulatory arrangements shape the incentives banks face[2] . Discussion of the effects of regulations on bank behaviors has been mostly implicit, if not absent entirely. By directly examining how the location of regulatory authority affects the incentive structure of banks, we may gain greater insight on the tradeoffs that policy makers face.

Second, by focusing on conflicting mandates associated with unification of macroeconomic and regulatory authority this analysis also contributes to the literature on central banking. Specifically, it qualifies the claim that independent central banks can correct time-inconsistency problems by restricting the ability of policy makers to trade off long-term goals for short-term political ends[3] . If regulatory central banks create moral hazard, and if this leads to less prudent behavior in the private financial sector, then those systems may be more susceptible in the longer-run to more frequent or more severe financial crises and the enormous resulting costs.

The article proceeds as follows: in the next section I discuss how the tension between macroeconomic and regulatory goals provides reasons for some states to unify authority in a single institution and how this creates moral hazard. This discussion leads to specific hypotheses about the effects of the location of regulatory authority on bank behaviors. In the following section I test those hypotheses empirically by performing a time series cross-sectional econometric analysis of bank actions in 30 OECD countries from 1990-2007. I discuss the results of these tests, and conclude with a discussion of possible policy implications and ideas for further research.

Policy Tension and the Creation of Moral Hazard

Regulators are in a principal-agent relationship with governments; they must maintain financial stability or risk the removal of their authority (Singer 2007). This threat is real. As a response to the public and private costs of exposure to the subprime financial crisis, the United Kingdom announced plans to abolish its primary financial regulator, the Financial Services Authority, and give its authority to the Bank of England by 2012. This observation does not imply that all regulators are in the *same* principal-agent relationship with governments, however. When regulatory authority is located separately from monetary authority, each agency will pursue its mandate and the tension between the counter-cyclical monetary goals and pro-cyclical regulatory goals is strengthened. When regulatory and monetary authority are unified, the need

[2] For a discussion of how electoral rules influence regulatory choice see Rosenbluth and Schaap (2003). Singer (2007) explores the principal-agent relationship between legislatures and financial regulators.

[3] There is a broad literature focused on this question. See Simmons (1994) for a discussion of how independent central banks privileged domestic price stability over other policy goals during the interwar years. Maxfield (1997) shows that when isolated from political pressures, central banks in developing countries privilege long run over short run outcomes. Cukierman (1992) demonstrates that while central banks are never truly independent, those with broader discretion are more successful in moderating inflation, which improves long run macroeconomic health.

to balance both goals incentivizes central banks to pursue more expansionary policies than they otherwise would, as Copelovitch and Singer show.

This logic can be made clear by considering how these institutions are likely to respond to economic downturns. As aggregate demand falls, central banks tasked with maintaining price stability stimulate the economy by lowering interest rates, thus making it more attractive for banks to borrow from the central bank and lend to businesses and consumers. The desired result is an increase in economic activity sufficiently large to restore money growth and thus maintain price stability. Separate regulators, on the other hand, face mandates to promote financial stability, not macroeconomic performance. If the economic downturn increases the chances that creditors will default on their debt, regulators may restrict the risk-taking activities of banks in order to improve the resilience of the financial system. In response, banks lend less and increase liquid holdings such as hard currency. Because banks intermediate between the monetary authority and the real economy, the result is that banks maintain higher capital adequacy ratios, but monetary policy is less effective.

When regulatory authority and monetary authority are unified in central banks this dilemma is easily resolved: central banks can credibly commit to provide liquidity to banks during downturns, so banks will not have to hoard the funds provided by the central bank to protect against default risk[4] . Instead, banks can continue to lend during downturns – increasing economic activity and improving the effectiveness of monetary policy – while central banks provide liquidity to the banking system – improving bank stability. Thus the tension between two policy goals is lessened when monetary and regulatory authority are unified, and may make both more effective. In fact, central bankers have explicitly made this argument when asking for regulatory authority. In a January 13, 2010 letter to Chairman Dodd and Ranking Member Shelby of the U.S. Senate Committee on Banking, Housing, and Urban Affairs, Federal Reserve Chairman Ben Bernanke wrote "Its supervisory activities provide the Federal Reserve information about the current state of the economy and the financial system that, particularly during periods of financial crisis, is valuable in aiding the Federal Reserve to determine the appropriate stance of monetary policy" (Bernanke 2010).

By unifying monetary and regulatory authority, policy makers may hope to increase the effectiveness of both. This may be difficult to achieve in practice, however. If policy tension is lessened by unifying authority in a central bank, then banks in unified systems should maintain lower capital ratios during economic downturns as they continue to lend funds rather than hoard them. Indeed, this may be the goal of policy, as central banks attempt to stimulate a

[4] This is not to say that inter-agency cooperation is impossible when authority is split, or that intra-agency tensions are non-existent when it is unified. Merely that at the relevant margin the tension will be greater across agencies than within them.

damaged economy. But if those banks recognize that they will face fewer regulatory requirements during downturns, then they have little incentive to improve their capital ratios and incur the opportunity cost of foregone profits during economic expansions. In fact the incentives run in the opposite direction. Central banks cannot make a credible commitment to withhold favorable policies from banks during downturns, since such a policy would weaken the macroeconomy and increase the risk of a systemic financial crisis. Banks expect central banks to fulfill their role as "lender of last resort" in order to prevent a financial crisis. For this reason, banks regulated by central banks have less incentive to insure themselves against default risk by maintaining high capital ratios.

It is not immediately clear how this situation differs for banks regulated by a separate agency with a single mandate to maintain bank stability. It is true that these agencies are not responsible for macroeconomic performance, and can make a credible commitment to not provide liquidity to needy firms during a downturn as they do not possess that authority, but banks may still receive access to funds from central banks as part of monetary policy. But separate regulators cannot rely on central banks to do their job for them by tailoring monetary policy to the needs of the banking sector. Instead, regulators must promote the security of the banking system on their own. Nor can banks expect much preferential treatment. As Copelovitch and Singer show, central banks with a single mandate to maintain price stability are less inclined to sacrifice that goal by enacting bank-friendly policies. Because neither separate regulators nor banks can be certain that central banks will provide adequate liquidity to the banking system during downturns, they face incentives to build a stronger capital cushion during economic expansions.

Moreover, because separate regulators bear no responsibility for macroeconomic performance they may be tempted to over-regulate by requiring banks to raise capital above their official obligations in *anticipation* of future defaults. A recent example of this are the "stress tests" conducted by regulators in the United States in the Spring of 2009 as part of the Supervisory Capital Assessment Program (SCAP). SCAP examined 19 of the largest bank holding companies in the United States to assess their ability to withstand losses under a range of economic scenarios. At the start of SCAP none of the 19 firms had capital ratios below the legally-mandated minimum. Nevertheless, at the conclusion of the program 10 of the 19 firms were required to raise capital "buffers" in excess of the minimum capital requirements, totaling $185bn, to protect against the possibility of defaults under possible future adverse economic scenarios (Board of Governors of the Federal Reserve System 2009). It is very expensive to raise capital quickly, especially during downturns when the risk premium increases. If banks anticipate strict regulation during downturns they may prefer to maintain high capital ratios during expansions when capital is relatively inexpensive rather than be forced to raise capital when it is most expensive.

In any case, principal-agency dynamics lead us to expect central banks to regulate less rigidly than separate agencies, since regulating strictly would restrict their ability to fulfill their mandate to manage the macroeconomy. Separate regulators operating with a single mandate have no such conflict, so we should expect them to regulate more rigorously all else equal. This observation leads to the central hypothesis of this paper: banks in systems where regulatory and monetary authority are unified in a central bank will protect themselves against default risk less than banks in systems where authority is split, so capital ratios will be lower in unified than in split systems. Because banks operating in unified systems expect and receive preferential policies from regulatory central banks, they act less prudently than they otherwise would, and so exploit moral hazard.

This moral hazard arises from the need to maximize the effectiveness of monetary policy, and is thus distinct from the hazard that may arise from fiscal bailouts of systemically important, "too big to fail" financial institutions, but occurs for similar reasons. Fiscal bailouts of systemically-important financial institutions sometimes occur because policy makers have strong incentives to avoid the immense economic devastation that follows financial crises at all costs. In a crisis, policy makers can prevent financial collapse by redistributing public funds to private institutions. But if they issue a bailout guarantee then banks are incentivized to take larger risks than they otherwise might. This could lead to a self-fulfilling prophecy where banks know that governments must support struggling banks or suffer major economic damage and so take larger risks. If the risks pay off the banks make large profits. If the risks do not pay off, then the losses will be socialized by governments. Banks operating with a government guarantee may adopt a "heads I win, tails you lose" attitude towards risk. To avoid this, governments refrain from making such guarantees explicit.

As the quote at the beginning of this article indicates, in times of crisis bankers cannot be sure whether they will receive government support through fiscal policy or whether they will be allowed to fail[5] . For example, during the recent financial crisis some American financial institutions were given access to special funding sources from the government and were allowed to off-load damaged parts of their balance sheets to the Treasury Department and Federal Reserve (e.g. Bank of America, JPMorgan Chase, Goldman Sachs, Citigroup) while others were forced into liquidation or closure (e.g. Bear Stearns, Lehman Brothers, Merrill Lynch, Washington Mutual). *Ex ante* none of the banks could know which would be saved and which would not be, so gambling on a government bailout would be exceptionally risky. There is no indication that banks in the recent crisis made that gamble, likely because the stakes were so high and the

[5] The political choice of whether to bail out insolvent firms or enforce closures is carefully analyzed in Rosas (2006).

downside risk if they were wrong was enormous.

Regulatory central banks cannot make a credible commitment to withhold policies favorable to banks, however. If they preside over a financial collapse they risk the removal of their authority. Therefore, as Copelovitch and Singer show, they have reason to favor bank stability over price stability with monetary policy, and so pursue policies that benefit banks. The discussion above extends their logic to suggest that just as regulatory central banks respond to the incentives given them by institutional mandate, private banks respond to the same mandate by acting more riskily, with the understanding that regulatory central banks must privilege their interests.

Data Analysis

To this point I have argued that banks will act less prudently in systems where monetary and regulatory authority are unified in a central bank because of moral hazard endemic to those systems. In this section I describe the test of that hypothesis by examining the relationship between location of regulatory authority and bank behaviors in 30 OECD member countries from 1990-2007[6] .

The dependent variable is bank behavior, measured by the total risk-weighted capital adequacy ratios (CAR) of banks. These data come from the Bureau van Dijk's BankScope database, which contains data on bank characteristics and behaviors for over 29,000 financial firms. Of these, I limit my analysis to commercial banks, investment banks, savings banks, cooperatives, and bank holding companies in the OECD[7] . Because I am interested in how the location of central authority affects banking systems at the national level, I collapsed the data on their means by country and year. Therefore, my unit of analysis is yearly averages at the national level of firm-level CAR data, which measures the actual capital adequacy ratios of banking systems rather than any particular bank.

I choose to focus on CAR because the most common prudential regulations are mandated minimum CAR. These are simply the ratio of a bank's capital – comprised of Tier 1 capital (usually including shareholder equity and disclosed reserves) and Tier 2 capital (usually including undisclosed reserves and preferred stock) – to its risk, which is the probability that a bank's actual return on investment is lower than its expected return. Put another way, capital is the

[6] Several countries entered the OECD during the sample period – Mexico in 1994; Czech Republic in 1995; Hungary, Poland, and South Korea in 1996; Slovakia in 2000. I include these countries in the sample beginning with the year of entrance. The results of the statistical analysis are robust to the inclusion or exclusion of these countries, as shown in the appendix.

[7] The full data set also includes central banks, clearinghouses, government credit institutions, trust corporations, microfinance institutions, securities firms, mortgage brokers, private asset management companies, non-banking credit institutions, and multi-government banks. I exclude these firms to focus on the types of financial institutions subject to common prudential regulations like those in the Basel Accords.

difference between assets and liabilities, representing owners' equity and bank profits, while risk represents the default potential of bank assets, which are weighted according to the perceived riskiness of asset type[8] . Therefore, $CAR = \frac{Capital}{Risk-WeightedAssets}$. Less risky assets, such as cash or government bonds, require less capital to protect against potential default. More risky assets, such as unsecured loans, require larger capital cushions. Because of the risk-weighting mechanism there are two ways for banks to improve this ratio: by increasing the numerator (i.e. boosting the capital stock) or by reducing the denominator (i.e. holding fewer risky assets). An example of the former is issuing more stock; an example of the latter is increasing cash holdings. Table 1 shows common risk-weights for different types of assets.

Table 1: Common Risk Weights by Asset Type

Type of Asset	Risk Weight
Cash OECD sovereign debt	0%
Claims on OECD banks Securities issued by government agencies Municipal debt	20%
Residential mortgages	50%
Unsecured loans Claims on non-OECD banks Other non-securitized debt	100%

Because of skewness in the data due to the presence of outliers I transformed these country-year CAR averages onto the logarithmic scale[9] . While this was done for statistical reasons, such a transformation also has attractive interpretive qualities: coefficients of non-logarithmic input variables, such as my primary explanatory variable, can be interpreted as percentage-changes in CAR corresponding to unit changes in the input variable (i.e. semi-elasticities); coefficients of log-transformed input variables, such as some economic controls, can be interpreted as percentage-changes in CAR corresponding to one-percent changes in the input variable (i.e. elasticities). It

[8] While measurement of risk varies somewhat cross-nationally, the Basel Accords provide common guidelines for risk calculation.

[9] The skewness is created almost entirely by Japan, in which CAR values are at least two standard deviations above the mean in nearly half the years in the sample. I do not know whether this occurs because of measurement error, differences in reporting standards in Japan, or whether those values are appropriate. Japan does use a broader definition of capital than other OECD countries, but they remain within Basel guidelines. However, excluding Japan from the sample, as I do in the appendix, does not change the substantive results and alters the size of the effects very little. This remains true whether or not CAR is log-transformed.

is often more intuitive to conceptualize percentage-changes in CAR rather than level-changes, so a log-transformation of the outcome variable gives the analysis greater interpretive, as well as statistical, leverage.

Table 2: Location of Bank Regulatory Authority in the OECD

Regulatory Central Bank	EMU	Nonregulatory Central Bank	EMU
Australia[1]	No	Austria	Yes
Czech Republic	No	Belgium	Yes
France[2]	Yes	Canada	No
Greece	Yes	Denmark	No
Hungary	No	Finland	Yes
Iceland[3]	No	Germany[4]	Yes
Ireland	Yes	Japan	No
Italy	Yes	Luxembourg	Yes
Netherlands	Yes	Mexico	No
New Zealand	No	Norway	No
Portugal	Yes	Poland	No
Slovakia	No	Sweden	No
South Korea	No	Switzerland	No
Spain	Yes		
Turkey[5]	No		
United Kingdom[6]	No		
United States[7]	No		

[1] The Reserve Bank of Australia regulated the banking sector until 1999. Therefore, Australia is coded as having a regulatory central bank from 1990-1998, and nonregulatory from 1999-2007.

[2] Regulatory authority in France is located in the Commission Bancaire, which includes the Governor of the French central bank as well as members of the Treasury. Following Goodhart and Shoenmaker (1995) and Copelovitch and Singer (2008), I classify the Banque de France as a regulatory central bank.

[3] The Bank of Iceland was regulator until the establishment of the Financial Supervisory Authority in 1999. Therefore, Iceland is coded as having a regulatory central bank from 1990-1998 and nonregulatory from 1999-2007.

[4] The German Bundesbank is responsible for some tasks involved in regulation, like data gathering and dissemination, but regulatory authority ultimately resides with the separate Federal Financial Services Supervisory Authority.

[5] The Turkish Central Bank was primary regulator until 2000, when authority was handed over to the Banking Regulation and Supervision Agency. Therefore, Turkey is coded as having a regulatory central bank from 1990-1999, and nonregulatory from 2000-2007.

[6] The Bank of England regulated the banking sector until 1999, after which regulatory authority was transferred to the Financial Services Authority. Therefore, the United Kingdom is coded as having a regulatory central bank from 1990-1998, and nonregulatory from 1999-2007.

[7] The Federal Reserve is one of several bank regulators in the United States, but does share regulatory authority, and so fulfills the criteria necessary to be considered a regulatory central bank.

The primary explanatory variable is the location of bank regulatory authority, *Regulator*, which is a dummy variable equal to one if a central bank possesses some or all bank regulatory authority and zero if it does not[10] . A description of which states have regulatory central banks and which do not is in Table 2, and comes from the World Bank *Bank Regulation and Supervision* survey data set[11] . Where survey information was incomplete I supplemented the measure with data from national regulatory authorities and from Copelovitch and Singer (2008). Because I expect moral hazard to exist in states with a regulatory central bank, I expect *Regulator* to have a negative relationship with *CAR*.

During the period from 1990-2007, four OECD countries transferred regulatory authority over the banking sector[12] . In all four cases regulatory authority was removed from central banks and given to a separate regulator, and in all four cases mean capital adequacy ratios increased following the transition, as shown in Table 3. This observation is consistent with the theory presented above and with the simple cross-sectional relationship portrayed in Figure 1.

Table 3: Capital Adequacy Ratios Before and After Transition to Separate Regulator

Country	Regulatory Central Bank	Nonregulatory Central Bank
Australia	11.93%	14.11%
Iceland	13.01%	16.11%
Turkey	17.99%	30.01%
United Kingdom	16.06%	20.41%

An important political variable is membership in the European economic and monetary union (*EMU*). Twelve of the thirty countries in the sample joined the *EMU* during the sample period, as indicated in Table 2. As part of *EMU* accession those states sacrificed much monetary policy autonomy to the European Central Bank, which controls monetary policy in *EMU* countries but does not regulate banking sectors. This presents a measurement challenge: how should *EMU* countries with regulatory central banks be coded? Central banks that do not control

[10] Following previous literature, I classify a central bank as regulatory if it has complete or partial regulatory authority (Copelovitch and Singer 2008).

[11] Available at http://go.worldbank.org/SNUSW978P0, last accessed April 4, 2010.

[12] Australia, Iceland, and the United Kingdom transferred regulatory authority from their central banks to a separate agency in 1999. Turkey did so in 2000. The timing of these transitions corresponds with the fallout from the East Asian financial crises in the late-1990s, perhaps indicating that policy makers in those countries were responsive to the turmoil caused by that episode. That question is not directly examined here, however.

monetary policy do not face the same policy tradeoff as those that do: regulatory central banks in *EMU* countries can make credible commitments to not use monetary policy to aid banks during downturns because they do not control the levers of monetary policy. Therefore, the moral hazard that arises when monetary and regulatory authority are unified should be lessened, if not eliminated, in *EMU* economies.

However simply creating a new variable that combines location of regulatory authority and *EMU* membership risks conflating two very different effects[13] . Regulatory central banks in the *EMU* may not control monetary policy, but they still function as the lender of last resort for domestic financial firms, as the ECB has explicitly refused to take that responsibility (Walter and Bergheim 2008). Banks may expect more assistance when regulated by central banks than otherwise, but less than if that central bank had control over monetary policy. Therefore, I include a binary variable equal to zero for all country-years in which a state was not a member of the *EMU* and one for all country-years in which a state was a member of the *EMU*. Because central banks in *EMU* states do not control monetary policy, banks cannot rely on them for preferential monetary policies during downturns, but may still rely on other mechanisms provided by lenders of last resort, so the potential for moral hazard is lessened but not eliminated by *EMU* membership. As such, I expect a positive association between *EMU* and *CAR*. I also interact *Regulator* and *EMU* to test whether the effect of regulatory location is conditioned by *EMU* membership.

I also include a variable measuring the financial *Openness* of a country. A commonly-used measure of openness is the *Kaopen* composite index created from the IMF's *Annual Reports on Exchange Arrangements and Exchange Restrictions* (Chinn and Ito 2008). The index has four components: capital account restrictions, presence of multiple exchange rates, current account restrictions, and requirements to surrender export proceeds. I include *Openness* because states may seek to protect domestic firms by limiting the amount of competition they face from foreign firms. Previous literature assumes that this type of profit-padding regulation will induce domestic banks to act more prudently than they would if they faced stronger competition (Rosenbluth and Schaap 2003). If this is true, then we should see a significant negative relationship between *Openness* and *CAR*, meaning that banks lower their capital adequacy ratios and take on more risk when faced with foreign competition. While I agree that banks facing more competition may take on more risk to stay competitive, I also expect banks protected from foreign competition to face fewer constraints from market discipline. So I expect a weakly negative, statistically

[13] I do test the effect of a combined measure on *CAR* as a robustness check, and report the results in the appendix. As expected, the effect of the combined measure is weaker than that of *Regulator* because of the inclusion of positive *EMU* effects, but it remains significant and negatively signed.

insignificant relationship between *Openness* and *CAR*[14] .

The devastating consequences of banking crises should also affect banks' *CAR*. These are infrequent events, occurring in only about 2% of country-year observations, but have profound effects on *CAR* by weakening the capital base of the banking sector. To account for the effects of banking crises, I include a dichotomous variable, *Bank Crisis*, indicating whether a country is suffering from a systemic banking crisis during a given year. This variable comes from the IMF's *Financial Crisis Episodes* database, described by Laeven and Valencia (2008). There is a risk of conflating cause with effect, however; lower *CAR* leave banks more susceptible to crisis, but the occurrence of crisis will also deteriorate *CAR* by eroding a bank's capital base. Because I am trying to control for the effects of crises rather than explain them, I remain agnostic about the causal direction between *CAR* and *Bank Crisis*, but expect a significantly negative association between them[15] .

Table 4: Predicted relationships between independent variables and *CAR*

Variable	Direction
Regulator	Negative
EMU	Positive
Openness	Negative
Bank Crisis	Negative
Growth	Positive
Inflation	Inflation
Current Account	Positive

I also include several macroeconomic control variables, taken from the World Bank *World Development Indicators* database, that could affect bank behaviors. I include the logged GDP *Growth* rate, logged *Inflation* rate (measured by GDP deflator), and current account balance as a percentage of GDP (*Current Account*). I expect *Growth* to be positively correlated with *CAR*, meaning that I expect banks' capital adequacy ratios to deteriorate during economic downturns, but I do not expect this relationship to be large or significant. The "profit-padding" regulations literature discussed above assumes a positive relationship between *Inflation* and *CAR*, but the

[14] While all four components of *Kaopen* might have some effect on bank behavior, it is also possible that the effect of capital account restrictions – which is most relevant to my argument – could be masked by the inclusion of other restrictions in the index. Therefore, I also estimated the model isolating component measuring capital account restrictions, which is a binary variable coded zero if capital account restrictions are not present in a country-year and one if there are. I report those results in the appendix. I also report results from a model excluding *Openness* entirely, because of concerns about nonrandom missingness in *Kaopen*, which does not include values for Luxembourg.

[15] I also ran the model without *Bank Crisis* and report the results in the appendix.

present analysis questions that assumption, so I expect a weakly negative relationship between *Inflation* and *CAR*. Countries that run large, persistent current account deficits increase the risk of financial crises (Reinhart and Rogoff 2008), which should be negatively correlated with *CAR*, so I expect *Current Account* to be positively associated with *CAR*.

Model and Method

I estimate a time series cross-sectional (TSCS) econometric model to test the association between the independent variables on *CAR*. The potential problems with TSCS models are well-documented: researchers much choose between using fixed and random effects to control for unit-level processes, how to incorporate invariant or sluggish regressors in the face of unit effects, whether to include a lagged dependent variable as a regressor given the risks of bias from heteroskedasticity. In this section I discuss those issues, and my methodological choices concerning them.

The following represents a typical time series cross sectional (TSCS) regression model:

$$Y_{it} = \alpha_i + X_{it}\beta + \epsilon_{it}$$

Where 'Y_{it}' is the outcome variable for country 'i' at time 't', $X_{it}\beta$ is the product of a matrix of independent variables and their coefficients, and ϵ_{it} is a residual term.

Mundlak (1978) argues that "any matrix combination of the 'within' and 'between' effects is generally biased", and the direction and size of that bias is indeterminate. This occurs because TSCS data includes two components within the stochastic term, so $\epsilon_{it} = u_i + e_{it}$. The u_i component varies nonrandomly across panels but not time. This variance is often called "unit effects" or "unobserved heterogeneity". The e_{it} component varies randomly across panels and time. When $u_i \neq 0$, which it almost always does in TSCS data, pooled OLS coefficient estimates will always be biased and inconsistent because of unmodeled endogenous processes.

Because of this, many have concluded that using "fixed effects" – which are mathematically equivalent to dummy variables for each panel – to control heterogenous variation within units is the best solution because it eliminates bias and inconsistency in coefficient estimates. Still, there are problems: coefficients estimated using fixed effects are inefficient, which can create problems of interpretation and inference, especially in smaller samples. Perhaps more severely, while coefficients estimated using fixed effects do provide unbiased, consistent estimates of effects *within* panels, they do this by completely eliminating the variance *across* panels. Nevertheless, I include fixed effects to eliminate potential bias from un-modeled non-stochastic processes operating

within panels.

I cluster standard errors on the fixed effects parameter estimates to correct any potential autocorrelation. There is strong debate over whether to also include a lagged dependent variable (LDV) as a regressor. While including a LDV can potentially produce biased and inconsistent parameter estimates due to heteroskedasticity (Achen 2000), the bias is often trivial and is in the "right" direction, as it leads to more conservative estimates of the effects of regressors on the regressand and is thus a more rigorous test of the impact of variables (Keele and Kelly 2006). More significantly, exclusion of a LDV may produce omitted variable bias, and may produce too-large parameter estimates of regressors if they are collinear with the LDV. Other approaches to this problem, such as the Kiviet correction, generally demand a very high price in terms of model flexibility and confidence in standard errors for very moderate gains in reducing bias (Beck and Katz 2009). Because it is impossible to know *ex ante* whether the potential bias from including an LDV is more severe than the potential bias from excluding it, I estimate the model with and without the LDV. As we will see below, and as we might expect, the differences in the two estimations are noticeable in intensity of effect, but not in direction or significance.

Results

Table 5 shows the results from the TSCS regression, which are robust to alternative specifications as mentioned above and shown in the appendix. Remember that the dependent variable is transformed to the logarithmic scale, so coefficients represent percentage-changes in banks' capital adequacy ratios for unit-changes (non-logged variables) or one-percent changes (logged variables) in the input variables. Models 1 and 2 exclude the lagged dependent variable (LDV), models 2 and 4 include the the interaction term *Regulator*EMU*. Additionally, the inclusion of the LDV in models 3 and 4 drops Mexico from the sample because of missingness in the dependent variable for most of the sample period[16] .

The first thing to notice is that the direction and significance of the independent variables are largely stable across model specifications. As expected, the models that include a LDV have smaller coefficient estimates for explanatory variables (except *Growth*); nevertheless, qualitative effects and strong significance remains across the models. This is impressive, since a fixed effects model with a LDV and clustered standard errors represents a very demanding test of the data. The stability of the coefficients across model specifications – including robustness checks

[16] Overall, missingness is not a large concern: only 26 of the 503 country-years are missing in the dependent variable, and these are concentrated in Mexico (13 of 26) and the years 1990-1991, which are the earliest in the sample (11 of 26). Despite concerns over casewise deletion, multiple imputation is not a viable option because the missingness in the sample is nonrandom.

discussed above and reported in the appendix – also boosts overall confidence in the results.

Table 5: Determinants of Bank Capital Adequacy Ratios

Variable	Model 1	Model 2	Model 3	Model 4
Regulator	-0.365***	-0.363***	-0.117**	-0.117**
	(0.08)	(0.08)	(0.05)	(0.05)
EMU	0.101**	0.145**	0.044**	0.042
	(0.04)	(0.06)	(0.02)	(0.03)
Regulator*EMU	.	-0.074	.	0.004
		(0.09)		(0.04)
Openness	0.036	0.041	-0.032	-0.033
	(0.03)	(0.03)	(0.02)	(0.02)
Bank Crisis	-0.427*	-0.426*	-0.353*	-0.353*
	(0.23)	(0.23)	(0.18)	(0.18)
Growth (log)	-0.020	-0.021	-0.026*	-0.026*
	(0.02)	(0.02)	(0.01)	(0.01)
Inflation (log)	-0.026	-0.025	0.018	0.018
	(0.02)	(0.02)	(0.01)	(0.01)
Current Account (% GDP)	0.027***	0.026**	0.008**	0.008**
	(0.01)	(0.01)	(0.00)	(0.00)
LDV	.	.	0.604***	0.604***
			(0.09)	(0.09)
Constant	2.990***	2.978***	1.269***	1.269***
	(0.07)	(0.07)	(0.26)	(0.26)
Observations	390	390	366	366
Number of Countries	29	29	28	28
R^2	0.156	0.157	0.487	0.487

TSCS regression with fixed effects.

Robust standard errors, clustered on panels, in parenthesis

* p < 0.10, ** p < 0.05, *** p < 0.01

In all models banking systems that are regulated by their central banks have significantly lower CAR than those regulated by a separate agency. In both models 1 and 2, the semi-elasticity of *Regulator* is below -0.36, meaning that *ceteris paribus* banking systems regulated by central banks have 36% lower CAR than banking systems with a separate regulator. These effects are statistically significant at the 1% level, and are consistent with the hypothesis presented above. In models 3 and 4 the inclusion of the LDV shrinks the size of the coefficients as we would expect, but the effect is still quite large: banks operating under regulatory central banks have

ratios 11.7% lower than those that do not, all else equal, and we can reject the null hypothesis that there is no difference caused by the location of regulatory authority at the customary 5% level of significance in both models. Note that the coefficients of the *Regulator*EMU* interaction term are both small and are statistically indistinguishable from zero, so we may be confident that the effect of *Regulator* on *CAR* is not conditioned by *EMU*.

The difference in between the size of coefficient estimates of *Regulator* in the LDV and non-LDV models is large. What is the substantive importance of these effects? Median *CAR* across the sample is 15.25%, so the 36% average decrease associated with having a central bank as regulator would reduce median *CAR* to 9.76%, which is below the 10% minimum to be considered "well-capitalized" by the United States Federal Deposit Insurance Corporation but above the minimum of 8% mandated by the Basel Accords. Even after including the LDV, which biases coefficient estimates downwards, median *CAR* under regulatory central banks falls to 13.5%. In other words, these effects are non-trivial.

Membership in the *EMU* also has the predicted impact on bank behaviors. On average, and holding the other variables at their means, EMU membership increases *CAR* by roughly 4% in the LDV models and 10% - 14.5% in models 1 and 2. These estimates reach statistical significance at the traditional 5% level except in model 4. This provides further support for the argument that moral hazard is discouraged when the tension between financial stability and macroeconomic flexibility is stronger. But the small, insignificant effect of the interaction term indicates that the assuagement of moral hazard in *EMU* countries with regulatory central banks is a matter of degree.

We cannot reject the null hypothesis that capital account openness has a non-zero effect on bank behaviors, however, nor are the coefficients stable: the coefficient switches signs depending on the inclusion of the LDV. This provides evidence against the claim made by Rosenbluth and Schaap (2003) that profit-padding regulations are sufficient to curb the capital-to-risk ratios of banks. In fact, this shows that banking systems appear to be unresponsive to financial protectionism. There may be other policy justifications for placing controls on capital movements, but this analysis indicates that promoting safety in the banking sector may not be one of them.

As expected, banking crises are associated with a large deterioration of capital adequacy ratios, ranging from 35% - 42% across the models, and all estimates are significant at the 10% level. So there is support for the expectation that banking crises are strongly associated with declining capital ratios, but our conclusions cannot be more specific than that. It may be that banking crises cause deterioration of *CAR*, or that lower *CAR* make banking crises much more likely. In fact, both are likely true, but disentangling these effects is not possible from this

analysis.

The effects of the macroeconomic control variables on *CAR* are small. *Inflation* has no statistically significant effect on bank behaviors at traditional levels. Somewhat strangely, the negative effect of *Growth* on *CAR* increases in size and significance when the LDV is included as a regressor, but the largest effect is substantively small: a one percentage-point increase in GDP growth is associated with a 2.6% decrease in *CAR*, all else equal. In models 1 and 2 the effect does not reach traditional significance levels. The current account balance as a percentage of GDP is significant across all model specifications, but the substantive impact is also small: a one percentage-point increase in *CurrAcct* is associated with a roughly 2.5% increase in *CAR* in models 1 and 2, and a 0.8% increase in models 3 and 4.

Conclusion

In this paper, I argue that the location of regulatory authority is a major determinant of bank behaviors. Because of the counter-cyclical nature of monetary policy and the pro-cyclical nature of regulatory policy, if regulatory authority is separate from monetary authority then a state's policy makers may be working against themselves. Central banks that also regulate the banking sector will often be willing to enact monetary policies that favor the banking sector. This can lead to moral hazard, where banks expect preferential policies and so act less prudently than they otherwise might. The results of a time series cross-sectional statistical model analyzing capital adequacy ratios in OECD countries support this hypothesis.

Specifically, I find that capital adequacy ratios are higher when central banks possess regulatory authority over the banking sector. I also find that banking systems where monetary authority has been given to an outside agency, such as those in member states of the European economic and monetary union, have higher capital-to-risk ratios. Both findings support the theory that moral hazard exists when macroeconomic authority and regulatory authority are unified.

These results call into question the contention that central banks may be able to induce prudence from banks by enacting policies favorable to them. Copelovitch and Singer (2008) argue that regulatory central banks will favor the needs of banks by providing them with easy access to funds, trading off some inflation in the process. Rosenbluth and Schaap (2003) argue that this sort of "profit-padding" policy reduces the necessity of excessive risk-taking for profitability, and thus encourages banks to act less riskily. While this analysis is broadly congruent with the former, it disagrees with the latter. In fact, it presents the opposite case; if banks expect preferential policies they may choose to act less prudently than they otherwise would.

These findings have several important implications for policy. First, states often re-examine their regulatory structures following financial crises. Some have argued that locating regulatory authority in a central bank can eliminate institutional rivalries and lead to better-coordinated policy (Bernanke 2010). I agree with this assessment, but argue that the relaxation of policy tension can create moral hazard. This can make locating regulatory authority in a central bank that also manages the macroeconomy counter-productive from the perspective of financial stability.

On the other hand, there may be a benefit to unifying policy authority: increased macroeconomic flexibility. While I do not directly test that hypothesis here, the analysis relies on the argument that policy tension is relaxed in an environment where an independent central bank also regulates the banking sector. If this is true, regulatory central banks should have greater capacity to make macroeconomic adjustments when needed. So long as the relaxed policy tension does not lead to a financial crisis, states may be better off when regulatory and monetary authority are unified. If national leaders feel that they can protect against financial crises in other ways, for example through strict non-discretionary prudential standards, then giving regulatory authority to central banks may have positive results.

There are limitations to the analysis presented here. The greatest challenge comes from the limitations of statistical analyses of time series cross-sectional data sets. Namely, the fact that the presence of unit effects in panel data requires controls that make cross-sectional comparison difficult. Since much of the variation of the primary explanatory variable is cross-sectional, this limits the generalizability of the results. This problem is partially overcome by the fact that the location of regulatory or monetary authority varies in more than half of OECD countries during the sample period. Moreover, even a cursory look at the cross-sectional data, as in Figure 1, demonstrates that states with regulatory central banks typically have lower capital adequacy ratios than those that do not. These different ways of analyzing the data all point in the same direction. Put together, they make a compelling case.

Another potential challenge is that, while the analysis is consistent with the theory that moral hazard exists for banks operating in states with regulatory central banks, it is impossible to test for a latent concept like moral hazard directly. It is possible that there is some other mechanism that is also consistent with the statistical results. For example, perhaps the patterns we observe in the data are not a result of moral hazard, but rather efficiency-seeking. If separate regulators systematically over-regulate, they may sacrifice economic performance in the process. Regulatory central banks may pursue more bank-friendly policies, but if these do not increase the risk of financial crisis then they may be better able to manage their domestic economies without incurring too much downside risk. It may seem obvious that better-capitalized banking

sectors are less prone to crisis, but there may be tipping points or other conflating factors that are not analyzed here.

Finally, the analysis presented here offers avenues for continued research. If a tradeoff exists between financial stability and macroeconomic flexibility, what determines how this tradeoff is resolved? Why would leaders in some states, but not all, choose stability over flexibility? Presumably leaders will be held accountable for policy choices in both areas, so how do they choose which goal to privilege? Do they understand the effects of the choices they make? One interesting implication from the analysis here is that all institutional reforms have moved away from unified authority: twelve states ceded monetary independence by joining the EMU during the sample period, seven of which had regulatory central banks. Four states switched the location of regulatory authority during the sample period, and all of them set up a regulator separate from the central bank. Given that financial crises have become more common and more severe in the post-Bretton Woods period, perhaps leaders are choosing stability over flexibility in their domestic economies. Further research is needed to shed light on this question.

APPENDIX

Table 6: Determinants of Bank Capital Adequacy Ratios, including Regime Type

Variable	Model 1	Model 2	Model 3	Model 4
Regulator	-0.399***	-0.400***	-0.109	-0.109
	(0.12)	(0.12)	(0.07)	(0.07)
EMU	0.111***	0.141**	0.042**	0.043
	(0.04)	(0.06)	(0.02)	(0.03)
Regulator*EMU	.	-0.051	.	-0.002
		(0.09)		(0.04)
Openness	0.035	0.039	-0.027	-0.026
	(0.03)	(0.03)	(0.02)	(0.02)
Polity2	0.141	0.141	0.019	0.019
	(0.12)	(0.12)	(0.07)	(0.07)
Bank Crisis	-0.373*	-0.373*	-0.340*	-0.340*
	(0.19)	(0.19)	(0.17)	(0.17)
Growth (log)	-0.020	-0.020	-0.019	-0.019
	(0.02)	(0.02)	(0.01)	(0.01)
Inflation (log)	-0.023	-0.022	0.021	0.021
	(0.02)	(0.02)	(0.02)	(0.02)
Current Account (% GDP)	0.033***	0.032***	0.008*	0.008
	(0.01)	(0.01)	(0.00)	(0.00)
LDV	.	.	0.614***	0.614***
			(0.09)	(0.09)
Constant	1.631	1.619	1.028	1.027
	(1.17)	(1.17)	(0.76)	(0.76)
Observations	375	375	351	351
Number of Countries	28	28	27	27
R^2	0.184	0.185	0.495	0.495

TSCS regression with fixed effects.

Robust standard errors, clustered on panels, in parenthesis

* p < 0.10, ** p < 0.05, *** p < 0.01

The models presented as above, with a control for regime type (Polity 2) taken from the Polity IV data set. *Regulator* loses significance in models 3 and 4 at traditional levels, but only barely: in model 3 the P-value = 0.107; in model 4 the P-value = 0.109. Other than that difference, the size and direction of all effects is consistent with the models in Table 5, except that *Growth* and *Current Account* lose significance in the models that include the LDV.

Table 7: Determinants of Bank Capital Adequacy Ratios, Excluding Japan

Variable	Model 1	Model 2	Model 3	Model 4
Regulator	-0.357***	-0.356***	-0.107**	-0.107**
	(0.08)	(0.08)	(0.05)	(0.05)
EMU	0.099**	0.142**	0.043**	0.039
	(0.04)	(0.06)	(0.02)	(0.03)
Regulator*EMU	.	-0.071	.	0.006
		(0.09)		(0.04)
Openness	0.035	0.041	-0.031	-0.031
	(0.03)	(0.03)	(0.02)	(0.02)
Bank Crisis	-0.297	-0.296	-0.214	-0.214
	(0.22)	(0.22)	(0.13)	(0.13)
Growth (log)	-0.023	-0.024	-0.025*	-0.024*
	(0.02)	(0.02)	(0.01)	(0.01)
Inflation (log)	-0.034	-0.032	0.016	0.016
	(0.02)	(0.02)	(0.02)	(0.02)
Current Account (% GDP)	0.028***	0.027**	0.008**	0.008**
	(0.01)	(0.01)	(0.00)	(0.00)
LDV	.	.	0.613***	0.614***
			(0.09)	(0.09)
Constant	2.953***	2.942***	1.220***	1.221***
	(0.08)	(0.07)	(0.26)	(0.26)
Observations	384	384	361	361
Number of Countries	28	28	27	27
R^2	0.145	0.146	0.490	0.490

TSCS regression with fixed effects.

Robust standard errors, clustered on panels, in parenthesis

* p < 0.10, ** p < 0.05, *** p < 0.01

An alternative specification, excluding Japan due to concerns about outlier effects. The substantive effects change very little, except that *EMU* becomes insignificant in model 4 and *Bank Crisis* loses significance in all models (P-values range from 0.104 - 0.194).

Table 8: Determinants of Bank Capital Adequacy Ratios, Different Measure of Openness

Variable	Model 1	Model 2	Model 3	Model 4
Regulator	-0.356***	-0.355***	-0.131*	-0.131*
	(0.10)	(0.10)	(0.07)	(0.07)
EMU	0.112**	0.151*	0.037	0.058
	(0.05)	(0.07)	(0.02)	(0.04)
Regulator*EMU	.	-0.056	.	-0.030
		(0.10)		(0.05)
Openness	0.021	0.024	-0.029	-0.027
	(0.05)	(0.05)	(0.04)	(0.04)
Bank Crisis	-0.770***	-0.771***	-0.554**	-0.555**
	(0.27)	(0.27)	(0.24)	(0.24)
Growth (log)	-0.020	-0.020	-0.032**	-0.032**
	(0.02)	(0.02)	(0.01)	(0.01)
Inflation (log)	-0.048*	-0.048*	0.011	0.012
	(0.02)	(0.02)	(0.02)	(0.02)
Current Account (% GDP)	0.029***	0.028**	0.007*	0.007
	(0.01)	(0.01)	(0.00)	(0.00)
LDV	.	.	0.563***	0.562***
			(0.09)	(0.09)
Constant	3.070***	3.065***	1.377***	1.377***
	(0.07)	(0.07)	(0.27)	(0.27)
Observations	354	354	333	333
Number of Countries	28	28	28	28
R^2	0.201	0.202	0.495	0.495

TSCS regression with fixed effects.

Robust standard errors, clustered on panels, in parenthesis

* p < 0.10, ** p < 0.05, *** p < 0.01

This specification isolates the restrictions on the capital account component from *Kaopen*. In this specification *EMU* loses significance at normal levels in models 3 and 4 (P-values are 0.132 - 0.143, respectively), and the effect of *Bank Crisis* increases. Other results change very little.

Table 9: Determinants of Bank Capital Adequacy Ratios, Excluding *Bank Crisis*

Variable	Model 1	Model 2	Model 3	Model 4
Regulator	-0.347***	-0.345***	-0.098**	-0.098**
	(0.07)	(0.07)	(0.04)	(0.04)
EMU	0.097**	0.143**	0.039*	0.037
	(0.04)	(0.06)	(0.02)	(0.03)
Regulator*EMU	.	-0.077	.	0.003
		(0.09)		(0.04)
Openness	0.046	0.052*	-0.022	-0.022
	(0.03)	(0.03)	(0.02)	(0.02)
Growth (log)	-0.021	-0.022	-0.027*	-0.027*
	(0.02)	(0.02)	(0.01)	(0.01)
Inflation (log)	-0.025	-0.024	0.018	0.018
	(0.02)	(0.02)	(0.01)	(0.01)
Current Account (% GDP)	0.029***	0.027***	0.009***	0.009***
	(0.01)	(0.01)	(0.00)	(0.00)
LDV	.	.	0.622***	0.623***
			(0.09)	(0.09)
Constant	2.956***	2.944***	1.183***	1.183***
	(0.07)	(0.07)	(0.28)	(0.28)
Observations	390	390	366	366
Number of Countries	29	29	28	28
R^2	0.127	0.129	0.463	0.463

TSCS regression with fixed effects.

Robust standard errors, clustered on panels, in parenthesis

* p < 0.10, ** p < 0.05, *** p < 0.01

The exclusion of *Bank Crisis* has very little effect on the substantive results: *EMU* loses significance at traditional levels in model 4, and *Openness* gains significance in model 2. Besides that, there is little discernible difference in the size or significance of effects.

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