

Do developing countries' financial regulations help explain their economic performance during the current financial crisis?

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Abstract

This paper investigates whether developing countries' financial regulations help explain their economic performance during the current financial crisis. This includes the examination of components of financial regulation, the level of financial development of an economy, institutional factors and the effect of macroeconomic variables. Although the impact of financial regulation on crises has been explored in the literature, this study provides an analysis in a contemporary setting, as well as exploring the differences between developing and developed countries. It is found that the supervisory aspect of financial regulation is especially important, but that macroeconomic factors such as the real interest rate may have played a more prominent role.

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1. Introduction

Words such as ‘finance’ and ‘credit’ have become stigmatised in the developed world of late – seen as the culprits of the recession that spread throughout the world following the beginning of the global financial crisis in 2007. At the same time the topic of financial regulation has gone from one of relative obscurity to making the headlines on an almost daily basis. Regulation² has been proposed as both the cause of and solution to the current crisis.

In spite of the growing hostility towards banking and finance, there is nevertheless a large body of evidence showing that the development of financial markets plays a crucial role in economic growth and development (King and Levine (1993), McCaig and Stengos (2005)).³ Better bank regulations allow the efficient distribution of funds and can therefore positively influence macroeconomic outcomes. This subject is consequently of vital importance to developing countries if they wish to grow their populations out of poverty. Barth et al. (2006, page 2) put it well when they state that “banks matter for human welfare”. This study is highly motivated by this aspect. The author has also taken inspiration from their own work experience at the UK financial regulatory body, the FSA, and their study of development economics.

This paper will contribute to the existing literature on the topic firstly through it’s analysis in a contemporary setting, as well as providing a further investigation into the current crisis. Secondly, although the impact of financial regulation on banking crises has been explored in the literature, studies on the effects of global financial crises on the real economy are few. Furthermore, the existing literature provides conflicting views on the benefits and effectiveness of several aspects of financial regulation and other variables. This study will extend the literature on these topics. In addition, the differences between developed and developing countries can also be explored. Finally, policy implications for developing countries that can help decrease the probability of future crises can be drawn.

² Note that the terms ‘financial regulation’, ‘banking regulation’ and ‘regulation’ are used interchangeably here.

³ The first proponent of this link was Schumpeter (1911) who argued that the services provided by financial intermediaries are essential for economic development.

This paper is organised as follows: section 2 discusses the relevant literature and previous studies on this topic, section 3 examines the methodology employed, section 4 describes the data and section 5 includes the results and interpretation of the econometric analysis. Finally, section 6 concludes the findings with policy implications and limitations.

2. Literature Review

2.1 A brief timeline of financial regulation

From the 1980s until the relatively recent present, the financial services industry experienced a wave of deregulation. This was especially prominent during the Thatcher and Reagan years when the neo-liberal ideology that free markets were best left to their own devices was prominent.⁴ This ‘Anglo-Saxon model’ was adopted to varying extents by other, including developing, countries. Over the past two decades many developing countries have deliberately sought to liberalise their financial systems. However, the inadequacy of their regulatory systems was exposed by the crises which emerged in many of their economies in the 1980s and they were thus stimulated to implement major reforms in the 1980s and early 1990s.⁵ Many developing countries adopted developed countries’ (known collectively as ‘Basel’⁶) models of regulation and supervision, but important differences remain.

2.2 Differences in financial regulation: developed versus developing countries

It is important to distinguish what separates developing countries from developed in their approaches to regulation. Much of the literature emphasises that the choice of banking regulations is affected by countries’ political characteristics, which are in turn endogenous to countries’ historical experiences and cultural characteristics.

Authors such as Evrensel (2009) and Brownbridge and Kirkpatrick (2000) find conclusive evidence on these differences and that developing countries have stricter banking regulations.

⁴ The Efficient Markets Hypothesis, which proposes that prices on traded assets already reflect all known information, was also widely supported throughout this period. See Samuelson (1965) and Fama (1970) for more on the EMH.

⁵ Before the 1980s developing countries did not prioritise the prudential regulation and supervision of their financial systems. Many inherited banking and regulatory systems from the colonial era, especially those in sub-Saharan Africa. See Polizatto (1992).

⁶ This comprises of detailed prudential regulations, such as minimum capital requirements, restrictions on banks’ asset portfolios, auditing requirements and supervision undertaken directly by a public agency. These are set out in the Basel Committee’s Core Principles for Effective Banking Supervision, 1997. See IMF (1998, Annex I).

Evrensel uses data from Barth et al. (2006) to find that developing countries are more likely to be prohibited from making loans abroad, have higher minimum capital asset requirements⁷ (9.29% versus 7.96%), but that the ratio of non-performing loans⁸ to total assets is more than four times greater in developing countries (6.25% vs. 1.52%). However, Evrensel finds no significant differences between developed and developing countries in the areas of banking activities or internal management. This suggests that banks in developing countries may have been just as involved in risk-taking activities as those in developed.

2.3 Rethinking bank regulation

The academic leaders in the field of financial regulation are Barth, Caprio and Levine who have published extensively on this subject⁹ and indeed provide the data upon which many other studies are based. Their book 'Rethinking Bank Regulation: Till Angels Govern' (2006) is almost manual-like in its breadth, depth and indeed length. Bank development is taken as a measure of the level of intermediation of the financial system, which their previous literature suggests has a causal impact on long-run economic growth (King and Levine 1993, Levine et al. 2000). One of their key findings is that "societies that emphasise [private] market-based monitoring¹⁰, as opposed to official supervision, of banks enjoy superior outcomes along a range of criteria."¹¹ The rationale for this view is the theory of 'regulatory capture'. This posits that banks will lobby politicians, who can unduly influence supervisors, and therefore reliance on market discipline is important. However this result now seems grossly out of date, as regulators scramble to enforce more intrusive and rules-based approaches to supervision following the financial crisis.¹² International credit rating agencies¹³ have also come in for

⁷ This is the minimum percentage of a bank's capital that it must hold relative to its total assets and is imposed to decrease the risk of a bank going bust.

⁸ A loan is nonperforming when payments of interest and principal are past due by 90 days or more, or at least 90 days of interest payments have been capitalized, refinanced or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons to doubt that payments will be made in full (IMF 2004).

⁹ See, for example, Barth et al. (2001, 2004, 2008).

¹⁰ Market monitoring requires banks to obtain and publish certified audits or ratings from international rating agencies.

¹¹ See: their introduction. Herring (2004) also finds in favour of market-based monitoring.

¹² See Financial Services Authority (2009) and Appendix 4.

¹³ The three main credit rating agencies are Fitch Ratings, Moody's and Standard and Poor's.

heavy criticism following the revelations that many AAA rated¹⁴ assets were found to be of much lower quality than their ratings suggested.

Their finding does not seem appropriate in the institutional context of developing countries and is also contended by other literature. For example Brownbridge and Kirkpatrick (2000) find that “the option of relying more on market-based monitoring of banks does not appear to be feasible in low income LDCs because the private agents and capital markets which are needed to undertake monitoring are themselves very poorly developed...” Hence, there is a need to deduce which aspects of developed countries regulations are appropriate for developing countries.

2.4 Constructing an economic model

In this institutional framework, Angkinand (2009) conducts one of the few empirical studies on the effects of financial regulation, via banking crises, on the real economy. A cross-sectional time-series analysis is used to analyze the influence of banking regulation on the real output cost of banking crises from the 1970s to 2003 in 35 industrial and emerging market countries. The author finds that the effects of bank regulation in reducing the severity of crises are substantial and economically significant, with countries that enforce stricter bank capital adequacy requirements and *fewer* restrictions on bank activities experiencing smaller output costs of crises. Their results, however, do not find a significant impact of bank supervision or robust evidence that the magnitude of the output cost of crises depends on the extent of banks’ financial intermediation in the economy.

This supervision result is somewhat surprising, and might be interpreted as poor quality of supervision, rather than its existence being detrimental.¹⁵ This paper also fails to examine the cost of financial crises which have not necessarily resulted in systemic banking crises. For example, most countries’ banks have experienced constrained access to global capital markets and risk aversion in lending during the current crisis, even if they did not experience a systemic banking crisis.

¹⁴ The highest quality. For more on credit rating see Bluhm et al. (2002).

¹⁵ This has parallels with the case of Northern Rock in the UK, see House of Commons Treasury Committee (2008).

To conclude, although there is a large literature on the issue of financial regulation, there are few papers that exclusively focus on it with respect to the real economy, and fewer still with reference to developing countries and the current crisis. This paper aims to cover this empirical deficiency, using the methodology described in the next section.

3. Methodology

3.1 Justification

The aim of this paper is to determine whether developing countries' financial regulations help explain their economic performance during the current financial crisis. It is necessary to test and control for the significance of macroeconomic variables, institutional factors and the level of financial development in an economy, as well as individual aspects of regulation as proposed by the literature. The methodology used by Angkinand (2009) shall broadly be adopted, together with some modifications and extensions. This paper is chosen as a basis as it captures the elements described above and tests them in a coherent and intuitive fashion.

Much of the literature on financial regulation adopts measures other than Ordinary Least Squares to investigate the effect of independent variables on binary outcomes. However, it is not the aim of this paper to investigate binary outcomes, nor to predict probabilities. Instead the focus is on examining the effect that the independent variables have on the magnitude of the output cost, which may be positive or negative.¹⁶

Angkinand (2009) also adopts the Heckman two-stage model to correct for their selection bias problem, as both countries that experienced and did not experience banking crises are included in their estimations. This method is not appropriate for inclusion in this model as all countries included have a non-zero output cost. Furthermore, Davidson & Mackinnon (1993) recommend that the Heckman procedure should only be used to test for the presence of selectivity bias. Therefore if selectivity is not a problem, as is the case in this study, then the Ordinary Least Squares method can be used.

¹⁶ In contrast, Angkinand (2009) codes all non-positive output costs (i.e. output above trend) as zero.

3.2 Form

Following Angkinand (2009), the regressions take the basic form of:

$$\text{Output cost} = f(\text{macroeconomic variables, financial intermediation, financial regulation variables}) \quad (1)$$

The dependant variable is the total per country output cost in terms of real GDP, from the third quarter of 2007 to the fourth quarter of 2008 inclusive.¹⁷ For further information on how the output cost is computed please see Appendix 1.

The macroeconomic variables include GDP growth, GDP per capita, inflation and the real interest rate, as per Angkinand. It is also important to include the level of financial intermediation in the economy as it is obvious that countries with more developed financial sectors may be more susceptible to output costs during the crisis. The measures of financial development are the ratio of private credit to GDP¹⁸ and the ratio of liquid liabilities to GDP. The distinction between the two (according to Beck et al. (2009) and Freedman and Click (2006)) is that private credit is a measure of the activity of financial intermediaries in channelling savings to investors, i.e. it is an indicator of *credit*, whereas liquid liabilities is a measure of the absolute size of the financial sector and is in terms of *deposits*. Institutional quality is proxied for by property rights and corruption indices. A range of financial regulation variables are tested, which can be compared and contrasted with the findings in the literature. Differences between developing and developed countries are also tested for. For a full description of the variables please refer to Appendix 1.

¹⁷ This is the most recent data available for the crisis period. The output cost can be seen as a lower bound, since the current crisis is acknowledged to be ongoing. This is recognised as a potential caveat to this study, see conclusion and evaluation.

¹⁸ Pill and Pradhan (1995) find that the variable that best captures financial liberalization is the ratio of credit to the private sector to GDP which also lends weight to this proxy.

A typical specification takes the form:

$$\text{Output cost}_{i\text{crisisperiod}} = \beta_{0i} + \beta_1 \text{GDP growth}_{it-1} + \beta_2 \ln(\text{GDP per capita})_{it-1} + \beta_3 \text{inflation}_{it-1} + \beta_4 \text{real interest rate}_{it-1} + \beta_5 \ln(\text{private credit})_{it-1} + \beta_6 \ln(\text{property rights})_{it-1} + \beta_7 \text{developing} + \beta_8 x_i + \beta_9 x_i * \text{developing} + \varepsilon_i \quad (2)$$

for country i , where x represents an individual or vector of financial regulation variables and β_9 is the coefficient on the interaction term. The ' R^2 ' is the measure of fit of the model while the F-statistic is used to test the overall joint significance of the variables. Each of the regulation variables are tested in the initial specification individually to avoid issues of multicollinearity, as many are dummies, and a combined model then constructed.¹⁹

Further efforts have been made to reduce the threats to the internal validity of the model. Independent variables are lagged, where appropriate and possible, to reduce the simultaneity bias problem. A noted disadvantage of using lagged values is that if the macroeconomic effects work relatively quickly, then their effect would not be evident the year the crisis takes place. However the general consensus is that using lagged values of such variables is theoretically sound. Omitted variable bias has been limited by including a range of macroeconomic and institutional control variables, some of which have several possible proxies. Care has been taken to reduce the probability of misspecification or errors in variables bias. The financial regulation variables are taken from the most recent dataset available, which was usefully compiled just before the crisis officially started in 2007, and allows for maximum accuracy of the results. For further discussions on the limitations of this methodology please see the conclusions. Some analysis on the data can now be carried out.

¹⁹ Angkinand (2009) uses aggregate indices supplied in Barth et al.'s 2000 dataset to get around this problem. Unfortunately these indices are not available in their latest dataset.

4. Data Analysis

The data on financial regulation is from Barth et al.'s 2007 World Bank database and contains over 40,000 observations across 143 countries on a plethora of factors such as capital, activities, ownership and supervision. However, there are many countries which do not have data for all the variables. Furthermore, construction of the complete dataset using all data sources shows that there are other gaps, most notably with respect to long run production indices which are required for the calculation of the output cost.²⁰ This leaves a definitive core of 40 countries for the purposes of this study with both developing (14) and developed (26) included for comparison.

Firstly some of the differences between the two sets of countries described in the literature can be highlighted. Table 1 shows that developing countries tend to have higher GDP growth, a higher real interest rate and weaker property rights during (the lag of) the current crisis. It is noticeable that, on average, both groups of countries had a non-negative output cost but that developing countries have suffered less. Unsurprisingly developed countries tend to have higher levels of financial development, measured on both private credit and liquid liabilities.²¹

Table 1²²

Developed vs. developing countries								
Variable	Mean		Std. Dev.		Min		Max	
Output cost (\$ billion)	-1.22	-2.55	8.94	4.01	-32.2	-14.7	16.9	0.51
GDP growth (%)	2.12	5.08	1.82	2.8	-0.18	-2.07	7.74	9.51
GDP per capita (\$)	23172	3454	10145	2345	5971	482	40569	6743
Inflation (CPI %)	3.65	7.19	1.8	3.36	0.94	3.7	10.66	16.06
Real interest rate (%)	3.42	6.68	1.75	10.98	1.13	-2.16	7.29	38.9
Private credit (% of GDP)	111.53	43.84	47.68	26.95	29.19	16.94	191.76	100.69
Liquid liabilities (% of GDP)	98.69	57.1	50.51	31.44	42.29	20.52	277.38	126.07
Property Rights	7.6	5.56	1.08	0.87	5.04	3.98	9.01	6.99
(Lack of) Corruption	1.36	-0.13	76.84	0.61	-0.18	-1.19	2.56	1.35

Note: Dollar values are in constant 2000 US dollars

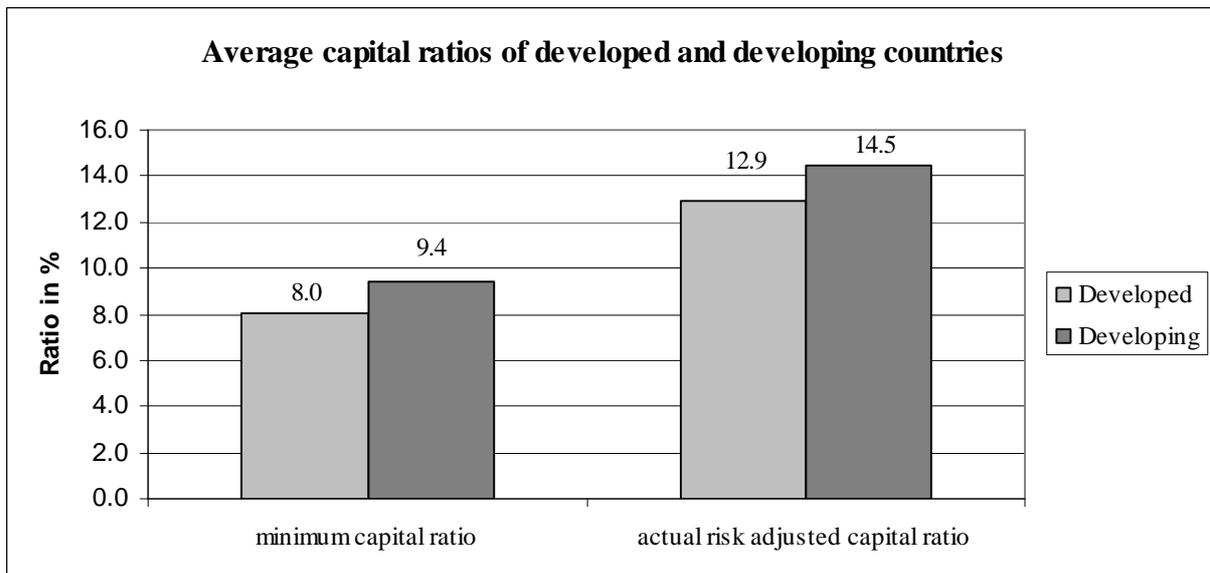
²⁰ For more information on the data sources and the construction of the output cost please see Appendix 1.

²¹ For a chart of the evolution of financial development see Appendix 2.

²² Appendix 2 contains overall summary statistics.

Further differences can be seen in the areas of financial regulation. Chart 1 compares two of the measures of banks capital. It can be seen that on average developing countries have both a higher minimum capital ratio and actual risk adjusted capital ratio. Furthermore, the null-hypothesis of no difference between the two sets of countries is rejected at the 1% level for the minimum capital ratio and at the 10% level for the actual capital ratio. The correlation between the minimum capital ratio and the actual risk adjusted capital ratio is also fairly high (0.52).

Chart 1



T-tests also prove other significant differences between the 2 sets of countries. For example an average of 7.77 of developed countries top 10 banks are rated by international credit rating agencies compared to just 5.64 of developing countries. The null hypothesis of no difference is rejected at the 5% significance level. With regards to supervision, the frequency of onsite inspections conducted in large and medium size banks is found to be both high and strikingly similar as the null hypothesis of no difference is not rejected.

Tables 1 and 2 in Appendix 2 report correlation matrices across the macroeconomic variables for the two subsamples of countries. It can be seen that there is a positive correlation between the real interest rate and GDP growth for both sets of countries which seems counterintuitive. However Demirgüç-Kunt and Detragiache (1998, page 44) note that “empirical studies tend to support the proposition that moderately positive real interest rates have a positive effect on

growth". More markedly, although private credit and liquid liabilities are strongly correlated, there is quite a large difference between their respective correlations with output cost in developed countries, which is something that previous literature has not shown. There may therefore be important definitional differences and consequently both measures should be tested. Property rights and the lack of corruption are also very strongly correlated as expected, and should therefore be used as substitutes for one another when testing regressions.

As is to be expected in a study of this type, many of the macroeconomic variables are correlated. There may therefore be a small issue of imperfect multicollinearity, however there is a sound theoretical basis for the inclusion of all the variables included. Stock and Watson (page 209) note that "imperfect multicollinearity does not pose any problems for the theory of the OLS estimators; indeed, a purpose of OLS is to sort out the independent influences of the various regressors when these regressors are potentially correlated." It is, however, a recognised caveat that t-statistics may be underestimated. The results are analysed in the next section.

5. Results

The regressions described in this section are carried out using the private credit and liquid liabilities proxies for financial development separately, whilst property rights and corruption are used interchangeably to control for institutions. The main results tables appear below while miscellaneous regressions are found in Appendix 3 and are referenced accordingly throughout. All coefficients are in terms of elasticities with respect to the output cost.

5.1 Initial specification

Columns 1-4 in Table 2 below report the regression results for the initial specification - without the addition of any financial regulation variables. It can be seen across all regressions that being a developed country is associated with a lower output cost, but that this is not significant, indicating that developing countries have fared no worse than developed in the crisis. Using the jointly significant regressions 2 and 4 it can also be seen that only the real interest rate is found to be significant, with a 1% increase in the real interest rate associated on average with around a 0.75% decrease in output cost, which is fairly inelastic. The positive coefficients on GDP per capita indicates that rich countries have *tended* to suffer more, whilst the positive coefficients on inflation are consistent with Angkinand (2009) who finds that the output cost of crises is more severe in countries with poor macroeconomic policies. The aforementioned importance of institutions, most notable property rights, is also evident. The coefficients on corruption are less intuitive but fairly small.

This finding is in direct agreement with Demirgüç-Kunt & Detragiache (1998) who find that using lagged explanatory variables to explain banking crises renders most macroeconomic control variables insignificant with the exception of the real interest rate. Angkinand (2009) finds a negative coefficient on the real interest rate, without explaining why. Possible explanations for the positive coefficient are provided by McKinnon (1973) and Shaw (1973) who posit that low real interest rates reduce private financial savings which decreases resources available for investment, which may have been a particularly important aspect during the 'credit crunch'. A further interpretation is that countries with high real interest rates helped

keep asset price bubbles in check, or that their citizens saved more. This will be further discussed later in the paper.

Perhaps most interestingly, the two regressions (1 and 3) which use private credit as a proxy for financial development, though insignificant, take opposite signs to those of liquid liabilities (2 and 4). Equation 4 shows that a higher level of liquid liabilities as a percentage of GDP, a measure of financial sector development, is associated with a lower output cost. As discussed previously the distinction between private credit and liquid liabilities is that the former relates to the amount of *credit* in the economy whereas the latter is a measure of the absolute size of the financial sector and is in terms of *deposits*. This important difference is not often discussed in the literature, much of which finds an ambiguous effect of the extent of financial development, but is important to highlight here. It appears that a higher level of credit is associated with a higher output cost whilst a higher level of deposits in the economy decreases the output cost. This can be illustrated in the context of the current crisis, where overextended borrowers have suffered greater next to cautious savers.

Columns 5-8 extend 1-4 respectively through the addition of an interaction term to explore for any additional effects financial development might have on developing countries. Again the most significant result is when using liquid liabilities, this time in conjunction with property rights, see column 6. The additional effect of liquid liabilities for developing countries is a 1% increase being associated on average with an additional 5.8% increase in output cost, compared to developed countries, and highlights their differing effects of financial development on economic output. Angkinand (2009) found no significant effect of such interaction terms for their time period considered.

Table 2

Ordinary Least Squares

Dependent variable: output cost

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP growth _{t-1}	-0.45 (0.97)	-0.41 (0.97)	-0.56 (0.97)	-0.38 (0.98)	-0.50 (1.09)	-0.59 (1.04)	-0.58 (1.07)	-0.52 (1.05)
GDP per capita _{t-1}	0.83 (1.07)	0.88 (1.14)	0.39 (1.22)	0.57 (1.28)	0.80 (1.04)	1.00 (1.23)	0.37 (1.15)	0.49 (1.24)
Inflation _{t-1}	1.87 (2.01)	1.55 (1.74)	2.14 (1.92)	1.62 (1.61)	1.80 (2.08)	0.74 (1.75)	2.12 (1.97)	0.96 (1.60)
Real interest rate _{t-1}	-0.77** (0.32)	-0.80*** (0.24)	-0.68** (0.30)	-0.74*** (0.23)	-0.77** (0.32)	-0.82*** (0.29)	-0.68** (0.31)	-0.73** (0.27)
Private credit to GDP _{t-1}	1.29 (1.71)		0.11 (1.40)		1.07 (2.11)		0.01 (1.83)	
Liquid liabilities to GDP _{t-1}		-2.99 (2.10)		-3.29* (1.93)		-5.52 (3.31)		-5.73* (3.32)
Property rights _{t-1}	-9.98 (7.54)	-2.86 (7.24)			-10.04 (7.72)	-5.75 (7.07)		
(Lack of) corruption _{t-1}			-0.47 (0.55)	0.04 (1.42)			-0.45 (1.55)	-0.06 (1.33)
Developing	-0.32 (0.43)	-1.56 (5.22)	-0.32 (0.43)	-0.50 (0.62)	-0.22 (0.48)	0.36 (0.54)	-0.28 (0.51)	0.29 (0.55)
Private credit to GDP _{t-1} * Developing					0.51 1.65		0.20 (1.42)	
Liquid liabilities to GDP _{t-1} * Developing						5.80* (3.36)		5.15 (3.30)
Constant	1.79E+10 (2.88E+10)	-7.49E+09 (2.51E+10)	-7.76E+09 (1.75E+10)	-1.23E+10 (1.91E+10)	1.86E+10 (2.88E+10)	1.26E+09 (2.24E+10)	-7.42E+09 (1.64E+10)	-1.01E+10 (1.9E+10)
N	40	40	40	40	40	40	40	40
Prob (F-Stat)	0.135	0.004	0.146	0.005	0.152	0.095	0.197	0.094
R ²	0.158	0.220	0.120	0.215	0.159	0.300	0.120	0.282

Notes

Robust standard errors in parentheses

* statistically significant at 10% level

** statistically significant at 5% level

*** statistically significant at 1% level

GDP per capita, private credit to GDP, liquid liabilities to GDP and property rights are in the logarithm

All coefficients are in terms of elasticities except the constant

5.2 Supervision

Table 3 extends the initial specification through the addition of a measure of supervision, which has been one of the most frequent aspects of financial regulation cited during the crisis. Column 1 tests for the effects of supervision through the variable *frequency of inspections* which measures how frequently medium and large size banks are inspected per year. It can be seen that this supervision measure is significant for both developed and developing countries but that there is no additional effect for developing countries. This is in contrast to Angkinand (2009) who does not find a significant impact of supervision on the output cost of crises. A higher *quality* of supervision implemented since the period investigated by Angkinand might reconcile these findings. This also has implications for developed countries as it indicates that problems such as Northern Rock might have been avoided had more frequent supervisions been carried out. However this result is not found when using alternative measures of financial development and institutions in Appendix 3, Table 1, columns 1-3.

Furthermore columns 2 and 3 below show that supervision is even more effective at reducing output cost at higher levels of private credit. This makes intuitive sense as we would expect economies with bigger financial sectors to suffer disproportionately in the crisis (for example the UK, the US and Iceland) and so the significant effects on supervision become even more important. This also applies for liquid liabilities, as can be seen in columns 4 and 5, indicating that higher levels of deposits also require careful supervision. It is notable that there is no additional effect for developing countries with respect to developed countries concerning private credit, but column 4 shows an additional positive effect of more frequent supervision on output cost of being a developing country at higher levels of liquid liabilities. There may therefore be something about the banks of developing countries that have high levels of deposits that warrant greater supervision. Angkinand (2009) does not find a significant relationship between the level of domestic private credit and bank regulation variables.

Table 3

Ordinary Least Squares

Dependent variable: output cost

Independent Variable	(1)	(2)	(3)	(4)	(5)
GDP growth _{t-1}	-0.57 (1.27)	0.20 (1.01)	0.06 (0.99)	0.02 (1.00)	0.03 (1.00)
GDP per capita _{t-1}	1.36 (1.24)	1.56 (1.14)	1.14 (1.36)	1.59 (1.02)	1.28 (1.17)
Inflation _{t-1}	1.25 (2.18)	1.58 (2.12)	1.97 (2.02)	0.40 (1.59)	0.75 (1.47)
Real interest rate _{t-1}	-0.74*** (0.27)	-0.82*** (0.29)	-0.69** (0.27)	-0.88** (0.32)	-0.75** (0.30)
Private credit to GDP _{t-1}	1.16 (1.73)	7.07*** (2.37)	5.86** (2.59)		
Liquid liabilities to GDP _{t-1}				9.80** (3.97)	8.73** (4.22)
Property rights _{t-1}	-11.94* (6.89)	-11.88* (6.59)		-11.16* (6.06)	
(Lack of) corruption _{t-1}			-0.77 (1.55)		-1.36 (1.60)
Developing	-2.29 (1.47)	0.33 (0.47)	0.27 (0.51)	0.31 (0.46)	0.22 (0.50)
Frequency of inspections	-2.92* (1.61)	-3.11** (1.30)	-2.94* (1.60)	-3.90*** (1.18)	-3.61** (1.56)
Freq. of inspections * Developing	2.28 (1.52)				
Freq. of inspections * Private credit to GDP _{t-1}		-9.74** (4.38)	-9.56** (4.52)		
Freq. of inspections * Private credit to GDP _{t-1} * Developing		4.15 (2.71)	3.76 (2.72)		
Freq. of inspections * Liquid liabilities to GDP _{t-1}				-17.58** (7.30)	-16.63** (7.74)
Freq. of inspections * Liquid liabilities to GDP _{t-1} * Developing				8.61* (4.76)	7.54 (4.75)
Constant	2.15E+10 (2.85E+10)	1.68E+10 (2.66E+10)	-1.54E+10 (1.91E+10)	1.76E+10 (2.22E+10)	-1.35E+10 (1.66E+10)
N	40	40	40	40	40
Prob (F-Stat)	0.008	0.009	0.008	0.014	0.032
R ²	0.256	0.305	0.256	0.453	0.414

Notes: Robust standard errors in parentheses

* statistically significant at 10% level

** statistically significant at 5% level

*** statistically significant at 1% level

GDP per capita, private credit to GDP, liquid liabilities to GDP and property rights are in the logarithm

All coefficients are in terms of elasticities except the constant

5.3 Market-based approach

This ‘hands on’ approach to supervision should be compared with the ‘market-based’ approach advocated by some of the literature. Column 1 of Table 4 below shows that no statistically significant effects are found for either developed or developing countries banks that are rated by domestic credit rating firms (nor in Appendix 3, Table 1, columns 4 to 6).

But what of the international credit rating agencies²³ who come in for criticism following the crisis, might they have done a better job? Column 2 shows that no significant effects are found for this variable, indicating that this ‘market-based’ approach has served neither developing nor developed countries particularly well in this crisis (see also Appendix 3, Table 1, columns 7 to 9). An interesting observation nonetheless is that the coefficient on the interaction term for developing countries is positive for a domestic credit rating but negative for an international credit rating, which lends support to Brownbridge and Kirkpatrick’s (2000) contention that developing countries institutions used to undertake market monitoring are poorly developed. It therefore appears that ‘light touch’ regulation’s death is a not unjustified one and that regulators have been right to scramble to a more intrusive style of supervision, especially in developed countries.

5.4 Capital ratios

Much has also been mooted of the merits of banks holding higher capital reserves as a buffer against potential future losses. However column 3 below shows that there is no effect of increasing the actual amount of risk adjusted capital²⁴ held by banks for either developing or developed countries and no significant difference in the additional effect that capital would have on developing countries’ output cost. Columns 1-3 of Appendix 3, Table 2 show this to be robust across specifications. This could be said to be a somewhat ‘disappointing’ result, as this has been touted as one of the foremost solutions to preventing a similar crisis occurring again in the future. However, this finding may not be completely disparate to this proposal, as countries whose banks maintained higher capital ratios prior to the crisis may subsequently

²³ As aforementioned, the three main credit rating agencies are Fitch Ratings, Moody’s and Standard and Poor’s.

²⁴ This measure is used as it captures the *actual* capital ratio across countries’ banks and not simply the minimum level required.

have been lending less, resulting in lower growth in subsequent periods and greater output costs. Note that both developed and developing countries' banks might also have been in better health as a consequence of such higher capital ratios.

5.5 Bank management

Whilst it is difficult to find a suitable regulation conducive to good bank management, it is at least possible to test for the effects of the *threat* of removal should malpractice be detected, which one would expect to be conducive to better bank management. Column 4 shows that this threat is associated with a lower output cost across the entire subsample (due to near perfect multicollinearity developed and developing countries cannot be tested for separately). This agrees with the findings of de Juan (2003). Columns 4–6 of Appendix 3, Table 2 show this to be robust across specifications.

5.6 Activity restrictions

Calls have also been made in the wake of the crisis for a reinstatement of the Glass-Steagall Act which used to separate retail from investment banking. The US has recently moved to enact its own rules regarding this to restrict banks from carrying out certain securities activities.²⁵ However, there has been a lot of international debate on whether such measures are warranted, or indeed useful. The results found in column 5 below suggest that there would have been no significant impact on output cost in the crisis had such measures been in place.²⁶ Similar results are also found in columns 7-9 of Appendix 3, Table 2. This may be because economies are inextricably dependent on credit provided by financial institutions - whether they are retail banks or investment banks is irrelevant. This finding is also in agreement with Angkinand (2009).

²⁵ See The White House (2010).

²⁶ Note that it is again not possible to test for the effects on developed and developing countries separately due to near perfect multicollinearity. The literature review noted that Evrensel (2009) found no significant differences in the areas of banking activities or internal management.

Table 4

Ordinary Least Squares

Dependent variable: output cost

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
GDP growth _{t-1}	-0.50 (1.17)	-0.03 (0.87)	-0.09 (0.93)	0.21 (0.94)	-0.32 (1.14)	0.02 (1.38)
GDP per capita _{t-1}	2.21 (1.75)	1.29 (1.16)	1.24 (1.29)	1.06 (0.96)	1.44 (0.94)	1.23 (1.27)
Inflation _{t-1}	1.16 (1.93)	1.71 (1.80)	1.86 (1.83)	2.37 (1.66)	1.86 (1.69)	1.93 (2.28)
Real interest rate _{t-1}	-0.78** (0.35)	-0.75*** (0.19)	-0.79*** (0.23)	-0.75*** (0.26)	-0.83*** (0.25)	-0.73** (0.30)
Private credit to GDP _{t-1}						0.86 (1.63)
Liquid liabilities to GDP _{t-1}	-4.03* (2.22)	-3.45 (2.18)	-3.21 (2.33)	-2.70 (1.95)	-2.91 (2.14)	
Property rights _{t-1}	-4.31 (9.11)	-3.18 (7.42)	-3.04 (7.48)	0.01 (6.65)	-2.66 (7.60)	-8.08 (6.18)
(Lack of) corruption _{t-1}						
Developing	0.27 (0.64)	0.64 (0.78)	-0.55 (1.70)			-1.44 (1.56)
Domestically credit rated	-1.62 (1.04)					
Domestically credit rated * Developing	0.28 (0.55)					
Internationally credit rated		0.71 (2.02)				
Internationally credit rated * Developing		-1.00 (0.64)				
Risk adjusted capital ratio			-2.57 (4.13)			
Risk adjusted capital ratio * Developing			0.24 (1.71)			
Management removal				-6.60* (3.72)		-5.53* (3.16)
Securities restrictions					0.02 (0.19)	
Frequency of inspections						-2.39 (1.60)
Frequency of inspections * Developing						1.59 (1.61)
Constant	-2.12E+10 (2.65E+10)	-1.55E+10 (2.54E+10)	-9.58E+09 (2.58E+10)	-1.16E+10 (2.02E+10)	-1.82E+10 (2.83E+10)	1.69E+10 (2.56E+10)
N	37 [†]	40	40	40	40	40
Prob (F-Stat)	0.027	0.000	0.003	0.013	0.001	0.002
R ²	0.354	0.245	0.228	0.315	0.213	0.321

Notes: Robust standard errors in parentheses

* statistically significant at 10% level

** statistically significant at 5% level

*** statistically significant at 1% level

GDP per capita, private credit to GDP, liquid liabilities to GDP and property rights are in the logarithm.

All coefficients are in terms of elasticities except the constant

[†] 3 observations unavailable

5.7 Combined model

Assembling the 'best' model with the financial regulation variables found to be significant does not, however, yield many significant coefficients as can be seen in column 6 above and columns 1-3 in Appendix 3, Table 3. The notable exception to this is the dummy for 'management removal'; however this is not very significant nor robust across all specifications.

This provokes the wider questions of "could regulation have done anything to dampen the negative effects of the crisis in both developing and developed countries?" and "was the crisis really due to a failure of regulation?" The answer to the former is broadly 'yes'. It has been shown that the frequency of supervision and the ability to encourage good management practices in developing countries can have a significant impact on the output cost suffered, and that magnitudes may differ from those of developed countries.

The answer to the former, however, is more ambiguous. It is striking that the only variable to remain significant over *all* regressions was that of the real interest rate. Much has been made, of the role that low interest rates played in the current crisis through the availability of cheap credit and the asset price bubbles that this generated. This study has found that higher real interest rates are associated with a lower output cost and so serious consideration must be given to this idea. Coupled with the often cited problem of global imbalances in saving and spending it is extremely hard to say with certainty that the crisis was a failure of regulation and that wider macroeconomic problems were not, at least in part, to blame.

6. Conclusion and Evaluation

6.1 Policy implications

This paper set out to investigate whether developing countries' financial regulations help explain their economic performance during the current financial crisis. The estimated regressions gave mixed results of the hypotheses. The initial preliminary regression showed that only the negative coefficient on the real interest rate was significant among the macroeconomic and institutional variables while differing effects for the measures of financial development were also uncovered. With respect to the regulatory variables the two most important factors for both developing and developed countries are those of supervision and bank management - a fairly intuitive finding. This suggests that both international organisations (such as the Basel Committee) and governments alike ought to ensure that both the quantity and quality of bank supervision is increased, as well as encouraging good bank management. Both of these, in particular the latter, are currently at the forefront of public opinion. Finally, measures should be taken to address the structural problems underlying the crisis, as without this better financial regulation may be but a stopgap before the next crisis.

6.2 Limitations, extensions and future directions

There are several limitations of this study. In addition to the methodological difficulties previously discussed, a major difficulty lies in the use of proxy variables for some of the financial regulations. It is often difficult to find the 'right' variable to substitute for an aspect of regulation and so the results found should be treated with an element of caution. Furthermore there is also a question of how sensitive the results may be to the methodology and explanatory variables included. This study has also focussed on macroeconomic and institutional variables without consideration for other aspects such as the structure of the banking system, the functioning of the interbank market and other, as yet unknown, factors.

The internal validity of the models can be substantiated by its results which agree with aspects of the literature, which can itself be highly divisive. However, the external validity may be less

applicable due to the unique nature of the current financial crisis, though if a similar situation were to arise in the future this study might indeed serve as a good reference.

With this in mind some future extensions would be firstly to increase the sample size and years included in the dataset. It has already been noted that the output cost figures used in this study are a lower bound and carrying out the same tests when the crisis has officially ended would allow for more accurate results, as well as potentially presenting new findings and ruling out any possible multicollinearity. The significance of other factors such as remittances from abroad and commodity prices, which are of particular importance for developing countries, might also be tested for. Further possible extensions might include using only developing countries and experimenting with different crisis start dates. The dataset might also be extended historically to test for significant differences between the current crisis and previous crises. Some work on this has already been carried out but has been omitted due to space constraints. Preliminary results suggest that the real interest rate may have played less of an important role in previous crises.

It can be seen that developed countries are already rushing to enact some of the proposed reforms following the worst economic crisis experienced in over 70 years. However it is the developing world which has the opportunity to learn from our mistakes, which one can only hope they do.

Appendix 1**Variable list**

Variable	Type	Description
Output cost	C	The sum of the difference between the actual and potential output levels from 2007 quarter 3 to 2008 quarter 4 inclusive. The quarterly real GDP is used for the output data.
GDP growth	C	Real GDP growth rate (annual %).
GDP per capita	C	Natural logarithm of real GDP per capita (constant 2000 US\$).
Inflation	C	Consumer price index (%)
Real interest rate	C	Real interest rate (%)
Private credit to GDP	C	The ratio of private credit provided by deposit money banks to GDP.
Liquid liabilities to GDP	C	The ratio of currency plus demand and interest-bearing accounts of banks and non-banks financial intermediaries to GDP.
Property rights	C	Legal Structure and Security of Property Rights - composite of judicial independence, impartial courts, protection of property rights, lack of military interference, the integrity of the legal system, the legal enforcement of contracts and regulatory restrictions on the sale of real property. A higher score indicates greater security of property rights and a better legal structure.
(Lack of) Corruption	C	Lack of corruption index, measured in units ranging from about -2.5 to 2.5, with higher values corresponding to better governance outcomes.
Developing	D	Dummy variable for developing country
Frequency of inspections	C	Annual frequency of onsite inspections conducted in large and medium size banks
Management removal	D	Bank management can be removed and replaced by bank supervisor/court/other
Securities restrictions	D	Conditions under which banks can engage in securities activities are classified as either 'restricted' or 'prohibited'
Risk adjusted capital ratio	C	Actual risk adjusted capital ratio in banks, using the 1988 Basel Accord definitions
Domestically credit rated	C	Fraction of the top ten banks (in terms of total domestic assets) of a country that are rated by domestic credit rating agencies
Internationally credit rated	C	Fraction of the top ten banks (in terms of total domestic assets) of a country that are rated by international credit rating agencies

C = Continuous Variable

D = Dummy Variable

List of countries

Country	World Bank Income Group	Developing (1) / Developed (0)
Australia	High income: OECD	0
Austria	High income: OECD	0
Belgium	High income: OECD	0
Brazil	Upper middle income	1
Chile	Upper middle income	1
Croatia	Upper middle income	1
Czech Republic	High income: OECD	0
Denmark	High income: OECD	0
Fiji	Upper middle income	1
Finland	High income: OECD	0
France	High income: OECD	0
Germany	High income: OECD	0
Greece	High income: OECD	0
Hong Kong, China	High income: nonOECD	0
Hungary	High income: OECD	0
India	Lower middle income	1
Ireland	High income: OECD	0
Israel	High income: nonOECD	0
Italy	High income: OECD	0
Japan	High income: OECD	0
Jordan	Lower middle income	1
Malaysia	Upper middle income	1
Mexico	Upper middle income	1
Netherlands	High income: OECD	0
New Zealand	High income: OECD	0
Nigeria	Low income	1
Pakistan	Low income	1
Peru	Lower middle income	1
Philippines	Lower middle income	1
Poland	Upper middle income	1
Portugal	High income: OECD	0
Romania	Upper middle income	1
Slovak Republic	High income: OECD	0
Korea, Rep.	High income: OECD	0
Spain	High income: OECD	0
Sweden	High income: OECD	0
Switzerland	High income: OECD	0
Trinidad and Tobago	High income: nonOECD	0
United Kingdom	High income: OECD	0
United States	High income: OECD	0

Income Group Classification Source: Beck et al. (2009), The World Bank.

'Developing' countries are those classified by the World Bank as 'low income', 'lower middle income' or 'upper middle income'.

Data sources

Variable	Source
Output cost (GDP)	World Development Indicators, International Monetary Fund
GDP growth	World Development Indicators, International Monetary Fund
GDP per capita	World Development Indicators, International Monetary Fund
Inflation	World Development Indicators, International Monetary Fund
Real interest rate	World Development Indicators, International Monetary Fund AMECO database, European Commission
Private credit to GDP	Beck et al. (2009), The World Bank
Liquid liabilities to GDP	Beck et al. (2009), The World Bank
Property rights	Fraser Institute
(Lack of) Corruption	Worldwide Governance Indicators, The World Bank
Financial Regulation Variables	Barth et al. (2007) [†] , The World Bank

[†] In the extreme minority of cases where an observation is missing in the 2007 dataset, the most recent previous regulation dataset (2004/2001) is used. This is highly unlikely to bias any results.

Methodology for the calculation of the output cost

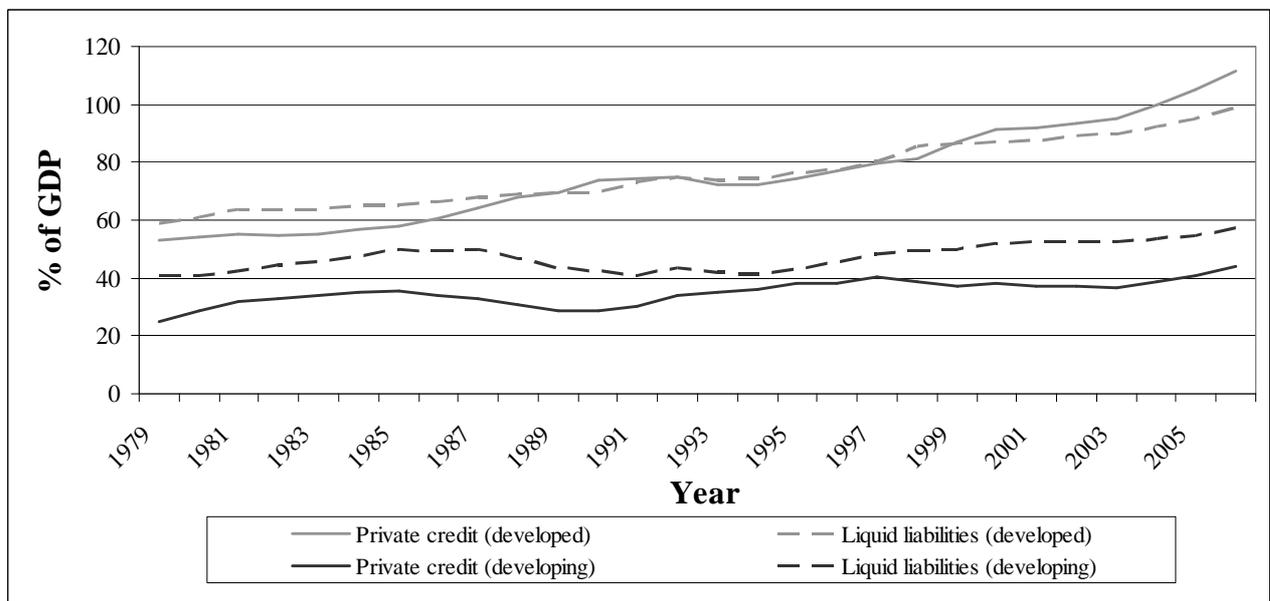
- Figures for real GDP (constant 2000 US\$) taken from World Development Indicators, IMF.
- Interpolated annual into quarterly real GDP using the ‘denton’ command in STATA. Quarterly production indices taken from International Financial Statistics, IMF and expressed in 2005 constant U.S. dollars.
- Hodrick-Prescott filter used to calculate trend quarterly GDP over the period 1980 to 2008 for all countries with the exception of Brazil (1991 onwards), Croatia (1991), Czech Rep. (1993), Hong Kong (1982), New Zealand (1987), Philippines (1981), Poland (1990), Romania (1989) and Slovak Rep. (1993).
 - This estimated trend reflects the level which the real GDP would be had the crisis not occurred.
- Output cost then calculated by subtracting actual GDP from trend GDP, for each country quarter, giving positive (below trend output) and negative (above trend output) values for ‘output cost’.
- The total real output cost is then calculated by aggregating across the 6 quarters of the crisis for which the data is available - the third quarter of 2007 to the fourth quarter of 2008 inclusive. This neatly coincides with the start date of the crisis, often cited as 9th August 2007. See: <http://news.bbc.co.uk/1/hi/7521250.stm>

Appendix 2

Summary statistics – both groups of countries

Variable	Mean	Std. Dev.	Min	Max
Output cost (\$ billion)	-1.68	7.55	-32.20	16.90
GDP growth (%)	3.16	2.60	-2.07	9.51
GDP per capita (\$)	16271	12592	482	40569
Inflation (CPI %)	4.89	2.96	0.94	16.06
Real interest rate (%)	4.56	6.68	-2.16	38.90
Private credit (% of GDP)	87.84	52.61	16.94	191.76
Liquid liabilities (% of GDP)	84.13	48.67	20.52	277.38
Property Rights	6.89	1.40	3.98	9.01
(Lack of) Corruption	0.84	1.01	-1.19	2.56

The evolution of financial development through time



It can be seen that financial sector development has been steadily increasing across both sets of countries since the 1980s, on both measures, but that developed countries have maintained much more developed financial sectors.

Correlation Matrices

Table 1: Developed countries

	GDP growth	GDP per capita	Inflation	Real interest rate	Private credit/GDP	Liquid liabilities/GDP	(Lack of) corruption	Property rights	Output cost
GDP growth	1.00								
GDP per capita	-0.43	1.00							
Inflation	0.31	-0.56	1.00						
Real interest rate	0.25	-0.41	0.31	1.00					
Private credit/GDP	-0.54	0.58	-0.63	-0.39	1.00				
Liquid liabilities/GDP	-0.12	0.48	-0.53	-0.16	0.58	1.00			
(Lack of) corruption	-0.41	0.69	-0.55	-0.27	0.67	0.34	1.00		
Property rights	-0.40	0.64	-0.64	-0.26	0.68	0.37	0.92	1.00	
Output cost	-0.06	-0.16	0.25	0.07	-0.07	-0.46	-0.14	-0.25	1.00

Table 2: Developing countries

Developing	GDP growth	GDP per capita	Inflation	Real interest rate	Private credit/GDP	Liquid liabilities/GDP	(Lack of) corruption	Property rights	Output cost
GDP growth	1.00								
GDP per capita	-0.26	1.00							
Inflation	0.12	-0.69	1.00						
Real interest rate	0.20	0.16	-0.29	1.00					
Private credit/GDP	-0.19	0.37	-0.04	-0.20	1.00				
Liquid liabilities/GDP	-0.13	0.20	0.06	-0.16	0.91	1.00			
(Lack of) corruption	-0.08	0.71	-0.29	0.02	0.71	0.48	1.00		
Property rights	-0.15	0.63	-0.39	-0.16	0.79	0.66	0.89	1.00	
Output cost	-0.17	-0.15	0.37	-0.75	0.07	-0.07	0.04	-0.01	1.00

Table 3: Combined

	GDP growth	GDP per capita	Inflation	Real interest rate	Private credit/GDP	Liquid liabilities/GDP	(Lack of) corruption	Property rights	Output cost
GDP growth	1.00								
GDP per capita	-0.61	1.00							
Inflation	0.45	-0.77	1.00						
Real interest rate	0.28	-0.16	-0.01	1.00					
Private credit/GDP	-0.60	0.75	-0.57	-0.29	1.00				
Liquid liabilities/GDP	-0.37	0.59	-0.44	-0.23	0.80	1.00			
(Lack of) corruption	-0.55	0.85	-0.64	-0.20	0.83	0.60	1.00		
Property rights	-0.55	0.83	-0.69	-0.26	0.85	0.66	0.95	1.00	
Output cost	-0.11	0.00	0.14	-0.23	0.03	-0.25	-0.01	-0.07	1.00

GDP per capita, private credit to GDP, liquid liabilities to GDP and property rights are in the logarithm.

Appendix 3

Table 1

Ordinary Least Squares

Dependent variable: output cost

Independent Variable	Supervision		Domestically credit rated			Internationally credit rated			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GDP growth _{t-1}	-0.56 (1.26)	-0.71 (1.28)	-0.50 (1.29)	-0.67 (1.27)	-0.44 (1.17)	-0.65 (1.33)	-0.43 (0.93)	-0.01 (0.90)	-0.53 (1.00)
GDP per capita _{t-1}	1.35 (1.34)	0.90 (1.43)	0.99 (1.49)	1.28 (2.08)	2.01 (1.86)	0.86 (2.21)	0.09 (1.37)	0.93 (1.24)	0.65 (1.39)
Inflation _{t-1}	1.06 (1.97)	1.61 (2.10)	1.22 (1.82)	1.64 (2.16)	1.25 (1.85)	1.91 (2.02)	1.90 (2.06)	1.79 (1.67)	2.16 (1.97)
Real interest rate _{t-1}	-0.76*** (0.22)	-0.63** (0.26)	-0.68* (0.21)	-0.77* (0.43)	-0.73** (0.33)	-0.69 (0.43)	-0.71** (0.29)	-0.69*** (0.16)	-0.61** (0.28)
Private credit to GDP _{t-1}		-0.10 (1.39)	-2.93 (2.07)	1.11 (2.73)		0.26 (2.39)	1.46 (2.46)		0.44 (2.25)
Liquid liabilities to GDR _{t-1}	-2.48 (2.32)				-4.22** (2.11)			-3.75* (2.08)	
Property rights _{t-1}	-5.61 (8.14)			-9.67 (8.49)			-10.10 (8.14)		
(Lack of) corruption _{t-1}		-0.73 (1.54)	-0.31 (1.58)		-0.46 (1.65)	-0.72 (1.65)		0.04 (1.40)	-0.68 (1.59)
Developing	-2.29 (1.50)	-2.20 (1.70)	-2.12 (1.64)	-0.28 (0.69)	0.26 (0.64)	-0.29 (0.70)	-0.30 (1.29)	0.63 (0.81)	-0.32 (1.31)
Frequency of inspections	-2.59 (1.85)	-2.71 (1.91)	-2.38 (1.95)						
Freq. of inspections * Developing	2.08 (1.67)	2.17 (1.76)	1.91 (1.80)						
Domestically credit rated				-1.63 (1.15)	-1.64 (1.04)	-1.65 (1.18)			
Domestically credit rated * Developing				0.67 (0.60)	0.29 (0.55)	0.69 (0.62)			
Internationally credit rated							-1.48 (2.91)	0.69 (1.94)	-1.61 (2.83)
Internationally credit rated * Developing							-0.04 (1.07)	-0.98 (0.64)	-0.02 (1.07)
Constant	-7.66E+08 (2.76E+10)	-1.02E+10 (1.94E+10)	-1.37E+10 (2.08E+10)	1.14E+10 (3.76E+10)	-3.13E+10 (2.74E+10)	-1.20E+10 (3.26E+10)	1.84E+10 (3.60E+10)	-2.06E+10 (1.98E+10)	-8.62E+09 (2.41E+10)
N	40	40	40	37 [†]	37 [†]	37 [†]	40	40	40
Prob (F-Stat)	0.000	0.011	0.000	0.302	0.040	0.314	0.031	0.000	0.038
R ²	0.296	0.206	0.281	0.260	0.349	0.235	0.178	0.243	0.142

Notes: Robust standard errors in parentheses

* statistically significant at 10% level

** statistically significant at 5% level

*** statistically significant at 1% level

GDP per capita, private credit to GDP, liquid liabilities to GDP and property rights are in the logarithm.

All coefficients are in terms of elasticities except the constant

[†] 3 observations unavailable

Table 2

Ordinary Least Squares

Dependent variable: output cost

Independent Variable	Risk adjusted capital ratio			Management removal			Securities restrictions		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GDP growth _{t-1}	-0.48 (0.89)	-0.06 (0.94)	-0.53 (0.94)	0.14 (0.98)	0.26 (0.97)	0.11 (0.98)	-2.23 (1.17)	-0.25 (1.05)	-0.17 (1.08)
GDP per capita _{t-1}	0.86 (1.32)	0.88 (1.41)	0.41 (1.41)	0.85 (1.02)	0.62 (1.06)	0.29 (1.18)	1.27 (0.97)	1.17 (1.18)	1.03 (1.22)
Inflation _{t-1}	1.87 (2.10)	1.92 (1.72)	2.18 (2.02)	2.58 (1.91)	2.41 (1.53)	2.82 (1.83)	2.10 (1.91)	1.93 (1.54)	2.41 (1.81)
Real interest rate _{t-1}	-0.76** (0.32)	-0.74*** (0.22)	-0.68** (0.31)	-0.72** (0.32)	-0.71*** (0.24)	-0.65** (0.30)	-0.80** (0.31)	-0.78*** (0.23)	-0.71** (0.26)
Private credit to GDP _{t-1}	1.34 (1.96)		0.07 (1.59)	0.89 (1.54)		-0.21 (1.25)	1.37 (1.72)		0.39 (1.37)
Liquid liabilities to GDP _{t-1}		-3.50 (2.17)			-2.86 (1.72)			-3.15 (2.03)	
Property rights _{t-1}	-10.27 (8.08)			-5.74 (5.67)			-9.62 (8.14)		
(Lack of) corruption _{t-1}		0.05 (1.44)	-0.45 (1.58)		0.62 (1.23)	0.34 (1.13)		0.04 (1.44)	-0.55 (1.57)
Developing	0.18 (1.73)	-0.70 (1.66)	-0.39 (1.67)						
Risk adjusted capital ratio	0.44 (5.02)	-2.68 (4.00)	-0.31 (4.84)						
Risk adjusted capital ratio * Developing	-0.51 (1.88)	0.42 (1.63)	0.09 (1.78)						
Management removal				-6.77* (3.51)	-7.00* (4.03)	-7.56* (4.11)			
Securities restrictions							0.09 (0.20)	0.05 (0.17)	0.17 (0.16)
Constant	1.77E+10 (3.05E+10)	-1.42E+10 (2.07E+10)	-7.86E+09 (1.86E+10)	1.22E+10 (2.16E+10)	-5.47E+09 (1.79E+10)	1.96E+09 (1.92E+10)	8.46E+09 (2.90E+10)	-2.32E+10 (1.60E+10)	-1.93E+10 (1.60E+10)
N	40	40	40	40	40	40	40	40	40
Prob (F-Stat)	0.275	0.005	0.300	0.071	0.014	0.096	0.030	0.001	0.015
R ²	0.159	0.223	0.120	0.261	0.322	0.250	0.158	0.210	0.125

Notes: Robust standard errors in parentheses

* statistically significant at 10% level

** statistically significant at 5% level

*** statistically significant at 1% level

GDP per capita, private credit to GDP, liquid liabilities to GDP and property rights are in the logarithm

All coefficients are in terms of elasticities except the constant

Table 3

Ordinary Least Squares

Dependent variable: output cost

Independent Variable	Combined model		
	(1)	(2)	(3)
GDP growth _{t-1}	0.06 (1.33)	0.18 (1.36)	0.03 (1.39)
GDP per capita _{t-1}	1.21 (1.34)	0.75 (1.48)	0.65 (1.48)
Inflation _{t-1}	1.74 (2.01)	1.91 (1.82)	2.31 (2.18)
Real interest rate _{t-1}	-0.75*** (0.26)	-0.70** (0.26)	-0.65** (0.29)
Private credit to GDP _{t-1}			-0.33 (1.29)
Liquid liabilities to GDR _{t-1}	-2.38 (2.19)	-2.68 (1.88)	
Property right _{t-1}	-2.63 (8.19)		
(Lack of) corruption _{t-1}		0.29 (1.51)	0.04 (1.37)
Developing	-1.42 (1.53)	-1.13 (1.63)	-1.16 (1.71)
Management removal	-5.50 (3.37)	-6.04 (3.78)	-6.54 (3.91)
Frequency of inspections	-2.08 (1.83)	-1.86 (1.89)	-2.12 (1.85)
Frequency of inspections * Developing	1.39 (1.72)	1.12 (1.82)	1.31 (1.79)
Constant	-2.26E+09 (2.53E+10)	-4.26E+09 (2.32E+10)	-5.64E+08 (2.30E+10)
N	40	40	40
Prob (F-Stat)	0.001	0.004	0.019
R ²	0.361	0.359	0.297

Notes: Robust standard errors in parentheses

* statistically significant at 10% level

** statistically significant at 5% level

*** statistically significant at 1% level

GDP per capita, private credit to GDP, liquid liabilities to GDP and property rights are in the logarithm

All coefficients are in terms of elasticities except the constant

Appendix 4

‘UK Financial Regulation: After the Crisis’

Adapted from speech by Hector Sants, Chief Executive, Financial Services Authority
Annual Lubbock Lecture in Management Studies
12 March 2010

“So turning to those elements that contributed to the crisis which relate to supervision and, in consequence, what the FSA is now doing differently.

As I mentioned, the FSA has radically changed the way it operates. This is best described in two main respects: first, the changes we have made to our philosophy; and second, the resultant changes to our operating model.

Regarding the first, there were various ways to describe the FSA’s philosophy historically. By politicians as ‘light-touch’, by the FSA, as derivations of ‘principles-based’ or ‘more principles-based’.

The new approach we have moved to is ‘outcomes-based’ and this is delivered through intensive supervision. But why outcomes and how is this different?

The ‘old-style’ FSA rarely intervened until there was clear evidence that something had gone wrong. It was a retrospective form of regulation. Intervention needed to be based on observable historical facts.

The old approach was never going to stop firms making mistakes, as that was not its intention. This was well supported by society and the city at the time.

The new outcomes-based approach, however, is centred on intervening in a proactive way, and judging the future decisions of firms based on business model and other analysis.”

Full speech available at:

http://www.fsa.gov.uk/pages/Library/Communication/Speeches/2010/0312_hs.shtml

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