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Prudential Regulation of Banks in Less Developed Economies

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ABSTRACT

Beginning with an empirical analysis of banking crises using a logit econometric model covering a sample of developed and developing countries between 1980-1997, the paper suggests that crises are more likely in years of low growth and high real interest rates. Private sector credit as a percentage of GDP, lagged credit growth and tight liquidity in the banking sector are also strongly related with banking crises. The results call for more robust financial regulation. The paper argues that less developed countries (LDCs) face inherent obstacles in setting up efficient regulation, and building up a sound-banking sector. These are related to the presence of multiple tasks and multiple principals, poor institutions, lack of economies of scales in banking sector as well as regulatory supervision, and the lack of reputation. LDCs need a regulatory framework that rewards prudent risk taking, but punishes misconduct. This is likely to involve a combination of input based measures impacting on bankers' incentives, with a few direct controls on the output of the banking sector. The paper concludes with a list of policy options whose appropriateness is judged by the 'friendliness' with the circumstances in LDCs.

Keywords: Prudential Regulation, Banks, Financial Crises.
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In his Presidential address to American Economics Association, Milton Friedman gave us the authoritative version of the *monetarist* creed:

> …..monetary policy can prevent money itself from being a major source of economic disturbance….A second thing monetary policy can do is to provide a stable background for the economy.
>
> Milton Friedman, 1968, pp 12-13.

This statement has become the cornerstone of macroeconomic policy advice dispensed to all developing and transitional economies. It also constitutes the *raison d'être* for the primacy of inflation control, as well as the stabilisation and structural adjustment programmes of the 1980s, and the associated liberalisation of capital markets. But as we all know, with hindsight, this view (generally described as the Washington consensus) ignores the need for prudential regulation of the financial sector as a pre-requisite for sound monetary policy. The converse is equally true: stable monetary policies are needed if an efficient financial sector is to flourish. Simple (or simple-minded) views of capital account liberalisation have become discredited in the wake of the Asian crisis of 1997, even in the most hawkish quarters. In addition, it is recognised that monetary policy reform geared at controlling inflation will not benefit the economy fully unless and until the private financial sector is well functioning. Also in the presence of many other distortions in the economy, financial liberalisation may be undesirable, due to second-best considerations. The over-arching problem lies in the weak nature of institutions and the type of strategic interaction between the state and various groups in developing countries (LDCs).

This paper aims to make a policy oriented empirical and theoretical contribution to the literature on prudential bank regulation for LDCs. It does 3 things: First, it carries out empirical analysis on the determinants of banking crises using macroeconomic, financial and institutional variables. Secondly, it provides some theory emphasising the difficulties of regulation. Finally, it critically analyses policy advice in a taxonomic style with regard to prudential regulation. Section 1 contains the empirical analysis, section 2 is devoted to the theoretical and policy analysis, and finally section 3 concludes with policy recommendations.

1. Empirical Motivation for More Robust Banking Sector Policy

In the 1990s, foreign portfolio investment and short term bank lending to the financial-services sector experienced more dramatic growth than trade and direct investment flows (Crafts, 2000, Bordo et. al. 1998). Financial integration is largely confined to emerging economies in the developing world. The globalization of capital markets carries its own price. National governments have become more vulnerable to changes in circumstances often unrelated to the stance of domestic economic fundamentals due to the sudden reversal of capital flows and shifts in investor sentiment.

After the recent crises in Mexico, East Asia and Russia, the reality of excessive volatility in international capital markets or contagion is becoming more widely accepted, although the reasons for vulnerability of countries to contagion are still not clearly understood (Dornbusch et.al., 2000). Kaminsky and Reinhart (1996) show that currency and banking crises have generally increased since the 1980s following a wave of financial liberalisation allowing more banks to operate. Table 1 summarises a part of their survey findings combined with data on gross fiscal costs of selected crises from different sources. The gross costs include outpayment of guaranteed liabilities, liquidity support, recapitalisation, and acquisition of non-performing loans. The net costs will only be known after incorporating proceeds from recoveries and reprivatisation. Except for the estimates by Caprio and Klingebiel (1996a), the costs of banking crises do not take account of the foregone output associated with the crises[1].

Table 1 also indicates that financial crises are more expensive for developing countries. Honohan (1996) establishes the vulnerability of small countries with his finding that economic size appears to be a more robust explanatory variable compared to a set of macroeconomic indicators in regressions on crisis resolution cost. The very disproportional resolution cost as a share of GDP combined with the harmful impact of disorderly financial liberalisation casts doubts on the viability and sensibility of financial integration for developing countries (Rodrik, 1998).

[1] Bordo et. al. (1999) point out that banking crises before 1914 involved a less sharper drop in output.

Table 1: Financial Liberalisation, Banking Crises, Currency Crises and the Gross Fiscal Costs

Country	*Dates of Financial Liberalisation (FL)*[a]	*Number of Banking and Currency Crises since FL*[b]	*Total Number of Crises during survey period (1970 – 1997)*[b]	*Gross Costs as % of GDP (selected banking crises)*
Argentina	1977	8	10	55.3 (1980 – 1982) [c]
Indonesia	1983 – 1988	4	6	42 (1998 – 1999) [d]
Chile	1974 – 1976	5	8	41.2 (1981 – 1982) [c]
Israel			5	30 (1977 - 1983) [c]
Thailand	1989 - 1990	1	6	26 (1997 – 1999) [d]
Cote d'Ivoire				25 (1988 – 1991) [c]
Malaysia	1978 – 1985	2	3	11 (1998 – 1999) [d]
Senegal				17 (1988 – 1991) [c]
Spain	1974	6	6	16.8 (1977 – 1985) [c]
Bulgaria				14 (1990s) [c]
Mexico	1974 and 1991	4 and 2	4 and 2	13.5 (1995) [c]
South Korea				10 (1997 – 1999) [d]
Hungary				10 (1991 – 1993) [c]
Finland	1982 – 1991	4	5	7.5 (1991 – 1994) [e]
Sweden	1980 - 1990	4	5	5.2 (1991 – 1993) [e]
Sri Lanka				5 (1989 – 1993) [c]
Norway	1980 – 1990	4	5	3 (1988 – 1992) [e]
United States				3.2 (1984 – 1991) [e]
Australia				1.6 (1989 – 1991) [c]
Colombia	1980	3	3	
Denmark	Early 1980s	2	5	
Bolivia	1985	2	4	
Brazil	1975	7	7	
Peru	1991	0	3	
Philippines	1980 – 1984	5	6	
Uruguay	1975 – 1979	2	4	
Turkey	1980 and 1987 (Dec. 83-June 87 controls reimposed)	3	4	
Venezuela	1981 and 1989 (1984-jan. 1989 controls reimposed)	5	6	

[a] Kaminsky and Reinhart (1996); [b] Counted from Kaminsky and Reinhart (1996) with addition of one count for Indonesia, Thailand, Malaysia, South Korea, and Philippines due to the recent Asian crisis; [c] CK (1996a); [d] Merrill Lynch' (1999), [e] Edey and Hviding (1995)

In addition to the contagion factor, reduced profitability as a result of tougher competition in a more deregulated market is an important explanation for the higher number of banking crises. However, as argued by Kaufmann and Mehrez (2000), the increased likelihood of banking crises in the periods after liberalisation is not an excuse for countries not to liberalise their financial sector. They show that banking crises are not more likely in *any* liberalised financial system, as pointed out by Demirguc-Kunt and Detragiache (1998a), but in countries where banks have little time to gather information, update their knowledge and make adjustments during periods of transition to a more deregulated system. The lesson is that in countries with poor transparency financial liberalisation should be carried out cautiously.

Despite the debate on whether or not liberalised and financially integrated countries are more vulnerable to contagion and boom-bust cycles in banking, hardly any researcher is found to challenge the urgency of supervision, regulation, contract enforcement, rule of law and transparency for a strong banking sector, *both* in liberalised and unliberalised financial systems. In fact, studies on the causes of Mexican and Asian crises have shown a shift in conventional wisdom from emphasising macro imbalances to weaknesses in the financial sector. Having said this, a question mark still remains over the relative importance of the various determinants of banking crises. Recent years have seen a stream of studies looking for determinants of banking crises (e.g. Demirguc-Kunt and Detragiache, 1998b; Kaufmann and Mehrez, 2000; and, Hardy and Pazarbaþioðlu, 1999). We find however that relative significance of determinants of banking crises shown in existing literature, be they macroeconomic, financial or institutional, are quite sensitive to different crisis definitions, sample selection and model specification (Frydl, 1999). For purposes of comparability we use a model specification and econometric methodology that are similar to Demirguc-Kunt and Detragiache (1998b) or DKD. The following sub-section briefly presents and discusses the data, estimation and results.

1.A. Determinants of Banking Crises

1.A.1. Banking Crisis Variables

An essential aspect of studies on the determinants of banking crises is the construction of the dependent variable, i.e. banking crisis dummies. The difference from the existing literature in term of crisis definition is that we strive for some compromise in the composition of the dependent variable. This is done by first taking the years of crisis as indicated in DKD as given. The reason is that DKD arguably have a clear criteria for determining which localised banking distresses are to be seen as systematic banking crises. It does not mean that DKD have stricter criteria because a number of DKD's crisis episodes are normal years according to others. Second, we include all dates of banking crises according to Caprio and Klingebiel (1996a), or CK. Third, we further expand our crisis dummies by adding 6 crisis episodes on which information is gleaned from Lindgren, Garcia and Saal (1996), or LGS. Finally, we complete our banking crises data by making the year 1997 as the start of banking crises in four Asian countries, as can be concluded from the report of Lindgren et. al. (2000). Table 2 shows that our banking crises are highly correlated with all three sources of banking crises data. Appendix I gives a full list of countries under survey including the non-crisis ones, details on the number of crises years that overlap among our banking crises data and the three other sources. Two tables list banking crises according to DKD and CK. Note that 1982 for Israel was a crisis year according to CK but a 'tranquil' year in our data set. This is because we follow DKD, who find an Israeli banking crisis to take place a year later, i.e. 1983.

Table 2. Correlation of Banking Crises Data

	Authors	*DKD*	*CK*	*LGS*
Authors	1			
DKD	0.6302	1		
CK	0.7502	0.3185	1	
LGS	0.4687	0.3711	0.3033	1

Since a banking crisis may affect the explanatory variables, we delete two observations following a banking crisis, which is shorter than the five observations in Mehrez and Kaufmann (2000), or generally shorter than the whole observation as in one of DKD's set of regressions. If a crisis lasts longer than one year, we delete the first year following the end of the crisis. In line with Bordo et. al. (1999), we believe that the recovery from banking crises starts earlier in the modern period (post-1972) due to the availability of more last-resort lending, deposit insurance, and international rescue

packages, especially if banking crises are accompanied by currency crises. Some arbitrariness admittedly remains, for example, when we delete years when there are doubts about the end date of banking crises. Another example is that the 1997 crisis dummy for Indonesia does not appear. This is because the 1997 observation had been deleted anyway as a result of the deletion mechanism, related to the banking crisis in the period 1992-1995. Table 3 presents our set of banking crisis dummies before the exclusion of extreme outliers.

Table 3. The Starting Dates of Banking Crises in Comparison with Three Other Studies

Country Code	Year	DKD	CK	LGS	Country Code	Year	DKD	CK	LGS
ARG	1982		1	1	**MAR**	1982		1	
ARG	1989		1	1	**MEX**	1982	1	1	1
ARG	1995		1	1	**MEX**	1995		1	
AUS	1989		1	1	**MLI**	1987	1		1
BFA	1989		1	1	**MOZ**	1987		1	
BGD	1989		1		**MYS**	1985	1	1	1
BOL	1986		1	1	***MYS***	*1997*			
BRA	1990		1		**NGA**	1991	1	1	1
CHL	1982		1	1	**NOR**	1987	1	1	1
CIV	1988		1		**NZL**	1987		1	
CMR	1987		1		**PER**	1983			1
COL	1982	1	1	1	**PHL**	1981	1	1	1
CRI	1987		1		***PHL***	*1997*			1
DNK	1987			1	**PNG**	1989	1		
ECU	1992		1		**PRT**	1986	1		
EGY	1982		1		**PRY**	1995		1	1
ESP	1982		1		**SEN**	1983	1		1
FIN	1991	1	1	1	**SGP**	1982		1	1
GHA	1982		1		**SLV**	1992			1
GUY	1993	1		1	**SWE**	1990	1		1
HUN	1991		1		**TGO**	1993		1	
IDN	1992	1		1	**THA**	1983		1	1
IND	1991	1			***THA***	*1997*			
ISR	1983	1	1	1	**TUR**	1982		1	1
ITA	1990	1		1	**TUR**	1991	1		1
JAM	1994			1	**UGA**	199	1		1
JOR	1989	1		1	**URY**	1982	1	1	1
JPN	1992	1	1	1	**USA**	1982	1		1
KEN	1985		1		**VEN**	1994	1	1	1
KOR	1985			1	**ZAF**	1985	1		1
KOR	*1997*				**ZAR**	1991		1	1
LKA	1989	1	1	1	**ZMB**	1994			1
MDG	1988		1	1					

Years of banking crises take the value one.
DKD: Demirguc-Kunt and Detragiache (1998b); CK: Caprio and Klingebiel (1996a); LGS: Lindgren, Garcia and Saal (1996)

1.A.2. Explanatory Variables, Data and Methodology

In order to relate our findings to the existing literature, the data set includes macroeconomic, financial and institutional variables that are identified by DKD as increasing probability of a financial crisis. The explanatory variables are: GDP growth rate, change in terms of trade, depreciation, real interest rate, inflation, the central government budget surplus (including grants), M2/reserves, credit to private sector as percentage of GDP, the ratio of bank cash and reserves to bank assets, credit growth lagged by two periods and GDP per capita. The sources of the data for macroeconomic and financial variables are International Financial Statistics, World Bank Global Development Finance and World Development Indicators. The period of analysis is between 1980 and 1997. We began with all the countries in the World Development Report. Countries were eliminated if a great deal of the data series were missing or incomplete. Furthermore, we exclude Argentina, Bolivia, Brazil and Peru because they were outliers with respect to inflation and the real interest rate.

Following DKD and many others, we make use of institutional indices published by Political Risk Services, New York (ICRG indices). Due to incomplete data, we do not include the presence or absence of deposit insurance as in DKD, which is likely to increase risk owing to moral hazard, even though it may reduce the incidence of bank runs. As a proxy for moral hazard, we construct dummy variables for exchange rate regimes. It has been argued that banks are more prone to collapse in a fixed exchange rate system as incentives for banks to hedge currency risk are eliminated. (Burnside et.al., 1999). There is a problem of interpretation, however, as the exchange regime dummy reflects a *de-jure,* and not necessarily *de-facto,* policy arrangement.

In addition, there is some ambiguity about the nature of relationship between the exchange regime and financial stability (Eichengreen and Hausmann, 1999). As is well known, an economy with a policy of a pegged currency system will find it unsustainable unless the country imposes capital controls or abandons the independence of its monetary policy (e.g. Mundell 1968; Obstfeld and Taylor, 1997). However, Eichengreen (1998) points out that flexible systems are no less prone to banking crises than fixed arrangements. Eichengreen and Hausmann (1999) find that in the developing country context, interest rates go up more sharply in recessions under

floating than under the typical fixed-rate regime. This means floating exchange rates for developing countries are also not compatible with an independent monetary policy. From this perspective, the sign of the coefficient on the dummy for exchange rate policies will be uncertain.

We classify exchange rate policies using the information from the IMF's Exchange Rate Regimes and Exchange Restrictions (1983-1998) into three, i.e. floating, managed and others. The latter is a group of exchange rate regimes that fall under peg to the US Dollar; peg to currencies other than the US dollar; peg to a composite of currencies and limited flexibility that covered the erstwhile European Monetary System.

We use a logit model to estimate the probability of the occurrence of an event (banking crisis) as a function of a vector of independent variables, $X_{i,t}$, for the *i*-th country at year *t* and a vector of unknown parameters, β. Let $Y_{i,t}$ denote the dependent variable taking the value of one if a banking crisis takes place and F is a probability function. The specific model we use is:

$$Pr(Y_{i,t})=F[\Phi(X_{i,t}, \beta)] \quad (1)$$

The probability function that takes a logistic functional form gives rise to the logit model whose basis equation can be written as:

$$Pr(Y_{i,t}=1) = F[(\Phi(X_{i,t}, \beta)] = \frac{1}{1+e^{-\Phi_{i,t}}} \quad (2)$$

Where

$$\Phi = \beta_0 + \sum \beta_j X_{i,t} \quad (3)$$

Under the logistic specification, the model is non-linear. The sign of the coefficient indicates the direction of the change. But the coefficients do not measure the percentage change in the estimated probability of a banking crisis associated with a given percentage of change in the independent variables. The increase in the probability depends on the original probability of a crisis and hence, on the initial values of all the right hand side variables and their coefficients.

1.A.3. Estimation Results

Our empirical analysis is primarily directed to making a rough comparison with the results from DKD possible. This implies adopting most of their explanatory variables, pooling together industrial and developing countries and using a logit model without fixed effects[2]. The first column in table 4 presents results of a logit model using a benchmark specification from DKD. As in DKD, coefficients on growth of GDP, real interest rate, ratio of credit to the private sector and GDP per capita are with correct signs and significant. Our coefficients on inflation and broad money as a percentage of international reserves are insignificant. Instead we find that the growth of credit, lagged by one and two periods tends to increase the likelihood of banking crises at a 1% significance level. As GDP per capita in this specification is seen as representing the quality of institutions, we substitute the index of corruption for GDP per capita. The sign of its coefficient is as expected but the significance of corruption falls just outside conventional levels[3]. Using the index of rule of law does not result in a lower p-value.

The fourth column includes dummies for exchange rate regimes. A floating regime is not found to lower the probability of a banking crisis. In contrast, countries with a managed float seem to be more prone to banking crises. It turns out that if financial stability is promoted as a criterion, deciding on an optimal exchange rate regime tends to involve corner solutions, floating versus fixed. It may be argued that countries with fixed exchange rate arrangements should suffer earlier and more seriously than those with a managed float. However, the absence of a significant coefficient on the dummy for fixed regimes (not reported in the table) is attributable to the fact that most countries in our sample that did fix had various sorts of capital controls.

Under managed floats, monetary policy is geared towards controlling domestic inflation, which in turn pushes up real interest rates, and sometimes halts the flow of credit to the private sector. This has adverse implications for banks that have experienced rapid loan growth.

[2] Employing country fixed effects would require omitting from the panel all countries that did not have banking crises during the period under investigation (Greene, 1997, ch. 19), which will reduce the number of observations.

[3] Including Argentina, Brazil, Bolivia and Peru would result in a significant coefficient on corruption at a 10% level.

A complementary explanation for the negative impact of managed float regimes is related to moral hazard that increases banking sector fragility. Banks lack incentives to hedge their foreign currency exposure because governments are believed to have an interest in smoothing the fluctuation of exchange rates. As noted by Reinhart (2000) countries avoid floating exchange rates, as it raises doubts regarding the credibility of their anti-inflation policies. In other words, countries do not really float when they announce that they allow their exchange rates to vary, and thus use monetary instruments, mainly interest rates, to stabilise exchange rates.

Table 5 presents results from the same model specification but with standard errors adjusted for clustering on countries to account for the fact that the observations are independent between countries but not necessarily within countries. The overall results are similar to table 4 except that changes in terms of trade now turns out to be significant in all specifications while the ratio of broad money to international reserves becomes significant in specification 3 (with a corruption index). The quality of the model specification in both tables is quite satisfactory in terms of in-sample classification accuracy that has overall classification accuracy varying between 72 % and 75 % as compared to, for instance, 67 % and 84 % in DKD.

Table 6 states the results from the regression using a country-fixed logit model. It shows that the lagged credit growth generally remains significant, with inflation, M2/reserves and bank liquidity rising in importance. The fourth specification is notable because the significance level of the credit growth and the dummy for Managed Float turn out to fall below the conventional level. However, our previous conclusion on the role of high credit growth and Managed Float in increasing the likelihood of a banking crisis can be preserved[4].

[4] The main findings in table 4 are fully recovered if we use a yearly fixed effect method that only implies a slight fall in the number of observations. In addition, excluding industrial countries does not change the general conclusions, except that the coefficient on income per capita loses its significance. This indicates that more developed countries tend to have a more stable banking sector. Details of the results that are not presented here are available on request.

Table 4. Logit Estimates: Determinants of Banking Crises

	(DKD)	(2)	(3)	(4)
Macroeconomic Variables				
GDP Growth	-.172***	-.170***	-.162***	-.256***
	-3.584	*-3.986*	*-3.831*	*-4.408*
Terms of Trade Growth	-8.49	-7.158	-7.27	-8.293
	-1.451	*-1.327*	*-1.372*	*-1.227*
Depreciation	-.009	-.008	.000	-.003
	-.474	*-.459*	*.008*	*-.185*
Real Interest Rate	.060***	.052***	.047***	.051**
	3.110	*2.878*	*2.754*	*2.034*
Inflation	.015	.015	.007	-.006
	.935	*0.988*	*.514*	*-.254*
Surplus/GDP	-.001	-.003	-.001	.057
	-.041	*-.080*	*-.349*	*1.065*
Financial Variables				
M2/Foreign Exchange Reserves	.008	.008	.013	.006
	0.757	*.751*	*1.227*	*.527*
Private Credit as % of GDP	.012**	.015***	.007	.014**
	2.078	*2.591*	*1.464*	*2.008*
Bank Cash and Reserve/Assets	-.031	-.026	-.018	-.039*
	-1.449	*-1.472*	*-1.062*	*-1.631*
1 Period Lagged Credit Growth		3.579***	3.273***	3.494***
		3.506	*3.239*	*2.991*
2 Period Lagged Credit Growth	3.32***			
	2.568			
Policies and Institutions				
Floating Exchange Rate Dummy				-.052
				-.085
Managed Floating Exchange Rate Dummy				1.131**
				2.026
Corruption			-.194	
			-1.401	
GDP per Capita	-.000***	-.000***		-.000***
	-2.707	*-.2.968*		*-2.660*
Number of Crises	33	40	40	30
Number of Observations	469	541	529	445
% total correct	73	75	72	75
% crises correct	67	75	65	80
% no-crises correct	73	75	72	75
Model Chi(sq.)	32.60***	39.43***	35.44***	43.01***
Log Likelihood	-100	-116	-120	-87

The value of z-statistics is given in italics. One, two, and three asterisks indicate significance levels of 10, 5, and 1 %, respectively.

Table 5. Logit Estimates: Determinants of Banking Crises
(*Standard errors adjusted for clustering on country)*

	(DKD)	(2)	(3)	(4)
Macroeconomic Variables				
GDP Growth	-.172***	-.170***	-.162***	-.256***
	-3.381	*-3.596*	*-3.441*	*-3.542*
Terms of Trade Growth	-8.49**	-7.158**	-7.27**	-8.293*
	-2.026	*-1.953*	*-1.933*	*-1.899*
Depreciation	-.009	-.008	-.000	-.003
	-.418	*-.446*	*-.008*	*-.182*
Real Interest Rate	.060**	.052***	.047**	.051**
	2.374	*2.763*	*2.493*	*2.341*
Inflation	.015	.015	.007	-.006
	.678	*0.914*	*.443*	*-.251*
Surplus/GDP	-.001	-.003	-.001	.057
	-.031	*-.080*	*-.353*	*1.205*
Financial Variables				
M2/Foreign Exchange Reserves	.008	.008	.013**	.006
	1.550	*1.347*	*2.243*	*.925*
Private Credit as % of GDP	.012**	.015***	.007*	.014**
	2.306	*3.012*	*1.627*	*2.256*
Bank Cash and Reserve/Assets	-.031	-.026	-.018	-.039
	-1.550	*-1.363*	*-1.005*	*-1.401*
1 Period Lagged Credit Growth		3.579***	3.273***	3.494***
		3.434	*3.200*	*3.302*
2 Period Lagged Credit Growth	3.32***			
	3.163			
Policies and Institutions				
Floating Exchange Rate Dummy				-.052
				-.081
Managed Floating Exchange Rate Dummy				1.131**
				2.160
Corruption			-.194	
			-1.408	
GDP per Capita	-.000***	-.000***		-.000***
	-2.964	*-.3.402*		*-2.914*
Number of Crises	33	40	40	30
Number of Observations	469	541	529	445
% total correct	73	75	72	75
% crises correct	67	75	65	80
% no-crises correct	73	75	72	75
Model Chi(sq.)	50.29***	56.20***	56.54***	42.35***
Log Likelihood	-100	-116	-120	-87

The value of z-statistics is given in italics. One, two, and three asterisks indicate significance levels of 10, 5, and 1 %, respectively.

Table 6. Country-Fixed Logit Estimates: Determinants of Banking Crises

	(DKD)	(2)	(3)	(4)
Macroeconomic Variables				
GDP Growth	-.502***	-.467***	-.468***	-.546***
	-2.998	*-3.961*	*-3.995*	*-2.516*
Terms of Trade Growth	-16.951	-1.75	7.27**	-20.70
	-.898	*-.132*	*0.074*	*-1.073*
Depreciation	-.006	-.005	.131	.009
	-.148	*-.173*	*.008*	*-.202*
Real Interest Rate	.399***	.287***	.293**	. 365**
	2.568	*3.685*	*3.723*	*2.304*
Inflation	.266**	.095**	.097	.209
	1.962	*2.068*	*2.286*	*1.525*
Surplus/GDP	.118	-.069	-.107	.119
	.870	*-.677*	*-1.192*	*.0684*
Financial Variables				
M2/Foreign Exchange Reserves	.241**	.161***	.131**	.273**
	2.545	*2.597*	*2.262*	*2.360*
Private Credit as % of GDP	-.213	.262	.020	-.011
	-.921	*1.557*	*1.324*	*-.429*
Bank Cash and Reserve/Assets	-.213**	-.151**	-.018**	-.255**
	-2.382	*-2.474*	*-2.656*	*-2.424*
1 Period Lagged Credit Growth		5.451***	4.570***	3.184
		2.960	*2.656*	*1.278*
2 Period Lagged Credit Growth	5.393**			
	2.225			
Policies and Institutions				
Floating Exchange Rate Dummy				
Managed Floating Exchange Rate Dummy				2.060
				1.573
Corruption			.188	
			.503	
GDP per Capita	-.000	-.000		.000
	-.491	*-1.384*		*.750*
Number of Crises	29	36	36	28
Number of Observations	196	282	275	177
LR Chi2	64.96	75.90	73.45	60.69
Log Likelihood	-24	-37	-37	-21

The value of z-statistics is given in italics. One, two, and three asterisks indicate significance levels of 10, 5, and 1 %, respectively.

2. Prudential Financial Regulation

We now turn to issues regarding the prudential regulation of the banking sector by a regulatory agency in LDCs. We focus on the banking sector because the *sine qua non* for a robust financial sector is a strong banking system.

One of the main results of our empirical analysis is that bank regulators should be particularly alert about the rapid the growth of credit and tightened liquidity in the banking sector. This is consistent with the Honohan and Stiglitz (1999) statement that over-optimism and deliberate gambling together with self-dealing or looting are three endemic components present in every banking crisis. All three call for more robust regulation and supervision. Similarly, Caprio and Klingebiel (1996b) show that poor supervision and regulation is the most prevalent feature for a sample of 29 bank insolvencies in 21 developing countries. Notwithstanding this, low-income developing countries face particular impediments, mainly in terms of social capability, human resources and general infrastructure, in establishing prudential banking standards as outlined in the Basle Core Principles (Basle Committee, 1997).

This section attempts to fill in the gap between the need for prudential standards and the limitations of many LDCs. The next sub-section reviews the hurdles in the path of strengthening the domestic financial system and applying prudential standards. We also discuss a series of controversies concerning the selection of regulatory measures, followed by a search for a prudential, but also viable, set of banking regulations that suit general developing countries conditions. In line with the arguments of several economists (e.g. Honohan and Vittas, 1995) a more simple set of regulations instead of detailed formal rules and regulations following the US style would be preferable. A simple framework that reduces misalignment between the policy makers' goals of a sound banking sector and banks' pursuit for profitability by rewarding prudent risk-taking while punishing misconduct and incompetence is required. Many economists (e.g. Bhattacharya et. al. 1998; Galloway et.al. 1997; Caprio and Summers 1995) have advocated this incentive compatible framework.

2. *A Obstacles to Building a Robust Financial Sector*

Before selecting an appropriate set of policy options, it is imperative to document a number of stylised obstacles and limitations that are often more serious in LDCs. The first major obstacle is related to difficulties in devising efficient regulation because regulators themselves have multiple tasks and multiple principals. While it is also relevant for industrial countries, the problem is exacerbated in developing countries due to weaker institutions. Other remaining constraints to a more robust financial sector stem from a lack of regulatory infrastructure, the smallness of the banking sector and reputational inadequacies.

2.A.1. Who Guards the Guardians

The regulators of a banking system themselves require regulation. They may be acting as principals as regulators of the private sector, but in turn they are appointed by governments to whom they must answer. In that sense they are agents, as well. What happens if they have several masters or principals and perform several tasks? Examples of several masters include such instances as answering not only to the government but other powerful special interest groups. Tirole (1994) cites the example of the legislature and the executive in the US system. In developing countries, and elsewhere one can think of other interest groups and lobbies. When we come to the agent (regulator in this case) she or he may have multiple tasks: prudentially manage the financial sector, but also promote economic growth and take into account the interests of powerful stakeholder groups. In general, as demonstrated by Holmström and Milgrom (1991), this will yield low-powered incentives to perform any task. The essence of any principal-agent relationship is unverifiable effort exerted by the agent in carrying out the task for the principal. There is, however, a verifiable output. One cannot usually prove effort levels undertaken by those who act on our behalf, but the outcome or output is fully verifiable.

Following the set-up in Dixit (1999) we specify a multiple principal, multi-task framework. Let the two tasks to be done be denoted by x_1 and x_2 corresponding to commissions made by Principal 1 and 2 respectively. Each job entails symmetric costly and unpleasant effort levels, e. We abstract from uncertain variations in the agent's efforts (the influence of luck), and the fact that she or he might want to

undertake some of the tasks for its own sake (Tirole, 1994).[5] Principal 1 derives a benefit = B for task 1 but none from job 2, and the same in reverse applies to principal 2. Both principals will need to satisfy the participation constraint of the agent. The first principal's profit function takes the following form:

$$P_1 = Bx_1 - w\left[x_1 - ex^2{}_1 - ex^2{}_2 - 2kx_1 x_2\right] \quad (4)$$

The terms inside the square brackets indicate the costs of exerting effort by the agent, which the principal must meet in order to satisfy the agent's participation constraint. Observe the jointness of effort, because the agent must simultaneously carry out both tasks x_1 and x_2. The payment made to the agent is indicated by w, and the payment schedule is linear. The last term refers to how carrying out one task affects effort levels in the other. If k is positive then the two tasks are substitutes: more effort in one direction implies less effort elsewhere. If k is negative the two jobs are complements.

The second principal's profit function by symmetry is:

$$P_2 = Bx_2 - w\left[x_2 - ex^2{}_1 - ex^2{}_2 - 2kx_1 x_2\right] \quad (5)$$

Maximisation of (4) with respect to x_1 will lead to:

$$\frac{\partial P_1}{\partial x_1} = B - w - 2wx(e+k) = 0 \quad (6)$$

where, $x_1 = x_2 = x$ by symmetry. An identical expression can also be obtained for Principal 2. Rearrangement in terms of w yields the following payment schedule:

$$w = \frac{B}{1 + 2x(e+k)} \quad (7)$$

Note the following:

a) Incentive payments to the agent decline (or are less high-powered) if the two tasks conducted by the agent are substitutes, as efforts in one direction detract from the other function. This is not the case if the jobs are complements.
b) Incentive payments related to effort and output to the agent increase, if the principals act together in a cooperative or collusive manner. Thus, incentives to the

[5] We are all aware that in academia and the public sector peer group respect and the prospects of future promotion are strong motivating forces. The novelist E M Forster when asked why he wrote is said to have replied (*sic*), "I write for the money, and to earn the respect of those whom I respect".

agent to exert optimal effort become stronger. This can be demonstrated by summing (4) and (5) and then jointly maximising for x. In the resultant expression for w in (7), the term 2 will vanish. The most frequently cited reason for the failure of cooperation is that people suspect one another, and are unsure of how the benefits of acting jointly will eventually be divided up between the different parties. In other words, there is coordination failure. Clearly, this problem is more acute the larger the number of potential principals.

c) Equation (7) states that incentive payments to a multi-task agent decline as the number of principals, stakeholders or masters increases, as the magnitude of the term 2 in the denominator of (7) rises with the number of principals.

In summary, the presence of multiple tasks and multiple principals increases the difficulties associated with efficient regulation. A political system has many stakeholders, often deliberately so constructed, so as to minimise the chances of a corrupt dictator emerging. A dictator, of course, will completely subvert the process of regulation, rendering it meaningless. The downside is a weaker set of incentives for regulators, which in turn adversely affects their efficiency. Other problems associated with multiple principals (the common agency problem) in the context of adverse selection are discussed in Murshed and Sen (1995).

A related problem is that of regulatory capture. This occurs when regulators are bribed or controlled by groups they are meant to supervise. The existence of powerful vested interests, and strong informal social networks often results in regulatory capture. The new institutional economics emphasises the need for constitutions (rules) and the construction of well functioning institutions. Vested interests and informal networks are, however, notoriously resistant to reform. Thus, it is important for the policy maker to attempt to work with the existing institutional structure rather than suggest piece-meal reform. In the context of monetary policy and financial regulation, Romer and Romer (1996) call for a two-tiered regulatory structure: a board of trustees and a separate body of policy makers, each with different tenures in office. The idea is to limit the influence of any government of the day by appointing trustees on non-renewable long-term contracts, with more short-term periods of office for regulators.

2.A.2. Other Obstacles

Banking regulators in developing countries are believed to face more serious obstacles and limitations in promoting banking stability, which are generally related to the overall backwardness of their economic development and low bureaucratic capability. Four stylised obstacles can be stated:

a) LDCs have more serious information, contracting and monitoring problems. Information problems refer to the difficulty of determining product, project and borrower quality; contracting problems are related to the difficulties of detecting fraud and of attaching collateral; while by monitoring problems, we mean the difficulty of verifying the compliance of covenants.
b) The provision of required public infrastructure and services for a sound financial system is subject to constraints related to a lack of economies of scale. The comparative disadvantage in regulatory and supervisory implementation is linked to the paucity of qualified officials in some LDCs, and the limited financial resources for supporting clean and motivated supervisory agents.
c) The profitability of the banking sector tends to be squeezed by high overall unit costs of operation due to smallness and technological backwardness. There is a limited choice of financial assets for diversification purposes, thereby making risk pooling less effective.
d) Most LDCs suffer from a so-called Peso Problem. This arises because risk-neutral investors require an extra premium owing to their perception that the government benefits from inflation tax by depreciating its currency (Hausmann, et.al., 1999). Besides reflecting an international financial market imperfection, this is also a specific manifestation of the overall reputation problems covering government agencies and institutions in developing countries.

Given the above, the question now is which set of prudential standards LDCs should adopt. There is a large menu of policy tools for a sound bank regulation. The cornerstone of the BIS regulation (1988) is the 8% capital adequacy ratio (CAR). This may be adequate for international banks, but for banks in smaller LDCs, this standard regulatory capital ratio should be complemented with other robust policy tools.

2.B An Appropriate Regulatory Framework

Recommendations from various bank regulation studies differ as to what should be controlled: whether it concerns banks' output, input or process. Restraints on input mainly relate to incentives: capital adequacy, liability composition and proper tests for bank managers. Those on output pertain to direct controls. They include administrative ceilings on a number of identified high-risk assets, total asset growth, lending rate ceilings and other permissible activities. For simplicity, the term restraint on processes can be replaced with *supervision*. It refers to regulators' involvement in overseeing and influencing banks' risks policy framework, internal reporting standards and procedures concerning market and credit risk management.

Restraint on output is generally considered to be the least effective, but they do have the lowest verification costs. At the other end of the spectrum, prudential restraint on processes potentially produces the least crisis-prone financial sector (Honohan and Stiglitz, 1999). But because of complexity and costs, they are also the most expensive and difficult to implement in developing countries where rent seeking activities are ubiquitous. Appendix II shows the findings of Transparency International from a survey about the *subjective* perception of business people, risk analysts and the general public on the corruption level in 99 countries.

With regard to whether regulators target restraint on banks' input or output, some economists (e.g. Honohan and Stiglitz, 1999) argue for more direct regulatory restraints on output. Others put more weight on more indirect measures based on incentive driven regulation models (e.g. Galloway, et.al. 1997, Caprio and Summers, 1995).

A simplistic conclusion from various empirical findings would be to limit credit expansion and maintain ample liquidity in the banking sector. But, while theses measures may prevent countries from experiencing crises, they are usually at expense of financial sector performance that is important for stimulating general economic activity. In addition, restraints on output tend to lose effectiveness as a result of financial innovation, and if underlying incentives driving bankers' actions are not taken into account. Measures by the Indonesian government to curb foreign exchange syndicated loans issued by banks are a notable example. As the government had not worked on the underlying incentives by preserving a crawling peg exchange rate regime, thus allowing foreign investors to exploit interest rate differentials with

guaranteed predictability of exchange rate depreciation, banks' external borrowing were not held back[6]. In fact, financial innovation and advancing technology facilitated the continuing build up of foreign debt through issuance of short-term promissory notes and commercial papers that were not entirely covered by rules and constraints.

As the alternative to the direct approach, the incentive-based regulatory framework is also subject to question. Proponents of more direct restraints point out that two banks having the same capital adequacy ratio and employing a similar risk management procedure, may have thoroughly different risk profiles if the interests of bank owners and managers diverge. To clarify this, assume that according to a new regulation bank owners have to inject more equity into the banking sector. The higher capital adequacy ratio (CAR) will theoretically motivate bank owners to act prudently. However, as a result bank managers may be enticed to gamble in riskier asset allocation if the higher CAR puts them under pressure to perform[7]. They could also make changes in the loan composition that maintains the agreed capital ratio constant but actually increases the risk profile by lending more than warranted to government bodies, and by expanding short term loans to financial institutions, which under the present Basle capital adequacy framework have a lower risk weighting[8]. There could also be incentives towards the manipulation of interest income recognition. Imposing more direct restraint on output, in form of administrative ceilings on asset composition or total loan growth could restrain such unwanted responses of agents. Hence the critics of incentive based bank regulation highlight the ineffectiveness of fine tuning incentives in situations where bankers respond differently from what has been assumed in the underlying model. In the worst case scenarios, Honohan and Stiglitz (1999) argue that incentive-based measures can lead to perverse outcomes.

However, in the case of small LDCs the differences in policy recommendations between proponents of direct (restraint on output) and indirect measures turn out to be

[6] Financial liberalisation combined with a fixed exchange regime is a strong recipe for a lending boom financed by foreign money, as pointed out by Honkapohja and Koskela (1999) in the case of Finland.
[7] Gorton and Rosen (1995) also show how in well-capitalised banks, managers' objectives are not aligned with the objectives of outside shareholders. Managers take excessive risks in order to convince shareholders that they are good managers. When disappointing results emerge, 'bad managers' can easily hide behind bad luck arguments.
[8] Such an activity is described as capital arbitrage (e.g. Basle Committee, 1999a).

not so striking. Both views take into account the limitations of developing countries in adopting best practises in bank regulation and supervision.

It is useful to examine if the dangers of perverse results stressed in Honohan and Stiglitz (1999) are pressing. They show this by illustrating how attuning capital requirement and deposit insurance premia based on certain behavioural models prove ineffective, or generate perverse results when agency and information problems are large. With regard to the problems associated with the use of the minimum CAR, we find that in the developing country context with little fragmentation of shareholding and absence of stock listing, bank owners (principals) are usually involved in important decision making[9]. The agency problem where bank managers' (agent's) interests are not aligned with their principals' therefore becomes less pertinent. Targeting prudent risk taking of shareholders will not, therefore, produce perverse results due to misalignment of interests between bank owners and managers.

Further, Honohan and Stiglitz (1999) persuasively demonstrate that information and monitoring problems in correctly pricing deposit insurance premia can lead to perverse outcomes when bankers exploit their ability to manipulate the loan book. However, it is questionable if the schedule of deposit insurance premia will play such a substantive role for banks in developing countries where the institution of deposit insurance is itself absent (explicitly or implicitly). In fact, most LDCs included in Demirguc-Kunt and Huizinga (1999) have no deposit insurance premium schedule (Colombia being a notable exception, where deposits are guaranteed by banks).

Hence, for less developed countries, focusing on aligning bank owners' and agents' incentives with prudent risk taking will potentially render a more feasible set of robust bank regulatory standards. Inefficient regulation due to the presence of multiple tasks and multiple principals can be alleviated, as the interests of regulators and the financial sector in favour of financial stability become closer.

Another reason for stressing incentive-compatible mechanisms is that supervision cannot be the main line of defence against bank failures, even in developed countries

[9] See e.g. Claessens et.al. (2000) for a documentation of control pattern, group affiliation and cross-ownership in the East Asian corporate sector.

(Caprio and Summers, 1995). The supervisory agency could be starved of resources and suffer from an inferior remuneration package. Training and education of quality bank supervisors takes many years[10]. Furthermore, even in developed countries, supervisors' face political and other pressures, and are frequently inclined to be silent about chronic banking problems until net worth becomes negative. Ironically, depositors and bank analysts in sophisticated financial systems are found to fail to anticipate the downgrading of banks to problem status (Simons and Cross, 1991).

The first evident option to induce bankers to exercise safe and sound banking is a higher CAR. Besides providing a financial cushion against unforeseen losses, a bank with a substantial capital base is less prone to gambling and looting (Akerlof and Romer, 1993). In a case of too few net assets and in the presence of a government safety net, a bank tends to take more risks to enable it to attract deposits more aggressively.

An absence of supporting conditions can however undermine the effectiveness of the higher CAR. Firstly, deficiencies in accounting and reporting standards could compromise the integrity of capital when a bank faced with non-performing loans refuses to recognise falling interest income and make the necessary provisioning (Brownbridge and Kirkpatrick, 1998). Secondly, as noted above, a bank can change the composition of its risk assets to meet a higher CAR while actually increasing the riskiness of its loan book. The new capital adequacy framework that is now being proposed by the Bank for International Settlement (Basle Committee, 1999b) will in principle reduce the possibility of capital arbitrage and the first-order differences between regulatory and economic capital requirement[11]. The new required regulatory capital should be set using models involving various relevant portfolio characteristics

[10] For a similar reason, some argue that it is ironic that after the recent Asian crises the IMF rescue package includes conditionality for comprehensive structural changes including reforms in banking supervision, business-government relationships, bankruptcy laws etc. (Feldstein 1998). It is better to strive for more compatibility between market-oriented reforms and pre-existing institutional capabilities in order to have higher probability of success (Rodrik 2000).

[11] Economic capital requirement for credit risk is defined as the amount of equity needed such that the probability of credit losses being larger than capital is no more that a specified small probability. In a frictionless world with informed parties, the economic capital requirement should be close to the bank's market capital requirement, which is the capital ratio that maximises the value of the bank in the absence of regulatory capital requirements. In other words, the value of the bank can fall because it has too little or too much capital (see, Berger et.al. 1995 for the distinction between regulatory and market capital requirement).

that drive credit risk. These comprise individual asset risk, portfolio size, and behaviour of defaulted assets and the correlation of individual loan credit losses. It should be pointed out that important barriers to adoption still remain under discussion especially concerning technical and empirical uncertainty about the dimensions of credit risks (see Carey, 2000). Thirdly, the effectiveness of the higher CAR could be eroded by high intra-group lending, especially when protecting the funds put in the bank are less attractive for bank owners than exploiting the bank as a financing vehicle for their more profitable non-bank business interests. The latter problem can be specifically solved by making the banking sector more profitable and by imposing restraints on the percentage of capital invested in own group companies (which is a form of restraint on output)[12].

In addition to the increasing minimum CAR, the banking sector can be strengthened with a rise in liability limits on bankers. Saunders and Wilson (1995) draw lessons from the success of Scottish banking adopting contingent liability provision in the 19th century, which was a period of relatively frequent banking failures in England and the USA. The system created a powerful incentive to bank owners to stay prudent because their liability extended to both personal and inheritable wealth. Unlike the case of higher CARs above, it does not require an accompanying restriction on intra-group lending. A drawback of imposing this measure is disintermediation in financial services. Moreover, the penalty for risk taking becomes so high that necessary investment in growth inducing, but risky, activities like infrastructure and technological development will not be undertaken. The concerns about the adverse effects of too high a penalty risk can be addressed by employing lower liability limits. Apart from technicalities on the optimal liability extent, making failure more costly to management and shareholders should ensure more prudent risk behaviour in an environment of low transparency and many information problems. This option retains its attractiveness even when the regulatory capital ratio is based on the *new* BIS capital adequacy framework.

While raising capital ratios and liability limits might be suggested to small countries with insufficient supervisory skills; the two policy tools could induce either banking disintermediation in the case where both measures are imposed, or gambling if only the

[12] Indonesia's case showed, however, that intra-group lending was circumvented on a large scale through off-balance sheet construction.

minimum capital ratios apply. To guarantee profitability, limiting entry could be a solution. The downside of this alternative is that the financial sector will not benefit from static and dynamic efficiency in form of lower interest and service charges and technical progress. The presence of foreign banks may mitigate the welfare losses and lack of innovation characterising a monopolistic banking market. In some African countries, foreign (ex-colonial) banks are well established. Claessens et.al (1998) provide empirical evidence that foreign bank entry improves the functioning of domestic financial sector, with positive welfare implications for banking customers, despite the reduced franchise value of bank licenses.

Another possible drawback of entry barriers is that banks become excessively profitable, which in turn gives rise to non-bank financial institutions. Rent seeking activities will emerge (Honohan and Stiglitz, 1999) when bank licenses are so valuable. But, small banks operating in small markets, are unlikely to be excessively profitable. Entry barriers have the advantage that they are compatible with the limited oversight abilities of most banking authorities in small countries. Keeping a small number of financial institutions in check will be more manageable for them. The Indonesian pre-crisis experience was probably the best example of an excessively liberal competition policy, where the number of banks mushroomed following the 1988 banking deregulation. This situation was sustainable, and poor supervision remained unpunished, as long as investment was buoyant. It was a matter of time before a banking crisis forced rationalisation in the business.

Entry policies determining the degree and ease of entry are not independent of the two incentives based measures discussed above. If the capital requirement is high, and owners as well as managers face increased liability in case of failures, only those that know how to bank will venture into the financial sector. One may argue that this is not enough if incentives to gambling and looting are high in the presence of implicit deposit insurance. An additional restraint on banks' input should be requiring potential owners and bank managers to pass fit and proper tests. While the latter will also engender rent seeking opportunities in countries with low transparency, the fit and proper test requirement can be applied when the instruments are ready.

An important issue relevant to entry policy, which proponents of more direct restraint on output point out, is the extent of permissible operations and limits on products. Again, there is a need for balancing on the one-hand sufficient profit opportunities for banks, and on the other-hand guarding against excessive risk taking. Recalling the limited supervisory capacity of small countries, extensive and complicated rules should be avoided. In an extensive survey of more than 60 countries, Barth et.al. (2000) find that restrictions with respect to what a bank is permitted to do i.e. securities, insurance and real-estate activities are not beneficial for the performance and stability of the banking sector. Especially restrictions placed on securities and bank ownership of non-financial firms are harmful to financial stability[13].

Nonetheless in developing countries, where economic structure is less diversified, restrictions on exposure concentration in certain commodities and real estate are to be encouraged. Although banks, acting under a robust incentive compatible regulatory regime will voluntarily avoid risk concentration, government intervention to limit systemic crises is necessary. Due to bounded rationality, banks may be compelled to follow herd behavioural patterns during booms, as bankers believe that when bank failures occur across the board the government will refrain from applying the increased liability rule.

Several other incentive based bank regulations may be inappropriate for LDCs because of an unfavourable cost-benefit balance as well as the unfeasibility of implementation. One is a curb on deposit rates allowing banks to earn high interest margins. A major flaw of this option is that the typical low income country has low saving rates. Low or negative real deposit rates are not conducive to financial sector deepening. Second, is the proposal for risk-calibrated deposit premia (e.g Bhattacharya et.al, 1998). The implementation of this regulation assumes however that regulators are able to price the risk of the loan book fairly and accurately. Third, is increasing the monitoring efforts of depositors through a co-insurance rule, where depositors face a deductible in their insured funds, e.g. 25% of their deposit. The advantage of this instrument is that it reduces moral hazard associated with deposit insurance. Unfortunately, the ability of depositors to influence bank behaviour is seriously contestable even in developed

[13] The study of Kono and Schuknecht (1998) similarly reveal that the use of broad spectrum of financial instruments and the presence of foreign financial institutions promote financial sector stability.

countries. Finally, the idea that the banking sector in LDCs form long-term mutual ties with each other, resulting in self-policing arrangements (Bossone and Promisel, 1998) could be an appealing addition to the regulatory package. But it seems to be an unattainable objective as this requirement implies the creation of a new institution that may not always be realistic in many countries.

3. Conclusions and Policy Implications

It has been argued that small countries need a regulatory framework that rewards prudent risk taking more handsomely, but punishes misconduct more harshly. Regulation and restrictions on banking activities will be counterproductive if they erode franchise value while banks have a lot at stake due to higher capital ratio and increased liability limits. It has also been argued that the portfolio of this incentive compatible bank regulation should be 'LDCs friendly'. The various policy options discussed, and their degree of friendliness in terms of the four stylised obstacles to building a strong financial sector are summarised in Table 7.

Table 7. Incentive compatible policy instruments under stylised LDCs circumstances

	Information, contracting and monitoring problem	Poor endowment of infrastructure for adequate supervision	Smallness of banking sector	Credibility and reputation problem of government agencies in regulatory enforcement
Minimum capital requirement [1]	***	*****	***	****
Contingent Liability limit	*****	*****	*****	*
Entry Barriers with openness to foreign bank	**	*****	****	***
Fit and Proper Test of bankers	*	*	***	*
Curb on deposit rate	**	****	*	****
Risk-calibrated deposit premia	*	*	*	*
Self-Policing Arrangements	*	***	****	***
Co- insurance	*	****	****	*
Restrictions on bankable activities	***	***	*	*

[1] Assuming that the formula of capital ratio follows the existing BIS capital adequacy framework, the friendliness of policy instruments is ranked from * (least suitable) to ***** (most suitable) under the four stylised impediments to building strong financial sector in small countries.

Promoting the *right* incentive compatible policy regime does not mean that policy makers neglect strengthening the credibility and capacity of supervisory cadres,

auditing and reporting standards and other public infrastructure necessary for a healthy and profitable banking sector. The building of institutional capacities together with the elimination of corruption can not be overemphasised, because they are the backdrop to efficient regulation, and to alleviating the obstacles to building a robust financial sector.

Appendix I

Full List of Countries

Argentina, Australia, Austria, Bahrain, Bangladesh, Belgium, Bolivia, Botswana, Brazil, Burkina Faso, Cameroon, Canada, Chile, Colombia, Costa Rica, Cote d'Ivoire, Denmark, Dominican Republic, Ecuador, Egypt, Arab Rep., Ethiopia, Finland, France, Gabon, Gambia, Ghana, Greece, Guatemala, Guyana, Honduras, Hungary, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Korea, Rep., Madagascar, Malawi, Malaysia, Mali, Mexico, Morocco, Mozambique, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Senegal, Sierra Leone, Singapore, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syrian Arab Republic, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, United Kingdom, United States, Uruguay, Venezuela, Zaire, Zambia, and Zimbabwe

Authors versus Demirguc-Kunt and Detragiache (1998b)

	DKD		
Authors' Crises	*No crisis*	*Crisis*	Total
No crisis	1308	0	1308
Crisis	39	27	65
Total	*1346*	*27*	*1367*

Authors versus Caprio and Klingebiel (1996a)

	CK		
Authors	*No crisis*	*Crisis*	Total
No crisis	1302	1	1308
Crisis	27	39	65
Total	*1329*	*40*	*1367*

Authors versus Lindgren, Garcia and Saal (1996)

	LGS		
Authors' Crises	*No crisis*	*Crisis*	Total
No crisis	1220	81	1308
Crisis	20	46	65
Total	*1240*	*127*	*1367*

DKD data (first year of crises)

Year	*Worldbank*	*Authors*	*CK*	*LGS*
1982	COL	1	1	1
1991	FIN	1	1	1
1993	GUY	1	0	1
1992	IDN	1	0	1
1991	IND	1	0	0
1983	ISR	1	1	1
1990	ITA	1	0	1
1989	JOR	1	0	1
1992	JPN	1	1	1
1989	LKA	1	1	1
1982	MEX	1	1	1
1994	MEX	1	0	1
1987	MLI	1	0	1
1985	MYS	1	1	1
1991	NGA	1	1	1
1987	NOR	1	1	1
1981	PHL	1	1	1
1989	PNG	1	0	0
1986	PRT	1	0	0
1983	SEN	1	0	1
1990	SWE	1	0	1
1991	TUR	1	0	1
1990	UGA	1	0	1
1982	URY	1	1	1
1982	USA	1	0	1
1993	VEN	1	0	0
1985	ZAF	1	0	1

CK data (first year of crisis)

Year	*Worldbank*	*Authors*	*LGS*	*DKD*
1982	ARG	1	1	0
1995	ARG	1	1	0
1989	ARG	1	1	0
1989	AUS	1	1	0
1989	BFA	1	1	0
1989	BGD	1	0	0
1986	BOL	1	1	0
1990	BRA	1	0	0
1982	CHL	1	1	0
1988	CIV	1	0	0
1987	CMR	1	0	0
1982	COL	1	1	1
1987	CRI	1	0	0
1991	ECU	1	0	0
1992	ECU	1	0	0
1982	EGY	1	0	0
1982	ESP	1	0	0
1991	FIN	1	1	1
1982	GHA	1	0	0
1991	HUN	1	0	0
1982	ISR	0	0	0
1983	ISR	1	1	1
1992	JPN	1	1	1
1985	KEN	1	0	0
1989	LKA	1	1	1
1982	MAR	1	0	0
1988	MDG	1	1	0
1982	MEX	1	1	1
1987	MOZ	1	0	0
1985	MYS	1	1	1
1991	NGA	1	1	1
1987	NOR	1	1	1
1987	NZL	1	0	0
1981	PHL	1	1	1
1995	PRY	1	1	0
1991	SEN	1	0	0
1990	SEN	1	0	0
1982	SGP	1	1	0
1993	TGO	1	0	0
1983	THA	1	1	0
1982	TUR	1	1	0
1982	URY	1	1	1
1991	ZAR	1	1	0

Appendix II

Corruption Perception Index, Selected Countries, 1999

Country Rank	Country	1999 CPI Score	Country Rank	Country	1999 CPI Score
1	Denmark	10,0		Macedonia	3,3
2	Finland	9,8		Romania	3,3
24	Botswana	6,1	68	Guatemala	3,2
	Slovenia	6,0		Thailand	3,2
27	Estonia	5,7		Nicaragua	3,1
28	Taiwan	5,6		Argentina	3,0
	Namibia	5,3		Colombia	2,9
31	Hungary	5,2	75	Cote d´Ivoire	2,6
32	Costa Rica	5,1		Moldova	2,6
	Malaysia	5,1		Ukraine	2,6
34	South Africa	5,0		Venezuela	2,6
	Tunisia	5,0		Vietnam	2,6
	Mauritius	4,9	80	Armenia	2,5
	Italy	4,7		Bolivia	2,5
	Peru	4,5		Ecuador	2,4
41	Jordan	4,4		Russia	2,4
	Uruguay	4,4		Albania	2,3
43	Mongolia	4,3	85	Georgia	2,3
44	Poland	4,2		Kazakhstan	2,3
	Malawi	4,1		Kyrgyz Republic	2,2
	Morocco	4,1		Pakistan	2,2
	Zimbabwe	4,1		Uganda	2,2
49	El Salvador	3,9	90	Kenya	2,0
50	Jamaica	3,8		Paraguay	2,0
	Lithuania	3,8		Yugoslavia	2,0
	South Korea	3,8		Tanzania	1,9
53	Slovak Republic	3,7		Honduras	1,8
54	Philippines	3,6		Uzbekistan	1,8
	Mexico	3,4		Indonesia	1,7
	Senegal	3,4		Nigeria	1,6
63	Bulgaria	3.3		Cameroon	1,5
	Egypt	3,3			

Note: The scores range from 1 to 10, where 1 is the most corrupt, and 10 the least corrupt.
Source: Transparency International website

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