Financial Liberalization Policies and Banking Crises in Sub-Saharan Africa

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ABSTRACT

This paper studies the impact of financial liberalization policies on the probability of occurrence of banking sector crises in Sub Sahara Africa (SSA) region. It uses ordered logit model to analyse the effect of banking liberalization policies on the occurrence of systemic as well as non-systemic banking crises. It finds evidence that total liberalization reduces the probability of either type of banking crises. However, the results suggest that some financial liberalization policies such as "easing of entry" as well as "removing activity restrictions" increase the likelihood of banking crises occurrence in the region. On the contrary, other policies such as "bank privatisation", "prudential regulation" as well as" bank supervision" help stabilize banking sectors in SSA. However, the destabilising effect of some of the financial liberalization policies is limited in stable economies with well-developed institutions.

Keywords: Financial Liberalization Policies, Banking crises, Prudential Regulation, Sub Saharan Africa.

INTRODUCTION

By the late 1980's several countries in SSA had moved towards liberalising their financial markets after decades of financial repression. Most countries abolished credit controls and reduced or removed compulsory reserve requirements. They also privatized state owned banks, removed interest rate ceilings, relaxed capital account restrictions, eased bank entry requirements, and eliminated restrictions on scope of banking activities. Nowadays, some countries are strengthening prudential regulations and supervision. Based on the work of McKinnon (1973) and Shaw (1973), liberalization of financial markets (also referred to as deregulation or financial reform), provides a remedy to problems associated with repressive policies in developing countries. However, the scope and frequency of bank failures in SSA over the last two decades have clouded the benefits of financial liberalization[1].

Systemic banking crises, in which large segments of the banking system become technically insolvent and/or illiquid, have occurred with increasing frequency across international markets since the 1970s. Bordo et al. (2001) show that the frequency of banking crises has increased following financial liberalization of the 1980s to reach levels not witnessed since the great depression. The repercussions of these crises have been huge fiscal costs incurred as a result of both bailing out insolvent financial institutions, and in terms of output loss to economies.

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[1] Laeven and Valencia (2008) identified 103 countries that experienced systemic banking crises. Of these, 36 (35%) are in Africa, accounting for 45% of total crisis episodes. Between 1976 and 2005, 65% of SSA countries experienced systemic banking crises and this figure increases to about 83% with borderline crises. This compares to only 28% recorded in emerging market economies for the same period

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So far, there has been a lot of research on the link between liberalization and bank stability (See for instance, Angkinand et al., 2009; Shehzad and De Haan, 2009; Daniel and Jones, 2007; Giannetti, 2007; Demirguc-Kunt and Detragiache, 2005; Noy, 2005; Bayraktar and Wang, 2004; Kaminsky and Reinhart, 1999; Demirguc-Kunt and Detragiache, 1998a). However, researchers have not agreed on a precise conclusion. Theoretical research that finds a positive relationship between banking crises and financial sector liberalization, provides three rationales for this link.

The first rationale argues that banking liberalization erodes monopoly profits and reduces the opportunity cost of bankruptcy, therefore enhancing incentives for excessive risk-taking (See for instance, Zhao and Murinde, 2009; Gonzalez, 2055; Hellmann et al., 2000; Keeley, 1990). The second rationale posits that financial liberalization may result in increase in general risks that banks face in their otherwise usual operations. For instance, competitive pressure on banks resulting from liberalization can drive banks to broaden their lending commitments. This may result in rapid credit growth and heightened credit risk which often turn into banking crises (See for example Wilmarth Jr, 2003; Kaminsky and Reinhart, 1999; Allen and Gale, 1998). The third rationale argues that institutional flaws arising from newly liberalised economies drive banking crises especially in developing countries (Noy, 2004; Rossi, 1999; Williamson and Mahar, 1998; Lindgren et al., 1996).

On the other hand, a different strand of literature suggests a negative relationship between liberalization and banking crises (Boyd et al., 2006; Boyd and De Nicolo, 2005). Following financial liberalization, the competitive culture amongst banks promotes stability of banking systems through facilitating diversification of bank portfolios, widening of the depositor base and adoption of advanced risk-management standards from new players in the market (Carlson and Mitchener, 2006; World Development Report, 2002; Demirguc-Kunt et al., 1998).

Although previous studies provide some useful insights, the above analysis reveals that these studies provide mixed evidence that makes it difficult to draw conclusions on the relationship between financial liberalization and banking crises. A key contributor to such mixed evidence is the use of different measures of financial liberalization as well as diverse measures of banking crises[2]. Previous studies have also restricted financial liberalization to one or few components from a range of liberalization policies, thus they fail to account for the effects of a wide array of liberalization policies. In the case of SSA countries, liberalization episodes entailed reform along distinct but inter- related dimensions, at different implementation rates and levels. As such, binary variables used to proxy financial liberalization in the literature cannot properly account for the causal effect of liberalization on bank stability in the context of SSA.

This paper therefore seeks to fill in the gap in literature. Specifically, the study focuses on seven liberalization policies: (i) credit controls and reserve requirement, (ii) interest rate controls, (iii) entry and activity barriers, (iv) state ownership in the banking sector, (v) capital account restrictions, (vi) prudential regulation and supervision of the banking sector, and (vii) securities market policy. These indicators provide liberalization measures that capture the magnitude, pace, and timing of reform aspects, on a wide spectrum of SSA countries.

Regarding indicators of banking crises, those most often used in the literature are: (i) a dummy variable to capture the occurrence of banking crises (Noy, 2004; Weller, 2001; Demirguc-Kunt and Detragiache,

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[2] The indicators of banking liberalisation which have been identified in literature include: (i) a dummy variable for the presence of controls on interest rate (Noy, 2004; Weller, 2001), (ii) a measure of capital account liberalisation (Eichengreen and Arteta, 2002), and (iii) intermediation measures such as ratio of liquid assets to GDP (Aziakpono, 2004; Allen and Ndikumana, 2000).

1998b), or (ii) measures of bank risk-taking (Shehzad and De Haan, 2009; Gonzalez, 2005; Demsetz et al., 1996; Keeley, 1990)3. These two indicators have some inadequacies in the SSA context. The dummy variable indicators do not take into account the non-systemic banking crises[4]. To account for banking crises indicators, this paper constructs a banking crisis index that incorporates both systemic and non-systemic banking crises in SSA. This crisis indicator allows for more than two (ordered) response categories. The variable takes the value of 0 if there is no crisis, 1 for non-systemic crises and 2 for systemic crises. This is the most comprehensive crises index for SSA countries to be used in the analysis of banking instability and financial liberalization.

The goal of this paper is therefore to use the liberalization and banking crises data sets to provide a comprehensive empirical analysis of the impact of financial liberalization on banking industry stability in 26 SSA countries from 1986 to 2006. To achieve this goal, this paper employs an empirical strategy which takes into account all the methodological shortfalls so far encountered in the literature. Given that the dependent variable is an ordered variable, the relevant discrete method in this panel data context is an ordered probit or logit model in panel data setting. To compute the marginal effects of this model the study uses the two-step method developed by Hove, Tchana-Tchana and Touna-Mama (2011). Using this method, the study investigates how different liberalization policies affect the likelihood of the occurrence of both systemic and non-systemic banking crises in SSA.

This paper focuses mainly on SSA which is a specific group of countries that have implemented several types of financial liberalization policies in the late 1980s. The study period stretches over periods before, during and after major financial liberalization episodes. Furthermore, banking industries in these countries provide a unique sample of developing economies which have witnessed a large number of bank failures during the past two decades. The period was also characterised by macroeconomic turbulence across the African continent. These economic dynamics are expected to have affected bank performance in a significant way, and therefore should be reflected in the level of bank stability.

The empirical results suggest that total liberalization reduces the probability of occurrence of both systemic and non-systemic banking crises. However, different liberalization policies have different effects. For instance, while removal of entry and activity restrictions significantly increases the probability of occurrence of banking crises, privatization of mainly state-owned banks as well as bank supervision have negative effects. Thus, the results support deregulation policies implemented alongside prudential regulation, as well as improving the institutional environment, to offset the positive impact of these policies on banking sector stability. The results are robust to various discrete econometric model specifications as well as banking liberalization, and banking crisis indicators.

The rest of this paper is structured as follows. Section 2 presents a theoretical as well as empirical literature review on the link between financial liberalization and banking crises. Data and empirical methodology is presented in section 3, while section 4 presents the results and analysis of the empirical model. Finally, section 5 presents a summary of the results, conclusion, and policy recommendations.

LITERATURE REVIEW

A wide range of theoretical and empirical studies exist on the link between banking liberalization and banking crises. The theoretical studies often focus on the channels through which banking liberalization affects banking crises, while empirical studies aim at verifying if theoretical links are supported by statistical evidence.

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[3] See Tchana Tchana (2008a) for a discussion on the weaknesses of dating crisis based on market events.

[4] Unavailability of bank-level data from most SSA countries has limited the use of other measures of bank risk-taking in the literature.

One strand in literature argues that financial liberalization promotes banking instability as regulations that previously shielded banks from competition are relaxed; eroding bank profits which in turn increases bank risk-taking incentives. On this front, the work of Gonzalez, 2005, Noy 2004; Hellmann et al. (2000), Demsetz et al. (1996), and Keeley (1990) establish that banks shun the risk of bankruptcy and are more conservative when they earn monopoly profits[5] With moral hazard and limited liability, banks in competitive markets choose risky investments that yield high returns if the gamble succeeds, but bear little or no risk if the gamble fails.

Another strand in literature argues that financial liberalization positively impacts on banking instability through its negative effect on bank supervisory structures. Financial reform often implies a change in the rules and regulations under which banks operate, and bank managers have to manage risk in an unfamiliar environment. This new environment stretches available monitoring capacity, if no simultaneous adjustments to supervisory resources are implemented. As such, if the regulatory framework does not keep pace with the new instruments and institutions, enforcement is weakened, and bank risk-taking behaviour may increase (Noy, 2004; Rossi, 1999; Williamson and Mahar, 1998).

Financial liberalization also contributes much to uncertainty about prices and credit expansion. This heightens levels of credit risk, interest and exchange rate risk, and liquidity risk that banks face (Allen and Gale, 1998; Chari and Jagannathan, 1988; Kaufman, 1988). As demonstrated by Allen and Gale (1998, 2001), growth in credit, which often follows after financial liberalization, can cause a bubble in asset prices. However, when the bubble bursts, a decline in the market value of assets forces borrowers to default on loan payments and, as a result, banks incur huge non-performing loans. Banks are inclined to finance high risk projects and charge high risk premiums. Thus, in free markets, banks are more likely to hold high risk portfolios than in controlled markets (Demirguc-Kunt and Detragiache, 1998b).

Much empirical work has also been done in recent years to ascertain the theoretical claims and identify the causal effect of financial liberalization on bank stability. One branch of empirical studies uses computed measures of bank risk (for example, ratio of risk weighted assets to total assets, market to asset ratio, volatility of credit to private sector and bank stock price volatility), to assess how such risk is associated with different measures of financial liberalization or bank regulation (Gonzalez, 2005; Keeley, 1990; Furlong, 1988). These studies confirm the positive link between liberalization and bank instability.

Another body of research employs a dummy variable for the occurrence (or non-occurrence) of systemic banking crises, using the limited dependent variable estimation technique. The probability of a banking crisis is expressed as a function of a set of control variables including different bank regulation or financial liberalization measures (Angkinand et al.,2009; Barth et al., 2004; Noy, 2004; Demirguc-Kunt and Detragiache, 2005; Rossi, 1999; Demirguc-Kunt and Detragiache, 1998b). Studies that use different measures of bank risk, and those that use crisis dummy variables, also use different measures to proxy for financial liberalization. The cited studies establish that financial liberalization significantly increases or decreases bank fragility. For instance, Rossi (1999) finds that moving from a repressed to a more liberalised banking system reduces the likelihood of banking crises, whereas Demirguc-Kunt and Detragiache (1998b) report contradictory findings.

Various studies have also empirically tested the effects of supervision and prudential regulation on banking crises (Barth et al., 2004; Demirguc-Kunt and Detragiache, 2005; Demirguc- Kunt and

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5 Another strand in the literature suggests a negative relationship between competition and bank risk taking. See for instance Boyd and De Nicolo (2005) and Boyd et al. (2006).

Detragiache, 1998a; Lindgren et al., 1996). Barth et al. (2006) test the impact of all possible regulations on bank stability and their results vary with different regulations. Angkinand et al. (2009) emphasize the importance of capital regulation and supervision, arguing that the probability of crises increases with liberalization especially where supervision is weak.

On the contrary, another strand of literature finds evidence that liberalization reduces chances of banking crises. For instance, Shehzad and De Haan (2009) use a database of 33 developed and developing countries, and establish that conditional on effective banking supervision, most financial reform policies reduce the likelihood of systemic crises. Angkinand et al. (2009) find that crises are likely to occur after some degree of liberalization and not necessarily full liberalization. They find an inverted U- shaped relationship between liberalization and the likelihood of crises.

Other studies have found no evidence of any positive link between financial liberalization and banking crisis (Bordo et al., 2001; Eichengreen and Arteta; 2002). Although theory presents a strong case for the positive influence of financial liberalization on banking crises, empirical work shows mixed evidence. This may be partly because these studies use various financial liberalization as well as banking instability measures. Most of the literature reviewed suggests that most financial liberalization measures are limited both in terms of time coverage as well as in scope. The truncated nature of such data, limits its usefulness in analysing the effects of liberalization on long run performance of financial sectors in cross-country and panel studies. Furthermore, studies that focus on Sub Saharan Africa (SSA) are sparse. The current study therefore seeks to fill this empirical gap in literature.

ESTIMATION STRATEGY

Model Specification

This study employs the ordered logit model to analyse the response of both systemic and non-systemic crises to financial liberalization. It is the relevant model given the discrete and ordered nature of the dependent variable. This study tests the hypothesis that various financial liberalization policies increase the probability of the occurrence of banking crises. The study assumes that the underlying variable behind the occurrence of banking crises is a linear function of banking liberalization and some control variables. This underlying variable is referred to as banking instability, *Bkinst* (hereafter).

$$Bkinst_{it} = \mu_i + Lib_{it}\delta + Z_{it}\gamma + \varepsilon_{it}, i = 1 \dots N \ and \ t = 1 \dots T_i \qquad (3.1)$$

$$\varepsilon_{it} \sim D(0,1)$$

where Lib is a matrix of liberalization policies, Z is a matrix of control variables that are capable of explaining crisis, σ and γ are slope coefficients, μ_i is a vector of individual country effects while ε_{it} is a vector of error terms, i and t are country and time indices respectively, N is the total number of countries and T_i is the total number of time observations for country i. D (0, 1) is a probability distribution with mean 0 and standard deviation 1.

Lib is a matrix of seven different liberalization policies which include: (i) credit controls and reserve requirements (*cr*), (ii) interest rate controls (*ir*), (iii) entry and activity restrictions (*ent*), (iv) state ownership in the banking sector (*pvt*), (v) capital account restrictions (*intk*), (vi) prudential regulation and supervision (*sup*), and (vii) securities market policy (*secmkt*).

Z is a matrix of control variables which include: (i) macroeconomic variables (real gdp growth (*rgdpg*), inflation (*infn*), real interest rate (*rir*) as well as change in terms of trade (*tot*), (ii) banking system characteristics variables (liquidity (*liq*), share of private sector loans to GDP (*cr/gdp*), lagged real credit growth (*crgr*$_{t-2}$), as well as ratio of broad money to foreign reserves (*m2res*), (iii) institutional and regulatory quality variables (GDP per capita (*gdppc*), rule of law (*rlaw*), governance (*gov*), required reserves (*reqres*), as well as presence of explicit deposit insurance (*depins*). Each cross section unit is observed for a period t, and t = 1, 2….T and it varies across i countries, i = 1, 2…N depending on data availability.

Bkinst is an unobserved variable. In fact the study observes the occurrence of only three states of nature; no-crisis, non-systemic crisis, and systemic banking crisis states. These states of nature can be labelled as ordered variables that are referred to as banking crises, hereafter *crisis*. The study assumes that:

$$crisis_{it} = \begin{cases} 0 & if \ Bkinst_{it} \ \leq \ L_{it} \\ 1 & if \ L_{it} \ \leq \ Bkinst_{it} \ \leq \ U_{it} \\ 2 & if \ Bkinst_{it} \ \geq U_{it} \end{cases} \tag{3.2}$$

L and U are threshold parameters reflecting the change from no crisis to non-systemic crisis, as well as from no crisis to systemic crisis states respectively. To reduce the length of the equations, the following notations are set:

$$Y_{it} = crisis_{it} \ and \ X_{it}\beta = \mu_i + lib_{it}\sigma + Z_{it}\gamma.$$

Therefore, Y_{it} is the new dependent variable, X_{it} is the new set of exogenous variables and β is the new vector of parameters. The structural fixed effects logit model for the unbalanced panel data is written as:

$$\begin{cases} BKinst_{it} = & X_{it}\beta + \epsilon_i + v_{it}, i = 1, \dots., N. \ and \ t = 1 \dots. T_i \\ Y_{it} = 2 \ if \ Bkinst_{it} > U_{it}; 1 \ if \ L_{it} \leq Bkinst_{it} \leq U_{it}; \ and \ 0 \ otherwise. \end{cases} \tag{3.3}$$

Where ϵ_i is the unobserved country specific heterogeneity and $v_{it} \sim$ logistic distribution. The response probabilities of the occurrence of banking instability outcome are:

$$P(Y_{it} = 0) = P(Bkinst_{it} \leq L_{it}) = F(L_{it} - X_{it}\beta), \tag{3.4}$$

$$P(Y_{it} = 1) = P(L_{it} \leq Bkinst_{it} \leq U_{it}) = F(U_{it} - X_{it}\beta) - F(L_{it} - X_{it}\beta), \tag{3.5}$$

$$P(Y_{it} = 2) = P(Bkinst_{it} > U_{it}) = 1 - F(U_{it} - X_{it}\beta). \tag{3.6}$$

The parameters are estimated by maximum likelihood and the log likelihood function of the logistic function is:

$$\sum_{i=1}^{N} \sum_{t=1}^{T} \begin{cases} 1_{[Y_{it}=0]} In[F(L_{it} - X_{it}\beta)] + 1_{[Y_{it}=1]} In[F(U_{it} - X_{it}\beta) - F(L_{it} - X_{it}\beta)] + \\ 1_{[Y_{it}=2]} In[1 - F(U_{it} - X_{it}\beta)] \end{cases}$$

$$\tag{3.7}$$

where F (.) is the cumulative probability distribution function of v and $1_{[Y_{it}=j]}, j = 0,1,2$ is

the indicator function of the set $[Y_{it} = j]$

Another methodological concern is the use of fixed effects model. Using fixed effects in this study implies that countries that had not any banking crises would be dropped from the regression (See Demirguc-Kunt and Detragiache 1998b). In this study, there are only two countries from the sample which recorded no crises at all. However, in unreported results, the study estimates random effects models, with robust and clustering standard errors by country, and the results are not significantly different from the baseline estimation results.

Data and Variable Description

This study is carried out on an unbalanced panel data. Observations on different groups do not cover the same time periods. Macroeconomic data is drawn from World Bank's World Development Indicators (WDI), while microeconomic data is drawn from IMF's International Financial Statistics (IFS). Although all SSA countries from WDI database are initially considered, others are eliminated due to unavailability of macroeconomic data.

Systemic crisis data is obtained from the dated episodes of banking sector crises by Laeven and Valencia (2008, 2010) Non-systemic or borderline crisis data is drawn from Kane and Rice (2001) and Caprio and Klingebiel (2003). In order to minimise bias and to avoid reducing the sample size, this study does not exclude countries which implemented financial liberalization but do not experience banking crises.

Data on 7 liberalization policies for 14 SSA countries; Burkina Faso, Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Madagasca, Mozambique, Nigeria, Senegal, South Africa, Tanzania, Uganda, and Zimbabwe, is taken from Abiad et. al. (2008). While Abiad et,al provide data on these countries for the period 1973 to 2005, this study adopts the methodology used in Abiad et al. (2008) to extend this dataset. The study sample 26 SSA countries, and the study period is extended from 1986 to 2006. Countries that liberalised only a few facets of their financial sectors but experienced crises during the study period are included in the sample as controls.

Table A1 in the Appendix shows that in terms of degree of liberalization, entry restrictions and interest rate liberalization are the most advanced dimensions in the sample. On the other hand, regulatory and supervisory reform is the least advanced dimension with an average scale of 0.84, on a scale of 0 (no reform) to 3 (fully liberalised). The total liberalization index has an average score of 9 out of a maximum score of 20. The standard deviations for liberalization policies give evidence of significant variations across the different dimensions and countries. There is also evidence of differences among countries, as shown by large standard deviations for variables such as ratio of private sector credit to GDP and lagged credit growth.

Banking Crises Variable

The literature provides many definitions of what constitutes a banking crisis. This is because banking crises have several dimensions[6]. This study adopts the definitions of systemic crises and non-systemic banking crises used by Caprio Jr and Klingebiel (1996) and Caprio and Klingebiel (2003), which have

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[6] Tchana Tchana (2008b) reviews the following four definitions of what is considered a banking crisis by different authors. i) liquidity crisis in the banking system ii) credit crunch crises iii) solvency crisis and iv) combination of insolvency and liquidity crisis that leads to bank runs and bank closures

been similarly adopted in Laeven and Valencia (2008). A crisis is classified as systemic if at least one of the following conditions apply: (i) the ratio of non-performing loans to total loans in the banking sector is at least 10%, (ii) the cost of any rescue operation is at least 2% of GDP, (iii) banking problems have resulted in large scale nationalization of banks, (iv) occurrence of extensive bank runs, (iii) the adoption of emergency measures such as deposit freezes, prolonged bank holidays or deposit guarantees by the government in response to the crisis.

A crisis is classified as non-systemic if some of the country's major banks suffer little erosion of their ownership capital. This includes banking system distress events that affect isolated banks but are not systemic in nature. Non-systemic episodes are usually either contained by some regulatory measures, or affect a small section of the banking system. Using these definitions, 95 systemic and 35 non-systemic crises in 24 SSA countries over 21 years were identified.

Macroeconomic Variables

The study includes the following macro- economic variables to capture economic fluctuations. The *real GDP growth (rgdpg)* is used as a control for cyclical output effects. During recessions, credit quality is likely to deteriorate, thereby negatively affecting loan repayments and resulting in increase in loan defaults. The GDP deflator is used to proxy inflation *(infn)*. The *real interest rate (rir)* is used to capture the potential adverse effects of high interest rates on bank balance sheets. The variable *change in terms of trade (Δ tot)* is included to control for external macroeconomic volatility. This variable also makes it possible to test if crises are not due to excessive foreign exchange risk exposure.

Banking System Variables

Liquidity (liq) is measured by the ratio of bank cash plus reserves to bank assets. If the banking system is liquid, adverse macroeconomic shocks are less likely to increase the chances of a crisis. The ratio of *private sector credit to GDP (cr/gdp)* controls for bank exposure to the private sector. Research has shown that most banking crises are preceded by a boom in private credit (Kaminsky and Reinhart, 1999).

Therefore, *lagged real credit growth* $(crgr_{t-2})$ is included in this study to control for asset market booms that may trigger a crisis when the booms burst. The ratio of *broad money to foreign exchange reserves (M 2/gdp)* is included to control for with sudden capital outflows.

Institutional and Regulatory Quality Variables

Governance (gov) and *press freedom (pressf)* are included to measure the quality of the legal and political systems in a country. Since these variables capture the administrative capacity of governments which determines the effectiveness of prudential supervision, low values may mean more opportunities for moral hazard and hence increase the possibility of banking crises. *GDP per capita (gdppc)* is included to control for the level of economic development in the country and hence general institutional quality. The presence of explicit *deposit insurance (depins)* is also included as a regressor.

Model Estimation and Result Analysis

Table 4.1 below, as well as Tables A2 and A3 in the appendix present the results of the ordered logit regressions estimating the relationship between financial liberalization and banking crisis, controlling for relevant variables. The results are explained in terms of marginal probability effects. Table 4.1 Column (1) corresponds to the aggregate financial liberalization index while columns (2) to (7) in the three tables correspond to different financial liberalization policies.

Banking Stability and Financial Liberalization

The baseline model in Table 4.1 column (1), presents strong evidence that total financial liberalization has negative marginal probability effects on the occurrence of both systemic

Table4.1. *Liberalization Policies and Banking Crises: Ordered Logit Estimation Results*

	(1)			(2)			(3)		
Variables	crises=0	crises=1	crises=2	crises=0	crises=1	crises=2	crises=0	crises=1	crises=2
rgdp	0.08***	-0.01***	-0.07***	0.13***	-0.02***	-0.01***	0.012***	-0.002***	-0.019***
	(0.003)	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.004)	(0.002)	(0.004)
lgdppc	0.13***	-0.03**	-0.10***	0.01**	-0.03**	-0.07**	0.12***	-0.035***	-0.09***
	(0.013)	(0.003)	(0.014)	(0.02)	(0.005)	(0.02)	(0.013)	(0.004)	(0.014)
ctot	-0.06***	0.004**	0.06***	-0.04***	0.004***	0.041***	-0.005	0.005	0.003
	(0.006)	(0.004)	(0.0007)	(0.01)	(0.003)	(0.01)	(0.008)	(0.004)	(0.007)
infn	0.001***	0.0001***	0.002***	-0.002*	0.001*	0.001*	-0.0002*	0.0001*	0.0002*
	(0.0001)	(0.0002)	(0.0001)	(0.001)	(0.003)	(0.001)	(0.01)	(0.004)	(0.001)
rir	-0.001*	0.021*	0.031*	-0.001***	0.0021***	0.001***	-0.0004***	0.0009***	0.005**
	(0.0001)	(0.002)	(0.001)	(0.0003)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
m2res	-0.013***	0.015***	0.02***	-0.024***	0.032***	0.004***	-0.041***	0.052***	0.064***
	(0.003)	(0.001)	(0.004)	(0.005)	(0.002)	(0.001)	(0.001)	(0.003)	(0.002)
crgdp	-0.002***	0.004***	0.009***	-0.008**	0.002**	0.001**	-0.001***	0.006***	0.009***
	(0.001)	(0.001)	(0.004)	(0.003)	(0.001)	(0.003)	(0.001)	(0.004)	(0.0002)
liq	0.0001	-0.0003	-0.0001	0.0001***	-0.001**	-0.0001***	0.001***	-0.0002**	-0.001**
	(0.0003)	(0.001)	(0.003)	(0.0003)	(0.0001)	(0.0003)	(0.0002)	(0.001)	(0.002)
crgr_2	-0.03***	0.01***	0.021***	-0.028**	0.01**	0.022**	-0.061***	0.014***	0.05***
	(0.01)	(0.002)	(0.01)	(0.012)	(0.002)	(0.01)	(0.01)	(0.003)	(0.001)
depins	-0.11***	0.02***	0.09***	-0.05**	0.01**	0.04***	-0.02***	0.02***	0.056***
	(0.027)	(0.002)	(0.03)	(0.03)	(0.002)	(0.03)	(0.02)	(0.003)	(0.022)
finreform	0.025***	-0.003***	-0.022***						
	(0.003)	(0.004)	(0.003)						
ir				-0.06	0.01	0.05			
				(0.17)	(0.51)	(0.11)	-0.081***	0.011***	0.07***
ent							(0.01)	(0.002)	(0.01)
Obs	488	488	488	508	508	508	488	488	488
R^2	0.85	0.67	0.81	0.84	0.69	0.83	0.92	0.71	0.89

Robust standard errors in parenthesis; ***p<0.01, **p<0.05, *p<0.1; Marginal effects reported.

All regressions include a constant

And non-systemic banking crises, contrary to widely held perceptions. This relationship between the occurrence of banking crisis and liberalization is significantly negative at 1% level. This seems to suggest that financial liberalization improved stability by enabling banks to better diversify their asset portfolios as well as widening their depositor base.

These results are consistent with findings in previous research. For example, Carlson and Mitchener (2006) find that states in the US that deregulated bank branching laws had fewer bank failures in the 1920s. Similarly, Gonzalez (2005) reports that banks in 36 developed and developing countries outside Africa (except South Africa) with stricter regulations take higher risk, and hence face more chances of failure than those in countries with less restrictive laws.

As mentioned earlier, this study focuses on the relationship between specific components of banking liberalization and the occurrence of banking crises. Results presented in column (2) suggest that interest rate liberalization has a positive, though insignificant marginal probability effect on the occurrence of systemic banking crisis in SSA countries. The marginal probability effects are stronger for systemic crises than non-systemic crises. This contradicts results reported in previous studies (see for instance Angkinand et al. (2009); Demirguc-Kunt and Detragiache (1998b)). The current results suggest that in SSA banking crises seem not to be related to higher levels of interest rates. The interest rate variable used in this study captures financial liberalization which was implemented in stages as well as instances where policy reversals were encountered. Therefore, given that the interest rate variable used in the current study captures all such developments, the result is not totally surprising.

Regarding controls on entry and activity restrictions, the results suggests that relaxing such restrictions increases the marginal probability effects of bank failure. This is consistent with findings by Lepetit et al. (2008. The probability of occurrence of systemic crises induced by removal of entry and activity restrictions is higher than that of non-systemic crises. This may reflect the weaknesses of domestic banks that sprouted after easing of entry requirements in the majority of SSA countries.

Removing controls on credit allocation reduces the marginal probability effects of both systemic and non-systemic banking crises. Brownbridge and Harvey (1998) report that prior to financial liberalization, several state owned banks accumulated non-performing loans as a result of non-repayment of loans by poorly performing parastatals as well as institutions from "priority sectors" to which banks were obliged to offer credit at below market rates. As such, removal of compulsory credit quarters, ceilings and preferential interest rates on credit lines improved the banks' financial positions, and as a result contributed to bank stability. Thus, the negative result on removal of credit controls may be justified on these grounds.

Results presented in column (5) show a positive and significant relationship between banking crises and removal of restrictions on flow of international capital. As expected, greater capital outflows increase the likelihood of banking crises, especially for less developed countries. Capital flows are subject to asymmetric information, agency problems, adverse selection, and moral hazard problems. At the same time, inadequate institutional and prudential arrangements that characterise developing economies may fail to deal with the risks associated with diverse types of capital flows.

Reducing the share of government assets in the banking sector through increased privatisation has a negative effect on both systemic and non-systemic banking crises (column 6). The study observes that state owned banks were characterised by poor loan procedures and had loan recovery rates less than 50% in a majority of the study countries. This result is intuitive; it suggests that reducing state participation in banking systems reduces bank failure rates significantly.

Lastly, there is a negative and significant relationship between liberalization of security market policies and banking crises. This supports the claim that stock market development improves bank stability through easing liquidity constraints. Allen et al. (2011) and Allen et al. (2012) surveys on stock market development in SSA report a positive performance of stock markets in liberalised markets. As such, liberalization of security market policies promotes competition and hence bank stability through financial deepening and improved efficiency.

Bank Supervision and Prudential Regulation

Several studies observe that well developed regulatory institutions that enhance effective supervision mitigate the positive impact of financial liberalization on banking crises. This link is revised for SSA countries by using an interacting dummy variable between the index of financial liberalization and bank supervision. The results, available upon request, show a negative and significant marginal probability effect of liberalization on banking crises.

To understand these results more clearly, the following observations are made. Firstly, for the prudential regulations and supervision variable, a greater degree of government intervention is coded as a reform, thus a higher ranking shows the presence and effectiveness of government supervision and prudential regulation. Secondly, the lax-supervision hypothesis suggests that an efficient supervisory structure reduces the destabilising impact of liberalization on banking sector. The empirical results seem to substantiate these observations. Specifically, strengthening the supervisory and regulatory framework helps to contain the impact of other liberalization policies on banking

crises. To investigate this further, the previous regressions were re-run, but in these regressions the variable for bank regulation and supervision is considered as one of the control variables. The objective here is to observe the impact of other liberalization policies on banking crises, given the different levels of bank supervision in each country.

If the financial reform index and an interactive term *finrefsup*, (finreform*sup), are included as explanatory variables the coefficient of the index for total liberalization, *finreform* changes to positive, though it is not significant. However, the interactive term is negative and strongly significant. This result strongly supports the stabilising effect of efficient supervision and prudential regulatory structures. Overall, these results are consistent with the view that, if financial liberalization is not concurrently implemented alongside efforts to improve prudential regulation, it is more likely to increase bank risk-taking behaviour and lead to subsequent crisis.

Macroeconomic Variables

Several macroeconomic variables in the empirical tests presented in this chapter significantly affect the probability of banking crises. GDP growth has a negative and significant effect in all specifications. Similarly, high interest rates have positive effects on bank crises. Thus supports the assertion that high and volatile interest rates reduce the quality of loan portfolios and compromise loan repayment by borrowers. Such loan defaults contribute to high ratios of non-performing assets to total assets and consequently, to higher incidences of banking crises.

The coefficient on inflation is generally positive and significant. High levels of inflation increase the probability of banking crises, due to its impact on nominal interest rates and hence bank balance sheets. These results suggest that banking crises increase during periods of low GDP growth, high interest and inflation rates, and are consistent with results in reported by (Demirguc-Kunt and Detragiache, 2005; Gonzalez, 2005; Noy, 2004; Demirguc- Kunt and Detragiache, 1998b). Change in terms of trade is generally not significant.

Banking System Characteristics

The ratio of broad money to foreign exchange reserves, *m2res*, has a positive and significant marginal effect on the probability of having either type of crises. This suggests that vulnerability of banks to speculative attacks which may result in sudden capital outflows increases the probability of a banking crisis. This result is consistent with that of Angkinand et al. (2009) and Demirguc-Kunt and Detragiache (1998b). The ratio of private sector credit to GDP, *crgdp*, has positive and significant marginal probability effects on occurrence of either type of banking crisis as expected. Lagged credit growth, crgr_2 is generally not significant. Finally, the results also suggest that more liquid banking systems reduce the likelihood of a banking crisis.

Robustness and Sensitivity Analysis

This section conducts various robustness and sensitivity tests of the results.

Logit Estimation

The study assumes a crisis dummy variable that takes the value of 0 for non-crisis periods, and 1 in the first year of each crisis episode (whether systemic or non-systemic crisis)[7]. Therefore, the study specifies a multivariate logit regression model to estimate the probability of occurrence of a crisis in liberalized financial sectors. The results in indicate that total financial liberalization reduces the probability of banking crises[8]. A similar relationship is reported in the results from ordered logit estimation.

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[7] Years following the onset of banking crisis are excluded

[8] Results are available on request

The other liberalization policies generally bear the same relationship as in the baseline model. Privatization, relaxing credit controls and security market policy has negative marginal probability effects, while removal of entry restrictions and capital account liberalization has positive effects. The other explanatory variables generally have the same signs and are of similar significance as in the main model already presented. These findings confirm that the results in of this study are neither driven by endogeneity, neither are they sensitive to model specification.

Liberalization Dummy Variable

In the second robustness test, the study employs a dummy variable for financial liberalization (*f inlib*) instead of the index for total liberalization, *f inref*. This dummy variable takes the value of 1 starting from the year in which reforms on interest rate controls were initiated, and 0 for all the years prior to the interest rate liberalization, to proxy total liberalization.

Table A4 in the Appendix reports a positive and significant relationship between liberalization and the occurrence of both systemic and non-systemic crises. While this result is not consistent with the one established using total financial liberalization index, the result concurs with the one pertaining to interest rate liberalization in Table 4.1, except that the coefficient is now significant. This result concurs with those reported in studies that used a similar dummy variable to proxy total liberalization, and concluded that financial liberalization increases bank fragility. The coefficients on the other variables are not significantly different from the baseline results.

In other unreported results, the crises variable is replaced with non-performing loans and bank

Z-score. The sample period is reduced due to limited data on non-performing loans and bank z-score. The results are however not significantly different from the ones presented earlier.

SUMMARY AND CONCLUSION

This study examines the relationship between financial liberalization policies and the probability of occurrence of banking sector crises in a sample of SSA countries. The study employs seven different liberalization components that capture the extent and the progress made with reforms as well as regulatory and supervisory contributions made during financial liberalization. In addition, a composite index for total financial liberalization used in this analysis is constructed from these policies. The study also makes use of a banking crisis variable that encompasses both systemic and non-systemic banking crises. As such, the crises variable allows for 3 response categories. The study therefore specifies an ordered logit model to analyse the response of both systemic and non-systemic crises to the implementation of financial liberalization policies.

The results of the empirical estimations show that total financial liberalization has significant negative marginal probability effects on systemic and non-systemic banking crises. This relationship is reinforced in well-developed institutional environments that enable efficient bank supervision as well as prudential regulation. Thus, conditional on prudent supervision, the results report evidence that overall liberalization does not necessarily increase the chances of banking crises occurrence.

Regarding specific policies, the results show that different financial liberalization policies have the following marginal probability effects on bank stability. On the one hand the removal of entry and activity restrictions has a positive and significant impact on the occurrence of banking crises. This result seems to confirm the notion that as more banks enter the market, bank failures are likely to increase as lower profits resulting from competition encourage banks to take on more risk. This result, therefore, does not support the stabilizing effects likely to arise from diversification opportunities as a result of removal of activity restrictions. Similarly, relaxing controls on international capital flows has positive marginal probability effects on systemic and non-systemic banking crises

On the other hand, financial liberalization reduces the likelihood of banking crisis when controls on credit allocation are removed, and when public banks are privatized. This confirms the view that removal of compulsory credit quarters, ceilings and preferential interest rates on credit lines to poorly performing institutions may improve bank's financial positions, and as a result contribute to bank stability.

Reforms that entail strengthening supervision and prudential regulation have a negative impact on banking crises. This negative relationship is strongly significant in all the model specifications presented in this study. Furthermore, interacting the prudential supervision variable with liberalization policies confirms that prudential regulation policies help contain the destabilizing effects of some financial liberalization policies.

The study finds a negative and significant relationship between removal of controls on security markets and the probability of banking crisis occurrence, although weakly significant in some specifications. Finally, this study does not find convincing evidence that removal of controls on interest rates has positive marginal probability effects on systemic banking crises, a result that is common in previous studies. This result is intuitive given the manner in which most SSA countries implemented interest rate liberalization. There are several cases of partial implementation and policy reversals, which were not captured in previous research. The empirical results concur with those of previous research regarding a positive link between interest rate liberalization and banking crises when a dummy variable for the presence or absence of interest rate controls is used.

Overall, empirical results from this study provide clear and robust evidence that different liberalization policies have varying marginal probability effects on banking crises incidences in SSA countries. While several previous studies agree on a positive and significant relationship between liberalization and banking crises, this study shows that this assertion is true when removal of controls on entry and activity restrictions, and removal of restrictions on flow of international capital are considered as the liberalization variables. Indeed, other liberalization policies, for instance, removal of credit controls, privatisation of previous state-owned banks, and strengthening prudential regulations have stabilising effects on banking crises. As such conclusions drawn from analysing similar relationships should be made with regard to specific liberalization policies.

REFERENCES

[1] Abiad, A., Detragiache, E. and Tressel, T. (2008). A new database of financial reforms, IMF Working Paper 08/266 .

[2] Allen, D. and Ndikumana, L. (2000). Financial intermediation and economic growth in Southern Africa, Journal of African Economies 9(2): 132.

[3] Allen, F. and Carletti, E. (2011). Systemic risk and macro-prudential regulation, Global Governance Programme p. 35.

[4] Allen, F., Carletti, E., Cull, R., Qian, J., Senbet, L. and Valenzuela, P. (2012). Resolving the African financial development gap: Cross-country comparisons and a within-country study of Kenya, Technical report, National Bureau of Economic Research.

[5] Allen, F. and Gale, D. (1998). Optimal financial crises, Journal of Finance 53(4): 1245–1284.

[6] Allen, F. and Gale,D. (2001). Bubbles and crises, The Economic Journal 110(460): 236–255.

[7] Angkinand, A., Sawangngoenyuang, W. and Wihlborg, C. (2009). Financial liberalization and banking crises: A cross-country analysis, SSRN: http://ssrn.com/abstract=1305711.

[8] Aziakpono, M. (2004). Financial intermediation and economic growth in a highly dependent African

economy: Evidence from Lesotho, Unpublished Paper, Department of Economics, Rhodes University 17.

[9] Barth, J., Caprio, G. and Levine, R. (2004). Bank regulation and supervision: What works best?, Journal of Financial Intermediation 13(2): 205–248.

[10] Bayraktar, N. and Wang, Y. (2004). Foreign bank entry, performance of domestic banks, and sequence of financial liberalization, World Bank Policy Research Working Paper No.3416.

[11] Bordo, M., Eichengreen, B., Klingebiel, D. and Martinez-Peria, M. (2001). Financial crises: lessons from the last 120 years, Economic Policy 16(32): 51–82.

[12] Boyd, J. and De Nicolo, G. (2005). The theory of bank risk taking and competition revisited Journal of Finance pp. 1329–1343.

[13] Boyd, J., De Nicolo, G. and Jalal, A. (2006). Bank risk-taking and competition revisited: new theory and new evidence, IMF Working Paper, 06/297.

[14] Brownbridge, M. (1998). The causes of financial distress in local banks in Africa and implications for prudential policy, Journal of Development Policy Review.

[15] Caprio, G. and Klingebiel, D. (2003). Episodes of systemic and borderline banking crises, World Bank Development Research Group http://econ.worldbank.org/research (428): 31–49.

[16] Caprio Jr, G. and Klingebiel, D. (1996). Bank insolvencies cross-country experience, World Bank Policy Research Working Paper No. 1620.

[17] Carlson, M. and Mitchener, K. (2006). Branch banking, bank competition, and financial stability, Journal of Money, Credit, and Banking 38(5): 1293–1328.

[18] Chari, V. and Jagannathan, R. (1988). Banking panics, information, and rational expectations equilibrium, Journal of Finance 43(3): 749–761.

[19] Daniel, B. And Jones, J. (2007). Financial liberalization and banking crises in emerging economies, Journal of International Economics 72: 202–221.

[20] Demirguc-Kunt, A. and Detragiache, E. (1998a). The determinants of banking crises in developing and developed countries, IMF Sta¤ Papers 45(1): 81–109.

[21] Demirguc-Kunt, A. and Detragiache, E. (1998b). Financial liberalization and financial fragility, The World Bank Policy Research Working Paper 1917.

[22] Demirguc-Kunt, A. and Detragiache, E. (2005). Cross-country empirical studies of systemic bank distress: A survey, National Institute Economic Review 192(1): 68.

[23] Demirguc-Kunt, A., Levine, R. And Min, H. (1998). Opening to foreign banks: Issues of stability, efficiency, and growth, The Implications of Globalization of World Financial Markets pp. 83–115.

[24] Demsetz, R., Saidenberg, M. and Strahan, P. (1996). Banks with something to lose: The disciplinary role of franchise value, Federal Reserve Bank of New York Economic Policy Review 2(2): 1–14.

[25] Eichengreen, B. and Arteta, C. (2002). Banking crises in emerging markets: Presumptions and evidence, Financial Policies in Emerging Markets pp. 47–94.

[26] Flamini, V., McDonald, C. and Schumacher, L. (2009). The determinants of commercial bank profitability in Sub-Saharan Africa, IMF Working Paper 09/15.

[27] Furlong, F. (1988). Changes in bank risk-taking, Economic Review (Spr):56.

[28] Giannetti, M. (2007). Financial liberalization and banking crises: The role of capital inflows and lack of transparency, Journal of Financial Intermediation 16: 23–63.

[29] Gonzalez, F. (2005). Bank regulation and risk-taking incentives: An international comparison of

bank risk, Journal of Banking and Finance 29(5): 1153–1184.

[30] Hellmann, T., Murdock, K. and Stiglitz, J. (2000). Liberalization, moral hazard in banking, and prudential regulation: are capital requirements enough?, American Economic Review 90(1): 147–165.

[31] Hove, S., Touna Mama, A. and Tchana Tchana, F. (2011). Do monetary, financial institutions really matter for inflation targeting in emerging market economies?, Economic Research Southern Africa Working Paper 247 .

[32] Kaminsky, G. and Reinhart, C. (1999). The twin crises: the causes of banking and balance-of-payments problems, American Economic Review 89(3): 473–500.

[33] Kaufman, G. (1988). Bank runs: causes, benefits, and costs, Cato Journal 7(3): 559–587.

[34] Keeley, M. (1990). Deposit insurance, risk, and market power in banking, The American Economic Review 80(5): 1183–1200.

[35] Laeven, L. and Valencia, F. (2008). Systemic banking crises: a new database, IMF Working Paper 08/224. .

[36] Lepetit, L., Nys, E., Rous, P. and Tarazi, A. (2008). Bank income structure and risk: An empirical analysis of European banks, Journal of Banking and Finance 32(8): 1452–1467.

[37] Levine, R., Loayza, N. and Beck, T. (2000). Financial intermediation and growth: Causality and causes, Journal of Monetary Economics 6(1): 31–78.

[38] Lindgren, C., Garcia, G. and Saal, M. (1996). Bank soundness and macroeconomic policy, International Monetary Fund.

[39] McKinnon, R. (1973). Money and capital in economic development, Brookings Institution Press.

[40] Noy, I. (2005). Banking crises in East Asia: the price tag of liberalization?, Asia Pacific Issues, Analysis from the East-West Center .

[41] Rossi, M. (1999). Financial fragility and economic performance in developing economies: do capital controls, prudential regulation and supervision matter?, IMF Working Paper No. 99/66

[42] Shaw, E. (1973). Financial deepening in economic development, Oxford University Press. Shehzad, C. and De Haan, J. (2009). Financial liberalization and banking crises, Conference of the Royal Economic Society, University of Surrey.

[43] Tchana Tchana, F. (2008a). The empirics of banking regulation, Available at SSRN: http://ssrn.com/abstract=1150739.

[44] Tchana Tchana, F. (2008b). Regulation and banking stability: A survey of empirical studies, University of Cape Town.

[45] Weller, C. (2001). Financial crises after financial liberalization: exceptional circumstances or structural weakness?, Journal of Development Studies 38(1): 98–127.

[46] Williamson, J. and Mahar, M.(1998). A survey on financial liberalization, essays in international finance, Department of Economics, Princeton University.

[47] Wilmarth Jr, A. (2003). Too-Big-To-Fail: Policies and Practices In Government Bailouts, Greenwood Publishing Group, Does Financial Liberalization Increase the Likelihood of a Systemic Banking Crisis? Evidence from the Past Three Decades and the Great Depression.

[48] World Development Report (2002). Technical report, World Bank.

[49] Zhao, T. and Murinde, V. (2009). Bank competition, risk taking and productive efficiency: Evidence from Nigeria's banking reform experiments, Sterling Economics Discussion Paper 23.

APPENDIX

TableA 1. *Descriptive Statistics*

Variable	Observations	Mean	Std Deviation	Minimum	Maximum
Crisis	546	0.49	0.81	0	2
Liberalization Policies					
Finnreform	546	9.06	5.81	0	20
ent	447	2.15	1.09	0	3
ir	483	2.13	1.16	0	3
cr	462	1.69	1.03	0	3
sup	483	0.84	0.78	0	3
pvt	462	1.62	1.04	0	3
intk	462	1.19	0.91	0	3
secmkt	462	1.02	0.91	0	3
Finnlib	546	0.82	0.39	0	1
Institutional Variables					
gov	546	-0.02	1.27	-2.5	2.5
lgdppc	544	6.22	1.12	4.63	8.93
pressf	546	0.69	0.71	0	2
depins	546	0.13	0.33	0	1
Macroeconomic and Banking Characteristics					
crgdp	544	29.62	192.54	1.58	42.35
m2res	546	0.982	0.215	0.0091	148.3
liq	546	17.37	16.01	0.18	118.7
crgr_2	542	9.58	20.58	-10.99	34.55
rgdpg	546	3.68	4.99	-19.01	33.63
rir	534	5.63	14.33	-110.06	48.39
ctot	443	1.46	8.02	-54	71.75
infn	543	17.86	40.03	-30.16	49.53

TableA.2. *Financial liberalization Policies and Banking Crises Ordered Logit Estimation Results*

Variables	(4) crisis=0	(4) crisis=1	(4) crisis=2	(5) crisis=0	(5) crisis=1	(5) crisis=2
rgdpg	0.011***	-0.002***	-0.01***	0.013***	-0.02***	-0.011***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
lgdppc	0.08***	-0.02***	-0.05***	0.12***	-0.03***	-0.09***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)
ctot	0.04***	-0.01***	-0.03***	0.02*	-0.003*	-0.02*
	(0.003)	(0.01)	(0.01)	(0.011)	(0.003)	(0.01)
infn	-0.001**	0.001**	0.003**	-0.001***	0.001***	0.001***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
rir	-0.011***	0.028***	0.022***	-0.051***	0.044***	0.041***
	(0.002)	(0.02)	(0.001)	0.006)	(0.002)	(0.002)
m2res	-0.003***	0.001***	0.003***	-0.004***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.001)
crgdp	-0.004	0.002	0.003	-0.002***	0.006***	0.002***
	(0.003)	(0.003)	(0.003)	(0.001)	(0.004)	(0.001)
liq	-0.0004	0.0001	0.0004	-0.001***	0.001**	0.001**
	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)
crgr_2	-0.024**	0.01***	0.02**	-0.07***	0.02***	0.05***
	(0.002)	(0.01)	(0.01)	(0.016)	(0.003)	(0.013)
depins	-0.07**	0.02***	0.06*	-0.003	0.01***	0.01***
	(0.003)	(0.03)	(0.03)	(0.002)	(0.024)	(0.03)
cr	0.13***	-0.02***	-0.114***			
	(0.001)	(0.01)	(0.01)			
intk				-0.06***	0.01***	0.05***
				(0.002)	(0.01)	(0.01)
Obs	390	390	390	388	388	388
	0.866	0.635	0.841	0.901	0.770	0.871

Robust standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1; Marginal effects reported

TableA.4. *Robustness Tests: Using Removal of Interest Rate Controls to Proxy Overal Liberalization*

Variable	(1) crises=0	(2) crises=1	(3) crises=2
rgdpg	0.013***	-0.003***	-0.010***
	(0.0005)	(0.0001)	(0.0005)
lgdppc	0.101**	-0.03**	-0.08*
	(0.05)	(0.011)	(0.05)
ctot	-0.001	0.0002	0.001
	(0.001)	(0.005)	(0.0024)
infn	-0.001***	0.001***	0.001***
	(0.0001)	(0.0001)	(0.0001)
rir	-0.001***	0.0004***	0.001***
	(0.0001)	(0.0001)	(0.0001)
m2res	-0.005***	0.0004***	0.004***
	(0.0001)	(0.0002)	(0.0003)
crgdp	0.0001	-0.0001	-0.0001
	(0.0002)	(0.0001)	(0.00002)
liq	-0.003***	0.0004***	0.003***
	(0.0001)	(0.0001)	(0.0002)
crgr_2	-0.001***	0.0001***	0.001***
	(0.0001)	(0.0001)	(0.0002)
depins	-0.217***	0.043***	0.174***
	(0.011)	(0.007)	(0.015)
…nlib	-0.143***	0.024***	0.119***
	(0.0112)	(0.006)	(0.002)
Constant	-0.0003	-0.0004	0.0006
	(0.0005)	(0.0003)	(0.0008)
Prob>chi2			0.000
Pseudo R^2			0.35

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

TableA.3. *Financial liberalization Policies and Banking Crises continued*

Variables	(6) crisis=0	crisis=1	crisis=2	(7) crisis=0	crisis=1	crisis=2
rgdpg	0.01***	-0.001***	-0.06***	0.012***	-0.005***	-0.02***
	(0.001)	(0.003)	(0.001)	(0.001)	(0.0002)	(0.001)
lgdppc	0.05***	-0.02***	-0.04**	0.11***	-0.03***	-0.08***
	(0.014)	(0.004)	(0.015)	(0.014)	(0.01)	(0.015)
ctot	-0.05***	-0.01**	0.06**	0.011	-0.01	-0.01
	(0.008)	(0.01)	(0.011)	(0.01)	(0.002)	(0.01)
infn	-0.003**	0.001***	0.002**	-0.001*	0.003*	0.001*
	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
rir	-0.002	0.001	0.003	0.004***	0.001***	0.003***
	(0.0002)	(0.0002)	(0.0002)	(0.001	(0.0002)	(0.001)
m2res	-0.004***	0.0002***	0.004***	-0.004***	0.0001***	0.003***
	(0.0003)	(0.0004)	(0.0002)	(0.0001)	(0.0001)	(0.0002)
crgdp	-0.01***	0.03**	0.06***	-0.02***	0.04***	0.07***
	(0.009)	(0.01)	(0.02)	(0.001)	(0.004)	(0.006)
liq	0.0001	-0.0003	-0.0002	0.001***	- 0.0003***	-0.001***
	(0.0003)	(0.001)	(0.0003)	(0.0003)	(0.0001)	(0.0004)
crgr_2	-0.021**	0.01***	0.02***	0.001***	0.0003***	-0.001***
	(0.01)	(0.002)	(0.006)	(0.0003)	(0.0001)	(0.0004)
depins	-0.08***	0.001***	0.09***	-0.068***	0.013***	0.055***
	(0.027)	(0.01)	(0.02)	(0.02)	(0.002)	(0.016)
pvt	0.17***	-0.03***	-0.14***			
	(0.08)	(0.002)	(0.06)			
secmkt				-0.07***	0.017***	0.06***
				(0.028)	(0.003)	(0.027)
Obs	508	508	508	488	488	488
R^2	0.776	0.567	0.737	0.702	0.737	0.777

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Marginal effects reported. All regressions included a constant.*