

8-2012

# Financial Liberalization and the Severity of Systemic Banking Crises

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# FINANCIAL LIBERALIZATION AND THE SEVERITY OF SYSTEMIC BANKING CRISES

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A Dissertation  
Presented to  
the Graduate School of  
Clemson University

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In Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Philosophy  
Economics

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by  
Michael Drew Scott  
August 2012

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# Abstract

Recent macroeconomic events have reinvigorated research in financial crises, namely systemic banking crises. While theoretical and empirical research on the causes and leading indicator of banking crises is vast, empirical literature on the cost of such crises is sparse. This paper addresses that void in the literature. Utilizing a new database compiled by the IMF on financial sector reforms, the correlation between financial sector liberalization and the severity of systemic banking crises is examined. The aspect of financial sector liberalization with the strongest correlation with the severity of systemic banking crises is the level of banking supervision and prudent regulation. It is found that higher levels of banking supervision is negatively correlated with output losses due to the banking crisis. Weaker evidence is found for the aspects relating to credit controls, entry barriers, privatization, and security markets. Additionally, reforms are not shown to be significantly correlated with more or less severe banking crises. Results are robust to changes in assumptions made during the calculation of the output loss figures.

# Dedication

I would like to dedicate this manuscript to my family and friends for the support and encouragement that you have provided me throughout this journey. There are three people that I would like to thank individually. My parents, Ernest and Patsy, and my best friend and partner in life, Julie. Without the three of you, I could not have accomplished this feat. You have been and will continue to be my inspiration.

# Acknowledgments

I would like to express my gratitude to the members of my committee: Dr. Michal Jerzmanowski, Dr. Howard Bodenhorn, Dr. Robert Tamura, Dr. Scott Baier, and Dr. Raymond Sauer. Each of you have contributed to this dissertation and my career in economics in ways that you are not aware. Thank you for your confidence and guidance throughout this process.

I would also like to thank all of the participants of the aggregate workshop. Your comments were extremely valuable in the development of this work.

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# Chapter 1

## Financial Liberalization and the Severity of Systemic Banking Crises

### 1.1 Introduction

In an expansive study of financial crises over the two preceding centuries, Reinhart and Rogoff (2008) observe that “since the early 1970s, financial and international capital account liberalization took root worldwide. So, too, have banking crises.” From 1950 to 1973, the percentage of countries experiencing a banking crisis remained close zero percent (Reinhart and Rogoff, 2008).<sup>1</sup> Over the following four decades, the percentage of countries experiencing a banking crises increased dramatically. At one point in the 1990s, that percentage reached as high as 30 percent. As the global financial system appeared to regain its composure, the first global financial crisis of the 21st century explodes into the forefront of political and international

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<sup>1</sup>Reinhart and Rogoff (2008) report the percentage weighted by their share of world income.

macroeconomic concerns, and with it, an influx of research on the causes and consequences of systemic banking crises.

Systemic banking crises can have disastrous consequences on the macroeconomy as episodes are often associated with stark declines in economic activity. As explained by Haugh et al. (2009), output losses are greater for recessions following banking crises than for recessions not following banking crises. Additionally, the half-life of the maximum output gap is greater in recessions following banking crises. This result implies that economic contraction following banking crises are not only deeper but of longer duration. Beyond persistent output losses, systemic banking crises are associated with periods depressed asset prices, high levels of unemployment, sharp increases in the real interest rate, and significant slowdown or reversal of financial capital inflows (Laeven and Valencia, 2008). Reinhart and Rogoff (2008) note that banking crises are not a concern for just the less developed countries. They find that while industrialized countries have seemed to have graduated from inflation, currency, and until recently, sovereign debt crises, they have not been able to escape the grasp of banking crises. As a result, the factors relating to the consequences of banking crises remain a source for further exploration.

This paper builds upon the observation that banking crises tend to follow periods of financial liberalization. Hence, the correlation between the pre:crisis level of financial liberalization and the severity of systemic banking crises is examined. The measure of financial liberalization, as developed by Abiad et al. (2008), is disaggregated into its seven components to determine which of the policy aspect variables are correlated with the measured output loss during the crises.<sup>2</sup> To test this correlation, a measure of output loss must be derived for each of the crises occurring from

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<sup>2</sup>The seven components are credit controls, interest rate controls, entry barriers, banking supervision, privatization, international capital restrictions, and security markets. The measures is discussed further in the data section of the paper.

1973 to 2005, a task that is made more difficult by the lack of a consensus on the preferred methodology. To account for this lack of consensus, various measures are created. Each measure alters the assumption on the desired window of time utilized to calculate the pre-crisis trend. Weak evidence is found that liberalization of the credit controls, entry barriers, privatization, and security market development are correlated with greater output losses. When allowing for changes in the overall measure of financial liberalization, it is found that reversals, a downward adjustment of the financial liberalization measure, are correlated with greater output losses. While this is an interesting result, another important result is that reforms in the country's financial sector does not show to have any significant impact on the severity of the banking crises. The most compelling evidence relates to the policy aspect relating to banking supervision and prudent regulation. Across all measures of output loss, banking supervision and prudent regulation is negatively related to output loss, and when interacted with the remaining six policy variables, banking supervision lowers the impact that liberalizing has on the measured output loss.

This paper proceeds as follows: Section II provides an overview of the root causes of banking crises. Section III reviews the related literature and highlights the void that this project fills. Section IV provides details on the creation of the output loss variable and the data utilized. Section V describes the empirical models that will be estimated. Section VI discusses the estimation and results. Section VI provides concluding remarks.

## **1.2 Banking Crises: An Overview**

Financial instruments, markets, and institutions develop to minimize information and transactions costs associated with matching lenders with borrowers. With an

underdeveloped financial system, savers desiring to lend must find a debtor willing to borrow. This matching process requires a significant amount of time and cost. The saver determines the rate that covers the costs incurred during the search process and the opportunity cost of not having the funds at their disposal. The potential borrower searches for a lender with a rate that is lower than the expected rate of return on their investment project. As the financial system develops, savers are no longer required to carry out the search process themselves. They deposit funds with a financial institution whose comparative advantage lies in the collection and evaluation of information, and that institution matches the funds with a firm or household in need of external financing of their capital purchases (Calomiris and Kahn, 1991). The existence and further development of financial intermediaries can increase saving rates, and with better access to external financing, firms are able to acquire funding to innovate and purchase capital goods. As the capital stock in the economy expands and the level of total factor productivity rises, long-run growth is accelerated (Levine, 2004).

Savers deposit their funds with financial institutions under a belief that the institution will return to them on demand the funds deposited plus a rate of interest. Banking crises occur when depositors realize that the rate of return that they are receiving does not sufficiently reward the amount of risk they are bearing and withdraw their funds from the financial institution. When individual bank runs occur, much concern does not arise, but when runs become systemic, the economy finds itself in the midst of a crisis. To satisfy their depositors, banks must sell their assets to obtain the funds to cover their demand deposits. Under a fractional reserve system and the nature of the banking industry, banks are subject to maturity mismatch as many illiquid long term assets are financed through short term debt (Bernanke et al., 1996). Thus, selling the long-term assets is costly as the increased supply to the

market lowers their price, and banks find it difficult to liquidate a sufficient amount to cover the debt. As the bank becomes insolvent, it must turn to the government for assistance. At this point, credit is constrained, asset prices are falling, real interest rates are rising, investment is falling, and the economy is pushed into a recession with unemployment rates rising by an average of seven percent (Reinhart and Rogoff, 2009a).<sup>3</sup> The government is faced with the decision whether to bail out the financial institutions and how much it is willing to contribute toward saving insolvent banks.

When systemic banking crises arise, the financial system loses its ability to facilitate the matching of savers and borrowers as the level of asymmetric information rises. Prior to the occurrence of a banking crisis, the economy experiences a prolonged period of credit growth (Laeven and Valencia, 2010), and leading into the banking crisis, large imbalances in the balance sheet can be found in the private sector. This imbalance, whether caused by currency mismatch or exchange rate risk, translates into credit risk for the financial intermediaries, and lending to finance large capital expenditure declines. This channel through which a financial crisis leads to a decline in real output is referred to as the “balance sheet” or “collateral” channel. The second channel through which financial crises moves into the real sector is the “bank lending” channel where a troubled banking sector tightens credit in the face of liquidity constraints. When the firms are not able to smooth their liquidity shortfall through borrowing from intermediaries, large contractionary impacts on real output occurs (Bernanke, 1983). Both channels increase the financial constraint that firms and households face, and in doing so, decreases the level of investment and output growth throughout an economy (Kalemli-Ozcan et al., 2010).

Banking crises can be extremely costly as illustrated in Reinhart and Rogoff

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<sup>3</sup>Reinhart and Rogoff (2009b) find that there is a decline in real housing prices of 35 percent from peak to trough of approximately six years, and equity prices decline over an average of three and a half years by 55 percent.

(2009a). In their sample of banking crisis over the last century, they find that the cumulative decline in real asset prices declines from peak to trough by approximately 35.5 percent and continues to decline for an average of six years following the onset of the banking crisis. The drop in equity prices is more pronounced with an average of 55.9 percent, but the decline is over a shorter period of time than for the real estate prices. On average, unemployment rises over a five year period by approximately seven percentage points. Declines in output per capita lasts for two years on average with an mean magnitude of 9.3 percent.<sup>4</sup> Real government debt also rises following a banking crisis. On the back of falling tax revenues and increased government spending to attempt to stimulate the economy, government debt increased over 86 percent in the three years following the banking crisis. Thus, banking crises can be detrimental to an economy through falling output prices, falling per capita income, rising and persistent unemployment that is present even after output per capita rebounds, and increases government debt. In this paper, the loss in per capita output is examined further. It serves as a link between the identification of the economic consequences of a banking crises and one of the most often identified causes, financial liberalization.

### 1.3 Related Literature

The theoretical literature on the causes and consequences of banking crises is vast, but the empirical work on the subject is far less comprehensive. Focusing on both developed and developing countries, the empirical literature on systemic banking crises largely focuses on determining the economic and financial variables associated with the probability of a banking crisis occurring. A survey of the literature highlights factors such as a weak macroeconomic environment, currency overvaluation, deposit

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<sup>4</sup>Note: Reinhart and Rogoff (2009) only examines absolute changes in income, not the percent deviation from potential output.

insurance, and financial liberalization.

In examining the factors that associated with the emergence of a systemic banking crisis, Demirguc-Kunt and Detragiache (1997) find strong evidence that a weak macroeconomic environment precedes banking crisis and increases the probability of a banking crisis occurring. A weak macroeconomic environment exhibits low output growth and high inflation rates. In addition, high real interest rates are associated with banking sector problems. Sudden capital outflows, a high share of credit to the private sector, and high credit growth in the years prior to the crisis are associated with a higher probability of a crisis. Reinhart and Kaminsky (1999) identify variables that act as early warning signals for crises to be foreign exchange reserves, high real interest rates, low output growth, and a decline in stock prices.

As the financial system is liberalized, banks have are able to borrow in foreign currency and lend in the domestic currency. In cases of unexpected depreciation, bank profitability is jeopardized because even if the banks are able to call the loans issued, the value outstanding in domestic currency will not cover the foreign denominated debt. With the asset side of the bank's balance sheet declining against their liabilities, the solvency of these banks comes into question. If the banks choose to project the risk onto the borrowers in the domestic country, they would issue the domestic debt denominated in foreign currency. While this removes direct exposure to the exchange rate risk, bank profitability remains impacted as an unexpected devaluation would increase the number of non:performing loans. Many researchers incorporate the real exchange rate and the percent change in the real exchange rate. Reinhart and Kaminsky (1999) find that currency devaluations precede banking crises and can be used as an early warning sign. Others, such as Demirguc-Kunt and Detragiache (1997) find that when controlling for output growth, inflation rates, and interest rates, the rate of currency depreciation is not significant in determining the cause of banking

crises.

Once depositors believe that the banking sector is troubled, many withdraw their funds from the bank to avoid complete loss. If banks are able to meet the demand of funds from the initial depositors, the bank will be able to signal their health and stave off further bank runs. In times of crises, the government's deposit insurance acts as a guarantee to the depositors and can diminish the frequency and volume of bank runs. Deposit insurance can decelerate the onset of insolvency. A negative aspect of this guarantee is that it leads to moral hazard on the side of bank managers as incentive is provided to take on excessive risk. Thus, the presence of a government guarantee, explicit or implicit, makes moral hazard an even larger problem (Demirguc-Kunt and Detragiache, 1998). Oversight of the banking system can minimize the moral hazard due to the guarantee. As a predictor, explicit deposit insurance is often highlighted as a factor that contributes to the probability of a banking crisis (Demirguc-Kunt and Detragiache, 1997). An alternative solution to an implicit guarantee is to allow depositors act as market disciplinarians (Peria and Schmukler, 2001). Allowing depositors act as bank monitors, banks taking on excessive risk are penalized as depositors will demand higher interest rates. In their analysis, Peria and Schmukler found that market discipline on the part of depositors, in both insured and uninsured systems, declines during crises and increases sharply after the crisis ends.

Through a further examination of the determinants of banking crises, Reinhart and Kaminsky (1999) create a measure of financial liberalization through the observation of policy changes such as the bank interest rate deregulation in 53 countries between 1980 and 1995. While controlling for the factors identified as determinants of banking crisis in their previous work, Kaminsky and Reinhart investigate whether banking crises are more likely to occur in countries with more liberalized financial sectors. They find that periods of financial liberalization increases the probability



of a banking crisis occurring, and the probability increases substantially in countries with weak institutions where rule of law is weak, corruption is widespread, the bureaucracy is inefficient, and contract enforcement mechanisms are ineffective. The primary reason for financial sector fragility is the degree of moral hazard present in the system. The aforementioned discussion on banking guarantees is one source, but financial liberalization is another. Financial liberalization leads to the increased fragility of the banking sector through the removal of interest rate ceilings and/or the reduction of barriers to entry. Reinhart and Kaminsky (1999) also observe that financial liberalization often precedes banking crises, and that banking crises often precede currency crises. Prior to the liberalization of financial markets during the 1970s, no apparent link between banking and currency crises was found.

Research has shown that the movement to liberalize financial sectors has resulted in short-run financial sector fragilities that could lead to banking crises. Glick and Hutchison (1999) examines the causes of both banking and currency crises and find that twin crises are more common in emerging markets who have liberalized their financial sector, and similar to Reinhart and Kaminsky (1999), Glick and Hutchinson claim that banking crises are predictors to currency crises. Additionally, Eichengreen and Arteta (2000) propose that the leading causes to banking crises are lending booms, precipitous financial liberalization, inadequate prudential supervision, and weaknesses in the legal and institutional framework. The unsustainable lending boom arises when macroeconomics and financial policies are combined with financial deregulation. As the volume of lending rises, it becomes more difficult for the lending institutions to sort through the information on each borrower. The issue of adverse selection arises, and the quality of loans declines. Financial liberalization, through releasing controls on the domestic interest rate, allows banks to compete for deposits and finances the unstable lending, and the increased competition through the reduction of entry

barriers encourages the risk taking behavior of the financial institutions.

Typically, measures such as real interest rates and interest rate controls, are used to proxy for the level of financial liberalization. Employing the “New Database of Financial Reforms”, Shehzad and de Haan (2009) find that most of the six dimensions of financial liberalization captured in the measure conditional on the level of banking supervision and prudential regulation decreases the probability of a banking crisis occurring. Thus, it is when the financial sector is liberalized in the absence of supervision and regulation that the risk of a banking crisis increases. This finding is not that different than the work of Reinhart and Kaminsky (1999), but the financial liberalization measure that is used by Shehzad and de Haan (2009) covers a wider array of the elements of financial liberalization. Kaminsky and Reinhart created a measure based upon observed policy movements in a country’s interest rate controls while the measure used by Shehzad and Haan covers five additional aspects plus prudential regulation and banking supervision.

A brief overview of the literature on financial liberalization and financial crises brings to light a void in the empirical literature on systemic banking crises. The vast majority of the work centers on the causes of the crises and leaves the discussion of the severity as an afterthought. When discussing severity, papers normally use their measure, typically output loss, as a means of comparing the depth of different banking crises and comparing banking crises to other types of financial crises. There is little work on the correlation between pre:crisis levels of financial liberalization and output losses suffered during a banking crisis. This paper is related to the literature in that it takes the aforementioned findings and poses the question of whether the pre:crisis level of financial liberalization is associated with the severity, or output loss, attributed to the banking crisis. This project further contributes to the existing literature in that differing assumptions are utilized to form measures of output loss

that will be used to test the sensitivity of the results.

## 1.4 Data

Historically, a systemic banking crisis is identified as a period in which a large fraction of the banking system is depleted (Laeven and Valencia, 2010). In what is traditionally thought of to be a fairly qualitative approach, Laeven and Valencia extend their previous work and build upon that of previous research to develop a specific criterion with the goal of identifying, in a quantitative fashion, the beginning and end years of banking crises. According to their methodology, countries are determined to have experienced a systemic banking crisis if (1) the banking system shows significant signs of bank distress, and (2) significant losses in the banking system have led to significant policy intervention.<sup>5,6</sup> The beginning year of the crisis is the first year that meets both of the above criteria. The end year of the banking crisis is determined to be the year prior to at least two consecutive years of positive real credit and real GDP growth. Laeven and Valencia’s “Banking Crisis Database” identifies 145 banking crises from 1970 to 2009. For this paper, the number of crisis examined is reduced along with the sample period. The first reason for reducing the number of crisis observed is that many of the crisis in Laeven and Valencia’s database occur during the latest global banking crisis, and many of those crisis were ongoing at the end of their sample. In addition to the aforementioned crises, any episode with an end date after 2005 was omitted from the sample. Due to the availability of the

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<sup>5</sup>Signs of financial distress are recorded bank runs, losses in the banking system, and bank liquidations.

<sup>6</sup>Laeven and Valencia (2010) identify the existence of significant policy intervention if at least three of the following six measures are observed: (1) extensive liquidity support, (2) bank restructuring costs of at least three percent of GDP, (3) significant bank nationalizations or government acquisition of a majority stake in financial institutions, (4) significant guarantees instituted, (5) asset purchases of at least 5 percent of GDP, and (6) deposit freezes and bank holidays.

measure(s) of financial liberalization, the period of time examined in this paper is narrowed to 1973 to 2005. Taking in these limiting factors, the final set of banking crises includes 69 crises in 54 countries. Table 1.1 provides a list of those countries along with the start and end dates of their systemic banking crisis.

The measure of financial liberalization employed originates in “A New Database of Financial Reforms” developed by Abiad et al. (2008). This financial reform database provides a graded measure of financial liberalization covering the financial sector of 91 countries from 1973 to 2005. The key feature of this measure is that it provides a broader sense of financial liberalization than previous efforts have produced as it is composed from seven financial policy aspects instead of conventional proxies such as the real interest rate. Using the real interest rate as a proxy is problematic as it measures only one aspect of financial liberalization and influenced by more changes than just the desired financial policy changes (Demirguc-Kunt and Detragiache, 1998). The overall measure of financial liberalization can be disaggregated into its seven policy dimensions: credit controls and excessively high reserve requirements, interest rate controls, entry barriers, state ownership in the banking sector, capital account restrictions, regulation and supervision of the banking sector, and securities market policy.<sup>7</sup> The financial system of each country is assigned a value from zero to three for each of the seven aspects. For every category, with the exception of prudent regulation and banking sector supervision, a zero represents complete repression, and a three represents the highest level of liberalization. For banking supervision and regulation, a zero represents a system that exhibits very little regulation and/or supervision, whereas a three is assigned to economies in which their financial system has the highest level of supervision and regulation. Prompted by preliminary investigation and findings on the importance of banking supervision in the literature, the graded measure

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<sup>7</sup>See appendix for detailed information on each policy dimension.

of the banking supervision aspect is divided into four binary variables: Banking(0), Banking(1), Banking(2), and Banking(3). Banking(0) is an indicator variable that takes on a value of one if the level of supervision and regulation is a zero. Banking(1) is an indicator variable that equals one when the banking supervision score is a one. Banking(2) and Banking(3) are formed in a similar fashion. This approach allows for differences in the level of banking supervision without enforcing a linear relationship between the index values. In reaching a measure of the overall level of financial liberalization, the score for each of the seven policy aspects is summed together. Thus, the overall measure ranges from a minimum of zero to a maximum of 21, where the higher the score, the more liberalized the financial sector. Since the primary concern is pre-crisis levels of financial liberalization, all values are from the year prior to the beginning of the crisis.

In addition to the graded scores for the level of financial liberalization, the database includes a set of indicator variables representing changes in the level of financial liberalization. When the overall index increases by three or more points, the movement is referred to as a large reform. When it increases by two or fewer points, it is referred to as a reform. A negative movement of two or fewer points is called a reversal. where as a decrease of three or more points is referred to as a large reversal. If it remains constants, the authors call this non:movement the “status quo”. As shown by Reinhart and Kaminsky (1999), Demirguc-Kunt and Detragiache (1998), and Angkinand et al. (2010) amongst others, economies are more susceptible to a banking crisis following a period of liberalization of the financial sector. In fact, 59 percent of the crises followed either a reform or large reform. Consequently, a set of variables is created to test whether a change in the level of financial liberalization is correlated with output loss. The indicator variable “reform in two” takes on a value of one if a reform occurred during the two years prior to the crisis. the variables “large

reform in two”, “reversal in two”, “large reversal in two”, and “status quo in two” are formed in a similar fashion. In addition to the measure(s) of financial liberalization and indicators for changes in liberalization, the provided indicators for geographical region are utilized.

Generally, the severity of a banking crisis is determined through an examination of the output lost over the duration of an episode. Output loss is defined the cumulative percent deviation of actual from potential output over the length of the crisis.<sup>8</sup> While it is widely used in the literature as an acceptable means of determining the severity of the financial crisis, the methodology for calculating the statistic remains a topic of debate.<sup>9</sup> The source of the disagreement lies with assumptions made in order to calculate the output loss. The first assumption concerns the formation of the pre-crisis trend. Logically, for the trend to represent potential output, it should represent the growth path of the economy if the banking crisis had not occurred. Thus, the issue arises when determining the number of years prior to the beginning of the crisis used to form the trend of potential output. A consensus on the length of time to utilize is debated in the literature. Laeven and Valencia (2010) use a twenty year period prior to the crisis to estimate the pre-crisis trend. In their calculation, Hoggarth et al. (2002) examine the measure using both three and ten year windows prior to the crisis. Even though Bordo et al. (2001) focuses on output growth rates instead of levels, they calculated their pre-crisis growth trend using the five years prior to the start of the crisis. In this project, three different periods are used to calculate potential output: a five year window, 20 year window, and imputing the

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<sup>8</sup>Duration of the crisis is determined by Laeven and Valencia (2010)

<sup>9</sup>Research such as Hoggarth et al. (2002), Laeven and Valencia (2010), and Eichengreen and Bordo (2002) use output loss as their measure of severity. Much of the literature utilizing output loss focuses on the comparison of the severity of banking crises over time or against other types of financial crises (currency and sovereign debt crises) as in Kapp and Vega (2012).

trend directly from the moving average smoothed series of per capita output.<sup>10</sup>

The second assumption of concern is the appropriate post:crisis window that the researcher sums across. The difficulty arises from the fact that downturns accompanying the crisis can impact many economic variables with varying degree and persistence with per capita output being one with the shortest duration (Reinhart and Rogoff, 2009a). As noted by John H. Boyd and Smith (2005), ending the period when output regains a positive growth rate underestimates the real cost of banking crises. If the determination of the end of the crisis is when per capita real GDP returns to its pre-crisis level, it ignores the opportunity cost associated with the depressed output during the crisis. For consistency, the criterion set by Laeven and Valencia (2010) for determining the end of the banking crisis is utilized in this paper.<sup>11</sup>

In forming the output loss measure utilized, the logged per capita real GDP series is smoothed using the Hodrick:Prescott (HP) Filter from the beginning of the sample to the year prior to the start of the crisis,  $t - 1$ , as illustrated for Finland in Figure 1.<sup>12,13</sup> In that figure, the solid line is LN per capita real GDP over the sample, and the red line marked with the small x's shows the smoothed Hodrick-Prescott series for the variable. The advantage to using a moving average filter is that it

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<sup>10</sup>Two additional measures of output loss are provided when discussing the robustness of results. Both of these measures moves the window back one year to  $t - 2$ . The reason for this alternation is that it is believed and some have shown Hoggarth et al. (2002) that banking crises are preceded by credit booms. If the credit boom is large enough, the estimated trend of potential output can be biased upward, and thus, overstate the loss Kapp and Vega (2012). It is also likely that recession can begin prior to the dating of the crisis. In this case, inclusion of the year  $t : 1$  could bias the trend downward and understate the losses. Therefore the two additional measures created are projections across the period  $[t - 6, t - 2]$  and  $[t - 20, t - 2]$ . Table 1.3 provides the complete set of output loss figures.

<sup>11</sup>The end of a crisis is determined to be the year prior to real GDP growth and real credit growth are positive for at least two consecutive years. In a number of cases this methodology long crisis durations results, which sometimes is the consequence of additional shocks affecting the country's economic performance. In order to keep their identification process tractable, they truncate duration at 5 years.

<sup>12</sup>The smoothing parameter of the HP Filter is  $\lambda = 100$ .

<sup>13</sup>Data on per capita real GDP extends backwards until 1960 for most countries

minimizes the impact of the fluctuations in the business cycle. It is at this point that a divergence in philosophy arises. Typically, a linear trend is calculated from the filtered series over a pre-determined set of years prior to the crisis to form the potential output trend. As mentioned, three different pre-crisis trends are created. Figure 2 illustrates the three trends created for Finland whose crisis started in 1991 and ended in 1995. The first trend is based upon the five years prior to the start of the crisis and is shown as the red line marked with x's.<sup>14</sup> For this first measure, it can be argued that five years is an insufficient length of time to determine potential output. It is possible that growth over that window of time is above the actual growth rate of potential output, and thus, the potential trend calculated would overstate the actual potential output and overstate losses. To address this concern, the length of the time frame used to determine the trend is extended to obtain the second measure of output loss. This measure lengthens the window from five years to 20 years. In the second figure, the green line with squares represents this trend. The final measure imputes the trend directly from the HP filtered series itself. This method does not have a uniform window across crises as the imputed values are based upon data from the beginning of the series until the year prior to the crisis. The advantage to this method is that it utilizes all of the data points available to form the pre-crisis trend. The dark orange line with circles in Figure 2 is the trend line based upon the Hodrick-Prescott series to the period before the crisis.

After the estimates for potential output are calculated, annual output loss is calculated as the percent deviation of actual output to potential output. To reach a final figure, the annual output loss is summed across the duration of the banking crisis. As is common in the literature, output loss is censored at zero and losses are

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<sup>14</sup>The usage of the five years prior to the crisis or event follows in line with research by Eichengreen and Bordo (2002) and Barro (2001).



stated in absolute value. Thus, a country who experienced an output gain during the crisis shows in the data as a zero. Output loss values for the three measures can be found in Table 1.2. Through examination of the different measures of output loss, it is evident that the values can differ dramatically depending on the assumption on the number of years it takes to form the pre-crisis trend. For Finland, the output loss for the first measure is 34.62 percent, 80.12 percent for the measure based upon the  $[t - 20, t - 1]$  trend, and 139.09 percent for the measure derived from the HP imputed trend. Across the entire sample of 69 episodes, the average output loss under the first measure is 10.44 percent with a standard deviation of 14.1 percent. The average output loss under the second measure is 26.34 percent with a standard deviation of 33.61 percent, and for the last measure, the average output loss is 45.06 percent with a standard deviation of 53.48 percent. Finland is not unique in that the largest measured output loss is derived from the series imputed directly from the Hodrick Prescott series as nearly 73 percent of the countries in the sample have the largest percent deviation through this measure.

With past and current literature focusing on the determinants of banking crisis, many of the macroeconomic variables shown to be correlated with the occurrence of a banking crises are identified. Given the list of contributing factors to banking crisis, many of the identified variables are used as controls for the macroeconomic environment within the country. The variables per capita real GDP, exchange rate, fraction of output devoted to domestic consumption, government spending and investment are from the Penn World Table 7.0.<sup>15</sup> All control variables correspond to the year prior to the beginning of the banking crisis. The growth rate of real per capita GDP is the growth rate of the year prior to the beginning of the crisis. The

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<sup>15</sup>Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 7.0, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, May 2011.

percent change in the exchange rate is calculated over the period  $[t - 2, t - 1]$ . The current account:to:GDP ratio is computed using the fraction of domestic absorption provided in the Penn World Table. The inflation rate is pulled from the World Economic Outlook Database 2003.<sup>16</sup> The interest rate is included because the crisis is likely to be associated with high nominal interest rates. Lastly, the variable “Previous Crisis” takes on a value of one if a banking crisis occurs prior to that crisis in the country. Table 1.4 provides selected descriptive statistics.

## 1.5 Empirical Models

The empirical models utilized are designed to test for the potential linkages between financial sector liberalization and output losses sustained during a systemic banking crisis. The examination of this correlation is approached on two fronts. The first is concerned with the levels of financial liberalization. Specifically, is the pre-crisis level of financial liberalization associated with banking crises of greater or lesser severity? The second front incorporates the research on changes in the level of financial liberalization. Thus, the research question becomes are banking crises that follow changes in the level of financial liberalization associated with increased or decreased levels of output loss?

### 1.5.1 Pre-crisis levels of financial liberalization

The first model focuses on the correlation between the pre-crisis levels of financial liberalization and output loss associated with the crisis. The first two representation of the estimated model uses an OLS specification without interactions,

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<sup>16</sup>WEO database April 2003

$$Y_{it} = \alpha_0 + \beta_i FL_{it-1} + \gamma_i Z_{it-1} + \varepsilon_{it}, \quad (1.1)$$

where  $Y_{it}$  is the output loss measured as the cumulative deviation of actual from potential output over the duration of the crisis.  $FL_{it-1}$  is the measure(s) of financial liberalization in the period prior to the beginning of the crisis. Differences between the two representations of the model without interactions appear in the financial liberalization index,  $FL_{it-1}$ . The first representation uses the aggregated pre-crisis index of financial liberalization. The second disaggregates the overall index of financial liberalization into its seven components. Here, the financial liberalization variable becomes graded indexes of credit controls, interest rate controls, entry barriers, privatization, international capital controls, security market. Banking supervision appears through indicator variables for the value of the index. In both specifications,  $Z_{it-1}$  is a vector of covariates that control for the pre-crisis level of the macroeconomic conditions in each country along with region indicator variables and a variable for to indicate whether a previous crisis is observed in the country.

As noted by Shehzad and de Haan (2009) and Angkinand et al. (2010), the banking supervision and regulation policy variable differs in form from the other six policy variables in that the higher the score, the more regulated the banking sector. Incorporating this observation and Demirguc-Kunt and Detragiache (1997)'s finding that banking crises are more likely to occur in an environment with weak banking supervision, the second model adds an interaction term between banking supervision and the other measures of financial liberalization. Here, the model becomes

$$Y_{it} = \alpha_0 + \beta_i FL_{it-1} + \delta_i \text{Banking Supervision}_{it-1} + \lambda_i (FL_{it-1} \times \text{Banking Supervision}_{it-1}) + \gamma_i Z_{it-1} + \varepsilon_{it}. \quad (1.2)$$

In this specification,  $Y_{it}$  remains the measure of output loss, however, the vari-

able for the financial liberalization index is altered to remove the banking supervision component. Thus, the index is the summation of the six remaining policy aspects with a minimum value of zero and maximum of 18. Banking supervision is a graded index from zero to three. As with the previous model, two representations of the second model are estimated. The first uses the overall index of financial liberalization, and the second representation uses the remaining six individual components of the overall index.  $Z_{it-1}$  is a vector of covariates that control for the pre-crisis level of the macroeconomic conditions in each country along with region indicator variables and a variable for to indicate whether a previous crisis is observed in the country.

### 1.5.2 Changes in the level of financial liberalization

The second set of models are similar in form to the first set in that the dependent variable is output loss. The difference between the two sets is that in the second, changes in the level of financial liberalization are observed and included in the model. Once again, the first two specifications of the model uses an OLS specification without interaction terms,

$$Y_{it} = \alpha_0 + \beta_i FL_{it-1} + \eta_i Reform_{it} + \gamma_i Z_{it-1} + \varepsilon_{it} \quad (1.3)$$

where  $Y_{it}$  is the output loss measured as the cumulative deviation of actual from potential output over the duration of the crisis.  $Reform_{it}$  is a vector of indicator variables that include large reform in 2, reform in 2, reversal in 2, and large reversal in 2.  $Z_{it-1}$  is a vector of covariates that control for the pre-crisis level of the macroeconomic conditions in each country along with region indicator variables and a variable for to indicate whether a previous crisis is observed in the country. As with the previous model, two specifications are estimated: one for the aggregated index of

financial liberalization, and another with the components individually.

Using the knowledge that banking crisis are more likely to occur after changes in the level of financial liberalization especially in environments with little banking supervision, an addition model is presented as

$$Y_{it} = \alpha_0 + \beta_i FL_{it-1} + \delta_i Banking\ Supervision_{it-1} + \eta_i Reform_{it} + \mu_i (Reform_{it} \times Banking\ Supervision_{it-1}) + \gamma_i Z_{it-1} + \varepsilon_{it}. \quad (1.4)$$

$Y_{it}$  remains the measure of output loss.  $Banking\ supervision_{t-1}$  is a graded index from zero to three. As with the previous models, two representations are estimated. The first uses the overall index of financial liberalization, and the second representation uses the remaining six individual components of the overall index.  $(Reform_{it} \times Banking\ Supervision_{it-1})$  is the interaction term between the level of banking sector supervision and the changes in the index of financial liberalization.  $Z_{it-1}$  is a vector of covariates that control for the pre-crisis level of the macroeconomic conditions in each country along with region indicator variables and a variable for to indicate whether a previous crisis is observed in the country.

## 1.6 Results

For each specification, three separate measures of output loss are utilized as the dependent variable.<sup>17</sup> The first measure is based on the assumption that the pre-crisis trend that represents the normal growth path of the economy is derived over the five year period prior to the crisis,  $[t - 5, t - 1]$ . The second measure addresses the concern that a five year window is insufficient to determine the trend for potential output. Thus, the second measure bases its trend on the 20 years prior to the beginning of an

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<sup>17</sup>Here, only the results pertaining to the censored output loss measures are discussed.

episode, that is  $[t - 20, t - 1]$ . The final measure uses all of the information available in the data set prior to the crisis to form the pre-crisis trend. This method derives potential output directly from a linear interpolation of the Hodrick-Prescott smoothed series, stated as *[Imputed HP]*. The discussion on each set of results presented relates the estimates on the financial liberalization variables to the three measures of output loss.

The empirical findings of the first model are provided in Table 1.5. For the columns labeled “Solo”, the coefficient in each row corresponds to the regression in which only the financial liberalization variable to the left of it is the independent variable. For instance, in estimating the model, the coefficient on credit controls is 0.78 when the model estimated is

$$Y_{it} = \alpha_0 + \beta_i \text{Credit Controls}_{it-1} + \gamma_i Z_{it-1} + \varepsilon_{it}. \quad (1.5)$$

In this specification, the overall measure of financial liberalization is insignificant for all output loss calculations. The primary advantage of this measure of financial liberalization is that it allows for disaggregation into its seven aspects of financial liberalization. Of the seven components, the indicator variable for the highest observed level of banking supervision, Banking (2), is significant at the one percent level. Countries with the higher level of banking supervision and prudent regulation are associated with crises with smaller output losses. For the first output loss measure, the severity of an episode is approximately a full standard deviation less than a country who had the lowest level of banking supervision and regulations, that is a country, such as Argentina in the 1980s, where the index for banking supervision is equal to zero. For the second output loss measure,  $[t - 20, t - 1]$ , countries with the highest level of supervision observed is also associated with less severe output losses

as the severity of banking crises is 1.13 standard deviations lower. The results for the third measure, [*Imputed HP*], reveal that the highest observed level of banking supervision is associated with much less severe banking crises. With this measure, banking crises are 1.48 standard deviations less severe for the countries with more supervision than those with the lowest level of supervision. This accounts for nearly one and a half standard deviations from a mean of 45.06 percent. While the estimates of the impact of higher levels of banking supervision on output loss vary greatly among the different measures of output loss, a common theme is apparent. Having greater levels of banking supervision is correlated with significantly lower levels of output loss. Thus, banking supervision matters greatly in questioning the impacts of liberalizing the financial sector on the severity of banking crises. In the column labeled “all”, all seven of the financial liberalization policy aspects appear in the regression simultaneously, and the results are similar in both sign and magnitude to the set of estimates where financial liberalization and then each of its components enter singularly.

The second model includes the interaction between the measures of financial liberalization and the level of banking supervision. The results from this model are presented in Table 1.6. It is divided into three sets of regressions where the dependent variable corresponds to the three primary measures of output loss. Examining the first set of results, three columns are provided. The first column represents the coefficient,  $\beta_i$ , for each of the policy variables on the far left column entered into the regression independently similar to that labeled “solo” in the previous table. In each of the estimations, the graded index of banking supervision enters into the regression. The second column of each set of results provides the coefficient on banking supervision,  $\delta_i$ . The third column reports the coefficient on the interaction,  $\lambda_i$ , between the financial sector policy variable and banking supervision. For example, in estimating the model with the output loss measure formed using the  $[t - 5, t - 1]$  period, the

coefficient on interest rate controls is 1.31, -2.10 for banking supervision, and -0.72 for the interaction term.

For the first output loss measure, the coefficient on banking supervision when regressing the output loss measure on entry barriers is significantly at the 5% level and negative indicating that an increase in the level of banking supervision by one index point is correlated with a less severe banking crisis by 0.52 standard deviations in countries with higher barriers to entry. Adding a square of banking supervision reveals that the rate at which banking supervision reduces the severity of a banking crisis diminishes with higher levels of banking supervision and output loss.

Under the third measure of output loss, the coefficients on many of the financial policy aspect variables are significant. In countries with less banking supervision and regulations, the overall level of financial liberalization and several of the individual aspects are significantly related to more severe crises. An increase in the financial liberalization index of one index point is correlated with an increase in the measured output loss of 0.67 percentage points.<sup>18</sup> Additionally, credit controls are positively correlated with output loss as an increase in one index point is associated with an increase in the severity of the banking crisis by 0.07 percent of one standard deviation. Repression in the financial sector with high barriers to entry is correlated with an increase of 2.84 percentage points, or 0.05 standard deviations, in the measure of output loss when the banking sector has low to no supervision. Interestingly, in cases where barriers to entry are extremely high, an increase in banking supervision by one index point is correlated with a decrease in severity by 0.06 standard deviations lowering the average output loss to 41.8 percent. Similar to the results of the first measure of output loss, the non-linear banking supervision term reveals a diminishing impact

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<sup>18</sup>The overall measure of financial liberalization does not include the index for banking supervision. It is the aggregation of the remaining six aspects described in the data section of the paper.



of increasing the level of prudent banking regulation and supervision. Increasing the level of privatization in the banking sector in an economy with weak supervision is correlated with more severe banking crises by approximately 0.03 standard deviations. Similarly countries developing security markets in the absence of banking supervision are correlated with crises that are more severe by nearly 0.04 standard deviations. Examining the results of this specification, the primary result of the first model is strengthened. Here, it is found that liberalizing the financial sector in the presence of weak banking supervision and regulatory enforcement are associated with increased output losses.

The third model controls for changes in the overall index of financial liberalization when examining the correlation between the aggregated/disaggregated measures of financial liberalization and measured output losses. The resulting estimates are similar to those of the first model and are presented in Table 1.7. Again, the table is divided into three groupings each relating to the three measures of output loss. In each of the groupings, there are four rows. The coefficient in each row is the coefficient for the variable in the first column when the header of the column is the independent financial sector policy aspect. For example, the coefficient for entry barriers when using the first measure of output loss is -0.41. Thus the first row relates provides the coefficient for the financial liberalization component,  $\beta_i$ . The indicator variable for banking supervision equal to two, Banking (2), is significant at the one percent level for all measures of output loss. For the first loss measure, Banking (2) is correlated with less severe banking crisis of nearly a full standard deviation. For the second measure, this value increases to 1.12 standard deviations, and increases further to almost 1.5 standard deviations, for the third measure. The additional information gathered from this specification relates to changes in the overall level of financial liberalization. As noted, literature has found that banking crises are more likely to occur during the

years following financial sector liberalization. In fact, in 59 percent of the observed episodes, a reform or large reform had occurred in the two years prior to the dating of the banking crisis. The next three rows in the table provide the coefficients on the reform variables,  $\eta_i$ . For example, the coefficient on reform in 2 in the first row is 0.18 when privatization is the lone policy variable in the regression. For the first output loss measure, estimates relating a reform or large reform in the previous two years are insignificant, but the estimates relating reversals in the previous two years to the measure of output loss are positive and significant. Countries who decreased their level of financial liberalization in the years prior to the crisis occurring are correlated with increases in severity of approximately 10 percentage points. One explanation for such a strong positive correlation between reversals and output loss is that a country observes problems with their financial sector and tightens controls of the financial sector, but despite their efforts, the country ends up in a crisis. This could cause an endogeneity bias, and at this time, a good way of dealing with the bias is not available. The third output loss measure reveals a similar outcome as the estimates for a reversal in the previous two years are also significant and positive with values ranging from 18 to 23 percent of one standard deviation. While estimates for the second measure of output loss are not significant, the sign of all estimates are positive and similar in magnitude of the other two measures. With the widespread finding in the literature that increasing the level of financial liberalization increases the probability of a banking crisis occurring, it is interesting that none of the coefficients for “reform in 2” are significant. Thus, it can not be concluded that increasing the level of financial liberalization has a positive or negative impact on the severity of a crisis.

The fourth model incorporates an interaction term between the index for banking supervision and the reform variables. Results of this specification are presented in Table 1.8. Table 1.8 reads similar to Table 1.7. For the third measure of output

loss, [*Imputed HP*], the overall result mirrors those of the previous specifications. The estimated coefficients for banking supervision are negative in every estimation and significant in the majority of cases. Increasing the level of banking supervision and regulation by one index point is estimated to be related to decreased output loss of 67 to 71 percent of a standard deviation. The estimates for reform, large reform and reversal paint a similar picture as the results from the third model. For the first measure of output loss, reform and large reform remains insignificant, but in each set of regressions, the estimates are positive. Reversals in the two years prior to the crisis are shown to be positively correlated with output loss with estimated values that range from 0.82 to one standard deviations, nearly a 0.21 standard deviation increase from the model without interactions. The estimates for both reform variables remain positive but insignificant for the second output loss measure, and the only significant reversal estimate is in the regression where the independent variable is the overall measure of financial liberalization. Here, the presence of a reversal in the two years prior to the crisis is associated with an increase in the severity of the crisis by 37.18 percentage points or 1.1 standard deviations. While all of the other coefficients on reversal are insignificant, the magnitude of the effects are large as they range from 0.66 to 0.86 standard deviations. The “reversal in 2” remains significant and positive in the set of regressions for the third measure of output loss as the correlation between the reversal variable and output loss ranges from 0.47 and 0.58 standard deviations. The interaction terms between the variables for a reform during the two years prior and index for banking supervision in the period prior to the crisis are negative and significant in the the regressions were the independent variable is privatization and security markets. Thus, an increase in the level of banking supervision even in the absence of a reform is correlated with a decline in output loss of 0.14 standard deviations when the independent variable is privatization and when the independent

variable is the aspect relating to presence of security markets. Again, “Reform in 2” is not significant in any of the measures of output loss.

### 1.6.1 Robustness Check

To test the sensitivity of the above results to the specification of the model, two primary alterations are made. The first addresses the concern that credit booms prior to the crisis leads to higher than normal levels of investment. With elevated investment figures, the derived potential output measures will overstate the pre-crisis trend that the output loss measure is based upon. For this reason, two additional output loss figures were derived. One bases the pre-crisis trend over the period  $[t - 6, t - 2]$ , and the other is calculated over the period  $[t - 20, t - 2]$ . In general, the literature on output losses during financial crises censors the estimates at zero and reports output losses as positive values. In the second alteration, the data is not censored at zero. Thus, an output loss is negative while an output gain is positive. Making this change increases the variability of all measures of output loss and takes into account that output can rise over the crisis period.

#### 1.6.1.1 Changing Period

Table 1.9 includes the results of the two additional measures of output loss in addition to the three presented in above for the first model. Again, the indicator variable for banking supervision with a value of two is the only variable that is significant in this specification. For the measure based on the period  $[t - 6, t - 2]$ , the coefficient remains negative and significant, but increases in magnitude indicating that the highest observed level of banking supervision is correlated with less severe banking crises with the output loss declining by 1.07 standard deviations. For the

measure that uses the period  $[t - 20, t - 2]$  to calculate potential output, the results are similar. They are of the same sign and significance, but are larger by 0.1 standard deviations. Thus, the removal of the year prior to the banking crisis does not yield significant differences in the results of the first model.

The estimates for all five output losses are presented in Table 1.10. For the output loss derived from the period  $[t - 6, t - 2]$ , the results again are the same as the  $[t - 5, t - 1]$  but are larger in magnitude. The coefficient on banking supervision when the independent aspect variable is entry barriers is -9.82, an increase of half a standard deviation. The non-linear term on banking supervision is again negative and of larger magnitude. For the  $[t - 20, t - 2]$  output loss measure, the coefficient on banking supervision when privatization is the independent aspect variable becomes significant and remains negative. Thus, an increase in the index of banking supervision by one index point is correlated with a decrease in output loss by 0.42 standard deviations.

In estimating the third model, the coefficients on both the  $[t - 6, t - 2]$  and  $[t - 20, t - 2]$  measure of output loss yield similar conclusions as the  $[t - 5, t - 1]$  and  $[t - 20, t - 1]$  measures. Results can be found in Table 1.11 and reveal that Banking (2) remains significant and negative with each estimate gaining in magnitude. The largest difference is in the coefficient on the reversal indicator variable. When moving the window back from  $[t - 5, t - 1]$  to  $[t - 6, t - 2]$ , most of the estimates become insignificant with only the coefficient when entry barriers is the independent aspect measure is significant with a value of 12.79, nearly a 2 percentage point, or 0.1 standard deviation increase. However, the estimates are very similar in magnitude between the two measures, and the associated p-values are close to the 10 percent cut-off value. A similar analysis can be made for the fourth model as much of the difference is made in the coefficients on the reversal variable.

### 1.6.1.2 Non-censored output loss measures

Non-censored output loss figures take on both negative and positive values. A positive estimate implies that output is lost over the duration of the crisis while a negative estimate means that output is gained over the duration. Table 1.12 provides the results for the first model using the non-censored values as the dependent variable. For all three of the measures of output loss,  $[t - 5, t - 1]$ ,  $[t - 20, t - 1]$ , and  $[Imputed\ HP]$ , the coefficient on Banking (2) is large and negative meaning that banking supervision with an index of two is correlated negatively with output losses.<sup>19</sup> This result implies that countries with higher levels of banking supervision have banking crises that are less severe on average. The largest difference between the censored and non-censored output loss results is that other aspects of financial liberalization begin to show significance. In the output loss measure derived over the period  $[t - 20, t - 1]$ , the coefficient on the overall measure of financial liberalization is -3.24. Thus, an increase in the financial liberalization index of one index point is associated with a reduction in severity by 0.08 standard deviations. Entry barriers, International Capital Restrictions, and Security Markets also become significant with coefficients of -9.99, -9.75, and -11.45 respectively. Each of the variables are indexes that range from zero to three; thus, an increase in any of the financial liberalization aspect variables by one index point lessens the severity of a crisis by 0.25, 0.24, and 0.38 standard deviations respectively.

Table 1.13 provides the estimation results of the second model. For the output loss measure with potential output derived from the period  $[t - 20, t - 1]$ , the coefficient on banking supervision when entry barriers is the independent financial

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<sup>19</sup>Output loss figures based upon  $[t - 6, t - 2]$  and  $[t - 20, t - 2]$  were calculated and used for the non-censored estimations. Utilizing these two output loss variables did not create significant differences in the coefficients and significance levels of the variable of interest.

liberalization variable is positive and becomes significant at the 5% level. The same is true when the independent financial liberalization variable is privatization. Hence, increasing banking supervision by one index point while holding the entry barriers and privatization index values constant is correlated with a reduction in output loss by 0.66 standard deviations and 0.48 standard deviations, respectively. In terms of the output loss based upon the imputation of potential output from the Hodrick-Prescott smoothed series, the overall index of financial liberalization, privatization and security markets lose significance. All of the other significant estimates retain their correlation with output loss.

The third model, which incorporates the changes in financial liberalization, produces similar results to the estimation with the censored values of output loss. The results of this model are presented in Table 1.14. For all three output loss measures, Banking (2) remains significant and correlated with lower output losses. For the output loss measure based upon the  $[t - 20, t - 1]$  period, certain aspects of financial liberalization are found to be significant and to be correlated with a reduction in the severity of a banking crisis as well. Besides the overall measure of financial liberalization, those aspects include entry barriers, international capital restrictions, and security markets. For the first measure of output loss,  $[t - 5, t - 1]$ , only the reversal in the previous two years retains its significance with a value of 10.55. Thus, for countries who decrease their level of financial liberalization sometime during the previous two years, it is correlated with an increase in severity of 0.58 standard deviations. Compared to the estimated coefficient of the censored data, 0.75 standard deviations, the values differ by 0.17 standard deviations. For the output loss measure derived directly from the smoothed HPrescott series, all coefficients on reversal in two remain significant and the direction of correlation with the exception of the regression in which the independent financial liberalization aspect is entry barriers.

Table 1.15 reports the estimates of the fourth model with the non-censored calculated output losses. For the output loss derived from the pre-crisis period  $[t - 20, t - 1]$ , the coefficient on the overall level of financial liberalization and entry barriers becomes significant. A one index point increase in the overall financial liberalization index correlates to a 0.08 standard deviation reduction in the severity of a crisis. Where as a one index point increase in the measure of entry barriers is correlates to a 0.28 standard deviation decline in the loss of output. When the results of the regression using the output loss measure derived directly from the HPrescott smoothed series, all coefficient estimates for banking supervision are significant and exhibit the same magnitude and direction of correlation as the censored results further strengthening the importance of banking supervision. Reversal in two remains significant and negative in the estimation showing that reversals in the degree of financial liberalization is correlated with greater losses. A stark difference between the censored and non-censored measures of financial liberalization is the emergence of significance for the interaction between reform and banking supervision. In the estimations based upon the output losses based on  $[t - 5, t - 1]$  and  $[Imputed\ H\ P]$ , the interaction between reform and banking supervision is positive meaning that increasing the index value of banking supervision (adding additional banking supervision and regulations) while holding the overall level of financial liberalization constant is correlated with a reduction in the severity of the banking crises. For the  $[t - 5, t - 1]$  output loss measure, the values range from 0.64 to 0.68 standard deviations, and the range is between 0.17 and 0.19 standard deviations for the output loss measure imputed directly from the HPrescott series.



## 1.7 Conclusions

Research on financial liberalization finds that it leads to faster growth in the long run but more crises in the short-run. Schmukler and Kaminsky (2003) reveals that financial liberalization is followed by more pronounced boom-bust cycles stock market cycles in the short run, but in the long run, liberalization leads to more stable financial markets. Ranciere et al. (2006) find that after decomposing the effects of financial liberalization, the positive direct effect that it has on growth is greater than the negative indirect effect of the increased likelihood of a banking crisis occurring. Realizing that financial liberalization is good for an economy in the long-run, this project provides a detailed analysis of whether the liberalization of the financial sector dampens or exacerbates banking crises.

Using the aggregate measure of financial liberalization and its seven components, the correlation between financial sector liberalization and the severity of systemic banking crises is analyzed. The primary finding is that banking supervision and prudent regulation plays an important role in the liberalization of the financial sector with the more highly regulated economies suffering less from a loss in output. One possible explanation for this correlation is that adequate banking supervision and regulation is needed to control for the inherent increase in moral hazard from the liberalization of the financial sector as bank managers are less likely to act in a manner that pushes their banks into insolvency. Interestingly, the measure of output loss does not tend to matter in determining the importance of banking supervision as the different methods of calculating potential output are consistent on this matter. The greatest difference in the coefficients from the different measures lies in the magnitude of those estimates. When using the non-censored measures of output loss, banking supervision shows to be important in its interaction with the “reform in two”

variable. Here, increasing the level of banking supervision while holding the overall level of financial liberalization constant is correlated with a lower output loss.

There is weak evidence that liberalization in the financial sector in terms of credit controls, entry barriers, privatization, and security market development are correlated with greater output losses. Additionally, countries that reverse their level of financial liberalization in the years prior to the beginning of the crisis tend to suffer greater. No evidence is found to show that a correlation exists between reforms and output loss or large reforms and output loss even though a reform or large reform preceded a large fraction of the observed crises.

Given recent global macroeconomic events, interest in financial crises has reemerged. The quantity and frequency of articles in scholarly journals has increased, and books published about the causes and consequences banking crises such as Reinhardt and Rogoff's *This Time is Different* or Rajan's *Fault Lines* find their way into the popular media. Both the public and policy makers want to know what caused the dominoes to fall on this and past banking crises, and if the economy falls into a banking crisis, how severe will the crises be? Here, it is recognized that financial liberalization is a vital part of the growth process as it leads to more stable financial markets and faster growth in the future. Thus, the increased risk of banking crises is a necessary evil along the path of higher growth rates. From studies such as this, policymakers can see the aspects of the financial system that can be liberated, and how liberating certain areas can make crises more or less severe if they occur. For a problem that is largely the result of asymmetric information, theory has predicted and this paper has shown that any liberalization of the financial sector without proper banking supervision can lead to banking crises that are far worse than those with more supervision. Governments can surmise that unbridled liberalization can make the short-run pain greater.

# Appendices

## Appendix A Components of the Financial Liberalization Measure

The measure of financial liberalization is constructed of seven financial sector policy aspects. Each of the policy aspects receive a graded score from zero to three. The scores are then added to reach an overall score between zero and 21 with the higher the score representing the higher the level of financial liberalization. As in Abiad et al. (2008), each of the seven financial sector policy aspects are described below.

- **Credit Controls:** How restrictive are the reserve requirements? Countries with higher reserve requirements are considered to be more financially repressed. Are there minimum amounts of credit that must directed to certain sectors of the economy? Is credit supplied to certain sector subsidized?
- **Interest Rate Controls:** Are interest rates subject to a binding ceiling, or are they fully determined in the market. The more financially liberalized systems will allow for interest rates to be determined in the financial markets.
- **Entry Barriers to the Banking Sector:** Questions if foreign banks are allowed to enter the industry, if the government allows new domestic banks, are there restrictions on branching, and in which activities will the government allow the banks to engage.
- **Banking Supervision and Prudent Regulation:** In determining the score for this aspect, ? ask the following questions: Is the banking supervisory agency independent from executive's influence? Has the country adopted a capital

adequacy ratio based on the Basle standard? Does the supervisory agency conduct the supervision through on- and off-site evaluations? Are all financial institutions subject to the supervisory agency?

- **Privatization:** The score for this category depends on the percentage of state owned banks.
- **International Capital Restrictions:** Is there a special exchange rate for capital or current account transactions? Are there any restrictions on capital outflows? Are there any restrictions on capital outflows?
- **Security Markets:** Does the economy have securities markets? How advanced are those markets, and is their equity market open to foreign investors?

## 1.2 Figures

Figure 1.1: LN Per Capita Real GDP and Hodrick-Prescott Smoothed LN Per Capita Real GDP, Finland: 1973 - 2005.

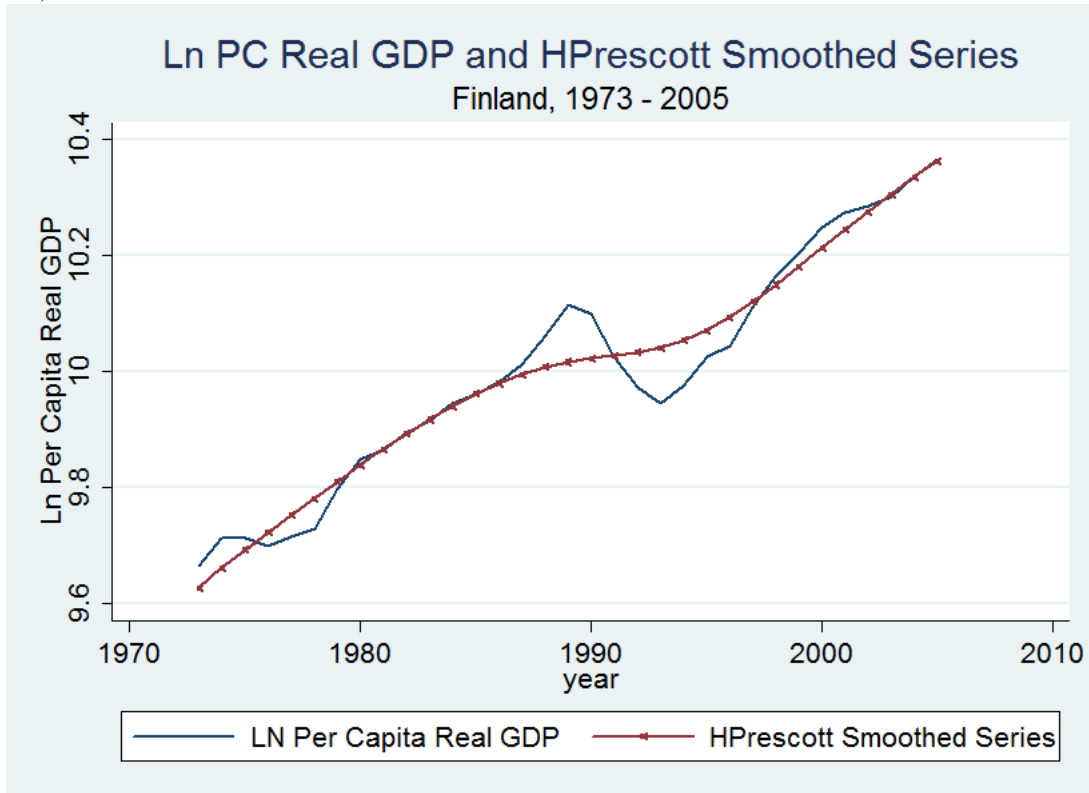
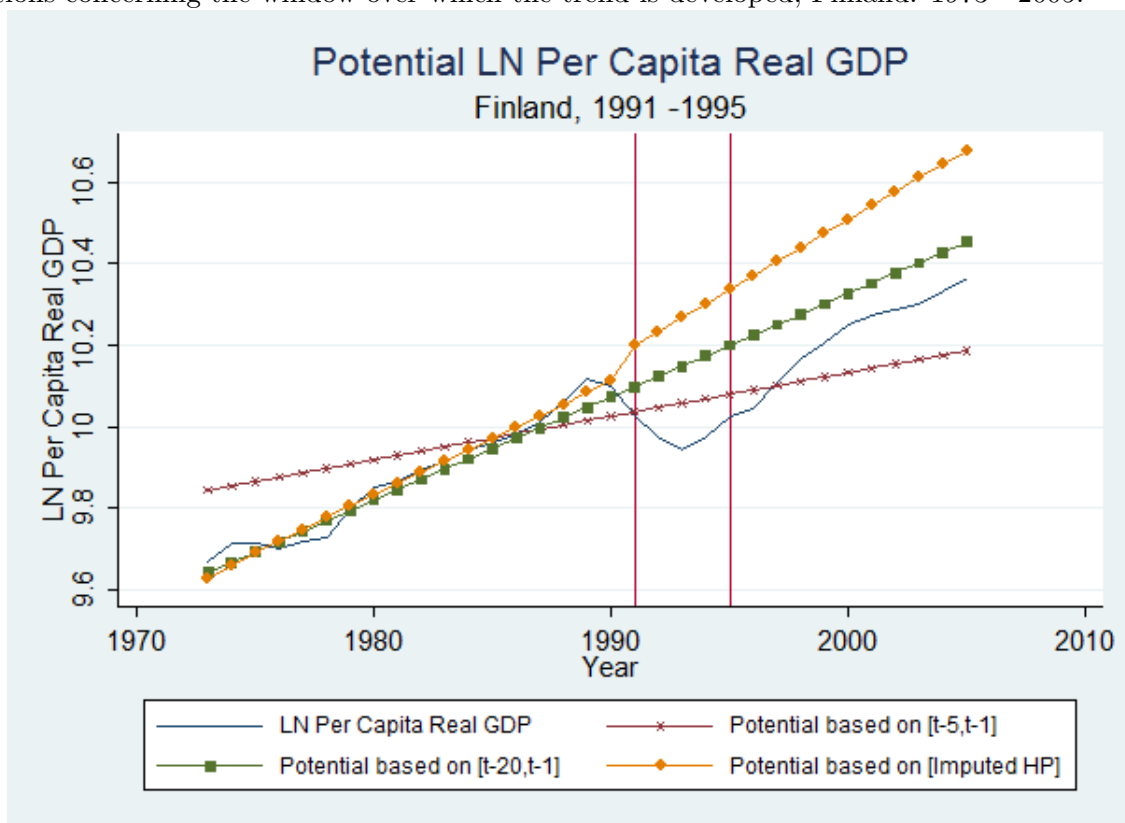


Figure 1.2: The calculations of the pre-crisis trends based upon the three primary assumptions concerning the window over which the trend is developed, Finland: 1973 - 2005.



## 1.3 Tables



Table 1.1: List of Countries and Dates of Systemic Banking Crises

Country	Start Year	End Year	Duration	Country	Start Year	End Year	Duration
Algeria	1990	1994	5	Madagascar	1988	1988	1
Argentina	1980	1982	3	Malaysia	1997	1999	3
Argentina	1989	1991	3	Mexico	1981	1985	5
Argentina	1995	1995	1	Mexico	1994	1996	3
Argentina	2001	2003	3	Morocco	1980	1984	5
Bangladesh	1987	1987	1	Mozambique	1987	1991	5
Bolivia	1986	1986	1	Nepal	1988	1988	1
Bolivia	1994	1994	1	Nicaragua	1990	1993	4
Brazil	1990	1994	5	Nicaragua	2000	2001	2
Brazil	1994	1998	5	Nigeria	1991	1995	5
Bulgaria	1996	1997	2	Norway	1991	1993	3
Cameroon	1987	1991	5	Paraguay	1995	1995	1
Cameroon	1995	1997	3	Peru	1983	1983	1
Chile	1976	1976	1	Philippines	1983	1986	4
Chile	1981	1985	5	Philippines	1997	2001	5
China	1998	1998	1	Poland	1992	1994	3
Colombia	1982	1982	1	Senegal	1988	1991	4
Colombia	1998	2000	3	Spain	1977	1981	5
Costa Rica	1987	1991	5	Sri Lanka	1989	1991	3
Costa Rica	1994	1995	2	Sweden	1991	1995	5
Ecuador	1982	1986	5	Tanzania	1987	1988	2
Ecuador	1998	2002	5	Thailand	1983	1983	1
Egypt	1980	1980	1	Thailand	1997	2000	4
El Salvador	1989	1990	2	Tunisia	1991	1991	1
Finland	1991	1995	5	Turkey	1982	1984	3
Ghana	1982	1983	2	Turkey	2000	2001	2
India	1993	1993	1	Uganda	1994	1994	1
Indonesia	1997	2001	5	Ukraine	1998	1999	2
Israel	1977	1977	1	United States	1988	1988	1
Jamaica	1996	1998	3	Uruguay	1981	1985	5
Japan	1997	2001	5	Uruguay	2002	2005	4
Jordan	1989	1991	3	Venezuela	1994	1998	5
Kenya	1985	1985	1	Vietnam	1997	1997	1
Kenya	1992	1994	3	Zimbabwe	1995	1999	5
Korea	1997	1998	2				

<sup>a</sup> Identification and dates determined by Laeven and Valencia (2010).

<sup>b</sup> Crises with duration longer than five years are truncated at 5 years.

Table 1.2: Measured Output Loss Estimates

Country	Beginning	Ending	Output Loss		
	Year	Year	[t-5,t-1]	[t-20,t-1]	Imputed
Algeria	1990	1994	13.86	82.43	99.42
Argentina	1980	1982	5.52	32.68	38.22
Argentina	1989	1991	17.16	31.60	68.28
Argentina	1995	1995	0.00	0.00	0.20
Argentina	2001	2003	25.42	10.74	24.96
Bangladesh	1987	1987	0.64	0.00	0.00
Bolivia	1986	1986	6.92	16.58	21.51
Bolivia	1994	1994	0.00	0.00	0.50
Brazil	1990	1994	11.94	100.41	195.85
Brazil	1994	1998	0.00	15.57	160.90
Bulgaria	1996	1997	10.16	43.05	69.38
Cameroon	1987	1991	57.84	132.53	109.71
Cameroon	1995	1997	0.75	77.66	121.70
Chile	1976	1976	12.89	20.64	21.12
Chile	1981	1985	1.91	14.96	42.61
China	1998	1998	0.05	0.00	0.00
Colombia	1982	1982	0.00	1.68	0.76
Colombia	1998	2000	0.00	0.00	0.00
Costa Rica	1987	1991	0.00	58.16	103.53
Costa Rica	1994	1995	0.00	0.00	7.07
Ecuador	1982	1986	48.25	93.60	75.92
Ecuador	1998	2002	5.43	0.00	131.91
Egypt	1980	1980	2.17	0.00	0.00
El Salvador	1989	1990	0.67	4.00	26.83
Finland	1991	1995	34.62	80.12	139.09
Ghana	1982	1983	4.32	37.62	42.94
India	1993	1993	3.03	1.70	0.00
Indonesia	1997	2001	43.12	68.48	101.03
Israel	1977	1977	6.25	13.54	17.06
Jamaica	1996	1998	0.86	0.00	0.00
Japan	1997	2001	15.48	52.54	188.70
Jordan	1989	1991	37.67	95.69	97.89
Kenya	1985	1985	7.15	6.88	8.05
Kenya	1992	1994	9.41	6.64	10.01
Korea	1997	1998	9.97	16.52	0.00

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<sup>a</sup> All values are in percentages.

Table 1.2: Measured Output Loss Estimates  
(continued)

Country	Beginning	Ending	Output Loss		
	Year	Year	[t-5,t-1]	[t-20,t-1]	Imputed
Madagascar	1988	1988	0.00	0.00	0.00
Malaysia	1997	1999	7.26	0.00	9.75
Mexico	1981	1985	12.95	35.89	33.05
Mexico	1994	1996	3.54	12.43	63.03
Morocco	1980	1984	32.45	80.19	109.00
Mozambique	1987	1991	0.00	14.97	47.16
Nepal	1988	1988	0.00	0.00	0.00
Nicaragua	1990	1993	26.20	93.33	216.38
Nicaragua	2000	2001	0.00	0.00	13.46
Nigeria	1991	1995	0.00	0.00	71.50
Norway	1991	1993	6.17	16.07	26.77
Paraguay	1995	1995	0.19	11.58	18.99
Peru	1983	1983	9.55	20.72	28.31
Philippines	1983	1986	25.05	57.40	66.09
Philippines	1997	2001	0.00	0.00	40.60
Poland	1992	1994	7.79	18.72	28.11
Senegal	1988	1991	0.00	0.00	0.00
Spain	1977	1981	26.77	103.68	120.99
Sri Lanka	1989	1991	6.92	10.80	10.68
Sweden	1991	1995	13.66	24.61	73.47
Tanzania	1987	1988	0.00	3.09	16.03
Thailand	1983	1983	3.02	3.58	5.43
Thailand	1997	2000	41.17	65.57	55.15
Tunisia	1991	1991	0.00	4.20	11.17
Turkey	1982	1984	7.16	25.12	25.53
Turkey	2000	2001	6.72	6.77	13.80
Uganda	1994	1994	0.00	0.00	0.00
Ukraine	1998	1999	13.78	13.78	0.00
United States	1988	1988	0.00	0.00	0.00
Uruguay	1981	1985	40.36	19.40	7.38
Uruguay	2002	2005	36.28	59.37	24.03
Venezuela	1994	1998	0.00	0.00	48.41
Vietnam	1997	1997	0.00	0.00	0.00
Zimbabwe	1995	1999	0.00	0.00	0.00

<sup>a</sup> All values are in percentages.

Table 1.3: Complete Set - Measured Output Loss Estimates

Country	Beginning Year	Ending Year	Output Loss				Imputed
			[t-5,t-1]	[t-6,t-2]	[t-20,t-1]	[t-20,t-2]	
Algeria	1990	1994	13.86	22.10	82.43	93.04	99.42
Argentina	1980	1982	5.52	10.31	32.68	37.29	38.22
Argentina	1989	1991	17.16	13.42	31.60	34.30	68.28
Argentina	1995	1995	0.00	0.00	0.00	0.00	0.20
Argentina	2001	2003	25.42	27.76	10.74	7.83	24.96
Bangladesh	1987	1987	0.64	0.29	0.00	0.00	0.00
Bolivia	1986	1986	6.92	7.01	16.58	18.41	21.51
Bolivia	1994	1994	0.00	0.00	0.00	0.00	0.50
Brazil	1990	1994	11.94	14.21	100.41	115.32	195.85
Brazil	1994	1998	0.00	0.00	15.57	21.70	160.90
Bulgaria	1996	1997	10.16	9.47	43.05	49.08	69.38
Cameroon	1987	1991	57.84	87.71	132.53	142.93	109.71
Cameroon	1995	1997	0.75	0.00	77.66	91.25	121.70
Chile	1976	1976	12.89	13.37	20.64	22.13	21.12
Chile	1981	1985	1.91	0.00	14.96	17.91	42.61
China	1998	1998	0.05	0.00	0.00	0.00	0.00
Colombia	1982	1982	0.00	0.54	1.68	2.09	0.76
Colombia	1998	2000	0.00	0.00	0.00	0.00	0.00
Costa Rica	1987	1991	0.00	0.00	58.16	69.45	103.53
Costa Rica	1994	1995	0.00	0.00	0.00	0.00	7.07
Ecuador	1982	1986	48.25	71.84	93.60	99.24	75.92
Ecuador	1998	2002	5.43	4.12	0.00	0.00	131.91
Egypt	1980	1980	2.17	0.52	0.00	0.00	0.00
El Salvador	1989	1990	0.67	0.00	4.00	4.79	26.83
Finland	1991	1995	34.62	43.04	80.12	87.15	139.09
Ghana	1982	1983	4.32	4.41	37.62	43.72	42.94
India	1993	1993	3.03	3.16	1.70	1.43	0.00
Indonesia	1997	2001	43.12	57.96	68.48	72.16	101.03
Israel	1977	1977	6.25	8.52	13.54	14.98	17.06
Jamaica	1996	1998	0.86	3.43	0.00	0.00	0.00
Japan	1997	2001	15.48	22.89	52.54	57.92	188.70
Jordan	1989	1991	37.67	46.52	95.69	105.01	97.89
Kenya	1985	1985	7.15	7.08	6.88	6.80	8.05
Kenya	1992	1994	9.41	11.17	6.64	6.22	10.01
Korea	1997	1998	9.97	13.41	16.52	17.62	0.00

<sup>a</sup> All values are in percentages.

Table 1.3: Measured Output Loss Estimates (continued)

Country	Beginning	Ending	Output Loss				Imputed
	Year	Year	[t-5,t-1]	[t-6,t-2]	[t-20,t-1]	[t-20,t-2]	
Madagascar	1988	1988	0.00	0.00	0.00	0.00	0.00
Malaysia	1997	1999	7.26	11.58	0.00	0.00	9.75
Mexico	1981	1985	12.95	22.23	35.89	39.40	33.05
Mexico	1994	1996	3.54	0.94	12.43	14.38	63.03
Morocco	1980	1984	32.45	44.91	80.19	88.01	109.00
Mozambique	1987	1991	0.00	0.00	14.97	25.11	47.16
Nepal	1988	1988	0.00	0.00	0.00	0.00	0.00
Nicaragua	1990	1993	26.20	35.42	93.33	104.21	216.38
Nicaragua	2000	2001	0.00	0.00	0.00	0.00	13.46
Nigeria	1991	1995	0.00	0.00	0.00	0.00	71.50
Norway	1991	1993	6.17	6.15	16.07	17.79	26.77
Paraguay	1995	1995	0.19	0.63	11.58	13.86	18.99
Peru	1983	1983	9.55	10.62	20.72	22.94	28.31
Philippines	1983	1986	25.05	35.50	57.40	62.31	66.09
Philippines	1997	2001	0.00	0.00	0.00	0.00	40.60
Poland	1992	1994	7.79	4.72	18.72	20.86	28.11
Senegal	1988	1991	0.00	0.00	0.00	0.00	0.00
Spain	1977	1981	26.77	41.01	103.68	115.57	120.99
Sri Lanka	1989	1991	6.92	8.08	10.80	11.35	10.68
Sweden	1991	1995	13.66	17.70	24.61	26.34	73.47
Tanzania	1987	1988	0.00	0.00	3.09	4.36	16.03
Thailand	1983	1983	3.02	2.95	3.58	3.68	5.43
Thailand	1997	2000	41.17	55.97	65.57	69.02	55.15
Tunisia	1991	1991	0.00	0.00	4.20	5.10	11.17
Turkey	1982	1984	7.16	9.17	25.12	28.07	25.53
Turkey	2000	2001	6.72	7.14	6.77	6.76	13.80
Uganda	1994	1994	0.00	0.00	0.00	0.00	0.00
Ukraine	1998	1999	13.78	10.74	13.78	10.74	0.00
United States	1988	1988	0.00	0.00	0.00	0.00	0.00
Uruguay	1981	1985	40.36	50.26	19.40	15.67	7.38
Uruguay	2002	2005	36.28	41.63	59.37	62.38	24.03
Venezuela	1994	1998	0.00	0.00	0.00	0.00	48.41
Vietnam	1997	1997	0.00	0.00	0.00	0.00	0.00
Zimbabwe	1995	1999	0.00	0.00	0.00	0.00	0.00

<sup>a</sup> All values are in percentages.

Table 1.4: Descriptive Statistics

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Financial Reform Index	69	8.45	5.30	0	18
Credit Controls	69	1.24	0.92	0	3
Interest Rate Controls	69	1.78	1.24	0	3
Entry Barriers	69	1.55	1.09	0	3
Banking Supervision	69	0.32	0.56	0	2
Privatization	69	0.99	1.05	0	3
Int'l Capital Restrictions	69	1.43	1.17	0	3
Security Markets	69	1.14	0.97	0	3
Banking0	69	0.73	0.45	0	1
Banking1	69	0.23	0.43	0	1
Banking2	69	0.04	0.21	0	1
Reform in Two	69	0.43	0.50	0	1
Large Reform in Two	69	0.16	0.37	0	1
Reversal in Two	69	0.06	0.234	0	1
Status Quo in Two	69	0.35	0.48	0	1
Output Loss [t-5,t-1]	69	10.44	14.10	0	57.84
Output Loss [t-6,t-2]	69	13.36	19.57	0	87.71
Output Loss [t-20,t-1]	69	26.34	33.61	0	132.53
Output Loss [t-20,t-2]	69	29.10	37.14	0	142.93
Output Loss [Imputed HP]	69	45.06	53.46	0	216.38
Non-Censored Output Loss [t-5,t-1]	69	7.23	18.30	57.84	47.66
Non-Censored Output Loss [t-6,t-2]	69	9.18	24.52	87.71	54.55
Non-Censored Output Loss [t-20,t-1]	69	20.16	40.66	132.53	62.06
Non-Censored Output Loss [t-20,t-2]	69	22.21	44.99	142.93	68.91
Non-Censored Output Loss [Imputed HP]	69	42.29	56.37	216.38	48.57
Per Capita Real GDP (Log)	69	8.27	1.09	5.42	10.38
Growth Rate Output	69	1.78	5.32	-15.32	21.02
Current Account/Output (CA/Y)	69	-104.47	12.30	-139.05	-71.34
% $\Delta$ CA/Y	69	-0.50	3.55	-15.70	7.97
Inflation	69	317.07	1530.99	-4.10	11749.60
% $\Delta$ Exchange Rate	69	226.86	837.98	-18.04	4736.73
Previous Crisis	69	0.25	0.43	0	1

<sup>a</sup> All variables are pre-crisis values.

Table 1.5: Model 1: Dependent Variable - Output Loss (Censored)

	OL [t-5,t-1]		OL [t-20,t-1]		OL [Imputed HP]	
	Solo	All	Solo	All	Solo	All
Financial Liberalization (Overall)	0.15 (0.76)		-1.47 (0.27)		-1.32 (0.41)	
Credit Controls	0.78 (0.78)	0.50 (0.89)	-5.33 (0.37)	-0.48 (0.94)	-4.00 (0.67)	0.48 (0.96)
Interest Rate Controls	1.10 (0.63)	0.10 (0.97)	-3.32 (0.54)	-2.52 (0.66)	-5.60 (0.38)	-8.95 (0.28)
Entry Barriers	0.53 (0.81)	-0.96 (0.72)	-5.34 (0.36)	-5.58 (0.38)	0.47 (0.95)	-0.24 (0.98)
Banking (1)	0.07 (0.99)	-0.40 (0.93)	-4.76 (0.66)	1.71 (0.88)	-16.00 (0.29)	-19.34 (0.22)
Banking (2)	<b>-14.40***</b> <b>(0.00)</b>	<b>-16.51***</b> <b>(0.01)</b>	<b>-38.03***</b> <b>(0.01)</b>	<b>-41.12***</b> <b>(0.01)</b>	<b>-78.92**</b> <b>(0.01)</b>	<b>-85.76***</b> <b>(0.01)</b>
Privatization	-0.08 (0.96)	-0.91 (0.61)	-1.19 (0.74)	0.32 (0.93)	-0.46 (0.93)	-0.20 (0.97)
Int'l Capital Restrictions	0.94 (0.53)	1.11 (0.70)	-2.63 (0.52)	3.08 (0.55)	-7.51 (0.26)	-5.77 (0.45)
Security Markets	0.90 (0.64)	1.29 (0.55)	-6.71 (0.22)	-3.83 (0.44)	1.06 (0.89)	12.23 (0.19)

<sup>a</sup> p-values are provided in parentheses.

<sup>b</sup> Cluster-robust standard errors calculated.

<sup>c</sup> \* p > 10 percent, \*\* p > 5 percent, \*\*\* p > 1 percent.

<sup>d</sup> Dependent variable is valued as a percent.

<sup>e</sup> Macro/Region controls are not reported.

Table 1.6: Model 2: Dependent Variable - Output Loss (Censored) - Financial Liberalization Variables Interacted with Banking Supervision

	OL [t-5,t-1]			OL [t-20,t-1]			OL [Imputed HP]		
	Coefficient	Banking Supervision Coefficient	Coefficient on Interaction Term	Coefficient	Banking Supervision Coefficient	Coefficient on Interaction Term	Coefficient	Banking Supervision Coefficient	Coefficient on Interaction Term
Financial Liberalization (Overall)	0.46 (0.43)	-2.26 (0.73)	-0.20 (0.70)	-0.73 (0.61)	0.34 (0.99)	-0.97 (0.53)	<b>0.67**</b> (0.01)	-1.13 (0.64)	-0.10 (0.66)
Credit Controls	1.70 (0.61)	-2.23 (0.73)	-0.99 (0.75)	-1.90 (0.78)	-2.25 (0.89)	-5.03 (0.52)	<b>3.92**</b> (0.01)	-1.64 (0.59)	-0.22 (0.90)
Interest Rate Controls	1.31 (0.58)	-2.10 (0.70)	-0.72 (0.72)	-1.90 (0.71)	-1.94 (0.89)	-4.96 (0.35)	1.78 (0.12)	0.06 (0.98)	-0.51 (0.67)
Entry Barriers	0.09 (0.97)	<b>-7.28*</b> (0.05)	2.10 (0.24)	-6.02 (0.36)	-17.44 (0.11)	4.40 (0.35)	<b>2.84***</b> (0.00)	<b>-3.26**</b> (0.04)	0.74 (0.47)
Banking Supervision	7.34 (0.32)		<b>-7.27*</b> (0.06)	9.49 (0.67)		-14.25 (0.26)	1.74 (0.72)		<b>-2.71*</b> (0.10)
Privatization	0.59 (0.75)	-2.57 (0.56)	-0.77 (0.73)	-0.77 (0.86)	-13.70 (0.11)	1.49 (0.79)	<b>1.54*</b> (0.08)	2.53 (0.50)	-0.72 (0.71)
Int'l Capital Restrictions	2.27 (0.21)	2.70 (0.74)	-3.39 (0.27)	1.40 (0.73)	13.44 (0.51)	-11.90 (0.15)	0.62 (0.57)	0.33 (0.95)	-0.38 (0.82)
Security Markets	2.23 (0.36)	-0.81 (0.89)	-2.17 (0.47)	-3.49 (0.55)	1.83 (0.91)	-6.58 (0.40)	<b>1.99*</b> (0.10)	-1.30 (0.69)	-1.78 (0.49)

<sup>a</sup> p-values are provided in parentheses.

<sup>b</sup> Cluster-robust standard errors calculated.

<sup>c</sup> \* p i 10 percent, \*\* p i 5 percent, \*\*\* p i 1 percent.

<sup>d</sup> The Variable Financial Liberalization (Overall) does not include the aspect that relates to banking supervision.

<sup>e</sup> Dependent variable is valued as a percent.

<sup>f</sup> Macro/Region controls are not reported.





Table 1.8: Model 4: Dependent Variable - Output Loss (Censored)

	Financial Liberalization Index	Credit Controls	Interest Rate Controls	Entry Barriers	Banking Supervision	Privatization	Capital Restrictions	Security Markets
	Dependent Variable: OL [t-5,t-1]							
$FL_{it-1}$	0.16 (0.78)	-0.06 (0.99)	0.21 (0.93)	-0.31 (0.90)	-1.64 (0.67)	0.46 (0.76)	1.20 (0.49)	0.95 (0.68)
Banking Supervision	-1.94 (0.59)	-1.62 (0.66)	-1.71 (0.65)	-1.55 (0.67)	-1.64 (0.67)	-1.58 (0.52)	-2.54 (0.60)	-1.93 (0.60)
Reform in 2	2.06 (0.73)	1.75 (0.77)	1.68 (0.78)	1.78 (0.76)	1.75 (0.76)	1.71 (0.77)	1.56 (0.79)	1.84 (0.76)
Reform in 2 x Banking Supervision	-8.43 (0.15)	-6.68 (0.26)	-6.54 (0.27)	-6.74 (0.26)	-6.66 (0.27)	-6.96 (0.25)	-6.39 (0.28)	-6.93 (0.26)
Large Reform in 2	3.68 (0.71)	4.00 (0.63)	3.66 (0.68)	4.05 (0.63)	3.99 (0.63)	3.85 (0.71)	3.18 (0.65)	3.34 (0.69)
Large Reform x Banking Supervision	1.85 (0.90)	3.84 (0.71)	4.04 (0.67)	4.05 (0.70)	3.79 (0.68)	3.54 (0.71)	4.96 (0.60)	4.04 (0.66)
Reversal in 2	<b>13.79*</b> (0.07)	<b>13.56**</b> (0.04)	<b>13.30*</b> (0.05)	<b>13.85**</b> (0.03)	<b>13.53**</b> (0.05)	<b>14.15*</b> (0.07)	<b>11.56*</b> (0.08)	<b>13.10**</b> (0.04)
Reversal x Banking Supervision	-7.68 (0.50)	-5.14 (0.59)	-4.87 (0.61)	-5.08 (0.61)	-5.12 (0.60)	-6.02 (0.57)	-3.21 (0.73)	-5.87 (0.58)
	Dependent Variable: OL [Imputed HP]							
$FL_{it-1}$	<b>0.47*</b> (0.07)	<b>2.99**</b> (0.04)	1.11 (0.36)	<b>2.27**</b> (0.02)	1.85 (0.59)	0.75 (0.34)	-0.10 (0.92)	1.26 (0.28)
Banking Supervision	0.96 (0.76)	0.94 (0.75)	1.46 (0.66)	1.17 (0.70)	1.85 (0.59)	1.94 (0.58)	1.93 (0.58)	1.46 (0.65)
Reform in 2	0.96 (0.69)	1.05 (0.66)	0.66 (0.81)	0.87 (0.72)	1.04 (0.68)	0.98 (0.70)	1.06 (0.68)	1.15 (0.65)
Reform in 2 x Banking Supervision	-5.77 (0.19)	-6.10 (0.13)	-6.33 (0.14)	-6.47 (0.13)	-7.01 (0.11)	<b>-7.50*</b> (0.10)	-7.03 (0.11)	<b>-7.36*</b> (0.10)
Large Reform in 2	1.78 (0.65)	1.62 (0.65)	0.58 (0.89)	1.86 (0.57)	2.31 (0.53)	2.10 (0.57)	2.38 (0.53)	1.45 (0.70)
Large Reform x Banking Supervision	-5.46 (0.46)	-2.40 (0.77)	1.61 (0.85)	-1.61 (0.78)	0.29 (0.97)	-0.12 (0.99)	0.19 (0.98)	0.61 (0.94)
Reversal in 2	<b>17.95***</b> (0.00)	<b>16.43***</b> (0.00)	<b>17.14***</b> (0.00)	<b>15.95***</b> (0.00)	<b>18.37***</b> (0.00)	<b>19.38***</b> (0.00)	<b>18.54***</b> (0.00)	<b>17.81***</b> (0.00)
Reversal x Banking Supervision	-12.98 (0.11)	-9.59 (0.12)	-9.40 (0.21)	-10.98 (0.16)	-10.70 (0.18)	-12.17 (0.14)	-10.86 (0.18)	-11.69 (0.13)

<sup>a</sup> p-values are provided in parentheses.

<sup>b</sup> Cluster-robust standard errors calculated.

<sup>c</sup> \* p < 10 percent, \*\* p < 5 percent, \*\*\* p < 1 percent.

<sup>d</sup> Dependent variable is valued as a percent.

<sup>e</sup> Macro/Region controls are not reported.

Table 1.9: Model 1 - Dependent Variable - Output Loss (Censored) - Full Set

	OL [t-5,t-1]		OL [t-6,t-2]		OL [t-20,t-1]		OL [t-20,t-2]		OL [Imputed HP]	
	Solo	All	Solo	All	Solo	All	Solo	All	Solo	All
Financial Liberalization (Overall)										
Credit Controls	0.15 (0.76)	0.50 (0.89)	0.01 (0.99)	-0.29 (0.95)	-1.47 (0.27)	-0.48 (0.94)	-1.78 (0.22)	-0.78 (0.91)	-1.32 (0.41)	0.48 (0.96)
Interest Rate Controls	0.78 (0.78)	0.10 (0.97)	-0.16 (0.97)	-0.55 (0.88)	-5.33 (0.37)	-2.52 (0.66)	-6.55 (0.31)	-3 (0.64)	-4.00 (0.67)	-8.95 (0.24)
Entry Barriers	1.10 (0.63)	0.10 (0.97)	0.72 (0.82)	-2.43 (0.55)	-3.32 (0.54)	-5.58 (0.38)	-4.2 (0.48)	-6.37 (0.36)	0.47 (0.95)	-0.24 (0.98)
Banking (1)	0.53 (0.81)	-0.96 (0.72)	-0.29 (0.93)	0.83 (0.90)	-5.34 (0.36)	1.71 (0.88)	-6.44 (0.31)	1.9 (0.88)	-16.00 (0.29)	-19.34 (0.22)
Banking (2)	0.07 (0.99)	-0.40 (0.93)	0.5 (0.93)	0.83 (0.90)	-4.76 (0.66)	1.71 (0.88)	-5.85 (0.63)	1.9 (0.88)	-16.00 (0.29)	-19.34 (0.22)
Privatization	<b>-14.40***</b> (0.00)	<b>-16.51***</b> (0.01)	<b>-20.89***</b> (0.00)	<b>-24.70***</b> (0.00)	<b>-38.03***</b> (0.01)	<b>-41.12***</b> (0.01)	<b>-41.52***</b> (0.01)	<b>-44.74***</b> (0.01)	<b>-78.92***</b> (0.01)	<b>-85.76***</b> (0.01)
Int'l Capital Restrictions	-0.08 (0.96)	-0.91 (0.61)	-0.25 (0.91)	-1.3 (0.60)	-1.19 (0.74)	0.32 (0.93)	-1.51 (0.70)	0.43 (0.92)	-0.46 (0.93)	-0.20 (0.97)
Security Markets	0.94 (0.53)	1.11 (0.70)	1.29 (0.53)	2.64 (0.50)	-2.63 (0.52)	3.08 (0.55)	-3.48 (0.44)	3.15 (0.57)	-7.51 (0.26)	-5.77 (0.45)
	0.90 (0.64)	1.29 (0.55)	0.47 (0.86)	1.52 (0.61)	-6.71 (0.22)	-3.83 (0.44)	-7.98 (0.19)	-4.4 (0.43)	1.06 (0.89)	12.23 (0.19)

<sup>a</sup> p-values are provided in parentheses.

<sup>b</sup> Cluster-robust standard errors calculated.

<sup>c</sup> \* p i 10 percent, \*\* p i 5 percent, \*\*\* p i 1 percent.

<sup>d</sup> Dependent variable is valued as a percent.

<sup>e</sup> Macro/Region controls are not reported.

Table 1.10: Model 2 fixed full set - Financial Liberalization Variables Interacted with Banking Supervision (Censored)

	OL [t-5,t-1]			OL [t-6,t-2]		
	Coefficient	Banking Supervision Coefficient	Coefficient on Interaction Term	Coefficient	Banking Supervision Coefficient	Coefficient on Interaction Term
Financial Liberalization (Overall)	0.46 (0.43)	-2.26 (0.73)	-0.20 (0.70)	0.4 (0.63)	-2.92 (0.76)	
Credit Controls	1.70 (0.61)	-2.23 (0.73)	-0.99 (0.75)	1.13 (0.81)	-2.47 (0.79)	-1.54 (0.73)
Interest Rate Controls	1.31 (0.58)	-2.10 (0.70)	-0.72 (0.72)	0.96 (0.77)	-3.36 (0.65)	-0.78 (0.78)
Entry Barriers	0.09 (0.97)	<b>-7.28*</b> (0.05)	2.10 (0.24)	-0.96 (0.81)	<b>-9.82*</b> (0.09)	2.96 (0.28)
Banking Supervision	7.34 (0.32)		<b>-7.27*</b> (0.06)	11.44 (0.27)	-0.25 (0.74)	<b>-10.94**</b> (0.05)
Privatization	0.59 (0.75)	-2.57 (0.56)	-0.77 (0.73)	0.27 (0.92)	-4.75 (0.40)	-0.16 (0.96)
Int'l Capital Restrictions	2.27 (0.21)	2.70 (0.74)	-3.39 (0.27)	3.15 (0.21)	3.93 (0.72)	-4.79 (0.26)
Security Markets	2.23 (0.36)	-0.81 (0.89)	-2.17 (0.47)	2.26 (0.49)	-0.45 (0.96)	-3.16 (0.45)

<sup>a</sup> The Variable Financial Liberalization (Overall) does not include the aspect that relates to banking supervision.

<sup>b</sup> p-values are provided in parentheses.

<sup>c</sup> Cluster-robust standard errors calculated.

<sup>d</sup> \* p i 10 percent, \*\* p i 5 percent, \*\*\* p i 1 percent.

<sup>e</sup> Dependent variable is valued as a percent.

<sup>f</sup> Macro/Region controls are not reported.

Table 1.10: Model 2 Full Set - Financial Liberalization Variables Interacted with Banking Supervision  
(Censored) (continued)

	OL [-20,t-1]		OL [-20,t-2]		OL [Imputed HP]	
	Coefficient	Banking Supervision on Interaction Term	Coefficient	Banking Supervision on Interaction Term	Coefficient	Banking Supervision on Interaction Term
Financial Liberalization (Overall)	-0.73 (0.61)	0.34 (0.99)	-0.99 (0.53)	0.63 (0.98)	<b>0.67**</b> (0.01)	-1.13 (0.64)
Credit Controls	-1.90 (0.78)	-2.25 (0.89)	-2.74 (0.71)	-2.35 (0.90)	<b>3.92**</b> (0.01)	-1.64 (0.59)
Interest Rate Controls	-1.90 (0.71)	-1.94 (0.89)	-2.58 (0.65)	-1.99 (0.90)	1.78 (0.12)	0.06 (0.98)
Entry Barriers	-6.02 (0.36)	-17.44 (0.11)	-7.17 (0.32)	-19.15 (0.11)	<b>2.84***</b> (0.00)	<b>-3.26**</b> (0.04)
Banking Supervision	9.49 (0.67)	-14.25 (0.26)	9.06 (0.72)	-14.91 (0.29)	1.74 (0.72)	<b>-2.71*</b> (0.10)
Privatization	-0.77 (0.86)	-13.70 (0.11)	-1.19 (0.81)	<b>-15.70*</b> (0.09)	<b>1.54*</b> (0.08)	2.53 (0.50)
Int'l Capital Restrictions	1.40 (0.73)	13.44 (0.51)	0.95 (0.83)	14.86 (0.51)	0.62 (0.57)	0.33 (0.95)
Security Markets	-3.49 (0.55)	1.83 (0.91)	-4.48 (0.49)	1.98 (0.91)	<b>1.99*</b> (0.10)	-1.30 (0.69)

<sup>a</sup> The Variable Financial Liberalization (Overall) does not include the aspect that relates to banking supervision.

<sup>b</sup> p-values are provided in parentheses.

<sup>c</sup> Cluster-robust standard errors calculated.

<sup>d</sup> \* p < 10 percent, \*\* p < 5 percent, \*\*\* p < 1 percent.

<sup>e</sup> Dependent variable is valued as a percent.

<sup>f</sup> Macro/Region controls are not reported.

<sup>g</sup> Macro/Region controls are not reported.

Table 1.11: Model 3 - Dependent Variable - Output Loss (Censored) - Full Set

	Financial Liberalization Index	Credit Controls	Interest Rate Controls	Entry Barriers	Banking Supervision Banking(1)	Banking Supervision Banking(2)	Privitization	Capital Restrictions	Security Markets
OL [t-5,t-1]									
$FL_{it-1}$	-0.09 (0.87)	-0.06 (0.98)	0.47 (0.84)	-0.41 (0.86)	-1.50 (0.70)	<b>-13.81***</b> (0.00)	-0.16 (0.92)	0.40 (0.80)	-0.17 (0.93)
Reform in 2	0.20 (0.97)	0.14 (0.98)	0.06 (0.99)	0.17 (0.97)		0.14 (0.98)	0.18 (0.97)	0.09 (0.99)	0.14 (0.98)
Large Reform in 2	4.04 (0.54)	3.72 (0.58)	3.09 (0.65)	3.86 (0.55)		3.66 (0.59)	3.76 (0.58)	3.46 (0.61)	3.81 (0.57)
Reversal in 2	<b>10.65*</b> (0.07)	<b>10.32*</b> (0.08)	<b>10.14*</b> (0.07)	<b>10.83*</b> (0.06)		<b>9.84*</b> (0.10)	<b>10.29*</b> (0.06)	<b>10.04*</b> (0.08)	<b>10.48*</b> (0.10)
OL [t-6,t-2]									
$FL_{it-1}$	-0.26 (0.72)	-1.09 (0.78)	0.00 (1.00)	-1.38 (0.68)	-1.03 (0.85)	<b>-20.30***</b> (0.00)	-0.35 (0.88)	0.74 (0.73)	-0.71 (0.81)
Reform in 2	0.66 (0.92)	0.48 (0.94)	0.51 (0.94)	0.58 (0.93)		0.44 (0.95)	0.59 (0.93)	0.41 (0.95)	0.49 (0.94)
Large Reform in 2	4.87 (0.58)	4.33 (0.63)	3.81 (0.68)	4.39 (0.62)		3.51 (0.70)	3.97 (0.66)	3.39 (0.71)	4.31 (0.63)
Reversal in 2	12.06 (0.12)	11.58 (0.14)	10.98 (0.14)	<b>12.79*</b> (0.09)		9.85 (0.21)	10.98 (0.14)	10.50 (0.16)	11.73 (0.16)
OL [t-20,t-1]									
Financial Liberalization	-1.86 (0.18)	-6.29 (0.32)	-4.60 (0.41)	-6.49 (0.28)	-5.48 (0.63)	<b>-37.79**</b> (0.01)	-1.23 (0.74)	-3.07 (0.46)	-8.52 (0.15)
Reform in 2	-0.80 (0.94)	-2.05 (0.85)	-1.02 (0.92)	-1.55 (0.88)		-1.80 (0.87)	-1.60 (0.88)	-1.43 (0.89)	-2.14 (0.83)
Large Reform in 2	9.29 (0.50)	4.74 (0.73)	7.62 (0.58)	4.46 (0.73)		2.02 (0.89)	2.31 (0.86)	3.56 (0.80)	7.67 (0.57)
Reversal in 2	11.60 (0.44)	7.37 (0.64)	5.44 (0.73)	12.40 (0.42)		3.26 (0.84)	3.92 (0.81)	5.91 (0.71)	12.82 (0.41)
OL [t-20,t-2]									
Financial Liberalization	-2.21 (0.15)	-7.57 (0.27)	-5.64 (0.36)	-7.63 (0.25)	-6.43 (0.61)	<b>-41.32**</b> (0.01)	-1.53 (0.70)	-3.91 (0.40)	-9.94 (0.12)
Reform in 2	-1.60 (0.88)	-3.10 (0.79)	-1.83 (0.87)	-2.51 (0.82)		-2.78 (0.82)	-2.55 (0.83)	-2.32 (0.84)	-3.20 (0.77)
Large Reform in 2	10.27 (0.50)	4.91 (0.75)	8.50 (0.57)	4.50 (0.76)		1.71 (0.91)	2.01 (0.89)	3.62 (0.81)	8.22 (0.58)
Reversal in 2	11.61 (0.49)	6.63 (0.71)	4.34 (0.81)	12.46 (0.47)		1.94 (0.91)	2.48 (0.89)	5.01 (0.78)	12.86 (0.45)
OL [Imputed HP]									
Financial Liberalization	0.32 (0.23)	<b>2.96**</b> (0.05)	1.37 (0.28)	<b>2.20**</b> (0.02)	-1.75 (0.47)	-2.94 (0.37)	0.25 (0.76)	-0.24 (0.81)	0.58 (0.61)
Reform in 2	-0.33 (0.89)	-0.38 (0.86)	-0.73 (0.78)	-0.58 (0.81)		-0.39 (0.88)	-0.53 (0.83)	-0.44 (0.86)	-0.45 (0.85)
Large Reform in 2	0.27 (0.94)	0.51 (0.88)	0.16 (0.97)	0.99 (0.74)		2.23 (0.49)	1.79 (0.61)	2.04 (0.54)	1.50 (0.66)
Reversal in 2	<b>9.81*</b> (0.08)	<b>10.19**</b> (0.03)	<b>11.36**</b> (0.02)	<b>8.94*</b> (0.10)		<b>12.31**</b> (0.02)	<b>11.81**</b> (0.02)	<b>11.97**</b> (0.02)	<b>11.21**</b> (0.04)

<sup>a</sup> p-varles are provided in parentheses.

<sup>b</sup> Cluster-robust standard errors calculated.

<sup>c</sup> \* p ; 10 percent, \*\* p ; 5 percent, \*\*\* p ; 1 percent.

<sup>d</sup> Dependent variable is valued as a percent.

<sup>e</sup> Macro/Region controls are not reported.

Table 1.12: Model 1 - Financial Liberalization Variables - Non-censored Output Loss

	OL [t-5,t-1]		OL [t-20,t-1]		OL [Imputed HP]	
	Solo	All	Solo	All	Solo	All
Financial Reform	-0.12 (0.85)		<b>-3.24**</b> <b>(0.03)</b>		-1.66 (0.32)	
Credit Controls	0.64 (0.83)	1.03 (0.79)	-8.72 (0.18)	1.22 (0.88)	-4.54 (0.63)	1.19 (0.90)
Interest Rate Controls	1.29 (0.61)	1.00 (0.74)	-7.43 (0.24)	-3.80 (0.59)	-6.90 (0.32)	-10.82 (0.21)
Entry Barriers	-0.12 (0.96)	-0.90 (0.79)	<b>-9.99*</b> <b>(0.10)</b>	-6.76 (0.30)	-0.89 (0.91)	-1.90 (0.81)
Banking (1)	-2.59 (0.62)	-1.58 (0.80)	-19.63 (0.17)	-7.68 (0.60)	-21.54 (0.18)	-25.19 (0.13)
Banking (2)	<b>-16.19***</b> <b>0.00</b>	<b>-17.68**</b> <b>(0.01)</b>	<b>-42.76**</b> <b>(0.01)</b>	<b>-45.68***</b> <b>(0.01)</b>	<b>-87.68***</b> <b>0.00</b>	<b>-97.37***</b> <b>0.00</b>
Privatization	-1.61 (0.45)	-2.14 (0.34)	-6.64 (0.19)	-2.63 (0.59)	-0.70 (0.90)	0.05 (0.99)
Int'l Capital Restrictions	0.33 (0.87)	1.04 (0.73)	<b>-9.75*</b> <b>(0.05)</b>	-2.28 (0.71)	-8.77 (0.21)	-6.37 (0.40)
Security Markets	-0.50 (0.85)	0.06 (0.99)	<b>-11.45*</b> <b>(0.08)</b>	-2.22 (0.70)	1.14 (0.88)	15.09 (0.12)

<sup>a</sup> p-values are provided in parentheses.

<sup>b</sup> Cluster-robust standard errors calculated.

<sup>c</sup> \* p > 10 percent, \*\* p > 5 percent, \*\*\* p > 1 percent.

<sup>d</sup> Dependent variable is valued as a percent.

<sup>e</sup> Macro/Region controls are not reported.

Table 1.13: Model 2 - Financial Liberalization Variables Interacted with Banking Supervision (Non-Censored)

	OL [-5,t-1]			OL [-20,t-1]			OL [Imputed HP]		
	Coefficient	Banking Supervision Coefficient	Coefficient on Interaction Term	Coefficient	Banking Supervision Coefficient	Coefficient on Interaction Term	Coefficient	Banking Supervision Coefficient	Coefficient on Interaction Term
Financial Reform	-2.39 (0.13)	-9.34 (0.59)	-0.57 (0.67)	-2.82 (0.10)	-10.54 (0.58)	-0.63 (0.67)	0.21 (0.69)	-2.56 (0.41)	-0.08 (0.78)
Credit Controls	-6.06 (0.41)	-18.47 (0.32)	-0.16 (0.99)	-7.39 (0.36)	-21.12 (0.31)	0.06 (1.00)	<b>4.34**</b> <b>(0.03)</b>	3.77 (0.34)	0.28 (0.90)
Interest Rate Controls	-6.47 (0.27)	-14.15 (0.29)	-3.16 (0.52)	-7.83 (0.23)	-15.82 (0.28)	-3.64 (0.51)	0.3 (0.90)	-3.01 (0.43)	-0.01 (0.99)
Entry Barriers	-10.38 (0.12)	<b>-26.76**</b> <b>(0.03)</b>	5.62 (0.24)	-11.95 (0.10)	<b>-29.60**</b> <b>(0.03)</b>	6.06 (0.25)	<b>2.77*</b> <b>(0.06)</b>	<b>-4.72*</b> <b>(0.09)</b>	0.39 (0.80)
Banking Supervision	-17.88 (0.55)		-1.75 (0.92)	-21.97 (0.51)		-0.77 (0.97)	-4.22 (0.56)		0.8 (0.83)
Privatization	-0.51 (0.83)	-2.97 (0.55)	-1.49 (0.57)	-5.1 (0.35)	<b>-19.41**</b> <b>(0.04)</b>	0.39 (0.95)	-0.59 (0.74)	0.89 (0.82)	-2.56 (0.22)
Int'l Capital Restrictions	1.99 (0.41)	2 (0.80)	-3.82 (0.23)	-4.99 (0.34)	6.39 (0.73)	-11.16 (0.16)	-1.54 (0.44)	-1.01 (0.85)	-0.56 (0.79)
Security Markets	1.09 (0.73)	-1.64 (0.79)	-2.37 (0.49)	-8.37 (0.21)	-15.48 (0.40)	-0.33 (0.97)	0.38 (0.85)	-3.39 (0.38)	0.09 (0.96)

<sup>a</sup> The Variable Financial Liberalization (Overall) does not include the aspect that relates to banking supervision.

<sup>b</sup> p-variables are provided in parentheses.

<sup>c</sup> Cluster-robust standard errors calculated.

<sup>d</sup> \* p i 10 percent, \*\* p i 5 percent, \*\*\* p i 1 percent.

<sup>e</sup> Dependent variable is valued as a percent.

<sup>f</sup> Macro/Region controls are not reported.



Table 1.14: Model 3: Dependent Variable - Output Loss (Censored)

	Financial Liberalization Index	Interest Rate Controls		Entry Barriers	Banking Supervision Banking(1) Banking(2)		Privatization	Capital Restrictions	Security Markets
		Credit Controls	Rate Controls		Banking(1)	Banking(2)			
$FL_{it-1}$	0.37 (0.59)	0.09 (0.98)	-0.77 (0.77)	1.02 (0.73)	4.14 (0.45)	<b>-15.61***</b> <b>0.00</b>	1.74 (0.44)	0.19 (0.93)	1.64 (0.58)
Reform in 2	0.95 (0.88)	0.73 (0.90)	0.59 (0.92)	0.78 (0.90)	0.87 (0.89)		1.11 (0.85)	0.76 (0.90)	0.68 (0.91)
Large Reform in 2	-5.22 (0.51)	-3.76 (0.63)	-2.73 (0.72)	-4.13 (0.59)	4.24 (0.59)		4.47 (0.57)	3.82 (0.63)	4.85 (0.55)
Reversal in 2	<b>-10.53*</b> <b>(0.10)</b>	-9.04 (0.15)	-8.74 (0.16)	-10.32 (0.10)	9.49 (0.15)		8.99 (0.13)	9.11 (0.14)	10.71 (0.13)
					OL [t-5,t-1]				
$FL_{it-1}$	<b>-3.79**</b> <b>(0.02)</b>	-0.50 (0.15)	-8.72 (0.20)	<b>-11.45*</b> <b>(0.07)</b>	-20.72 (0.19)	<b>-42.26**</b> <b>(0.02)</b>	-6.57 (0.20)	<b>-10.26*</b> <b>(0.05)</b>	<b>-13.52*</b> <b>(0.06)</b>
Reform in 2	-1.25 (0.91)	-3.72 (0.77)	-1.82 (0.89)	-2.88 (0.80)	-2.55 (0.84)		-2.01 (0.87)	-1.98 (0.88)	-3.87 (0.75)
Large Reform in 2	11.52 (0.50)	0.7 (0.97)	7.3 (0.67)	0.95 (0.95)	-0.14 (0.99)		-0.9 (0.96)	2.18 (0.89)	5.58 (0.73)
Reversal in 2	18.8 (0.23)	8.35 (0.62)	6.03 (0.71)	18.11 (0.25)	8.38 (0.63)		3.14 (0.85)	9.79 (0.56)	17.28 (0.29)
					OL [Imputed HP]				
$FL_{it-1}$	-1.83 (0.35)	-5.13 (0.63)	-6.84 (0.38)	-1.46 (0.86)	-21.74 (0.21)	<b>-87.13***</b> <b>(0.00)</b>	0.17 (0.98)	-8.83 (0.23)	0.9 (0.92)
Reform in 2	-0.64 (0.84)	-0.64 (0.82)	-0.77 (0.81)	-0.84 (0.79)	-0.50 (0.88)		-0.32 (0.92)	-0.39 (0.91)	-0.77 (0.81)
Large Reform in 2	0.24 (0.96)	-2.01 (0.72)	-0.62 (0.90)	-1.24 (0.82)	0.57 (0.92)		0.4 (0.94)	1 (0.83)	0.33 (0.95)
Reversal in 2	<b>10.98*</b> <b>(0.07)</b>	<b>8.46*</b> <b>(0.10)</b>	<b>10.25*</b> <b>(0.06)</b>	7.75 (0.22)	<b>11.95**</b> <b>(0.04)</b>		<b>10.29*</b> <b>(0.05)</b>	<b>11.90**</b> <b>(0.02)</b>	<b>11.45*</b> <b>(0.07)</b>

<sup>a</sup> p-values are provided in parentheses.

<sup>b</sup> Cluster-robust standard errors calculated.

<sup>c</sup> \* p | 10 percent, \*\* p | 5 percent, \*\*\* p | 1 percent.

<sup>d</sup> Dependent variable is valued as a percent.

<sup>e</sup> Macro/Region controls are not reported.

Table 1.15: Model 4: Dependent Variable - Output Loss (Censored)

	Financial Liberalization Index	Credit Controls	Interest Rate Controls	Entry Barriers	Banking Supervision	Privatization	Capital Restrictions	Security Markets
	Dependent Variable: OL [t-5,t-1]							
$FL_{it-1}$	-0.08 (0.91)	-0.24 (0.94)	0.30 (0.90)	-0.98 (0.76)	-1.14 (0.79)	-0.88 (0.68)	0.87 (0.70)	-0.13 (0.97)
Banking Supervision	-0.98 (0.81)	-1.06 (0.80)	-1.24 (0.78)	-0.84 (0.85)		-1.24 (0.69)	-1.79 (0.69)	-1.09 (0.80)
Reform in 2	3.81 (0.61)	3.76 (0.62)	3.66 (0.63)	3.84 (0.61)	3.76 (0.61)	3.84 (0.61)	3.62 (0.63)	3.75 (0.62)
Reform in 2 x Banking Supervision	<b>-12.36*</b> (0.10)	<b>-12.40*</b> (0.09)	<b>-12.14*</b> (0.10)	<b>-12.56*</b> (0.09)	<b>-12.32*</b> (0.10)	<b>-11.75*</b> (0.10)	-12.12 (0.11)	-12.29 (0.11)
Large Reform in 2	4.80 (0.62)	4.56 (0.64)	4.04 (0.63)	4.70 (0.63)	4.51 (0.64)	4.76 (0.63)	3.92 (0.69)	4.60 (0.65)
Large Reform x Banking Supervision	4.98 (0.62)	5.21 (0.64)	5.35 (0.59)	5.82 (0.62)	4.99 (0.61)	5.47 (0.58)	5.84 (0.56)	4.96 (0.61)
Reversal in 2	<b>13.35*</b> (0.05)	<b>13.22*</b> (0.07)	<b>12.73*</b> (0.08)	<b>14.11**</b> (0.05)	<b>13.06*</b> (0.09)	11.87 (0.18)	11.64 (0.12)	<b>13.12*</b> (0.07)
Reversal x Banking Supervision	-7.31 (0.50)	-7.38 (0.49)	-6.94 (0.50)	-7.17 (0.51)	-7.29 (0.50)	-5.56 (0.63)	-5.90 (0.56)	-7.18 (0.55)
	Dependent Variable: OL [Imputed HP]							
$FL_{it-1}$	0.03 (0.99)	-0.69 (0.95)	-7.36 (0.32)	2.17 (0.79)		2.86 (0.63)	-4.50 (0.53)	7.45 (0.42)
Banking Supervision	<b>-41.13*</b> (0.06)	<b>-40.86*</b> (0.06)	<b>-38.49*</b> (0.08)	<b>-41.73*</b> (0.06)	<b>-41.08*</b> (0.07)	<b>-40.72*</b> (0.08)	<b>-37.70*</b> (0.08)	<b>-43.38**</b> (0.05)
Reform in 2	1.60 (0.67)	1.62 (0.65)	1.68 (0.66)	1.47 (0.69)	1.61 (0.67)	1.72 (0.65)	1.95 (0.61)	1.61 (0.67)
Reform in 2 x Banking Supervision	<b>-10.72*</b> (0.08)	-9.76 (0.12)	<b>-10.84*</b> (0.08)	-10.27 (0.11)	<b>-10.72*</b> (0.08)	<b>-9.88*</b> (0.08)	<b>-11.21*</b> (0.06)	<b>-10.72*</b> (0.09)
Large Reform in 2	-0.90 (0.89)	-1.60 (0.82)	-0.56 (0.94)	-1.24 (0.86)	-0.87 (0.90)	-0.50 (0.94)	0.55 (0.93)	-0.85 (0.90)
Large Reform x Banking Supervision	7.15 (0.52)	4.30 (0.71)	6.91 (0.51)	5.55 (0.58)	7.15 (0.51)	7.85 (0.46)	5.10 (0.60)	7.14 (0.51)
Reversal in 2	<b>15.81***</b> (0.00)	<b>13.78***</b> (0.00)	<b>16.06***</b> (0.00)	<b>13.81***</b> (0.00)	<b>15.84***</b> (0.00)	<b>14.09***</b> (0.01)	<b>19.30***</b> (0.00)	<b>15.85***</b> (0.00)
Reversal x Banking Supervision	-10.00 (0.23)	-8.82 (0.18)	-10.23 (0.22)	-10.23 (0.22)	-10.00 (0.22)	-7.47 (0.38)	-13.35 (0.17)	-9.98 (0.25)

<sup>a</sup> p-values are provided in parentheses; Cluster-robust standard errors calculated.

<sup>b</sup> \* p < 10 percent, \*\* p < 5 percent, \*\*\* p < 1 percent.

<sup>c</sup> Dependent variable is valued as a percent; Macro/Region controls are not reported.

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