

Banking Crises; Determinants and Crises Impact on Fiscal Cost and Economic Output

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Martin Zistler
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Abstract
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PURPOSE OF THE STUDY

This thesis' first empirical part studies determinants associated with the emergence of systemic banking crises. Low GDP growth, high inflation, low creditor rights, low GDP per capita and financial reforms are hypothesized to increase the probability of a banking crisis. I evaluate the determinants' value in explaining 80 banking crisis around the globe by employing a multivariate logit model, exactly as in Demirgüç-Kunt and Detragiache (1997). This thesis' second empirical part evaluates banking crises' effects on fiscal cost and economic output by regressing each of these two dependent variables separately on a number of new or updated explanatory variables in an ordinary least squares (OLS) regression, exactly as in Demirgüç-Kunt and Detragiache (1997). This study provides new insights into the determinants and effects of banking crises with new and larger datasets and time frames as well as better and further developed variables.

DATA

From the database by Laeven and Valencia (2008) I obtain the core data on banking crises, consisting of 80 banking crises in a sample of 120 countries during the period of 1980 to 2005. From IMF's IFS database and world economic outlook (WEO) I obtain the data for the remaining variables. The data finally consists of 2755 country-year observations for the empirical part I on the determinants of banking crises. For the empirical part II on banking crises' effects, I obtain the complete data on 42 banking crises and their explanatory variables, during the period of 1970 to 2007, from the database by Laeven and Valencia (2008).

RESULTS

The findings of the study on determinants of banking crises show that low GDP growth, highly developed institutional and regulatory environments and high GDP per capita increase the probability of a banking crisis statistically significantly. This thesis updated the study of Demirgüç-Kunt and Detragiache (1997) and turned their results around. The findings of the second empirical part on banking crises effects show that a parallel currency crisis and explicit deposit insurances increase the economic output loss. French and Socialist law countries experience lower output losses but more frequent crises. As in Honohan and Klingebiel (2003), I also observe that government interventions result in higher fiscal costs. Additionally, higher fiscal expenditure was not found to reduce output losses, exactly as Claessens, Klingebiel, and Laeven (2003) conclude. However, foregone tax revenues due to output losses might also impact fiscal cost, as suggested by Reinhart and Rogoff (2008). Thus, any conclusion about the relationship between fiscal cost and output loss is difficult due to a possible endogeneity.

KEYWORDS

Banking crisis, crises, determinants, economic output loss, fiscal cost,

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1 Introduction

1.1 Background and motivation

The origins and effects of banking crises are currently, in the light of the U.S. credit and banking crises that started in 2007, often discussed. The public and media search for explanations but even more for scapegoats. However, during these discussions very fundamental aspects seem to be forgotten. The public's surprise about the possibility of a banking crisis shows that most have not understood the current financial system and its history. Therefore, I argue that understanding banking crises requires first to understand financial systems, banking and the history of financial crises.

Levine (1997) argues that banks satisfy random liquidity needs of lenders better (at lower risks) than if these lenders would invest their funds directly in the financial markets. However, in order to credibly commit to repay depositors, banks must choose a fragile bank capital structure; argue Diamond and Rajan (2001). Thus, the risk of a banking crisis may be a necessary disciplinary device in an imperfect market.

Liquidity is only provided if expected returns during times of low market liquidity are high in order to compensate providers for their large opportunity cost of holding idle capital for a long time. Low market liquidity however can trigger cash-in-the-market pricing which may lead to fire-sales, contagion and self-fulfilling prophecies of a banking crisis (Kane, 1989; Demirgüç-Kunt and Detragiache, 2002).

Research (e.g. Lindgren et al., 1996; Dooley and Frankel, 2003; and Collyns and Kincaid, 2003) identified various underlying macroeconomic origins of past banking crises such as inflation, cyclical output downturns, term of trade deterioration, exchange rate crashes, and currency as well as asset and real estate devaluations. Additionally, financial liberalization (Demirgüç-Kunt and Detragiache, 1998), flexible exchange rate regimes (Peria, 2003), public bank ownership (Caprio and Levine, 2001), a weak institutional environment (Demirgüç-Kunt and Detragiache, 1998) and an explicit deposit insurance (Demirgüç-Kunt and Detragiache, 2002) were all found to increase the probability of a banking crisis.

Once a banking crisis is ongoing, the credit crunch hypothesis predicts that decreased bank credits to firms decrease investments and expenditure, thus resulting in decreased economic output and demand (Eichengreen and Rose, 1998; Kaminsky and Reinhart, 1999; Demirgüç-Kunt and Detragiache., 2005). While fighting a banking crisis, governments face a trade-off between fiscal and economical costs. Higher fiscal spending on government interventions is expected to decrease the economical cost of crisis (Laeven and Valencia, 2008). However, earlier findings suggest that generous support to the banking system does not reduce the output cost of banking crises (Claessens, Klingebiel and Laeven, 2003).

Therefore, an important question to policy makers and economists is how to decrease the negative effects of a banking crisis most efficiently and effectively as well as how to prevent a banking crisis totally. Also highlighted should be the fact that “econometric analyses of systemic banking crises are a new field” (Demirgüç-Kunt, Detragiache, 2005) and only limited research exists. Hence, more empirical research about banking crises, their origins and relation to economic and fiscal cost is needed.

I contribute to the research on banking crises by providing new insights into the determinants and effects of banking crises with new and larger datasets and time frames as well as better and further developed variables. Specifically, the dataset by Laeven and Valencia (2008) gives the opportunity to research banking crises’ effects by taking into account government interventions. To my knowledge, earlier studies did not address broad government interventions and policies sufficiently, while researching banking crises’ effects. Additionally, by taking a larger time frame, I will turn earlier results of Demirgüç-Kunt and Detragiache (1997) about determinants of banking crises around. Therefore, this thesis adds in-depth insight and new results to the research of banking crises’ determinants and effects.

1.2 Empirical part I: Determinants of banking crises

The first empirical part studies the factors associated with the emergence of systemic banking crises. I hypothesize GDP growth, real interest rate, inflation, M2 to reserves, creditor rights, GDP per capita and financial reforms to have an impact on the probability of a banking crisis.

I evaluate the chosen determinants’ value in explaining 80 banking crisis around the globe by employing a multivariate logit model, exactly as in Demirgüç-Kunt and Detragiache (1997). From the database by Laeven and Valencia (2008) I obtain the core data on banking crises,

consisting of 80 banking crises within a sample of 120 countries during the period of 1980 to 2005. From IMF's IFS database and world economic outlook (WEO) I obtain the data for the remaining variables. The data finally consists of 2755 country-year observations.

Following variables are hypothesized to influence the possibility of a banking crisis. Low GDP growth is hypothesized to reflect adverse macroeconomic shocks that hurt banks through higher rates of non-performing loans (Demirgüç-Kunt and Detragiache, 1997). High short-term real interest rates affect banks negatively if they are not able to quickly pass the higher interests on to their customers (Demirgüç-Kunt and Detragiache, 1997). Real interest rates might proxy financial liberalization (Galbis, 1993) which is then again found to increase the likelihood of a banking crisis (Demirgüç-Kunt and Detragiache, 1997). The variable measuring inflation is expected to reflect macroeconomic mismanagement as high inflation is hypothesized to be a sign for a price bubble (Reinhart and Rogoff, 2008). The ratio of M2 to foreign exchange reserves of the central bank measures sudden capital in- or outflows and a country's vulnerability to balance-of-payment problems (Calvo, 1996). Thus, a high ratio of M2 to foreign exchange reserves is hypothesized to increase the probability of a banking crisis. The variable measuring creditor rights in each country is hypothesized to reflect the economy wide impact of a strong legal system and thus lower likelihood of a banking crisis (LLSV, 1999; Demirgüç-Kunt and Detragiache, 1997). The dummy measuring the introduction of a financial reform equals 1 for five years if the country was undergoing a large financial reform and thus has a larger risk of a banking crisis (Demirgüç-Kunt and Detragiache, 1998). Finally, I also measure the time that passed by since the last crisis as I expect that the probability of a crisis increases over time as new problems after the last crisis accumulate anew (Demirgüç-Kunt and Detragiache, 1997).

As a summary of the results, low GDP growth, highly developed institutional and regulatory environments and high GDP per capita were shown to increase the probability of a banking crisis statistically significantly. Therefore, this study updated the study of Demirgüç-Kunt and Detragiache (1997) and turned their results around. Their study's time frame is from 1980 to 1994 for which they find countries with weak institutional environments, low GDP per capita and low GDP growth to inhibit the largest risks of banking crises. The fact that the study by Demirgüç-Kunt and Detragiache (1997) has a different time frame is a limitation to comparing results. However, at the same time this is also an update of the results for most variables that are defined exactly as in Demirgüç-Kunt and Detragiache (1997). Thus, by

taking a larger time frame, this study turned earlier results of Demirgüç-Kunt and Detragiache (1997) around. In addition, according to my knowledge, no previous study has employed such a large time frame while studying determinants of banking crises. Therefore, this thesis adds in-depth insight and new results to the research of banking crises' determinants. Especially, we showed that most variables are statistically significantly correlated to at least one other variable. This raised questions about the endogeneity of these variables and whether the true determinants of banking crises are yet found. Future research is advised to focus on developing better determinants of banking crises.

1.3 Empirical part II: Banking crises' effects

The second empirical part evaluates banking crises' effect on fiscal cost and economic output by regressing each of the two dependent variables separately on a number of explanatory variables in an ordinary least squares (OLS) regression. This event study methodology is performed exactly as in Demirgüç-Kunt and Detragiache (1997). I argue that financial and structural variables as well as government interventions explain fiscal costs and economic output loss of banking crises. From the database by Laeven and Valencia (2008) I obtain the complete data on 42 banking crises and their explanatory variables during the period of 1970 to 2007.

In summary, I report a parallel currency crisis and an explicit deposit insurance to increase the economic output loss. Countries with French and Socialist law origins experience lower output losses but more frequent crises. As in Honohan and Klingebiel (2003), I observe that government interventions result in higher fiscal costs. Also, higher fiscal expenditure was not found to reduce output losses, exactly as in Claessens, Klingebiel, and Laeven (2003). Reinhart and Rogoff (2008) suggest that a possible explanation could be found in output losses which result in foregone tax revenues and ultimately in higher fiscal costs. Thus, any conclusion about the relationship between fiscal cost and output losses is difficult due to a possible endogeneity. Finally, near-by elections are shown to decrease fiscal costs statistically significantly.

This study has limitations as financial crises are rare in number, thus this empirical part II is based on relatively few data points. In addition, every crisis might be different from previous ones, thus coefficients derived from in-sample estimation are of limited use out-of-sample (Demirgüç-Kunt and Detragiache, 2002). Also, information on intervention policies is rare

and each intervention might depend on the skills of the policy makers. On the other hand, according to my knowledge, no previous research has used such a rich set of variables (including government intervention variables) while researching banking crises' effects.

1.4 Case study

Banking crises' determinants of my empirical study I would not have accurately detected the U.S. credit and banking crisis that started in 2007. Exactly as Reinhart and Rogoff (2008), I suggest therefore that every banking crisis might be different. Thus, I investigate the U.S. banking crisis that started in 2007, its development and origins, in a case study. I identify securitization, the institutional environment, account imbalances and hubris as major origins of this crisis. This case study adds to the literature a valuable and comprehensive review of the current literature on the U.S. credit and banking crisis' most important reasons and origins.

1.5 Structure of the study

The remaining of the study is structured as follows. Section 2 reviews the literature on financial systems, banking, liquidity and banking crises. Thereafter, Section 3 inhibits two empirical studies of banking crises' determinants and costs. Section 4 looks at the U.S. banking crises of 2007 and Section 5 concludes this study with a summary of the findings.

2 Literature review

Understanding banking crises requires understanding the theory of financial systems and banking in general. Thus I first review the theory of financial systems. The most important act of financial intermediation is the creation of liquidity. Diamond and Rajan (2001) argue that banks need a fragile bank capital structure to be able to credibly commit to pay back funds to depositors. Consequently, the risk of a banking crisis may be a necessary disciplinary device in an imperfect market. Such a risk materializes, thus a banking crisis arises, due to various macroeconomic origins of banking crises such as inflation, cyclical output downturns, terms of trade deterioration, exchange rate crashes, and currency as well as asset and real estate devaluations (e.g. Lindgren et al., 1996; Dooley and Frankel, 2003; and Collyns and Kincaid, 2003). Once a banking crisis is ongoing, the credit crunch hypothesis predicts that decreased bank credits to firms decrease investments and expenditure, which results in decreased economic output and demand (Kaminsky and Reinhart, 1999; Demirgüç-Kunt and Detragiache, 2005). Governments' intervention in the banking crisis will on the other hand result in fiscal costs. Therefore, governments face a trade-off between fiscal and economical cost as higher fiscal spending on government interventions is expected to decrease the economical cost of crises, and vice-versa (Laeven and Valencia, 2008).

After this literature review introduction each literature part is reviewed separately. After the theory of financial systems, banking and liquidity follows the history and determinants of banking crises as well as the crises' fiscal and economical costs.

2.1 Financial systems and intermediation

Already Adam Smith (1776) viewed the high density of banks in Scotland at that time as a reason for the high development of the Scottish economy. One and a half centuries later, Schumpeter (1911) argued that banks creating credit is an essential source of entrepreneurs' capability to drive real growth (through employing a new mix of factor use). Goldsmith (1969) is one of the first researchers analyzing financial wealth and GDP in an empirical study. After Goldsmith (1969), a vast amount of empirical research followed which mainly reported a positive relationship between the size and liquidity of bank and capital markets (e.g. King and Levine, 1993a, b; and Levine and Zervos, 1998). Positive relation between the

bank and capital sector development and real economic growth is found by Levine, Loayza and Beck (2000), Beck, Levine and Loayza (1999), Neusser and Kugler (1998), and Rousseau and Wachtel (1998). Also, Rajan and Zingales (1998) found that industries relying more heavily on external financing grow faster under well developed financial system conditions.

Financial systems satisfy demands that can be categorized according to Levine (1997) into facilitating trading, hedging, diversifying and pooling of risks; allocating resources; monitoring managers and exerting corporate control; mobilizing savings; and facilitating the exchange of goods and services. Merton and Bodie (1995) summarize financial systems' primary function perfectly as "facilitating the allocation of resources, across space and time, in an uncertain environment".

The difference between bank- and capital-focused financial systems was researched by Demirgüç-Kunt and Levine (1999). They report that bank-focused systems mobilize savings, allocate capital, oversee investment decisions and provide risk management. On the other hand, capital markets mainly exert corporate control (exert corporate governance), provide long term financing and ease risk management. Therefore, financial markets alleviate market frictions which come as information cost, cost of reinforcing contracts and cost of exchanging goods and financial claims (Demirgüç-Kunt and Levine, 1999).

In addition, Demirgüç-Kunt and Levine (1999) find that, as income rises, capital and bank sectors' efficiency and developments soar. On the other hand, French civil law tradition countries with poor accounting standards, heavy banking restriction and high inflation tend to have underdeveloped financial systems (Lopez de Silanes, Shleifer and Vishny, 1997). Nevertheless, despite positive developments in external finance, the dominant source of financing is still corporate cash flow (Thiel, 2001). Corporate cash flows often account for over 50% of total financing (Graff, 2000). On the other hand, as Adam Smith (1776) already argued, banking is beneficial for an economy.

2.2 Unstable banking

The Modigliani-Miller theorem lets Fama (1980) conclude that lenders can construct optimal portfolios themselves and therefore have no need for intermediaries. However, in practice these theoretical approaches are unrealistic since large portfolios would be needed to be hold and skills and expertise to be acquired (Allen and Santomero, 1996). Therefore banks have for

a long time played an important role in the transformation of savings into investments in real assets as they face higher economies of scale in evaluating assets, lower trading costs, more diversification and lower information asymmetry.¹

A traditional view on the theory of banking is offered by Diamond and Rajan (2001) who specify that both, investors and borrowers, are concerned about liquidity. Investors need liquidity because they are uncertain about when they desire to eliminate their holding of the financial asset whereas borrowers focus on liquidity due to uncertainty of future cash inflows or amounts of future retainable funds. To balance these different liquidity concerns, a bank is optimal to be at the centre. The bank creates liquidity for depositors by insuring them to get better access to their funds at a similar expected return than if invested directly (satisfy random liquidity needs of the lender better at lower risk). At the same time, borrowers are insured against the liquidity risk that funding will be cut off prematurely because not all future cash flows can be credibly pledged to outside investors (Hart, 1995).

A bank can optimally develop specific talents that allow it to lend against illiquid assets but nevertheless avoid the costs of illiquidity since it raises cash through other means. Cash can come from other sources such as loan repayments, liquidity maintenance and most important by attracting new deposits which combined offset withdrawals. This allows the bank continuity and no need to transfer illiquid assets. Also, banks have specific skills to maximize loan values which results in a relationship specific rent (e.g. bankers' higher salaries and perks) and thus might reduce bank's ability to borrow against loan repayments. Diamond and Rajan (2001) argue that banks can commit to pay depositors everything collected from borrowers (minus the specified operating costs and bankers' compensation) by choosing a fragile capital structure. Under such a capital structure, a financial crisis is triggered if the bank attempts to get concessions from depositors or when depositors lose confidence that the bank will not deliver all repayments. This would in a theoretical model, in which neither transaction nor information costs exist, mean that banks have to renegotiate loans with borrowers and a disintermediation effect takes place. Depositors share in the bank's exclusive right of negotiating loans and try to seize the loans from borrowers which will weaken the borrower's incentives to fully pay back loans. Additionally, a bank run would partially transfer banks' revenues to lenders and borrowers. This is the largest incentive and discipline

¹ The bank was described as a "delegated monitor" by Diamond (1984).

for banks to avoid bank runs. Additionally, bank runs can also occur under self-fulfilling fears that the bank will not stick by the deal (Diamond and Dybvig, 1983).

Despite the high usage of such traditional theories on banking it is to acknowledge that, since the 1970s and 1980s, financial innovation has been extensive. Especially the rise of securitization considerably changed the banking landscape as loan origination became separated from holding the loan (and its risk). Shleifer and Vishny (2009) proposed therefore a new theoretical model of banking called “unstable banking”.

In this financial intermediary theory by Shleifer and Vishny (2009), markets are influenced by investor sentiment and banks make loans, securitize these loans, trade in them or hold cash. They can also borrow money by using these securities as collateral. Shleifer and Vishny (2009) see banks as maximizing their profit and avoiding any conflict between its bank shareholders and creditors. Also, if banks can't securitize loans, they smooth their lending over time whereas when securitizing, they respond to investor sentiment. The bank's small equity share is used to co-invest in newly-securitized loans in times of high asset prices and buy or hold securities in times of low asset prices. Profit in good times is so high that banks borrow short-term and consequently take the risk (assign low probability to a downturn) of having to liquidate holdings at fire sales prices in bad times. This rational irrationality destabilizes security prices. Thus, banks leave out profit opportunities to buy distressed assets or finance investments in bad times. This makes the financial intermediaries prone to cyclicity in terms of profits, balance sheet and real investment (Shleifer and Vishny, 2009). Thus, securitization made banking more unstable and cyclical but also increased levels of investments although possibly only during times of bubbles (resulting in reduced efficiency). Unstable banking therefore leads security market fluctuations into the real economy instead of smoothing out economical cycles.²

In summary, the described model of Shleifer and Vishny (2009) accounts for cyclical behaviour of credit and investment and fundamental instability of banks in financial markets³. Most importantly, I noted that banks might need to face the risk of financial distress and bankruptcy in order to function optimally. Thus, incomplete markets may require financial fragility and liquidity risks.

² Volatility of investor sentiment impacts the volatility of the real activity (Shleifer and Vishny, 2009).

³ Especially when banks use leverage, there is a fundamental instability of banks in financial markets (Shleifer and Vishny, 2009).

2.3 Theory of liquidity, financial fragility and contagion

From a financial intermediary's perspective, intermediaries provide liquidity insurance to lenders against their individual liquidity shocks (Allen and Gale, 2004, 2007). Financial markets in turn allow financial intermediaries to share aggregate risks (Allen and Gale, 2004, 2007). The fact that banks manage liquidity needs of depositors leads to two uncertainties for banks. First, each bank faces idiosyncratic liquidity risk since consumers have varying liquidity needs over time. Second, aggregate liquidity risk exposes all banks to a general demand for a varying level of liquidity. Complete financial markets would efficiently provide liquidity by ensuring that banks hedge their liquidity shocks. Such a hedging would be ensured if each bank issued a small amount of security contingent on the idiosyncratic liquidity shock experienced by each other bank in the system (Allen and Carletti, 2008). Hence, each bank bought all the issued securities (contingent on the bank's own idiosyncratic shocks) from the other banks. Therefore, whenever a bank experiences an idiosyncratic liquidity shock, it is fully hedged since it obtains funds to cover the liquidity requirement. On the other hand, hedging aggregate liquidity risk is more challenging and time consuming. Only a complicating structure of hedges combined with equilibrium prices of all bank-specific securities besides an efficient central bank would lead to a liquid financial system. The correct equilibrium prices would be ensured by the "invisible hand" which in turn leads to correct incentives for liquidity in the banking system (Allen, Carletti and Gale, 2008).

Allen, Carletti and Gale (2008) argue that a theoretically complete market would require large bank-specific securities which, in practice, are largely inexistent. The infrastructure could be very costly and inconvenient in practice. Despite existing hedging instruments such as credit default swaps, markets are incomplete and banks are therefore not able to fully hedge against liquidity risks which leads to inefficient provisions of liquidity by the financial system (Allen and Carletti, 2008). Such provisions can exist in form of cash-in-the-market pricing (prices of safe assets can fall below their fundamental value) that lead to financial fragility where small shocks can have large effects on asset prices. Also, contagion effects can arise in which an individual bank's shock spreads to other institutions leading to a chain of bankruptcies. In the case of contagion effects, financial fragility is high and cash-in-the-market pricing might be observable.

2.3.1 Cash-in-the-market pricing and financial fragility

I find that incomplete markets result in incomplete liquidity provisions which in turn alter the nature of managing liquidity risk in banks. This is opposite to the framework of Allen and Gale (2004, 2007) in which complete markets would ease hedging of liquidity risk and the price system would ensure adequate liquidity and proper prices. In that case liquidity-securities are bought and sold where it is plentiful and rare, thus the financial system allows risk sharing and insurance. On the other hand, incomplete markets may require selling assets to obtain liquidity. These assets' prices are determined by the liquidity (=cash) in the market. Thus, a counterparty would need to hold extra liquidity to buy the asset in case of low liquidity. These counterparties are compensated with an average cost of providing liquidity across all countries where liquidity is low. Such liquidity providers face two choices, either to invest into productive long assets at higher return rates or to hold excess cash at low return rates with the expectation of earning even higher returns once invested. Assuming theoretically that no one were holding liquidity, long asset values would collapse to zero until the incentive is large enough to hold liquidity as assets would be acquired so inexpensively. Hence, equilibrium prices have to compensate liquidity providers for holding liquidity constantly which will therefore result in much higher expected returns.⁴ The higher the expected returns are, the lower the asset prices have to be in order to reach equilibrium. This yields negative insurance and suboptimal risk sharing since the timing is very inefficient for there to be a wealth transfer between banks demanding liquidity and suppliers of liquidity (Allen and Carletti, 2008). Asset price volatility is costly because bank's depositors are risk averse (only share in negative returns, but not positive returns) and deposit demand depends on the banks idiosyncratic risk (Allen and Carletti, 2006, 2008). In this whole framework of incomplete markets, the need for a central bank and its intervention is noted. Through fixing asset prices or short term interest rates that remove inefficiencies derived from asset price volatility, the central bank can achieve similar allocation as in complete markets argue Allen, Carletti and Gale (2008). In summary, financial fragility in form of volatile asset prices may be necessary in incomplete markets because incentives to provide liquidity might only then exist. This, however, may lead to costly crisis and the need for central bank intervention.

⁴ Since liquidity needs can't be forecast these liquidity providers face large opportunity costs of holding idle capital.

2.3.2 Contagion

Incomplete markets also inhibit risk of contagion, signifying the risk of spreading an individual financial institutions risk to other ones, thus potentially disrupting the whole financial system. More precisely, contagion risk comes from overlapping claims that financial institutions have on each other. Defaulting Bank A for example decreases Bank B's assets if Bank A's claims are included in these assets. Such a strong enough spill over effect might even yield a default of Bank B leading to a default of Bank C which has Bank B's assets in its accounts and might have been already weakened by Bank A's. This causes a systemic crisis in which a higher degree of interconnectedness results in a further but less strong spread of the crisis and a shock can be absorbed better. On the other hand, if only a few but strong links exist, then crisis are more likely to spread since capital buffers are overwhelmed by the strength of the defaulting link (one of only a few but strong links). Contagion can be very expensive for a financial system which in turn would potentially have large spill over effects to the real economy. In such a scenario, firms face low or no access to funding and consequently are forced to cut back investment and output levels.

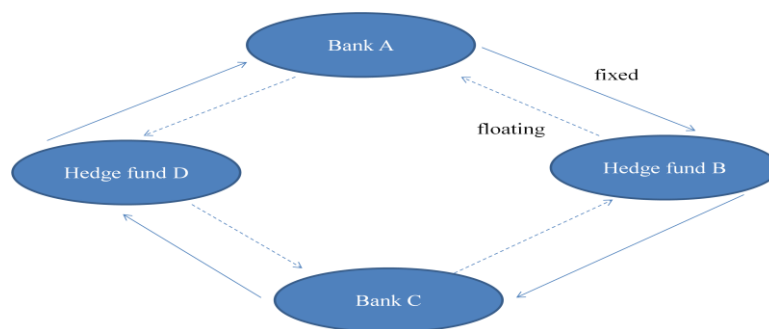


Figure I Network of interest rate swap arrangements

Figure 1 shows that all parties (Bank A and B as well as Hedge fund B and D) are inter-connected but are missing a central party which could file a multilateral netting arrangement and thus eliminate all exposure. This market imperfection may lead to costly crises.

Contagion risk and the risk of network effects are often found in the current financial architecture of the 21st century, which is made up of an interwoven network of financial obligations. Often, obligations are offset with other parties which in turn then offset again

their obligation. As an illustration, Bank A and hedge fund (HF) B agree on an interest rate swap in which B offsets its position with another interest rate swap with counterparty Bank C. Essentially, Bank A and Bank C do now have an indirect connection too as it would be unwise for A to renew the contract if C were in financial difficulty (Brunnermeier, 2008). For further illustration lets still assume that C offsets obligations with HF D which in turn does the same offsetting contract with A. Now all parties from A to D are fully hedged. A multilateral netting arrangement could eliminate all exposure. However, each party only knows about two of the other three parties in this cycle, as seen in Figure 1. Therefore, any potential uncertainties lead to higher perceived counterparty credit risk. Thus, banks A and C require B and D to put up more liquidity or purchase credit default swaps which may be at times very costly.

These over-the-counter (OTC) transactions result in a highly inefficient financial system (higher systemic risk) in which a clearinghouse or central authority would be beneficial in providing multilateral netting agreements to stabilize the system and lower information asymmetry. In conclusion, such a web of interconnected obligations can result in higher network risks. These risks of financial fragility and contagion seem to vary of time.

2.4 Returning periods of stability and instability

Minsky (1957) finds that the financial industry undergoes waves of innovation, regulation, and deregulation, hence periods of stability and instability. New financial innovations and deregulated environments often end in increased instability and a crisis. Thus, most crises and periods of instability have common underlying features. Also, every time after a crisis, regulation develops, increases and is said to prevent future crisis. For example, before the banking and credit crisis that started in 2007, Basel II was said to increase the capital base and risk control of banks by accounting to credit, market and operational risk. However, as Minsky (1957) predicted, financial innovations found “loopholes” and gave rise to nonbank financial institutions with major capital power. Such hedge funds, investment banks, private equity funds, mutual funds, pension funds and insurance companies therefore provided investors with the highly looked after returns, avoided much of the regulation and produced themselves new financial products that finally turned the financial world again into a period of instability, as predicted by Minsky (1957). However, the resolving of these periods of instability are mostly at a high price and Adrian Bludnell-Wignall, a former Federal Bank

economist, even suspects that instability and crises are not resolved but rolled-over. Each time that a central bank responds with rate cuts, the new liquidity increase might simply lead to another and possibly even bigger bubble and crisis (Tan, 2007). As illustration, the Asian crisis was followed by the Long Term Capital Management crisis which in turn might have fuelled the dotcom bubble. This raises questions about how to create a countercyclical regulatory regime for capital and liquidity. Gieve (2008) noted, as a last alternative, to require larger capital and liquidity buffers across the whole cycle. Such cycles of stability and instability are expected to result, at times, in banking crises.

2.5 Banking crises

Banking crises experiences of the 19th and early 20th century were, until recently, the bases for research on large banking crises (Bernanke, 1983; Haubrich, 1990; Calomiris and Mason, 1997). Especially the Great Depression caused various large bank failures around the world. A new wave of banking crises resurged in the 1990s during which Finland and Japan were only two examples giving potential for more in-depth research on past banking crises.

Between World War II and the 1990s, a period of economic and financial stability with only a few isolated banking crises was recorded. Demirgüç-Kunt and Detragiache (2005) see a calm macroeconomic environment, favourable economic growth, low inflation and pervasive controls on international capital flows as reasons that contributed to that financial stability. Also, bankers' freedom of action remained severely restricted due to high regulatory powers controlling price and quantity of credit. Even the turbulence of the 1970s did not destroy the soundness of banks due to presumably low real interest rates and high regulation. However, relaxing monetary policies and credit markets as well as increasing real interest rates led to several financial crises in developing countries during the 1980s. Besides developing countries, also developed countries such as the U.S. faced financial fragility such as during the savings and loans debacle due to eroding bank capital, generous deposit insurance and ineffective regulation following financial liberalization (Kane, 1989; Akerlof and Romer, 1993). The beginning of the 1990s brought currency and asset devaluation in Scandinavia resulting in economic slowdown and severe banking crises (Drees and Pazarbasioglu, 1998). Also in Japan, the collapse of the asset price bubble rendered the majority of the banking sector insolvent. However, Japanese regulatory forbearance, lax monetary policy and keiretsu

politics hindered the failing of poorly managed banks but instead kept the financing of poorly performing firms continue for over a decade (Hoshi and Kashyap, 2004).

On the other hand, the Mexican Tequila crisis was a combination of a faltering banking system, dollar-denominated debt, and political shocks leading to currency devaluation and a financial meltdown from December 1994 onwards (Calvo, 1996; Edwards and Végh, 1997). Bail-out costs reached up to 20 percent of GDP and even ten years later economic growth remained low.

Evidence about how financial fragility can hurt a whole economy is found in the East Asian crises of 1997-8 during which sound public finance, high growth countries faced huge economic decline due to asset price devaluations as well as pulled out foreign capital (Lindgren et al., 1999).

The U.S. bank and credit crisis that started in 2007 made a point in proving how interconnected the financial world is. Complicated structures of pools of mortgage bonds were overvalued due to high capital inflow, demand for AAA-bonds, flawed incentive structures and rating agencies. A boom in securitization of these pool of bonds led to information asymmetries and lost confidence, almost leading to a still stand of the financial world and collapses of major banks around the world. I look deeper into this crisis' origins in my case study in Section 4.

In summary, I reported various macroeconomic origins of banking crises such as inflation, cyclical output downturns, terms of trade deterioration, exchange rate crashes, banking crises and currency, as well as asset and real estate devaluations (e.g. Lindgren et al., 1996; Dooley and Frankel, 2003; and Collyns and Kincaid, 2003). However, one origin that is common to almost all banking crises is of psychological nature to which Reinhart and Rogoff (2008) refer as the “this time is different” thinking. Not surprisingly therefore, even Greenspan (2001) found the new ways of risk management of the 21 century to have made the financial world safer. As Reinhart and Rogoff (2008) already stated, also Greenspan was trapped into the “this time is different” thinking failure instead of acknowledging that the current financial system may inhibit imperfections and thus results in periods of instability.

2.6 Determinants of banking crises

This section reviews earlier studies on the determinants of banking crises. Especially factors relating to financial liberalization, international shocks, exchange rate regimes, bank structure and ownership and institutional and political environment were found to influence the probability of a banking crisis.

2.6.1 Financial Liberalization and Crises

Caprio and Summers (1993) and Stiglitz (1994) express the concern that financial liberalization may lead to greater financial fragility as banks find greater opportunities for risk taking. Through limited liability, lax regulation and supervision, eroding bank capital and implicit as well as explicit guarantees, banks face only little downside risk and therefore often increase fragility beyond socially desirable limits (Stiglitz, 1994). The study of Demirgüç-Kunt and Detragiache (1998) shows that banking crises are indeed more likely to occur in financially liberalized countries, even after controlling for other country characteristics. However, as stated above, a strong institutional environment, respect for the rule of law, low corruption and good contract enforcement mitigate the negative effect of financial liberalization. Later empirical studies by Mehrez and Kaufmann (1999), Glick and Hutchison (2001), Arteta and Eichengreen (2002), and Noy (2004) also report that financial liberalization often arises within weak institutional environments leading to increased bank fragility. Also Balino and Sundarajan (1991), Gavin and Hausman (1995) and Bhatt (1995) confirm that financial liberalization leads to increased likelihood of banking crisis.

2.6.2 International Shocks, Exchange Rate Regime and Crises

The impact of worldwide economic shocks and exchange rate regimes on bank fragility is researched by Eichengreen and Fishlow (1998). They found that developing countries' financial difficulties and developed countries' tighter monetary conditions and slower growth are related. For example the monetary tightening in the U.S. in 1994 might have helped the Mexican tequila crisis to evolve. Eichengreen and Rose (1998) in addition report that international shocks such as interest rate and GDP growth changes had affected bank fragility in developing countries. However, later studies (e.g. Arteta and Eichengreen, 2002) found that the banking crises in the 1990s were different from all other crises with external factors being less important than domestic factors, thus weakening the results of Eichengreen and Rose

(1998). Concerning exchange rate regimes, Mundell (1961) found that flexible ones can stabilize financial systems and absorb effects of the real shocks on the economy. Flexible regimes may also prevent countries from dangerous lending booms through over-borrowing in foreign currency (Eichengreen and Hausmann, 1999). On the other hand, fixed regimes limit lender of last resort operations as monetary expansion risks decrease confidence in the currency peg. Therefore, countries with fixed exchange rate regimes may be more prone to bank runs and financial panics (Eichengreen and Rose, 1998; Wood, 1999). On the other hand, Eichengreen and Rose (1998) feel that a currency peg commitment may reduce the likelihood of a banking crisis and discourage risk-taking by banks. However, especially developing countries often lack credibility and access to international markets. For those developing countries, exchange rate volatility is especially hurtful due to their high liability dollarization. Hence, fixed regimes increase transparency and credibility that also protects the country from contagion, argues Calvo (1999). Peria (2003) concludes that fixed regimes decrease the likelihood of a crisis but once a crisis is ongoing, the fixed regime will on average suffer higher costs.

2.6.3 Bank Ownership, Structure and Crises

The bank ownership structure (private vs. public, domestic vs. foreign) is argued to affect a bank's performance. Additionally, it is also shown that the likelihood of systemic banking crises is affected by the owners of the banks in the system. Barth, Caprio, and Levine (2001), and La Porta, Lopez-de-Silanes, and Shleifer (2002) found that greater state ownership of banks results in political abuse, governance problems, reduced competition, poor productivity and lower growth. Caprio and Martinez-Peria (2000) and Barth, Caprio and Levine (2001) show in a large sample that greater state ownership increases the probability of a banking crisis.

Looking at foreign vs. domestic bank ownership, Claessens, Demirgüç-Kunt, and Huizinga (2001) note that foreign entries are related to higher operating efficiency, better financial intermediation and long-term growth of the banking market. Demirgüç-Kunt, Levine, and Min (1998), Dages et al. (2000), Peek and Rosengren (2000) and Detragiache and Gupta (2004) prove any concern wrong about increased risk of contagion and volatility in the banking market through entries of foreign banks. Besides more concentrated banking systems and fewer regulatory restrictions on bank competition and activity, foreign entries also

increase competition and therefore decrease the probability of a banking crisis argue Beck, Demirgüç-Kunt, and Levine (2004).

2.6.4 The role of institutions

Demirgüç-Kunt and Detragiache (1998) prove that a weaker institutional environment may be related to a higher probability of a banking crisis. Additionally, Mehrez and Kaufmann (1999) found that low transparency in financially liberalized markets lead to higher likelihood of a banking crisis.

Explicit deposit insurances are originally designed to prevent bank runs and self-fulfilling panics but also create incentives for excessive risk-taking (Kane, 1989). Demirgüç-Kunt and Detragiache (2002) confirmed this finding by reporting explicit deposit insurances to increase the probability of banking crises, especially in interest rate deregulated and weak institutional environments. Thus, moral hazard is a greater problem in liberalized financial systems in which bank monitoring is more challenging. Also, the design of the deposit insurance is affecting the probability of a banking crisis as lower coverage, coinsurance, private sector involvement in the scheme's management, ex-post funding and mandatory membership are associated with lower levels of bank fragility.

Regarding bank regulation and supervision affecting banking crises, Barth, Caprio and Levine (2004) found that regulatory and supervisory practices that insist on accurate information disclosure, empowerment of private sector monitoring of banks and the fostering of incentives for private agents to exert control on banks, are optimal to promote bank performance and stability.

2.6.5 The Political System and Crises

Political considerations may play a very important role in government decisions to deal with insolvent institutions and more generally with establishing a sound banking system. Kroszner (1997) suggests that it is most important to ensure transparency in government policies and decisions; competition; legislative oversight of regulation; and the possibility of foreign bank entries. Concerning politics and their dealing with insolvent institutions, Brown and Dinc (2004) report that failing banks are less likely to be taken over by the government or to lose their licenses before elections than after elections.

2.7 Effects and implications of banking crises

The empirical part of this study investigates the effects of banking crises. Reviewing this question from a theoretical point of view, I discuss the credit crunch and bank relationship loss hypotheses as well as the crisis' theoretical effect on output loss and fiscal cost.

2.7.1 The credit crunch hypothesis

During banking crises, banks may decrease credit to firms which in turn lower expenditure and investment. This decrease lowers consumption, aggregate demand and employment and possibly drives firms into illiquidity. Distressed banks and consecutive bank runs and bank failures may threaten the payment system's soundness, thus increasing transaction costs. These mechanisms suggest that distressed banks hinder the rest of the economy. Such lower credit supply than demand is called "credit crunch" (Demirgüç-Kunt and Detragiache, 2005; and Bernanke, 1983)

Additionally, banking crises increase agency problems and lending relationships become more complicating as banks may abandon risky borrowers and/or raise spreads. Thus, output and bank credit may decline during banking crises even without feedback effects from bank distress to credit availability. However, inflation and exchange rate effects may mix up credit valuations as well as credit restructurings with off-balance sheet vehicles, thus appearing as a deeper decline of credit than in reality (Demirgüç-Kunt and Detragiache, 2005).

In past banking crises mixed evidence on the credit crunch hypothesis was found. Bernanke et al. (1991) report a credit crunch in the U.S. during 1990, Domac and Ferri (1999) didn't find a credit crunch in Malaysia and Korea during the East Asian crisis whereas Gosh and Gosh (1999) confirmed a credit crunch for Indonesia and Korea during the same crisis.

Rajan, Detragiache and Dell'Ariscia (2008), examined the output consequences of a credit crunch following banking crises, while using micro and industry data. They found that industries more dependent on external finance are more negatively affected during banking crises. This confirms the credit crunch hypothesis, argue Rajan, Detragiache and Dell'Ariscia (2008). They observe that more financially dependent sectors indeed lose about 1 percentage point of growth more in each crisis year, compared to industries that are less dependent on

external finance. This effect becomes even stronger in developing countries where private sectors may have less access to foreign capital.

2.7.2 Bank relationship and information loss hypothesis

The corporate slogan of Chase Manhattan Bank in 1998 sums it all up; “the right relationship is everything”. However, banking crises often force banks into bankruptcy, a merger or downsizing where valuable bank-to-customer relationships and knowledge are lost. Many bank employees, credit officers and bank managers might have changed departments, banks or the industry. As seen, banks are providers of liquidity by granting loans. Banks are supposed to “lean against the wind” (Smith and Ongena, 2002) by accommodating debtors during difficult times. Hence, valuable bank relationship, bank services and information get lost during banking crises.

Bank defaults can create deadweight costs if lost customers reputations decrease future borrowing ability (de Lange, 1992) because a new bank relationship requires the new bank to accumulate information which comes at a cost (Stiglitz, 1992). Djankov, Jindra and Klapper (1999) confirmed a decrease in the firm’s market value upon announcement of its main bank’s closure. Besides bank defaults, already formal actions against a bank, dispositions of failed or failing banks or voluntary bank mergers will cause temporary disruptions in banking services. Jiangli, Unal and Yom (2006) reported higher credit availability for firms with multiple-bank relationships during the Asian Financial Crisis. Miyajima and Arikawa (2006) analyzed the Japanese Financial Crisis of the 1990’s and found that firms most affected by the crisis had common characteristics. These firms had high leverage, lower R&D expenditures, lower profitability, difficulty in accessing capital markets and high dependence on their main bank. Additionally, contrary to theory, main banks were found to delay firms from restructuring. Overall Miyajima and Arikawa (2006) concluded that the main bank system may have been an “impediment to creative destruction” during the period of the banking crisis. Also Brewer et al. (2002) researched the Japanese Financial Crisis, noting that bank failures affected their customers’ market value the more the customers had less access to alternative funding. However, the bank failure was “bad news” for all firms in the economy and the banking crisis resulted overall in high economical cost.

2.7.3 Banking crises and economical costs

Few empirical studies of banking crises examine how banking crises affect the rest of the economy. Summarizing several case studies, Lindgren, Garcia, and Saal (1996) conclude that bank fragility has adversely affected economic growth. More systematic empirical investigations have also shown that output growth and private credit growth drop significantly below normal in the years around banking crises (Eichengreen and Rose, 1998; Kaminsky and Reinhart, 1999; Demirgüç-Kunt and Detragiache., 2005). Bordo et al. (2001) show that financial crises (currency crises, banking crises, or both) entailed similar-sized output losses in recent years as compared to previous historical periods. Crises, however, are more frequent now than during the gold standard and Bretton Woods periods, and are as frequent now as in the interwar years. Hoggarth et al. (2002) prove that output losses associated with banking crises are not more severe in developing countries than in developed countries. Claessens, Klingebiel and Laeven (2003) showed that economic output loss is not decreased through more government intervention and higher fiscal cost.

2.7.4 Banking crises and fiscal costs

Fiscal costs due to banking crises mostly result from government interventions in the crisis and foregone tax revenues due to banking crisis output losses. The question about the optimal government intervention in banking crises is important to policymakers but difficult to answer through empirical analysis. One problem is that compiling accurate information on intervention policies for a large enough sample of crises is a laborious task. Another difficulty is that the sequence, timing, and specific modalities of bank support strategies are crucial to the outcome. A few studies have used cross-country empirical analysis to study which intervention policies can minimize the costs of a banking crisis (Claessens, Klingebiel, and Laeven, 2003, Honohan and Klingebiel, 2003).

Honohan and Klingebiel (2003) attempted to quantitatively measure government intervention. They constructed a database with estimates of the fiscal cost of forty banking crises and catalogued the policies adopted in each episode. These policies were classified according to five broad categories: blanket guarantees to depositors, liquidity support to banks, bank recapitalization, financial assistance to debtors, and forbearance. With this database, the authors explore how the different intervention policies affect the fiscal cost of the bailout,

after controlling for country and crisis characteristics. They conclude that more generous bailouts resulted in higher fiscal costs.

Also Claessens, Klingebiel and Laeven (2003) found that extensive liquidity support, government guarantees on financial institutions' liabilities and forbearance from prudential regulation add to the fiscal costs of resolving the banking crisis. Moreover, Claessens, Klingebiel and Laeven (2003) explore the relationship between intervention policies and the economic costs of crises. Costs are measured by the output loss relative to trend during the crisis episode. The main finding is that generous support to the banking system does not reduce the output cost of banking crises. However, since omitted exogenous shocks may simultaneously cause a stronger output decline and more generous intervention measures, the interpretation of the results is ambiguous. Nevertheless, they conclude that countries are advised to use strict policies to resolve a crisis and focus on structural reforms that help avoid future systemic crises. It is also to note that their results survived even after the authors control for a large set of variables such as GDP growth prior to crisis, existence of deposit insurance, inflation rate at the onset of the crisis, state ownership of banks and degree of dollarization.

Regarding the political side of government interventions, Keefer (2001) notes that when voters are well informed, elections are close and there are many veto players, governments incur smaller fiscal costs of banking crises. Thus, transparency, information dissemination and competition amongst interest groups play an important role in shaping crisis response policies.

3 Empirical part

The first empirical part looks at the determinants of banking crises by estimating the significance of various determinants' impact on the likelihood of an occurrence of a banking crisis. By optimizing a multivariate logit model's maximum likelihood function I obtain empirical results which are thereafter discussed and compared to theory and earlier research findings. The second empirical part investigates how banking crises impact the crises' outcomes, defined as slowed growth and higher fiscal cost. Banking crises' effects are explored by employing ordinary least squares regressions.

3.1 Empirical part I: Determinants of banking crises

According to the literature review, banking crises may disrupt the flow of credit, reduce investments and may force viable firms into bankruptcy. Thus, a banking crisis can cause a decline in wealth. Understanding therefore the origins and the mechanism behind banking crises with the goal of preventing the occurrence of a systemic crisis is a major objective for policymakers. Finding features in the economic environment that tend to enforce banking sector fragility and that lead to systemic crises is an important research field. In this empirical research I therefore study factors associated with the emergence of systemic banking crises. I employ a multivariate logit model in a large sample of developed and developing countries between 1980 and 2005. As feedback effects may affect some of the explanatory variables after the onset of a crisis, I construct two sets of regressions. In the first set of regressions I eliminate all observations from the data panel following a banking crisis. In the second set of regressions I eliminate all data observations while the banking crisis is on-going.

Macroeconomic variables as well as structural characteristics of the economy in general and of the financial sector in particular are included into the maximum likelihood function. I describe the variables and hypotheses, as well as the methodology and data used. Thereafter, an extensive discussion about the results follows. I find that low GDP growth, highly developed institutional and regulatory environments and high GDP per capita increase the probability of a banking crisis.

3.1.1 Banking crises determinants and hypotheses

On the basis of the literature review, I describe the chosen variables and hypothesize how these variables influence the probability of a banking crisis. Table 1 summarizes the chosen variables and their description, while Table 2 summarizes, based on previous research, the variables hypothesized impact on banking crises probabilities.

Table 1. Summary of the determinants of banking crises	
This table describes the variables used in the empirical part I on determinants of banking crises. This table's column "Explanation" describes the origins of the variables. Year t equals the year of the start of the banking crisis. The data sources are described in parantheses.	
Dependent Variable	Explanation
BANKING CRISIS	Dummy equals 1 if a banking crisis exists in year t in the specific country k (obtained from the database by Laeven and Valencia (2008))
Explanatory Variables	
Macroeconomic variables	
GDPGROWTH	Rate of growth of real GDP in year t (obtained from IFS)
REALINTEREST	Treasury bill interest rate in year t (obtained from IFS)
INFLATION	Rate of change of the GDP deflator in year t (obtained from IFS)
Financial variable	
M2RESERVES	Ratio of M2 to foreign exchange reserves of the central bank in year t (both obtained from IFS)
Institutional variable	
CREDITORIGHT	Ordinal variable ranging from 0 (weak creditor rights) to 4 (strong creditor rights), based on an index of aggregated creditor rights (Djankov, McLiesh and Shleifer, 2007)
GDP CAP	GDP per capita in year t (obtained from WEO and IFS)
Alternative variable	
FINREFORM	Dummy equals 1 during the period [t, t+5] if the country was undergoing a large financial reform (obtained from the database by Abiad, Detragiache and Tressel (2008))
Past crisis variable	
LASTCRISISDURATION	Measures the time (in years) that passed by since the last banking crisis in year t

Table 2. Summary of hypothesized and empirical findings of determinants' relation to banking crises

This table shows the variables used in the empirical part I on determinants of banking crises. GDPGROWTH equals the rate of growth of the real GDP, REALINTEREST equals the treasury bill interest rate, INFLATION equals the rate of change of the GDP deflator, M2RESERVES equals the ratio of M2 to foreign exchange reserves of the central bank, CREDITORIGHT equals an index of aggregated creditor rights by Djankov, McLiesh and Shleifer (2007), GDPCAP equals the GDP per capita, FINREFORM equals a dummy which is equal to 1 if the country was undergoing a large financial reform (obtained from the database by Abiad, Detragiache and Tressel, 2008), and LASTCRISISDURATION measures the time that passed by since the last banking crisis. All variables were obtained from IFS if not specified otherwise. The column "previous empirical evidence" shows earlier research on which our hypotheses are based. The column "hypothesized relation to the probability of a banking crisis" describes how each determinant is hypothesized to influence the probability of a banking crisis. Finally, the column "empirical results on the relation to the probability of a banking crisis" shows the results of this empirical part I (Table 5 and 6) where the determinants' impact was tested in a multivariate logit model.

Explanatory variables	Previous empirical evidence	Hypothesized relation to the probability of a banking crisis (based on previous empirical evidence)	Empirical results on the relation to the probability of a banking crisis (Table 5 and Table 6)
Macroeconomic variables			
GDPGROWTH	Demirgüç-Kunt and Detragiache (1997)	Negative	Negative
REALINTEREST	Galbis (1993), Demirgüç-Kunt and Detragiache (1997)	Positive	Positive
INFLATION	Reinhart and Rogoff (2008)	Positive	Negative
Financial variable			
M2RESERVES	Kaminsky and Reinhart (1996), Demirgüç-Kunt and Detragiache (1997)	Positive	Negative
Institutional variable			
CREDITORIGHT	Demirgüç-Kunt and Detragiache (1997), LLSV (1999)	Negative	Positive
GDPCAP	Demirgüç-Kunt and Detragiache (1997)	Negative	Positive
Alternative variable			
FINREFORM	Kaminsky and Reinhart (1996), Demirgüç-Kunt and Detragiache (1998)	Positive	Negative/ unclear
Past crisis variable			
LASTCRISIS DURATION	Demirgüç-Kunt and Detragiache (1997)	Positive	Negative

3.1.1.1 Dependent variable

A systemic banking crisis is defined, exactly as in Laeven and Valencia (2008), as one where the country's corporate and financial sector experiences a large number of defaults and difficulties in timely repaying of contracts. Also, non-performing loans increase sharply and most of the aggregate capital in the banking system may be exhausted. Alongside depressed asset prices, sharp increases in real interest rates and slowed capital flow is often observable. Each crisis event and starting date is cross-checked with whether it coincides with deposit runs, deposit freezes, extensive liquidity support, large proportions of non-performing loans, or bank interventions.

3.1.1.2 Explanatory variables

My choice of explanatory variables reflects the results of earlier studies (Demirgüç-Kunt and Detragiache, 1997, Demirgüç-Kunt and Detragiache, 1998, Demirgüç-Kunt and Detragiache, 2000, and Shehzad and De Haan, 2009), as well as the literature review on origins of banking crisis and data availability. I grouped the variables into macroeconomic, financial, institutional, alternative and past crisis variables sections.

Macroeconomic variables

The variable GDPGROWTH equals the rate of growth of real GDP. Low GDP growth reflects adverse macroeconomic shocks that hurt banks through higher rates of non-performing loans. Thus the probability of a banking crisis is expected to be negatively related to the variable GDPGROWTH, exactly as Demirgüç-Kunt and Detragiache (1997) argue. REALINTEREST signifies the short-term real interest rate that is inflation-adjusted. High short-term real interest rates affect banks negatively if they are not able to quickly pass the higher interests on to their customers (Demirgüç-Kunt and Detragiache, 1997). Also, real interest rates might proxy financial liberalization as suggested in Galbis (1993). Higher interest rates may increase opportunities for excessive risk-taking and fraud, thereby increasing financial fragility. I also introduce the variable INFLATION which is specified as the rate of change of the GDP deflator. I argue that the variable measuring inflation reflects macroeconomic mismanagement in which high inflation is a sign for a price bubble (Reinhart and Rogoff, 2008).

Financial variable

Reinhart and Rogoff (2008) found that inflation and large capital inflows often preceded crises. I suggest to measure sudden capital in- or outflows and a country's vulnerability to balance-of-payment problems (Calvo, 1996) as ratio of M2 to foreign exchange reserves of the central bank, named M2RESERVES. I expect, exactly as Calvo (1996) and Demirgüç-Kunt and Detragiache (1997), the variable measuring M2 to reserves to positively relate to the probability of a banking crisis.

Institutional variables

I introduce the variable GDPCAP which equals the GDP per capita and shall reflect the basic institutional environment and efficiency of the country. Exactly as Demirgüç-Kunt and Detragiache (1997), I also hypothesize that lower values of GDPCAP increase the probability of a banking crisis.

***H1.11** Low GDP growth, high real interest rates, high inflation, high M2 to foreign exchange reserves and low GDP per capita increase the probability of a banking crisis in the data panel that excludes years after the first banking crisis.*

***H2.11** Low GDP growth, high real interest rates, high inflation, high M2 to foreign exchange reserves and low GDP per capita increase the probability of a banking crisis in the panel that excludes years while the banking crisis is ongoing.*

LaPorta, Lopez-de-Silanes, and Shleifer (LLSV) introduced a database of creditor rights around the globe in the year 1999. This database was extended and yearly recorded for 129 countries by Djankov, McLiesh and Shleifer (2007). Their index of aggregated creditor rights focuses on whether rights of secured lenders are defined in laws and regulations; secured creditors are able to seize their collateral after the reorganization petition is approved; secured creditors are paid first out of the proceeds of liquidating a bankrupt firm; and whether management doesn't retain administration of its property during the resolution of the reorganization. The index ranges from 0 (weak creditor rights) to 4 (strong creditor rights) and is constructed as at January of every year. This variable is introduced as CREDITORIGHT and is hypothesized to reflect the economic wide impact of the legal system. A weak regulation might higher the likelihood of a banking crisis as suggested by LLSV (1999) and Demirgüç-Kunt and Detragiache (1997). However, GDPCAP and

CREDITORIGHT might be difficult to disentangle as these earlier studies reported strong correlations.

***H1.12** Low creditor rights increase the probability of banking crises in the data panel that excludes years after the first banking crisis.*

***H2.12** Low creditor rights increase the probability of banking crises in the panel that excludes years while the banking crisis is ongoing.*

An alternative variable

To test financial liberalization, the variable FINREFORM is introduced which is based on a study by Abiad, Detragiache and Tressel (2008) for the time span of 1973 to 2005. The dummy FINREFORM equals 1 for five years if the country was undergoing a large financial reform as identified in Abiad, Detragiache and Tressel (2008). I hypothesize that financial liberalizations increases financial fragility and the likelihood of financial crises, exactly as Kaminsky and Reinhart (1996) have shown in their study on determinants of banking crises.

***H1.13** Financial reforms increase the probability of banking crises in the data panel that excludes years after the first banking crisis.*

Past crisis variable

For the second set of regressions in which I exclude the period between the start and end of the crisis, the variable LASTCRISISDURATION is included which measures the time that passed by since the last crisis. Exactly as Demirgüç-Kunt and Detragiache (1997), I hypothesize that the probability of a new banking crisis increases with the time as new problems after the last crisis accumulate again.

***H2.13** The more time that passed by since the last banking crisis, the more increases the probability of a new banking crisis in the panel that excludes years while the banking crisis is ongoing.*

***H2.14** The more time that passed by since the last banking crisis as well as financial reforms increase the probability of banking crises in the panel that excludes years while the banking crisis is ongoing.*

3.1.2 Methodology: Multivariate logit approach

There exist two different methodologies to research the determinants of banking crises; the signals approach and the multivariate logit approach. I chose to employ the multivariate logit approach as this approach fits our research question optimally. This choice becomes evident when looking at both possible approaches closely.

3.1.2.1 Signals Approach

The signals approach was first applied to research determinants of banking crises by Kaminsky and Reinhart (1999). They found that before the start of banking crises, monetary growth and interest rates (lending and deposit rates) were above normal, showing a high demand for money and credit. Additionally, export growth appeared below trend and real exchange rates were appreciating. Eight months before the peak of the banking crisis, output growth falls below trend while stock prices peak, suggesting that banking crises are preceded by a cyclical downturn, as argued by Kaminsky and Reinhart (1999).

Using the signals approach in the econometric analysis of determinants of banking crises, a variable is deemed to signal a crisis any time it crosses a particular threshold during the 24 months prior a crisis. Each signals threshold is chosen to minimize the in-sample noise-to-signal ratio. Kaminsky and Reinhart (1999) find the appreciation of real exchange rates, equity prices and the money multiplier to be the strongest signals for a banking crisis. However, even these strongest signals would not issue a signal in 73-79 percent of the observations during the 24 months preceding a crisis. Furthermore, each possible covariate is considered in isolation and thus aggregate information provided by each indicator is getting lost in that econometric model. Additionally, thresholds are always “black and white” because they ignore signals that almost crossed the threshold or were far above it. This is presumably important in assessing fragility.

Demirgüç-Kunt and Detragiache (2000) proof that the crises probabilities estimated through a multivariate logit framework result in lower in-sample type I and type II errors compared to the signals of Kaminsky and Reinhart (1999). Demirgüç-Kunt and Detragiache (2005) confirmed that the multivariate logit approach is better and more suitable. Therefore I

estimate the probability of a banking crisis using a multivariate logit model, exactly as in the original application by Demirgüç-Kunt and Detragiache (1997).⁵

3.1.2.2 *The multivariate logit model*

I estimate the probability of a banking crisis using a multivariate logit model, exactly as in Demirgüç-Kunt and Detragiache (1997). In the multivariate logit approach, the probability of a crisis occurrence equals a function of a vector of explanatory variables. A logit econometric model is fit to the data and an estimate of the crisis probability is obtained by maximizing the likelihood function. Therefore, the model produces a summary measure of fragility, the estimated probability of a crisis, which makes the best possible usage of information in the explanatory variables. More formally, in each period the country either experiences a crisis, or doesn't. Thus, my dependent variable, the crisis dummy, takes either the value zero if there is no crisis or the value one if there is a crisis. I hypothesize that the probability that a crisis will occur at a particular time in a particular country is a function of a vector of n explanatory variables $X(i, t)$. Let $P(i, t)$ denote the crisis dummy variable that takes the value of one when a banking crisis occurs in a country i at time t , and a value zero otherwise. β is a vector of unknown coefficients and $F(\beta'X(i, t))$ is the cumulative probability distribution function evaluated at $\beta'X(i, t)$. Therefore, the log-likelihood function of the model for the hypotheses 1.11 to 2.14 is:

$$\ln L = \sum_{t=1..T} \sum_{i=1..n} \left(P(i, t) \ln [F(\beta'X(i, t))] + (1 - P(i, t)) \ln [1 - F(\beta'X(i, t))] \right)$$

This probability distribution inhibits the logistic functional form which is commonly used in studying banking difficulties (Cole and Gunther, 1993, Gonzalez-Hermosillo et al., 1997). Thus, the regression results' estimated coefficients don't indicate the increase in probability of a crisis given a one-unit increase in the corresponding explanatory variables. Instead, the coefficients reflect the effect of a change in an explanatory variable on $\ln(P(i, t)/(1 - P(i, t)))$ where the increase in probability depends upon the original probability of the initial values of all the independent variables and their coefficients. Hence the coefficient's sign indicates the direction of the change but the magnitude depends on the

⁵ Further applications are found in Demirgüç-Kunt and Detragiache (1998), Demirgüç-Kunt and Detragiache (2000), and Shehzad and De Haan (2009).

slope of the cumulative distribution function $\beta'X(i, t)$. Therefore, the countries' changes in explanatory variables have different effects on the probability of a crisis depending on the countries' initial crises probabilities. The logistic specification means that very high or low initial probabilities of crises will be little affected by marginal changes of independent variables over time whereas the same marginal changes have greater effect on countries with intermediate initial crises probabilities.

After the onset of crises I am expecting feedback effects to affect some of the explanatory variables such as real interest rates (loosened monetary policies) which then again will destroy a clear relationship. Therefore, in the first set of regressions (Hypotheses 1.11 to 1.13) I eliminate all observations from the panel following a banking crisis. However, this also means that I am going to lose many observations for the 1990s and 2000s and 23 banking crises that occurred as second, third or fourth crises in the same country. In the second set of regressions (Hypotheses 2.11 to 2.14) I identify the year in which each banking crisis ended based on information available in existing case studies and from Laeven and Valencia (2008) for the second set of regressions in which I eliminate only the years between the start and end of the crisis in order to take into account possible feedback problems. In case no information on the end of a banking crisis was available, I assumed the crisis ended at $t+4$. Hypotheses 2's disadvantage is how I identify the crises' ends and whether these results are reliable. In addition, I argue that a country with a crisis in the past has a different likelihood of crisis in the future. This hypothesis will be taken into account by introducing a variable which records the duration since the last crisis.

Exactly as in the study of Demirgüç-Kunt and Detragiache (1997), I will not include any country fixed effects as this would require omitting all countries that did not experience a banking crisis which would result in a biased sample.

Each hypothesis 1.11- 1.13 and 2.11- 2.14 is statistically different from zero if the model chi-square is statistically significant at the 1, 5 or 10% level.

3.1.3 Data

In contrast to the study by Demirgüç-Kunt and Detragiache (1997) who research banking crises between 1980 and 1994, I am choosing a larger time frame. I am researching the probability of a banking crisis during 1980 and 2005. Initially, all countries in the IFS were

included. Thereafter, most centrally planned economies, as well as most economies in transition which proved to be outliers, were excluded. Only, Hungary, Poland and Romania stayed within the average range and were kept in the sample. Additionally, a few more countries had to be excluded due to data unavailability. This process of elimination left us with a number of countries ranging from a maximum of 121 to a minimum of 120 countries depending on the specification of the regression. Appendix A1 reflects the list of countries included in the sample. The 65 banking crises (Hypothesis 1) and 80 banking crises (Hypothesis 2), respectively, are taken from the database by Laeven and Valencia (2008). The data on creditor rights was obtained from an index of aggregated creditor rights by Djankov, McLiesh and Shleifer (2007) and the data on financial reforms was obtained from the database by Abiad, Detragiache and Tressel (2008). From IMF's IFS database and world economic outlook (WEO) I obtained the data for the remaining variables (Table 1). Nevertheless, some single data points were still missing, thus some observations included in the panel do not cover the entire 1980 to 2005 time period. The dataset for Hypotheses 2 consists eventually of 2755 country-year observations (24795 data points) that are not associated with bank crises year observations.

3.1.3.1 Descriptive statistics of banking crises' costs

Before reporting the empirical findings about how and whether the chosen determinants influence banking crises, Table 3 and Table 4 report the variables' mean, standard deviation, student's t-distribution and their 95% confidence interval. As expected, these variables differed most of the time substantially from their means as macroeconomic factors may have fundamentally changed over the decades. Table 4 shows that many variables are, as expected, statistically significantly correlated. High inflation is significantly correlated to low GDP growth and to high real interest rates, both times at the 1% level (2-tailed). Strong creditor rights are statistically significantly correlated to higher GDP per capita at the 1% level (2-tailed). Finally, financial reforms are statistically significantly correlated to higher real interest rates, higher inflation and higher creditor rights. Clearly, any conclusion about individual determinants' influences on the probability of a banking crisis has to take into account these correlations.

Table 3. Descriptive statistics of banking crises' determinants

Table 3 describes banking crises determinants' most important statistical values. The first empirical study's variable GDPGROWTH equals the rate of growth of the real GDP, REALINTEREST equals the treasury bill interest rate, INFLATION equals the rate of change of the GDP deflator, M2RESERVES equals the ratio of M2 to foreign exchange reserves of the central bank, GDPCAP equals the GDP per capita, CREDITORIGHT equals an index of aggregated creditor rights by Djankov, McLiesh and Shleifer (2007), and FINREFORM equals a dummy which is equal to 1 if the country was undergoing a large financial reform (obtained from the database by Abiad, Detragiache and Tressel, 2008).

Variable	Mean	Std. Deviation	t-distribution	95% confidence interval	
				Lower	Upper
GDPGROWTH (in %)	3.18	5.55	30.48	0.20	6.56
REALINTEREST (in %)	8.94	7.50	45.63	0.38	18.26
INFLATION (in %)	12.85	26.97	18.27	0.89	27.09
M2RESERVES	0.73	3.59	7.82	0.18	1.65
GDPCAP	16689.12	15617.35	33.50	977.49	34355.73
CREDITORIGHT	1.31	1.31	53.62	0.04	2.68
FINREFORM	0.11	0.32	19.28	0.01	0.24

Table 4. Correlation matrix of banking crises' determinants

This Table 4 presents cross sectional Pearson correlations for regression variables of the first empirical study on the determinants of banking crises. REALINTEREST equals the treasury bill interest rate, INFLATION equals the rate of change of the GDP deflator, M2RESERVES equals the ratio of M2 to foreign exchange reserves of the central bank, GDPCAP equals the GDP per capita, CREDITORIGHT equals an index of aggregated creditor rights by Djankov, McLiesh and Shleifer (2007), and FINREFORM equals a dummy which is equal to 1 if the country was undergoing a large financial reform (obtained from the database by Abiad, Detragiache and Tressel, 2008). The sample period is from 1980 to 2005. ** indicate that the variables are statistically significantly correlated at the 0.01 level (2-tailed).

Variables	GDP GROWTH	REAL INTEREST	INFLATION	M2 RESERVES	GDPCAP	CREDITORIGHT
REAL INTEREST	-0.0399	1				
INFLATION	** -0.0594	** 0.2776	1			
M2RESERVES	-0.0140	0.0005	0.0311	1		
GDPCAP	0.0353	-0.0103	-0.0112	-0.0040	1	
CREDITORIGHT	0.0344	-0.0048	0.0036	-0.0276	** 0.115	1
FINREFORM	0.0026	** 0.0915	** 0.0912	-0.0104	0.0387	** 0.1493

3.1.4 Empirical findings of determinants of banking crises

Table 5 and 6 contain the main results of the multivariate logit regressions of the determinants of banking crises. Table 5 reports the results for the hypotheses 1.11 to 1.13, using the panel that excludes years after the first banking crisis. Table 6 reports the results for the hypotheses 2.11 to 2.14, in which the panel excludes years while banking crises are ongoing.

The quality of each model is assessed with three criteria, as in Demirgüç-Kunt and Detragiache (1997) and Amemiya (1981): model chi-square, Akaike's information criterion (AIC), and in-sample classification accuracy. The model chi-square tests the joint significance of the regressors by comparing the likelihood of the model with that of a model with only the intercept.

Table 5. Determinants of Banking Crises Results—Panel Excluding Years After the First Banking Crisis

This Table 5 shows the results of the multivariate logit regressions for hypotheses 3.11 to 3.13 of the first empirical study on the determinants of banking crises. I regressed the dependent variable, BANKINGCRISIS, on a set of variables in a maximum likelihood function. The dependent variable takes the value one if there is a crisis and the value zero otherwise. Standard errors are given in parentheses. GDPGROWTH equals the rate of growth of the real GDP, REALINTEREST equals the treasury bill interest rate, INFLATION equals the rate of change of the GDP deflator, M2RESERVES equals the ratio of M2 to foreign exchange reserves of the central bank, GDPCAP equals the GDP per capita, CREDITORIGHT equals an index of aggregated creditor rights by Djankov, McLiesh and Shleifer (2007), and FINREFORM equals a dummy which is equal to 1 if the country was undergoing a large financial reform (obtained from the database by Abiad, Detragiache and Tressel, 2008). “% total correct”, “% crisis correct”, and “% no-crisis correct” shows how many observations were classified overall, as crisis and as no-crisis, correctly. */**/*** denotes statistical significance on the 10, 5 and 1 percent level, respectively.

	Dependent variable: BANKINGCRISIS		
Explanatory variables	1.11	1.12	1.13
Constant	-3.4648 *** (0.148)	-3.6330 *** (0.2001)	-3.6297 *** (0.1923)
GDPGROWTH	-.0602 *** (0.20)	-0.0609 *** (0.0206)	-0.0607 *** (0.0206)
REALINTEREST	0.0005 ** (0.001)	0.0006 ** (0.0003)	0.0006 ** (0.0002)
INFLATION	-0.00007 (0.001)	-.0001 (0.0006)	-0.0001 (0.0006)
M2RESERVES	-0.0027 (0.0006)	-0.0018 (0.0134)	-0.0018 (0.0134)
CREDITORIGHT		0.1359 (0.0956)	0.1369 (0.0964)
GDPCAP	0.00001 ** (0.0002)	0.00001 ** (0.000001)	0.00001 ** (0.000001)
FINREFORM			-0.0302 (0.0423)
No. of crises	65	65	65
No. of observations	2123	2123	2123
No. of countries	120	120	120
% total correct	84.6	84.7	85.6
% crisis correct	30.5	30.7	34.1
% no-crisis correct	99.2	99.0	98.1
Model chi-square	19 ***	21.82 ***	21.8 ***
Akaike's information criterion (AIC)	282.16	282.19	283

Table 6. Determinants of Banking Crises Results—Panel Excluding Years While the Crisis is On-Going

This Table 6 shows the results of the multivariate logit regressions for hypotheses 4.11 to 4.14 of the empirical study I on the determinants of banking crises. I regressed the dependent variable, BANKINGCRISIS, on a set of variables through a maximum likelihood function. The dependent variable takes the value one if there is a crisis and the value zero otherwise. Standard errors are given in parentheses. GDPGROWTH equals the rate of growth of the real GDP, REALINTEREST equals the treasury bill interest rate, INFLATION equals the rate of change of the GDP deflator, M2RESERVES equals the ratio of M2 to foreign exchange reserves of the central bank, GDPCAP equals the GDP per capita, CREDITORIGHT equals an index of aggregated creditor rights by Djankov, McLiesh and Shleifer (2007), FINREFORM equals a dummy which is equal to 1 if the country was undergoing a large financial reform (obtained from the database by Abiad, Detragiache and Tressel, 2008), and LASTCRISISDURATION measures the time that passed by since the last banking crisis. All variables were obtained from IFS if not specified otherwise. “% total correct”, “% crisis correct”, and “% no-crisis correct” shows how many observations were classified overall, as crisis and as no-crisis, correctly. */**/*** denotes statistical significance on the 10, 5 and 1 percent level, respectively.

Explanatory variables	Dependent variable: BANKINGCRISIS			
	2.11	2.12	2.13	2.14
Constant	-3.4636 *** (0.1291)	-3.5880 *** (0.1782)	-3.5795 *** (0.2876)	-3.6210 *** (0.2898)
GDPGROWTH	-0.0724 *** (0.22)	-0.0730 *** (0.0219)	-0.0742 *** (0.0212)	-0.0743 *** (0.0212)
REALINTEREST	0.0007 (0.0004)	0.0007 (0.0004)	0.0009 (0.0006)	0.0008 (0.0006)
INFLATION	-0.0004 (0.0014)	-0.0005 (0.0015)	-0.0009 (0.0022)	-0.0008 (0.0022)
M2RESERVES	-0.0017 (0.0096)	-0.0015 (0.0097)	-0.0015 (0.0070)	-0.0015 (0.0070)
CREDITORIGHT		0.0938 (0.0872)	0.1452 (0.1372)	0.1219 (0.1383)
GDPCAP	0.0001 ** (0.000001)	0.0001 * (0.000001)	0.0001 ** (0.000001)	0.0001 * (0.000001)
FINREFORM				0.6520 * (0.3841)
LASTCRISISDURATION			-1.0203 ** (0.4776)	-1.0142 ** (0.4685)
No. of crises	80	80	80	80
No. of observations (crisis/no-crisis)	2835	2835	2835	2835
No. of countries	121	121	121	121
% total correct	46.42	46.56	49.98	49.84
% crisis correct	42.50	42.50	42	43.50
% no-crisis correct	73.83	73.83	74	73.18
Model chi-square	30.16 ***	31.30***	101.98***	104.67 ***
AIC	354.20	354.63	320.29	319.95

First, all model chi-square values confirm that each model (1.11-1.13, and 2.11-1.13) rejects, at the one percent significance level, the hypothesis that the variables' coefficients are jointly equal to zero. Also Demirgüç-Kunt and Detragiache (1997) find that all their models reject the hypothesis that the variables' coefficients are jointly equal to zero.

Second, the AIC criterion is found by computing as minus the log-likelihood function of the model plus the number of parameters being estimated. Thus, the smaller AIC the better is the model. AIC is important in comparing models with different degrees of freedom. Table 5, regression 2.11 performs best. However, the difference to hypotheses 1.12 and 1.13 is very small with 0.03 and 0.84, respectively. Table 6 on the other hand, shows larger differences in AIC values between the different regressions. Hypothesis 2.14 with an AIC of 319.95 reports the lowest value. Therefore, hypotheses 2.13 and 2.14 are better models, in which the statistically significant variables measuring financial reforms and the duration since the last banking crisis are added. Overall, I conclude that Table 5, excluding years after the first banking crisis, inhibits better regression models in terms of Akaike's information criterion (AIC). This finding is parallel to Dermirguc-Kunt and Detragiache (1997) who also report better AIC values for their models that exclude years after the first banking crisis.

Third, in order to assess the predictive power and accuracy of the various specifications, I report the percentage of crises that are correctly classified (the cut-off probability is equal to the in-sample crisis frequency), the percentage of non-crises correctly classified and the total percentage of observations that are correctly classified.

The models perform fairly well in terms of their classification accuracies. The overall classification accuracy varies between 85 to 86 percent in the panel excluding years after the first banking crisis and 46 to 50 percent in the panel excluding years during a banking crisis. The panel excluding years after the first banking crisis (table 5) performs overall better as seen by the fact that ca. 99 percent of the no-crisis years were correctly classified while 30 to 34 percent of the crisis years were detected. The panel excluding years during a banking crisis (table 6) reports that only 73 to 74 percent of no-crisis were correctly classified. This resulted on the other hand in a higher percentage of correctly classified crisis periods, 42 to 44 percent.

The percentage of correctly classified periods tends to be downplayed because in a number of episodes the estimated probability of a crisis increases significantly a few years before the episode begins or continues to be high even after the "official" end of a banking crisis. Those

observations are considered as incorrectly classified by the accuracy criterion. Appendix A1 reports more details about the classification accuracy of one of the best models, model 1.13. 65 percent of the crisis episodes were not correctly classified by the model. While only one crisis was correctly classified, in 26.25 percent of additional cases the probability of a crisis jumped up already as early as three or more years prior to the starting date. In additional 6.25 percent of the episodes, the model classifies as a crisis also the year before the beginning of the crisis. These results suggest that the elements that contribute to systemic banking sector fragility may be in place one or more years before problems become manifest. Also Demirgüç-Kunt and Detragiache (1997) came to the same conclusion and overall reported similar model accuracies.

3.1.4.1 Significance of the explanatory variables

This section discusses the significance of the explanatory variables and their implications. Despite the fact that the study by Demirgüç-Kunt and Detragiache (1997) has a smaller time frame and not the exact same set of variables, their variables' performance and results will be compared to this study. The variables in Demirgüç-Kunt and Detragiache (1997) keep their direction and magnitude across different set of variables and hypotheses, which helps a profound comparison. It has to be noted that any findings have to be treated with caution, as the coefficients come from a reduced form equation. This study doesn't provide a structural model that makes explicit connections among the various explanatory variables, exactly as in Demirgüç-Kunt and Detragiache (1997).

Macroeconomic variables

In both panels, low GDP growth is associated with a higher probability of a banking crisis, exactly as in Demirgüç-Kunt and Detragiache (1997). This confirms that developments in the real side of the economy may be a major source of banking sector difficulties. Thus, higher rates of nonperforming loans may hurt banks and indirectly increase the likelihood of a banking crisis. Also, a small effect of real interest rate changes is visible. An increase in real interest rates increases the probability of a banking crisis, confirming the findings by Demirgüç-Kunt and Detragiache (1997). However, this variable is statistically significant in only a few of the models and the coefficient itself is very small. Nevertheless, higher interest rates may increase opportunities for excessive risk-taking and fraud, thereby increasing financial fragility.

Regarding the variable measuring inflation, any definite conclusion is not reached as all the coefficients are very small and statistically insignificant. The variable measuring inflation keeps nevertheless in all the model specification its negative direction, which would suggest that lower inflation increases the risk of banking crisis. This is against the theoretical assumption that inflation reflects macroeconomic mismanagement in which high inflation is a sign for a price bubble, as argued by Reinhart and Rogoff (2008). The result is also contrary to Demirgüç-Kunt and Detragiache (1997) who observed a positive and significant relation between the variable measuring inflation and the probability of a banking crisis. However, inflation was significantly correlated to GDP growth and real interest rates. Thus, any conclusion about the variables measuring inflation, real interest rate and GDP growth and their individual influence on the probability of a banking crisis is difficult to make.

Financial variable

The ratio of M2 to foreign exchange reserves of the central bank, named M2RESERVES, measuring external vulnerability to capital outflow, does not seem to increase the probability of a crisis in any of the model specifications. This is contrary to the prediction in theory and the findings of Demirgüç-Kunt and Detragiache (1997). This variable, however, tends to be statistically insignificant and rather small which leaves us without any strong conclusion about the variable's impact on the probability of a banking crisis.

Institutional variables

Contrary to the predictions in theory and earlier studies (Demirgüç-Kunt and Detragiache, 1998), the variable measuring creditor rights is increasing the probability of a banking crisis, the better creditor rights become. However, the results are statistically insignificant which leaves questions about the impact of creditor rights on the banking crisis likelihood. Additionally, the variable measuring creditor rights was found to be correlated to GDP per capita and financial reforms. Thus, some of these variables might be endogenous. In any case, no conclusion on each variable's individual influence on the probability of a banking crisis can be made.

Also GDP per capita is contrary to the theoretical predictions positive, practically implying that higher GDP per capita leads to a higher probability of crisis. As Demirgüç-Kunt and Detragiache (1997), I expected GDP per capita to reflect the basic institutional environment and efficiency of the country. However, it should be noted that it is difficult to disentangle the

effect of the creditor rights index from that of GDP per capita, given the high degree of correlation between the two variables in the sample. These two institutional variables together show a consistently positive effect of institutional development on the probability of a banking crisis. This is against the theoretical expectations and the findings by Demirgüç-Kunt and Detragiache (1997).

Alternative variable

In order to measure financial liberalization I introduced the variable measuring financial reforms which proves to statistically significantly increase the probability of a banking crisis in hypothesis 2.14. On the other hand, in hypothesis 1.13, financial reforms were negative but statistically insignificant. Nevertheless, 2.14 shows that financial liberalizations can increase financial fragility and the likelihood of financial crises, exactly as Kaminsky and Reinhart (1996) conclude. On the other hand, financial reforms were found to be statistically significantly correlated to real interest rates and inflation. Therefore, it is difficult to disentangle each variables separate effect on the probability of a banking crisis.

Past crisis variable

The variable measuring the duration since the last banking crisis is only employed in model specifications 2.13 and 2.14 and is shown to be statistically significantly reducing the likelihood of a crisis the longer no new banking crisis arise. This finding could suggest that banking crises lead to periods of instability but once a country overrode instability, further crises become less likely. In 9% of the countries surveyed, two or more crisis were observed during 1980 and 2005. However, it is difficult to disentangle the effect of the first crisis on the preceding crises from other macroeconomic effects, unrelated to the first crisis, which affected the next crisis. These findings are clearly contradicting the finding by Demirgüç-Kunt and Detragiache (1997) who report that a new banking crisis' probability is increasing over time.

Table 2 gives an overview on the variables' empirical evidence of their impact on the probability of a banking crisis. The best results are reported for GDP growth and the duration since the last crisis; both decrease the probability of a banking crisis the higher GDP growth is and the longer ago the last crisis was recorded. Both variables are statistically significant at the 1 and 5 percent level, respectively. Also, the variable creditor rights shows that higher institutional development increases the likelihood of a banking crisis.

Most of the above findings contradict the theoretical expectations and earlier findings (Table 2). Weak macroeconomic environment, including structural and regulatory deficiencies, was hypothesized to result in banking sector problems. However, the results may suggest that highly economically developed nations with low GDP growth might search higher earnings through financial reforms. This search of higher profits, while having low GDP growth, high creditor rights and high GDP per capita, would thus lead to a higher probability of a banking crisis. However, creditor rights are statistically significantly correlated to financial reforms and GDP per capita. Thus, any conclusion on each determinant's separate effect on the probability of a banking crisis might be difficult to make.

Regarding the financial variable M2 to reserves, which measures the vulnerability to capital outflows, no significant results were found. Contrary to theoretical assumptions and the findings of Demirgüç-Kunt and Detragiache (1998), this variable shows negative coefficients across all model specifications. The regression would therefore imply capital outflow to decrease the likelihood of a banking crisis. This could suggest that the possibility of foreign capital outflow is a disciplinary device against banking crises. The variables measuring financial reforms, inflation and real interest rates were statistically insignificant and of comparably small impact. Any conclusions concerning their influence on the probability of a banking crisis are difficult to make. The variables inflation and real interest rates were both statistically significant at the 1 percent level in the study by Demirgüç-Kunt and Detragiache (1998). However, their study only researches a small number of countries, banking crises and years. Finally, thanks to the different model specifications 1.11 to 1.13 and 2.11 to 2.14, automatic robustness checks were ensured and successful, as additional variables did not alter the original variables' coefficients. However, I found that earlier studies' results are not as strong as expected.

Most importantly, the study of Demirgüç-Kunt and Detragiache (1997) with a time frame of 15 years showed, as mentioned, strong results which were turned around in this study. Especially, we showed that most variables are statistically significantly correlated to at least one other variable. This raised questions about the endogeneity of these variables and whether the true determinants of banking crises are yet found. Future research is advised to focus on developing better determinants of banking crises.

3.2 Empirical part II: Banking crises' effects

This second empirical part investigates how the origins of banking crises impact the crises' outcome. I argue that financial and structural variables as well as government intervention-, monetary- and fiscal policies might explain fiscal costs and economic output loss. These outcomes, defined as slowed growth and higher fiscal cost, are in ordinary least squares regressions regressed on crisis and pre-crisis variables. From the database by Laeven and Valencia (2008), I obtain the dataset on 42 banking crises for the period 1970 to 2007. Overall, the results show a strong impact of twin and triple crises, different institutional environments and government interventions on fiscal and economical cost. Honohan and Klingebiel (2003) noted, only few studies have used cross-country empirical analysis to study most efficient crisis resolutions despite its importance to policymakers.

While focusing on fiscal and economical cost of banking crises, I recognize that the most efficient crisis resolution is under dispute. Generally, a trade-off is faced between reducing fiscal costs, and reducing economic cost (output loss). Governments can reallocate taxpayers wealth towards banks and debtors to restart productive investment at the cost of misallocating capital and distorting incentive which potentially results in moral hazard.⁶ Crisis resolution policies are researched by Claessens et al. (2003), Hoelscher and Quintyn (2003) and Honohan and Laeven (2005). This literature confirms that assisting banks and their borrowers can be counterproductive⁷ as banks tend to take unproductive risks at governments' expenses. Furthermore, bailing out banks during times of regulatory capital forbearance⁸ results in higher tax costs, more severe credit supply contraction and economic decline (Demirgüç-Kunt and Detragiache, 2002, Honohan and Klingebiel, 2003, Claessens, Klingebiel and Laeven, 2003). Additionally, liquidity support and government guarantees (explicit) on financial institutions are not necessarily recovery enhancing despite the fact that it is difficult to foresee the consequences hadn't such costly steps been taken (Honohan and Klingebiel, 2003 and Claessens, Klingebiel and Laeven, 2003).

In summary, crises costs appear in two forms and are dependent on each other. Fighting crises with government interventions will increase fiscal costs but is theoretically expected to lower output losses. Vice-versa, lower fiscal costs will increase output losses of the economy.

⁶ As banks may feel encouraged to abuse government protections.

⁷ It can increase losses to banks.

⁸ This allows banks to avoid the cost of regulatory compliance.

The main focus of this research part II is therefore to research variables that explain crises outcomes; slowed growth and fiscal costs incurred. I hypothesize that the severity of output losses can be explained with the simultaneous occurring of a debt and or currency crisis, levels of public debt, current accounts and deposits to GDP and inflation. Also, a preceding credit boom may explain the strength of the output loss. Additionally, structural variables, such as the financial, institutional and economic development, government ownership in banks, explicit deposit insurance and the severity of the crisis are hypothesized to explain output losses. After describing the variables, hypotheses, data and methodology used, follows the section on the empirical results which will show that more government intervention results in higher fiscal cost as well as higher economical cost.

Table 7. Determinants of banking crises costs			
This table describes the variables used in my OLS regression on the determinants of banking crises costs. Year t equals the year of the start of the banking crisis. If not specified otherwise, the variables were obtained from Laeven and Valencia (2008).			
Dependent Variables	Explanation	Expected correlation to	
		OUTPUTLOSS	FISCALCOST
FISCAL COST NET	net fiscal cost as percentage of GDP during [t, t+5]		
OUTPUT LOSS	difference of the real GDP and trend real GDP in percentage of the trend real GDP, for the period [t, t+3]		
Explanatory variables			
Initial conditions			
Dummy CURRENCY CRISIS	equals 1 if a currency crisis (a nominal currency depreciation of minimum 30% which is also at least a 10% increase in the rate of depreciation compared to the year before) occurred during the period [t-1, t+1]	+	+
Dummy DEBT CRISIS	equals 1 if a sovereign debt crisis occurred during the period [t-1, t+1]	+	+
PUBLICDEBT/GDP	general government gross debt to GDP in the pre-crisis year t-1	+	+
INFLATION	percentage change of the GDP deflator in the pre-crisis year t-1	+	+
DEPOSITS/GDP	total deposits taking institutions to GDP in the pre-crisis year t-1	+	+
GOVERNMENT OWNED	government owned share of the banking system assets in the pre-crisis year t-1	+	+

Table 7 continued. Determinants of banking crises costs			
Explanatory Variables	Explanation	Expected correlation to	
		OUTPUT LOSS	FISCAL COST
Financial system indicators			
Dummy FS LAW	equals 1 if a country's legal origin is based on French or Socialist law at time t (index of countries' legal origins from La Porta et al. (2000))	+	+
FINANCIAL LIBERALIZATION	measures major financial liberalizations during [t-5, t] (index of financial liberalization (Abiad and Mody, 2005))	+	+
Crisis containment policy responses			
Dummy DEPOSIT INSURANCE	equals 1 if the government introduced a deposit insurance or blanket guarantee during [t, t+3],	-	+
Crisis Resolution Policies			
Dummy LARGE-SCALE INTERVENTION	equals 1 if the government intervened in banks through e.g. nationalizing, closures, mergers, sales and recapitalizations of large banks during [t, t+3]	?	+
Dummy DEPOSITOR LOSSES	equals 1 if depositors of failed banks incurred losses during [t, t+3],	+	-
Control variables			
CURRENT ACCOUNT/GDP	total current accounts of private households, corporations and the government to the country's GDP in the pre-crisis year t-1	-	-
CREDIT BOOM	equals 1 if a country experienced a credit boom during [t-3, t-1]	+	+
Dummy MARKET	equals 1 if the country has a market-based financial system in the pre-crisis year t-1	+/-	+/-
Dummy DEVELOPED	equals 1 if the country at time t belongs to the first half of countries in the world ranked according to their GDP per capita at time t	+	+
PEAK NPL	peak ratio of nonperforming loans to total loans during [t, t+5]	-	-
Dummy BANK RUN	equals 1 if a country's banking system experienced a depositor run (minimum 5% drop in total outstanding deposits within one month during [t, t+1])	+	+
MONETARY POLICY INDEX	index of monetary policies during the years [t, t+3], either expansive (+1), contractive (-1), or neither (-0)	?	?
FISCAL POLICY INDEX	index of fiscal policy stance indicating fiscal policies' expansion (+1), contraction (-1) or neither (0) during the years [t, t+3]	-	+

3.2.1 Determinants of banking crises' costs and hypotheses

On the basis of the literature review, I describe the chosen variables and hypothesize how these variables influence the cost of banking crisis. The variables are grouped into dependent variables and groups of explanatory variables; -initial conditions, -containment policies, -resolution policies and -macroeconomic policies. Table 7 summarizes the variables and their expected relation to the cost of banking crises.

3.2.1.1 *Dependent Variable*

The variable FISCAL COST NET corresponds, exactly as in Laeven and Valencia (2008), to the net fiscal cost as percentage of GDP and is measured over the period $[t, t+5]$ where t equals the starting year of the banking crisis.

The variable OUTPUT LOSS measures, exactly as in Laeven and Valencia (2008), the difference between the actual real GDP and the trend real GDP expressed as a percentage of trend real GDP, for the period $[t, t+3]$ where t is the starting year of the banking crisis. The trend real GDP is computed by using the trend real GDP growth up to the year preceding the crisis. Using this method could overstate losses if preceding the crisis a growth boom occurred. Also if the crisis is solely a correction of unsustainable economic developments, output losses need not be attributed to the banking crisis per se (Laeven and Valencia, 2008).

3.2.1.2 *Explanatory and control variables*

Initial conditions

In all 42 identified crises occurred a systemic banking crisis. I define a systemic banking crisis, exactly as Laeven and Valencia (2008), as one where the country's corporate and financial sector experiences a large number of defaults and difficulties in timely repaying of contracts. Thus, non-performing loans increase sharply and most aggregate banking system capital is exhausted. Alongside depressed asset prices, sharp increases in real interest rates and slowed capital flow is often observable. Hence, each crisis event and starting date is cross-checked with whether the crisis coincides with deposit runs, deposit freezes, blanket guarantees, extensive liquidity support, large proportions of non-performing loans, exhausted capital flows or bank interventions.

I define, exactly as Laeven and Valencia (2008) and Frankel and Rose (1996), a “currency crisis” as a nominal currency depreciation of minimum 30% which is also at least a 10% increase in the rate of depreciation compared to the year before. In practice, the percentage change of period end official nominal bilateral dollar exchange rate from the World Economic Outlook (WEO) database of the IMF was used. Therefore the Dummy CURRENCY CRISIS equals 1 if a currency crisis occurred during the period $[t-1, t+1]$, where t signifies the starting year of the banking crisis. A twin crisis is expected to have even more negative effects on output growth and fiscal cost.

The Dummy DEBT CRISIS equals 1, exactly as in Laeven and Valencia (2008), if a sovereign debt crisis occurred during the period $[t-1, t+1]$, where t signifies the starting year of the banking crisis (following only referred to “ t ” anymore). Also in this case, a twin or triple crisis is expected to have even more negative effects on output growth and fiscal cost. The data was obtained from Laeven and Valencia (2008) who in turn obtained data on “sovereign debt crises” by relying on information from Beim and Calomiris (2001), WorldBank (2002) and Sturzenegger and Zettelmeyer (2006).

Figure 2 reports the frequency of crises, namely banking, currency and sovereign debt crises and notes the occurrence of twin (banking and currency) and triple (banking, currency and debt) crises in each year between 1970 and 2007. A twin crises is defined as a banking crises in year t in combination with a currency crisis during the period $[t-1, t+1]$, and in a triple crisis a sovereign debt crisis occurs in addition to the currency and banking crisis, during the period $[t-1, t+1]$.

The variable PUBLIC DEBT/GDP is the ratio of the general government gross debt to GDP for the pre-crisis year $t-1$. Fink et al. (2004) found strong relationships between public debt financing and the country’s growth. They find that especially if foreign banks locally lend to developing governments, both parties face a mutual interest in an efficient, sound, regulated and stable financial sector. These findings oppose theoretical assumptions of Fink et al. (2004) who expect a high level of public debt to GDP to weaken the macroeconomic environment. Thus, I hypothesize that a higher ratio of public debt to GDP increases the severity of the crisis as governments are facing financial constraints during their crisis intervention. INFLATION is the percentage change of the GDP deflator during the pre-crisis year $t-1$ which is hypothesized to explain the severity of the crisis in case of a boom in asset growth and prices preceding the start of the banking crisis (Demirgüç-Kunt and Detragiache,

1997). I expect high inflation to increase the severity of a crisis as high booms are expected to be followed by strong busts. The variable DEPOSITS/GDP measures the ratio of total deposits taking institutions to GDP for the pre-crisis year t-1, which is a measure of economic activity and a stock indicator of deposit resources available to the financial sector for the sector's lending activities. Beck, Demirgüç-Kunt and Levine (2009) found that the ratio varies positively with the income level of countries. The global median was 27% in 1980 and rose to 51% in 2007. However, it can also signify a vulnerability to balance-of-payment crisis because a higher deposits to GDP value is hypothesized to increase the severity of the crisis (Demirgüç-Kunt and Detragiache, 1997).

The variable GOVERNMENT OWNED measures the share of the banking system assets that are government owned in year t-1. A high government owned share of the banking system is hypothesized to increase the banking crisis' costs because governments are found to be inefficient and bureaucratic, burdensome owners (Demirgüç-Kunt and Detragiache, 1998). On the other hand, a high share of government owned bank assets might decrease the likelihood of moral hazard between financial institutions and government as the government is itself the owner. In countries with corrupt officials I expect this ratio to negatively affect the crisis as officials want other (foreign) financial intermediaries to give up positions. LLSV (2002) as well as Barth, Caprio and Levine (2001) found greater state ownership in banking to be associated with reduced competition and poorer productivity. Also, Caprio and Martínez-Peria (2000) and Barth, Caprio and Levine (2001) show that greater state ownership is associated with higher likelihood of banking crises.

H3.11 *A parallel currency crisis, a parallel debt crisis, high public debt to GDP, high inflation, high deposits to GDP and a high share of government owned assets increase output losses.*

H4.11 *A parallel currency crisis, a parallel debt crisis, high public debt to GDP, high inflation, high deposits to GDP and a high share of government owned assets increase fiscal costs.*

Financial systems

The law and finance view exists since La Porta et al. (2000) rejected the entire bank vs. market based view debate about the primary determinant of the effectiveness of the financial system in facilitating growth and mitigating banking crises. Instead, La Porta et al. (2000)

stated that legal systems are the primary determinant of the effectiveness of the financial system. Therefore, I also introduce the Dummy FS LAW which equals 1 if the countries legal origins are based on either French or Socialist law in contrast to British, German or Scandinavian law. La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999) provide the dataset on legal origins. They find French and Socialist legal origins to affect GDP most negatively. Exactly as Demirgüç-Kunt and Detragiache(1998), I hypothesize therefore that countries with French or Socialist legal origins will experience higher output losses and fiscal costs following a banking crisis. Furthermore, the variable FINANCIAL LIBERALIZATION is measured by using an index of financial liberalization from Abiad, Detragiache and Tressel (2008) which is hypothesized to proxy for higher likelihood of financial innovations and a riskier financial system that increased the likelihood of growth but also of financial crises (Wilmarth, 2003). This variable equals 1 if during [t-5, t] a major financial liberalization took place, as recorded by Abiad, Detragiache and Tressel (2008). Wilmarth (2003) noted that financial liberalization encourages banks to increase their lending commitment and equity investments in the real estate and securities markets. Rapid growth of credit and investment results in an economic “boom”, fuelling asset prices and the willingness of financial intermediaries to provide financing. This “boom” loses its relation to “fundamentals” which, after investors realize the divergence, ends in a strong “bust” due to rapid liquidation of investments and loans. This “bust” often gives rise to a systemic banking crisis and thereafter high output losses (Demirgüç-Kunt and Detragiache, 1998). Therefore, I hypothesize that financial liberalization increase the output loss and fiscal cost of banking crises.

H3.12 *Countries with French or Socialist legal origins and financially liberalizing reforms will experience higher output losses.*

H4.12 *Countries with French or Socialist legal origins and financially liberalizing reforms will experience higher fiscal costs.*

Crisis containment policy responses

Governments’ crisis containment and resolution responses are hypothesized to also influence crises’ costs. In the containment phase the crisis is ongoing and governments aim to restore public confidence whereas the resolution phase signifies the actual financial restructuring of financial institutions and corporations (Honohan and Laeven, 2005, Hoelscher and Quintyn, 2003).

At the beginning of a crisis, government's policy options are limited to existing institutions and simple new mechanisms such as a) suspension of convertibility of deposits⁹ b) regulatory capital forbearance¹⁰ c) emergency liquidity support to banks or d) a government guarantee to depositors (Laeven and Valencia, 2008). These intervention policies are designed to mitigate financial distress of borrowers and banks which may arise through high capital requirements, loan defaults and bank runs due to diminished market and intermediaries' confidence or wider macro-economic pressures including exchange rate pressures. Arising bank runs can be addressed for example with a bank holiday. The success of the intervention depends on the credibility and creditworthiness of the government. Preventing an insolvent or near to insolvent bank from defaulting may require the government to intervene administratively (overtake management power) or close down the bank and e.g. transfer bank's assets and liabilities to a sound bank. Finally, government intervention is most critical under wider macroeconomic and financial turbulences during which banks are victims of external factors. Regulatory forbearance on capital and liquid reserve requirements can be appropriate and necessary in such an environment (Laeven and Valencia, 2008). Every government policy response impacts the ultimate allocation of losses in the system and possible moral hazard considerations. In general, it can be said that central banks usually privilege stability over cost, meaning governments rather too liberally extend loans of "bankrupt banks" instead of taking the risk of even larger costs of contagion and a worsening financial crisis (Lindgren, 2003). Therefore, the Dummy deposit insurance was introduced, which equals 1, exactly as in Laeven and Valencia (2008), if the government introduced a deposit insurance or blanket guarantee on bank deposits. This dummy is hypothesized to negatively affect the crisis' financial cost as this might lead to moral hazard of excessive risk taking by banks (Kane, 1989). This higher fiscal cost is, on the other hand, hypothesized to restore confidence into the banking sector and therefore increases economical output.

H3.13 The presence of a deposit insurance *decreases output losses*.

H4.13 The presence of a deposit insurance *increases fiscal costs*.

⁹ This prevents bank depositors from seeking repayment from banks.

¹⁰ This allows banks to avoid the cost of regulatory compliance (e.g. banks are allowed to overstate their equity capital to avoid the cost of a crunch in credit supply).

Crisis Resolution Policies

Governments' solutions towards long-run challenges of crises are usually built around focusing on resuming normally functioning credit and legal systems and the rebuilding of banks and borrower's balance sheets. Possible government ownership or regulatory administration of banks has to be transferred back into solvent private entities' hands. Therefore, the financial and organizational restructuring of firms and intermediaries is one of the most important tasks during the crisis resolution period. Due to coordination problems and lack of capital, these functions are mostly performed by governments. However, governments always face a trade-off between enlarged fiscal cost with an accelerated economic recovery or lower fiscal costs, resulting in slower economic recovery. Whether to forgive some debt and restructure banks or move assets to a new entity with new management, are critical questions. Overall, policy responses mostly depend on the crisis' sources. Thus, a general rule on how to approach such restructuring challenges is almost impossible.

The main policy responses during the resolution phase can be stated as a) conditional government-subsidized, but decentralized, workouts of distressed loans, b) debt forgiveness, c) establishment of a government-owned asset management company to buy and resolve distressed loans, d) government-assisted sales of financial institutions, and e) government-assisted recapitalization of financial institutions through injection of funds (Laeven and Valencia, 2008). Discretionary schemes of debt relief b) can lead to potential moral hazard as debtors might stop trying to repay debts in order to get into the list of beneficiaries of b). On the other hand, debt relief through inflation or currency depreciation is seen as inducing lower potential hazard. Alternatively, an insolvent bank's bad loan portfolio can be carved-out, organizationally restructured under new ownership and management and thereafter gradually sold back into the market. However such a government run asset management company's success depends mostly on portfolio's assets where real estate assets are more beneficial than politically-connected loans (Klingebiel, 2000). Typically, countries apply a combination of resolution strategies including government-managed and market-based mechanisms (Calomiris, Klingebiel, and Laeven, 2003). The success of both depends on efficient and effective legal, regulatory, supervisory and political institutions in which possible moral hazard implications were taken into account. Thus it is difficult to predict the effect of interventions on output losses. On the other hand, it is easier to show the effect on fiscal costs.

The Dummy LARGE-SCALE INTERVENTION equals 1, exactly as in Laeven and Valencia (2008), if the government intervened in banks through e.g. nationalizing, closures, mergers, sales and recapitalizations of large banks during $[t, t+3]$. This dummy is hypothesized to be positively related to fiscal costs but any relation to output losses is unclear.

Furthermore, the dummy DEPOSITOR LOSSES equals 1, exactly as in Laeven and Valencia (2008), if depositors of failed banks incurred losses. I expect that depositor losses weaken the confidence into the economy and thus result in higher output losses. On the other hand, higher depositor losses could mean that the government loaded the cost of this crisis onto the depositor and thus should face lower fiscal costs.

H3.14 *Large-scale interventions influence output losses and depositor losses increase output losses.*

H4.14 *Large-scale interventions increase the fiscal costs and depositor losses decrease the fiscal cost.*

Control variables

The variable CURRENT ACCOUNT/GDP equals the ratio of total current accounts of private households, corporations and the government in relation to the country's GDP in year $t-1$. I expect a current account deficit to negatively influence the severity of the crisis. The dummy CREDIT BOOM equals 1 if a country experienced a credit boom before the crisis. A credit boom is defined as three-year pre-crisis average growth in private credit to GDP in excess of 10 percent per annum. A credit boom is often connected to opening up credit to a new and mostly subprime class of lenders, thus granting unsustainable credits is hypothesized to lead to higher probabilities of default and a severe banking crisis outcomes (Demirgüç-Kunt and Detragiache, 1998).

The Dummy MARKET equals 1 if the country has at time $t-1$ a market-based financial system in contrary to a bank-based system. An yearly index about countries' financial structure based on the measurement ratio Stock Market Capitalization to Total Deposits is constructed. Countries belonging to the half above the sample median are identified as market-based countries. I expect a market based country to decrease the negative effects of a banking crisis better.

The Dummy DEVELOPED equals 1 if the country's GDP per capita at time t is above the sample median (measured exactly as in Demirgüç-Kunt and Detragiache, 1998). Various studies found that financial crises in developed countries are more rare but also more severe once a crisis has started. Therefore I expect this dummy to increase crisis' cost.

The variable PEAK NPL signifies the peak ratio of nonperforming loans to total loans (in percent) during the years $[t, t+5]$. This is a measure for the cut in the supply of financial intermediation as banks faced lower stocks of available credit supply due to high percentages of nonperforming loans. Furthermore, banks are more risk averse than normally and might not be able to separate good from bad projects. Hence credit supply is left-ward shifted and positive NPV growth projects and investments won't be undertaken which again suppresses the output growth.

The dummy BANK RUN equals 1 if a country's banking system experienced a depositor run, defined as a minimum 5% drop in total outstanding deposits within one month during the period $[t, t+1]$, exactly as in Laeven and Valencia (2008). I hypothesize that a bank run undermines consumers' and lenders' confidence, thus negatively affecting the crisis' outcome.

In order to manage banking crises and reduce their impact on the real economy, governments tend to change macroeconomic policies. However, such policy changes are usually difficult to observe. Laeven and Valencia (2008) introduced two indices focusing on macroeconomic policy changes. They divide between the monetary policy index and the fiscal policy index; the former is an index of monetary policies during years $t, t+3$ and is either expansive (+1), contractive (-1), or neither (-0). Laeven and Valencia (2008) derived this index by observing the average percentage change in reserve money during the years $t, t+3$ compared to the pre-crisis years $[t-4, t-1]$. Expansive refers to a change in $[t, t+3]$ of 1 to 5%, contractive to a change of -1 to -5%-. There is no clear consensus on the effects of monetary policy influencing crisis outcomes (Laeven and Valencia, 2008).

The variable FISCAL POLICY INDEX is an index of the government's fiscal policy stance and indicates fiscal policies' expansion (+1), contraction (-1) or neither (0) during years $[t, t+3]$. An expansive fiscal policy is defined as an average fiscal balance during $[t, t+3]$ of less than -1.5% of GDP whereas contractive refers to an average fiscal balance of more than 1.5%

of GDP. An expansive fiscal balance, thus more fiscal spending, is expected to be positively related to fiscal costs but negatively to output losses.

3.2.2 Methodology: Ordinary Least Squares Regression

In order to study the hypotheses in this event-study, an ordinary least squares regression methodology will be applied exactly as in Demirgüç-Kunt and Detragiache (1997), and Claessens, Klingebiel and Laeven (2003).

Dougherty (2002) states that the ordinary least squares regression assumes the dependent variable Y to depend on $k-1$ explanatory variables X_2, X_3, \dots, X_k according to a true but unknown relationship

$$Y = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki} + \mu_i$$

Given a set of n observations on Y, X_2, X_3, \dots, X_k , the OLS method is used to fit the equation

$$\hat{Y} = b_1 + b_2 X_{2i} + \dots + b_k X_{ki}.$$

This is done by minimizing the sum of squares of the residuals of b_1, b_2, \dots, b_k . The residual is defined as $e_i = Y_i - \hat{Y}_i$. The regression coefficients, b_1, b_2, \dots, b_k , provide an estimate of the impact of explanatory variables, X_2, X_3, \dots, X_k , on the dependent variable, Y .

To evaluate the joint explanatory power of the independent variables included in the regression, I report R^2 . This coefficient of determination is a statistical measure of how well the regression line approximates the real data points. The theoretical minimum of R^2 is 0. An R^2 of 1.0 indicates that the regression line fits perfectly the data. In addition to R^2 I report the P -Values, a measure of goodness of fit based on the null hypothesis $H_0 : \beta_k = 0$.

I re-scale calendar times into crisis-centred time for each country. Country-specific effects are diminished by demeaning each appropriate observation with the corresponding country average. I focus my analysis in most variables on the duration of three to one year before the crisis and three to five year from the start of the systemic banking crises onwards.

In order to assess the robustness of the findings, I divide the sample into developing and developed countries, market-based and bank-based countries, French/ Socialist Law Origin Countries and Other Law Origin Countries, financial liberalized and not liberalized countries

and government ownership in bank countries and no government ownership in banks countries.

3.2.3 Data

From Laeven and Valencia (2008) I obtained a database that consists of 124 systemic banking crises in 62 countries during the period from 1970 to 2007. The dataset also provides data on 208 currency crises as well as 63 episodes of sovereign debt crises.

Figure 2 shows that banking crises were most frequent during the early 1990's as well as currency crises were also common during the first-half of the 1990's. The early 1980's also recorded a high number of currency crises, with a peak in 1981 with 45 episodes. Sovereign debt crises were also relatively common during the early 1980's, with a peak of 10 debt crises in 1983. In total, I count 124 banking crises of which 42 are considered twin crises and 10 can be classified as triple crises (Figure 2).

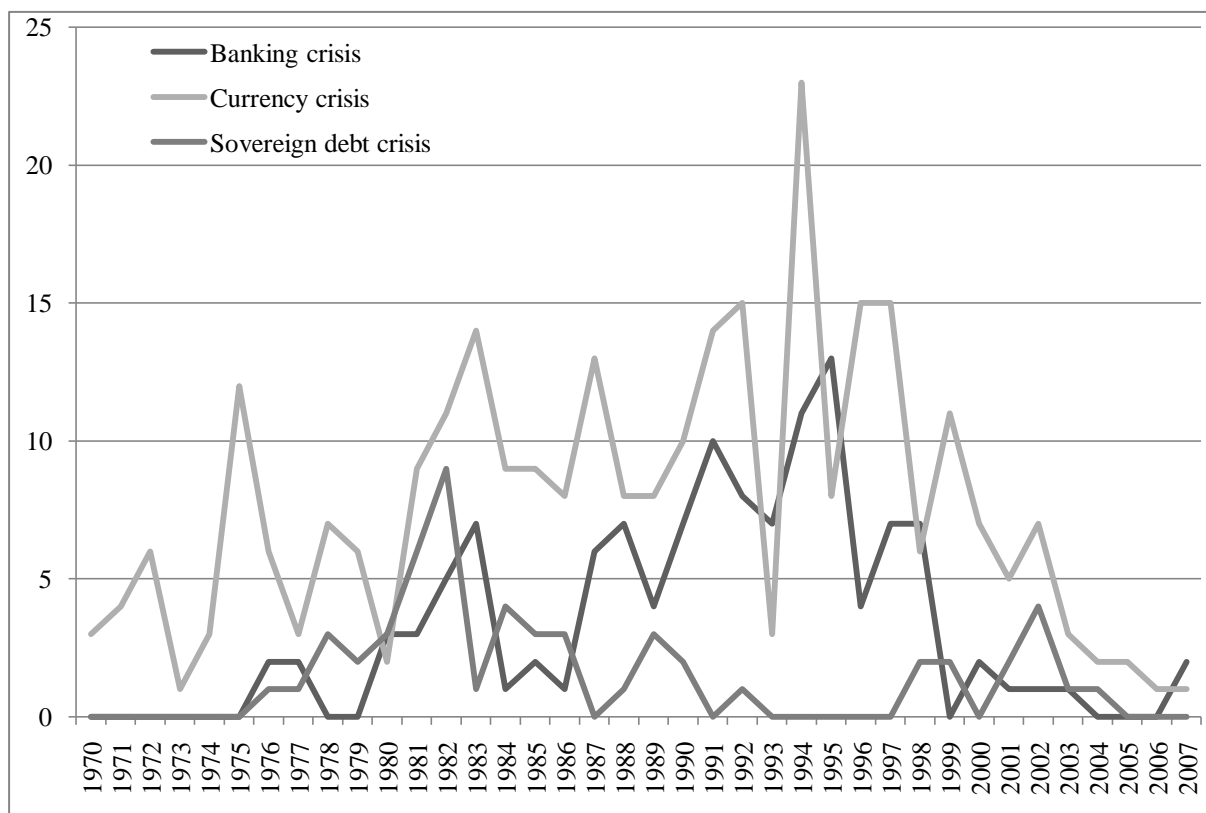


Figure II Frequency of financial crises

Figure 2 reports 124 banking crises, 208 currency crises and 63 sovereign debt crises over the period of 1970 to 2007 from around the world. Out of the 124 banking crises, 42 occurred as twin and 10 as triple crises. Figure 2 reveals that banking crises were most frequent during the 1990's with a maximum of 13 systemic banking crises starting in the year 1995. Currency crisis peaked in 1981 with 45 crises and 10 debt crises in 1983.

For the empirical part II the complete data was obtained from the database of Laeven and Valencia (2008) who drew upon information sources such as IMF staff reports, World Bank documents, working papers from central bank staff and academics. However, I also cross-check on the information provided by Laeven and Valencia (2008) through information gathering in Datastream, IMF, IFS, BIS, FIBV, and the world economic outlook (WEO). Additionally, data on the legal origin and financial reforms of countries are obtained from LLSV (2000) and Abiad and Mody (2005). After leaving out all banking crises with missing explanatory variables, I am left with 42 banking crises as my core data. Exactly as Demirgüç-Kunt and Detragiache (2002) already noted, also this sample is small and is based only on relatively few data points. In addition, every crisis might be different from previous ones. Thus, coefficients derived from in-sample estimation are of limited use out-of-sample.

Descriptive statistics of banking crises' costs

Table 8 gives a descriptive overview on the variables' means, standard deviation, standard error, t-value, confidence intervals, median, minimum, maximum, and their correlation to output loss and fiscal cost. Fiscal cost, net of recoveries, is on average 13.3% of the GDP but can increase up to as much as 55% of GDP in the case of Argentina in 1980. Output losses, measured as deviation from trend GDP, are large with a sample average of 20% of GDP during the first four years of the crisis. The banking crises in Brazil and Bolivia in 1994, don't show any output losses whereas Thailand in 1997 reached almost 98% output loss of GDP. Additionally, it is theoretical expected that fiscal cost and output loss are negatively correlated to each other, as the crisis can be paid either through financial cost or larger output losses. However, higher output losses will also yield larger tax revenue losses. Therefore, both variables, if enough strong, would move into the same direction. Table 9 reports that output loss and fiscal cost are in the Pearson Correlation positively and statistically significantly (at the two-tailed 5% level) correlated. However, these two variables might be endogenous because I expect a feedback function to exist between these two variables. For example higher output loss results in lower tax income and thus a higher fiscal cost. Therefore, any relation must be carefully interpreted, as suggested already by Honohan and Klingebiel (2003).

Table 8. Descriptive statistics of banking crises' initial conditions

This table describes empirical study II on the determinants of banking crises costs variables' statistical values. FISCAL COST NET equals the net fiscal cost as percentage of GDP during [t, t+5], OUTPUT LOSS equals the difference of the real GDP and trend real GDP in percentage of the trend real GDP for the period [t, t+3], the dummy CURRENCY CRISIS equals 1 if a currency crisis occurred during the period [t-1, t+1], the dummy DEBT CRISIS equals 1 if a sovereign debt crisis occurred during the period [t-1, t+1], PUBLICDEBT/GDP equals the general government gross debt to GDP in the pre-crisis year t-1, INFLATION equals the percentage change of the GDP deflator in the pre-crisis year t-1, DEPOSITS/GDP equals the total deposits taking institutions to GDP in the pre-crisis year t-1, GOVERNMENT OWNED corresponds to the government owned share of the banking system assets in the pre-crisis year t-1, the dummy FS LAW equals 1 if a country's legal origin is based on French or Socialist law at time t (index of countries' legal origins from La Porta et al. (2000)), FINANCIAL LIBERALIZATION measures major financial liberalizations during [t-5, t] through an index of financial liberalization (Abiad and Mody, 2005), the dummy DEPOSIT INSURANCE equals 1 if the government introduced a deposit insurance or blanket guarantee during [t, t+3], the dummy LARGE-SCALE INTERVENTION equals 1 if the government intervened in banks during [t, t+3], the dummy DEPOSITOR LOSSES equals 1 if depositors of failed banks incurred losses during [t, t+3], CURRENT ACCOUNT/GDP equals the total current accounts of private households, corporations and the government to the country's GDP in the pre-crisis year t-1, CREDIT BOOM equals 1 if a country experienced a credit boom during [t-3, t-1], the dummy MARKET equals 1 if the country has a market-based financial system in the pre-crisis year t-1, the dummy DEVELOPED equals 1 if the country at time t belongs to the first half of countries ranked according to their GDP per capita at time t, PEAK NPL equals the peak ratio of nonperforming loans to total loans during [t, t+5], the dummy BANK RUN equals 1 if a country's banking system experienced a depositor run during [t, t+1], MONETARY POLICY INDEX equals an index of monetary policies during [t, t+3], FISCAL POLICY INDEX equals an index of fiscal policy stance during [t, t+3]. The data was obtained, if not specified otherwise, from Laeven and Valencia (2008) and looks at the time range of 1970 to 2007. "t" equals the starting year of the banking crisis.

	Mean	Variance	t-distribution	95% confidence interval		Median	Correlation to OUTPUT LOSS	Correlation to FISCAL COST NET
				Lower	Upper			
Dependent variables								
FISCALCOSTNET	0.13	0.02	6.18	0.09	0.17	0.1	0.34	1
OUTPUTLOSS	0.21	0.07	4.71	0.12	0.29	0.11	1	0.34
Explanatory variables								
CURRENCYCRISIS	0.55	0.25	7.05	0.39	0.71	1	0.32	0.28
DEBTCRISIS	0.12	0.11	2.35	0.02	0.22	0	-0.11	-0.04
PUBLICDEBTGDP	0.46	0.16	6.75	0.32	0.6	0.3	-0.33	-0.06
INFLATION	1.37	23.64	1.81	-0.16	2.91	0.11	-0.16	-0.12
DEPOSITSGDP	0.49	0.21	7	0.35	0.63	0.36	0.13	-0.03
GOVOWNED	0.31	0.06	8.19	0.23	0.39	0.28	-0.14	0
FSLAW	0.71	0.21	10.12	0.57	0.86	1	-0.36	-0.04
FINLIBERAL	48.03	751.2	11.36	39.49	56.57	53	0.19	0.04
DEPOSITINSURANCE	0.29	0.21	4.05	0.14	0.43	0	0.4	0.42
INTERVENTION	0.86	0.13	15.68	0.75	0.97	1	0.18	0.2
DEPOSITORSLLOSSES	0.33	0.23	4.53	0.19	0.48	0	0.08	-0.14

Table 8 continued. Descriptive statistics of banking crises' initial conditions								
	Mean	Variance	t-distribution	95% confidence interval		Median	Correlation to OUTPUT LOSS	Correlation to FISCAL COST NET
				Lower	Upper			
Control variables								
CURACCOUNTGDP	-0.04	0	-5.09	-0.05	-0.02	-0.03	-0.09	-0.07
CREDITBOOM	0.24	0.19	3.58	0.1	0.37	0	0.09	0.15
MARKET	0.31	0.22	4.29	0.16	0.46	0	0.18	0.13
DEVELOPED	0.83	0.14	14.32	0.72	0.95	1	0.1	0.04
PEAKNPL	0.25	0.02	10.26	0.2	0.3	0.22	0.05	0.1
BANKRUN	0.62	0.24	8.16	0.47	0.77	1	-0.02	-0.15
MONETARYPOLICY	1.68	20.8	2.18	0.12	3.25	0.22	-0.16	-0.14
FISCALPOLICY	-0.04	0	-7.64	-0.05	-0.03	-0.03	0.19	-0.3

Initial and financial system conditions

Table 8 reveals that banking crises tend to coincide with currency crisis (in 55% of the cases) more often than with sovereign debt crises (in only 7% of the cases). Macroeconomic conditions are often weak prior to banking crisis and fiscal balances are mostly negative, 2.1% minus on average. Inflation runs high at 137% at the start of the crisis (Table 8).

LLSV (1997) found that government ownership in banks often leads to a higher likelihood of banking crisis. As expected, governments owned also in this sample about 31% of banking assets on average. Additionally, 30% of the countries experienced severe credit booms preceding the crisis. These credit booms in turn often appear to be coupled to earlier financial liberalization such as the ones before the Nordic crisis in the 90's (Drees and Pazarbasioglu, 1998). Countries experiencing credit crises often suffer from weak legal institutions that are based on a French or Socialist law origin or fundament. Indeed, in 71% of the countries experiencing a banking crisis, French or Socialist law was the law origin (Table 8). Finally, an average of 48 points in the index of financial liberalization (Abiad, Detragiache and Tressel, 2008) was recorded preceding banking crises. This might imply a high financial reform activity preceding banking crises.

Crisis variables

Deposit insurances were issued during the crisis containment phase in 50% of the cases whereas in 86% followed a large-scale government intervention in banks, such as bank closures, nationalizations, or assisted mergers. Thus, only a few banking crisis managed to be overcome without large-scale government intervention. In the case of Argentina during the 1995 crisis for example, only 0.6% of the financial systems assets, five actual banks, were liquidated.

Control variables

Current accounts show an average deficit of -3.9% and nonperforming loan rates vary substantially and often depend on how connected loans are across banks. Furthermore, bank runs are a common feature of banking crises; in 62% of the cases sharp reductions in total deposits were observed (up to 26% in one month).

The theory of benefits of multiple avenues of financial intermediation suggests that capital markets besides banks can smoothen out any imbalances in the banking sector. Also in the sample only 30% of the banking crises took place in market-oriented financial systems. This finding is in line with the results in our first empirical study which show that capital market based financial systems have fewer but stronger banking crises.

Fiscal policies are on average expansive, possibly to support the financial and real sectors and to host bank and debt restructuring programs. At the same time, also monetary policies are expansive. This shows that central banks increase their reserve money, possibly to signal to the international financial community a commitment to increase the macroeconomic stability.

Correlations

Table 9 shows that only the variables measuring monetary policies and inflation are statistically significantly correlated at the 1 percent level (2-tailed). This implies that any later findings in which both variables are included have to be treated with care as I might not be able to separate banking crises effects of these two variables or any effect of an exogenous unidentified variable on both of them.

Table 9. Correlation matrix of banking crises' effects

This table presents cross sectional Pearson correlations for regression variables of the second empirical study on the determinants of banking crises costs. The sample period is from 1970 to 2007. ** indicate that the variables are statistically significantly correlated at the 0.01 level (2-tailed). Find a description of the variables in Table 7.

	FISCALCOST NET	OUTPUTLOSS	CURRENCY CRISIS	DEBT CRISIS	PUBLICDEBT GDP	INFLATION	DEPOSITS GDP	CURACCOUNT GDP	CREDIT BOOM	GOV OWNED	MARKET	FSLAW	DEVELOPED	FINLIBERAL	PEAK NPL	BANK RUN	DEPOSIT INSURANCE	INTERVEN TION	DEPOSITORS LOSSES	MONETARY POLICY
FISCALCOSTNET	1																			
OUTPUTLOSS	0.34	1																		
CURRENCYCRISIS	0.3	0.3	1																	
DEBT CRISIS	-0	-0	0.2	1																
PUBLICDEBT GDP	-0	-0	-0	0.2	1															
INFLATION	-0	-0	0.2	-0	-0	1														
DEPOSITS GDP	-0	0.1	-0	-0	0.1	0.31	1													
CURACCOUNT GDP	-0	-0	0.3	0.1	-0.41	0.2	0.2	1												
CREDIT BOOM	0.2	0.1	0.2	-0	-0	-0	-0	0.1	1											
GOV OWNED	0	-0	0	0	-0	0.1	-0.32	0.31	-0	1										
MARKET	0.1	0.2	0.3	-0	-0	0.30	0.2	0.1	-0	-0.31	1									
FSLAW	-0	-0.35	0.1	0.1	-0	0.2	-0.38	-0	0.2	0.2	-0	1								
DEVELOPED	0	0.1	0.2	-0	-0.43	0.1	0.2	0.30	-0	-0	0.3	-0	1							
FINLIBERAL	0	0.2	0.2	0.1	-0	-0	0.1	0.2	0.2	-0	0.2	-0	0.36	1						
PEAK NPL	0.1	0.1	0.32	0.1	0.2	-0	-0	0.1	-0	0.2	-0	-0	-0	0	1					
BANK RUN	-0	-0	0.3	0.1	-0	0.2	-0	0.3	0.1	0.2	-0	0.3	0	-0	0	1				
DEPOSIT INSURANCE	0.4	0.4	0.3	-0	0.2	-0	0.3	-0	-0	-0	0.3	-0	0	0.3	0.1	-0	1			
INTERVEN TION	0.2	0.2	0	0.2	-0	-0	-0	-0	-0	0.1	-0.31	0	-0	0.1	0.2	0.1	0.3	1		
DEPOSITORS LOSSES	-0	0.1	0.1	0.2	-0	0.1	-0	-0	0.1	-0	-0	0.33	-0	-0	0.2	0.2	-0	0.1	1	
MONETARY POLICY	-0	-0	0.3	-0	0	**0.6 8	0.2	0.2	-0	0.2	0.1	0.2	0.1	-0.40	-0	0.3	-0	-0.73	0.2	1

Table 10. Banking Crises Effects' Regression Results for output loss and each variable separately

This table shows the results from the OLS regressions on banking crises effects. The dependent variable, OUTPUT LOSS, was regressed on each explanatory variable separately. The sample consists of 42 banking crises. Constant and beta-coefficient refer to the regressions' constant and coefficient, respectively. I also indicated the F-value, error term and P-value. Variables' descriptions are found in Table 7. */**/** denotes statistical significance at the 10%/ 5%/ 1% level.

	Regressed on OUTPUT LOSS				
Variables	Con-stant	Beta - coefficient	Error term	F-value	P-Value Regression
CURRENCYCRISIS	0.096	0.169	0.317	3.789	*0.059
DEBTCRISIS	0.216	-0.082	0.111	0.423	0.520
PUBLICDEBTGDP	0.299	-0.204	0.330	3.186	*0.086
INFLATION	0.216	-0.008	0.155	0.834	0.367
DEPOSITSGDP	0.171	0.072	0.127	0.555	0.461
GOVOWNED	0.254	-0.152	0.144	0.723	0.401
FSLAW	0.353	-0.206	0.358	5.013	**0.032
FINLIBERAL	0.109	0.002	0.191	1.284	0.265
DEPOSITINSURANCE	0.132	0.217	0.398	6.408	**0.016
INTERVENTION	0.075	0.146	0.178	1.114	0.299
DEPOSITORSLLOSSES	0.191	0.045	0.081	0.223	0.640

Table 11. Banking Crises Effects' Regression Results for fiscal cost and each variable separately

This table shows the results from the OLS regressions on banking crises effects. The dependent variable, FISCAL COST, was regressed on each explanatory variable separately. The sample consists of 42 banking crises. Constant and beta-coefficient refer to the regressions' constant and coefficient, respectively. I also indicated the F-value, error term and P-value. Variables' descriptions are found in Table 7. */**/** denotes statistical significance at the 10%/ 5%/ 1% level.

	Regressed on FISCAL COST				
Variables	Constant	Beta - coefficient	Error term	F-value	P-Value Regression
CURRENCYCRISIS	0.087	0.075	0.28	3.239	*0.080
DEBTCRISIS	0.132	-0.017	0.043	0.07	0.792
PUBLICDEBTGDP	0.148	-0.21	0.058	0.097	0.758
INFLATION	0.138	-0.003	0.124	0.574	0.453
DEPOSITSGDP	0.134	-0.009	0.03	0.034	0.855
GOVOWNED	0.13	0	0.001	0	0.996
FSLAW	0.139	-0.011	0.038	0.054	0.818
FINLIBERAL	0.121	0	0.038	0.055	0.816
DEPOSITINSURANCE	0.094	0.120	0.417	8.020	**0.007
INTERVENTION	0.053	0.086	0.196	1.511	0.227
DEPOSITORSLLOSSES	0.144	-0.038	0.139	0.753	0.391

3.2.4 Empirical findings of determinants of banking crises' costs

This section reports the results of regressing output loss and fiscal costs on each variable separately, as shown in Table 10 and 11. A parallel currency crisis and public debt to GDP are statistically significantly explaining output loss at the 10% level. Furthermore, French and Socialist law origins are statistically significantly explaining output loss at the 5% level. A twin crisis, banking and currency crisis, was hypothesized to increase output losses. Table 10 proves that a parallel currency crisis negatively affects output loss. public debt to GDP is negatively affecting output loss, contrary to the expectations. However, public debt to GDP is negatively correlated to large-scale government interventions (Table 9). Therefore, public debt to GDP could serve as a disciplining device against fiscal spending and lowers economic losses. Explicit deposit insurances also statistically significantly increases output loss at the 5% level which shows that deposit insurance does not lead to significant mitigation but rather might increase moral hazard of banks in taking too large risks. Finally, French and Socialist legal origin countries are negatively related to output loss, suggesting that in countries with French or Socialist law origins output loss is lower.

A parallel currency crisis increases fiscal costs, as was expected. Also, an explicit deposit insurance introduction significantly increases fiscal costs at the 5% significant level.

Table 12. Banking Crises Effects' Regression Results for Output Loss

This table shows the results from the OLS regressions (Hypotheses 3.11 to 3.14) on banking crises effects, by regressing OUTPUT LOSS on a set of explanatory as well as control variables. OUTPUT LOSS equals the difference of the real GDP and trend real GDP in percentage of the trend real GDP for the period [t, t+3], the dummy CURRENCY CRISIS equals 1 if a currency crisis occurred during the period [t-1, t+1], the dummy DEBT CRISIS equals 1 if a sovereign debt crisis occurred during the period [t-1, t+1], PUBLICDEBT/GDP equals the general government gross debt to GDP in the pre-crisis year t-1, INFLATION equals the percentage change of the GDP deflator in the pre-crisis year t-1, DEPOSITS/GDP equals the total deposits taking institutions to GDP in the pre-crisis year t-1, GOVERNMENT OWNED corresponds to the government owned share of the banking system assets in the pre-crisis year t-1, the dummy FS LAW equals 1 if a country's legal origin is based on French or Socialist law at time t (index of countries' legal origins from La Porta et al. (2000)), FINANCIAL LIBERALIZATION measures major financial liberalizations during [t-5, t] through an index of financial liberalization (Abiad and Mody, 2005), the dummy DEPOSIT INSURANCE equals 1 if the government introduced a deposit insurance or blanket guarantee during [t, t+3], the dummy LARGE-SCALE INTERVENTION equals 1 if the government intervened in banks during [t, t+3], and the dummy DEPOSITOR LOSSES equals 1 if depositors of failed banks incurred losses during [t, t+3]. The data was obtained, if not specified otherwise, from Laeven and Valencia (2008) and looks at the time range of 1970 to 2007. "t" equals the starting year of the banking crisis. The sample consists of 42 banking crises. P-Values are in brackets. * /** /*** denotes statistical significance on the 10%/ 5%/ 1% level, respectively.

	Dependent variable: OUTPUT LOSS			
Explanatory variables	3.11	3.12	3.13	3.14
(Constant)	0.093 (0.609)	0.273 * (0.079)	0.152 ** (0.010)	0.064 (0.630)
CURRENCYCRISIS	0.177 * (0.0908)			
DEBTCRISIS	-0.03642 (0.792)			
PUBLICDEBTGDP	-0.3185 ** (0.032)			
INFLATION	-0.019 ** (0.0342)			
DEPOSITSGDP	0.214 * (0.0813)			
GOVOWNED	0.109 (0.651)			
FSLAW		-0.183 * (0.071)		
FINLIBERAL		-0.0009 (0.605)		
DEPOSITINSURANCE			0.20 ** (0.014)	
INTERVENTION				0.143 (0.671)
DEPOSITORSLLOSSES				0.041 (0.671)
R Square	0.466	0.156	0.14	0.037
F	2.074	1.429	6.001	0.636
P-Value	0.092 *	0.248	0.013 **	0.536

Table 13. Banking Crises Effects' Robustness Test Regression Results for Output Loss

This table shows the results from the OLS regressions on banking crises effects, by regressing OUTPUT LOSS on a set of explanatory as well as control variables. OUTPUT LOSS equals the difference of the real GDP and trend real GDP in percentage of the trend real GDP for the period [t, t+3], the dummy CURRENCY CRISIS equals 1 if a currency crisis occurred during the period [t-1, t+1], the dummy DEBT CRISIS equals 1 if a sovereign debt crisis occurred during the period [t-1, t+1], PUBLICDEBT/GDP equals the general government gross debt to GDP in the pre-crisis year t-1, INFLATION equals the percentage change of the GDP deflator in the pre-crisis year t-1, DEPOSITS/GDP equals the total deposits taking institutions to GDP in the pre-crisis year t-1, GOVERNMENT OWNED corresponds to the government owned share of the banking system assets in the pre-crisis year t-1, the dummy FS LAW equals 1 if a country's legal origin is based on French or Socialist law at time t (index of countries' legal origins from La Porta et al. (2000)), FINANCIAL LIBERALIZATION measures major financial liberalizations during [t-5, t] through an index of financial liberalization (Abiad and Mody, 2005), the dummy DEPOSIT INSURANCE equals 1 if the government introduced a deposit insurance or blanket guarantee during [t, t+3], the dummy LARGE-SCALE INTERVENTION equals 1 if the government intervened in banks during [t, t+3], and the dummy DEPOSITOR LOSSES equals 1 if depositors of failed banks incurred losses during [t, t+3]. The data was obtained, if not specified otherwise, from Laeven and Valencia (2008) and looks at the time range of 1970 to 2007. "t" equals the starting year of the banking crisis. The sample consists of 42 banking crises. P-Values are in brackets. * / ** / *** denotes statistical significance on the 10% / 5% / 1% level, respectively.

	Dependent variable: OUTPUT LOSS		
Explanatory variables	3.15	3.16	3.17
(Constant)	0.300 (0.25)	0.03 (0.811)	3.1667 (0.352)
FISCALCOSTNET		0.411 (0.222)	0.64 (0.301)
CURRENCYCRISIS	0.301 ** (0.041)		0.282 (0.348)
DEBTCRISIS	-0.102 (0.537)		-0.228 (0.452)
PUBLICDEBTGDP	-0.26 (0.147)		-0.200 (0.614)
INFLATION	-0.004 (0.698)		0.044 (0.520)
DEPOSITSGDP	0.054 (0.698)		0.122 (0.593)
GOVOWNED	0.150 (0.601)		0.544 (0.265)
FSLAW	-0.326 ** (0.026)		-0.283 (0.131)
FINLIBERAL	0.003 (0.343)		0.0004 (0.936)
DEPOSITINSURANCE		0.186 * (0.064)	0.112 (0.551)
INTERVENTION		0.029 (0.831)	-3.127 (0.353)
DEPOSITORSLOSSES		0.093 (0.311)	0.289 (0.214)
R Square	0.684	0.23	0.886
F	1.851	2.316	1.557
P-Value	0.146	0.079 *	0.361

3.2.4.1 Determinants of output loss (Hypotheses 3.11 to 3.14)

Table 12 reports the results of hypotheses 3.11 to 3.14 in which I regressed output loss on a set of explanatory variables with the basic expectation that banking crises adversely affect economic growth (Lindgren, Garcia, and Saal, 1996; Kaminsky and Reinhart, 1999; Eichengreen and Rose, 1998). In order to robustness test the hypotheses 3.11 to 3.14, I combined these hypotheses in various forms in 3.15 to 3.17.

Hypothesis 3.11 looks at initial economic conditions in the pre-crisis years and on how they affected the output loss. A currency crisis increases the output loss statistically significantly. Robustness testing this variable proofed the variable's statistical significance in Hypothesis 3.15 and its direction in Hypothesis 3.17 (Table 13).

An occurring of a debt crisis during $[t-1, t+1]$ did lower output losses. This was against expectations. However, this variable was statistically insignificant across all regressions (3.11, 3.15, and 3.17). Nevertheless, the variable debt crisis always kept its negative direction, suggesting that a debt crisis lowers output losses.

The variables measuring public debt to GDP, inflation, and deposits to GDP were all statistically significant at the 5%, 5% and 10% level, respectively. The results show that higher levels of public debt to GDP will yield lower output losses, which was against theoretical expectations and against the findings of Fink et al. (2004). I theorize that higher levels of public debt to GDP will act as a disciplining device to resolve the crisis better at lower costs. Also, a preceding inflation before a banking crisis seems to lower output losses, which is against expectations and the findings in Demirgüç-Kunt and Detragiache (1998) who conclude that an increased risk of banking sector problems may be one of the consequences of a high rate of inflation, possibly because the high and volatile nominal interest rates associated with high inflation make it difficult for banks to perform maturity transformation. The variable measuring deposits to GDP is thought to be an indicator of financial stock levels for financing economic activity. Thus higher levels would need longer to be used and therefore could longer withstand pressures. However, our findings positively relate the variable deposits to GDP to output loss which is against expectations but exactly as in the findings of Demirgüç-Kunt and Detragiache (1998). Robustness testing this variable proofed the variable's direction of effects on output losses but did not confirm the variable's statistical significance.

The variable measuring government owned bank assets increases output loss statistically insignificantly but always keeps its positive direction throughout the robustness tests. As hypothesized and according to the findings of Demirgüç-Kunt and Detragiache (1998), this result implies that a higher share of government owned bank assets yields higher output losses. In summary, I observe a goodness of fit of 0.47 and an F-value of 2 yielding an overall significant regression at the 10% level for Hypothesis 3.11.

Hypothesis 3.12 finds that countries with French or Socialist law origins statistically significantly experience lower output loss. On the other hand, French or Socialist law origin countries were found to experience more often crises. In the original database of Laeven and Valencia (2008), out of 124 crisis periods 96 happen in countries with French or Socialist law origins. According to the database by LLSV (1999), worldwide exist 129 countries with French or Socialist law origins, out of a total 268 countries worldwide. Therefore, in 47% of the countries happened about 75% of the larger financial crises. This information lets us suggest that countries with another legal origin than French or Socialist (often developed countries) face less often but stronger financial crises. Robustness testing this variable proofed the variable's statistical significance in Hypothesis 3.15 and its direction in Hypothesis 3.17.

Financial liberalization before banking crises did not statistically significantly affect output loss. This was confirmed by robustness testing this variable as the variable even changed directions. This finding is contrary to the results in Demirgüç-Kunt and Detragiache (1998) and our expectations which suggested that financial liberalizations increase output losses. However, our empirical results suggest that financial liberalizations are either not worsening the crisis or are not measured correctly but have an effect on banking crises. Overall, this hypothesis' R-Square (0.16), the F-value (1.43) and P-Value (0.25) show the insignificance of this regression. Hypothesis 3.12 is therefore rejected.

Hypothesis 3.13 confirmed statistically significantly at the 5 percent level, that introducing an explicit deposit insurance results in higher output loss, even while controlling for other factors. Robustness testing this variable proofed the variable's statistical significance in Hypothesis 3.16 and its direction in Hypothesis 3.17. R-Square (0.16), F-value (6.4) and P-Value (0.016) of Hypothesis 3.13 show the significance of this regression. Hypothesis 3.13 is therefore not rejected.

Hypothesis 3.14 found a positive relation of large scale government intervention to output losses, exactly as Claessens, Klingebiel and Laeven (2003) reported. This confirms their finding that large scale government interventions in fact harm the economy. However, this variable is not statistically significant but nevertheless keeps its positive sign also in the robustness tests (3.16 and 3.17). The same applies also to depositor losses which are statistically insignificantly increasing output losses. Overall, Hypothesis 3.14 is not statistically different from zero (P-Value of 0.536) and therefore rejected.

Looking at hypotheses 3.11 to 3.14 shows that only hypotheses 3.11 and 3.13 were statistically significant, hypotheses 3.11 and 3.14 are not statistically different from zero. In summary, I found that initial conditions in the pre-crisis year, countries' law origins, the introduction of an explicit deposit insurance and the parallel occurrence of a currency crisis are most significantly explaining output losses. These findings let us suggest that once a crisis started, governments are only able to mitigate the crisis to a certain extend as more generous support to the banking system might only increase fiscal costs but does not lower output loss, exactly as Claessens, Klingebiel and Laeven (2003) also concluded.

Table 14. Banking Crises Effects' Regression Results for Fiscal Cost

This table shows the results from the OLS regressions on banking crises effects (Hypotheses 4.11 to 4.14), by regressing FISCAL COST on a set of explanatory as well as control variables. FISCAL COST equals the net fiscal cost as percentage of GDP during [t, t+5], the dummy CURRENCY CRISIS equals 1 if a currency crisis occurred during the period [t-1, t+1], the dummy DEBT CRISIS equals 1 if a sovereign debt crisis occurred during the period [t-1, t+1], PUBLICDEBT/GDP equals the general government gross debt to GDP in the pre-crisis year t-1, INFLATION equals the percentage change of the GDP deflator in the pre-crisis year t-1, DEPOSITS/GDP equals the total deposits taking institutions to GDP in the pre-crisis year t-1, GOVERNMENT OWNED corresponds to the government owned share of the banking system assets in the pre-crisis year t-1, the dummy FS LAW equals 1 if a country's legal origin is based on French or Socialist law at time t (index of countries' legal origins from La Porta et al. (2000)), FINANCIAL LIBERALIZATION measures major financial liberalizations during [t-5, t] through an index of financial liberalization (Abiad and Mody, 2005), the dummy DEPOSIT INSURANCE equals 1 if the government introduced a deposit insurance or blanket guarantee during [t, t+3], the dummy LARGE-SCALE INTERVENTION equals 1 if the government intervened in banks during [t, t+3], and the dummy DEPOSITOR LOSSES equals 1 if depositors of failed banks incurred losses during [t, t+3]. The data was obtained, if not specified otherwise, from Laeven and Valencia (2008) and looks at the time range of 1970 to 2007. "t" equals the starting year of the banking crisis. The sample consists of 42 banking crises. P-Values are in brackets. * /** /*** denotes statistical significance on the 10%/ 5%/ 1% level, respectively.

Explanatory variables	Dependent variable: FISCAL COST			
	4.11	4.12	4.13	4.14
(Constant)	0.0588 (0.577)	0.121 (0.126)	0.084 (0.000)	0.063 * (0.35)
CURRENCYCRISIS	0.129 ** (0.045)			
DEBTCRISIS	-0.069 (0.456)			
PUBLICDEBTGDP	0.004 (0.956)			
INFLATION	-0.007 (0.221)			
DEPOSITSGDP	0.011 (0.879)			
GOVOWNED	0.045 (0.773)			
FSLAW		-0.004 (0.934)		
FINLIBERAL		0.001 (0.935)		
DEPOSITINSURANCE			0.140 *** (0.001)	
INTERVENTION				0.091 (0.204)
DEPOSITORSLOSSES				-0.042 (0.341)
R Square	0.205	0.017	0.150	0.062
F	0.710	0.149	7.020	1.218
P-Value	0.680	0.962	0.004 ***	0.307

Table 15. Banking Crises Effects' Robustness Test Regression Results for Fiscal Cost

This table shows the results from the OLS regressions on banking crises effects, by regressing FISCAL COST on a set of explanatory as well as control variables. FISCAL COST equals the net fiscal cost as percentage of GDP during [t, t+5], the dummy CURRENCY CRISIS equals 1 if a currency crisis occurred during the period [t-1, t+1], the dummy DEBT CRISIS equals 1 if a sovereign debt crisis occurred during the period [t-1, t+1], PUBLICDEBT/GDP equals the general government gross debt to GDP in the pre-crisis year t-1, INFLATION equals the percentage change of the GDP deflator in the pre-crisis year t-1, DEPOSITS/GDP equals the total deposits taking institutions to GDP in the pre-crisis year t-1, GOVERNMENT OWNED corresponds to the government owned share of the banking system assets in the pre-crisis year t-1, the dummy FS LAW equals 1 if a country's legal origin is based on French or Socialist law at time t (index of countries' legal origins from La Porta et al. (2000)), FINANCIAL LIBERALIZATION measures major financial liberalizations during [t-5, t] through an index of financial liberalization (Abiad and Mody, 2005), the dummy DEPOSIT INSURANCE equals 1 if the government introduced a deposit insurance or blanket guarantee during [t, t+3], the dummy LARGE-SCALE INTERVENTION equals 1 if the government intervened in banks during [t, t+3], and the dummy DEPOSITOR LOSSES equals 1 if depositors of failed banks incurred losses during [t, t+3]. The data was obtained, if not specified otherwise, from Laeven and Valencia (2008) and looks at the time range of 1970 to 2007. "t" equals the starting year of the banking crisis. The sample consists of 42 banking crises. P-Values are in brackets. */**/*** denotes statistical significance on the 10%/ 5%/ 1% level, respectively.

	Dependent variable: FISCAL COST			
Explanatory variables	4.15	4.16	4.17	4.18
(Constant)	0.244 (0.2219)	0.104 *** (0.000)	0.047 (0.48)	-2.127 (0.436)
OUTPUTLOSS		0.16 ** (0.003)	0.116 (0.222)	0.398 (0.307)
CURRENCYCRISIS	0.162 * (0.0953)			-0.034 (0.891)
DEBTCRISIS	-0.042 (0.727)			-0.043 (0.862)
PUBLICDEBTGDP	0.012 (0.919)			0.008 (0.977)
INFLATION	-0.009 (0.328)			-0.0418 (0.439)
DEPOSITSGDP	0.048 (0.670)			-0.088 (0.626)
GOVOWNED	0.076 (0.709)			-0.211 (0.608)
FSLAW	-0.0257 (0.796)			0.044 (0.794)
FINLIBERAL	-0.001 (0.407)			0.004 (0.914)
DEPOSITINSURANCE			0.073 (0.176)	0.107 (0.458)
INTERVENTION			0.055 (0.443)	2.242 (0.404)
DEPOSITORSLOSSES			-0.011 (0.824)	-0.183 (0.336)
R Square	0.314	0.100	0.207	0.783
F	0.490	4.801	2.028	0.724
P-Value	0.905	0.043 **	0.115	0.723

3.2.4.2 *Determinants of fiscal costs (Hypotheses 4.11 to 4.14)*

Table 14 reports the results of hypotheses 4.11 to 4.14 in which I regress a set of explanatory variables on fiscal costs. In order to robustness test the hypotheses 4.11 to 4.14, I combined these hypotheses in various forms in 4.15 to 4.18 (Table 15).

Hypothesis 4.11 shows, as expected, that a parallel currency crisis increases fiscal costs statistically significantly at the 5% level. Robustness testing this variable proofed the variable's statistical significance in Hypothesis 4.15 and its direction in Hypothesis 4.18. All other variables in Hypothesis 4.11 yield inconclusive results. A parallel debt crisis is statistically insignificantly decreasing fiscal costs. This result holds also in the robustness tests but this variables negative effect on fiscal cost is clearly against our expectations as this would imply that a parallel debt crisis has a positive effect on banking crises' fiscal costs. On the other hand, public debt to GDP robustly but statistically insignificantly increases fiscal costs as expected and exactly as in Fink et al. (2004). This might suggest that a higher ratio of public debt to GDP might increase the severity of the crisis as governments are facing financial constraints during their crisis intervention. Empirical results for the variable inflation suggest that inflation decreases fiscal costs statistically insignificantly but robustly across different regressions. This was against our expectation and the findings in Demirgüç-Kunt and Detragiache (1997) who show inflation to increase fiscal costs.

The variable measuring deposits to GDP does not yield any clear effect on fiscal costs and even changes its direction across different robustness regressions. Also the ratio of government owned bank assets does not influence fiscal cost in any clear direction. Overall, hypothesis 4.11 shows a low F- and high P-value, thus is not statistically different from zero. Therefore Hypothesis 4.11 is clearly rejected because the chosen initial condition variables don't affect fiscal costs significantly.

Also hypothesis 4.12 doesn't yield significant results and therefore has to be rejected. Both variables measuring the legal origin of a country and financial liberalizations preceding a banking crisis are statistically insignificant and change directions in the robustness tests. On the other hand, explicit deposit insurances in hypothesis 4.13 increase fiscal costs statistically significantly at the 1 percent level. Thus, exactly as in Honohan and Klingebiel (2003), I find that government intervention in form of introducing blanket guarantees on deposits will

significantly increase fiscal costs. I conclude that Hypothesis 4.13 with a P-Value of 0.004 is not rejected and statistically significant at the 1 percent level.

Finally, Hypothesis 4.14 doesn't yield statistically significant results and has to be rejected. Nevertheless, both variables, measuring large-scale government interventions and depositors' losses, affect fiscal cost in the expected direction. Interventions robustly increase fiscal costs (3.14, 3.17 and 3.18) suggesting that large-scale government interventions indeed result in higher costs, as suggested by Honohan and Klingebiel (2003). On the other hand, depositor's loss robustly decreased fiscal costs. This finding therefore may imply that depositors carried losses that otherwise might have occurred to the government.

Overall, only hypotheses 4.14 and 4.18 were statistically significant and thus all other hypotheses are not statistically different from zero as such. However, fiscal costs might be related to more generous government intervention activities such as issuing deposit insurances and large-scale interventions. The same conclusion was reported by Honohan and Klingebiel (2003). Especially hypotheses 3.13/ 3.14 and 4.13/4.14 could imply that more generous bailouts only result in higher fiscal cost, but not lower output losses. As Reinhart and Rogoff (2008), I also found that government intervention might only explain part of the fiscal cost because most fiscal cost might occur through foregone tax revenues due to output losses. Also, the relation of fiscal cost to output loss is yet inconclusive because both variables might be endogenous and any direct relation could stem from a third, yet unaccounted, variable that affects both.

Table 16. Banking Crises Effects' Regression Results for Robustness Test II

This Table 16 shows the results from the robustness test OLS regressions on banking crises effects by using OUTPUT LOSS and FISCAL COST as dependent variable. The sample consists of 124 banking crises. OUTPUT LOSS equals the difference of the real GDP and trend real GDP in percentage of the trend real GDP for the period [t, t+3], FISCAL COST equals the net fiscal cost as percentage of GDP during [t, t+5], the dummy CURRENCY CRISIS equals 1 if a currency crisis occurred during the period [t-1, t+1], and the dummy FS LAW equals 1 if a country's legal origin is based on French or Socialist law at time t (index of countries' legal origins from La Porta et al. (2000)). The data was obtained, if not specified otherwise, from Laeven and Valencia (2008) and looks at the time range of 1970 to 2007. "t" equals the starting year of the banking crisis. P-Values are in brackets. * / ** / *** denotes statistical significance on the 10% / 5% / 1% level, respectively.

Regressed on OUTPUT LOSS					
Variables	Constant	Beta-coefficient	Error term	F-value	P-Value
FISCALCOSTNET	5.782	0.918	0.48	14.929	0 ***
CURRENCYCRISIS	15.175	10.343	0.182	3.491	0.065 *
FSLAW	17.396	2.182	0.034	0.117	0.733
Regressed on FISCAL COST					
Variables	Constant	Beta-coefficient	Error term	F-value	P-Value
OUTPUTLOSS	10.311	0.25	0.48	14.929	0 ***
CURRENCYCRISIS	10.749	9.31	0.331	7.276	0.009 ***
FSLAW	13.857	0.324	0.01	0.006	0.938

Table 17. Banking Crises Effects' correlation matrix for Robustness test II

This Table 17 shows the correlations between each robustness test variable that was further robustness tested for the empirical study II on banking crises effects. The sample consists of 124 banking crises. OUTPUT LOSS equals the difference of the real GDP and trend real GDP in percentage of the trend real GDP for the period [t, t+3], FISCAL COST NET equals the net fiscal cost as percentage of GDP during [t, t+5], the dummy CURRENCY CRISIS equals 1 if a currency crisis occurred during the period [t-1, t+1], and the dummy FS LAW equals 1 if a country's legal origin is based on French or Socialist law at time t (index of countries' legal origins from La Porta et al. (2000)). The data was obtained, if not specified otherwise, from Laeven and Valencia (2008) and looks at the time range of 1970 to 2007. "t" equals the starting year of the banking crisis. ** indicate that the variables are statistically significantly correlated at the 0.01 level (2-tailed).

Variables	FISCALCOST NET	OUTPUT LOSS	FSLAW	CURRENCY CRISIS
FISCALCOSTNET	1.00			
OUTPUTLOSS	0.47 **	1.00		
FSLAW	0.01	0.03	1.00	
CURRENCYCRISIS	0.33 **	0.18	0.16	1.00

3.2.4.3 *Robustness checks*

To further robustness check the results of the determinants of crisis costs, I divide the sample into developing and developed countries, market-based and bank-based countries, French/Socialist Law Origin Countries and Other Law Origin Countries, and financial liberalized and not liberalized countries. Finally, I also split the sample into countries with high government ownership and low government ownership in banks. In most cases my results yielded similar results to the earlier ones. However, while splitting the sample into developed and developing countries, I found that current accounts to GDP showed a strong and negative impact on output loss at the 10% confidence level in the group of developed countries. This suggests that positive current account balances of developed countries are associated to less severe economic output loss. Otherwise, no differences between developed and developing countries were found. This is exactly as in Hoggarth et al (2002) who note that output losses associated with banking crises are not more severe in developing countries than in developed countries. Furthermore, I excluded transition countries from my regression. This, however, did not yield significantly different results.

Earlier I proofed that the legal origin of a country and a parallel currency crisis were good explanatory variables of output loss and fiscal costs. Therefore, I robustness test my results for these two variables. The new sample consists of 124 banking crisis datasets between 1970 and 2007 and is obtained from the database by Laeven and Valencia (2008). The results are seen in Table 16 and 17. Neither of the variables' results yielded any new findings as variables kept their original statistical in- or significance. Also direct correlations were constant to earlier findings (Table 9 vs. Table 17). These results proof that my original results are robust across different model specifications and datasets.

3.2.5 **Time to next presidential elections**

Finally, a new variable called TIMETOELECTION is introduced which measures the time until the next presidential elections. A large set of literature suggests that the more time that remains until the next presidential elections, the more heavily currently elected officials discount the benefits of re-elections. Indeed, Keefer (2001) found that when presidential elections are close, governments make smaller fiscal transfers to the financial sector and are less likely to exercise forbearance. Thus, I hypothesize that if there are presidential elections in the near future, fiscal costs of banking crises interventions will be smaller.

H5.11 *Close-by elections decrease fiscal costs of banking crises.*

I use the same OLS methodology and the same set of 42 banking crises between 1970 and 2007 as for my hypotheses 3.11 to 3.14 and 4.11 to 4.14. The core data on how much time is left to the next presidential election is obtained from the dataset by Keefer (2001).

Table 18. Time-to-Election Effects' OLS Regression Results for fiscal cost, Hypothesis 5.11

This Table 18 shows the results from my OLS regression elections influence on fiscal costs, where fiscal cost was employed as the dependent variable. My variable of interest researches the time to the next presidential elections and its relation to FISCAL COST NET which equals the net fiscal cost as percentage of GDP during [t, t+5]. The sample consists of 42 banking crises between 1970 and 2007 and t signifies the starting year of the banking crisis. * /** /*** denotes statistical significance on the 10% / 5% / 1% level, respectively.

Regressed on FISCALCOSTNET					
Variables	Constant	Beta - coefficient	Error term	F-value	P-Value Regression
TIMETOELECTION	0.001	0.054	0.733	46.502	0.001***

I find a strong relationship between how much time is left to the next presidential election and fiscal costs (Table 18). This suggests that near-by elections might ensure that politicians-in-power refrain from transferring public wealth to private wealth. Elections might therefore serve as a disciplining device. I conclude, exactly as Keefer (2001), that near-by elections lower fiscal wealth transfer to the financial sector. However, any relation between the time to the next presidential election and the containment phase and resolution phase crisis variables were insignificant.

Concluding this second empirical part, I find in summary that initial conditions in the pre-crisis year, the introduction of a deposit insurance, a country's French or Socialist legal origin and a parallel currency crisis explain most significantly economic output losses. Also, fiscal cost is in part related to more generous government intervention activities such as issuing deposit insurances, exactly as Honohan and Klingebiel (2003) reported. Costly government intervention such as introducing deposit insurances seems to result in higher fiscal costs and possibly even increase output losses through feedback effects from fiscal costs to economic growth. The variables measuring countries' legal origins and a parallel currency crisis were robustness tested on a larger sample of 124 banking crises and yielded similar results to the

original regressions, thus confirming their robustness. However, while splitting the sample into developed and developing countries, I found that the variable current accounts showed a strong and negative impact on output loss at the 10% confidence level in the group of developed countries. In addition, near-by elections were found to significantly decrease fiscal costs.

4 Case study: the U.S. credit and banking crisis of 2007

Banking crises' determinants of our first empirical study would not have accurately detected the U.S. credit and banking crisis that started in 2007. Exactly as Reinhart and Rogoff (2008), I suggest therefore that every banking crisis might be different. Thus, I investigate the U.S. banking crisis that started in 2007, its development and origins, in a case study. In this financial crisis, securitization first disrupted the capital market. However, as the theory of financial systems suggested, bank and capital markets are substantially interrelated. Thus, a twin crisis materialized also this time.

Following the media and public discussion shows that a large part of the population has yet not understood the true origins of the crisis. In addition I have proven that current research may not yet be able to employ correct determinants of banking crises which reliably explain banking crises. This case study will therefore review the literature about this banking crisis and its individual reasons and origins. I argue that understanding this financial crisis extensive negative effect requires understanding the crisis' deeper (sometimes indirect) origins and its development. Therefore I describe firstly the development of the crisis. Secondly, I seek to understand the crisis by digging deeper into the crises' origins. Securitization, the institutional environment, account imbalances and hubris are identified as major origins of this crisis. Earlier research has not identified such broad but in-depth origins of the crisis comprehensively. Therefore, this case study adds to the literature a valuable and thorough review of the current literature on the U.S. credit and banking crisis' important reasons and origins.

4.1 The development of the U.S. banking and credit crisis of 2007

The financial innovation called subprime mortgages made the "American Dream" come true by providing home ownership opportunities to riskier borrowers in the United States of America (U.S.). Lending to this group of riskier borrowers involved a mortgage design feature that resulted in a link to house appreciation. As Listokin et al. already in the year 2000 noted, underwriting and mortgage standards would have to differ completely for this group of borrowers. This needed change in mortgage policy was made possible through technological change in standardizing and routinizing loan application procedures (LaCour-Little, 2000,

Straka, 2000, and Gates, Perry and Zorn, 2002). Efficiency enhancement made the procedure less costly but didn't change the related higher risks to this class of borrowers¹¹

These subprime mortgages were financed via securitization which then again was financed through Collateralized Debt Obligations (CDO). CDO tranches were thereafter often sold to off-balance sheet vehicles and money market mutual funds. These vehicles (derivatives, securitizations and repo markets) are often called "shadow banking system" (Gorton, 2008) which is clearly a negative synonym as the demand for transparency strongly increased during the last decade. Unlike securitization of other types of assets such as prime mortgages, credit cards and auto loans, subprime securitization has dynamic tranching linked to excess spread and prepayment resulting in sensitivity to house prices. The fact that CDOs were often even only synthetic ABS bonds (not enough bonds were available at that time) and that ABS CDS needed less capital to construct a collateral pool, increased the systemic risk in addition (Turnbull, Crouhy and Jarrow, 2007). Also, dealer banks only knew their subprime structures and the placement of the bonds but no information mechanism was existent for a long time. Only after the creation of the ABX index, information on the value of the underlying subprime mortgages slowly became revealed. Subprime mortgages relied on increasing house prices and the successful refinancing. This was between 2001 and 2005 possible as house prices increased on average by 54.4 percent in the same time span.¹² Also, the ratio of median house price to median household income rose from a historically stable ratio of three times (1970 – 2000) to five times in 2006 (Leonhardt, 2007). However, during 2006 and 2007, house prices declined by about 5 percent. This was the start of a drastic decline. Lower house prices and higher mortgage rates triggered mortgage refinancing problems and therefore a strong increase in foreclosures. This in turn increased underwriting standards, decreased again house prices, which consequently resulted in even more foreclosures.

Information and knowledge gaps existed because of the complexity and of lagging information on house prices and mortgage performance. Overall, general knowledge on the effects and timing of house price changes was lacking (Gorton, 2008). Only the ABX index provided transparent prices of subprime risk despite liquidity problems and allowed to short on the subprime market (Gorton, 2008). After the ABX.HE's start in 2006, valuation of the

¹¹ Such risky borrowers had for example insufficient funds for down payment on the house, no or negative credit history, no official income, or they provided lacking or wrong information.

¹² Office of Federal Housing Enterprise Oversight, www.ofheo.gov/HPLasp

underlying subprime mortgages became slowly more efficient but the first indices in 2006 were still relatively high and inefficient despite the first signs of a house price meltdown. After a strong increase in subprime mortgage defaults (noted in February 2007), the 2007 editions of the ABX index immediately dived upon trade start or even opened significantly below par (Gorton, 2008). This means that the cost of insuring a basket of mortgages of a certain rating against default increased strongly. Following, UBS shut down its internal hedge fund, Dillon Read, in May 2007 after suffering about \$125 million subprime-related losses. Also Moody's, alongside Standard & Poor's and Fitch, put 62 tranches of 21 U.S. subprime deals on "downgrade review" during May 2007. The significant overvaluation of subprime mortgages became obvious latest during June and July 2007.

Thereafter the run on ABCPs and SIVs started and consequently made refinancing of short term funding difficult for these vehicles. SIVs had to be put back onto their sponsor's balance sheet and finally disappeared. Grand names such as Bear Stearns and BNP Paribas suffered enormous losses from their funds, and the German IKB and American Home Mortgage Investment Corp. were or were close to bankruptcy. Surprisingly, despite all these losses and write-downs, the SIVs original exposure to subprime mortgages was rather small with only 2% overall (Gorton, 2008). Instead, the uncertainties around this asymmetric information and the inability to value the SIVs portfolios caused this run. Following "cash was king", which made the basic form of secured lending, repurchase agreements (repo), to almost disappear. This market was generally believed to amount to up to \$11.5 trillion by 2007 (Geithner, 2008) but by August of the same year this market disappeared almost instantly and entirely for months. This was due to the fact that the collateral was believed to have no market in which it could be sold due to missing liquidity and uncertainty and was therefore invaluable.

Especially ratings of any kind of structured products were mistrusted and therefore most ABS, RMBS or CMBS bond were almost untradeable. Thus without repo, assets could only be sold at very low prices which in turn caused the mark-to-market value of all assets to fall, making it even more unlikely to start trading repos again. Any intervention by central banks was challenging as the ability to track loans (syndicated) was very low. Therefore central banks had to institute costly substitute measures to account for these high market inefficiencies.

In August 2007 started the first wave of illiquid financial intermediaries, increasing the LIBOR which then again prompted the European Central Bank (ECB) to inject €95 billion

and the U.S. Federal Reserve to inject \$ 24 billion into the interbank overnight credit market. The U.S. Federal Fund Rate was continuously decreased and the Bank of England provided liquidity to the Northern Rock bank (Shin, 2009). As the crisis unfolded, despite large central bank efforts¹³, write-downs of mortgage-related securities continued.

In conclusion, I recognize a complex building of interlinked connections that, in combination with information, political and efficiency uncertainties and asymmetries, led to this panic. Obviously, the complexity of this chain resulted in information losses due to the fact that the original mortgage could not be penetrated anymore. Especially the end buyer of shares in RMBS, CDOs, SIVs and money market funds substituted missing knowledge of the product with agency relationships, i.e. the products' ratings and the (long term) relationship with the banker. This might be one explanation for questions such as why rational firms and individuals invested in unknown products.

4.2 The origins of the U.S. banking and credit crisis of 2007

This crisis has a large set of origins. An introduction into the “flawed” structure of securitization will be followed by a description of further origins of this crisis such as the U.S. institutional environment, financial fragility, global imbalances and the rise of hubris.

4.2.1 Securitization

Rise in Subprime Mortgages

Subprime mortgages became very popular in the first decade of the new century. They solved the problematic question of how to lend to risky borrowers by bringing the innovation of benefiting from house price appreciation over short time horizons. The house's appreciation in price is the basis for refinancing the mortgage every two to three years. The refinancing exists as an option to the lender. In addition, the initial monthly payment is based on a “teaser” interest rate being fixed for the first two to three years after which the loan will “reset” to its higher and “real” interest rate which is mostly floating for the rest of the usually 30 years mortgage pay-back duration. The second rate is more burdensome and not always affordable. The main design features were therefore the refinancing option in order to avoid

¹³ Such as injecting high amounts cash into the financial system and bank equity

the reset rate as well as the prepayment penalty in order not to refinance too early¹⁴. Therefore, with a high-step up rate as well as a prepayment penalty and a possible default of the borrower, the lender has all the decision power over the outcome thanks to this roll-over option. Consequently, being long the house, the lender is highly sensitive to house prices because mostly the initial “teaser”-period is even yielding a negative profit. However, a borrower is largely tied to the initial lender and his predatory lending (Gorton, 2008). The borrower might not even understand that the right to use the house for short, revolving periods of time is at the lenders disposal. At each refinancing event, the borrower optimally built up equity to receive lower interest rates or faced the lender taking its right to opt out and take the recovery amount. Until the year 2006, house prices rose and up to 80% of mortgages were refinanced within five years (Bhardwaj and Sengupta, 2008).

However, banks and borrowers disregarded the fact that housing cycles with their booms and busts are existent already for decades. Also this time, after the construction peak in early 2006 house prices had fallen by around 40% within one year. This resulted in a massive overhang of excess supply over demand for housing. Housing vacancies skyrocketed subsequently and were out of line compared to population and prosperity growth¹⁵ (Ellies, 2008). This overhang created extreme vulnerability in housing prices which was speeding itself up with the first foreclosure waves enlarging the overhang furthermore. Compared to other countries such as Spain and the U.K. which faced difficulties in providing sufficient amount of housing for its population, the U.S. had created itself a large supply overhang. This overhang with a turn in the housing cycle led to severe consequences.

Securities’ design: Flawed risks and reward patterns

Securitization makes it possible to disperse risk which was often mistaken with reducing risks. Theoretically, dispersed credit risk lowers the chances of bank failures and financial instability as when credit risk is concentrated in a few banks. However, being able to separate credit risk from market risk and selling risks separately away resulted investors to invest into larger bets with less down payment and resulted banks to issue more loans and other securities (Anderson and Timmons, 2007, Tett, 2007). Therefore more risk is taken on since individuals’ risks are dispersible. However, it was disregarded that the systemic risk

¹⁴ Fannie Mae estimated that 80 percent of subprime mortgages had repayment penalties (Gorton, 2008).

¹⁵ These are indicators for housing demand.

increased overall. Additionally, the supposed reduction in risks causes lower asset price volatility which in turn permits players to increase their leverage, buy more assets and thus increase asset prices. However, as soon as volatility and capital cost increases and asset prices and liquidity fall, the process of de-leveraging energetically starts a downward spiral (Independent Strategy, 2007). Additionally, due to the once beneficial dispersing of risk, only a small amount of information about the risk location exists. Also, it is questionable whether most investors understood the nature of these risks and environmental changes in banking methods of granting credit where personal credit history and borrower characteristics are replaced by impersonal statistical methods of credit assessment. These “efficiency increasing” shifts in credit assessment have undervalued and mispriced risks massively.

Securities’ design: missing transparency

The complex nature of asset-backed structured products forced many small and mid-sized investors to rely heavily on credit ratings. However, rating agencies were not stating clearly the precise meanings of their ratings and the robustness of their methodologies for such products. Secondly, structured products were not transparent about the type of assets underlying which made investors expect the worst, exposure to the subprime market. Consequently, this created a market for “lemons”. Third, lack of transparency concerning the valuation of illiquid assets resulted investors to lose confidence into the posted prices and the creditworthiness of counterparties. Fourth, financial intermediaries did not transparently disclose their total magnitude of commitments received (e.g. lines of credits). Finally, banks did not transparently disclose the size of their assets in the warehouse which again lead to investors’ uncertainties and possibly even more volatile share prices of banks. However, all these securitization design failures may not have been possible without a favourable institutional environment.

4.2.2 Institutional environment

Eased U.S. lending standards

Since the beginning of the year 2000, many countries eased their lending standards but, despite issues about the comparability of standards between countries, a lot of research suggests that the U.S. did ease lending standards the most (Gorton, 2008, Kiff and Mills, 2007, Gerardi et al., 2008). Firstly, a range of legislative and policy changes were undertaken

to encourage the development of a non-conforming (subprime and Alt-A) lending sector which did not confine to the government sponsored enterprise (GSEs) models (Ellies, 2008). Reasons and motivations behind these moves lie largely in the politics of George W. Bush who formulated it a prime goal to make home ownership available to ethnic minorities who had usually been overseen by mortgage lenders (Gramlich, 2007). Secondly, the Bush administration had to find a quick way of recovering from the bursting of the “IT-bubble” in the early 2000’s. Pushing the housing sector seemed a viable option. Thirdly, GSE’s domination in the mortgage market had to be reduced (after accounting and governance irregularities) through caps and competition (Kiff and Mills 2007, Blundell-Wignall and Atkinson 2008).

As lending standards were eased, the bet on rising collateral value overweighed considerations about the actual lender (Gorton, 2008). Also second mortgages, either at purchase (piggyback) or later (home equity credit line), had increased (Avery, Brevoort and Canner 2007). Thus, a 100% financing was made possible without having to pay any mortgage insurance. To make facts even worse, Ashcraft and Schuermann (2008) prove with LoanPerformance data that in many cases the first mortgage lender didn’t know about the second mortgage. Earlier, this “silent second lien” was almost inexistent but by 2006 over 25% of subprime and 40% of Alt-A securitized mortgages actually had a “silent second lien”. Consequently, many first mortgages had to be actually mispriced. This obviously raises questions concerning legislation policies in the area of mortgage recording.

Despite the fact that 100% financing is also available in other countries, only the U.S. had changed it from low loan to value ratios (LTV) and fixed-interest rates to eased standards, high LTV and adjustable-rate mortgages, respectively (Tsatsaronis and Zhu, 2004). In addition, Mayer and Engelhardt (1996) found that even down payments were often third-party contributions such as family and friends. Even real estate sellers helped funding down payments via their own “charity organizations” in return for inflating the actual house price. Montgomery (2008) found that seller-financed down payment mortgages are 300% more likely to end in foreclosure which finally led the Housing Rescue and Foreclosure Prevention Act of 2008 to prevent such actions totally.

Loose U.S. monetary policy

In theory, monetary policy influences economic growth and inflation, especially through its interest rate setting function that impacts future movements of macroeconomic variables (Bernanke and Blinder, 1990). Also, Bernanke and Blinder (1990) and Black and Rosen (2008) proved that monetary policy responds quickly to supply shocks of bank reserves and therefore can affect the supply side of the “credit channel”. Supply of credit is also affected by redistributing loan supply across firms of different sizes (balance sheet channel) and banks altering the maturity of new loan originations (aggregate loan supply). However, before this financial crisis, a loose monetary policy of the Federal Reserve Bank that begun under Greenspan in late 2001, was observable. Originally, these policy actions were meant to pull the U.S. economy out of recession but at the same time also helped continue the boom in the housing market (Mah-Hui Lim, 2008).

Wolf (2007 b) argues that the Fed was responsible for the loose monetary policy and argues that interest rates should have risen to over 5% in 2005 instead of pushing interest rates down to 1% in 2003 and then raising them only slowly (Economist, 2007 a). Giving the theoretical background to Taylor’s and Wolf’s suggestion, monetary policy transmission would impact the “credit channel” also in a way that if money is held tight, according to Bernanke and Gertler (1995), informational frictions in credit markets become worse. This increases in turn the external finance premium which therefore enhances the wanted effects of monetary policy on the real economy. However, money was held loosely and exactly the opposite happened in the real economy; asset prices and especially house prices rose which caused excessive consumption and a “bubble”. The bubble arose due to the fact that central banks shifted their focus of monetary policy more and more towards financial stability (due to periods of low inflation and increased global financial markets) at the cost of focusing on stable asset prices and low inflation. Therefore the traditional main objective of central banks, stabilization of prices and outputs, were possibly competing with newer objectives (Violi, 2008).

The U.S. tax system

The tax system in the U.S. has certain features that highly encouraged high loan to value ratios. Firstly, mortgage interest of the house where the owner lives in, are income tax deductible like in other countries such as Switzerland, Sweden, Netherlands and partly Spain. However, the imputed rent is also tax-free which is contrary to the other countries mentioned

above. Therefore the U.S. tax system encourages home ownership and even more, to have high mortgages that might even finance other non-housing assets. Also, there is no real incentive to prepay a mortgage ahead of time and generally keep the loan-to-valuation ratio higher. This might explain certain features such as interest-only mortgages and the rapid increase of negative equity (Ellies, 2008). Drees and Pazarbasiouglu (1998) found that Nordic countries faced similar tax treatments in the 1980s during which a strong housing boom was existent but led to a burst in the beginning of the 1990s.

The Glass-Steagall Act

After the Great Depression of the 1930's, the U.S. government tightened anti-trust laws and banking regulations to protect as well as stabilize the financial system. One of the most important Acts passed was the Glass-Steagall Act that separated commercial from investment banks and prohibited interstate banking. Furthermore, the Act also regulated commercial banks' activities such as interest rates charged and entry into riskier investments (Mah-Hui Lim, 2008). However, since the 1970's commercial banks lobbied against the Glass-Steagall Act with success as from Reagan onwards until 1999 under Clinton's administration the Act was continuously lowered and finally dismissed. Thereafter, commercial banks were again able to engage in investment banking activities that included underwriting and trading of bonds and other security types. However, this resulted in a conflict of interest as banks often receive higher fees for investment banking activities compared to commercial loan fees. Thus, banks sacrificed the latter. The ratio of noninterest income from investment banking to net interest income from lending continuously rose from 0.25 in 1980 to 0.75 in 2005 (Federal Deposit Insurance Corporation, 2007). Investment banking income continuously rose but was also riskier and more volatile. Besides investment banks' risk taking, also their capital supply increased highly due to global account imbalances.

4.2.3 Global account imbalances

The Asian financial crisis of 1997 was caused by emerging countries' financing of account deficits with private capital inflows which were as quickly withdrawn as they were flowing in. Today on the other hand, most Asian countries have large account surpluses and foreign exchange reserves (59% of the world's foreign exchange reserves are owned by ten Asian countries). Export surplus and excess savings in Asia supported during recent years the consumption habits of the U.S. households and government. In 2006, U.S. public debt

amounted to \$5 trillion of which 44% was held by foreigners such as Japan (\$612 billion) and China (\$420 billion).¹⁶ However, even a bigger pile of debt is to be found in U.S. households (\$9.7 trillion in housing loans and \$2.4 trillion in credit card loans), corporations (\$9 trillion) and the financial sector (\$14.2 trillion) (Hodges, 2007). Also, 93% of the U.S. account deficit in 2007 was financed by the account surpluses of China, Japan, Germany and Saudi Arabia (Economist, 2007b). Therefore “poorer” nations financed the consumption habits of U.S. households, corporations and the government. Duncan (2007) specifies that especially ABS attracted foreign funds. The U.S. is currently the largest debtor nation worldwide but now accuses emerging countries of contributing to the crisis due to excess savings whereas during the Asian crisis in the late 1990’s, exactly the same countries were accused of excess deficits. Additionally, besides these account imbalances, also imbalances between the real and financial economy were existent.

4.2.4 Increasing financial fragility in the U.S.

One of the most serious imbalances and misallocations of resources are to be found between the U.S. real and financial economy. During the last years, financial transaction volumes outweighed drastically the value of productive investments worldwide. Financial assets to annual world output ratios used to be about equal (109%) in 1980 but continuously rose to over 300% by 2005 (Mah-Hui Lim, 2008). Global financial assets were \$140 trillion compared to the world’s total GDP of \$48 trillion in 2006 (Wolf, 2007 a). Also, OTC derivative transactions and traditional foreign exchange market transactions reach \$5.3 trillion per day whereas world trade is only \$12 trillion per year (Bank for international Settlement, 2007). Thus the original definition and concept of liquidity, M1, M2 and M3 are no longer valid because financial innovations resulted in new concepts of liquidity such as derivatives. M1 and M2 only make up 1% of the pyramid, the “broad money” level 9% and securitized debt stands at 10%. The rest, accounting for global liquidity, 80% of the total \$607 trillion liquidity market worldwide is made up of derivatives (Independent Strategy 2007). These facts proof that central banks have only small control over the global liquidity market but face enormous pressure to influence the cost of capital and global liquidity.

¹⁶ www.federalreserve.gov

There existed also a funding mismatch in the shadow banking system¹⁷ as they sell short-term asset-backed commercial paper and medium term notes with maturities between three and twelve months to money market funds. To ensure against a drop in demand of these papers and thus a funding problem, these vehicles drew down credit lines called “liquidity backstop”. Therefore, the banking system eventually carried the liquidity risk but kept it unrecognized in its balance sheets. Additionally, also investment banks started to fund themselves with short-term repos (as explained earlier repos essentially refer to borrowing funds by selling and agreeing to repurchase a collateral asset), often just lasting overnight or up to three months. As described earlier, the repo-market almost dried out completely at a certain point in this crisis and therefore exposed also these banks to vast maturity mismatches in addition to the already granted credit lines. In summary, the shadow banking system increased liquidity risks and financial fragility, leading to an even larger crisis (Brunnermeier, 2008). In addition, low equity- high debt deals in form of LBO’s became again very attractive in the beginning of 2000, adding to the financial fragility in the financial system.

4.2.5 Leveraged buy out

Leveraged buy outs have exploded in deal and total size during the last decade as loose credit standards, excess liquidity and asset prices were increasing. Such private equity funds raised \$459 billion in 2006 but even more; they borrowed several times over their capital base to take over companies¹⁸. Therefore, cheap credit and excess liquidity resulted in \$13.3 trillion (equivalent to the GDP of the U.S.) of LBO’s during 2003 and the first half of 2007. Thereafter, LBO deals plummeted and many bridge loans to LBO’s had to be revalued by banks. This revaluation resulted in huge write-downs for banks such as Citbank, Merrill Lynch, UBS and Deutsche Bank (i.e. up to \$20 billion write-downs for each of these banks). As the name already suggests, these LBO deals are highly leveraged to stem the deal, keep management’s motivation and effort at a maximum, align interests and reduce agency costs. However, the development of increasingly high leverage deals (from 2004 until 2007 leverage ratios rose from 4.8 to 8 times) and falling debt servicing capacity (operating profit to debt repayment) to 1.8 times from initially 3.4 in 2004, made these deals extremely vulnerable to negative macroeconomic developments (Farzad et al., 2007). Mah-Hui Lim (2008) observes that lax credit criteria was not only applied in subprime loans but also in

¹⁷ Off-balance sheet investment vehicles and conduits belong to the shadow banking system

¹⁸ Typically an LBO transaction is only funded 30% with private equity (Mah-Hui Lim, 2008).

LBO deals as seen in “covenant lite” loans (banks waived traditional monitoring rights and financial covenants) and payment-in-kind notes (borrowers repay in-kind using another credit note).

Many of these LBO’s were financed overconfidently with little considerations about a possibility of an economic recession.

4.2.6 The returning of Hubris

>>Success breeds a disregard of the possibility of failure... As a previous financial crisis recedes in time, it is quite natural for central bankers, government officials, bankers, businessmen, and even economists to believe a new era has arrived<< (Minsky, 1986)

Already in the 1920’s, experts proclaimed a new era has arrived which never has been there before. This new era therefore justified the fact that stock prices were supposed to only rise. Additionally, celebrities such as Winston Churchill assured people of the trustworthiness of the financial system and of rising stock prices by investing large funds on his own into the stock market.

Three quarter of a century later, experts found again that this time it is “different”. Financial innovations, models, safer strategies and levered expert management justified the development. Also, major figures in the financial world safe-sung a whole generation about how investors use now a different investment technique, private equity, which really adds value as proclaimed by David Rubenstein of the Carlyle Group, one of the largest private equity funds. Also Joe Anderson of Countrywide Mortgage stated that “we have a wealth of information we didn’t have before. We understand the data and can price the risk” (Farzad et al., 2007). Even Alan Greenspan confidently said that the new financial innovations disperse the risk to those willing and able to bear it and therefore acts like a shock absorber to prevent “cascading failures” (cited in Wehrfritz, 2007, Federal Reserve Board, 04/22/2002).

4.3 Case study conclusion

In this case study, I reported first the unwinding of the subprime crisis in 2007. It became clear that besides decreasing U.S. real estate prices, there were many more factors involved

that gave rise to a banking and credit crisis. It turned out that securitization could not diminish risk but instead only transferred risk until the risk's location became unknown. Also otherwise, securitization design showed many flaws when inspected more closely. Mortgage-backed securities were very difficult to value and not transparent, and moral hazard increased due to wrong incentives. However, such securitization needed the right institutional environment in which the legislation and monetary policy helped securitization to emerge. U.S. mortgage backed securities attracted international capital market funds that required AAA-rating investments. These funds therefore indirectly fuelled U.S. household spending. Large LBO's and the structure of the shadow banking system helped increase financial market's liquidity risk which became very stretched since the outbreak of this crisis.

5 Conclusions

Section II reviewed the literature on financial systems, banking and banking crises. I recognized that understanding banking crises requires understanding the theory of financial systems and banking in general. Hence I reviewed firstly the theory of financial systems with their most important act of creating liquidity (Boyd and Smith, 1992). Levine (1997) argues that banks satisfy random liquidity needs of lenders better (at lower risks) than if these lenders would forego financial intermediaries. However, in order to credibly commit to repay depositors, banks may have to choose a fragile bank capital structure, as argued by Diamond and Rajan (2001). Thus, the risk of a banking crisis may be a necessary disciplinary device in an imperfect market.

When such banking crises take place, various in-depth origins of the crises are found, such as inflation, cyclical output downturns, term of trade deterioration, exchange rate crashes, and currency as well as asset and real estate devaluations (e.g. Lindgren et al., 1996; Dooley and Frankel, 2003; and Collyns and Kincaid, 2003). The literature of determinants of banking crises formed various theories on how bank structure and ownership, financial liberalization, institutional and political environments, international shocks and exchange rate regimes influence the probability of a banking crisis.

Once a banking crisis is ongoing, the credit crunch hypothesis predicts that decreased bank credits to firms decrease investments and expenditure, thus resulting in decreased economic output and demand (Kaminsky and Reinhart, 1999; Demirgüç-Kunt and Detragiache., 2005). On the other hand, governments' intervention to lower banking crisis effects on the real economy results in fiscal costs. Thus, governments actually face a trade-off between fiscal and economical cost as higher fiscal spending on government interventions is expected to decrease the economical cost of a crisis, and vice-versa (Laeven and Valencia, 2008). However, earlier findings suggest that generous support to the banking system does not reduce the output cost of banking crises (Claessens, Klingebiel and Laeven, 2003). Thus, I recognized that an important question to policy makers and economists is how to decrease the negative effects of a banking crisis most efficiently and effectively as well as how to prevent a banking crisis at all. Earlier research confirmed that future research on banking crises is highly needed. I contribute to the research on banking crises by providing new insights into

the determinants and effects of banking crises with new and longer data as well as better and further developed variables.

In the first empirical study Section 3.1 I attempted to find determinants of banking crises. GDP growth, real interest rate, inflation, M2 to reserves, creditor rights, GDP per capita and financial reforms were hypothesized to have an impact on the probability of a banking crisis. I employed a multivariate logit model to evaluate the chosen determinants' value in explaining 120 banking crisis around the globe during 1980 and 2005. To my knowledge, no previous similar study has employed such a large time frame.

In summary, low GDP growth, highly developed institutional and regulatory environments, financial reforms and high GDP per capita increase the probability of a banking crisis statistically significantly. The observed factors are often found in developed nations which might be therefore more probable to experience a banking crisis. Interestingly, this study turned around earlier results of Demirgüç-Kunt and Detragiache (1997) who report countries with weak institutional environments, low GDP per capita and low GDP growth to inhibit the largest risks of banking crises. Therefore, my study updated the study of Demirgüç-Kunt and Detragiache (1997) who researched banking crises during 1980 and 1994, turned around their results and showed that most variables are correlated to at least one other variable. This shows that future research has to focus on developing better determinants of banking crises.

The second empirical part evaluated banking crises' effect on fiscal cost and economic output by regressing these two dependent variables on a number of explanatory variables in an ordinary least squares (OLS) regression. I argued that financial and structural variables as well as government intervention-, monetary- and fiscal policies explain fiscal costs and economic output loss of banking crises. From the database by Laeven and Valencia (2008) I obtain 42 banking crises datasets for the period 1970 to 2007. In summary, a parallel currency crisis and explicit deposit insurance increase the economic output loss. French and Socialist law countries experience lower output losses but more frequent crises. Also, higher fiscal expenditure didn't lower output losses. Exactly as Claessens, Klingebiel, and Laeven (2003) conclude, this result contradicts policy makers' believe that government interventions are "necessary". Additionally, government interventions result in higher fiscal cost (as in Honohan and Klingebiel, 2003) but government intervention might only explain part of the fiscal cost because most fiscal costs might, as hypothesized by Reinhart and Rogoff (2008), occur through foregone tax revenues due to output losses. However, any conclusions about

the relation between fiscal costs and economic output losses are difficult due to a possible endogeneity. Additionally, near-by elections were found to decrease fiscal costs statistically significantly as near-by elections might serve as a disciplining device. They might ensure that politicians-in-power refrain from transferring public wealth to private wealth as these politicians hope to get re-elected.

Finally, I investigated the U.S. banking and credit crisis that started in 2007, its development and origins, in a case study in Section 4. I identified securitization, the institutional environment, account imbalances, LBO's and hubris as major origins of this crisis.

In conclusion, I recognize the advantages of external finance, financial systems and banks. However, these imperfect markets can also result in costly banking crises. As shown, especially developed nations seem to inhibit a larger probability of the occurrence of a banking crisis. Once a crisis is ongoing, larger government interventions were not found to decrease economic output loss. This suggests that policy makers must reconsider expensive government interventions in the future.

Finally, the field of banking crises has evolved into two areas of research; open economy macroeconomics and microeconomics of banking and regulation. However, to understand financial crises better, future research must focus on how to better incorporate more bank and regulation level information into cross-country empirical research.

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Appendices

Appendix A1. Crisis classification accuracy of the determinants of banking crises

This Appendix A1 presents how model 1.13, regressing determinants on a set of banking crises (Table 5), classified the studied 65 banking crises. Each actual banking crisis was either not predicted as a crisis, predicted as a crisis exactly in the year of the actual crisis, predicted as a crisis one year prior the actual crisis or two or more years prior the actual crisis.

Country	Crisis Year	Not predicted as a crisis	Predicted as a crisis in the year of the crisis	Predicted as a crisis starting 1 year prior	Predicted as a crisis starting 2 or more years prior
Bangladesh	1987	X			
Benin	1988				X
Bolivia	1986	X			
Brazil	1990		X		
Burkina Faso	1990	X			
Burundi	1994	X			
Cameroon	1987				X
Cape Verde	1993				X
Chad	1982	X			
Chile	1981			X	
China	1998	X			
Colombia	1982			X	
Congo, Republic of	1992				X
Côte d'Ivoire	1998				X
Dominican Republic	2003	X			
Ecuador	1982	X			
Egypt	1980	X			
El Salvador	1989				X
Finland	1991	X			
Ghana	1982			X	
Guyana	1993	X			
Haiti	1994				X
Hungary	1991				X
India	1993	X			
Indonesia	1997				X
Jamaica	1996	X			
Japan	1997				X
Jordan	1989	X			
Kenya	1985	X			
Korea	1997				X
Kuwait	1982	X			
Lebanon	1990				X
Liberia	1991	X			
Madagascar	1988	X			
Malaysia	1997	X			
Mali	1987	X			
Mauritania	1987	X			
Mexico	1981	X			
Nepal	1988	X			
Niger	1983	X			
Nigeria	1991	X			
Norway	1991	X			
Panama	1988	X			
Paraguay	1995				X

Appendix A1 continued. Crisis classification accuracy of hypothesis 1.13 about the determinants of banking crises.					
Country	Crisis Year	Not predicted as a crisis	Predicted as a crisis in the year of the crisis	Predicted as a crisis starting 1 year prior	Predicted as a crisis starting 2 or more years prior
Peru	1983	X			
Philippine	1983	X			
Poland	1992	X			
Romania	1990	X			
Senegal	1988	X			
Sierra Leone	1990				X
Sri Lanka	1989	X			
Swaziland	1995	X			
Sweden	1991	X			
Tanzania	1987	X			
Thailand	1983	X			
Togo	1993	X			
Tunisia	1991	X			
Turkey	1982			X	
Uganda	1994	X			
United States	1988	X			
Uruguay	1981	X			
Venezuela	1994				X
Zambia	1995				X
Zimbabwe	1995				X
% in each category of 65 crises		65,62	1,56	6,25	26,25