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Deposit Insurance and Debt to Equity

Bachelor Thesis in Economics

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Abstract

This thesis addresses the issue of moral hazard in banking when deposit insurance is in place. That is, what are the effects of deposit insurance on banks risk-taking measured in form of the debt to equity ratio? Since the purpose of deposit insurance is to stabilize the financial markets a situation where banks use the insurance to increase their risk to gain profitable advantage could limit the stabilizing effect of the insurance. To investigate whether deposit insurance affects the debt to equity ratio, we conducted a study of two financial markets, the Swedish and the US. In doing so, a regression analysis was performed, showing that an effect of deposit insurance can be seen on debt to equity ratio. This means that deposit insurance also, contrary to its purpose, has a destabilizing effect.

Sammanfattning

Denna uppsats behandlar insättningsgaranti och dess relation till moralisk risk hos banker. Den fråga vi ställde oss var vilken effekt insättningsgaranti har på bankers risktagande, mätt i förhållandet mellan skuld och eget kapital. Syftet med insättningsgaranti är att stabilisera den finansiella marknaden. Dock kan insättningsgaranti ge upphov till en situation där banker ökar risken i syfte att nå högre vinst. För att undersöka huruvida insättningsgaranti påverkar förhållandet mellan skuld och eget kapital så studerade vi två finansiella marknader: USA och Sveriges. Vår metod bestod i en regressionsanalys av förhållandet mellan skuld och eget kapital hos banker och insättningsgarantin. Denna analys påvisade att insättningsgarantin kan ha effekt som är i motsats till sitt syfte. Det vill säga, insättningsgaranti kan leda till instabilitet på den finansiella marknaden.

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1 Introduction

Since the start of the financial crisis in 2007, different states have been obligated to support their banks either by taking the bank into direct possession or by providing credit support to banks with bad loans. Many countries have increased the guaranteed amount of their deposit insurance to stabilize their financial markets. The risk has in other words shifted from the financial market to different states, putting the tax payers' money at risk. Banks (at least the big ones) have been privileged with governmental support so that they do not face bankruptcy – even if they become insolvent. This special treatment has provoked both the public and the politicians, especially since the compensation for bankers is (relatively) high and compensation has in many cases been connected to short-term goals.

The general understanding has been that stockholders can lose their money when banks go bankrupt or need government support. With respect to debt holders, on the other hand, there is a consistent view that they are to be protected, either by explicit or implicit guaranties that the bank will pay its debts no matter what happens. Both these forms of guaranties are supposed to increase financial stability, preventing extreme costs for society.

It is said that deposit guaranties might promote moral hazard in the bank system. Even more so if the private market does not take full responsibility for its losses. If bankruptcy is filed, the stake of the stockholders is in comparison with other industries low, rarely exceeding 10 % of the liabilities. Since leverage is involved, there will be in the interest of the stockholders to increase debt so that return on equity increases. The stockholders' risk is still restricted to their relatively small stake in the bank. Commercial banks both in Sweden and US are regulated and have a minimum capital requirement ratio. Even though banks face capital requirements it has to date been an insufficient measure in order to circumvent crises in the financial system.

To prevent moral hazard and not to risk of tax payers' money several countries have started to review their regulations regarding banks and their taxation of compensation. Legislation discussions have been taken at an international level and the general view is that banks are in need of harsher restrictions. Some object to this view, since the underlying causes still exist; stockholders do not have enough at stake. The existence of this problem has been recognized for a long time even though earlier regulations have failed to extort the problem. Thus, combining financial stability with governmental support without encouraging moral hazard has proved to be a tough challenge.

1.1 Purpose

The purpose of this thesis is to analyze the consequences of implicit and explicit deposit guarantees and their effect on the debt to equity ratio. Furthermore, we aim to analyze the moral hazard problems that arise from the guarantees. We end with discussing different solutions.

1.2 Method

We examined how debt to equity ratio has changed over time using data from the US and Sweden. To do so, we relied on a regression analysis to see whether there are any correlation between the debt to equity ratio and deposit insurance. Following this, we related our analysis to existing literature and prior research.

1.3 Delimitation

The thesis will concentrate on two financial markets: the US market and the Swedish market. Both markets have deposit guarantees in place and are well developed financial markets.

1.4 Background

Figure 1 illustrates the increase in debt to equity ratio that has occurred in Europe (following the analysis of capital to asset ratio in Benink and Benston (2005)). Since the depression in the 1930s the ratio started to increase rapidly. At the same time, states started to introduce implicit and explicit bank guarantees.

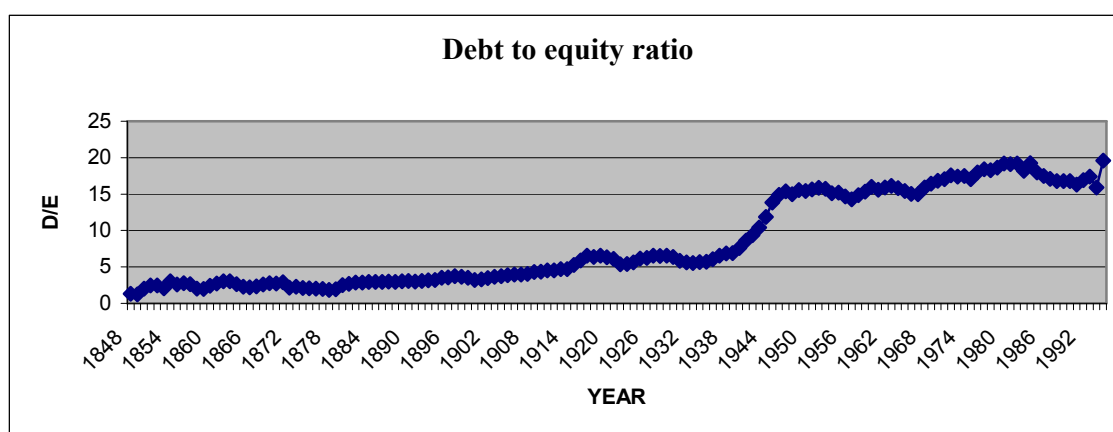


Figure 1. Increase in debt to equity ratio.

Source: Benink and Benston (2005)

Since the mid-1800s, many countries display a considerable increase in the debt to equity ratio. During this time states have undertaken themselves with providing guarantees to banks and deposit holders. The reason for giving guarantees is to avoid financial turbulence, e.g. bank runs and liquidity crisis. In other words, guarantees are meant to increase the financial stability.

The financial stability supposedly following guarantees might have the appalling effect of moral hazard. According to the Modigliani-Miller theorem a firm's market value is the same regardless whether it finances itself through debt (leverage) or equity. The market value of the firm should be calculated by taking the risk associated with the underlying asset and the earning capacity for the firm into consideration. For this to hold, borrowing rates should be the same for all corporations and individuals. A deposit insurance offsets Modigliani-Miller theorem due to the fact that banks can borrow at a favourable interest rate whereas depositors do not risk adjust, hence the insurance. Therefore, banks can carry out investment with negative risk adjusted net present value

(NPV). The bank could either choose more risky projects or choose to increase its debt to equity ratio as long as it is not beneath legislated capital requirements.

Banks with more risky assets or higher debt to equity are more sensitive to economic downturns and could therefore be seen as less stable. To prevent banks from taking advantage of the situation legislators have compelled capital ratios requirements and higher insurance costs for banks with high risk. Due to asymmetric information and the complexity of financial products the fair cost for the insurance is hard to approximate.

The recent financial crisis has sparked a discussion whether deposit guarantees have a stabilizing effect or, contrary to its purpose, it has a destabilizing effect on the financial market. Different theories have been laid out on what is needed to be done and how it should be done.

2 Theoretical framework

Here, we present some central notions and concepts within the literature on banking and debt – all of interest for the present investigation.

2.1 The Modigliani-Miller theorem and The Trade-Off Theory

The Modigliani-Miller theorem (henceforth MM) claims that the market value of a firm is unaffected by the composition of its financial liabilities (Bailey, 2005). MM states that, under certain conditions, the market value of a firm is not dependent on its debt to equity ratio, i.e. its leverage.

The capital structure of a firm can be described by MM in terms of two propositions (Ramesh, 2001). The first proposition states that “if there are no taxes paid, the value of a firm is independent and not affected by its capital structure”. This means that if a firm pays no taxes, then free cash flows are independent of leverage. The second proposition states that “if taxes are taken into consideration, then a firm’s structure with 100 percent debt is optimal”. So, if a firm pays taxes, then both leverage and free cash flows increase. For this reason the value of the firm also increases (ibid.).

The trade-off theory combines the benefits of leverage from the interest tax shield with the costs of financial distress, in order to decide the amount of debt that a firm would issue to maximize its value. According to the trade-off theory, the total value of a levered firm is equal to the value of the firm without leverage plus the present value of the tax savings from debt, minus the present value of financial distress costs, as shown in the formula below:

$$V(L) = V(U) + PV(\text{Interest Tax Shield}) - PV(\text{Financial Distress Costs})$$

Optimal leverage is the level of debt that maximizes VL.

This formula shows that the use of leverage is associated with both costs and benefits. Firms want to increase leverage to make use of the tax benefits on debt. With too much debt firms are thus more likely to risk default and to suffer from financial distress costs.

There are, according to the trade-off theory, three factors that determine the present value of financial distress costs: the probability of financial distress, the magnitude of the costs if the firm is in distress, and the appropriate discount rate for the distress costs. The probability of financial distress depends on the chances that a firm will be unable to meet its debt commitments and thus face the risk of default. This probability increases with the amount of liabilities relative to its assets. It also increases with the volatility of the cash flows and asset values of a firm.

The trade-off theory states that firms should raise their leverage until it reaches the optimal level of debt for which the value of a levered firm is maximized. By doing so, the tax savings that result from a raise in leverage are offset by the increased probability of suffering from the costs of financial distress (Berk and Demarzo, 2006).

The financial distress cost which occurs when debt-holders require a higher rate of return could be limited by deposit insurance. This is due to the fact that debt holders then are provided a failsafe from losing all their money. A decrease in the financial distress

cost increases the benefit from financing via debt which consequently increases the probability for bankruptcy.

2.2 Moral Hazard Banking

Moral hazard might come about when a party does not suffer the full negative consequences of its choices and therefore acting in a less careful way. Government intervention in the financial market, such as deposit insurance, could lead to a morally hazardous situation. The problem of moral hazard in banking regulation is, according to Krugman (2004) that deposit insurance could cause bankers to behave more risky than they would otherwise. This means that deposit insurance can increase the chance of bank failure even if it was created to prevent it.

Benston *et al.* (1986) show how deposit insurance schemes could cause incentives for excessive risk-taking by banks. Consequently, existing financial market regulation often returns to capital adequacy requirements so that credit risks coming from the activities of an institution are covered enough by bank capital. This is done in order to control the adverse incentives caused by deposit insurance.

Could moral hazard be prevented if deposit insurance is kept? Economists and regulators have discussed this for quite some time. One way is to use market signals to strengthen regulations. Gary Stern (1999) argues that the information available in the financial markets could be used to reduce moral hazard. An obvious problem with moral hazard and deposit insurance is that the money of the depositor is already insured, leading to a lack of incentive to supervise the behaviour of the banker (Stern, 1999).

A deposit insurance scheme can be funded and operated privately, by the public or jointly. In any of these cases, agency problems could arise which is when an agent serves his own interests instead of the principal that employs him. In deposit insurance systems, these relationships can be complicated which could cause different kinds of agency problems: political interference, regulatory capture and interagency conflicts (Garcia, 2000). To further understand the mechanisms and consequences of moral hazard, we now turn to debt to equity ratio and leverage.

2.3 Debt to equity ratio and leverage

To estimate to what degree a firm is using borrowed money different debt ratios can be used. These reveal to what extent the firm is financed by debt. The debt to equity ratio is calculated by dividing the total debt of a firm (including current liabilities) by its shareholders equity, as shown in eq. 2.1

Total debt / Shareholders equity = Debt to equity ratio eq. 2.1

Thus, the lower the ratio, the higher the level of the firms financing provided by shareholders will be, and the larger the margin of protection (in the event of decreasing asset values or losses). The ratio of debt to equity will differ depending on different types of businesses and the changes of cash flows. Firms with stable cash flows will normally have a higher debt to equity ratio than firms with less than stable cash flows. Comparisons between the debt to equity ratio for a certain firm with similar firms provide a measure of the credit worthiness and financial risk of a firm (Van Horne, James and Wachowicz, 2008).

In the simplified model of Hortlund (2003), it is suggested that there is a linear relationship between the return on equity (ROE) and the debt to equity ratio. ROE increases as the debt to equity ratio rises. If the interest rate is equal to i and the deposit interest rate is equal to d , then ROE will increase according to eq. 2.2.

$$\text{ROE} = I + (I - d) \cdot D/E \quad \text{eq. 2.2}$$

Thus, ROE is equal to the interest rate plus the difference in interest, multiplied by the debt to equity ratio. If d is not positive correlated to D/E then it will be in the interest of the banks to increase the D/E ratio.

The use of debt is called leverage because these funds, obtained at priority to a repayment and given a priority of return, increases the possibilities of both gains and losses to the ownership shares. The profit obtained by borrowing raises the owner's net rate of return. If the revenue obtained by borrowed funds decrease below the contracted rate, or if there are comprehensive losses, the negative difference strongly diminishes the rate of return or raises the loss on the equity.

The level of leverage in the capital structure of a firm is estimated by comparing how much the rate of return on equity would change if there was a change in the average rate of return on the total assets. The larger the part of outside funds to ownership capital, the greater is the leverage effect (Guerard and Schwartz, 2007).

Leverage is the enlargement of the rate of return, positive or negative, on a position or investment outside the rate that is gained by a direct investment of own funds in the cash market. Leverage is an important matter because it creates and increases the risk of default by market players, and it increases the possibility for fast deleveraging, which could cause shattering in financial markets by large market movements.

The most common used ratio is debt to equity but there are several others. Financial leverage is counterproductive if a firm is affected by a loss (Francis and Taylor, 2000). Calculating leverage is fairly simple as long as a firm relies on balance sheet transactions, e.g. bank loans. On the other hand, if a firm uses off-balance sheet transactions, e.g. derivative instruments, then it becomes less simple to measure leverage (Adams, Mathieson and Schinasi, 1999).

2.4 Deposit Insurance

Deposit insurance is part of the regulatory mechanism in international banking. Countries often have different kinds of deposit insurance, defined as either explicit or implicit. Explicit deposit insurance can be funded publicly or privately, or as a combination of both. In countries with explicit deposit insurance, deposits are secured up to a pre-determined level by bank monitoring and regulatory authorities. The purpose is to provide mechanisms by which the bank regulatory authorities can protect deposits in financial institutions and avoid bank runs. The policy of government deposit insurance has costs: bankers whose depositors are insured could have an insufficient incentive to avoid extensive risks when making loans. However, one apparent benefit of deposit insurance is a more stable banking system (Mankiw, 2008).

One of the two implicit deposit insurances that exists is the lender of last resort (LOLR) guaranties that the central bank or other regulatory authorities supply to banks and depositors. Under implicit deposit insurance, deposits are protected by the bank monitor-

ing and regulatory authority. This is implemented without specifying guarantees concerning the size of the protection. Implicit deposit insurance is seldom specifically funded (Mullineux and Murinde, 2003).

One of the most important tasks of a central bank is to act as LOLR to banks in financial crisis, guaranteeing that banks have adequate reserves to meet the demands of depositors for currency and/or banks reserve requirement (Snowdon and Vane, 2002). LOLR support can be defined as “the discretionary provision of liquidity to a financial institution (or the market as a whole) by the central bank in reaction to an adverse shock, which causes an abnormal increase in demand for liquidity that cannot be met from an alternative source” (Freixas, Parigi and Rochet, 2003). The importance of lending through the discount window to help certain banks and to lend to the market through open market operations is different between countries and circumstances (Enoch, Marston and Taylor, 2002).

The best way to avoid bank crisis is for the central bank to indicate that it is ready to act as a LOLR if a liquidity squeeze were applied to an individual bank. Central bankers do not want to undertake precise actions in advance. Uncertainty can be a necessary part in encouraging cautious behaviour by banks. Provoking a crisis and avoiding its spreading is still the most important part in the central banking art (Mentré, 1984).

There are, according to Goodhart and Illing (2002), two important reasons as to why the central bank acts as LOLR:

Information asymmetry that yields banks sensitive to deposit withdrawals or to the drying-up of interbank lending in times of crisis. As a consequence, sound banks could end up insolvent, and the banks stockholders would suffer a welfare loss.

The failure of a solvent bank might create a risk to the stability of the financial system as whole. A financial instability could spread, thereby hindering the primary functions of the financial system. Problems could be caused by failure of large financial institutions or groups of smaller institutions, which would effect other financial institutions.

Another implicit guarantee relates to the term *too big to fail*, often together with the actions of The Federal Deposit Insurance Corporation (FDIC) and the Federal Reserve to support large banks in financial trouble. A consequence of this might be government bailout, i.e. when the government aids large corporations that risk financial failure (Benton, 2004).

In most developed countries, the largest banks have raised their share of banking assets for the past ten years. Creditors then trust that larger banks will be supported by their government to the extent that they will be rescued in case their bank fails. As the number of large institutions has been reduced, the remaining firms have probably become more dependent on each other. To be cost-effective and to benefit from their size, large institutions could limit themselves to large transactions. This implies that the failure of one large bank indubitably will effect the solvency of the other large banks negatively (Feldman and Stern, 2004).

The motive for rescuing large banks is to prevent bank runs and systemic risk in the banking sector. The issue however, is that it give rise to moral hazard problems, manag-

ers have an incentive to make their bank big. It also worsens looting behaviours and could promote regulatory forbearance (Mullineux and Murinde, 2003).

2.5 Financial instability

To illustrate what deposit insurance attempts to prevent, we present undesired financial outcomes. Deposit insurance is generally seen as an important part of the regulatory structure for the banking system. This structure should protect the safety and soundness of the banking system and provide the banks with rules and incentives to allocate credit efficiently (Angkinand and Wihlborg 2007). However, deposit insurance as a protection against bank runs gives rise to moral hazard problems. This results in banks having the incentives to take on risks that could be shifted to a deposit insurance fund or to the tax payers instead. Thus, deposit insurance could contribute to the problem of systemic bank failure, even though it was designed to reduce it (Angkinand and Wihlborg, 2007). This might start with bank insolvency.

A bank becomes insolvent when its total assets are smaller than its total liabilities, or when its net worth becomes negative. When an insolvent bank goes out of business, often after a regulatory agency has stepped in, we say that the bank has failed. What causes banks to become insolvent? According to Hall and Lieberman (2007), the most common reasons are bankruptcy of businesses and households that have borrowed money from the bank. In the old days, when the banks were not regulated and no financial reporting existed, an insolvent bank could go on operating for some time. This is because on any given day just a small part of its checking account balances would be withdrawn. As long as the bank had an adequate amount of cash available to meet the normal requests for withdrawals, it could still go on.

When the word of a bank's insolvency leaks out, all of the depositors would want to be first in line to withdraw their money. The role of banks as liquidity providers and actors in the capital markets make them exposed to the risk of so-called bank runs. Because the information among the depositors about risk and value of the bank assets is scarce, this could lead to contagion of bank runs (Diamond and Dybvig, 1983). The depositors would know that banks meet requests for withdrawals on a first come, first served basis, and people that wait might not get any money at all. This situation, in which all depositors try to withdraw their money, is called a run on the bank.

A bank run could be caused by a random event (*ibid.*), for example if people see a run at another bank. If people are anxious about insolvency at one bank they might be concerned about insolvency among other banks, which could cause a banking panic, where many depositors run on many banks at once. On this version, bank runs are self-fulfilling prophecies (*ibid.*). If people believe that a banking panic is about to happen, it is in the best interest for each individual to attempt to withdraw her money. Because each bank does not have an adequate amount of assets to meet its undertakings, some assets have to be liquidated at a loss. If there are first-come, first-served deposit contracts, depositors who withdraw their money in the beginning will gain more than those that wait. In a banking panic, the money supply can decrease suddenly and cause a major recession (Hall and Lieberman, 2007).

Could people predict the financial markets, then all depositors would have an incentive to withdraw at once. Thus, as long as no one believes that a banking panic is about to

happen, then only those with an urgent demand for liquidity would need to withdraw their money. If banks have an adequate amount of assets to meet the demands for liquidity, there would not be a panic.

Today, bank runs are not a large problem for the U.S. banking system or the Fed (Mankiw 2008). The federal government now guarantees the safety of deposits for most banks; first and foremost by the Federal Deposit Insurance Corporation (FDIC). Depositors do not run on their banks because they know that the FDIC will make good on the deposits in case of a bankruptcy.

This contagion effect could also lead to systemic risk, the threat of that a problem in one institution could spread to other institutions, which could threaten the stability of the whole system (Hellwig, 1998). Systemic risk or instability are used to depict a disturbance in financial markets which results in unexpected changes in prices and quantities in credit or asset markets, which could lead to a failure of financial firms. This could in turn spread and lead to a shattering of the payments services and capacity of the financial system to allocate capital (Davis, 1992).

Another risk with banks runs is that it makes it difficult to control the money supply, because bankers want to hold on to their money in case of a future bank run. According to Mankiw (2008), bank runs make it difficult to control the money supply. One example of this problem happened during the Great Depression. After a number of bank runs and bank closings, households and bankers became more cautious. Households withdrew their deposits from banks because they wanted to hold their money in the form of currency. This behaviour reversed the process of money creation since the bankers responded to falling reserves by reducing bank loans. Bankers also increased their reserve ratios so that they would have a satisfying amount of cash available to meet the depositor's demands in future banks runs. The higher reserve ratio reduced the money multiplier, which reduced the money supply furthermore (ibid, 2008).

To control money supply, the Fed has three tools in their disposal: open-market operations, reserve requirements and the discount rate (Mankiw, 2004). The problem with the Fed's control of the money supply is that it imprecise. The Fed must deal with two problems. One stems from the fact that the Fed does not control the amount of money that households choose to hold as deposits in banks. If people lose confidence in their banks and start to withdraw their deposits, then the banking system loses its reserves and produces less money. The money supply decreases, even though the Fed has not taken any action. The second problem has to do with monetary control. The Fed does not control the amount of money that bankers choose to lend. If, for an example, bankers become more cautious and want to make fewer loans and hold more in reserves. Then the banking system would create less money and the money supply decreases because of the bankers' actions. We can conclude that in a system of fractional-reserve banking, the amount of money in an economy is depending, to some degree, on the behaviour of bankers and depositors.

In an interview the Swedish Minister for Finance Anders Borg compares the difference between how US and Sweden handles crisis in the banking system. Borg praises the Swedish way to deal with insolvent banks by demanding ownership if the state needs to assist banks with equity capital. Furthermore Borg regards direct ownership as the safest way to avoid risking tax payers' money and to make banks more careful in their risk management. In the US direct ownership is impossible by ideological and political rea-

sons according to Borg. He sees the US way to deal with the problem by regulations as inefficient and accuses the US government to be frightened by the power of the large US banking corporations (Wallqvist, 2010).

The most common way to prevent financial stability is through regulations. We now turn to this.

2.6 Regulations

On the two markets of our choice, the following regulations are in place.

2.6.1 United States regulations “Safety net”

A large “safety net” has been created to decrease the risk of bank failure. Krugman (2004) notes that the most important guarantees in U.S. are:

Deposit insurance. The Federal Deposit Insurance Corporation (FDIC) guarantees bank depositors against losses up to \$250,000. Banks must make contributions to the FDIC to cover the cost of the insurance. FDIC insurance discourages runs on banks because small depositors, knowing their losses will be made good by the government, no longer have the incentive to withdraw their money just because others are doing so.

Reserve requirements. Such requirements are crucial to monetary policy as the main tool of the central bank in influencing the relation between the monetary base and monetary aggregates. Reserve requirements also make the banks hold a part of their assets in a liquid form easily mobilized to meet hasty deposit outflows.

Capital requirements and asset restrictions. The difference between the assets of a bank and its liabilities is equal to the net worth of the bank, also called the bank capital. This is the equity that the shareholders win when they buy the stock. This is a regulation because the win is equal to the part of the assets that are not owed to the depositors. Thus, the bank is given an extra margin of safety. U.S. bank regulators set minimum required levels of bank capital to reduce the systems vulnerability to failure. There are also rules that prevent banks from holding assets that are too risky or lending too large fraction of their assets to a single private customer or to a single foreign government borrower.

Bank examination. The Fed, the FDIC and the Office of the Comptroller of the Currency all have the right to claim information about the financial status of the bank. Banks could be forced to sell assets that the examiner finds too risky. Other measures could be to change the balance sheet by writing off loans that are unsafe in the examiner’s opinion.

Lender of last resort facilities (LOLR). U.S. banks can borrow from the Fed’s discount window. Since discounting is a tool of monetary management, the Fed can also use discounting to prevent a bank crisis. The Fed has the possibility to produce currency which it can lend to banks that have a large deposit outflow. When the Fed acts in this way, it is said that it acts as a LOLR to the bank. When depositors know the Fed is standing by as LOLR, they believe that the banks are able to withstand a panic. The administration

of LOLR facilities is complex. If banks believe that the Fed will always bail them out, they will take large risks. To decide when banks in trouble have not brought insolvency on themselves through unwise risk taking, the LOLR must be involved in the bank examination process.

2.6.2 Swedish regulation

Today, there are two major actors that supervise and influence the Swedish financial market. The first one is an authority, Finansinspektionen (FI), that works closely with the banks. FI promotes and maintains the stability of the financial market while also aiming at an effective consumer protection. The second actor is Riksbanken, the Swedish central bank, which supervises and analyses risks and threats to the stability of the financial system. If problems occur, Riksbanken also have the ability to provide emergence liquidity assistance.

Another large actor, also of relevance for the regulation of the Swedish Market, is the European Union (EU). The financial rules and regulations that exists within the EU is built upon the Basel regulations that has been drawn up by an international committee, called the Basel Committee on Banking Supervision (2006). We now turn to these three actors in detail.

Finansinspektionen

The Swedish Financial Supervisory Authority, Finansinspektionen, promotes stability and efficiency in the financial system and keeps an effective consumer protection. FI also supervises and monitors all companies in the Swedish financial market. FI also supervises and analyses trends in the financial market. They estimate the financial health and risks of individual companies, sectors and all of the financial market.

Financial operations in Sweden are governed by laws and regulations. FI, through its regulatory code (FFFS), publishes regulations that are binding and general guidelines. FI works in consent with Swedish legislation, the rules and regulations of EU and international rules and regulations. Furthermore, FI also performs investigations at branches of Swedish companies that are located in other EU countries

Riksbanken

The Swedish parliament gives the assignment to promote a safe and efficient payment system to Riksbanken. A crucial task for Riksbanken is to supervise and analyze threats and risks to the stability of the Swedish financial system. Since the large banks constitute a central part of the financial system, they are crucial to the analysis of Riksbanken. This analysis takes the risks of the banks and the risks in the own activities of the bank into account. The largest risk for the banks is their credit risk, which means the problem that borrowers may not be able to meet their commitments against the banks. The analysis contains following the development of the banks borrowers. Riksbanken is the authority in Sweden that has the possibility to provide emergence liquidity assistance when serious problems occur that threaten the entire system (Riksbanken, 2010).

2.6.3 International regulation Basel II

The Basel II framework depicts an extensive measure and minimum standard for capital sufficiency that national authorities are trying to carry out through regulations and rules. The aim of this is to amend current rules by bringing regulatory capital requirements closer to the risks that banks experience. The Basel II Framework is also created to foster a better outlook to capital supervision. This will facilitate banks to identify risks, now and in the future, and to improve their capacity to deal with these risks (Bank for International Settlements, 2010).

The Basel regulations are built on three pillars as can be seen in Basel Committee on Banking Supervision (2006). The first pillar is the minimum capital requirements, the second pillar is supervisory review process and the third pillar is market discipline.

The first pillar, minimum capital requirements consists of the total minimum requirements for credit, market and operational risk. The committee allows banks to choose between two different methods for calculating their capital requirements for credit risk. One way is the Standardised Approach, which measures credit risk in a standardised manner, supported by external credit assessment. The other way is the Internal Ratings-based Approach, which is subject to the explicit approval of the banks supervisor, allows banks to use their internal rating systems for credit risk.

The second pillar – The supervisory review process of the Framework has the aim of ensuring that banks have a sufficient amount of capital to support all the risks in their business. The goal is also to support banks to develop and use better risk management techniques in the monitoring and managing of their risks.

The Third Pillar – Market Discipline has the aim of complementing the minimum capital requirements (Pillar 1) and the supervisory review process (Pillar 2). The Committee wants to stimulate the market discipline by developing a series of disclosure requirements that will allow market participants to estimate important information on the scope of application, capital, risk exposures, risk assessment processes, and therefore that the capital is fully sufficient in the institution (Basel Committee on Banking Supervision, 2006).

3 Data and Empirical Findings

To be able to see if there is a correlation between deposit insurance and debt to equity, we analyzed our two financial markets and to what extent insurance impacted on them. We begin with introducing earlier research on the subject.

3.1 Earlier research

Nier and Baumann (2006) tested the effect of market discipline on banks' risk-taking by regarding explicit and implicit views of depositor protection. Their results show that lack of explicit deposit insurance and a high degree of uninsured deposits appear to lower the risk-taking through the effect of higher capital buffers, while the chance of government support lowers market discipline directly through the effect of lower capital buffers.

Angkinand and Wihlborg (2008) report that high explicit coverage creates incentives to shift risk to a deposit insurance fund or taxpayers. Low explicit coverage could be associated with strong implicit insurance that show lack of credibility of non-insurance. Angkinand and Wihlborg found a U-shaped relationship between explicit coverage and risk taking. Their aim was to find the optimal level of coverage that minimizes the chance of banking crisis.

Rime (2005) concludes that implicit guarantees can undermine market discipline. The study includes banks in 21 countries and banks are ranked by size and market share. Banks that are considered too big to fail receive higher issuer rates by Moody's and Fitch and therefore will be given a substantially cutback in refinancing costs. Rime therefore believes that supervisors and central banks should be careful trusting issuer ratings.

3.2 Data

The data for Sweden was collected through annual reports ranging from 1970 to 2009. Two commercial banks were selected Handelsbanken and SEB since they have been commercial banks during the whole period and only been subject to one merger (Stockholms Enskilda Bank and Skandinaviska Banken creating SEB in 1972). The CPI used to deflate our data was collected from Statistiska Centralbyrån (SCB). The debt to equity ratio was calculated by dividing total debt with shareholders equity.

For the US the data was collected through the Federal Deposit Insurance Corporation (FDIC) for the years 1966 to 2009 and includes all commercial banks associated with FDIC. The CPI used to deflate our data was collected from the US Bureau of Labor Statistics (BLS). The debt to equity ratio was calculated by dividing total debt with shareholders equity

3.2.1 Deposit Insurance in Sweden

Following the entrance in EU, Sweden's use deposit insurance was put in place in 1996. The first guaranteed amount was SEK 250 000 but was changed during the turbulence 2008 to SEK 500 000.

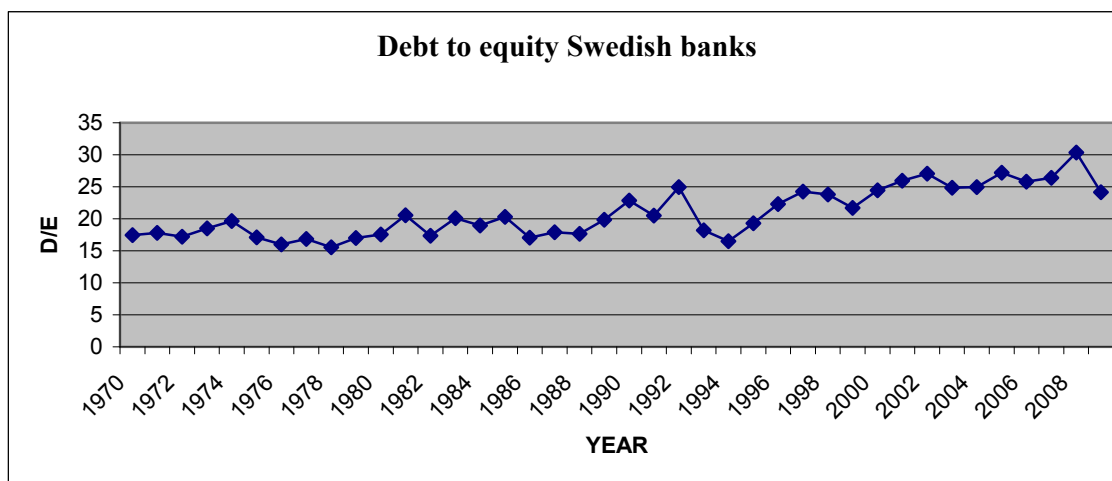


Figure 2. Debt to equity ratio for Swedish commercial banks, Handelsbanken and SEB.

Source: Annual reports Handelsbanken and SEB

As shown in Figure 2, there is a slight increase in the debt to equity ratio since the deposit insurance was put in place 1996. During the turbulence in 2008, SEB made an equity issuance which affected the ratio. A trend with increasing debt to equity ratio can be seen since the mid 1980s.

To see if there is any statistical difference on debt to equity without deposit insurance and with deposit insurance between the years 1970-2009, a paired t-test was made.¹ The data for the debt to equity ratio for Handelsbanken and SEB was divided into two groups: insurance and no insurance.

Group	No Insurance	Insurance
Mean D/E	18.02	25.23
SD	1.44	2.17
N	20	14
The mean of No insurance minus Insurance equals -7.21		
95% confidence interval for this difference: From -9.12 to -5.83		
P-value (two tailed) < 0.0001		

The difference between no insurance and insurance is statistically significant ($p < 0.0001$). The null hypothesis (i.e. no relationship) can thus be falsified: the years of insurance have had a statistically significant higher debt to equity ratio mean than the years without insurance. Our findings are in concordance with those reported in Nier and Baumann (2006), viz. that explicit guarantees will affect the bank's capital buffers in a negative way.

¹ N.b. the years 1990-1995 were excluded due to financial crisis and the implicit insurances that was in effect in the aftermath of crisis.

3.2.2 Deposit insurance in US

In the US, deposit insurance has been in place since 1934 (following as a consequence of the Great Depression). The amount of the deposit insurance has varied since 1934 and the current amount is set at USD 250 000. The amount of the deposit insurance has been changed seven times; the last changed in 2008 was due to the financial turbulence.

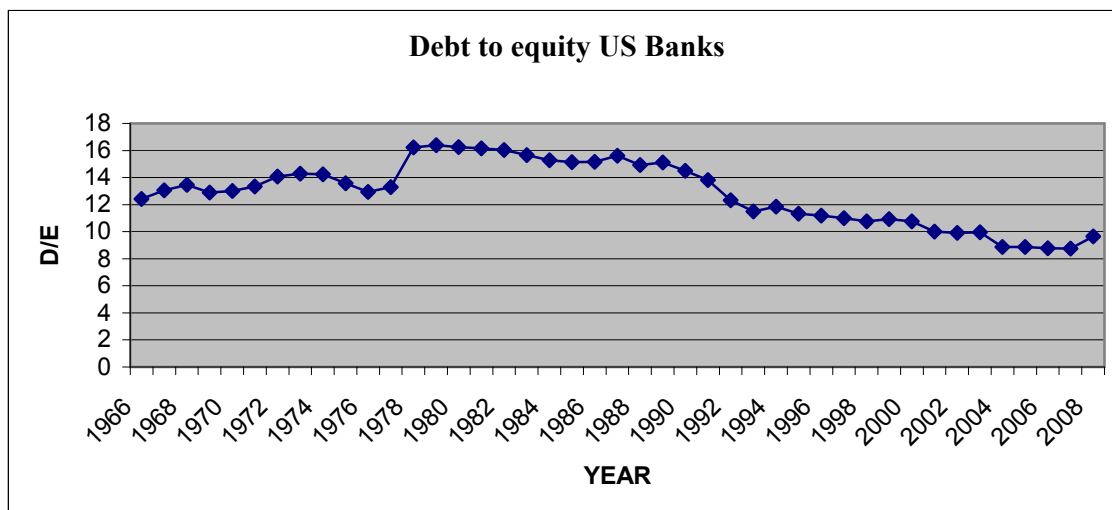


Figure 3. The debt to equity ratio for all US commercial banks affiliated to FDIC from 1966 to 2008.

Source: FDIC

Contrary to Sweden, US have not experienced a rise in the debt to equity ratio in the recent years – rather a decline has been in place since the early 1990s. The highest ratio level is found during the 1980s. During the last decade, the ratio was fairly steady.

To see if there is a correlation between the debt to equity ratio and the deposit insurance in the US, we used a regression analysis. The data, collected from FDIC, ranges from 1966-2009. The purpose of the regression analysis is to see whether the explicit guarantee affects debt to equity ratio. The regression analysis contains 43 observations and 5 changes in the amount of the deposit insurance. During the time period 1966-2009, US had 5 major crises which could influence the debt to equity ratio.

Deposit insurance amount	Years
USD 15000	1966-1968
USD 20000	1969-1973
USD 40000	1974-1979
USD 100000	1980-2007
USD 250000	2008-

Variables	Definition of the variable
dDER	Debt to equity ratio

dDI	Deposit insurance
c1	Oil crisis 1973
c2	Black Monday 1987
c3	Savings and loan crisis 1989-1991
c4	dot-com bubble 2001
c5	Financial crisis of 2007-
U	Model's error term

We postulate that the debt-to-equity ratio (DER) as a function of deposit insurance (DI) and dummy variables for crisis years (c_1, \dots, c_5)².

$$DER = \beta_0 \text{ _cons} + \beta_1 DI + \beta_y c_y$$

Before turning to the calculations, we use CPI to deflate values to current dollars. We then use our equation with OLS as we assume that all the right-hand-side variables are exogenous.³

Variable	Coefficient	Standard error	P. Value
Constant	8.594173	1.007949	0.000
Deposit insurance	0.000293	0.0000654	0.000
Crisis 1	2.844949	1.850144	-0.9073168
Crisis 2	1.460949	1.842295	-2.275399
Crisis 3	1.03648	1.087019	3.241057
Crisis 4	-2.142474	1.82861	0.249
Crisis 5	-4.581364	1.320137	0.001
Number of observations	43		
R2	0.5023		

Table 1. Data from regression analysis. More detailed information about variables in appendix.

² Dummy variables is included to pick up effects on debt to equity due to market uncertainties.

³ The full sets of dummy variables are included in the regression as they are not perfectly linearly correlated to each other (hence, all dummies equal 0 at certain observations).

The variable of most interest is deposit insurance where the coefficient is positive and significant for the debt to equity ratio. This means that banks will increase the debt to equity ratio if the deposit insurance amount is increased. The positive correlation between the amount of the deposit insurance and the debt to equity ratio is small and could have a modest economic effect, still the correlation points to the conclusion that banks adjust their debt to equity ratio when the deposit insurance is adjusted. The R-squared is 0.5023 which implies that around 50% of the adjustment in the debt to equity ratio could be explained by the variables included in the regression.

3.3 Implicit guarantees

Banks who are considered too big to fail should, in theory, have higher debt to equity ratios since they are considered protected by the state.

3.3.1 Implicit guarantees in Sweden

In Sweden, four banks dominate the market and could be considered to be of such importance that they threaten the financial stability. The banks that dominate the Swedish market are Swedbank, Nordea, SEB and Handelsbanken.

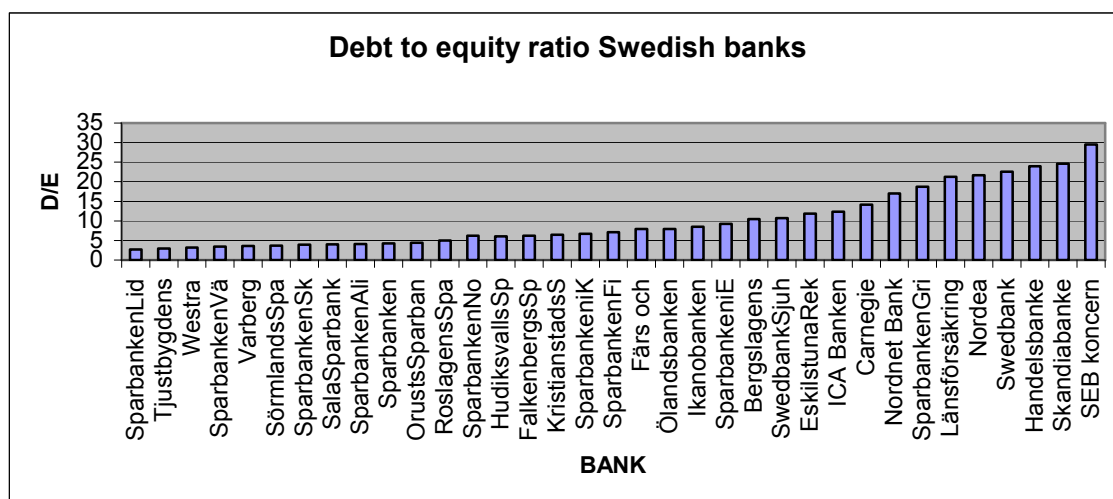


Figure 4. debt to equity ratio for different Swedish banks

Source: Annual reports for 2007

The important banks have a considerable higher debt to equity ratio than the remaining banks. Banks considered less important display lower ratios since their depositors will increase interest demands if they would find the ratio not satisfactory. The average ratio for the big four are 24.43 and for the remaining banks 8.35. All of the big four could be considered being of such importance that they are too big to fail and therefore causes a systemic risk.

3.3.2 Implicit guarantees in US

For the US market, we considered banks with assets less than USD 100 millions as small, banks with assets between USD 100 millions and USD 1 billions as medium, banks with assets over USD 1 billion as large.

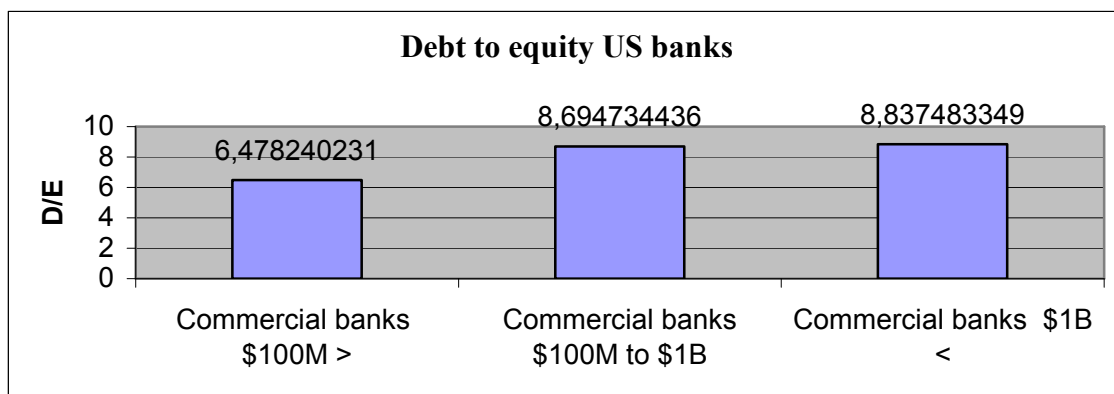


Figure 5. Debt to equity ratio for US banks at the end of 2007.

Source: FDIC

We found that small banks have the lowest debt to equity ratio followed by medium banks. The large banks have higher a ratio than both small and medium sized banks which is equivalent to Swedish bank sector. At the US market we can also see a tendency of the too big to fail effect on the debt to equity ratio but not in the same extent as Swedish market. This finding indicates that larger banks take higher risks.

4 Discussion

Stiglitz (2010) argues that banks considered too-big-to-fail should be broken up. With respect to the US market, Stiglitz further calls for more regulation in the financial sector, mocking the present governmental rescue plan as “among the most costly mistakes of any government at any time”. The rescue plan only worsens the too big too fail problem according Stiglitz and could be seen as a giveaway to powerful financiers.

Johnson and Kwak (2010) describe the big banks of US as oligarchs that use its economic power to gain political power and transform it to personal gains. The political power is gained from political contributions and the creation of culture which connect the gains of Wall Street to the gains of US. The political power that big banks have should be the reason why the present administration chose to use the blank cheque as option to deal with the financial meltdown. Johnson and Kwak suggest that the solution should be to limit the assets for financial intuitions to 4% of GDP and for investment banks to 2% of GDP. The evidence for the close relations between Wall Street and politicians should be the relatively high political contributions that Wall Street provides.

Alan Greenspan (2010) has received a lot of criticism; some considers him to be one major reason to the financial crisis that started 2007. Greenspan himself does not believe his monetary policy was the root to the problem; rather a macroeconomic change caused by rapidly growth in emerging countries like China was the igniting spark behind the crisis. The rapid growth led to increasing saving surplus which de-linked long-term rates from short-term rates, the latter under the control of the Fed. The housing market in the US is, according to Greenspan, much more correlated to long-term rates than short-term rates, therefore not under Fed’s control. To improve the financial system, Greenspan argues that banks need to raise their ability to absorb losses by raising capital and liquidity ratios. The suggested systematic regulator that would monitor the

financial system and predict future problems is to Greenspan not an attractive solution, partly since he considers it as an impossible job.

Pozen (2010) believes that banking regulators should demand that banks, besides to their normal reserves, set up a possible loan loss reserve up to three or four times the size of their normal reserves. This should be accepted only in “good times”, as defined by the bank regulators. One such definition could for example be that the annual GDP growth is higher than a certain percentage. In good times like this, it should be demanded that the banks have decreased their net income by setting aside a certain amount of money to a loan loss reserve. By doing so, banks will be better armed for bad times without misleading investors. These capital requirements should be especially hard for very large banks, due to the fact that they are the ones often believed to be too big to fail (Pozen, 2010).

Hortlund (2003) identifies two strategies to address the problem of lack of stability in the banking sector.

Stability through safety nets and supervision. It is uncontroversial to state that most of the expertise today believes in no governmental interference in the economy (unless it is really necessary). Equally uncontroversial, the general public seems to be of a different opinion: the banking sector is an exception. The central position of the banking sector justifies intervention. It is not just desirable, but also necessary to intervene; the banking sector is an example of a market failure. The banks borrow short term deposits from the public and lend it on a long term basis. This makes the bank vulnerable for rushes. A rush could spread to more banks and gradually give rise to financial crises. The banking sector itself is volatile and unstable, so one cannot rely on the normal course of events on the market. This strategy thus states that there must be a government-ruled safety net. Central banks must exist, in case of liquidity crisis, to act as a lender of last resort. This should be complemented with governmental deposit insurances, which guarantee the depositor’s money in case a bank should fail.

The government-ruled safety net however, brings with it the problem of moral hazard risks. The safety net causes banks to reduce their solidity and take larger risks. The competitiveness between banks leads to so-called Gresham effects. Risk-taking banks can offer customers a higher interest rate and thus drive conservative banks out of business. This is why additional government interventions are required. Supervision authorities like Finansinspektionen and Riksbanken must supervise so that the banks do not take too large risks. The government must arrange cogent capital requirements and continuously supervise that they are followed by the banks.

Stability through freedom and harsh budget restrictions. The other approach identifies nothing special about the banking sector, the stability should benefit from trust on the market discipline. The most important factor for stability is that banks are solid enough. Banks are also profit maximizing. Thus, in order to make banks more solid, solidity must become means of competition. This can only happen when there is government-funded safety nets and guarantees. This safety-net results in customers not discriminating between solid and non-solid banks. In the absence of government-funded safety-nets, the banks must have an adequate solidity to persuade customers to make deposits. In this case, the banks will not take any risks that could jeopardize their confi-

dence. The competition and the harsh budget restrictions will increase the solidity and reduce the risk-taking.

Hortlund (ibid.) concludes that banks themselves are not unstable. If there is freedom of contracts, banks can protect themselves against rushes. History provides ample proof that banking crises have arisen as a consequence of regulations and interference, and not in the absence of them.

Clas Wihlborg (Örn, 2009) believes that it must be risky to lend money to a bank. At least for some of the lenders, otherwise there will not be market discipline in the banking system. If the creditors know that the government always protects the debts in the balance sheets, then the bank will gain an endless lever. The shareholders could in theory, since they cannot lose more than their bet, borrow how much as they want, take on larger and larger risks, The creditors cannot lose anything, as long as they are protected by the government. In reality, it becomes possible for the banks to do risky businesses with the taxpayers' money as collateral. Historically, this has been displayed as a decreasing solidity in the banking system. When the creditors are protected by the government, the banks can reduce the share of their own capital in the balance sheet. One way to avoid this problem is regulation. Clas Wihlborg however, does not think that the politicians, central banks and financial authorities are up for the task. He believes that the regulation should be tightening up. The creditors must know that they will not be saved by the government in case of insolvency. There should be less governmental supervision and a higher market discipline.

The authors discussed herein almost all agree on more regulation as part of the solution. They do so by looking at the recent financial crisis which showed that banks are not financially stable during downturns under the current legislation. We also believe that depositors need to take more risk, otherwise banks will have an incitement in risk-taking. Our trust in legislation is not absolute since so many earlier attempts have failed. Complex financial products will be very hard and costly to supervise. If regulations are too tough then it will be less profitable for banks and will therefore be counter-productive for states. Cross-border regulations are then preferable due to the high degree of interactions on the financial markets. An increase in transparency will also help customers in choosing more stable banks. Even though large banks gain higher profits due to economies of scale, we do not find this sufficient an argument; no company should gain such market power that they make it impossible for them to go bankrupt. Instead, we would argue for their partitioning.

4.1 Conclusion

Both implicit and explicit deposit insurance is established to increase financial stability. According to our empirical research deposit insurances will have a positive effect on banks debt to equity ratio both in Sweden and the US. An increase in the debt to equity ratio will make the bank more risky and thereby prevent the financial stability. The positive effect of deposit insurance will to some extent then be offset by the increase in risk-taking. Large banks that are considered "too big to fail" have higher debt to equity ratio because they are seen as more stable. One then argues that a bankruptcy will be too costly for society. We can conclude that that in the formula $ROE = I + (I - d) \cdot D/E$, the deposit insurance will have an effect on d , i.e. deposit interest, which makes it more profitable for banks to raise D/E when they are insured.

Banks will in the immediate future face more regulations both in the US and Sweden. The present authors do not believe in only legislation; as we have shown, there is moral hazard involved and banks gain by being riskier as long as deposit insurance is in place. Earlier attempts to legislate have not worked out well and the complexness of financial products makes it hard to supervise. Therefore we agree with Claes Wihlborg that depositors need to share a higher burden of the risk otherwise the moral hazard problem will not be solved. Large banks need to be broken up if they are considered “too big to fail” otherwise states will be forced to bail them out to secure financial stability.

4.2 Future research

The present authors suggest research on how to handle banks that are too big to fail, and in which way to best handle the banks that already reached the status of too big to fail. Supplementary research could then address whether multinational banks can, through diversification, be in a better position to avoid bankruptcy and thereby granted the permission to be big, as long as they are not considered too big to fail (on one market).

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Figure 3: Retrieved 2010-04-20 <http://www2.fdic.gov/hsob/hsobRpt.asp>

Figure 5: Retrieved 2010-04-26 <http://www2.fdic.gov/SDI/SOB/>

Appendix

Regression analysis table 1

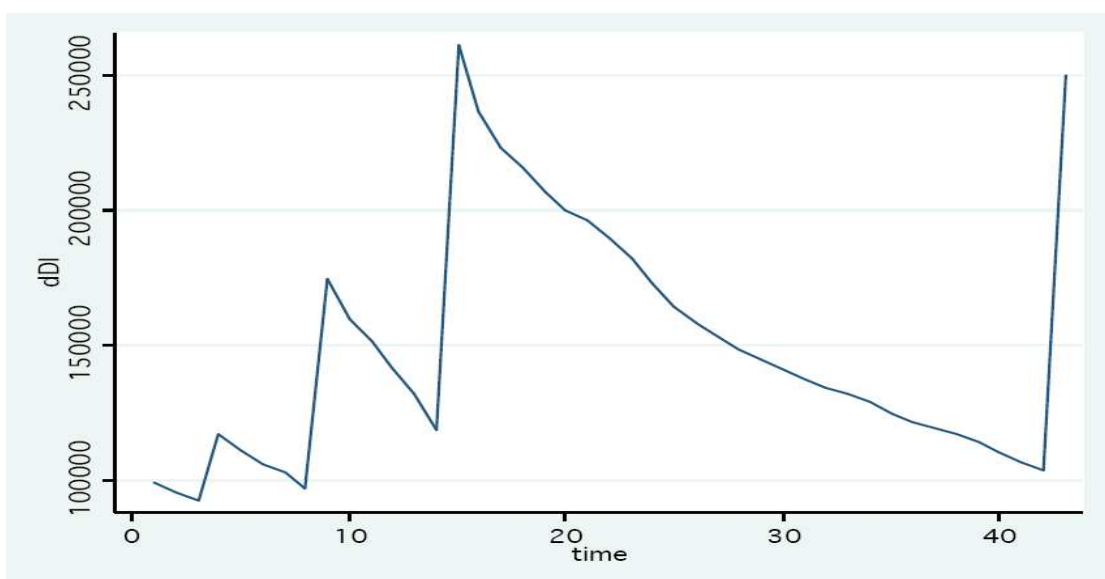
Source	SS	df	MS			
Model	117.121289	6	19.5202149	Number of obs =	43	
Residual	116.07134	36	3.22420388	FC (6, 36) =	6.05	
				Prob > F =	0.0002	
				R-squared =	0.5023	
				Adj R-squared =	0.4193	
Total	233.192629	42	5.55220546	Root MSE =	1.7956	

dDER	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dDI	.0000293	6.54e-06	4.48	0.000	.000016	.0000426
c1	2.844949	1.850144	1.54	0.133	-.9073168	6.597215
c2	1.460949	1.842295	0.79	0.433	-2.275399	5.197297
c3	1.03648	1.087019	0.95	0.347	-1.168096	3.241057
c4	-2.142474	1.82861	-1.17	0.249	-5.851066	1.566118
c5	-4.581364	1.320137	-3.47	0.001	-7.258725	-1.904002
_cons	8.594173	1.007949	8.53	0.000	6.549957	10.63839

Table summarize variables real debt to equity and real deposit insurance over the 43 years 1966 -2009.

Variable	Obs	Mean	Std. Dev.	Min	Max
dDER	43	12.86564	2.356312	8.751822	16.38842
dDI	43	148844.9	44441.56	92803.02	261290

Graph illustrates the deflated deposit insurance variable in more detail. The real deposit insurance amount is on Y-axis and time on the X-axis. With 43 years ranging from 1966 to 2009.



Data used in regression analysis.

Year	FDIC	Total Equity Capital	Total Debt and Equity Capital
	Total Debt		
2009	10,427,403,475	1,303,870,821	11,751,522,988
2008	11,061,168,391	1,147,063,944	12,208,232,360
2007	9,938,344,390	1,135,571,923	11,073,916,316
2006	8,968,668,143	1,022,851,993	9,991,520,176
2005	8,030,492,210	905,509,557	8,936,001,791
2004	7,475,503,860	843,914,251	8,319,418,111
2003	6,835,948,679	685,990,237	7,521,938,926
2002	6,366,191,463	642,437,762	7,008,629,229
2001	5,902,400,756	589,392,917	6,491,793,674
2000	5,665,525,289	526,722,321	6,192,247,604
1999	5,211,289,611	476,681,531	5,687,971,141
1998	4,941,140,700	459,046,667	5,400,187,370
1997	4,568,575,848	415,270,248	4,983,846,096
1996	4,178,118,289	373,224,351	4,551,342,639
1995	3,937,829,792	347,451,992	4,285,281,780
1994	3,674,470,244	310,176,809	3,984,647,053
1993	3,390,027,434	294,843,376	3,684,870,813
1992	3,224,253,915	261,876,018	3,486,129,932
1991	3,183,124,962	230,360,250	3,413,485,213
1990	3,152,284,870	217,273,826	3,369,558,695
1989	3,080,043,411	203,789,152	3,283,832,562
1988	2,920,682,801	195,619,383	3,116,302,186
1987	2,806,774,713	179,814,756	2,986,589,473
1986	2,747,518,284	181,335,194	2,928,853,483
1985	2,551,457,936	168,432,646	2,719,890,660
1984	2,345,882,496	153,502,956	2,499,385,601
1983	2,193,297,700	139,991,500	2,333,289,200
1982	2,057,405,232	128,347,381	2,185,752,613
1981	1,903,870,496	117,916,552	2,019,787,048
1980	1,742,138,125	107,253,775	1,848,391,900
1979	1,589,233,918	96,973,010	1,686,206,928
1978	1,416,212,123	87,228,518	1,503,440,641
1977	1,050,627,357	79,084,343	1,129,711,700
1976	931,950,078	72,070,232	1,004,020,310
1975	871,586,966	64,240,061	935,827,027
1974	838,918,633	58,931,305	897,849,938
1973	765,771,270	53,620,792	819,392,062
1972	677,775,573	48,197,109	725,972,682
1971	585,582,729	43,898,639	629,481,368
1970	526,049,076	40,451,276	566,500,352
1969	483,967,480	37,563,906	521,531,386
1968	463,499,721	34,425,488	497,925,209
1967	416,826,585	31,939,869	448,766,454
1966	371,433,927	29,888,347	401,322,274