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Bank recapitalization

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Abstract

Banks have to increase their capital ratios to meet the new regulation requirements. This can be achieved through raising new equity capital or by reducing bank assets. Banks often opt for the second channel due to the higher private costs of equity issuance. This, however, is associated with high public costs.

In this background document we discuss the welfare costs of undercapitalized banks and review the empirical literature. Undercapitalized banks are bad for the economy mainly for two reasons. The first is misallocation of credit resulting from banks *gambling for resurrection* and reluctance to recognize losses. The second is contraction of credit supply driven by banks reducing their assets to increase their capital ratios. In this respect, we describe the experience in previous financial crises.

Further, we analyze the potential private costs of bank recapitalization through equity issuance from a theoretical and empirical perspective. We perform an event study on bank equity issuance in the EU and US for the period 2007-2013. The results show a significant negative effect of SEOs on bank stock prices. However, this effect is on average not extreme and is comparable with other events. The negative effect on stock prices is partially compensated by a significant reduction of banks' funding costs proxied by CDS spreads.

The analysis concludes with a discussion of the appropriate policy options to enhance bank recapitalization.

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1 Introduction

In response to stricter regulation, banks have to raise their capital ratios. In principle, they can achieve this through raising new equity capital, but also by reducing their assets. Whereas the former may be the intended response by regulators, banks might be reluctant to issue new equity and rely more on the second channel. The motivation for this choice is that banks consider equity issuance as more expensive. The alternative however is associated with high public costs. The purpose of this study is to provide insights on several important questions related to the private and public costs of bank recapitalization.

First, we consider the welfare costs of undercapitalized banks and survey the empirical literature. Delay in recapitalization and a slow increase in equity ratios through a shrinking of assets can have adverse social welfare effects. In this respect, we describe the experience in previous financial crisis.

Second, we discuss the potential private costs of bank recapitalization from a theoretical perspective and empirical perspectives. The main empirical part of this paper consists of surveying the data on bank equity issuance in the period 2007-2013 in the US and the EU. We compare banks' stock issuances in both regions, and test empirically whether they affected their market value and funding costs.

We conclude with a discussion of policy options to take away possible obstacles to speedy recapitalization.

2 Costs of undercapitalization: empirical evidence

Banks' undercapitalization has substantial public costs. They are well documented from previous crises. This section outlines the main literature and summarizes empirical evidence from past crises.

We can distinguish two types of social costs. One is that undercapitalization induces distorted decisions for banks, resulting in a misallocation of capital. The second is that if banks decide to increase their capital ratios in other ways - in particular by shrinking their assets - the associated credit constraints may impede the growth of healthy firms.

2.1 Misallocation of credit

Low capitalization creates distortions in banks' decisions due to risk shifting: banks that have a realistic chance of going bankrupt - and perhaps subsequently getting bailed out - do

not fully internalize the downside of investments they make. In case of failure, the debt holders, or the government, will bear part of the burden of the bad investment. In case of success, on the other hand, the gains on the risky investment may help the bank to recover from its troubles, to the benefit of shareholders and management. This “heads I win, tails you lose” strategy is therefore sometimes termed “gambling for resurrection”.

Gambling for resurrection, in the form of misallocation of credit as a result of an undercapitalized banking system, has been extensively studied in the context of the Japan financial crisis (see e.g. Hoshi and Kashyap, 2013, for an overview). Troubled banks had perverse incentives to keep credit flowing to firms that were insolvent, in order to avoid the recognition of losses that would result from terminating lending relationships with those firms. This forbearance allowed the poorly capitalized banks to keep up appearances of sufficient capitalization, and postpone painful restructuring, in the hope that problems would be resolved with a recovery in the Japanese economy. Similar behaviour of gambling for resurrection was also observed in the US, during the Savings and Loans crisis in the 1980s, where the introduction of Prompt Corrective Action finally put a stop to that (see Benston and Kaufman, 1997). The effect of lending to insolvent firms (and inhibiting growth for stronger firms) is termed zombie lending and is a specific type of gambling for resurrection.

Zombie lending has been extensively studied in the literature (see e.g. Hoshi and Kashyap, 2013, for references). In one important analysis, Peek and Rosengren (2005) study bank lending patterns in Japan in the 1990s. They find that Japanese banks provided subsidized loans in particular to weak or insolvent firms, and that this occurred more if the bank itself had a weak capitalization. They explain the result as a form of “balance sheet cosmetics”, a desire to hide losses in order to avoid forced recapitalization.

Zombie lending not only had adverse effects for the banks involved, but also created negative spill-over effects on Japan’s economy. Caballero et al. (2008) analyze the effects on Japanese firm dynamics as a result of zombie lending. Keeping unprofitable firms alive worsens business opportunities for more efficient firms and keeps them from growing. The continued presence and subsidization of inefficient firms reduced efficient firms’ profitability, as well as their ability to attract funding because of reduced value of their collateral. The authors find that healthy firms in sectors with more zombie-lending invest less and create fewer jobs.

In contrast to these Japanese studies, Drechsler et al. (2013) look at risk shifting by banks in Europe, in the current crisis. They study bank-level data on repo lending in the euro zone by the ECB, in the period 2007-2011. This lending was provided in order to provide liquidity support to banks, under collateral requirements that were less strict than those of the market. They find that more weakly capitalized banks borrow more, and also at riskier collateral, in particular sovereign bonds. In addition, these banks increased their holdings of this riskier collateral during the period. Drechsler et al. (2013) argue that at least part of the lending was not explained by illiquidity (the motivation for the ECB’s repo lending), but by risk shifting: by increasing risk on their assets, as a result of the undercollateralization of the loans, the ECB would carry part of the losses on these assets if the crisis would get more

severe. In contrast, if the Euro zone economy would recover, it would be these banks themselves that would benefit.

2.2 Contraction of credit supply

Historically, banking crises have been costly to society. Using data of 100 systemic banking crises, Reinhart and Rogoff (2014) find that on average it takes roughly eight years to reach the pre-crisis level of income, while the median is about 6 ½ years. Homar and van Wijnbergen (2014) study how the durations of such crises depend on the types of government interventions, and conclude that in particular bank recapitalizations help in shortening those periods.

Looking at micro data can help at establishing the direct relation between bank undercapitalization and the supply of credit, as well as the effects on the economy that result from that. Such micro data studies have to overcome two potential problems. First, loan supply shocks and loan demand shock are difficult to separate: in periods of banking distress, the real economy often also suffers and even healthy financial institutions would cut back on their lending. Second, given that loan supply shocks have been identified, it is hard to show that the real economy is actually affected as a result of those banking shocks. Below, we discuss a number of studies that address this critique in successful ways by using data on individual loan applications. These studies convincingly show that low capitalizations cause banks to cut back on lending and that this negatively affects economic growth.

Peek and Rosengren (1997) consider the effect of capital shocks suffered by Japanese banks due to the shock after the collapse of equity prices in the late 1980s¹ on the lending of the branches and subsidiaries of Japanese banks located in the United States. The exogenous nature of these shocks in the US market allows them to identify whether changes to bank lending reflect shocks to credit supply or credit demand. They find that for the Japanese banks' US branches, a one percentage point fall in the risk-based capital ratio led to an annual fall in loan growth relative to assets of 4 percentage points, roughly translating into a 6 percentage point fall in the stock of lending.

Peek and Rosengren (2000) follow up on their earlier paper to test whether a loan-supply shock affects real economic activity in the United States. Using the variation across local commercial real estate markets in the United States, both in the degree of Japanese bank penetration and in local demand conditions, they find that the drop in lending by US branches of Japanese banks had a substantial impact on U.S. real estate activity. This indicates that firms deprived of funding were unable to obtain alternative financing.

Jimenez et al. (2012) use data from the Spanish Credit Register of Spain (CIR), which contains banks' monthly information requests on borrowers as well as monthly information on all credit institutions new and outstanding loans over 6,000 euro to nonfinancial firms since 1984. Because of the detailed nature of their data, they are able to study loan

¹ Japanese banks were allowed to treat unrealized gains on equity investments as capital.

applications made in the same month by the same borrower or for the same loan to different banks of varying balance-sheet strengths, which allows them to identify supply effects. They find that banks with low capital or liquidity grant fewer loans than well-capitalized banks when short-term interest rates are higher or GDP growth is lower. They also investigate whether firms are able to turn to other banks. They find that especially firms with few existing bank relationships have difficulties finding alternative financing.

In a study on German retail lending, Puri et al. (2011) use data on loan applications and loans granted for a set of German savings banks during the period 2006 through 2008. They identify savings banks with holdings in Landesbanken that have substantial subprime exposure and argue these are more affected by the US financial crisis compared to savings banks without such holdings. Because the drop in demand for loans is comparable for affected and non affected banks, they are able to distinguish between demand and supply effects. They find that the US financial crisis induced a contraction in the supply of retail lending and that affected banks reject substantially more loan applications compared to non affected banks. This result is particularly strong for smaller and more liquidity- constrained banks as well as for mortgage as compared with consumer loans.

Albertazzi and Marchetti (2010) use data on outstanding loans extended by roughly 500 banks to almost 2,500 non-financial firms. By using the fact that Italian firms borrow from different banks (firms in their sample on average borrow from 8 different banks), they can control for firm specific risk and credit demand. They find evidence of a contraction of credit supply, associated with low bank capitalization and scarce liquidity, while the ability of borrowers to substitute across banks is limited. They also find that larger low-capitalized banks reallocated loans away from riskier firms, but smaller ones did not.

Giannetti and Simonov (2013) study the effects of bank bail-outs on borrowing firms in the Japanese crisis. They find that large recapitalizations were effective in increasing lending to healthy borrowers. In contrast, recapitalizations that were too small to make banks meet their capital requirements did increase lending, but primarily to failing “zombie” firms. Therefore, such incomplete bailouts had adverse consequences on the Japanese recovery.

In addition to these studies that use detailed micro data on loans, a number of studies use variation in cross-industry dependence on external finance to identify a loan supply channel (Dell' Aricchia et al., 2008; Bijlsma et al. 2013). Laeven and Valencia (2013) find that firms that are more dependent on external finance benefit significantly from bank recapitalizations, but effects from other forms of interventions are less conclusive. Also several studies use bank balance sheets to try to identify an effect of capital ratio's on credit (Woo, 2003). Although less convincing in their separation of supply and demand effects, these studies also find evidence of a credit crunch. In conclusion, there is a large body of evidence showing that undercapitalized banks reduce lending.

2.3 Case Studies

It is illustrative to discuss a few historic cases of bank crises and the accompanying government intervention. Specifically we discuss Sweden, the Japanese banking crisis and the US financial crisis of 2007-2008. The case studies contain a wealth of lessons for policymakers today in dealing with the aftermath of a financial crisis. We summarize these lessons in the end of the section.

Sweden

The Swedish crisis in the early nineties is commonly seen as an example of successful government intervention. Factors such as political consensus for the actions from the ruling party and the opposition, as well as decisiveness and transparency about the management of the crisis have been argued to contribute to restoring confidence and to the eventual success of the resolution of the Swedish financial crisis.

The roots of the Swedish crisis were in the deregulation of the banking sector and credit markets in the eighties, which stimulated bank lending and increase competition on the credit markets. The impact of the deregulation was immediately apparent through the increase of new lending, which in the period 1986–1990 increased by 136 per cent (73 per cent in real terms). In combination with an expansive macro policy this contributed to a price boom in (commercial) real estate and the stock market, see Englund (1999).

Until the autumn of 1989 there were no signs of an impending financial crisis, but there was a strong recognition that the economy was overheated. The first indications that the commercial property market had reached its peak came at the end of 1989. A year later the real estate index had dropped 52 percent from its peak level of one year earlier. Credit losses at banks and finance companies increased to around 1 per cent of lending, which was two to three times as much as during earlier years.

The real estate bubble burst in the early nineties, triggering a downward price spiral which resulted in bankruptcies and massive credit losses. Over the period 1990–1993, credit losses accumulated to a total of nearly 17 per cent of lending. In retrospect, the Swedish crisis was the result from a highly leveraged private sector which was simultaneously hit by three major exogenous events (Viotti, 2000; Ingves & Lind, 1996; Bäckström, 1998): a shift in monetary policy with an increase in pre-tax interest rates, a tax reform that increased after tax interest rates, and the unrest on the European currency markets in the summer of 1992; the so-called European exchange-rate mechanism (ERM) crisis.

The first signs of solvency problems due to the rapid growth in nonperforming loans at banks arose in the last quarter of 1991. Nordbanken and Första Sparbanken, two of the six major banks, needed new capital to fulfil their capital requirements. Despite temporary rescue operations from the authorities to recapitalize Nordbanken and Första Sparbanken, problems returned at these banks in 1992. In 1992 this led to the nationalization of Nordbanken, which was accordingly split up in a good bank focusing on normal banking activity and an Asset Management Company (AMC), called Securum, to which most of the

nonperforming loans were transferred. Not much later, a third major institution, Gota Bank, experienced difficulties and was also taken over by the government. As in the case of Nordbanken, the government split Gota Bank into two entities: the good bank that focuses on normal banking activity and an AMC, called Retrieva. As such, the crisis worsened in 1992 and engulfed the entire banking sector. Now that the crisis turned systemic, the Swedish authorities recognized the need to restore confidence quickly and comprehensive action was taken. In September 1992 an emergency package was unveiled setting out guidelines for the management of the banking crisis. The most important elements of this package were the following.

First, previous to the crisis, Sweden had no deposit insurance system, although private insurance did exist. While there were no significant banks runs, Swedish banks' foreign creditors started to cut their credit lines. In December 1992, the Swedish government guaranteed all claims of deposit holders and creditors on Swedish banks. This prevented a run on the bank by foreign and domestic creditors. Only bank stockholders and owners of perpetuities were not covered by the guarantee.

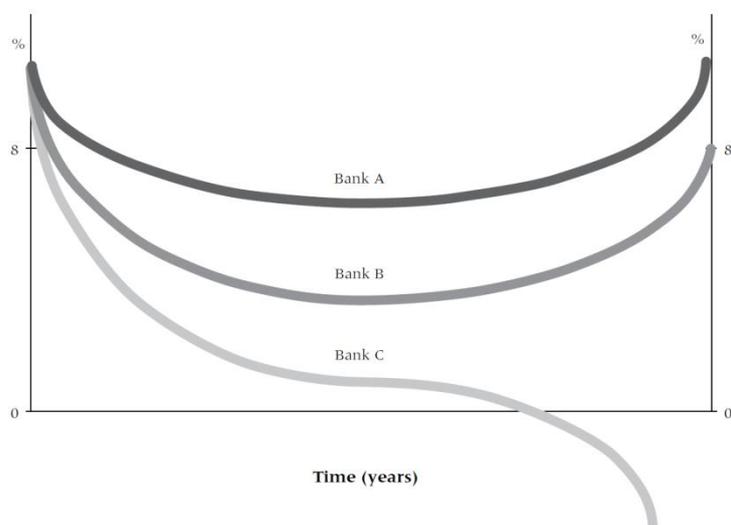
Secondly, the parliament passed the Bank Support Act authorizing the government to provide support flexibly in the form of loan guarantees, capital contributions and other appropriate measures. The Swedish parliament also enacted a temporary law that allowed bank owners to be dispossessed when capital buffers dropped below 2% of risk weighted assets, preventing banks that threatened to go bankrupt from obtain a strong bargaining position. To support the objectives of the Act, parliament set up a separate agency, the Bank Supervisory Authority (BSA), which had the authority to decide and manage bank support operation at market conform rates where possible. Its other goals were to keep the costs for the taxpayer as low as possible and not to provide guarantees to stock holders.

Thirdly, the BSA dealt with troubled banks such that it minimized the moral hazard problem: the aim was to save the banks, not its owners. By forcing owners of banks to absorb losses, public acceptance of the bank resolution was fostered. In this way, the Swedish authorities tried to secure widespread support among taxpayers that this policy was fair and just. The general strategy was to subject banks to stress tests and to divide them into three categories: A, B and C, depending on their potential viability in the medium term, see Figure 2.1. A-type banks were profitable; B-type banks were temporarily insolvent but would return to health, possibly needing government support; while C-type banks were insolvent and would not return to health. Type-C banks were nationalized, while bad assets of these banks were transferred to an AMC. Management of these institutes was dominated by experts, with limited government involvement.

During 1993, Nordbanken and Gota bank were merged, retaining the name Nordbanken. By that time it was Sweden's fourth largest bank. The bank was operationally restructured and partially sold to the private sector. Their respective AMCs—Securum and Retrieva— were merged in December 1995 and held assets worth roughly 3.5 percent of Swedish GDP. In 1996 Securum sold its real estate assets through public offerings on the Stockholm stock exchange, and private sales to companies and individuals. Securum settled operations much

faster than originally planned and it was dissolved at the end of 1997. In retrospect, to rescue its financial system Sweden shelled out 4 percent of GDP. However, total costs ended up being less than 2 percent GDP after the recovery from the sales of bad assets.

Figure 2.1 Three scenario's for expected capital ratios



Source: Schwierz, 2004.

Japan

The Japanese banking crisis during the early 1990s until the early 2000s was an unprecedented crisis in terms of severity. Whereas the most recent financial crisis rapidly turned systemic, the Japanese crisis unfolded itself over several years. Following the deflation of an asset price bubble in the early 1990s, Japan underwent a period of financial sector distress. The turning point in the history of the Japanese banking crisis was in 1997 with the bankruptcy of Sanyo Securities. The crisis turned systemic and a system-wide credit crunch emerged. A severely undermined financial intermediary channel contributed to delaying Japan's economic recovery. The long period of economic stagnation during the years 1991- 2004, combined with the initial period of financial distress and the later systemic crisis, is frequently referred to as Japan's *'lost decade'*. The resolution of the crisis turned out to be a very lengthy and costly process, see Hoshi and Kashyap (2013).

The build-up of the Japanese banking crisis and its prolonged downturn was a complex interplay of monetary, fiscal and banking sector policies, accompanied by external factors as the Asian crisis during 1997-1998, see Nelson and Tanaka (2014). Given this complex interplay of factors contributing to the crisis, Hoshi and Kashyap (2013) argue that two fundamental conceptual errors made by the Japanese government were responsible for most of the problems. The first was the failure to rehabilitate the banks, meaning to adequately clean up bank balance sheets and recapitalize the banks. The second was misjudging the nature of future problems facing the Japanese economy. In this section we focus on the policy response to the deepening financial sector problems and, ultimately, the recapitalization of the banks.

In the first half of the 1990s banks, after the collapse of asset prices, banks were not forced to write down bad loans or raise new capital. Banks balance sheets were hit both directly through the loan book, as indirectly through exposures via the *jusen*.² A number of reasons can be identified why the policy of regulatory forbearance - that is refraining banks to recognize their losses promptly - was adopted by the Japanese government. First, the scale of the problem was underestimated, due to incomplete and fragmented data on the non-performing loans. Next to that, Japanese government officials expected the problem with bad loans could be solved once the economy recovered, not being aware of the future problems of *the lost decade*. Thirdly, before 1998 there was no comprehensive legal mechanism in line to force banks to recapitalize - through equity issuance or dividend restrictions- or to facilitate orderly resolution of failing banks.

In the build up towards the systemic crisis, the regulatory forbearance led to moral hazard of banks. Mainly weakly capitalized banks with insured deposits had the incentive to 'gamble for resurrection' by investing in risky assets. Peek and Rosengren (2005) show that Japanese banks with low capital ratios were more prevalent to the behaviour of evergreening - that is, rolling over loans to weak firms with a high risk of insolvency in order to avoid losses. Caballerro, Hoshi and Kashyap (2008) find evidence that the continuation of weak firms due to banks' evergreening behaviour had a negative effect on healthy firms.

Progressing towards the crisis turning systemic, investor confidence eroded due to uncertainty over banks' asset valuations. Nelson and Tanaka (2014) mention the example of Hyogo Bank, which failed in August 1995, where the amount of non-performing loans appeared to be 25 times the amount that it published in its financial statements a few months earlier. Faced with a systemic banking crisis, the Japanese authorities adopted a policy package including the recapitalization of banks using public funds and a set of standards to improve non-performing loan disclosures, which were enforced through intensified supervision. The goal was to restore investor confidence, as well as to preserve the system's capacity to provide credit to the economy. The Japanese government undertook two rounds of public capital injection, in 1998 and 1999, respectively, totalling up to approximately 1.9% of GDP (Nelson and Tanaka, 2014).

U.S. financial crisis 2007-2008

The U.S. subprime mortgage crisis was triggered by a rise in subprime mortgage delinquencies and foreclosures in 2006/2007, in combination with a decline of securities (MBSs and CDOs) backed by these mortgages. In the period 2004 - 2006 there was a substantial rise in lower-quality subprime lending, with over 90% of them being adjustable rate mortgages. As such, the MBSs and CDOs backed by offered attractive returns due to the higher interest rate on subprime mortgages. However, the lower credit quality ultimately caused massive defaults ending up in a meltdown of sub-prime mortgages and securitized products. The direct effects of mortgage delinquencies and foreclosures on the balance sheet of financial institutions were aggravated by the large amount of derivatives that were related to sub-prime mortgages.

² *Jusen* are private non-bank financial firms dedicated to mortgage and real estate lending. The *jusen* companies had been created by banks in the 1970s to meet the public's demand for homeownership.

Financial market stresses became apparent during 2007 and early 2008. This resulted in sizable losses across the financial system, the bankruptcy of over one hundred mortgage lenders and the collapse of investment bank Bear Stearns in March 2008. Bear Stearns was rescued by the depository bank JP Morgan (at a fire sale price). A critical point in the crisis was in September, with the failure of Lehman Brothers and the government takeovers of Fannie Mae, Freddie Mac. Also AIG had to be rescued by the government because of the large amount of insurance (credit default swaps) they had sold on securities linked to subprime. Investments banks Goldman Sachs and Morgan Stanley obtained depository bank holding charters giving them access to emergency credit lines from the Federal Reserve.

Although the panic subsided in the first half of October after a variety of government actions to promote the liquidity and solvency of the financial sector, prices across most asset classes and commodities fell drastically, the risk premium in the cost of corporate and bank borrowing rose substantially, and financial market volatility rose to levels that have rarely, if ever, been seen. This sequence of events in 2008 has thrown many economies around the world in recession and had severe, long-lasting consequences for the U.S. and European economies.

Various interventions have been undertaken by the U.S. government and the Federal Reserve since the crisis became apparent in 2007. The Federal Reserve Bank lowered the Federal funds and the discount rate, see Bernanke (2009), undertook open market operations to ensure banks remain liquid, created programs to purchase MBS from government sponsored enterprises totalling up to 1,350 billion US dollar.³ Next to various economic stimuli programs, the most important US government response to the economic meltdown was the Emergency Economic Stabilization Act of 2008 (EESA), signed into law on October 3, 2008. The 700 billion US dollar program Troubled Assets Relief Program (TARP) was the centrepiece of the EESA. As its name implies, it was originally conceived as a program to purchase troubles assets, mainly MBS, in order to re-establish financial stability. However, because of the rapid unravelling of the financial system, the bulk of the funds would end up being used toward recapitalization of the banks.

The cornerstone of TARP was the recapitalization of the US banking system under the Capital Purchase Program (CPP) and Capital Assistance Program (CAP) of TARP. Under the CPP, which allocated 205 billion US dollar, banks could apply for capital injections through the purchase of preferred stock by the US Treasury. The CAP, on the contrary, mandated stress tests for banks with assets greater than 100 billion US dollar and required banks with capital shortfalls to raise common equity.

³ See Federal Press releases in 2008 and 2009, available via <http://www.federalreserve.gov/newsevents/press/monetary/20081125b.htm> and <http://www.federalreserve.gov/newsevents/press/monetary/20090318a.htm>

On the day that CPP was announced the nine largest financial institutions⁴ received an aggregate capital injection of 125 billion US dollar. As has been widely reported, most (but not all) of these nine banks needed little persuasion to accept the CPP (Swagel, 2009). Additionally, these nine banks did not undergo a formal evaluation, whilst other US banks had until mid-November to apply for CPP funds. Under the CPP the US Treasury would purchase nonvoting preferred stock, accompanied by the conditions that dividend on common shares wouldn't increase until the preferred shares were repaid and by setting limits on executive compensation. The CPP closed at the end of 2009. It provided about 205 billion US dollar on capital infusions to 707 US banks⁵, raising the average TIER-1 ratios materially from 10.9% to 13.8% (Office of Financial Stability, 2010). The literature on TARP-CPP suggests that banks participating in the CPP were more financially distressed than non-recipients. Some characteristics of banks likely to participate in the CPP were: high leverage, tendency to be larger with greater funding uncertainties, and exposure to troubled asset classes such as real estate loans. This implies that adverse signalling and debt overhang concerns as discussed in Section 2 do not have prevented weak US bank from participating in capital injections from the CPP. Bayazitova and Shivdasani (2012) find evidence that strong banks, rather than weak banks, opted out of participating in the CPP. In addition, their results suggest it is likely that government interference in executive compensation played an important role in participating in CPP, which might have led many (strong) banks to reject CPP-support. Duchin and Sosyura (2012) find that CPP funding was more probable among banks with political connections, lower capital adequacy, lower earnings, lower liquidity, and larger size. Li (2012) confirms that political connections were a determinant of TARP funding. Li (2012) and Taliaferro (2009) report as well evidence that most of the CPP funding was used to bolster capital ratios as opposed to increase lending.

While the CPP injections improved (core) TIER-1 ratios, the common equity of banks continued to be depleted since banks were facing ongoing credit losses and subsequent write-downs. The second stage of TARP addressed this problem. In February 2009 the US Government announced the Financial Stability Plan (FSP), which was funded with the remaining TARP funds. The FSP contained of multiple components, including the CAP. Under this program nineteen banks with assets over 100 billion US dollar were subject to a detailed, forward looking assessment to determine if they had sufficient capital to withstand the adverse macroeconomic conditions and financial market turmoil. The combined assets of the nineteen banks represented roughly two-thirds of aggregate U.S. bank holding company assets. The results of the stress test revealed that ten banks were required to raise new equity, by 75 billion US dollar in total. Under the CAP these banks were required to raise capital from public markets within six months, with the US Treasury as a capital provider serving to bridge the six month gap. Note that the capital needs were expressed in terms of dollars, such that banks couldn't comply with shrinking their balance sheet.

⁴ These are Citigroup, Wells Fargo, JP Morgan, Bank of America, Goldman Sachs, Morgan Stanley, State Street, Bank of New York Mellon and Merrill Lynch. Together, these accounted for close to half of both the more than \$8 trillion of deposits and the more than \$13 trillion of assets in the U.S. banking system (Swagel, 2009).

⁵ Nearly 8,500 banks were eligible to receive TARP funds through the CPP.

Being the largest government bailout in history, the design, implementation and effects of TARP, and CPP in particular, have been studied (and criticized) by academics. Generally speaking the empirical evidence shows that TARP helped to restore some confidence and stabilize the financial system. Firstly, TARP increased lending activities after a sharp decrease during the crisis (Ivashina and Scharfstein; 2010; Li, 2011). Second, Veronesi and Zingales (2010) and Bayazitova and Shivdasani (2012) argue that TARP created real economic value, while Huerta et al. (2012) show that TARP reduced stock market volatility. Further, the Treasury emphasizes that more than \$ 204 billion of TARP funds have been repaid, that taxpayers have earned about \$30 billion in income, and that the total estimated cost of TARP is now less than \$50 billion (Office of Financial Stability, 2010).

In contrast, the government is also criticized for adopting policies in TARP that failed in Japan during its banking crisis in the 1990s Hoshi and Kashyap (2010). Others criticize the government for sending opposing goals and the lack of clear targets under TARP: on the one hand the government urged banks to lend the newly injected TARP capital, but on the other hand she advised banks against risk taking (Cocheo, 2008). Black and Hazelwood (2010) argue that TARP had differing effects on risk taking based on bank size due to these two opposing goals. The authors find that following the TARP capital injections, the risk rating of loan originations significantly increased at large TARP banks but significantly decreased at small TARP banks relative to non-TARP banks. Hoshi and Kayap (2010) positively judge the lack of clear targets for TARP recipients as having avoided the dangers of linking explicit lending targets with bank recapitalization programs that were seen in Japan in the late 1990s.

To conclude, Veronesi and Zingales (2010) study the cost of alternative plans that would have achieved the same effects in terms of reduction of the default risk of existing banks. They conclude that alternatives would have done better, such as a debt-for-equity swap, but this would have required specific legislation to be implemented. Taylor (2011) pointed in his testimony before the Congressional oversight panel that other actions taken by the FED, such as its support for the commercial paper market and money market mutual funds were effective in mitigating the panic, while the contributions of TARP were marginal.

Summary: the lessons from three case studies

Each of these banking crises illustrates the need of adequate bank capitalization. These cases also yield some valuable lessons for policy makers in recapitalizing banks. From earlier crises the following lessons can be drawn:

1. **Forbearance and valuation.** In the Swedish banking crisis the problem (non-performing) loans were valued at conservatively estimated market values. On the one hand this aggravated holes in the banks' balance sheets and necessitated to recapitalize the banks on the short term. On the other hand, this strategy turned out to be beneficial on the medium term due to relative quick restoration of confidence in banks. Japan's experience highlights risks associated with adopting a policy of forbearance. In Japan this policy came forward as a combination of underestimating the size of the problem loans and the expectation of a soon recovering economy. Market confidence

eroded due to persistent uncertainty over banks' asset valuation. Restoration of investor confidence in Japan required detailed and repeated supervisory inspections using on transparent loan classification and provisioning standards.

2. **Transparency.** Central to overcoming a (further deepening of a) crisis is a fairly quick restoration of confidence in banks. Disclosure of the extent of the problem loans by both the banks and the authorities played a central role in all considered cases. The common factor in the studied crises is that once banks opened their books to scrutiny, resolution policies became credible, and market and public confidence slowly returned. This has been illustrated in Sweden as well as in the US (under the CAP).

3. **Predictable and flexible legal framework.** The resolution of earlier banking crises illustrates that legislation must allow for government intervention before a bank's capital is depleted. In the case of Japan we have seen that by the time the government gained insight in the real problem, they had not much choice to remain the forbearance policy due to absence of a comprehensive legal framework to facilitate prompt recapitalization and orderly resolution of failing bank.

When the crisis deepened in Sweden, the *Riksdag* passed legislation regarding bank resolution policy based on appropriate institutional framework and open-ended funding, which was key to the success of the resolution policy. Important in this sense is, of course, a broad political agreement on the measures for dealing with the crisis. Political quibbling could reduce confidence and could lead to suboptimal solutions.

4. **Government capital injection programs.** In resolving the US financial crisis the government employed under TARP two capital infusion programs, CPP and CAP, which differed notably. The certification effects of the SCAP are probably greater than for CPP capital injections, probably due to the following reasons:

- Self selection among banks was possible under CPP (with exception of the first nine), since participation under CPP was voluntary. SCAP, on the other hand was mandatory for the affected banks.
- Overall, the SCAP was more transparent than the CPP. Under SCAP the US government published which banks were subjected to the stress tests; as well detailed information on the methodology and the stress scenarios that had been used.
- Capital injections under SCAP were in common stock, instead of preferred stock as in the CPP which is more favourable to existing equity-holders Under CPP, with preferred stock, the common equity component of bank capital was unchanged.
- Under SCAP, the governments' role was largely supervisory, instead of a preferred shareholder under CPP.
- Capital needs under SCAP were expressed in terms of dollars, such that banks couldn't comply with shrinking their balance sheet.

3 Theory: is bank recapitalization expensive?

In this section we discuss theoretically the potential costs for banks associated with equity issuance. One of the main arguments that banks point out is that funding through equity is more expensive than funding through debt. Is this really the case? The classical argument from Modigliani and Miller (1958) suggests not. Of course, equity holders are first in line when the bank takes a loss, and therefore equity commands a risk premium compared to debt. But an increase of a bank's equity buffers also increases the bank's loss absorption capacity, and hence the bank's risk is spread over a larger group of investors. This decreases risk for all other equity and debt holders, reducing the required premium.

Modigliani and Miller famously argued that on aggregate a firm's cost of capital is independent of the precise shares of equity and debt in the firm's funding, and for banks this is not different (Miller, 1995; Admati et al., 2010). The increase in average cost of capital from a rise in the share of equity, which carries a higher risk premium than debt, exactly compensates the drop in the risk premiums of all existing equity and debt. The reason is that on aggregate, the total risk borne by the firm depends on the composition of its assets, not on how it is funded. The composition of the bank's liabilities affects how that risk is distributed among the various types of investors; but it does not change the aggregate amount of risk borne by them jointly.

This does not mean that discussion over banks' leverage are meaningless, though.⁶ First, Modigliani and Miller describe an idealized world, and real-life frictions may affect some of their conclusions. One of these is differential tax treatment of debt versus equity: debt is cheaper since interest payments are tax deductible,⁷ and hence some of the funding costs of debt are borne by tax-payers. More generally, changes in capital composition do affect the distribution of risks and costs among the various stake-holders. In particular, when some of the banks' risks are shifted to outsiders, equity holders' or management's private incentives to change a banks' leverage can well be different from social incentives. Secondly, and related to this first point, capital structure will in turn also affect the bank's decisions on its composition of assets. If some of the bank's risks are shifted to outsiders, banks' risk taking incentives will be distorted. In this respect, treating equity and debt similarly for tax purposes may help to reduce the incentives for banks to take on more debt.

Apart from tax considerations, a first reason why for bank equity holders it may be privately costly to issue equity is *debt overhang* (Myers, 1977). Additional equity makes existing claims by debt holders safer: higher equity reduces the debt repayment risk. As a result, debt-holders' claims increase in value as a result of the recapitalization. The rise in total

⁶ See Bijlsma and Zwart (2010) for a more extensive discussion.

⁷ Tax deductibility can extend also to hybrid instruments that do count towards tier-1 capital, such as perpetuals or Contingent Convertibles (CoCos). In that case, there is no differential treatment of such equity-like instruments and debt.

value of the bank as a result of the extra funds that are injected will equal the value for the new equity holders. But this means that the increase in debt holders' value must come from a decrease in the value of existing equity!

For banks, not only debt holders but also the government can win from a recapitalization, adding to the debt overhang problem. If equity holders increase the bank's buffers and by doing so make the bank safer, the government is less likely to be called upon later to bail out the bank. As a result, the implicit subsidies related to too-big-too-fail guarantees⁸ get smaller. For incumbent equity holders, this loss of subsidies is a cost.

A second reason why bank equity issuance may be costly for existing shareholders is related to adverse selection (see e.g. Myers and Majluf, 1984). Insiders, such as management or large shareholders, will have better information about a firm's prospects than new outside investors. To outsiders, the decision to issue equity can be sometimes a signal that management or existing equity holders view the current share price as overvalued. This is because companies which expect less favourable prospects have an incentive to sell equity while it is still at a higher price. In contrast, management who consider their stock to be undervalued will be less inclined to issue new stock. This may lead to a *market-for-lemons* equilibrium where eventually only firms with lesser prospects will issue stock, and investors will react to this by offering a lower price for the new shares. Firms with better prospects will avoid such an issuance, as it will lead to the mistaken inference that they are in a bad condition. Their shares will be sold cheaper than their actual value, causing a transfer of wealth from existing to new shareholders.

Bad signals can be mitigated or avoided if the decision to issue equity is not discretionary: mandated issuance (e.g. by a regulator) avoids the situation that only banks that have adverse private information ask for more funding (Admati et al., 2010). Ait-Sahali et al. (2012) show how government announcements of forced bank sector recapitalization had significant favourable effects on banks funding rates. Also, if only the existing equity holders fund the new capital, for instance in a rights offering fully subscribed by existing shareholders, there is no informational rent that needs to be compensated for in the issuance price (Eckbo and Masulis, 1992). Indeed, rights offers typically lead to lower negative stock price reactions (Eckbo, Masulis and Norli 2008, survey the evidence). This is also related to the fact that rights offers minimize potential profit dilution for current stock holders. Finally, an increase in transparency helps to reduce the adverse selection in equity issuance.

Note that in cases, debt overhang and signalling, equity issuance is privately costly for existing shareholders, but not socially costly. The loss to existing equity holders is a gain to debt holders or the government (in the case of debt overhang), or the new investors who get their shares at a discount (in the case of signalling). From a social welfare point of view, these effects are only redistributive. However, the private costs change incentives, and hence the decision on how to recapitalize. Inefficient recapitalisation has social costs.

⁸ See e.g. Bijlsma et al. (2014).

Of course, other forces may counteract the lack of private incentives to issue new equity. If markets view more strongly capitalized banks as more resilient and less prone to moral hazard, and in response lower funding costs, this provides a competitive advantage to engage in recapitalization. Indeed, this is consistent with a cross-country analysis by Fonseca et al. (2010), who find that better capitalization lowers deposit funding rates, in particular under adverse economic conditions. Similarly, equity holders may signal stronger prospects by increasing their own participation in the bank's equity capital. Also the involvement of other large investors can act as a signal to smaller investors that a bank is in better shape than competitor banks, and hence reduce funding costs. Indeed, stock market reactions to private placements are often positive (Eckbo, Masulis, Norli, 2008). Recapitalization may also be a rational response by banks in anticipation of increased transparency due to e.g. a stress test, to avoid the stigma of failing that test.

4 Empirics: stock market reactions to recapitalization

4.1 Introduction

In Section 3 we discussed the private cost of bank recapitalization from a theoretical perspective. In this section we examine empirically the private cost of bank recapitalization through equity issuances. The purpose of the analysis is to see how stock emissions affect banks' market value and funding costs. Next, we identify several issuance- and bank-specific factors which influence the magnitude of the effect.

We conduct an event study on the impact of bank seasoned offerings on stock prices and CDS spreads. We consider US and EU banks separately in order to observe if differences in the sign and the magnitude of the market response in the two regions exist.

A considerable empirical research has been dedicated on analysing the market reaction to seasoned equity offering (SEO). The majority of the studies observe significant negative response. For example, several studies find a negative reaction of around -3% for industrials, around -1% for utilities (Asquith and Mullins, 1983; Masulis and Korwar, 1986; Mikkelsen and Partch, 1986; Hansen and Crutchley, 1990; Eckbo and Masulis, 1995). The results of cross-industry and cross-country studies are also consistently negative reporting on average around -1% reduction in stock returns (see Eckbo and Masulis, 2008 for an exhaustive overview).

There are very few studies that analyze the effect of equity issuance on bank stock prices in particular. Wansley and Dhillon (1990) conducted an event study on 36 major banks for the period 1980-1986 and found significant negative reaction to new equity issues of around 1.5%. Cornett et al. (1998) study the announcements of common stock issues by 120 commercial banks in the US for the period 1983 - 1991. They divided the issuances into two

types voluntary (at discretion of the bank's managers) and involuntary (needed to meet regulatory capital standards). They conclude that banks which issue voluntarily common stock experience significant negative effect on their stock prices as well as a drop in their operating performance. For banks which issued stock involuntarily these measures were insignificant. Ergungor et al. (2010) however find no difference between the stock returns of well-capitalized and undercapitalized banks upon seasoned equity offering announcements for the years 1983-2005. In both cases they find similar and significantly negative stock price responses that vary between 1.3% and 2.1%. Further, post-issue abnormal returns are not significantly different from zero indicating that investors react upon bank SEO announcements.

4.2 Event study methodology

General setup

In order to study the effect of equity issuance on bank value, we apply an event study methodology following MacKinlay (1997), Cambell et al. (1997) and Kothari and Warner (2007). The advantages of this method are that it is simple and fairly accurate in estimating short-run effects.

First, we start by defining the event and choosing the size of the event window. We define as events the dates at which banks officially announce their intention to issue stock. In line with the literature we opt for symmetrical narrow 3 day window (-1/+1) days (Elliot et al., 2009; Ait-Sahalia et al., 2011). This window captures the general effect of the event while minimizing the influence of other factors. Using wider windows increases the risk of contaminating the effect of the events with other market triggers or introducing noise which may bias our results towards zero. For robustness we also use larger event windows of (-1/+3), (-3/+3), (-5/+5) and (-10/+10) days.

There are several important considerations in defining the event window. First, the event should be unexpected by the market. Violation of this condition reduces the significance of the announcement effect (MacKinlay, 1997; Klingebiel et al., 2000; Ait-Sahalia et al., 2011). We perform a robustness check of the results by applying an asymmetrical window (-10/+1) to allow for possible leakage of information to the market. Second, the literature shows clear evidence that stock prices react upon the announcement of SEOs rather than on the pricing dates (Ergungor et al., 2008). To be sure, we also test whether the pricing dates of the events have impact on the banks' value.

Once we have identified the events and the event windows, we proceed with estimating the abnormal returns during the event windows. The abnormal returns are defined as the actual ex post stock return relative to the expected return provided that the event did not take place.

$$AR_{it} = R_{it} - E(R_{it}|X_t) \quad (1)$$

where AR_{it} , R_{it} and $E(R_{it}|X_t)$ are the abnormal, actual and expected returns respectively for time period t . X_t is the conditioning information for the expected return model.

One of the main challenges of every event study is the proper estimation of the expected security return. Following the literature (MacKinlay, 1997; Cambell et al., 1997; Kothari and Warner, 2007) we apply the most widely applied model - the market model. This model relates the stock return to the market portfolio stock return in the following way:

$$R_{it} = \alpha_i + \beta R_{mt} + \varepsilon_{it}; \quad E(\varepsilon_{it} = 0) \quad var(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2 \quad (2)$$

where R_{it} and R_{mt} are the period- t stock return of bank i and the market portfolio return respectively, and ε_{it} is the zero mean disturbance term.

This model is superior to the constant mean return model (also referred as the *naïve model*) because it removes return volatility due to market fluctuations. In this respect it is important to use market index which has high explanatory power for the stock returns. In this way the pure effect of the SEO announcements is captured. We use the bank stock index returns for Europe and the US to capture movements in the market. This allows us to limit possible contamination of the events effect due to contagion and spill-over effects. In addition to this, we apply general market indices to insure unbiased and robust results.

Next, we estimate the cumulative abnormal returns (CARs) over the event windows and apply parametric and non-parametric tests for significance of the results in line with previous literature. We apply t-test allowing for robust standard errors. This test is parametric and assumes normal distribution of the abnormal returns. In addition to it, we use the non-parametric Signrank test which allows for non-normality.

CDS spreads

In addition to the effect on equity, issuance announcements are likely to influence the price of other bank securities. Elliot et al. (2009) find that SEO announcements have a significant positive effect on bondholders' returns in line with the leverage-risk reduction hypothesis. Therefore, we expand the analysis to credit default swaps (CDSs). We repeat the event study this time using the changes of bank 5-year CDS spreads. For CDS market benchmark we construct a broad index of the 5-year CDS spreads of all banks which have outstanding CDSs in the countries in our sample. The index is the average of all spreads. Next, we estimate the cumulative abnormal spreads (CASs) over the event windows and test the results with a parametric and a non-parametric test.

Explaining abnormal stock and CDS returns with bank- and issuance-specific characteristics

Finally, we examine the relationship between abnormal bank stock and CDS returns and bank- and issuance-specific characteristics. This is done through cross-sectional regression:

$$mean AR_i(AS_i) = \alpha + \beta X_i + \varepsilon_i \quad (3)$$

where AR_i (AS_i) is the mean abnormal return (spread) of bank i , X_i is a bank-specific or issuance-specific variable and ε_i is the error term.

The group of bank-specific variables include size, health (proxied by the percentage of non-performing loans, *bad loans ratio*) and equity ratio. The group of issuance-specific variables comprises of purpose of issuance, year and size of the issuance as a percentage of the company.

4.3 Data and descriptive statistics

Seasoned equity offerings

The data for this study comprises of announcement and pricing dates of seasoned equity offerings by publicly traded banks and bank holding companies in Europe and the United States for the period 2007-2013. The European sample consists of 74 events of SEOs of 46 banks. The US dataset covers 111 issuance events of 58 banks. The issuances are divided into groups based on the type of purpose the banks have stated. For Europe the events are divided into two categories - strengthening of the balance-sheet and acquisitions and growth while for the US a third group is also included - TARP repayment. All issuances are larger than 50mln euro. The data is obtained from Dealogic. Figure 4.1 shows the cumulative issuance over time for Europe and the US accounting for purpose of issuance. The cumulative issuance for Europe reaches 250 mln euros over the period 2007 to 2013 in comparison to the US where it amounts to 150 bln euros. Table 4.1 summarizes the number of events per year. Table 4.2 shows the distribution across countries as well as the average euro amount of each SEO. Figure 4.2 presents the total issuance per country relative to the banking sector size. We see that although the absolute amount of issued equity in the US is lower than in Europe, the relative issuance as a percentage of the banking sector is highest.

Figure 4.1 Cumulative equity issuance

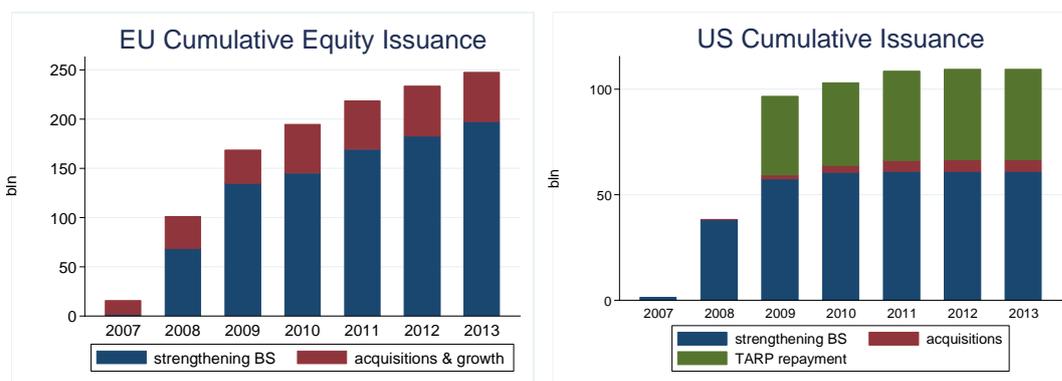


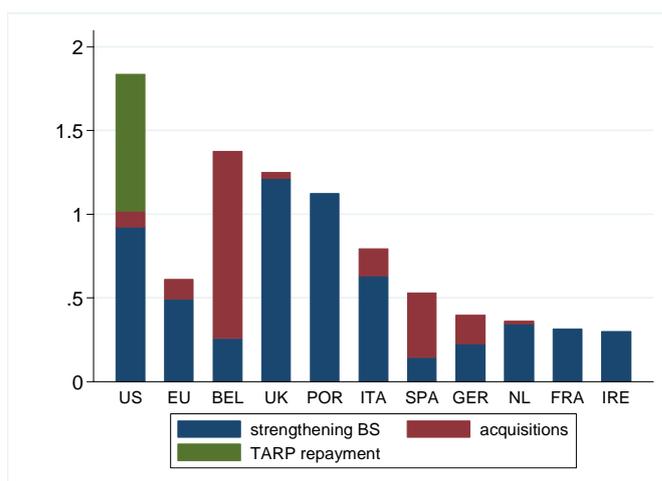
Table 4.1 Summary statistics event dates

Year	Europe	US
2007	3	1
2008	23	17
2009	13	57
2010	9	22
2011	11	10
2012	9	1
2013	6	3

Table 4.2 Summary statistics SEOs

Country	# Events	Average amount (€ bln)
BEL	4	1.03
FRA	5	4.86
GER	10	2.06
IRE	4	1.18
ITA	11	2.29
NL	3	2.72
POR	11	0.48
SPA	9	2.47
UK	17	5.45
US	111	1.2

Figure 4.2 Issuance per country relative to size banking sector



Bank-specific variables

We estimate bank stock returns from daily stock prices data available from Datastream. The average return for European banks is -0.28% while for US banks it is 0.03%. The average bank size for the European sample 470 bln euros is while for the US sample is 124 bln euros. The bank specific characteristics equity ratio and bad loans ratio measure bank capital adequacy and bank health respectively. The equity ratio is defined as equity divided by total assets, the bad loans ratio as the reserves for impaired loans relative to gross loans. All data is yearly and is obtained from Bankscope. Bank risk is captured by changes in the 5-year mid-quote CDS spread on senior bonds from Markit with daily frequency. Here mid-quote reflects the average of the bid and ask prices and 5-year is both the most liquid and the

benchmark maturity in the market. Table 4.3 provides the summary statistics for the issuer-related variables.

Table 4.3 Bank-specific variables, summary statistics

Variables	EU	US
Stock return (%)	-0.06 (3.55)	0.02 (4.01)
CDS spread change (%)	0.35 (5.42)	0.41 (6.52)
Size (bln)	470 (619)	124 (302)
Equity ratio (%)	4.8 (1.9)	10.8 (6.1)
Bad loans ratio (%)	2.8 (1.7)	3.9 6.0

Note: Mean values on top and standard deviations in parenthesis below.

Market variables

Market performance is measured through the daily price returns of several different indices. For Europe we use general market index (DJ Europe) as well as bank index (EU600banks). For the US we apply, general market index (DJ US) and bank index (DJ banks). All data is obtained from Datastream. Table 4.4 summarizes the market variables.

Table 4.4 Market variables, summary statistics

Market index	% return
DJ Europe	0.01 (1.85)
EU 600 banks	-0.03 (2.13)
DJ US	0.14 (1.55)
DJ US banks	-0.07 (3.16)
CDS index	2.60 (1.69)

Note: Mean values on top and standard deviations in parenthesis below.

4.4 Results

Event study results

The results of the event study using equity returns are summarized in Table 4.5. The results are estimated over several event windows. The mean abnormal return for the (-1/+1) event window is equal to -2.61% for the European sample in comparison to only -0.82% for the US banks. This indicates that SEO announcements are associated with a decline in the stock prices of both EU and US banks and that the effect is three times larger for EU issuers. One of the likely reasons for the substantial difference between EU and US banks is that the latter are on average better capitalized. As shown on Table 4.3, the average equity ratio for EU institutions is 4.8% while for the US banks it is more than double, 10.8%. The significantly better capital position of the US banks makes them less vulnerable to the negative effect of

SEO announcements. Another possible reason for the large difference between Europe and the US is the sovereign debt crisis in the Euro zone. The high market uncertainty during this period has undoubtedly aggravated the ability of banks to raise capital. A third reason may be the difference in the size of the equity issuance relative to the bank size which is smaller for the US than for Europe. In the cross-section analysis section, we estimate the effect of issuance size on the abnormal returns and compare if abnormal returns of issuances of similar size differ in both regions.

The results are statistically significant at 1% level of significance according to both the parametric and the non-parametric test. Expansion of the event window shows that the average abnormal return declines implying that stock prices respond quickly to the event shocks. Further, we check if there is evidence for leakage of information on the market prior to the announcements using an asymmetrical (-10/0) event window. The results for Europe are significant at 5% level of significance according to the non-parametric test. The average abnormal return for these event windows however is positive (0.66%). The positive result is likely the consequence of managers timing the SEO announcements, following a sequence of positive returns (Eckbo and Masulis, 2007). The results for the US are not statistically significant.

Table 4.5 Results using stock returns

Window	EU			US		
	Mean AR (%)	t-test (robust SE)	Signrank test	Mean AR (%)	t-test (robust SE)	Signrank test
(-1/+1)	-2.61 (4.94)	-4.54***	-5.26***	-0.82 (4.01)	-2.16**	-2.86***
(-3/+3)	-1.75 (2.65)	-5.67***	-5.69***	-0.43 (2.06)	-2.18**	-2.51**
(-5/+5)	-1.17 (1.92)	-5.26***	-5.21***	-0.19 (1.54)	-1.29	-2.02**
(-10/+10)	-0.09 (4.48)	-0.17	-4.44***	-0.04 (1.10)	-0.38	-0.84
(-10/0)	0.66 (9.74)	0.58	2.08**	-0.02 (1.71)	-0.10	-0.968

***, **, * significant at 1%, 5%, 10% respectively.

Table 4.6 Proportion of returns and abnormal returns below the average daily return during (-1/+1) window

US	proportion of returns < -0,82%	33%
	proportion of abnormal returns for the entire sample < -0,82%	26%
EU	proportion of returns < -2,61%	14%
	proportion of abnormal returns for the entire sample < -2,61%	8%

We compare the size of the abnormal returns during the event windows with the abnormal returns during the entire period from 2007 to 2013 as well as with the distribution of the returns. Table 4.6 shows the percentage proportion of returns and abnormal returns that is smaller than the average daily abnormal return over the (-1/+1) window for the EU and the US. The results show that 33% of the normal and 26% of the abnormal returns of the US stock prices are lower than the average daily return across US banks during the event

window. The results for EU banks are slightly lower - 14% of the normal returns and 8% of the abnormal returns are below the average daily return of -2,61% across EU banks during the event window. In both cases, the average SEO abnormal returns remain outside of the tails. These results suggest that although the market reaction to SEOs was significant and negative, it was not on average an extreme shock. We see that other events have caused even larger turmoil.

Table 4.7 summarizes the event study results using CDS data. The mean abnormal spread for the (-1/+1) window is equal to -1.88% for the European banks and -3.03% for the US banks. The results are significant at 1% level of significance according to both the parametric and the non-parametric tests. The negative sign of the abnormal spread indicates that SEO announcements lead to a decline in the CDS spreads during the event window. This implies that bank creditors unlike shareholders perceive positively SEO announcements. This is in line with the leverage-risk reduction hypothesis, according to which SEOs lead to lower leverage and thus lower costs of financial distress (Masulis, 1980; Elliot et al., 2009). We see that US banks benefit more from the events than EU banks. As we pointed out earlier weaker capital positions combined with severe sovereign crisis are likely responsible for this difference.

Expansion of the event window shows that the effect of the events becomes insignificant for Europe over a wider window and decreases steadily for the US. This shows that CDS spreads react quickly to the SEO shocks. Further, we also check for possible leakage of information prior to the events. The results obtained from the (-10/0) windows are significant at 5% level of significance but the size of the abnormal spreads is much smaller. This suggests that although there may have been leakage of information on the market, this is not a serious issue and does not distort the effect of the events. We see that the CDS responses to the SEO announcements are largest in the days closest to the event dates.

Table 4.7 Results using CDS spreads

Window	EU			US		
	Mean AS (%)	t-test (robust SE)	Signrank test	Mean AS (%)	t-test (robust SE)	Signrank test
(-1/+1)	-1.88 (5.15)	-2.73***	-2.99***	-3.03 (3.75)	-3.24***	-2.84***
(-3/+3)	-0.72 (3.25)	-1.65	-1.34	-1.87 (1.86)	-4.03***	-3.25***
(-5/+5)	-0.15 (2.31)	-0.49	0.11	-0.96 (1.75)	-2.19**	-2.59***
(-10/+10)	-0.19 (1.32)	-1.05	-0.70	-0.09 (2.91)	-0.12	-1.55
(-10/0)	-0.61 (2.36)	-1.94*	-1.76*	-1.05 (3.75)	-1.12	-2.02**

***, **, * significant at 1%, 5%, 10% respectively.

Cross-sectional analysis

In the second part of the analysis we employ a set of regressions to explore further the impact of different factors on abnormal returns that were not considered in the event study.

The regression analysis helps identify which issuance- and bank-specific characteristics determine the size and the magnitude of the market response to bank SEO announcements. We consider time, purpose, country and size of the issuance as issuance-specific characteristics. For time, we choose to split the sample in two parts - from 2007 until 2010 and from 2010 until 2013. The first period captures the years in which financial distress was most acute while the second period accounts for the post-financial crisis period. Table 4.8 displays the results for abnormal returns and spreads. The two periods are not statistically different from each other.

Table 4.8 Time-effects on abnormal returns and abnormal spreads

	Abnormal returns	Abnormal spreads
2007-2010	0.027	-1.51
	(0.68)	(1.26)
_cons	-1.60***	-1.07
	(0.54)	(1.06)
N	182	72
R ²	0.00	0.02
adj. R ²	-0.01	0.01
F	0.0015	1.43

Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Next, we explore how the purpose of the issuance affects the size of the abnormal returns and spreads. The results are summarized in Table 4.9. We observe that issuances whose purpose was acquisitions and growth are associated with 2.02 percent higher mean abnormal returns relative to the ones whose purpose was to strengthen the balance-sheet. This is likely due to the fact that such announcements can be perceived as positive signals by the market – stock holders expect potential profits to outweigh the dilution effect. TARP repayment events are not associated with statistically different mean abnormal returns than the reference group. The purpose dummies have no statistically significant effect on the mean abnormal spreads.

Table 4.9 Purpose effects on abnormal returns and abnormal spreads

	Abnormal returns	Abnormal spreads
TARP	1.39	-2.84
	(0.89)	(1.85)
acquisitions	2.02**	-0.014
	(0.82)	(1.51)
_cons	-2.25***	-1.82***
	(0.42)	(0.68)
N	182	72
R ²	0.04	0.03
adj. R ²	0.03	0.01
F	3.53	1.21

Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Further, we divide the sample in three groups based on the country of the issuer - the US, the UK and continental Europe. The effects of the country dummies are shown in Table 4.10. The

results show that events which took place in the US are associated with 1.4% higher mean abnormal returns relative to the ones which took place in continental Europe. The events which took place in the UK have -2.43% lower average abnormal spread in comparison to the ones from continental Europe.

Table 4.10 Country effects on abnormal returns and abnormal spreads

	Abnormal returns	Abnormal spreads
UK	-1.39 (1.22)	-2.43* (1.40)
US	1.42* (0.73)	-1.89 (1.43)
_cons	-2.31*** (0.59)	-1.14 (0.77)
N	182	72
R ²	0.04	0.05
adj. R ²	0.03	0.02
F	4.08	1.86

Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

It is interesting to compare the effect of the different issuances based on purpose across each region. Table 4.11 provides summary statistics of the average abnormal returns and spreads per region and per purpose of issuance. Two important differences stand out. First, the mean abnormal returns for mergers and acquisition purposes have a positive effect in the US while negative effect for the other two regions. The results are in line with Tables 4.9 and 4.10. The negative market reaction for the EU banks can be explained by their lower capital position. The market in the EU perceives the acquisition activities of banks as more risky than the US due to their lower level of equity. Second, issuances for strengthening the balance sheet in the UK trigger a much stronger reaction both on the credit and the stock market than in the other regions. The reason for this high response is that most of the events of the UK sample took place in 2008 and 2009. In years of substantial uncertainty, markets tend to overreact.

Table 4.11 Average abnormal returns and spreads per region and purpose

	Mergers & acquisitions		Strengthening BS		TARP repayment	
	AR	AS	AR	AS	AR	AS
UK	-1.29 (2.76)	-1.77 (1.91)	-4.44 (6.81)	-4.12 (9.27)	-	-
US	0.56 (4.30)	-	-1.50 (4.52)	-1.41 (3.03)	-0.86 (1.89)	-4.66 (3.86)
Euro zone	-1.41 (2.85)	-1.86 (4.66)	-2.56 (4.95)	-0.93 (2.29)	-	-

Dashes indicate there is no data available. Standard errors in parentheses.

The last issuance-specific variable that we examine is the size of the issuance as percentage of the company. Table 4.12 shows the results. We see that size of the issuance has a statistically significant effect on the abnormal returns. A 1% increase in the size of the emission leads to 0.09% lower average abnormal return implying that larger issuances cause

stronger negative market response. The size effect on the average abnormal spreads is not significant.

Further, it is interesting to compare the sizes of abnormal returns of events with similar size in Europe and the US. Table 4.13 shows the average abnormal returns for two categories of issuances – up to 10% and between 10 and 50% of the bank size. The results show that abnormal returns for both regions are less negative for events of smaller size. However, the difference in the abnormal returns between European and US banks of nearly three times perseveres even when we control for size of the issuances. This implies that it is the better capital position of the US banks rather than the size of the issuances that drives the difference in the market response in the two regions.

Table 4.12 Size effect on abnormal returns and abnormal spreads

	Abnormal returns	Abnormal spreads
size %	-0.093*** (0.017)	-0.0085 (0.029)
_cons	0.45 (0.48)	-1.91** (0.95)
N	182	72
R ²	0.14	0.00
adj. R ²	0.14	-0.01
F	29.7	0.086

Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.13 Bank-specific characteristics on abnormal returns and abnormal spreads

Size issuance	Abnormal returns	
	EU	US
<10%	-1.42 (1.86)	-0.52 (2.05)
10%-50%	-2.34 (4.50)	-0.85 (4.33)

Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In addition to the issuance-specific characteristics, we consider also bank-specific factors such as size, equity ratio and bad loans ratio (see Table 4.14). The only significant variable is the equity ratio - a 1% higher equity ratio is associated with 0.25% less negative (or higher when positive) abnormal returns on average. This is because issuances of well-capitalized banks are less likely to be perceived as negative signals by the market. The bank-specific factors have no statistically significant effect on the abnormal spreads.

Table 4.14 Bank-specific characteristics on abnormal returns and abnormal spreads

	Abnormal returns	Abnormal spreads
assets (log)	-0.072 (0.27)	-0.32 (0.62)
equity ratio	0.25* (0.13)	0.0060 (0.27)
bad loans ratio	0.026 (0.25)	0.34 (0.50)
_cons	-3.64* (2.11)	-1.41 (4.77)
N	153	57
R ²	0.05	0.02
adj. R ²	0.03	-0.04
F	2.37	0.34

Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.5 Robustness

Further, we conduct a robustness check using pricing dates instead of announcement dates (see Table 4.15). The results are insignificant both for Europe and the US. The non-parametric test for the US is significant at 5%. This however is due to the fact that a large proportion of the US SEOs are of the type accelerated book build which takes place within a very short period of time - 1-3 days. The results show that the market participants react early upon announcement and are in line with previous studies (Ergungor et al., 2008).

Table 4.15 Events based on pricing dates and (-1/+1) event window

	T-test (robust SE)	Signrank test	Mean value (%)
AR(eu)	0.57	0.84	0.07 (1.13)
AR(us)	-1.50	-2.43**	-0.60 (4.25)
AS(eu)	-1.40	-0.79	-0.48 (2.62)
AS(us)	-0.89	-1.45	-0.89 (4.01)

***, **, * significant at 1%, 5%, 10% respectively.

Next, we experiment with different market benchmark to ensure robustness of the results. Using a wider market index for benchmark shows results strongly in line with the results obtained from the bank indices (see Table 4.16).

Table 4.16 Market index benchmark

Market index	EU			US		
	t-test (robust SE)	Signrank test	Mean AR (%)	t-test (robust SE)	Signrank test	Mean AR (%)
(-1/+1)	-4.57***	-5.223***	-3.10 (5.83)	-3.36***	-3.898***	-1.45 (4.66)

***, **, * significant at 1%, 5%, 10% respectively.

4.6 Conclusions from the event study

The event study analysis indicates that SEOs tend to reduce the stock prices of both EU and US banks and the effect for the former is substantially larger. The same is true for the impact on CDS spreads. The results are robust and consistent with previous literature. The findings of this study point out that equity issuances are perceived as a negative sign by stockholders and lead to a reduction in the bank's market value at least in the short-run. This decline in stock prices however is on average not extreme in magnitude. At the same time, creditors react positively to banks' recapitalization as they associate it with lower default risk and reduce the risk premium they demand.

The cross-sectional analysis reveals several important results.

- First, bank capital position plays an important role in determining the effect of the market reaction. Banks with higher equity ratios experience less the negative effects of SEO announcements. This is the case for the US banks which are substantially better capitalized. Their stock prices demonstrated a much smaller response to the equity issuances.
- Second, issuances related to acquisition purposes are received more positively by the stock market. In the US where banks have higher capital ratios, the market reacts enthusiastically leading to positive market returns in the days around the announcements.
- Higher amount of issued stock as a percentage of the company reduces stock returns.

5 Policy options

AQR

It is likely that some member states will push for “forbearance” (i.e., hiding the bad news) in the AQR, driven by fear of the political and financial consequences of publicly-led bank restructurings. Although the ECB has strong incentives⁹ to resist them, two diverging scenarios are possible. In the first scenario, the ECB would resist the pressure for forbearance and expose a number of problem banks, whose restructuring will involve some public cost, and possibly market turmoil. In the second scenario, the ECB would yield to the political pressure from member states¹⁰ and do little better than the EBA in 2011 in terms of rigor and consistency of the assessment. Flashpoints would be avoided but the “zombification” of the Euro area's banking sector would continue, with a heavily negative impact on Europe's future growth.

⁹ The ECB's credibility is at stake, not only as a supervisor but more broadly as a European institution, with possible spillovers to its reputation as a monetary policy authority. The sad precedent of the EBA, whose stature never fully recovered from having endorsed a clean bill of health delivered in July 2011 to banks such as Dexia and Cyprus Laiki that collapsed shortly afterwards, can only reinforce its determination not to follow the same path.

¹⁰ Think for example of the notoriously politicized banking system in Germany, where some banks are suspected to be in bad condition. All Landesbanken are included in the ECB's assessment list.

Our review of economic theory and case studies implies the following:

- Conservative valuation combined with quick bank recapitalization works out beneficial on the medium term due to relative quick restoration of confidence in banks. Although attractive on the short term, forbearance policies will introduce persistent uncertainty over banks' asset valuation. Market and public confidence will, as a consequence, erode.
- Legislation must allow the authorities to force recapitalization before a banks' capital is depleted. The Swedish resolution framework is often cited as a textbook example.
- Transparency is central in a fairly quick restoration of confidence in banks. Disclosure of the extent of the problem loans by both the banks and the authorities played a central role in all considered cases. As much disclosure as possible on the regulatory actions by supervisors plays an equally important role in the restoration of confidence in banks.

Mandatory recapitalization

- Theoretical results and case studies point out that effective recapitalization of the banking sector is only possible when selection effects are circumvented. Hence, this would imply mandatory participation in recapitalization for affected banks.
- The methodology used in the recapitalization program to determine the amount of new capital to be issued should be transparent.
- US experience shows that capital injections by the government should preferably be in common stock instead of preferred stock. Under capital injections with preferred stock, the common equity component of bank capital remains unchanged.
- To avoid contraction of banks' balance sheets, capital needs under recapitalization programs should be preferably expressed in amounts instead of ratios.
- Our empirical results show that SEOs have a significant negative impact on the stock prices of banks. However, the magnitude of the decline in stock prices is on average not extreme, and is comparable with other events. Banks with better capital positions experience smaller market reaction. Further, this negative effect is partially compensated by a significant reduction of banks' funding costs. Last but not least, the decline of the stock price, which is a private cost, is accompanied by a public win, since better capitalized banks promote growth and reduce potential bailing out costs.

Literature

Admati, A.R., P.M. DeMarzo, M.F. Hellwig and P.Pfeleiderer, 2010, Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Expensive, Stanford GSB Research Paper 2065.

Ait-Sahali, Y., J. Andritzky, A. Jobst, S. Nowak and N. Tamirisa, 2012, Market response to policy initiatives during the global financial crisis, *Journal of International Economics*, vol. 87(1): 162-77.

Albertazzi, U., and D. Marchetti, 2010, Credit Supply, Flight to Quality and Evergreening: An Analysis of Bank-Firm Relationships after Lehman, Working Paper 756, Bank of Italy.

Asquith, P., and D. Mullins, 1983, The impact of initiating dividend payments on shareholders' wealth, *Journal of Business*, vol.56(1):77-96.

Bäckström, U., 1997, What lessons can be learned from recent financial crises? The Swedish experience, Remarks at the Federal Reserve Symposium "Maintaining Financial Stability in a Global Economy", Jackson Hole, Wyoming, USA.

Bayazitova, D., and A. Shivdasani, 2012, Assessing TARP, *Review of Financial Studies*, vol. 25(2): 377-407.

Benston, G.J. and G.G. Kaufman, 1997, FDICIA after five years, *The Journal of Economic Perspectives*, vol. 11(3): 139-58.

Bernanke, B., 2009, The Crisis and the Policy Response, Stamp Lecture, London School of Economics, January 13, 2009.

Black, L., and L. Hazelwood, 2012, The effect of TARP on bank risk-taking. Board of Governors of the Federal Reserve System International Finance Discussion Paper IFDP 1043.

Bijlsma, M., J. Lukkezen and K. Marinova, 2014, Measuring too-big-to-fail funding advantages from small banks' CDS spreads, CPB Discussion Paper 268.

Bijlsma, M., and G. Zwart, 2010, Zijn strengere kapitaaleisen kostbaar?, CPB Document 215.

Caballero, R.J., T. Hoshi and A.K. Kashyap, 2008, Zombie Lending and Depressed Restructuring in Japan, *American Economic Review*, vol. 98(5): 1943-77.

Campbell, C.J., and C.E. Wasley, 1997, Measuring security price performance using daily NASDAQ returns, *Journal of Financial Economics*, vol. 33: 73-92.

- Cocheo, S., 2008, TARP-driven lending: rhetoric vs. reality, *ABA Banking Journal*, vol. 100: 12-42.
- Cornett, M., H. Mehran and H. Tehranian, 1998, Are Financial Markets Overly Optimistic about the Prospects of Firms That Issue Equity? Evidence from Voluntary versus Involuntary Equity Issuances by Banks, *The Journal of Finance*, vol. 53(6): 2139-59.
- Dell’Ariccia, G., E. Detragiache and R. Rajan, 2008, The Real Effects of Banking Crises, *Journal of Financial Intermediation*, vol. 17(1): 89-112.
- Drechsler, I., T. Drechsel, D. Marques and P. Schnabl, 2013, Who borrows from the lender of last resort? NYU Stern Discussion Paper.
- Duchin, R., and D. Sosyura, 2012, The politics of government investment, *Journal of Financial Economics*, vol. 106(1): 24-48.
- Eckbo, B.E. and R.W. Masulis, 1992, Adverse selection and the rights offer paradox, *Journal of Financial Economics*, 32, 293-322.
- Eckbo, B.E., R.W. Masulis and O. Norli, 2008, Security offerings, in: B. Eckbo (ed.), *Handbook of Corporate Finance: Empirical Corporate Finance*, vol. 1, North-Holland, Amsterdam.
- Elliott, W., A. Prevost and R.P. Rao, 2009, The announcement impact of seasoned equity offerings on bondholder wealth, *Journal of Banking and Finance*, vol.33(8): 1472-80.
- Englund, P., 1999, The Swedish banking: roots and consequences, *Oxford review of economic policy*, vol 15(3): 80-97.
- Ergungor, E., C. Krishnan and P. Laux, 2010, Examining Bank SEOs: Are Offers Made by Undercapitalized Banks Different?, *Journal of Financial Intermediation*.
- Fonseca, A.R., F. González and L. Pereira da Silva, 2010, Cyclical Effects of Bank Capital Buffers with Imperfect Credit Markets: international evidence, Working Papers Series 216, Central Bank of Brazil.
- Giannetti, M., and A. Simonov, 2010, On the Real Effects of Bank Bailouts: Micro-Evidence from Japan, CEPR Discussion Paper 7441.
- Hansen, R.S., and C. Crutchley, 1990, Corporate earnings and financing: An empirical analysis, *Journal of Business*, vol. 63: 347-71.
- Homar, T.J., and S. van Wijnbergen, 2014, On Zombie Banks and Recessions after Systemic Banking Crises: Government Intervention Matters, Tinbergen Institute Discussion Paper 13-039.

Hoshi, T., and A.K. Kashyap, 2013, Will the U.S and Europe Avoid a Lost Decade? Lessons from Japan's Post Crisis Experience, paper presented at IMF 14th Jacques Polak Annual conference, 2013.

Huerta, D., D. Perez and D. Jackson, 2011, The impact of TARP bailouts on stock market volatility and investor fear, *Banking and Finance Review*, vol. 3(1): 45-54.

Ingves, S. and G. Lind, 1996, The management of the bank crisis – in retrospect, *Sveriges Riksbank Quarterly Review*, vol. 7(1): 5-18.

Ivashina, V., and D.S. Scharfstein, 2010, Bank lending during the financial crisis of 2008, *Journal of Financial Economics*, vol. 97(3): 319-38.

Jiménez, G., S. Ongena, J. Peydró and J. Saurina, 2012, Credit Supply and Monetary Policy: Identifying the Bank Balance-Sheet Channel with Loan Application, *American Economic Review*, vol. 102(5): 2301-26.

Kothari, S.P., and J.B. Warner, 1997, Measuring long-horizon security price performance, *Journal of Financial Economics*, vol. 43(3): 301-340.

Laeven, L., and F. Valencia, 2013, The Real Effects of Financial Sector Interventions during Crises, *Journal of Money, Credit and Banking*, vol. 45(1): 147-77.

Li, L., 2012, TARP funds distribution and bank loan supply, Working Paper, University of Kansas.

MacKinlay, A., 1997, Event Studies in Economics and Finance, *Journal of Economic Literature*, vol. 35(1): 13-39.

Masulis, R.W., and A.N. Korwar, 1986, Seasoned equity offerings: An empirical investigation, *Journal of Financial Economics*, vol. 15: 91-118.

Mikkelson, W.H., and M.M. Partch, 1986, Valuation effects of security offerings and the issuance process, *Journal of Financial Economics*, vol. 15: 31-60.

Miller, M.H., 1995, Do the M&M propositions apply to banks?, *Journal of Banking and Finance*, vol. 19(3-4): 483-89.

Modigliani, F., and M.H. Miller, 1958, The cost of capital, corporation finance and the theory of investment, *American Economic Review*, vol. 48(3): 261-297.

Myers, S. C., 1977, Determinants of Corporate Borrowing, *Journal of Financial Economics*, vol. 5(2): 147-175.

Myers, S. C., and N. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics*, vol. 13(2): 187-221.

Nelson, B., and M. Tanaka, 2014, Dealing with a banking crisis: What lessons can be learned for Japan's experience?, *Quarterly Bulletin 2014 Q1*, Bank of England, pp. 36-48.

Peek, J., and E.S. Rosengren, 1997, The international transmission of financial shocks: the case of Japan, *American Economic Review*, vol. 87(4): 495-505.

Peek, J and E. S. Rosengren, 2000, Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States, *The American Economic Review*, vol. 90(1): 30-45.

Puri, M., J. Rocholl and S. Steffen, 2011, Global Retail Lending in the Aftermath of the US Financial Crisis: Distinguishing Between Supply and Demand Effects, *Journal of Financial Economics*, vol. 100(3): 556-78.

Reinhart, C., and K. Rogoff, 2014, Recovery from Financial Crises: Evidence from 100 Episodes, NBER Working Paper 19823.

Swagel, P., 2009, The Financial Crisis: An Inside View, *Brookings papers on Economic Activity*, pp. 1-78.

Schwierz, C., 2004, Economic costs associated with the Nordic banking crisis, *The Norwegian Banking Crisis*, Norges Bank Occasional Papers 33, pp. 117-144.

Taliaferro, R., 2009, How do banks use bailout money? Optimal capital structure, new equity, and the TARP, Working Paper, Harvard Business School.

Taylor, J.B., 2011, Evaluating the TARP, Written Testimony for the Committee on Banking, Housing and Urban Affairs.

Veronesi, P., and I. Zingales, 2010, Paulson's gift, *Journal of Financial Economics*, vol. 97(3): 339-68.

Viotti, S., 2000, Dealing with banking crises – proposal for a new regulatory framework, *Economic Review*, vol. 3: 46-63.

Woo, D., 2003, In Search of 'Capital Crunch': Supply Factors Behind the Credit Slowdown in Japan, *Journal of Money, Credit and Banking*, vol. 35 (6): 1019-38.

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