# The Relation Between Bank Resolutions and Information Environment: Evidence from the Auctions for Failed Banks.

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**Abstract**

This study examines the impact of disclosure requirements on the resolution costs of failed banks. Consistent with the existence of adverse selection in auctions for failed banks, regulators incur lower costs of closing a bank and retain a higher portion of the failed banks' assets when the failed bank was subject to greater mandatory disclosure requirements. When failed banks have lower disclosure requirements, bidders are also more likely to be geographically closer to the failed bank. The paper provides new insights on the relation between information disclosure and the reorganization of a banking system when the banking regulators' preferred plan of actions is to promote and subsidize the acquisition of undercapitalized banks by healthy ones. The results are consistent with the hypothesis that mandatory disclosure requirements lower the total cost of resolution of a failed bank for the regulator.

**Keywords:** Banks, Failures, Disclosure Regulation, Cost of Capital.

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# 1 Introduction.

This study examines the interaction between the information environment of financial institutions and the reorganization process of the US banking system in the aftermath of the 2008 financial crisis. From the beginning of 2008 until the end of 2010, the Federal Deposit Insurance Corporation (FDIC) acted as the receiver or liquidating agent for more than 300 closed banks and successfully conducted 287 auctions for failed banks' assets and deposits. I investigate whether on average, regulators incur smaller losses on the resolution processes of banks whose disclosure requirements were more comprehensive.

The analysis of the relationship between accounting information and regulatory actions in response to a financial crisis is not new in the literature. For example, Skinner (2008) examines the distortion of accounting rules for deferred tax assets as an instrument of regulatory forbearance by Japanes authorities. More recently, Bischof et al. (2010) analyze the economic consequences of an amendment to IFRS that relaxed fair value accounting rules during the financial crisis of 2008-2010. Both studies focus on the role that accounting played as a tool of forbearance during financial crises. In contrast with this prior research, I examine how the information environment of financial institutions influences the outcomes of the reorganization process conditional on regulatory authorities choosing to close the distressed financial institutions.

The financial crisis is an opportunity to study the relationship between the information environment and the reorganization of a financial system following a crisis. The banking regulators and the Federal Deposit Insurance Corporation (FDIC) resolved a number of institutions that is only paralleled by the interventions of the Savings & Loans crisis of the 80's and early 90's. In 2008, they closed 25 financial institutions (including Washington Mutual, which is the greatest retail bank failure ever) and in 2009 and 2010, the regulators closed 140 and 157 banks. In terms of total deposits (measured relative to the fourth quarter of 2007), failed banking organization represented 5.5% of total deposits in the system.

The FDIC is mandated by the Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991 to choose the least costly method for bank resolution. During the financial crisis of 2008–2010, the Purchase and Assumption (P&A) transaction was almost always chosen as the least costly method to resolve a bank. In a P&A transaction, the failed banks' assets and liabilities are marketed to a

set of potential bidders (the bid list) who decide whether to place a bid for some or all of the closed bank's assets and liabilities. The financial institution whose bid entails the least cost for the federal deposit insurance fund takes over the failed bank and the correspondent assets and liabilities on sale at the auction. This form of bank resolution provides a setting to examine the relation between information environment and the reorganization of a financial system because the participants in the bank resolution process, namely regulators, potential bidders, and outside investors, are likely to be asymmetrically informed about the financial condition of the failed banking organization. Thus, this is an opportunity to analyze to what extent does an increase in disclosure requirements attenuate the information asymmetries between participants in the transaction and consequently reduce the price that the regulators have to pay to complete the bank resolution process and ultimately the reorganization of a financial system.

To motivate the empirical analysis, I rely on implications from auction theory models, namely those of Milgrom and Weber (1982), French and McCormick (1984), Engelbrecht-Wiggans et al. (1983) and Hendricks and Porter (1988). Milgrom and Weber (1982), show that the release of public information increases a seller's expected revenue in an auction regardless of the type of auction under consideration, whereas French and McCormick (1984) find that in equilibrium, the expected revenue for the seller is decreasing in the costs of preparing a bid, because ultimately the bidders in the auction will transfer the cost of preparing the bid to the seller in the form of lower expected bids. Tadelis and Zettelmeyer (2011) argue that information disclosure increases expected revenues through by improving the allocation of potential bidders to auctions where they have a comparative valuation advantage. The models of Engelbrecht-Wiggans et al. (1983) and Hendricks and Porter (1988) provide a theoretical characterization of the equilibrium bids when bidders are asymmetrically informed about the value of the auction. The results in these models show that when bidders are asymmetrically informed, the uninformed bidder's equilibrium strategy is a mixed strategy that involves not bidding with strictly positive probability. To the extent that greater disclosure requirements reduce the information asymmetries among participants in an auction, these models predict that failed banks with higher disclosure requirements should be less costly to close and regulators should retain a smaller share of these banks' assets. Moreover, the probability that uninformed bidders participate in auctions for failed banks with

greater disclosure requirements should be higher.

The identification strategy exploits the cross-sectional variation in the SEC filing requirements of failed banks to capture differences in the level of mandatory disclosure requirements across the sample of failed banks. Notwithstanding the quarterly financial report that all commercial banks must file with their respective regulators, registering with the Securities and Exchange Commission (SEC) still constitutes a sizable increase in disclosure requirements, given that it implies that bank managers must submit a mandatory Management Discussion & Analysis section and file 8-Ks notifying their shareholders of any unscheduled material events, among other disclosures. This identification strategy has the advantage of arguably being robust to a particular type of selection bias, since it is unlikely that bank managers decide to register with the SEC to limit the banking regulators' losses in the event of resolution.

A potential problem with the identification strategy is that banks registering with the SEC are more likely to be listed in a stock exchange and to be monitored both by banking supervisors and equity market participants. Academic studies such as Berger et al. (1998), provide evidence consistent with the hypothesis that the monitoring role of market participants produces incremental information that improves financial institutions' governance. To the extent that bidders recognize that SEC banks are better governed institutions, the lower cost of resolution of SEC failed banks can also be interpreted as a manifestation of the improved monitoring function of these banks. Furthermore, such results could also be explained by the incentives that public firms have to supply higher quality accounting as documented in Ball et al. (2003) and Burgstahler et al. (2006). To address this issue, I introduce in my analysis two distinct categories of failed banks: "Dark" banks are failed banks that were exchange listed but were not required to file with the SEC, *i.e.* banks that are monitored by equity market participants but are not subject to the enhanced disclosure requirements of the SEC and "Private SEC" banks, that is banks that committed to the higher disclosure requirements of the SEC but are not exchange listed.

The empirical strategy is subject to several other caveats. First, I acknowledge that the banks' SEC filing status can be associated to opportunities and risks that I am unable to control, but are correctly observed and priced by participants in the P&A transactions. Second, registration with the

SEC is strongly correlated with the size of the bank, which ultimately may impact the final outcomes if the relation between the estimated cost of resolution and assets' size is highly non-linear. I try to address these concerns in the robustness section by implementing further empirical tests that rule out competing hypotheses. However, I acknowledge that I will not be able to completely dissipate all concerns regarding the identification strategy employed in this paper, and consequently the empirical results should be interpreted with some caution.

The empirical analysis finds evidence consistent with the theoretical framework. When failed banks are subject to greater disclosure requirements, the regulator is able to close a bank with lower estimated costs as a percentage of the failed bank's deposits and retain a smaller percentage of the failed banks' assets. In fact, I find that if the failed bank is subject to the disclosure requirements mandated by the Securities and Exchange Commission (SEC), the average estimated cost to the banking regulators of failing the banking organization was on average 4.5 percentage points lower than the average estimated cost of closing a bank that was is not filing with the SEC. Moreover, the percentage of assets of the failed institution sold by the regulators in the auction is 7.5 percentage points greater when the failed bank is registered with the SEC. Morever, potential bidders that are not headquartered in the same state as the failed bank are significantly more likely to bid for failed banks that file with the SEC. The results also show that "Dark" banks are not significantly less costly to close vis-à-vis other private failed banks, whereas "Private SEC" banks are not significantly more costly to resolve than other SEC banks. Despite the small size of these sub-samples, I interpret these results as providing some support to the primary hypothesis that the SEC's stricter disclosure requirements are the driving force behind the main results.

This paper provides the following contributions to the literature. First, I provide new evidence on the impact of the information environment of banks on the outcomes of bank resolution. This evidence is important in the light of the current effort in the academic literature and by policy-makers to understand what the most efficient bank resolution structure is. (e.g. Acharya and Yorulmazer (2008), Kocherlakota (2009)). I show that the losses from bank resolution are affected by information asymmetries between the participants in the bank resolution process and that empirically these losses vary with the level of the banks' disclosure requirements. This result can have several policy

implications: First, a better understanding of the relative costs of the different options to deal with problem banks (e.g. forbearance, bank resolution) helps regulators choose the optimal mix of actions to deal with a financial crisis. Second, these results uncover a potential externality associated with information production and disclosure in the banking sector. Assuming that information disclosure does indeed affect the cost of resolution for the regulators, as I argue in this paper, the private benefits to the bank from information disclosure are lower than the social benefits of that decision. Thus, these results are informative for policy-makers, who may wish to take these effects into consideration when setting the optimal level of reporting for the financial institutions in the economy.

This paper also contributes to the sparse empirical literature documenting the relation between information disclosure and auction outcomes. With the exception of a few studies that exploit changes in state legislation regarding the disclosure of information in procurement auctions (e.g. De Silva et al. (2008)), empirical tests of the relation between information disclosure and auctions outcomes have been to a great extent confined to laboratory experiments (e.g. Kagel and Levin (1986)) that take advantage of their controlled environment to clinically administer information to the auction participants. The current study tries to partially fill this void by exploring a source of variation in information disclosure that derives from differences in banks' disclosure requirements prior to their failure. To the extent that banks' management teams were not selecting into stricter disclosure requirements with the purpose of reducing the costs of bank resolution for the regulators, it is possible to argue that this is a plausibly exogenous source of variation in the information environment of these auctions, hence making this setting suitable to tests of the main theoretical hypotheses of the relation between disclosure and auction outcomes.

## 2 Institutional Background: The resolution process of a bank

Financial institutions are supervised by a chartering authority (either a state banking regulator, The Office of the Comptroller of the Currency, The Office of Thrift Supervision), which is responsible for initiating a resolution process, once it deems that a financial institution is critically undercapitalized.

The chartering authority begins the resolution process by sending a "failing bank letter" to the

FDIC. Upon the receipt of this letter, the FDIC contacts the failing bank to coordinate efforts with the board of directors of the failing institution and to request its loan and deposit data. After receiving the data a team of FDIC's resolution specialists visits the institution's premises to directly inspect the institution's financial condition and collect detailed information on the liquidation value of the institution's asset. Given the demand for an expedited process, the FDIC resolution specialists use a statistical sampling procedure to estimate a loss factor for each category of loans on the failing institution's books. This loss factor is then used to estimate the bank's liquidation value, which will be crucial to set the reservation value on the sale of failing institution's assets.

After collecting all the information, the FDIC decides on the resolution structure to adopt. The most commonly used option is the purchase and assumption (P&A) agreement in which the FDIC auctions some or all of the bank's assets and liabilities in a procedure that closely resembles a first price sealed bid auction. (Giliberto and Varaiya (1989)). The other options available to the FDIC is to carry out a deposit payoff, in which it pays off all of the insured deposits and liquidates the assets of the failed bank or to create a bridge bank to manage the failed institution's assets and liabilities before putting it back to the market. According to James (1991), there are at least two reasons to believe that a P&A transaction is indeed more efficient than a deposit payoff. First, the bank can have a going-concern value that is higher than its liquidation value, which is lost if the FDIC chooses to liquidate the bank. Second, the private sector is arguably better at managing or liquidating the failed banks' assets. However, as authors like Spiegel (2001), argue the process of disposition of the failed bank through a P&A transaction precludes the possibility of an intensive due diligence process, which results in increased information asymmetry concerns. In practice, the greater efficiency associated with the P&A transactions seems to trump the asymmetric information concerns and the FDIC always promotes a P&A transaction and only if there are no bidders interested in purchasing the failed bank's net assets at a price above its reservation value, it conducts a deposit payoff.

Once the information has been gathered and the resolution process chosen, the FDIC starts marketing the failing institution to a list of potential bidders that satisfy a minimum set of previously defined criteria. To be eligible to bid for a failed banking organization, the potential bidder must be a

financial institution or be in the process of applying for a bank charter, have a CAMELS[1] rating of 1 or 2, have a satisfactory anti-money laundry record and be well-capitalized (Total risk-based capital of 10%, Tier 1 capital ratio of 6% and Tier 1 leverage ratio of 4%). On top of this, the bidder institution is required to be twice the size of the failing institution if it is located in its vicinity and it must be even larger relative to the failing institution if it is geographically distant from the target institution. The FDIC also accepts bids from private investors provided that they have the adequate funds and are engaged in the process of obtaining a charter to create a new institution.

All approved bidders are given access to the FDIC's IntraLinks portal, in which the supervisor places an information package containing detailed financial data and expected losses on the failed bank's loan portfolio. The bidders can also find information regarding the premises, IT systems and bidding details in the IntraLinks systems. The potential bidders are not granted access to customer specific data, so it is reasonable to say that information asymmetry will persist among all the involved parties in the transaction. The IntraLinks system also contains information regarding the types of P&A transaction that the FDIC selected for each particular deal. Depending on the characteristics and financial condition of the failed bank, the FDIC proposes one or more types P&A transaction such as, a whole bank purchase (all deposits and assets of the bank), a whole bank purchase with loss-share agreement, a modified P&A agreement (the bank is modified to exclude the riskier asset tranches), a clean P&A (the failed bank is stripped of all risky assets for the purpose of the auction) or a combination that includes some of the above. For a given resolution process, the FDIC may limit the types of feasible P&A transaction to just one of the above, but can also allow bids for several of these types of P&A agreements.

Every potential bidder in an auction can also conduct its own due diligence at the failing institution's site, provided that the board of the failing institution grants its approval. However, potential bidders have a very short window for doing their due diligence, since it is limited to two or three days for a team of three to five specialists. This number compares to a reported average of 115 days of due diligence for traditional M&A acquisitions reported in Wangerin (2010). Therefore, it is implausible that the due diligence process extinguishes the information asymmetries between the parties in the

[1]The CAMELS rating is the US banking regulators' rating of the bank's overall condition. CAMELS is an acronym for (C)apital adequacy, (A)sset Quality, (M)anagement, (E)arnings, (L)iquidity and (S)ensitivity to market risk

transaction.

The bidding process generally starts 12 to 15 days before the scheduled closing of the target institution. The potential bidders that are interested in the acquisition of the bank in the auction can place one or more sealed bids for the failed bank (bidders can place one bid for each type of P&A transaction proposed by the FDIC). A bid typically has two parts: The first is the deposit premium which consists of the amount that the bidder pays to assume the institution's deposits. The second part of the bid is the discount on assets, which represents the discount requested by the bidder on the book value of total assets. The FDIC is mandated by the Federal Deposit Insurance Company Improvement Act of 1991 to choose the least costly alternative to the deposit insurance. To meet the terms of the act, the FDIC selects the winning bid using its proprietary least cost test, which estimates the cost that each bid entails for the Deposit Insurance Fund.

To finish the process the FDIC staff provides a written recommendation to the FDIC board of directors, which is ultimately responsible for determining the least costly resolution. Once the board, approves the transaction, all the interested parties are informed of the outcome and the FDIC proceeds to close the bank and transfer the assets and deposits to the acquirer. According to the FDIC, this resolution process takes an average of 90 to 100 days to complete. However, this window may be significantly shortened if the institution fails before the end of the process (e.g. if the bank falls victim to a bank run).

# 3 Hypothesis Development

Information plays a key role in auctions. The equilibrium allocations and payoffs in an auction are crucially determined to a great extent on what is known by whom about the value of the object being auctioned. Academic research has studied these issues over the past few decades. Some models such as Milgrom and Weber (1982) or Kagel and Levin (1986) study a setting in which the seller is better informed relative to the bidders regarding the value of the object. Other models, such as those of Engelbrecht-Wiggans et al. (1983) and Hendricks and Porter (1988) focus on understanding the equilibrium bidding strategies in models in which some bidders have superior information vis-à-vis

other potential participants in the process. Models of information asymmetry in auctions have also been used empirically in the corporate finance literature, namely to study takeover and bankruptcy auctions (see Dasgupta and Hansen (2006) for a comprehensive survey of the corporate finance work in this field).

There are two distinct classes of models in auction theory: Independent Private Values (IPV) and Common Values (CV) auctions. In an IPV auction, bidders have perfect knowledge of their value for the object, but do not know how others value the object. In CV auctions, the object of interest is valued similarly by the bidders, but they only have an imprecise signal of what that the true value is. The winner of a CV auction tends to be the one that overestimates the true value of the object the most, thereby incurring in a loss. This common adverse selection result is known in the literature as the winner's curse. A standard result in the auction literature is that bidders protect against this effect by adjusting their equilibrium bidding strategies

The first-price sealed bid auction that the FDIC promotes for the failed banks is likely to have elements of both types of auctions. Different potential bidders can have different valuation of the failed bank depending on the synergies that they expect to have with the failed bank. Nevertheless, it is not clear that complementarities in geographic characteristics would necessarily be a private value of the potential bidders given that these synergy characteristics can be observed by other potential bidders. On the other hand, as Giliberto and Varaiya (1989) argue, the eligibility requirements imposed by the FDIC imposes some homogeneity among the pool of potential bidders and by this means reduces the variation in the true value of the bank for each potential bidder.

Milgrom and Weber (1982) show that under mild assumptions[2], the release of credible public information regarding the object's value increases the seller's (i.e. FDIC) expected revenues in a general model. The required mandatory disclosures resulting from SEC registration provide relevant additional information to auction participants about the condition of the failed bank and as a result, it reduces the adverse selection problems in the P&A transactions. This results in my first hypothesis:

[2]The main assumption in Milgrom and Weber (1982) is that the valuation of bidders must be affiliated. In rough terms, affiliation means that higher valuations by one participant make it more likely that other participants also have high valuations. In this sense, the release of public information unconditionally increases bid aggressiveness within an auction by aligning the valuation views of the auction participants.

**H1:** The estimated cost of bank resolution is likely to decrease with the level of disclosure requirements of failed banks.

I further explore the failed bank's auction setting focusing on its common values element. French and McCormick (1984) show that given free entry in a common values auction, bidders will enter the auction until their expected profits are equal to the costs of preparing a bid. Hence, in equilibrium the sellers bear the bidders' costs of preparing a bid which will be higher as the information asymmetry surrounding the P&A transaction is higher. I expect that stricter disclosure requirements for failed banks prior to their closure reduce some of the information asymmetry among participants in the auction, thus lowering bid preparation costs and decreasing the cost for the regulator of closing the failed bank. As a result, the French and McCormick (1984) framework also yields a similar empirical implication to H1. Recently, Tadelis and Zettelmeyer (2011), propose a mechanism through which information disclosure can affect auction outcomes. In their model, information disclosure increases expected revenues in an auction by facilitating the optimal matching of heterogeneous buyers to the auctions where they have a comparative advantage. This improves expected revenues by ensuring that buyers whose valuation of the object is greater are present in the auction. The interesting feature of this model is that it presents an example of how information could increase expected revenues even if in the bidding stage buyers can perfectly observe the quality of the object. Even though, this is a plausible channel through which disclosure may affect expected revenue in the auctions for failed banks, this paper is not able to directly test the Tadelis and Zettelmeyer (2011) model because to do so it would be necessary to pinpoint what creates horizontal differentiation in buyers' valuations of failed banks.

French and McCormick (1984) argue that the seller can improve its payoff by disclosing its private information regarding the failed bank, thereby reducing the bid preparation costs for potential bidders. However, because the FDIC's objective to minimize the resolution cost of the bank is in conflict with the interests of the potential bidders, the FDIC cannot credibly disclose its private information. As French and McCormick (1984) argue, the FDIC can credibly signal the quality of the underlying assets by retaining a part of the failed bank's most troubled assets. This mechanism, which resembles the costly signaling game introduced by Leland and Pyle (1977), would reduce the potential bidder's

demand for information, thus increasing the expected revenue from the sale of the failed bank. This feature of the French and McCormick (1984) model can explain some of the heterogeneity in the types of P&A transactions observed in the data.

I hypothesize that increased disclosure requirements in the failed bank attenuates the information asymmetry problem between the FDIC and potential bidders and as a result, reduces the need for the FDIC to signal the quality of the failed bank's assets through the costly mechanism of retaining a greater share of failed bank's assets. This leads to my second hypothesis:

**H2:** The percentage of assets sold in the failed bank auction increases with the level of disclosure requirements of failed banks.

The models of Engelbrecht-Wiggans et al. (1983) and Hendricks and Porter (1988) provide a theoretical characterization of the equilibrium bids when a bidder possesses superior information relative to other bidders in the form of a private signal or a more precise signal regarding the value of the object. The results in these models show that when bidders are asymmetrically informed, the uninformed bidder's equilibrium strategy is a mixed strategy in which it does not bid with some strictly positive probability and bids also with strictly positive probability. The intuition for this result is that if uninformed bidders always participate in the auction, they will be plagued by a form of the winner's curse to the extent that they will only win if the informed bidder's estimate is low. On the other hand, no bid, cannot be an equilibrium strategy for uninformed bidders because in that case, informed bidders will just offer the seller's reservation price and take all the surplus. In such an extreme situation, uninformed bidders would have incentives to bid slightly above the reservation price and win the auction.

I rely on a strategy akin to that of Sufi (2007), and use the geographic proximity between the potential bidder and the target failed bank as a construct for the likelihood that a potential bidder is superiorly informed relative to other potential bidders. To the extent that greater disclosure requirements reduces the information asymmetries among the participants in an auction, the models presented above predict that the probability that geographically distant bidders participate in the auctions for failed banks increases with the level of disclosure requirements of the failed bank. Thus, my third and final empirical hypothesis is:

**H3:** The probability that geographically distant bidders participate in a failed bank auction increases with the level of disclosure requirements of the failed bank.

# 4 Data and Summary Statistics.

## 4.1 Data and sample selection.

I obtain my sample on the P&A transactions and failed bank characteristics from the SNL Financial database. This database provides information on specific details of the deals such as the identification and financial characteristics of the target and buyer banks, and characteristics of the government assisted deals contract. The SNL financial database collects the data from a variety of sources, namely the financial institutions call reports, SEC filings (when available), FDIC press releases announcing the merger, merger applications, merger documents and finally from other documents subsequently released by the FDIC disclosing more details about the bidding process.

The FDIC closed 322 banking organizations from January 1, 2008 to December 31, 2010. I exclude from the sample all deals whose resolution process was the deposit payoff because there is no data on the resolution cost of this type of resolution process. This leaves me with a sample 287 completed P&A transactions. I also exclude six P&A deals for which there is no data on the target because these were a combination of some subsidiaries of bank holding companies for which there was no consolidated financial statement. I also dropped two deals for which there were no financial characteristics for the buyer because the failed bank was bought my multiple acquirers. I exclude two outlier banks whose dimensions required a specially negotiated type of bank resolution that does not fit perfectly into the P&A deal: Washington Mutual Bank and Indymac Federal Bank F.S.B. Finally, I exclude six transactions for which I could not link the target firms to their financial statements data.

## 4.2 Summary Statistics.

Table 1, provides information on the number of quarterly P&A transactions for the 2008 to 2010 period. The FDIC organized a total of 287 P&A transactions during this period. Most transactions

came after the second quarter of 2009, perhaps due to improved economic conditions and an increased appetite from healthy banks to enter the auctions for distressed banks.

Table 2, provides some descriptive statistics regarding the characteristics and outcomes of these auctions. The estimated cost of closing a bank is a measure of the estimated cost of the bank resolution calculated by the FDIC using its proprietary least cost test. During the sample period the estimated average cost as a percentage of the failing institution's deposits was 28.76%. Assets Sold is calculated as the percentage of assets sold in the P&A transaction over total assets of the failed bank at the time of closure. On average, 82.14% of the failing institution's assets were transferred to the winning bidder in the auction, 72% of the P&A transactions included a loss share agreement[3] and these loss share agreements covered on average 72% of the banks' assets at the time of closure.

Figure 1, shows the average estimated cost of bank failures as a percentage of deposits of the failed bank per quarter. The graph shows that the average estimated cost of bank failures increases during the 2008 year when it reaches the 35%-40% level and subsequently shows a pattern of steady decline to the 20%-25% of the failing bank's deposits. Figure 2, shows the evolution of the average percentage of assets that the failing bank sold in the bank resolution. During 2008, winning bidders chose to assume a smaller percentage of the failing bank's assets. Once again, with the improvement of the economic environment in the second half of 2009 and in 2010, the average percentage of assets sold in the resolution process increased to the 85%-90% range.

Table 3, provides univariate comparisons between failed banks and non-failed banks for the means of size, solvability, liquidity and prudential ratios. Failed banks are not significantly different from non-failed banks in terms of their mean size and liquidity but exhibit significantly worse prudential ratios and profitability and Asset quality ratios. Moreover, these banks seems to be significantly more exposed to Real Estate loans and are headquartered in regions that were hit harder by the housing price slump of 2007:Q4 to 2009:Q4.

[3]In a loss share agreement, the FDIC absorbs a share of the losses on a specified pool of covered assets. Until September 2010, the FDIC typically covered 80% of the losses in a first tranche of assets and 95% of the losses on a second tranche. After, September 2010, the FDIC changed to 80-20-95 coverage for each threshold of losses.

# 5 Empirical Implementation.

Every national and state commercial bank is required to file a Report of Condition and Income which is commonly known as Call Report. During the sample period, thrifts were required to file a Thrift Financial Report to the former Office of Thrift Supervision. Both reports mandate the financial institutions to disclose comprehensive data that overlaps and in some instances are more detailed than the financial information that is provided in the 10-Ks and 10-Qs filed by firms that register with the Securities and Exchange Commission (SEC). Furthermore, the FDIC provides public information on branch locations by financial institution and the Federal Financial Institutions Examination Council also publicly discloses bank-level loan data. Despite the depth of information that is provided by various sources, SEC registration still increases mandatory disclosure requirements in several ways. First, 10-Ks include a mandatory Management Discussion and Analysis which provides a narrative of how an entity has performed in the past, its financial condition, and its future prospects, whereas the Call and Thrift reports only include a commentaries section that is optional and very seldom used by banks. Second, banks that file with the SEC must file 8-Ks notifying its shareholders of unscheduled material events such as a director election, a material impairment, change in company ownership, the creation of a direct financial obligation or an obligation under an Off-Balance sheet arrangement of a registrant, among other events. This type of timely disclosure is unparalleled in any other source of public data available. Finally, public firms also have to distribute Proxy Statements (Schedule DEF14A) in advance of the annual shareholder meetings. This schedule contains a great amount of information such as the curricula of the directors and the elements of the compensation packages to the board of directors. Since 2006, the proxy statement must also include a Compensation Discussion and Analysis (CD&A) that contains a detailed analysis of the elements of the compensation packages that will be voted in the shareholder meeting. This statement may be useful to evaluate the quality of the banks' previous directors and thus infer how well run was the bank.

An important issue for this study is whether the requirement to report with the SEC actually corresponds to a significant increase in disclosure requirements. Anecdotal evidence is consistent with

this conjecture. In fact, the American Bankers' Association states[4] that it has lobbied for the update of the thresholds used to determine whether a public company has to report with the SEC, arguing that it is too costly for small banks to comply with the SEC disclosure requirement. Moreover, three months after the recent introduction of the JOBS act[5], more than 60 banks and bank holding companies have already filed for SEC deregistration. This number is greater than the number of banks that had deregistered in the prior four years. Thus, it is plausible to argue that the decision to file with the SEC results in a material incremental mandatory disclosure burden for banks over and above what is demanded by the Call and Thrift Reports, otherwise the introduction of the JOBS act would not have generated such a drastic and sudden reaction. Accordingly, I will use the banks' SEC registration status in my main specification to proxy for increased mandatory disclosure.

The empirical strategy implemented in this study leads to some problems that must be addressed. First, banks' SEC filing status greatly overlap with their public ownership status. In fact, given that the great majority of SEC filers are publicly owned companies, it is difficult to identify whether the effect on failed banks' resolution cost results from improved market monitoring by equity and debt market participants or from the improved information environment resulting from the increased mandatory disclosures associated with SEC registration. To deal with this issue and attempt to disentangle these two effects, I employ an alternative empirical specification in which I analyze the resolution costs of "Dark" banks, i.e. banks listing in OTC markets, but not filing with the Securities and Exchange Commission (SEC). These banks either belong to the Pink Sheets or the OTCBB[6] but decided either to not file with the SEC from their inception or to go dark as their optimal reporting strategy (Leuz et al. (2008)). Thus, this group of banks is likely to be subject to market monitoring by equity market participants, but it is not subject to the mandatory disclosure requirements that the SEC registration demands. Moreover, in the same empirical specification I also introduce an indicator variable to examine the resolution costs of banks that are privately owned (and therefore not subject to the equity market monitoring forces) but decided to register with the SEC. The study of the resolution costs for

[4] See http://www.aba.com/Issues/Issues_UpdatingSEC.htm

[5] The Jumpstart Our Business Act was signed into law April 5th. It increased the threshold under which a bank or bank holding company can deregister their securities from 300 to 1,200 holders of record

[6] The eligibility rule of the OTCBB market does not require banks to file with the SEC provided that these banks are current in their mandatory regulatory filings with the corresponding regulatory bodies.

these two classes of banks are likely to provide some insights regarding the relative strength of market monitoring and increased mandatory disclosure requirements in shaping the resolution costs of failed banks.

The second drawback to the use of SEC filing as the main variable of interest is that it is highly correlated with size. Thus, it is possible that the type of SEC filing may be capturing a size-related effect. Confirming the suspicions, Figure 3 shows that the size distribution of SEC failed banks is to the right of the corresponding distribution for Non-SEC banks. Nevertheless, the concerns raised above are alleviated by the fact that there is still some degree of overlap between SEC Banks and Non-SEC banks' sizes. To further alleviate concerns with this problem, I employ three splines for size in the main empirical specification and in robustness tests, I run the main regressions excluding all the failed banks outside the range of size that is common to the two categories of failed banks under analysis.

The third problem is that our main variables of interest may capture unobserved sources of value and risks in the loan portfolios of the failed banks that are detected and priced by the participants in the P&A transactions but are unobservable to the econometrician. Ideally, I would deal with this problem by using an instrument. However, I could not find any strong instrument that plausibly satisfied the exclusion restriction. Therefore, I will deal with this problem by trying to show that the two categories of failed banks do not substantially differ in terms of a comprehensive set of observable indicators for the bank.

On the positive side, the setting under analysis provides some comfort in terms of self-selection issues. Given that the equity stakes of the failed banks are invariably wiped out when a bank is closed, it is unlikely that the managers and equity holders of the banks select to register with the SEC in order to reduce the costs of resolution and as a result potentially salvage some of their capital. Nevertheless, it is plausible that the unobserved incentives that led some of the banks to recently raise capital and therefore select into registration with the SEC also have an effect on the resolution costs. To alleviate these concerns, I run additional robustness tests, in which I only analyze the subsample of SEC firms that have initiated SEC filing before 2004.

Table 4, presents means and standard errors for banks grouped by the empirical categories presented

above. Most failed banks do not file with the SEC. Moreover, Dark and Private SEC banks represent a small fraction of the total failed banks. This issue can create a statistical power problem for the empirical tests of the next section. Further confirming the suspicions regarding the correlation between SEC filing type and size, SEC banks seem to be larger than Non-SEC banks. Nonetheless, there does not seem to be great discrepancies for the solvability, liquidity and profitability ratios across the different groups and given the magnitude of the standard errors these small differences are surely statistically insignificant. The means and standard errors of the P&A deal characteristics suggest, as hypothesized in the previous section, that banks with better information environment due to increased mandatory disclosure requirements have lower costs of bank resolution and that regulator to hold a smaller portion of the failed bank's assets in the auction.

To explore the relation between the auction outcomes and the previous disclosure requirements of failed banks, I examine how the failed bank's disclosure characteristics affect the propensity of the potential bidders to place a bid for the failed bank in the P&A transaction process.

To implement this analysis, I start by defining the set of potential bidders that are likely to be invited by the FDIC to evaluate the acquisition of a failed bank. According to the FDIC, the bid list for a given P&A transaction is composed of well-capitalized banks that contact the FDIC notifying their interest in that particular geographical area and are at least double the size of the failed bank. In practice, I cannot observe the bid list of invited potential bidders for the failed bank, but I can observe whether a potential bank has expressed interest in a particular geographical area by analyzing whether a bank has bid for banks in the same geographical area both in the past or in the future. Thus, I construct the bid list of potential bidders for a given failed bank, by taking all banks that have bid or will bid for a bank in the same state in a one year window. To conform with FDIC criteria, I also restrict the bid list to banks that are at least double the size of the target bank. I also considered that very large potential bidder banks would not find bidding for small banks attractive, thus I restricted the bid list to pairs whose potential bidder's size relative to failed bank size is lower than 40. Results are robust to this research design option. Note that given the research design options, the unit of observation in this analysis is a pair failed bank-potential bidder.

Table 5, presents summary characteristics for participants in P&A transactions. The most relevant

facts to take away from this table are that the average size of bidders for SEC failed banks is about three times as large as the average size for the bidders of Non-SEC banks. To some extent this relation is purely mechanical, given that SEC failed banks are also larger than Non-SEC banks and the FDIC imposes a lower bound on the size of the potential bidder relative to the failed bank. An analysis of the relative size of the bidder-failed bank pair shows that on average bidders are much larger relative to failed banks in P&A transactions involving Non-SEC banks than for P&A transactions involving SEC failed banks. However, this can partially result from the high subsample skewness (unreported) of the ratio for Non-SEC P&A banks transactions. The geographical characteristics, hint at the results that are presented in the next sections. The examination of the table shows that the percentage of banks from the same geographical area bidding for Non-SEC failed banks is larger in every category of geographical stratification than the same percentage for the group of SEC failed banks.

# 6 Empirical Design and Results

## 6.1 Empirical Design

In this section, I investigate how the estimated cost of bank resolution and the percentage of assets sold in the P&A transactions vary with my constructs for information environment. The main regression has the following general specification:

$$P\&A_{ijt} = \alpha + \beta SEC_{ijt} + \gamma X_{ijt} + \eta_j + \nu_t + \varepsilon_{ijt}$$

where i is an index across P&A transactions, j is an index representing the US state where the failed bank is headquartered and t is an index that represents the quarter of the observation. The dependent variables are the variables of interest in the P&A transactions, namely the Estimated Cost of Bank Resolution as a percentage of deposits and the percentage of assets sold in the P&A transaction. The independent variable of interest is $SEC_i$, which as described in the previous section is an indicator variable for the failed bank's SEC registration status. The vector of observed bank characteristics $X_i$ include several bank characteristics measured as of the fourth quarter of 2007, namely Total assets of

the bank, Tier 1 Capital Ratio, Liquidity Ratio, Return On Assets, Real Estate Loans as a percentage of Total Assets, Non-Performing Loans and Loans 90 days or more past due over total equity plus Loan Loss Reserves, Brokered Deposits as a percentage of Total Deposits, Total Asset Growth in the 2005 to 2007 period and a house price shock index taken from the data provided by the Federal Housing Finance Agency that reflects the house price drop from 2007:Q4 to 2009Q4 in the MSA where the failed bank is headquartered. These control variables are aimed at controlling for the underlying riskiness, profitability, liquidity and solvability of the failed banking organizations because these are factors that may be jointly related to the outcomes of bank resolution and to my main variable of interest, thus their omission from the specification would potentially bias the results. Furthermore, I also include a set of dummy variables that control for quarter effects, hence allowing me to control for changing conditions in the market for auctions of failed banks (e.g. shifts in the demand and supply for/of failed banks) and another set of dummy variables that control for state effects, thus controlling for different banking regulations and supervisors across states and to a certain extent also for local economic conditions. The introduction of quarter and state dummies implies that the main effects are identified out of the variation in auction outcomes that took place within the same state and quarter.

Following Sufi (2007), I also include in the main regression three splines based on the total assets of the failed bank measured as of 2007:Q4. I use these to allow the intercepts and the coefficients on the Total Assets variable to vary for each size group. As I mentioned in the previous section, this type of methodology alleviates some concerns regarding the strong correlation of the type of ownership of the bank with its size. The results are robust (i.e. the coefficients of interest remain significant at the 10% level) to the non-inclusion of these three splines.

I also run an alternative empirical specification with the aim of identifying whether the effects captured in the main empirical specification are the result of increased disclosure requirements as hypothesized or if it results from the increased market monitoring and visibility associated with an exchange listing. The specification is:

$$P\&A_{ijt} = \alpha + \beta_1 PublicSEC_{ijt} + \beta_2 DARK_{ijt} + \beta_3 PrivateSEC_{ijt} + \gamma X_{ijt} + \eta_j + \nu_t + \varepsilon_{ijt}$$

where $PublicSEC_{ijt}$ is an indicator variable taking the value of one if the failed bank is listed in an exchange and simultaneously registered with the SEC, $Dark_{ijt}$ is an indicator variable that takes the value of one if the failed bank was listed on an OTC market (OTCBB or the Pink Sheets) but did not file with the SEC and $PrivateSEC_{ijt}$ is an indicator variable taking the value of one if the firm is not listed in an exchange and but registers with the SEC (e.g. the financial institution may have issued public debt is the past). All other variables are defined as above. Note that in this regression, the omitted group is the set of banks whose ownership is private and are not SEC registered.

If the main hypothesis in this paper holds and the coefficient associated with the variable $SEC_i$ does indeed result from increased disclosure requirements, I hypothesize that the estimated coefficients on the variable $Dark_{ijt}$ should not be statistically significant different from zero, because "Dark" banks do not exhibit the improved disclosure requirements from SEC filing even though they benefit from the improved market monitoring associated with being listed in an exchange. On the other hand, the coefficient associated with $PrivateSEC_{ijt}$ should be significant and have the same direction as the coefficient associated with the variable $PublicSEC_{ijt}$. The rationale is that these banks are subject to the increased disclosure requirements of being registered with the SEC, but their equity does not trade in an exchange list and as a result they do not receive the benefits from improved equity market monitoring.

To examine the relation between the type of bidders participating in a P&A transaction and the disclosure requirements of the failed bank, I employ a probit model with the following specification:regulatory entities

$$Prob(D_{ik} = 1) = \Phi\left(\alpha + \beta_1 SEC_i + \beta_2 SameRegion_{ik} + \beta_3 SameRegion_{ik} \times SEC_i + \gamma X_{ik} + \eta_j + \nu_t + \varepsilon_{ik}\right)$$

where $ij$ denotes a failed-bank-potential bidder pair, $i$ and $j$ are indices for failed banks and potential bidders, respectively. $D_{ij}$ is an indicator variable taking the value of one if the potential bidder makes a bid in the auction for the failed bank, $SEC_i$ is defined as above and $SameRegion_{ik}$ is an indicator variable taking the value of one if the potential bidder's headquarter is located in the same Metropolitan Statistical Area (MSA) as the failed bank. The set of control variables $X_{ik}$ include

the failed bank's total assets measured in the fourth quarter of 2007 and three splines for size, as well pair-specific variables such as the Asset Size ratio between failed bank and potential bidder, since this may be an important factor that bidders take into account in their auction participation decision. Given the larger sample size available in this test, I also include Failed Bank's state-fixed effects and quarter fixed effects.

The critical parameters of interest in this regression are $\beta_2$ and $\beta_3$. These coefficients provide information on the likelihood that uninformed potential bidders (measured by geographic distance to the failed bank's headquarters) participate in the auction for the failed bank when the latter is subject to higher or lower disclosure requirements prior to its failure.

The results from this empirical strategy should be interpreted cautiously. The most serious caveat is that P&A transactions for Non-SEC banks may be more likely to be IPV auctions, perhaps due to their smaller size, and bidders' private valuations are positively related to geographical proximity. In this context, results supporting the empirical hypothesis can also be interpreted as a manifestation of the fact that neighboring banks of Non-SEC failed banks are more likely to bid because they have higher private value for the bank.

According to Sufi (2007), a critical component of this analysis is the correlation structure of the error terms within a choice set. In fact, French and McCormick (1984) present a model in which a shock that prompts potential bidder $k = 1$ to participate in the auction can affect negatively bidder's $k = 2$ choice to participate in the same auction. Therefore, following the suggestion in Sufi (2007), I cluster standard errors in this analysis at the P&A transaction level.

## 6.2 Results.

Table 6 presents the results for the main regressions in the paper using Non-SEC failed banks as the omitted group in regressions (1) and (3) and Private Non-SEC banks as the omitted group in specification (2) and (4). The results of specifications (1) and (3) show that the bank resolutions of SEC failed banks are less costly on average and their P&A transactions involve a greater percentage of assets sold, thus providing support to the hypothesis that the reduction in information asymmetry that results from increased mandatory disclosure reduces the costs of resolution of failed banks for the

regulators. These results are statistical significant at the five percent level using heteroskedasticity robust standard errors. The results remain significant at the five percent level if the standard errors are clustered by quarter or state level.

The specifications (2) and (4) of Table 6 present the results from the alternative specification. The coefficient of the main variable (Public SEC) retains the same order of magnitude as the coefficient of the variable SEC in specifications (1) and (3) and is also statistically significant. The coefficient associated with the variable *DARK* in specification (2) is negative, but with a smaller magnitude than the coefficient associated with Public SEC and statistically insignificant. This result seems to lend some support for the hypothesis that the impact of the SEC variable on the dependent variable is the result of increased mandatory disclosure requirements rather than superior market monitoring. Nevertheless, these results should be interpreted very cautiously given that non-significance of the coefficient associated with Dark can be the result of lack of statistical power resulting from the small sample of "Dark" failed banks. In the same vein, the coefficient associated with the "Private SEC" variable is also not statistically significantly different from zero, a result that may also be due to the very small number of failed banks in the Private SEC category. Nevertheless, the order of magnitude of the coefficient associated with the variable Private SEC is very close to that of the variable Public SEC and larger than that of the variable Dark. This lends some support to the main hypothesis because the order of the magnitudes of the coefficients lines up with what would be predicted under the information disclosure story.

The results have economic significance. Using a back of the envelope calculation it is possible to argue that, given the information asymmetry problems that cause the estimated costs of bank resolution to increase in 4.5 percentage points, the 70% of the failed banks have lower mandatory disclosure requirements and that excluding Washington Mutual and Indymac, failed banks accounted for 3.5% of the total deposits in the fourth quarter of 2007, the information asymmetry problems may have cost the deposit insurance fund about 0.11% ($0.045 \times 0.035 \times 0.7$) of the total deposits in the financial system.

Taken together, these results are consistent with the theoretical framework. Banks that file with the SEC are more easily investigated by the potential bidders, thus attenuating the adverse selection

problem between the participants in the P&A transaction. Private SEC banks also experience lower estimated costs of resolution, but the coefficient is estimated very imprecisely and therefore turns out to be non-significant. Nevertheless, if one believes that the reason behind the "Dark" variable statistical insignificance is the lack of statistical power, one can interpret the coefficient in that variable as providing some support for the hypothesis that the increased market monitoring also plays a role in reducing the information asymmetries between the participants in these auctions and therefore accounts for some of the effect that the coefficient associated with the main variable of interest captures.

Table 7, presents coefficients and standard errors from the auction participants probit analysis. Given that the coefficients of interacted variables in non-linear models are uninterpretable (Norton et al. (2004)), I calculate the marginal effects of the interaction term at the individual level using the Stata command proposed by these authors to correctly calculate the marginal effects of interacted variables. Panel B of Table 7 and Figure 3 present the effects of the analysis of the interaction term. Results show that being geographically close to the failed bank does indeed increase the likelihood of participation in the auction relative to being geographically distant, but this effect is only present if the failed bank had low disclosure requirements, that is if it was not registered with the SEC. These results are consistent with the empirical hypothesis that uninformed bidders are more likely to shy away from participation in the auction if the failed bank is relatively opaque.

### 6.3 Robustness: Non-Linearities in the main specification

As I mentioned in the empirical implementation section, the SEC filing status of the financial institution is highly correlated with size. This may bias the main coefficients in the regression if the relationship between size and the outcomes of interest is non-linear. To correct for this problem, I implement three splines for size in the main regressions and the results were not significantly altered. Some concerns remain about the extrapolation of the results outside the common support of size of Non-SEC banks and SEC banks. Figure 4 is a plot of the kernel densities of the failed bank's size as of the fourth quarter of 2007, for each category of information environment implemented. This graph further alleviates these concerns because the distribution of failed Non-SEC banks contains banks whose size is comparable to that of failed banks with SEC banks. In unreported regressions, I estimate the main regressions

in the paper restricting the observations to the range of size which is common to both SEC filing categories. Results are not materially altered vis-à-vis the main specification and the main variable of interest remains significant at the five percent level. This further alleviates the concerns that the relationship between the SEC filing status and the outcomes of the auctions for failed banks is driven by a non-linear relationship in size. Moreover, I also estimated the causal effect of interest using a propensity-score matching procedure. This method has the advantage of not imposing any functional form assumption on the relationship between the dependent variables and the other variables. The unreported results of this estimation procedure show that the results are robust to the use of this alternative estimation method.

### 6.4 Robustness: Exploring differences in the details of call reports.

According to the FDIC's general instructions for preparation of the quarterly reports of condition and income[7], banks whose total assets exceed 300 million dollars must provide finer information about the composition of several categories such as the loan and lease portfolio, the cash and balances due from other depository institutions or credit card receivables by type of customer. To the extent that potential bidders glean less information from the reports of condition when a bank has less than $300 million in total assets, the additional information available from SEC filings should be more valuable below that threshold. I explore this discontinuity in the amount of information disclosed by depository institutions in the Call reports to assess whether the main empirical results are likely to be generated by the greater disclosure requirements associated with SEC registration.

The ideal research design for this setting would entail having a sufficiently large number of observations around a small enough neighborhood of the $300 million threshold. Under these conditions it would be possible to implement a regression discontinuity design and estimate the differential average impact of SEC registration status on a set of observations that are in all aspects similar, except in that they randomly crossed the $300 million threshold. Unfortunately, the implementation of this empirical strategy is constrained by the small sample size around the size cutoff. Thus, to attain a sufficiently large sample size to take advantage of this institutional feature, I must also include observations whose

[7] Available at http://www.fdic.gov/regulations/resources/call/crinst/301generalinst.pdf

size is significantly above or below $300 million, even though these observations are possibly systematically different in terms of other unobserved dimensions. As a result, the inference taken from this analysis is threatened by this potential bias. To address this concern, I implement two different empirical strategies akin to those suggested in **?**. First, I limit the sample to failed banks whose total assets are within a $250 million range of the size threshold[8]. Second, I implement a local linear regression with a similar bandwidth but using a triangular kernel to put more weight in observations that are closer to the size threshold of $300 million.[9]

Accordingly, I examine the differential impact of SEC registration above and below the size cutoff using the following empirical implementation:

$$P\&A_{ijt} = \alpha + \beta_1 SEC_{ijt} + \beta_2 Assets\ above\ \$300M_{ijt} + \beta_3 Assets\ above\ \$300M \times SEC_{ijt} + \gamma X_{ijt} + \eta_j + \nu_t + \varepsilon_{ijt}$$

where $Assets\ above\ \$300M_{ijt}$ is an indicator variable that assumes the value of one if the failed bank had more $300 million in total assets as of the fourth quarter of 2007, $Assets\ above\ \$300M \times SEC_{ijt}$ is an interaction term between $Assets\ above\ \$300M$ and $SEC$ and all other variables are defined as above, with the exception of $\eta_j$, which I now define as a region fixed effect due to the smaller sample size associated with this empirical test.

The empirical results are presented in table 8. The empirical results support the hypothesis that the estimated coefficients are the result of the greater information disclosure associated with SEC registration. In fact, above the $300 million cutoff, the *SEC* status is not statistical significant, whereas the estimated costs of resolution and the percentage of assets sold below that threshold are significantly affected in the predicted direction by the SEC registration. These results are consistent with the hypothesis that SEC registration influence the outcomes of the P&A transactions through an information channel.

[8] This is econometrically equivalent to implementing a local linear regression with a rectangular kernel that takes the value of one if total assets are between $50 million and $550 million and zero otherwise.

[9] The empirical results of this section are robust to the choice of broader and narrower bandwidths

### 6.5 Robustness: Different closing rules depending on SEC filing status

Another concern with the main empirical strategy is the possibility that bank regulators have different closure rules depending on SEC filing status. In fact, Fries et al. (1997) hypothesize that the optimal closure rule should depend on the easiness of bank monitoring. If the regulator systematically forbears against one of the categories of banks, the coefficients on the main empirical specification may reflect the fact that potential bidders in the auction perceive that these failed banks have more opportunities to engage into value destroying actions such as risk-shifting or tunneling. To address these concerns, Figure 5 shows a plot of the median capital ratios split by SEC filing status as the banks approach the resolution event. The plots of Figure 5 resemble each other and therefore it seems that there is not any significant difference in closure rules across SEC filing status. However, a close inspection of the figure shows that in the bank resolution event period, the median leverage ratio of Non-SEC banks is lower than the corresponding ratio for SEC failed banks by about one percentage point. This can be interpreted as evidence that regulators are quicker to act on SEC banks when the latter become critically undercapitalized. In unreported robustness tests, I include the leverage ratio measured at the time of bank resolution as an additional control in the main empirical specification. Results are not altered neither in terms of the magnitude of coefficients associated with the main variable of interest nor in terms of their statistical significance.

### 6.6 Robustness: SEC filing status proxies for unobserved risks associated with the loan portfolios

Another concern is that the main variable of interest is capturing unobserved risks in the loan portfolios of the failed banks that are detected and priced by the participants in the P&A transactions but remain undetected by the econometrician. If this is the case, a test of the main hypotheses using these constructs cannot be meaningfully distinguished from testing whether the potential bidders are just adequately pricing the failed bank's net assets. Given the apparent unavailability of an instrumental variable that satisfactorily respects the exclusion restriction, it is not possible to completely dismiss this hypothesis. In order to make an attempt to alleviate these concerns, I plot in Figure 6 the

quarterly median asset growth from 2005Q1 to 2007 Q4 split into SEC filing status. If the plots closely resemble each other, it is possible to argue that neither category of failed banks pursued an overtly more aggressive growth strategy compared to the other. Figure 6 does show that for an extended period of time Non-SEC banks grow slightly faster than their SEC counterparts. However, as observed in Table 4, the difference is not statistically different in aggregate terms.

Another possibility is that the econometrician cannot observe the risks associated with a particular type of bank but other market participants such as uninsured depositors or regular depositors are able to perceive these risks and act upon them by demanding higher interest compensation for these risks (e.g. Baer and Brewer (1986)) or rationing the amount of funds they supply to that particular type of banks (e.g. Goldberg and Hudgins (1996, 2002). Figure 7 displays the median costs of interest bearing liabilities split by SEC filing status. Figure 7 strongly indicates that there are no discernable differences through the sample period in the pricing of interest bearing liabilities across the two types of banks under analysis. This supports the argument that uninsured depositors, regular depositors and other suppliers of funds did not perceive incremental risks associated with SEC filing status. While, this is not enough evidence to disprove the existence of these risks, it does provide some comfort regarding the unobserved risks story, to the extent that it is not clear why were the suppliers of funds not able to perceive the unobserved risks associated with SEC filing status, but the participants in the auction were. Figure 8, shows the median wholesale funding (defined as Total Borrowings + Brokered Deposits) as a percentage of total funding by SEC filing category. Some studies (e.g. Goldberg and Hudgins (1996, 2002); Jordan (2000)) show that uninsured depositors discipline their banks by withdrawing their deposits if they perceive that their performance and risk-taking levels are not satisfactory. Figure 8, shows that while SEC failed banks have a liability structure that uses wholesale funding more pronouncedly, both types of banks register a decrease in their relative use of wholesale funding as failure approaches indicating that both categories are rationed by uninsured depositors and investors alike.

## 6.7 Robustness: Selection into SEC filing status.

As mentioned in previous sections, it is not plausible that failed bank's managers select into SEC status to lower resolution costs, since in the event of bank resolution equity holders are certainly wiped out if regulators incur costs in the process (which almost always happens). However, it is plausible that failed banks have selected into SEC status to better access capital markets and finance their growth opportunities during the subprime mortgage boom. To the extent that these heterogeneous growth opportunities are associated with the resolution costs and SEC filing status, there may be some bias associated with main coefficient of interest. To address this problem, I estimate the main regression, limiting the SEC sample to the banks whose initial filing with the SEC was prior to January 1st, 2004. The main purpose of this robustness analysis is to limit the sample to SEC registered banks that accessed capital markets to finance growth opportunities that have arguably already matured. Results are displayed in table 9. These results show that the coefficients of the main variable of interest remain significant at the 5% level and that the magnitudes of the coefficients is silimar to those of the main regression. These results further alleviate the concerns regarding the possibility that there is some heterogeous factor jointly causing both selection into SEC registration and auction outcomes.

## 6.8 Robustness: Information Disclosure or Reliability of Accounting Information.

Financial institutions that are registered with the SEC are also required to have their financial statements audited by an external party. This requirement sheds doubt on the interpretation of the main results. to the extent that it is possible to argue these are caused by the greater reliability of accounting information associated with an audit. To address this question, I make use of information on audit levels taken from the Call Reports of the banking institutions. Every year, in their March Call Reports, banks have to report the most comprehensive level of audit work performed by independent external auditors. The variable is coded in numerical categories from 1 to 8. A value of 1 or 2 means that the financial institution has had an independent audit on the firm. Codes 3-8 represent less comprehensive reports such as review and compilations or even no external audit work. The ability to decompose

the disclosure and reliability effects comes from the significant number of private firms that audit their financial statements. Thus, if the main results presented in the main section are attributable to higher reliability associated with an audit, the coefficent associated with the audit variable should be statistically different from zero. Table 10 shows that the audit variable is not statistically different from zero, hence providing some evidence against the hypothesis that the main results in the paper are driven by the greater reliability of SEC firms' accounting statements. If this was the case, we would expect the coefficient associated with the SEC variable to be attenuated and the coefficient associated with the audit variable to be significantly different from zero.

# 7 Conclusion

The financial crisis of 2008–2010 has dealt a blow to the regulatory capital buffers of many banking organizations. The near insolvency of a significant number of banks required government intervention to stop debt overhang problems or even contagious bank runs. The U.S. authorities have dealt with the financial crisis in a variety of ways. They have injected capital in ailing financial institutions, bought risky subprime assets in the market and also carried out the resolution and subsequent auction of distressed financial institutions to healthier banks. Alas, all of these interventions are ultimately costly to the taxpayers and as a result it is in the interest of society in general that they are organized in an efficient way.

This paper analyzes the structure of the auctions for failed financial institutions. More specifically, I explore the relationship between the information environment of the failed bank and the outcomes of the auction. I find evidence that greater disclosure requirements influence the outcomes of these auctions in a direction which is consistent with the predictions of the theoretical literature on auctions. Hence, results show that higher disclosure requirements correspond to higher estimated costs of closing a bank and lower percentage of assets sold in the auctions. I also find evidence consistent with the hypothesis that uninformed bidders are less likely to participate in the auctions when the failed bank was subject to lower disclosure requirements

These findings pave the way for further analysis on this topic, which I will briefly introduce in the

remaining text. First, it would be worthwhile to explore the subset of failed financial institutions that are publicly listed. Despite its smaller sample (it contains just 91 observations) it would be interesting to use the voluntary disclosure choices of public banks to test the relation between a better information environment of the bank and the outcomes of the resolution process. A more ambitious project is to implement a structural model of bidders' implicit valuations to test whether information characteristics of the failed banks are valued by the potential bidders. This is left for future research.

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Table 1: Purchase and Assumption Transactions per Quarter

This table presents the frequency of failed banks by quarter, over the period January 2008 through December 2010.

| **Quarter** | **Freq.** | **Percent** | **Cum.** |
|---|---|---|---|
| 2008-Q1 | 2 | 0.7 | 0.7 |
| 2008-Q2 | 2 | 0.7 | 1.39 |
| 2008-Q3 | 8 | 2.79 | 4.18 |
| 2008-Q4 | 13 | 4.53 | 8.71 |
| 2009-Q1 | 19 | 6.62 | 15.33 |
| 2009-Q2 | 20 | 6.97 | 22.3 |
| 2009-Q3 | 42 | 14.63 | 36.93 |
| 2009-Q4 | 34 | 11.85 | 48.78 |
| 2010-Q1 | 38 | 13.24 | 62.02 |
| 2010-Q2 | 41 | 14.29 | 76.31 |
| 2010-Q3 | 39 | 13.59 | 89.9 |
| 2010-Q4 | 29 | 10.1 | 100 |
| Total | 287 | 100 | |

Table 2: Summary Statistics for the sample of P&A transactions

Estimated Cost to the Regulatory Agency (% Tot Deposits) is the estimated cost of the bank resolution calculated by the FDIC using its proprietary least cost test as a percentage of the total deposits of the failed bank at the time of the closure. Estimated Cost to the Regulatory Agency (% Tot Assets) is the estimated cost of the bank resolution calculated by the FDIC using its proprietary least cost test as a percentage of the total assets of the failed bank at the time of the closure. Assets Sold (% Total Assets) is calculated as the percentage of assets sold in the Purchase and Assumption transaction over the total assets of the failed bank at the time of the closure. % of transactions with loss share agreement is the percentage of P&A deals that include a loss share agreement between the FDIC and the winning bidder. Loss Share Assets (% Total Assets) is calculated as the total amount of assets covered by the loss share agreement over the total assets of the failed bank at the time of closure. Number of bidders is the number of different banking organizations that submitted bids in the auction for the failed bank.

| | **N** | **Mean** | **p25** | **p50** | **p75** | **Skewness** |
|---|---|---|---|---|---|---|
| Estimated Cost to the Regulatory Agency (% Tot Deposits) | 275 | 28.78 | 19.63 | failed28.23 | 37.04 | 0.25 |
| Estimated Cost to the Regulatory Agency (% Tot Assets) | 275 | 25.72 | 17.12 | 25.54 | 33.59 | 0.39 |
| Assets Sold (% Total Assets) | 272 | 81.72 | 77.84 | 96.61 | 100.00 | -1.62 |
| % of transactions with loss share agreement | 275 | 0.72 | 0.00 | 1.00 | 1.00 | -0.98 |
| Loss Share Assets (% Total Assets) | 191 | 71.90 | 64.55 | 73.45 | 80.86 | -0.59 |
| Number of Bidders | 169 | 2.35 | 1.00 | 2.00 | 3.00 | 0.95 |

Table 3: Univariate comparison of failed and non-failed banks (Reriod: 2007-Q4)

FAIL is an indicator variable that takes the value of 1 if the bank was closed by the FDIC and a P&A transaction was conducted. Total Assets are the total assets of banks in the fourth quarter of 2007. Total Loans and Leases are the total loans and leases of banks measures in the fourth quarter of 2007. Total Deposits are the total amount of deposits of banks and thrifts in the fourth quarter of 2007. Number of offices is the number of branches operated by the banks in the fourth quarter of 2007. ROA is calculated as net income over average assets of the banks during the year. Net Interest Income (% Average Assets) is calculated as the net interest income over the year over average assets of the financial institution for the corresponding year. Tier 1 Capital Ratio is calculated as Tier 1 Equity Capital over total risk-weighted assets. Total Risk Weighted Capital Ratio is calculated as Tier 1 Capital + Tier 2 Supplemental Capital over total risk adjusted assets of the bank. Leverage ratio is calculated as Tier 1 Capital over adjusted average assets. Liquidity ratio is (Cash Balances + Balances due from depositary institutions + Securities + Fed Fund Repos + Trading Accounts – Pledged Securities)/ Total Liabilities. Real Estate Loans (% Total Loans) is the consolidated total Real Estate Loans as a percentage of total Loans. Com & Ind Loans (% Total Loans) is the consolidated total amount of loans to commerce and Industry as a percentage of total Loans. Consumer Loans (% Total Loans ) is the consolidated total amount of loans to consumer as a percentage of total Loans. Agricultural Loans (% Total Loans ) is the consolidated total amount of loans to agriculture as a percentage of total Loans. Other non-RE Loans (% Total Loans) is Other non-RE Loans (a residual category that aggregates loans to all purposes other than the ones mentioned above) as a percentage of total Loans. Non-performing loans (% Total Loans) is total non-performing loans over total assets. NPL and 90+due loans (% Tangible Equity + LLR) is also known as Texas ratio and is calculated as total non-performing loans + loans 90 or more past due over Total Tangible Equity plus Loan Loss Reserves. Loan Loss Reserves (% Total Loans) is total loan loss reserves as a percentage of total loas. Loan loss Provisioning (% Total Loans) are the total provision expensed by the banks as a percentage of loans. House Price change (FHFA - 2007Q4-2009Q4) is calculated as the house price change from 2007:Q4 to 2009:Q4 in the MSA corresponding to the headquarters of the bank. When the bank is not headquartered in a MSA, I calculate the house price change as the house price change from 2007:Q4 to 2009:Q4 FHFA data on house prices for non-MSA.

| | FAIL = 0 | FAIL = 1 | Difference | t-stat |
|---|---|---|---|---|
| *Size* | | | | |
| Total Assets | 1,490,297 | 2,237,170 | (746,873) | (0.4548) |
| Total Loans and Leases | 891,746 | 1,709,800 | (818,054) | (0.9571) |
| Total Deposits | 962,165 | 1,424,994 | (462,829) | (0.4564) |
| Number of offices | 13.2 | 18.4 | (5.2) | (0.612) |
| *Profitability* | | | | |
| ROA | 0.76 | -1.13 | 1.89 | 5.5697 |
| Net Interest Income (% Average Assets) | 3.65 | 3.48 | 0.17 | 2.4228 |
| *Solvability* | | | | |
| Tier 1 Capital ratio | 24.59 | 11.36 | 13.23 | 1.8405 |
| Total Risk-Weighted Capital ratio | 25.64 | 12.58 | 13.06 | 1.82 |
| Leverage ratio | 13.55 | 9.52 | 4.02 | 2.71 |
| Liquidity | | | | |
| Liquidity ratio | 50.18 | 13.15 | 37.03 | 1.30 |
| *Loan Portfolio* | | | | |
| Real Estate Loans (% Total Loans) | 69.86 | 82.44 | -12.58 | (10.16) |
| Com & Ind Loans (% Total Loans ) | 14.26 | 12.64 | 1.62 | 2.38 |
| Consumer Loans (% Total Loans) | 7.72 | 2.60 | 5.12 | 8.05 |
| Agricultural Loans (% Total Loans) | 7.18 | 1.59 | 5.58 | 6.92 |
| Other non-RE Loans (% Total Loans) | 1.41 | 0.71 | 0.70 | 2.16 |
| *Asset Quality* | | | | |
| Non-performing Loans (% Total Loans) | 0.95 | 3.36 | -2.42 | (19.49) |
| NPL and 90+due loans (% Tangible Equity + LLR) | 9.02 | 33.95 | -24.93 | (26.69) |
| *Loss Provisioning* | | | | |
| Loan Loss Reserves (% Total Loans) | 1.29 | 1.69 | -0.40 | (4.34) |
| Loan loss Provisioning (% Total Loans) | 0.14 | 0.63 | -0.49 | (12.68) |
| *Local Economic Conditions* | | | | |
| House Price change (FHFA - 2007Q4-2009Q4) | -0.05 | -0.14 | 0.09 | 17.19 |

Table 4: Means and Standard Errors of Failed Bank Characteristics by SEC Filing Category

SEC is an indicator variable taking the value of one if the bank or thrift is registered with the SEC. Non-SEC is an indicator variable taking the value 1 if the bank is not registered with the SEC. Private SEC is an indicator variable taking the value of 1 if the bank or thrift is privately owned and files with the SEC. Dark is an indicator variable taking the value of one if the bank or thrift is publicly listed in an OTC market but does not file with the SEC. Percentage of failed banks, is calculated as the number of failed in each category over total failed banks. Total Assets are the total assets of banks in the fourth quarter of 2007. Tier 1 Capital Ratio is calculated as Tier 1 Equity Capital over total risk-weighted assets. Liquidity ratio is (Cash Balances + Balances due from depositary institutions + Securities + Fed Fund Repos + Trading Accounts – Pledged Securities)/ Total Liabilities. ROA is calculated as net income over average assets of the banks during the year. Real Estate Loans (% Total Loans) is the consolidated total Real Estate Loans as a percentage of total Loans. Non-performing loans (% Total Loans) is total non-performing loans over total assets. NPL and 90+due loans (% Tangible Equity + LLR) is also known as Texas ratio and is calculated as total non-performing loans + loans 90 or more past due over Total Tangible Equity plus Loan Loss Reserves. Asset Growth 2005Q1:2007Q4 (%) is the percentage growth of total assets in the period ranging from the first quarter of 2005 to the fourth quarter of 2007. Brokered Deposits (% Total Deposits) is the percentage of total deposits of the bank that is composed by brokered deposits. House Price change (FHFA - 2007Q4-2009Q4) is calculated as the house price change from 2007:Q4 to 2009:Q4 in the MSA corresponding to the headquarters of the bank. When the bank is not headquartered in a MSA, I calculate the house price change as the house price change from 2007:Q4 to 2009:Q4 FHFA data on house prices for non-MSA areas by state. % of Commercial Bank is the percentage of banks in each category that are classified as commercial banks. Estimated Cost to the Regulatory Agency (% Tot Deposits) is the estimated cost of the bank resolution calculated by the FDIC using its proprietary least cost test as a percentage of the total deposits of the failed bank at the time of the closure. Estimated Cost to the Regulatory Agency (% Tot Assets) is the estimated cost of the bank resolution calculated by the FDIC using its proprietary least cost test as a percentage of the total assets of the failed bank at the time of the closure. Assets Sold (% Total Assets) is calculated as the percentage of assets sold in the Purchase and Assumption transaction over the total assets of the failed bank at the time of the closure. % of transactions with loss share agreement is the percentage of P&A deals that include a loss share agreement between the FDIC and the winning bidder.

| | SEC | Non-SEC | Private SEC | Dark |
|---|---|---|---|---|
| Target Institution characteristics | | | | |
| Percentage of failed banks | 0.29 | 0.71 | 0.03 | 0.08 |
| Total Assets ($M) | 2355.43 | 467.52 | 490.98 | 1029.561 |
| | (4448.97) | (1327.51) | (411.05) | (3649.19) |
| Tier 1 Capital ratio (%) | 11.01 | 11.55 | 10.85 | 11.30 |
| | (3.53) | (4.37) | (4.07) | (3.37) |
| Liquidity ratio (%) | 11.40 | 13.90 | 12.82 | 12.43 |
| | (8.87) | (1.03) | (6.43) | (7.15) |
| ROA (%) | -0.83 | -1.11 | -0.86 | -1.70 |
| | (2.58) | (4.24) | (1.71) | (2.88) |
| Real Estate Loans (% Total Loans) | 85.48 | 81.08 | 88.38 | 78.95 |
| | (9.21) | (14.46) | (2.26) | (14.22) |
| NPL and 90+due loans (% Tangible Equity + LLR) | 29.10 | 34.83 | 30.76 | 30.50 |
| | (31.05) | (37.50) | (16.79) | (33.74) |
| Asset Growth 2005Q1:2007Q4 (%) | 2286.83 | 3799.77 | 1812.11 | 7517.91 |
| | (7337.78) | (11860.54) | (1980.92) | (16929.28) |
| Brokered Deposits (% Total Deposits) | 14.15 | 14.75 | 9.18 | 14.92 |
| | (14.90) | (17.31) | (8.28) | (14.93) |
| House Price Shock | -0.16 | -0.13 | -0.14 | -0.16 |
| | (0.13) | (0.11) | (0.11) | (0.08) |
| % of Commercial Bank | 0.79 | 0.89 | 0.71 | 0.90 |
| | (0.41) | (0.32) | (0.49) | (0.30) |
| Purchase & Assumption deal characteristics | | | | |
| Estimated Cost to the Regulatory Agency (% Tot Deposits) | 25.89 | 29.90 | 30.82 | 29.24 |
| | (12.09) | (11.59) | (9.24) | (12.66) |
| Estimated Cost to the Regulatory Agency (% Tot Assets) | 22.45 | 27.00 | 28.29 | 26.29 |
| | (11.23) | (10.86) | (10.46) | (11.45) |
| Assets Sold (% Total Assets) | 86.38 | 79.74 | 97.29 | 81.75 |
| | (29.09) | (25.15) | (2.93) | (34.34) |
| Loss Share Agreement (Yes) | 0.72 | 0.83 | 0.86 | 0.71 |
| | (0.45) | (0.38) | (0.38) | (0.46) |

Table 5: Characteristics of Bidders in P&A transactions by SEC Category

This table examines the characteristics of 380 bidders in P&A transactions on 173 P&A transactions. There are 256 bidders on 121 P&A transactions for Non-SEC failed banks and 124 bidders on 52 P&A transactions for SEC failed banks. Size relative to failed bank is determines as the ratio of the assets of the bidder to the ratio of the assets of the failed bank both measured in the fourth quarter of 2007 and Capital relative to failed bank is the Tier 1 Capital ratio of the bidder over the Tier 1 capital ratio of the bank both measured in the fourth quarter of 2007.

| | SEC | Non-SEC | Total |
|---|---|---|---|
| General Characteristics | | | |
| Total Assets ($M in 2007:Q4) | 14,700 | 4,087 | 7,371 |
| Size relative to failed bank (in 2007:Q4) | 12.0 | 44.2 | 34.3 |
| Capital relative to failed bank (in 2007:Q4) | 1.7 | 1.3 | 1.4 |
| Geographical Characteristics | | | |
| In same county as failed bank? | 9.7% | 18.0% | 15.3% |
| In same MSA as failed bank? | 13.7% | 34.0% | 27.4% |
| In same State as failed bank? | 45.2% | 68.0% | 60.5% |

Table 6: OLS Regressions Investigating the Relation Between P&A Transaction Outcomes and Information Environment of the Failed Banks

Estimated Cost (% Tot Deposits) is the estimated cost of the bank resolution calculated by the FDIC using its proprietary least cost test as a percentage of the total deposits of the failed bank at the time of the closure. Assets Sold (% Total Assets) is calculated as the percentage of assets sold in the Purchase and Assumption transaction over the total assets of the failed bank at the time of the closure. SEC is an indicator variable taking the value of one if the bank or thrift is registered with the SEC. Public SEC is an indicator variable taking the value 1 if the bank is registered with the SEC and exchanged listed in either a major exchange market (e.g. NYSE, AMEX, NASDAQ) or in the OTC market. Private SEC is an indicator variable taking the value of 1 if the bank or thrift is privately owned and files with the SEC. Dark is an indicator variable taking the value of one if the bank or thrift is publicly listed in an OTC market but does not file with the SEC. Ln Total Assets is calculated as the log of total assets of banks in the fourth quarter of 2007. Ln Total Assets*Medium is calculated as log of total assets of banks in the fourth quarter of 2007 times an indicator variable that assumes the value of one if the bank is the second tercile of total assets. Ln Total Assets*Large is calculated as log of total assets of banks in the fourth quarter of 2007 times an indicator variable that assumes the value of one if the bank is in the third tercile of total assets. Tier 1 Capital Ratio is calculated as Tier 1 Equity Capital over total risk-weighted assets in the fourth quarter of 2007. Liquidity ratio is (Cash Balances + Balances due from depositary institutions + Securities + Fed Fund Repos + Trading Accounts – Pledged Securities)/ Total Liabilities as calculated in fourth quarter of 2007. ROA is calculated as net income over average assets of the banks during the year. Real Estate Loans (% Total Loans) is the consolidated total Real Estate Loans as a percentage of total Loans. NPL and 90+due loans (% Tangible Equity + LLR) is also known as Texas ratio and is calculated as total non-performing loans + loans 90 or more past due over Total Tangible Equity plus Loan Loss Reserves. Ln Asset Growth 2005Q1:2007Q4 (%) is the log of the percentage growth of total assets in the period ranging from the first quarter of 2005 to the fourth quarter of 2007. Brokered Deposits (% Total Deposits) is the percentage of total deposits of the bank that is composed by brokered deposits. House Price change (FHFA - 2007Q4-2009Q4) is calculated as the house price change from 2007:Q4 to 2009:Q4 in the MSA corresponding to the headquarters of the bank. When the bank is not headquartered in a MSA, I calculate the house price change as the house price change from 2007:Q4 to 2009:Q4 FHFA data on house prices for non-MSA areas by state. Quarter and State fixed effects are included in all regressions. Standard errors are robust to heteroskedasticity. Amounts represent coefficients from an OLS regression. (standard errors are presented in parenthesis)

| | (1) Estimated Cost (% Deposits) | (2) Estimated Cost (% Deposits) | (3) Assets Sold (% Total Assets) | (4) Assets Sold (% Total Assets) |
|---|---|---|---|---|
| SEC | -4.467** | | 7.745** | |
| | (1.821) | | (3.608) | |
| Public SEC | | -4.562** | | 7.805** |
| | | (1.837) | | (3.857) |
| Dark | | -1.835 | | 10.812 |
| | | (3.036) | | (6.652) |
| Private SEC | | -5.193 | | 17.617** |
| | | (5.016) | | (7.475) |
| Ln Total Assets | -2.071 | -2.261 | 1.764 | 0.486 |
| | (2.568) | (2.559) | (6.031) | (6.015) |
| Ln Total Assets*Medium | -6.521 | -6.613 | -5.644 | -3.055 |
| | (4.752) | (4.707) | (8.923) | (9.120) |
| Ln Total Assets*Large | 0.869 | 0.873 | 0.547 | 1.490 |
| | (2.756) | (2.767) | (6.858) | (6.863) |
| Tier 1 Capital Ratio | -0.180 | -0.210 | -0.546 | -0.536 |
| | (0.270) | (0.272) | (0.599) | (0.587) |
| Liquidity Ratio | -0.174* | -0.169* | 0.137 | 0.130 |
| | (0.092) | (0.092) | (0.178) | (0.177) |
| ROA | 0.197 | 0.170 | 0.384 | 0.468 |
| | (0.305) | (0.306) | (0.868) | (0.862) |
| Real Estate Loans | 0.111* | 0.113* | 0.080 | 0.114 |
| | (0.066) | (0.066) | (0.151) | (0.152) |
| NPL | 0.035 | 0.037 | -0.059 | -0.045 |

| | | | | |
|---|---|---|---|---|
| | (0.034) | (0.035) | (0.092) | (0.090) |
| Ln Asset Growth | 0.840** | 0.831** | 0.271 | 0.190 |
| | (0.395) | (0.397) | (1.159) | (1.159) |
| Brokered Deposits (%) | 0.031 | 0.036 | -0.001 | -0.015 |
| | (0.057) | (0.058) | (0.109) | (0.108) |
| House Price Shock | -6.647 | -6.511 | -15.712 | -16.792 |
| | (12.360) | (12.369) | (30.653) | (30.699) |
| Quarter Fixed Effects | Y | Y | Y | Y |
| State Fixed Effects | Y | Y | Y | Y |
| N | 271 | 271 | 268 | 268 |
| Adj.-R2 | 0.347 | 0.338 | 0.457 | 0.466 |

*, ** and *** indicate statistical significance at the 10%, 5% and 1%, respectively for a two-tailed test

## Table 7: Auction Participation Probit Estimation

$D_{ij}$ is an indicator variable taking the value of one if the potential bidder makes a bid in the auction for the failed bank, $SEC_i$ is an indicator variable taking the value of one if the bank or thrift is registered with the SEC and $SameRegion_{ij}$ is an indicator variable taking the value of one if the potential bidder's headquarter is located in the same Metropolitan Statistical Area (MSA) as the failed bank. $SameRegion_{ij} * SEC_i$ is an interaction variable between $SameRegion_{ij}$ and $SEC_i$. Ln Total Assets is calculated as the log of total assets of banks in the fourth quarter of 2007. Ln Total Assets*Medium is calculated as log of total assets of banks in the fourth quarter of 2007 times an indicator variable that assumes the value of one if the bank is the second tercile of total assets. Ln Total Assets*Large is calculated as log of total assets of banks in the fourth quarter of 2007 times an indicator variable that assumes the value of one if the bank is in the third tercile of total assets. Size Ratio is Failed bank's Total Assets in 2007:Q4 divided by Potential Bidder's Total Assets in 2007:Q4. Failed Bank's state-fixed effects and quarter fixed effects are included in the regression. Standard Errors are clustered at the P&A transaction level.

Panel A: Probit Regression Coefficients and Standard Errors

| | Pr($D_{ij}$=1) |
|---|---|
| SEC | 0.34 |
| | (0.12)*** |
| Same MSA | 0.72 |
| | (0.12)*** |
| Same MSA * SEC | -0.75 |
| | (0.30)** |
| Ln Total Assets | 0.09 |
| | (0.14) |
| Ln Total Assets*Medium | -0.09 |
| | (0.27) |
| Ln Total Assets*Large | 0.02 |
| | (0.19) |
| Size Ratio | -0.01 |
| | (0.005)** |
| Intercept | 85.58 |
| | (27.33) |
| Quarter Fixed Effects | Y |
| State Fixed Effects | Y |
| N | 1596 |
| Pseudo-R2 | 0.15 |

*, ** and *** indicate statistical significance at the 10%, 5% and 1%,

Panel B: Marginal Effects for the Interaction Term

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Interaction Term (Mean) | 1596 | -.1630849 | .0524198 | -.2919661 | -.0535355 |
| Interaction Term (Standard Error) | 1596 | .0742891 | .0224038 | .0308593 | .158371 |
| Interaction Term (Z-Stat) | 1596 | -2.184299 | .1439881 | -2.586755 | -1.48319 |

## Table 8: Robustness - OLS regression around the $300M size threshold

Estimated Cost (% Tot Deposits) is the estimated cost of the bank resolution calculated by the FDIC using its proprietary least cost test as a percentage of the total deposits of the failed bank at the time of the closure. Assets Sold (% Total Assets) is calculated as the percentage of assets sold in the Purchase and Assumption transaction over the total assets of the failed bank at the time of the closure. SEC is an indicator variable taking the value of one if the bank or thrift is registered with the SEC. Assets above $300M is and indicator variable that takes the value of one if the failed bank holds more $300 million in total assets as of the fouth quarter of 2007. Assets above $300M×SEC is an interaction term between Assets above $300M and SEC. Tier 1 Capital Ratio is calculated as Tier 1 Equity Capital over total risk-weighted assets in the fourth quarter of 2007. Liquidity ratio is (Cash Balances + Balances due from depositary institutions + Securities + Fed Fund Repos + Trading Accounts – Pledged Securities)/ Total Liabilities as calculated in fourth quarter of 2007. ROA is calculated as net income over average assets of the banks during the year. Real Estate Loans (% Total Loans) is the consolidated total Real Estate Loans as a percentage of total Loans. NPL and 90+due loans (% Tangible Equity + LLR) is also known as Texas ratio and is calculated as total non-performing loans + loans 90 or more past due over Total Tangible Equity plus Loan Loss Reserves. Ln Asset Growth 2005Q1:2007Q4 (%) is the percentage growth of total assets in the period ranging from the first quarter of 2005 to the fourth quarter of 2007. Brokered Deposits (% Total Deposits) is the percentage of total deposits of the bank that is composed by brokered deposits. House Price change (FHFA - 2007Q4-2009Q4) is calculated as the house price change from 2007:Q4 to 2009:Q4 in the MSA corresponding to the headquarters of the bank. When the bank is not headquartered in a MSA, I calculate the house price change as the house price change from 2007:Q4 to 2009:Q4 FHFA data on house prices for non-MSA areas by state. Quarter and Region fixed effects are included in all regressions. Standard errors are robust to heteroskedasticity. Amounts represent coefficients from an OLS regression. (standard errors are presented in parenthesis).

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Est. Cost (% Dep.) | Assets Sold (% Assets) | Est. Cost (% Dep.) | Assets Sold (% Assets) |
| SEC | -6.1870** | 15.0048*** | -6.2343** | 15.0243*** |
| | (3.065) | (5.078) | (2.961) | (5.277) |
| Assets above $300M | -2.6638 | -4.0800 | -0.6905 | 4.3918 |
| | (2.765) | (6.415) | (3.122) | (7.952) |
| Assets above $300M×SEC | 7.3021 | -17.2492 | 7.6099* | -15.7681* |
| | (4.466) | (10.889) | (4.459) | (9.167) |
| Ln Total Assets | -0.8173 | 6.3283** | -3.1897 | -2.2005 |
| | (0.944) | (2.708) | (2.025) | (6.289) |
| Tier1 Cap Ratio | -0.0110 | -0.2105 | -0.1578 | -0.6104 |
| | (0.275) | (0.630) | (0.302) | (0.742) |
| Liquidity Ratio | -0.2442* | 0.2600 | -0.2434 | 0.4136 |
| | (0.143) | (0.289) | (0.155) | (0.302) |
| ROA | 0.0114 | -1.1566 | 0.1944 | -1.1017 |
| | (0.186) | (0.787) | (0.192) | (0.711) |
| Real Estate Loans | 0.0693 | 0.0483 | 0.0683 | 0.1555 |
| | (0.074) | (0.188) | (0.079) | (0.212) |
| NPL | 0.0573* | -0.0395 | 0.0579* | -0.0999 |
| | (0.032) | (0.090) | (0.031) | (0.095) |
| Asset Growth | 0.0001* | 0.0001 | 0.0001* | 0.0001 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Brokered Deposits | 0.1162** | -0.2403 | 0.1490*** | -0.3138** |
| | (0.053) | (0.147) | (0.052) | (0.154) |
| House Price Shock | -4.6937 | 12.5573 | -0.7760 | -4.0722 |
| | (8.195) | (24.277) | (8.833) | (26.006) |
| Observations | 164 | 163 | 164 | 163 |
| Adjusted R-squared | 0.904 | 0.927 | 0.911 | 0.932 |
| Quarter Fixed Effects? | Yes | Yes | Yes | Yes |
| State Fixed Effects? | No | No | No | No |
| Region Fixed Effects? | Yes | Yes | Yes | Yes |
| Kernel Type? | Rectangular | Rectangular | Triangular | Triangular |

*, ** and *** indicate statistical significance at the 10%, 5% and 1%, respectively for a two-tailed test

Table 9: Robustness - OLS Regressions Investigating the Relation Between P&A Transaction Outcomes and Information Environment for the subsample whose first filing with the SEC was prior to 2004.

Estimated Cost (% Tot Deposits) is the estimated cost of the bank resolution calculated by the FDIC using its proprietary least cost test as a percentage of the total deposits of the failed bank at the time of the closure. Assets Sold (% Total Assets) is calculated as the percentage of assets sold in the Purchase and Assumption transaction over the total assets of the failed bank at the time of the closure. SEC is an indicator variable taking the value of one if the bank or thrift is registered with the SEC. Ln Total Assets is calculated as the log of total assets of banks in the fourth quarter of 2007. Ln Total Assets*Medium is calculated as log of total assets of banks in the fourth quarter of 2007 times an indicator variable that assumes the value of one if the bank is the second tercile of total assets. Ln Total Assets*Large is calculated as log of total assets of banks in the fourth quarter of 2007 times an indicator variable that assumes the value of one if the bank is in the third tercile of total assets. Tier 1 Capital Ratio is calculated as Tier 1 Equity Capital over total risk-weighted assets in the fourth quarter of 2007. Liquidity ratio is (Cash Balances + Balances due from depositary institutions + Securities + Fed Fund Repos + Trading Accounts – Pledged Securities)/ Total Liabilities as calculated in fourth quarter of 2007. ROA is calculated as net income over average assets of the banks during the year. Real Estate Loans (% Total Loans) is the consolidated total Real Estate Loans as a percentage of total Loans. NPL and 90+due loans (% Tangible Equity + LLR) is also known as Texas ratio and is calculated as total non-performing loans + loans 90 or more past due over Total Tangible Equity plus Loan Loss Reserves. Ln Asset Growth 2005Q1:2007Q4 (%) is the percentage growth of total assets in the period ranging from the first quarter of 2005 to the fourth quarter of 2007. Brokered Deposits (% Total Deposits) is the percentage of total deposits of the bank that is composed by brokered deposits. House Price change (FHFA - 2007Q4-2009Q4) is calculated as the house price change from 2007:Q4 to 2009:Q4 in the MSA corresponding to the headquarters of the bank. When the bank is not headquartered in a MSA, I calculate the house price change as the house price change from 2007:Q4 to 2009:Q4 FHFA data on house prices for non-MSA areas by state. Quarter and State fixed effects are included in all regressions. Standard errors are robust to heteroskedasticity. Amounts represent coefficients from an OLS regression. (standard errors are presented in parenthesis).

| | (1) | (2) |
|---|---|---|
| | Estimated Cost (% Deposits) | Assets Sold (% Total Assets) |
| SEC | -4.5479** | 7.7040** |
| | (1.924) | (3.905) |
| Ln Total Assets | -6.3720*** | -0.1061 |
| | (2.129) | (4.858) |
| Ln Total Assets*Medium | -0.9064 | -6.5049 |
| | (4.583) | (8.137) |
| Ln Total Assets*Large | 3.7838 | 4.4369 |
| | (2.381) | (5.757) |
| Tier1 Cap Ratio | -0.3463 | -0.6724 |
| | (0.298) | (0.581) |
| Liquidity Ratio | -0.1132 | 0.2562 |
| | (0.089) | (0.178) |
| ROA | -0.0079 | 0.6461 |
| | (0.271) | (0.739) |
| Real Estate Loans | 0.1387** | 0.1476 |
| | (0.065) | (0.141) |
| NPL | 0.0082 | -0.0000 |
| | (0.030) | (0.072) |
| Asset Growth | 0.0001* | 0.0000 |
| | (0.000) | (0.000) |
| Brokered Deposits | 0.0810 | -0.0437 |
| | (0.052) | (0.111) |
| House Price Shock | -11.1897 | -19.1295 |
| | (12.771) | (29.899) |
| Quarter Fixed Effects | Y | Y |
| State Fixed Effects | Y | Y |
| N | 254 | 251 |
| Adj.-R2 | 0.354 | 0.415 |

*, ** and *** indicate statistical significance at the 10%, 5% and 1%, respectively for a two-tailed test

## Table 10: Robustness - OLS Regressions with Audit Variable

Estimated Cost (% Tot Deposits) is the estimated cost of the bank resolution calculated by the FDIC using its proprietary least cost test as a percentage of the total deposits of the failed bank at the time of the closure. Assets Sold (% Total Assets) is calculated as the percentage of assets sold in the Purchase and Assumption transaction over the total assets of the failed bank at the time of the closure. SEC is an indicator variable taking the value of one if the bank or thrift is registered with the SEC. Audit is an indicator variable that takes the value of 1 if the bank state in its last March Call Report prior to closure that it has had its financial statements audited by an independent external auditor. Ln Total Assets is calculated as the log of total assets of banks in the fourth quarter of 2007. Ln Total Assets*Medium is calculated as log of total assets of banks in the fourth quarter of 2007 times an indicator variable that assumes the value of one if the bank is the second tercile of total assets. Ln Total Assets*Large is calculated as log of total assets of banks in the fourth quarter of 2007 times an indicator variable that assumes the value of one if the bank is in the third tercile of total assets. Tier 1 Capital Ratio is calculated as Tier 1 Equity Capital over total risk-weighted assets in the fourth quarter of 2007. Liquidity ratio is (Cash Balances + Balances due from depositary institutions + Securities + Fed Fund Repos + Trading Accounts – Pledged Securities)/ Total Liabilities as calculated in fourth quarter of 2007. ROA is calculated as net income over average assets of the banks during the year. Real Estate Loans (% Total Loans) is the consolidated total Real Estate Loans as a percentage of total Loans. NPL and 90+due loans (% Tangible Equity + LLR) is also known as Texas ratio and is calculated as total non-performing loans + loans 90 or more past due over Total Tangible Equity plus Loan Loss Reserves. Asset Growth 2005Q1:2007Q4 (%) is the percentage growth of total assets in the period ranging from the first quarter of 2005 to the fourth quarter of 2007. Brokered Deposits (% Total Deposits) is the percentage of total deposits of the bank that is composed by brokered deposits. House Price change (FHFA - 2007Q4-2009Q4) is calculated as the house price change from 2007:Q4 to 2009:Q4 in the MSA corresponding to the headquarters of the bank. When the bank is not headquartered in a MSA, I calculate the house price change as the house price change from 2007:Q4 to 2009:Q4 FHFA data on house prices for non-MSA areas by state. Quarter and State fixed effects are included in all regressions. Standard errors are robust to heteroskedasticity. Amounts represent coefficients from an OLS regression. (standard errors are presented in parenthesis)

| | (1) | (2) |
|---|---|---|
| | Estimated Cost (% Deposits) | Assets Sold (% Total Assets) |
| SEC | -4.794*** | 7.966** |
| | (1.771) | (3.558) |
| Audit | -0.405 | -6.205 |
| | (1.837) | (3.998) |
| Ln Total Assets | -6.930*** | 2.101 |
| | (2.143) | (4.708) |
| Ln Total Assets*Medium | -0.024 | -8.271 |
| | (4.692) | (8.052) |
| Ln Total Assets*Large | 4.619* | 1.118 |
| | (2.384) | (5.549) |
| Tier1 Cap Ratio | -0.332 | -0.632 |
| | (0.273) | (0.565) |
| Liquidity Ratio | -0.074 | 0.149 |
| | (0.088) | (0.160) |
| ROA | 0.055 | 0.498 |
| | (0.268) | (0.715) |
| Real Estate Loans | 0.121* | 0.102 |
| | (0.063) | (0.135) |
| NPL | 0.017 | -0.006 |
| | (0.030) | (0.073) |
| Asset Growth | 0.000* | 0.000 |
| | (0.000) | (0.000) |
| Brokered Deposits | 0.074 | -0.026 |
| | (0.051) | (0.106) |
| House Price Shock | -11.597 | -14.623 |
| | (12.003) | (27.759) |
| Quarter Fixed Effects | Y | Y |
| State Fixed Effects | Y | Y |
| N | 271 | 268 |
| Adj.-R2 | 0.329 | 0.447 |

*, ** and *** indicate statistical significance at the 10%, 5% and 1%, respectively for a two-tailed test

Figure 1: Estimated Cost of Bank Resolution per Quarter

This figure presents the average (orange dots), median (grey dots) and quartiles of the estimated costs of resolution as a % of total deposits, for each quarter in the 2008:Q1 to 2010:Q4 period.

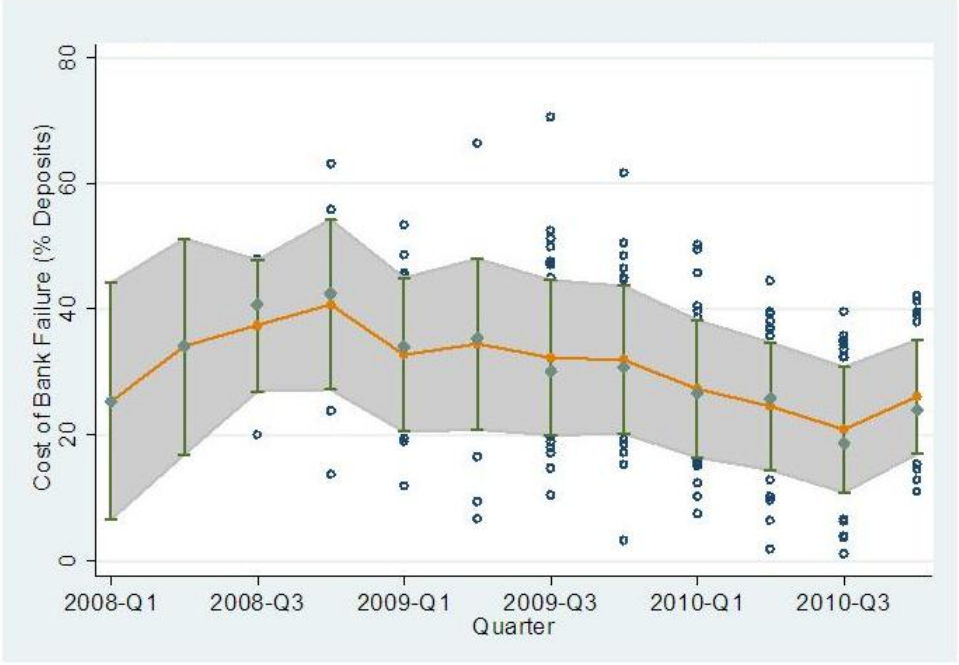

Figure 2: Percentage of Assets Sold in P&A agreements per Quarter

This figure presents the average (orange dots) and median (grey dots) of the assets sold in the P&A transaction as a % of the total assets of the failed institution, for each quarter in the 2008:Q1 to 2010:Q4 period.

Figure 3: Marginal Effects of Interacted Variable in Auction Partipants Probit Analysis

This figure presents the marginal effects of the interacted variable of interest (Same MSA * SEC) in the probit analysis. Each point represents the marginal effect of change in the interacted term for an observation whose characteristics result in a likelihood of being a participant in the auction that is measure in the x-axis.

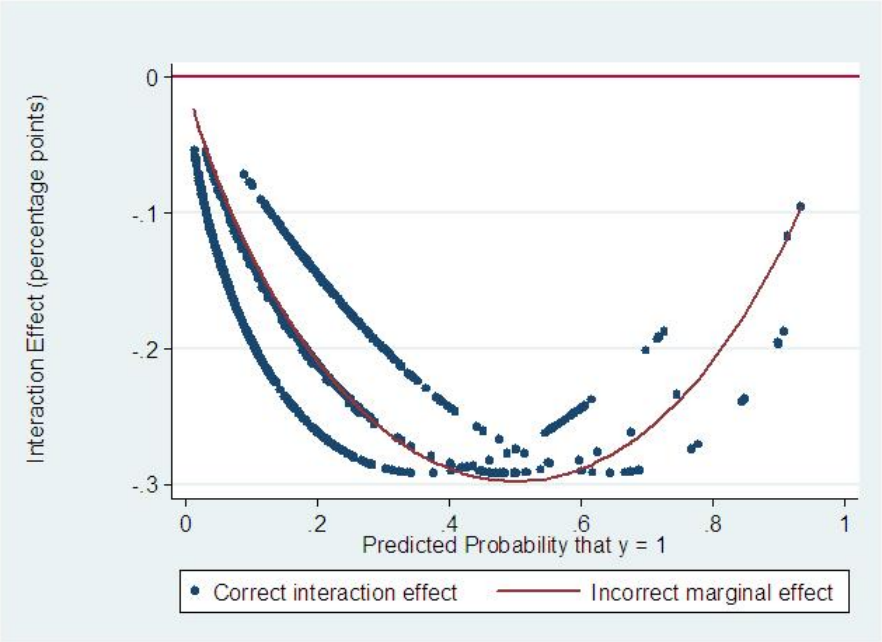

Figure 4: Kernel Density of Total Assets by SEC Filing Category

This figure presents the kernel density of the logarithm of total assets measured as of 2007-Q4 for SEC vis-à-vis Non-SEC filers. The kernel used to compute the density function is the Epachnikov kernel.

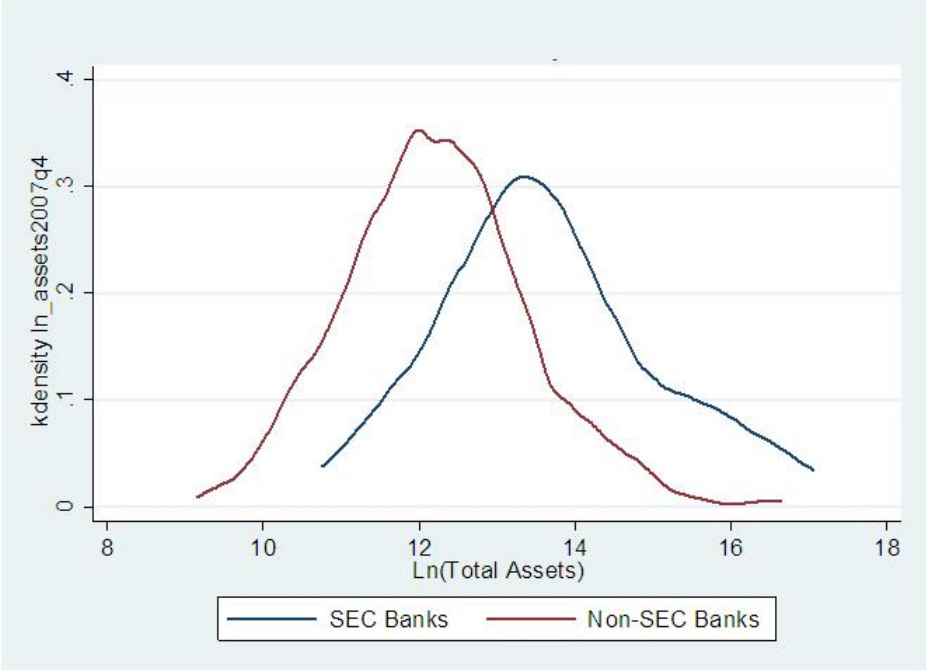

Figure 5: Leverage Ratio in Event Time by SEC Filing Category

This figure presents the median leverage ratio for SEC failed banks vis-a-vis Non-SEC failed banks as the banks approach the bank failure quarter.

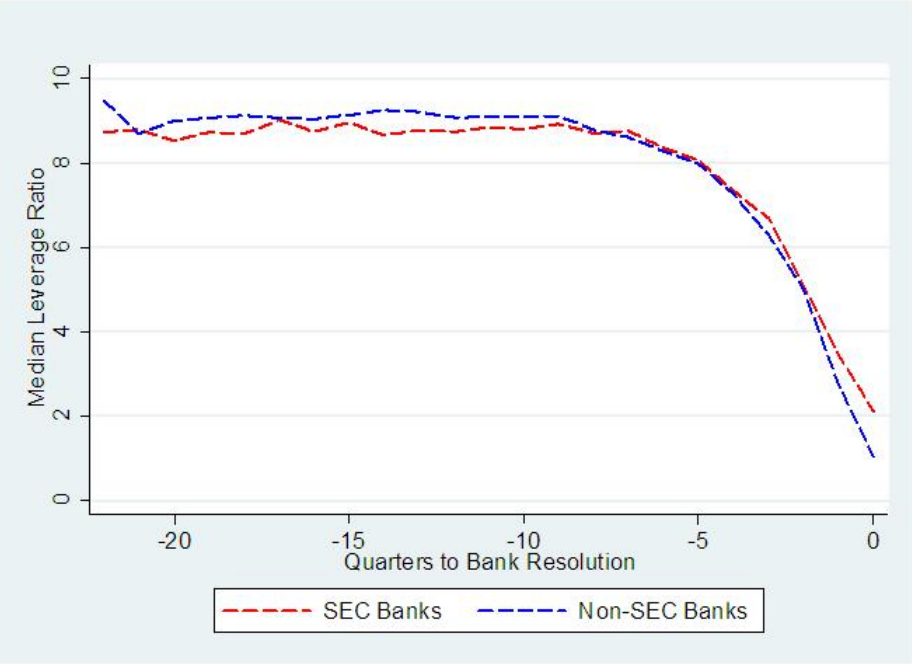

Figure 6: Median Asset Growth per quarter by SEC Filing Category

This figure presents the median asset growth per quarter for SEC failed banks vis-a-vis Non-SEC failed banks in the period 2005:Q1 to.2007:Q4

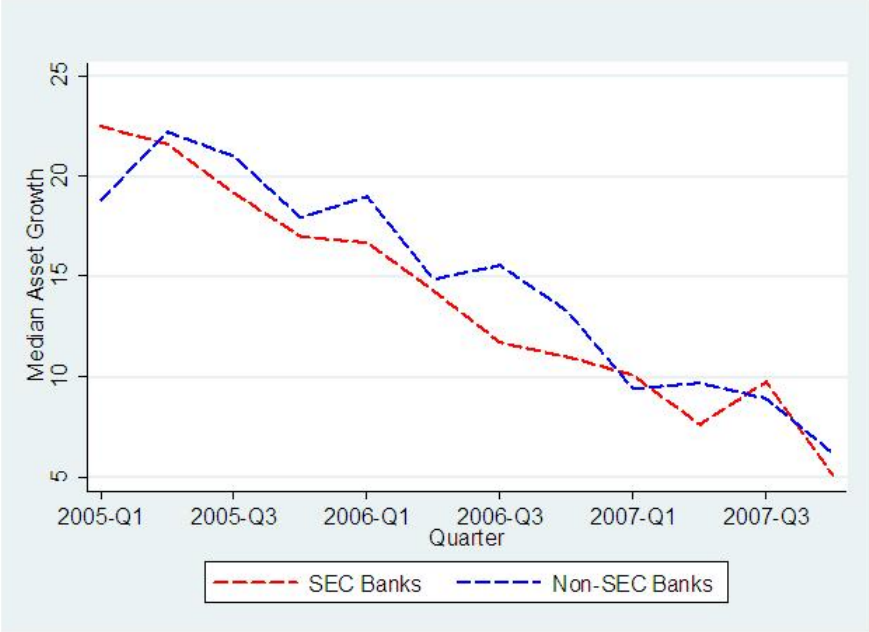

Figure 7: Interest costs of Interest Bearing Liabilities by SEC Filing Category

This figure presents the median interest cost (%) of interest bearing liabilities per quarter for SEC failed banks vis-a-vis Non-SEC failed banks in the period 2005:Q1 to.2010:Q4

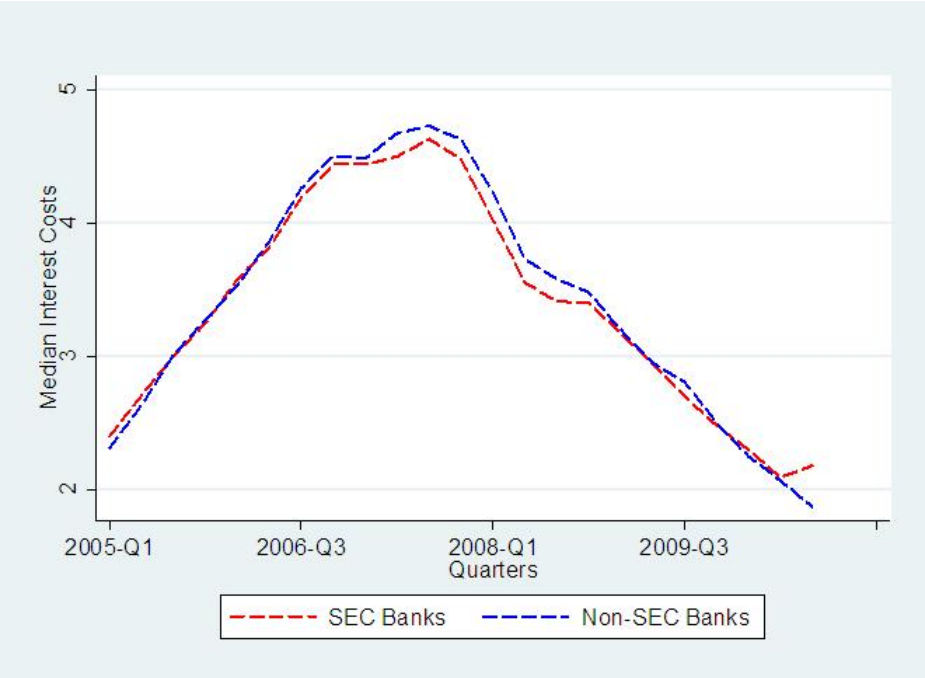

Figure 8: Median Wholesale Funding (% Total Funding) prior to Bank Resolution by SEC Filing Category

This figure presents the median wholesale funding (Total Borrowings + Total Brokered Deposits) as a percentage total funding for SEC failed banks vis-a-vis Non-SEC failed banks.