The Effect Of Government Bailouts On Default Risk And Charter Values In Banking

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This paper examines the impact of the Troubled Asset Relief Program/Capital Purchase Program (TARP/CPP) participation and early repayments on the disciplinary role of bank charter values following the 2008 financial crisis. I find that the disciplinary role of bank charter value has been significantly impacted by the bailouts. TARP/CPP participants exhibit lower sensitivity of the market-based default risk to the changes in charter values compared to non-participants indicating the presence of moral hazard. The effect is most significant for the strongest banks that were able to repay the TARP/CPP funds early with private equity. This study contributes to the literature on the disciplinary role of bank charter values by focusing on the effects of the government bailouts.

JEL classification: G01; G21; G28
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1. Introduction

In this paper, I examine the effects of the Troubled Asset Relief Program (TARP) and Capital Purchase Program (CPP) on the disciplinary role of bank charter values. The charter value hypothesis introduced by Marcus (1984) and originally tested by Keeley (1990) connects the effects of regulation, market structure, bank charter values and risk taking. Changes in regulation or market structure affect charter values and impact its risk taking behavior. The results of the numerous empirical studies that followed Keeley (1990) are often contradictory. Do the banks with the high charter values reduce risk in order to preserve their charter values (i.e. disciplinary effect of charter values), or do banks increase risk with assurance of the government safety net (i.e. moral hazard effect)? Unprecedented government assistance programs to the banking industry that followed the 2008 financial crisis provide a natural experiment opportunity to compare the effects of government bailouts on the bank charter values and risk.

The U.S. Congress approved $700 billion for TARP on October 3, 2008 as part of the Emergency Economic Stabilization Act (EESA), in an effort to prevent the collapse of the financial markets. CPP, the largest initiative under TARP, was launched to provide the capital injections to the banks in order to stabilize the banking sector. Although there is a growing body of literature on the effects of TARP on the various measures of bank risk taking and efficiency, this is a first study that examines the correlations between charter values and default risk for TARP recipients and non-recipients while accounting for early repayment of TARP funds. I test my hypotheses on a sample of publicly traded banks with market and accounting data available between 2007.Q1 to 2010.Q4. These financial institutions are further divided into four groups based on the asset size, TARP participation and repayment.I find that the participation in TARP/CPP has diminished the disciplinary role of charter values for both types of program participants: those that repaid TARP/CPP, as well as those that did not, although the results are statistically and economically stronger for the banks that repaid TARP/CPP. This paper contributes to the literature on the disciplinary role of the bank charter values by focusing on the impact of the government bailouts.It demonstrates that TARP/CPP participation reduced the disciplinary role of bank charter values and points at the moral hazard effect of the government bailouts.

The remainder of this paper proceeds as follows: I outline the existing theory and empirical studies surrounding the government safety net, bank charter values and risk taking in Section 2 and describe hypotheses in Section 3. Section 4 discusses the statistical methods and the model used in this study. Section 5 describes the data and sample selection. The empirical results are presented in Section 6, and Section 7 concludes.

2. Related Literature

2.1. TARP/Capital Purchase Program

The expressed purpose of TAPR/CPP funding was "to bolster the capital position of viable institutions of all sizes and, in doing so, to build confidence in these institutions and the financial system as a whole" (Office of Financial Stability, 2010). The U.S. banking organizations were made eligible to obtain preferred stock investments from the U.S. Department of the Treasury through CPP, which allocated $250 billion for that purpose[1] on October 14, 2008. The bailouts started in October of 2008 with eight largest financial institutions obtaining the initial injection of $125 billion[2]. Overall, 707 public and private financial institutions received funds through TARP/CPP to support the regulatory capital ratios which were declining due to depressed market values of investments and increase in non-performing loans. The CPP participation amount ranged between 1% and 3% of risk weighted assets, with the maximum amount capped at $25 billion (excluding the first eight largest recipients). The majority of TARP recipients (473 institutions or 67%) were small community banks with total assets under $1 billion. The process of TARP/CPP repayments involves 100% repurchase of preferred stock and the option to repurchase all related warrants. A significant number of the participating institutions have repaid the TARP/CPP funds to the U.S. Department of the Treasury. Restrictions on the executive compensation introduced in February of 2009 and stigma associated with the participation in the program were cited as some of the reasons for the early TARP repayment. At the same time, in March of 2009 the Treasury allowed smaller institutions with total assets under $500 million apply for the program and increased the upper limit of available funds to 5% of risk-weighted assets (Office of Financial Stability, 2010).

Veronesi and Zingales (2010) analyze the implicit benefit received by the banks in form of the enterprise value due to the decreased probability of the default. They argue that government intervention can create value for the banks. Specifically, they demonstrate that the inefficiencies created by the bailouts reduce the enterprise value by 2.5% and benefits from the reduction in "bank run" probabilities increase the enterprise value by 22%. Huerta et al. (2011) examine the short-run impact of TARP on the stock market volatility and find that the volatility of the bailout recipient industries declined followingallocation of the bailout funds. This effect is especially pronounced for the banking, insurance and financial industries. Carow and Salotti (2012) point out the selective nature of the government intervention, and differentiate between the bank decision to apply for TARP/CPP and Treasury's decision to approve the participation in the program. Wilson and Wu (2010) identify the inefficiencies in TARP program noting that TARP/CPP recipient banks may shift risk to the creditors (preferred shareholders).

Bayazitova and Shivdasani (2012) provide a comprehensive assessment of TARP/CPP program participants, the short term effects of the TARP fund participation and repayment. This study indicates that the executive compensation played an important role in banks' decision to exit TARP early. The banks that exited TARP ahead of schedule had stronger capital ratios and better asset quality. They also note a self-selection process in banks' decision to apply for TARP/CPP, demonstrating that stronger banks were more likely to opt out of TARP/CPP participation. Black

[1] This amount was lowered to $218 billion in March 2009. Of this amount, $205 billion was distributed to TARP/CPP recipients by the end of the program in December of 2009 (Office of Financial Stability, 2010).

[2] On October 28, 2008 Bank of America Corporation, The Bank of New York Mellon Corporation, City Group, Goldman Sachs Group, Inc., JP Morgan Chase, Morgan Stanley, State Street Corporation and Wells Fargo Company received an injection of $125 billion in form of preferred stocks with warrants (www.treasury.gov)

and Hazelwood (2012) analyze the effect of TARP/CPP injections on bank risk taking measured by the risk ratings of banks' commercial loan originations. They find that the risk taking at large banks increased compared to the banks that did not participate in TARP/CPP program thus indicating a moral hazard effect. Further tests controlling for TARP repayments show weaker results for the large banks. At the same time, they find that the risk taking in small TARP recipient banks has actually decreased. Harris et al. (2013) demonstrate the decline in operating efficiency of the banks that participated in TARP using a Data Envelopment Analysis. Each TARP bank in this study is matched to the value weighted portfolio of non-TARP banks. The authors attribute operating efficiency reduction to the moral hazard effect associated with the government bailouts.

2.2. Bank Charter Values and Risk

The charter value "plays a particularly important role in banking because it helps mitigate the "moral hazard problem" associated with the federal safety net" (Demsetz et al., 1996). Marcus (1984) points to the disciplinary role of the charter values in banking: with increase in competition and deregulation bank charter values decline which leads to excessive risk taking. Keeley (1990) introduces Tobin's q as a proxy for bank's market power measuring q as market value of assets calculated as the sum of the market value of common stock equal to price per share times the number of shares and the book value of liabilities divided by the book value of assets excluding loan loss reserves. Keeley (1990) concludes that the failures among thrifts in the 1980s were the result of deterioration in charter values. Demsetz et al. (1996) find that charter value increases may be associated with increases in systematic risk. Osborne and Lee (2001) examine the impact of the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) that introduced risk based insurance premiums on moral hazard in banking. The authors demonstrate that the associations between the bank charter values and systematic risk were reduced post-FDICIA, thus leading to reduction in moral hazard from government-backed deposit insurance. Laeven and Levine (2009) argue that government regulation does not directly affect the risk taking in the banking industry. The authors apply several alternative measures of bank risk including z-scores and earnings volatility to identify the key role of a bank's management and ownership structure in bank risk taking.

Empirical studies indicate that the charter values are strongly correlated with the stock market cycles. Saunders and Wilson (2001) analyze an extensive sample covering the period from 1893 to 1992 and conclude that the highest charter value banks demonstrate sharpest declines during the economic downturns and the risk-taking incentives associated with the high charter values disappear. The authors examine the relationship between charter value and capital structure decisions and find that during the expansions the high charter value banks hold the highest equity capital while in economic downturns these banks sustain the highest losses of charter values. They point out that in the original study by Keeley (1990), the market-based measure of risk and charter value both include the market-based value of equity which can lead to mechanical conclusions (accounting identity) and distort the results. Behr et al. (2010) demonstrate that regulation of bank capital can affect bank risk taking only in the markets with a low degree of concentration. Gan (2004) links two related hypotheses of charter value, market structure and risk taking, using the sample of thrifts in the state of Texas during the real estate crisis of 1980s. Gan (2004) finds that the correlations between charter value and risk taking increase following the exogenous shock.

Implicit and explicit government guaranties and bailouts affect the competitive market structure of the banking industry. Hakenes and Schnabel (2010) address the issue of the banks "too small to be saved", i.e. the banks that do not receive the bailout or government guarantees. This is one of the few studies that have addressed the negative effect of bailouts on the non-recipients. Following this line of research, Gropp et al. (2011) examine the impact of the government bailouts on the risk and find that the risk taking behavior increases among the competitors of the participating banks but not the bailout recipients themselves.

In sum, the question about the effects of the government bailouts and regulation on bank charter values and risk taking has not received a definitive answer in the literature. The findings of

previous empirical studies are influenced by the business cycles and different measures for risk taking and charter values. This study contributes to the literature on the disciplinary role of bank charter values and moral hazard hypotheses by examining the impact of TARP/CPP capital injections and subsequent early repayments following the 2008 financial crisis.

3. Hypothesis Development

I examine the effects of the government bailouts (TARP/CPP) on the relationship between bank charter values and default risk. TARP/CPP recipients were afforded a higher degree of government safety net and associated higher level of supervision than non-recipients. Furthermore, the "first wave" of TARP/CPP recipients included relatively large financial institutions with strong capital ratios that were healthier than non-recipients (Ng et al., 2011). The decision to participate and being approved for TARP/CPP program may have also included the signaling mechanism to the markets regarding the strength of the bank in the initial stage of the program. Some viewed TARP/CPP as an attempt by the government to pick "winners" and "losers" given the lack of transparency in application and approval process (Carow and Salotti, 2012).

Due to the costs associated with the CPP participation and restrictions on CEO compensation, stronger financial institutions decided to exit TARP following the American Recovery and Reinvestment Act (ARRA) of 2009, which allowed earlier repayments of CPP funds. These banks had better asset quality and stronger capital ratios (Bayazitova and Shivdasani, 2012). Wilson and Wu (2012) study the characteristics of the banks that chose to exit the TARP/CPP program and find that larger banks with lower levels of the problem assets were able to raise common or preferred stock in 2009 and exit CPP earlier. The second "wave" of CPP participants included smaller banks with higher levels of non-performing assets following the changes in TARP/CPP provisions in March of 2009 (Office of Financial Stability, 2010). Most of these banks were not able to repay the CPP ahead of schedule and some have missed scheduled dividend payments associated with preferred stock (Wilson, 2011).

In this study I examine the disciplinary role of charter values, making a distinction between banks with stronger charter values and relatively good asset quality that repaid TARP/CPP as soon as it became permissible, and banks with lower charter values and high level of non-performing assets that have not been able to repay by the end of 2011. Further, I compare these two groups of financial institutions with banks that did not participate in TARP/CPP. The non-participant group is divided into two groups based on asset size since the size of the banks is found to be a significant determinant of the risk taking behavior following bailouts (Black and Hazelwood, 2012).

Following Keeley (1990), I expect higher charter values to be associated with lower risk. Confirmation of this hypothesis would support disciplinary role of charter values. In addition, I examine the changes in slope of the risk proxy in respect to charter values similar to Osborne and Lee (2001) and Gan (2004). I expect the slopes of risk with respect to charter values be different for the subsamples of banks based on their TARP/CPP participation, repayment and asset size.

I test the following hypotheses:

Hypothesis 1: Distance-to-default (risk proxy) is positively correlated with charter values between 2007 and 2010.

Hypothesis 2: The slope of risk in respect to charter values increases following the financial crisis of 2008.

Hypothesis 3: The TARP/CPP participation and repayment impact the disciplinary role of bank charter value.

4. Charter Value, Risk and Model Description

The bank charter values in this study are calculated using a variation of Tobin's *q* introduced by Keeley (1990). The charter value (CV) is defined as the market value of equity (MVE) plus book value of liabilities (BVL) divided by book value of assets (BVA) (1). The book value of assets excludes goodwill following Keeley (1990) and Demsetz et al. (1996):

$$\mathrm{CV} = (\mathrm{MVE} + \mathrm{BVL})/(\mathrm{BVA} - \mathrm{Goodwill}) \quad (1)$$

I do not adjust book value of assets for loss reserve like Keeley (1990) as this amount can be a subject to a managerial and regulatory judgment.

Some recent studies question the validity of the Tobin's *q* as a proxy for market power due to the close correlation with the economic and stock market cycles. However, it is generally accepted as a reliable ordinal measure in studies comparing the performance of various groups of financial institutions (Jones, et.al. 2011).

I apply a modified distance-to-default (MDD) approximation (2) introduced by Byström (2006) to measure market-based default risk:

$$\mathrm{MDD} = \frac{\ln\left(\frac{\mathrm{BVL}}{\mathrm{MVE+BVL}}\right)}{\frac{\mathrm{BVL}}{\mathrm{MVE+BVL}} - 1}\frac{1}{\sigma_{\mathrm{E}}} = \frac{\ln \mathrm{L}}{\mathrm{L} - 1}\frac{1}{\sigma_{\mathrm{E}}}, \quad (2)$$

where *L* is market-based leverage measure, *BVL* is a book value of liabilities, *MVE* is a market value of equity (number of shares outstanding times close price per share at the end of the last trading day of the month), σ_{E} is annualized 90-day historic volatility of equity returns. It approximates the number of standard deviations between the mean of distribution of assets and default point and is based on credit risk measure originally introduced by Merton (1974). The higher the *MDD* measure, the further away the bank is from the default point. Byström (2006) demonstrates that the *MDD* serves as a good approximation for the distance to default which contains parameters that are good predictors of the default risk: leverage and inverse of equity volatility. This measure is less sensitive to the change in leverage, which is especially useful for banks due to opaque nature of their balance sheet. For high leverage firms such as banks, the ratio of $\frac{\ln \mathrm{L}}{\mathrm{L}-1} \to 1$ when L→1 and the inverse equity volatility becomes the risk measure.

I use the log-transform of the dependent variable adjusted by 1, which is referred to as distance-to-default (*DD*) in the rest of the paper, to smooth the outliers and avoid negative values:

$$\mathrm{DD} = \ln(1 + \mathrm{MDD}) \quad (3)$$

The final model (4) includes a set of standard control variables for bank charter values: log of total assets measured at the quarter-end, ratio of total deposits to total liabilities, total loans ratio, non-performing asset ratio, net interest margin, operating efficiency ratio, Tier 1 and Tier 2 capital ratios and S&P 500 Index as a macroeconomic factor. The full description of variables is presented in Exhibit "A".

$$\mathrm{DD}_{\mathrm{t,i}} = \mathrm{f}(\text{Charter Value}_{\mathrm{t,i}}, \text{Control Variables}_{\mathrm{t,i}}, \mathrm{S\&}P500_{\mathrm{t}}) \quad (4)$$

Given endogeneity of the charter value variable in (4) I apply two stage least squares (2SLS) regression model. Two simultaneous equations take form:

$$\begin{aligned} \text{Stage 1: Charter Value}_{\mathrm{t,i}} &= \alpha_1 \text{Control Variables}_{\mathrm{t,i}} + \alpha_2 \mathrm{S\&}P500_{\mathrm{t}} \\ \text{Stage 2: } \mathrm{DD}_{\mathrm{t,i}} &= \beta_1 \text{Charter Value}_{\mathrm{t,i}} + \beta_2 \mathrm{S\&}P500_{\mathrm{t}}, \end{aligned} \quad (5)$$

where *i* is a financial institution in the panel data, *t* is a time period and α_1 is a vector of coefficients.

I separate the sample in four groups based on asset size, TARP/CPP participation and early repayment and apply 2SLS method to all groups and years in the sample separately. Similar to

Osborne and Lee (2001) and Gan (2004), I examine the changes in the slope between the measures of risk and charter values.

5. Data

5.1. Sample Selection

For this study, I select a panel of publicly traded banking institutions with at least two quarterly observations between January 1, 2007 and December 31, 2010. Monthly and daily stock data is obtained from the Center for Research in Security Prices (CRSP) and matched with COMPUSTAT sample by *permno* using Wharton Research Data Services (WRDS) CRSP/COMPUSTAT merged database. TARP/CPP participation data is derived from Bloomberg and the U.S. Department of the Treasury TARP transactions report[3]. Ticker information from Bloomberg TARP report is matched with the U.S. Treasury Department Office of Financial Stability TARP Transaction Report, which contains date and amount of TARP/CPP receipt and repayment and reasons for leaving TARP. I exclude the financial institutions that received TARP at the on-set of the crisis on October 28, 2008 and financial institutions with maximum assets over $50 billion designated as systemically important ("too big to fail"). These institutions differ substantially from the rest of the sample by the types of the products, size, market share and regulatory and supervisory attention. The rest of the data were winsorized to control for outliers at 1% at each tail for charter value and distance-to-default variables.

5.2. Formation of the groups based on TARP/CPP participation and repayment

I divide the TARP/CPP recipients in two groups: banks that received TARP but chose to exit the program ahead of schedule (TARP REPAID), and banks that did not exit the program by the end of 2011 (TARP NOT REPAID). The notes to the U.S. Treasury Office of Financial Stability TARP Transaction report were checked manually. According to these notes, several banks among the TARP recipients that have repaid original TARP/CPP funds have used Community Development Capital Initiative (CDCI) and Small Business Lending Fund (SBLF) proceeds which were created as a part of Small Business Jobs Act enacted on September 27, 2010[4]. The deadline for the application to receive CDCI was in May of 2011, and a majority of the smaller banks thatrepaid TARP in 2011 did so with CDCI and SBLF funds. Since these banks did not raise outside equity and still use the government funds in their capital ratios, I retain them in the TARP NOT REPAID group. The final TARP REPAID group contains 68 financial institutions with at least two quarters of observations, and TARP NOT REPAID group contains 135 financial institutions.

The mean asset size among non-TARP banks is approximately $2.3 billion. The banks with the maximum asset size under $2.3 billion are assigned into the NON-TARP SMALL BANKS group (227 banks) and the banks with the maximum asset size over $2.3 billion are assigned into the NON-TARP LARGE BANKS group (78 banks). The final unbalanced panel data includes 508 financial institutions from 2007.Q1 to 2010.Q4.

6. Results

NON-TARP LARGE BANKS group has the highest mean charter values at 1.032 but TARP REPAID group has the highest distance-to-default value at 1.231 and lowest level of non-performing assets at 0.014 among all groups while TARP NOT REPAID has the highest level of non-performing assets at 0.028, the lowest mean charter values at 0.984 and the lowest distance-to-default at 1.075 (Table 1). This confirms the financial strength and high asset quality of banks that completed early TARP repayment.

The total number of observations in the sample is 6154 bank-quarters. The means of charter value and distance-to-default measures are compared among the four groups of banks using Tukey's

[3]http://treasury.gov/initiatives/financial-stability/briefing-room/reports/tarp-transactions/Pages/default.aspx?page=5

[4] www.sba.gov

studentized range test with 5% significance level for the entire sample and on annual basis.

Table 1
Descriptive Statistics

Groups	Full Sample	Non-TARP Small Banks	Non-TARP Large Banks	TARP Repaid	TARP Not Repaid
N	6154	2378	975	972	1829
Mean					
Charter Value	1.001	0.995	1.032	1.017	0.984
Distance-to-Default	1.159	1.170	1.218	1.231	1.075
Total Deposits to Total Liabilities Ratio	0.840	0.842	0.814	0.849	0.845
Non-Performing Assets Ratio	0.024	0.025	0.022	0.014	0.028
Total Assets	3218.200	803.400	6078.700	5957.500	3377.100
Total Loans to Assets Ratio	0.688	0.686	0.651	0.684	0.713
Operating Efficiency Ratio	1.031	1.045	1.019	0.909	1.084
Net Interest Margin	3.506	3.426	3.474	3.726	3.507
Tier 1 Capital Ratio	11.353	11.604	11.170	11.904	10.831
Tier 2 Capital Ratio	2.694	3.537	2.825	1.886	1.957
Total Capital Ratio	14.037	15.139	13.922	13.790	12.797
Median					
Charter Value	0.993	0.987	1.031	1.014	0.974
Distance-to-Default	1.135	1.139	1.229	1.220	1.030
Total Deposits to Total Liabilities Ratio	0.853	0.855	0.829	0.857	0.858
Non-Performing Assets Ratio	0.014	0.014	0.010	0.009	0.021
Total Assets	1304.900	679.930	3730.450	2930.010	1434.080
Total Loans to Assets Ratio	0.701	0.701	0.665	0.698	0.718
Operating Efficiency Ratio	0.893	0.906	0.850	0.847	0.931
Net Interest Margin	3.480	3.400	3.540	3.640	3.460
Tier 1 Capital Ratio	10.870	10.700	10.810	11.440	10.730
Tier 2 Capital Ratio	1.300	1.360	1.290	1.270	1.280
Total Capital Ratio	13.100	13.500	13.280	13.130	12.620
Standard Deviation					
Charter Value	0.048	0.044	0.053	0.045	0.041
Distance-to-Default	0.420	0.442	0.409	0.389	0.397
Total Deposits to Total Liabilities Ratio	0.102	0.107	0.126	0.093	0.082
Non-Performing Assets Ratio	0.029	0.034	0.032	0.015	0.025
Total Assets	5222.400	487.400	5990.900	6661.800	5729.800
Total Loans to Assets Ratio	0.117	0.129	0.136	0.101	0.085
Operating Efficiency Ratio	0.511	0.511	0.653	0.302	0.504
Net Interest Margin	0.753	0.776	0.823	0.653	0.709
Tier 1 Capital Ratio	3.450	4.167	3.568	2.847	2.424
Tier 2 Capital Ratio	3.110	4.186	3.206	1.292	1.258
Total Capital Ratio	4.631	6.143	4.497	2.877	2.184
Minimum					
Charter Value	0.908	0.910	0.908	0.910	0.910
Distance-to-Default	0.371	0.371	0.371	0.372	0.371
Total Deposits to Total Liabilities Ratio	0.221	0.355	0.221	0.460	0.525
Non-Performing Assets Ratio	0.000	0.000	0.000	0.000	0.000
Total Assets	86.800	86.800	1083.100	245.200	166.500
Total Loans to Assets Ratio	0.130	0.130	0.165	0.293	0.420
Operating Efficiency Ratio	0.213	0.235	0.325	0.213	0.366

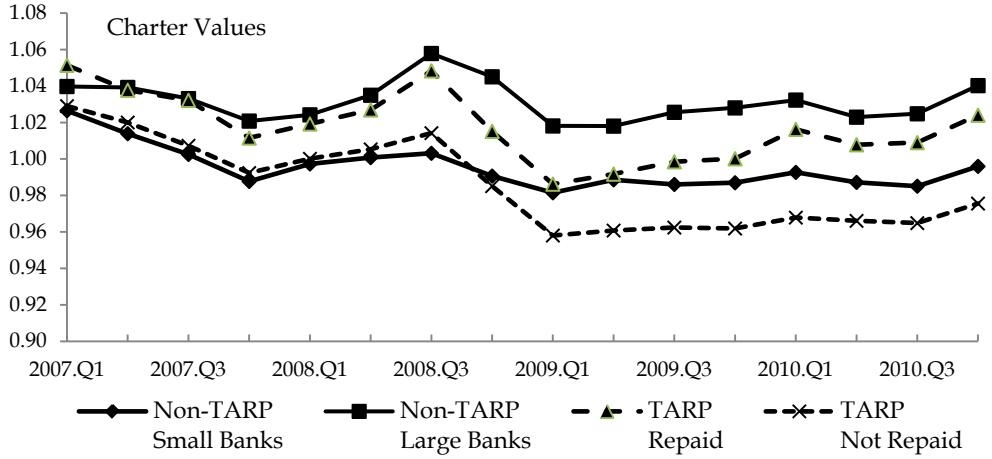
Table 1- continued

Groups	Full Sample	Non-TARP Small Banks	Non-TARP Large Banks	TARP Repaid	TARP Not Repaid
Net Interest Margin	-0.030	-0.030	0.600	2.150	1.290
Tier 1 Capital Ratio	-2.560	-1.710	-2.100	6.300	-2.560
Tier 2 Capital Ratio	-0.140	0.000	0.000	0.300	-0.140
Total Capital Ratio	-2.560	-1.710	-2.100	9.570	-2.560
Maximum					
Charter Value	1.169	1.169	1.169	1.141	1.163
Distance-to-Default	2.297	2.297	2.281	2.273	2.294
Total Deposits to Total Liabilities Ratio	1.261	1.261	1.218	1.103	1.043
Non-Performing Assets Ratio	0.481	0.481	0.410	0.121	0.206
Total Assets	47280.100	2279.700	42430.700	38828.800	47280.100
Total Loans to Assets Ratio	0.936	0.933	0.933	0.936	0.911
Operating Efficiency Ratio	9.453	6.933	9.453	4.683	6.456
Net Interest Margin	9.360	7.520	8.120	7.580	9.360
Tier 1 Capital Ratio	43.090	43.090	30.980	31.400	21.110
Tier 2 Capital Ratio	33.390	33.390	25.100	11.720	8.940
Total Capital Ratio	55.290	55.290	44.440	35.300	22.360

Notes: This table presents the sample descriptive statistics for the entire sample, from 2007 to 2010 and each group of banks separately: Non-TAPR small banks, Non-TARP large banks, TARP banks that repaid the funds and TARP banks that did not repay the funds.

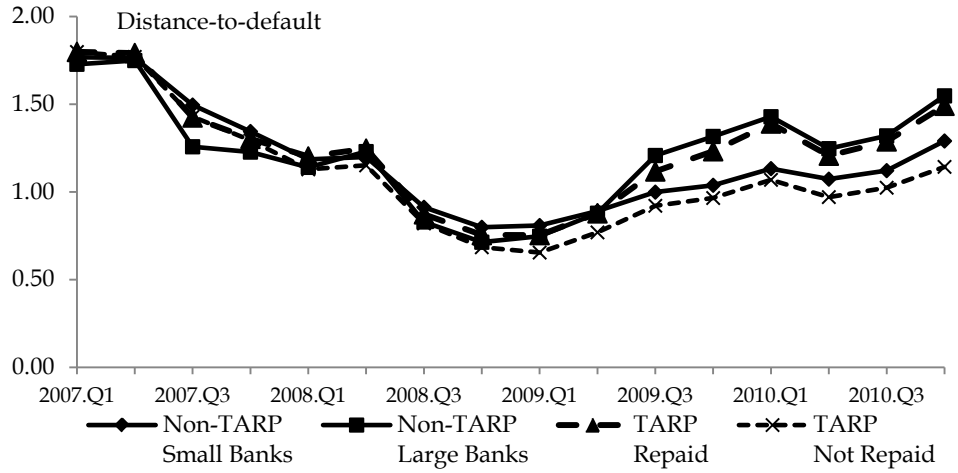
The distance-to-default measures of NON-TARP LARGE BANKS and TARP REPAID groups are statistically equal for every year in the sample with the exception of 2007. The charter values of these two groups are statistically equal in 2007 but diverge significantly from 2008 to 2010. The charter values of NON-TARP SMALL BANKS and TARP NOT REPAID groups are statistically equal in 2007 and 2008 but diverge in 2009 and 2010 when the charter values of TARP NOT REPAID banks decline to the lowest levels compared to the rest of the financial institutions. At the same time, the distance-to-default of TARP NOT REPAID group remains the lowest among all groups. The time series of the quarterly means of charter values and distance-to-default measures are illustrated in Figures II and III correspondingly.

Fig. I



This figure illustrates the changes in charter value means between 2007 and 2010 on a quarterly basis for four groups of banks: Non-TAPR small banks, Non-TARP large banks, TARP banks that repaid the funds and TARP banks that did not repay the funds.

Fig. II



This figure illustrates the changes in distance-to-default means between 2007 and 2010 on a quarterly basis for four groups of banks: Non-TAPR small banks, Non-TARP large banks, TARP banks that repaid the funds and TARP banks that did not repay the funds.

Pearson correlation coefficients for the entire sample indicate strong and significant correlation between distance-to-default measure and S&P 500 (0.600), and between distance-to-default and non-performing assets (-0.420). Charter values and distance- to-default show positive correlation for the entire period (0.371) for the entire sample (Table 2). This indicates the endogeneity and multicollinearity problems among this group of variables. The use of 2SLS regressions aims to mitigate endogeneity problem by using fitted charter values in the second stage of the regressions. Although the correlations between independent variables are significant, for the most part they are not as high as the correlations between independent and dependent variables. Two of the independent control variables, non-performing assets and operating efficiency ratios, have a relatively high and significant correlation coefficient (0.516). As a robustness check for multicollinearity issues, I reduce the model by removing one of these control variables, operating efficiency ratio, from the first stage regressions, without any significant impact on the estimates in the second stage.

Positive and significant correlation coefficients between the distance-to-default and charter values (Table 2) provide support for Hypothesis 1 and confirm the previous studies that find the disciplinary effect of bank charter values.

Table 2
Pearson Correlation Coefficients (2007-2010)

	1	2	3	4	5	6	7
Distance-to-Default	1.000	0.371***	-0.420***	0.600***	-0.342***	0.168***	0.283***
Charter Value	0.371***	1.000	-0.369***	0.212***	-0.251***	0.256***	0.034***
Non-Performing Assets Ratio	-0.420***	-0.369***	1.000	-0.275***	0.516***	-0.252***	-0.187***
S&P 500	0.600***	0.212***	-0.275***	1.000	-0.194***	0.101***	-0.020
Operating Efficiency Ratio	-0.342***	-0.251***	0.516***	-0.194***	1.000	-0.244***	-0.181***
Net Interest Margin	0.168***	0.256***	-0.252***	0.101***	-0.244***	1.000	0.002
Total Capital Ratio	0.283***	0.034***	-0.187***	-0.020	-0.181***	0.002	1.000

Notes: This table presents the Pearson correlation coefficients for Distance-to-Default, Charter Value and control variables. ***, **, * indicate statistical significance at the 0.01, 0.05 and 0.10 level respectively.

Table 3
Two Stage Least Squares (2SLS) Regression Estimates by Year

	Full Sample 2007-2010	2007	2008	2009	2010
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Intercept	0.892***	1.055***	0.919***	0.905***	0.837***
Total Assets (log)	0.011***	0.009***	0.013***	0.010***	0.015***
Non-Performing Assets Ratio	-0.433***	-0.359***	-0.486***	-0.289***	-0.392***
Total Deposits to Total Liabilities Ratio	0.020***	0.011	0.036***	0.059***	0.031**
Total Loans to Assets Ratio	-0.066***	-0.031**	-0.079***	-0.110***	-0.083***
Net Interest Margin	0.014***	0.014***	0.015***	0.012***	0.013***
Operating Efficiency Ratio	-0.005***	-0.004	-0.008***	-0.006***	-0.004
Tier 1 Capital Ratio	-0.001***	0.000	-0.001***	-0.001***	-0.001***
Tier 2 Capital Ratio	0.000**	-0.001***	0.001	0.002***	0.001***
S&P 500	0.028***	-0.090***	0.001	0.016**	0.049***
Adj. R- Sq	0.290	0.140	0.280	0.310	0.360
Intercept	-5.260***	1.291	-2.848***	-5.999***	-7.562
Charter Value	5.322***	2.250***	2.618***	6.041***	8.172
S&P 500	0.915***	-1.374***	1.025***	1.003***	0.553
Adj. R- Sq	0.380	0.040	0.320	0.340	0.290

Notes: This table reports the results of two stage least squares (2SLS) regression for the entire sample (2007-2010) and each year separately. Dependent variable in Stage 1 (top panel) is Charter Value. Dependent variable in Stage 2 (bottom panel) is Distance-to-Default. ***, **, * indicate statistical significance at the 0.01, 0.05 and 0.10 level respectively.

Table 4
Two Stage Least Squares (2SLS) Regression Estimates by TARP Participation and Repayment Groups

	Full Sample 2007-2010	Non-TARP Small Banks	Non-TARP Large Banks	TARP Repaid	TARP Not Repaid
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Intercept	0.892***	0.857***	0.919***	0.925***	0.916**
Total Assets (log)	0.011***	0.015***	0.011***	0.014***	0.010***
Non-Performing Assets Ratio	-0.433***	-0.346***	-0.437***	-0.590***	-0.542**
Total Deposits to Total Liabilities Ratio	0.020***	0.028***	0.056***	-0.033**	-0.002
Total Loans to Assets Ratio	-0.066***	-0.044***	-0.080***	-0.045***	-0.041***
Net Interest Margin	0.014***	0.011***	0.021***	0.017***	0.012***
Operating Efficiency Ratio	-0.005***	-0.001	-0.006**	-0.028***	-0.003*
Tier 1 Capital Ratio	-0.001***	0.000	-0.002***	-0.002***	-0.003***
Tier 2 Capital Ratio	0.000**	0.000	0.002***	-0.005***	-0.005***
S&P 500	0.028***	0.020***	-0.015**	0.035***	0.042***
Adj. R- Sq	0.290	0.200	0.270	0.360	0.350
Intercept	-5.260***	-7.820***	-6.934***	-2.004***	-5.464***
Charter Value	5.322***	7.980***	6.841***	1.984***	5.595***
S&P 500	0.915***	0.878***	0.914***	1.021***	0.877***
Adj. R- Sq	0.380	0.300	0.320	0.400	0.460

Notes: This table reports the results of two stage least squares (2SLS) regression for the entire sample and each group of banks separately: Non-TAPR small banks, Non-TARP large banks, TARP banks that repaid the funds and TARP banks that did not repay the funds. Dependent variable in Stage 1 (top panel) is Charter Value. Dependent variable in Stage 2 (bottom panel) is Distance-to-Default. ***, **, * indicate statistical significance at the 0.01, 0.05 and 0.10 level respectively.

Further analysis using 2SLS regressions shows that the sensitivity of the risk proxy to the charter values has increased progressively from 2.250 (in 2007) to 8.172 (in 2010) for the entire sample (Table 3, Stage 2) which lends support to Hypothesis 2. Moreover, TARP REPAID group has the lowest sensitivity to market risk in response to changes in the charter values at 1.984 (standardized estimate 0.227) followed by TARP NOT REPAID at 5.595 (standardized estimate 0.579), NON-TARP LARGE BANKS at 6.841 (standardized estimate 0.888) and NON-TARP SMALL BANKS at 7.980 (standardized estimate 0.808) between 2007 and 2010 (Table 4, Stage 2). Based on these results, TARP/CPP participation did have a significant impact on the sensitivity of market-based default risk in respect to the charter values. The banks that participated in TARP/CPP (whether it was repaid or not) are found to have a weaker correlation between charter values and market-based default risk measure compared to those banks that did not participate in TARP. It also indicates that between 2007 and 2010 the participation in the government bailouts had an impact on the disciplinary role of charter values thus supporting Hypothesis 3.

Table 5
Second Stage of Two Stage Least Squares (2SLS) Regression Estimates by Year and TARP Participation and Repayment Group

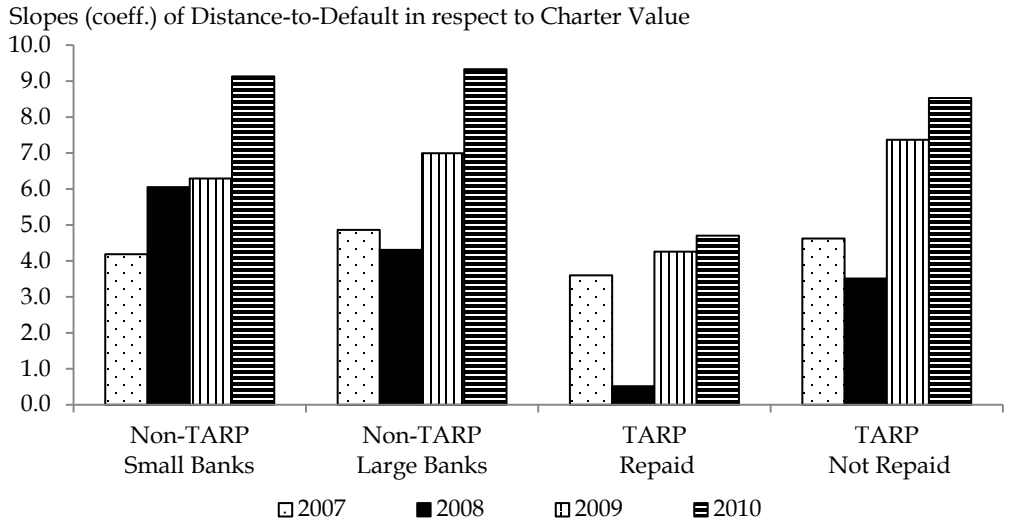
		Non-TARP Small Banks	Non-TARP Large Banks	TARP Repaid	TARP Not Repaid
		Coeff.	Coeff.	Coeff.	Coeff.
2007	Intercept	-2.074	-0.181	0.017	-1.197
	Charter Value	4.190***	4.864***	3.599***	4.626***
	S&P 500	-0.393	-2.272***	-1.464***	-1.307***
	Adj.R-Sq	0.030	0.100	0.060	0.080
2008	Intercept	-6.027***	-5.049***	-0.851	-3.673***
	Charter Value	6.055***	4.311***	0.517	3.513***
	S&P 500	0.870***	1.325***	1.146***	0.941***
	Adj.R-Sq	0.220	0.490	0.430	0.430
2009	Intercept	-5.907***	-7.704***	-4.530***	-7.141***
	Charter Value	6.296***	6.998***	4.258***	7.371***
	S&P 500	0.657***	1.632***	1.330***	0.912***
	Adj.R-Sq	0.200	0.630	0.530	0.320
2010	Intercept	-8.449***	-8.967***	-4.483***	-7.694***
	Charter Value	9.133***	9.336***	4.706***	8.535***
	S&P 500	0.489***	0.641***	0.921***	0.417**
	Adj.R-Sq	0.180	0.400	0.310	0.140

Notes: This table reports the results of the second stage least squares (2SLS) regression by year for each of four groups of banks: Non-TAPR small banks, Non-TARP large banks, TARP banks that repaid the funds and TARP banks that did not repay the funds. Dependent variable is Distance-to-Default. ***, **, * indicate statistical significance the 0.01, 0.05 and 0.10 level respectively.

Applying time fixed effect analysis for each group separately (Table 5), I find that the slopes of risk with respect to charter values in the second stage regressions have varied significantly between 2007 and 2010 (as illustrated in Figure III). In 2007, the estimates for NON-TARP SMALL BANKS, NON-TARP LARGE BANKS and TARP NOT REPAID were essentially similar at 4.190, 4.864 and 4.626, although TARP REPAID estimate was lower at 3.599. By the end of 2010, following the bailouts and early repayments of TARP by some of the institutions, the clear trend has emerged: TARP/CPP recipients from both groups (those that repaid and did not repay) have lower sensitivity to default risk resulting from the change in charter values (4.706 and 8.535) compared to non-recipients (9.133 and 9.336 correspondingly). Moreover, the banks that repaid TARP exhibit the lowest sensitivity to market-based default risk measure resulting from the change in the charter values. Between 2007 and 2010, the sensitivity of the market-based default measure increased by 118% for NON-TARP SMALL BANKS, by 92% for NON-TARP LARGE BANKS and only by 31% for

TARP REPAID and by 84% for TARP NOT REPAID. Although the TARP REPAID group clearly exhibits the lowest change in sensitivity, surprisingly, the TARP NOT REPAID group has the second lowest change in sensitivity despite the highest level of non-performing assets and the lowest charter value. Although the sensitivity of risk to charter values increased in all groups following the financial crisis, the rate of change is lower for TARP/CPP recipients.

Fig. III



This figure illustrates the changes in slopes of distance-to-default (risk) in respect to charter values for years 2007 to 2010 for four groups of banks: Non-TAPR small banks, Non-TARP large banks, TARP banks that repaid the funds and TARP banks that did not repay the funds. The values of the parameter estimates are detailed in Table 5.

These results indicate that participation in the government bailout program makes the market-based default risk relatively less sensitive to the changes in charter values thus reducing the disciplinary effect of the charter values. The banks that did not participate in TARP/CPP show increasing sensitivity over time to the market-based default risk measure resulting from the change in charter values, i.e. for these institutions the disciplinary role of charter value remains comparatively high.

7. Conclusion

This paper examines the associations between bank charter values and the market-based risk of default in the context of the government bailouts during the 2008 financial crisis. The effects of the government safety net on the disciplinary role of bank charter values, risk taking and moral hazard have been a focus of the debate in the existing literature. Does the increase in regulation and supervision lead to an increase in charter values which in turn act as a risk taking deterrent? Or, is the presence of government guaranties and safety net creates the moral hazard dilemma and leads to the increase in risk in the financial industry? An unprecedented flurry of government bailouts in form of TARP/CPP following the 2008 financial crisis provide an opportunity for the study of the effects of regulations and supervision that distinguish recipients and non-recipients of the bailout funds and different levels of supervision associated with participation in these programs.

For this study, I select the sample of 508 publicly traded domestic financial institutions from 2007.Q1 to 2010.Q4. I utilize Tobin's q as the charter value measure following Keeley (1990), and use the modified Merton (1974) distance-to-default measure as a proxy for the market-based default risk. I control for the early repayment of TARP/CPP funds, and distinguish between the stronger

TARP/CPP recipients that were able to repay the funds ahead of schedule and the weaker ones that did not repay. To address the endogeneity bias, I use 2SLS regressions for the entire sample time period, and for each year and each group of banks separately based on TARP/CPP participation, repayment and asset size.

I find that TARP/CPP recipients that have repaid the funds early represent the strongest financial institutions with the lowest default risk. I find that the market-based risk (distance-to-default) measure and charter values are positively correlated throughout the entire study period, which agrees with previous research and confirms the disciplinary role of bank charter values. The main findings of this study indicate that the disciplinary effect of charter values has weakened for TARP/CPP recipients by the end of 2010, one year after the end of the bailout program. This result applies to both types of TARP/CPP recipients, i.e. the strongest banks that repaid TARP/CPP and the weakest banks that have not repaid, although the results are quantitatively stronger for the banks that repaid TARP/CPP. The disciplinary role of charter values is found to be comparatively stronger by the end of 2010 for non-recipients.

An important contribution of my study is a separate sensitivity analysis of the market-based default risk and charter values for TARP/CPP recipients that repaid the government funds ahead of schedule and the ones that did not. I find that the disciplinary role of the charter values is relatively weaker for both types of TARP/CPP recipients compared to the non-recipients. This may be associated with the market structure distortion caused by TARP/CPP and implies the presence of moral hazard in the financial system following the government bailouts.

Exhibit "A"
List of Variables

List of Variables	Abbreviations	Description
Total Assets	ATQ	Total Assets at the Quarter end
Total Deposits Ratio	DPTCQ/LTQ	(Total Deposits at the Quarter end)/ (Total Liabilities at the Quarter end
Total Loans Ratio	LNTALQ/LTQ	(Total Loans at the Quarter end)/ (Total Liabilities at the Quarter end)
Tier 1 Capital Ratio	CAPR1Q	Risk-Adjusted Capital Ratio Tier 1
Tier 2 Capital Ratio	CAPR2Q	Risk-Adjusted Capital Ratio Tier 2
Total Capital Ratio	CAPR3Q	Risk-Adjusted Capital Ratio Combined
Net Interest Margin	NIMQ	Net Interest Margin
Non-Performing Assets Ratio	NPATQ/ATQ	(Non-Performing Assets-Total)/ (Total Assets at the Quarter end)
Operating Efficiency Ratio	TCOEQ/TCORQ	(Total Current Operating Expenses)/ (Total Current Operating Revenue)

The abbreviations and definitions of the variables in this list are obtained from the Wharton Research Data Services (WRDS) database

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