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The Emergency Economic Stabilization Act of 2008 was the response of the Federal government to the economic crisis of 2007-2009. Within this act, the Troubled Asset Relief Program (TARP) was the mechanism to attempt to stabilize the financial market through the injection of liquidity into troubled firms. This paper examines the effect of TARP bailouts on stock market volatility and investor fear. Using an event study methodology, we find evidence of a significant decrease in stock-market volatility on the day of bailouts, and the day after. Additionally, findings show that the VIX, a proxy of investor fear, significantly declines on the second day subsequent to bailouts. The results suggest that government intervention, in the form of bailouts, is successful in stabilizing financial markets and reducing investor anxiety in the short-run.

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1. Introduction

Anxiety, fear, and panic were prevalent emotions among investors during the recent 2007-2009 economic crisis. These feelings are believed to have contributed to the significant increase in stock market volatility during this period. Consequently, the U.S. government has tried to calm investor fear and increase investor confidence by implementing various policies directed at stabilizing financial markets. Specifically, through the Troubled Asset Relief Program (TARP), the government injected over $700 billion U.S. dollars into the economy in the form of bailouts and security purchases from financially troubled firms beginning on October 28, 2008. The TARP, which was part of the Emergency Economic Stabilization Act of 2008, was composed of several programs. The largest and most noticeable was the Capital Purchase Program (CPP), through which the U.S. Treasury assigned close to $250 billion to acquire preferred stocks and debt securities in over 700 firms.

The TARP and CPP programs have generated widespread controversy. Proponents argue that the programs have reduced volatility by stabilizing the financial system through an injection of much needed liquidity into financially distressed firms. In contrast, opponents argue that the misuse of funds and the inability of the government to keep track of these resources reduce the effectiveness of TARP as a stabilizing tool. Irrespective of which view is correct, it is still unclear if bailouts have any effect on stock market volatility, and particularly on uncertainty and anxiety among investors.

We employ an event-study methodology to examine the impact of TARP bailouts on stock market volatility and investor fear during the latest economic recession. Specifically, we assess the impact of bailouts on: 1) the volatility of the New York Stock Exchange composite index; 2) the volatility of ten portfolios constructed by market capitalization to examine possible differential effects corresponding to firm size; and 3) the volatility of TARP recipient industries. To ensure robustness of our results, we also test the impact of TARP bailouts on two different measures of investor fear; the implied volatility for both the Standard and Poor's 500 index (VIX) and the Standard and Poor's 100 index (VXO).

Results show that stock market volatility significantly decreases on the day of the disbursement of bailout funds and the day after. Moreover, compared to the bailout day, the magnitude of the decrease in volatility is almost twice as large on the day subsequent to the bailout. When we analyze the ten portfolios classified by size deciles, only five of the ten size deciles have significant volatility reduction on the bailout day. However, the volatility of all portfolios significantly decreases the day following the disbursement of TARP funds. Additionally, we observe that TARP bailout recipient industries – the banking, insurance, finance, and automotive industries – exhibit volatility reduction in different magnitudes. The banking, insurance, and financial industries display a significant reduction in volatility the day after bailouts, with the insurance industry showing further volatility reduction up to two days subsequent to bailouts. Surprisingly, the automotive industry shows no significant drop in volatility, it is worth pointing out that the number of firms receiving TARP funds in this industry is much smaller than for the others. We also observe that both measures of investor fear exhibit significant reductions two days after the bailouts. We attribute this delay to the time it takes for the dissemination of information to take effect. Our results suggest that government interventions, in the form of bailouts and security purchases from financially distressed firms, are successful in reducing volatility and investor fear in the short-run.

The remainder of this paper is organized as follows. In section two, we provide a background and summarize the related literature. Section three describes the data utilized in the study and a discussion of the applied methodology. Section four reports the estimation results and section five concludes.

2. Background and Literature Review

The United States government launched the Emergency Economic Stabilization Act of 2008 in response to the significant market declines which pushed the U.S. economy into recession and almost caused the collapse of the financial sector. The centerpiece of this act, the TARP, was introduced as a rescuing mechanism that allows the Federal government to purchase "troubled" assets from banks and other institutions in financial distress. By purchasing impaired assets, the Federal government would in effect inject significant amounts of liquidity into the financial sector with the hope of jump-starting the economy and reducing investor anxiety.

Northehr (2008) describes the TARP program as a $700 billion U.S. dollars bailout plan that allows banks to sell assets that are negatively impacting their balance sheets which they would not be able to sell otherwise. A Congressional Budget Office report released on January 16, 2009, explains that "troubled assets" are referred to as "residential or commercial mortgages and any securities, obligations, or other instruments that are based on or related to such mortgages, that in each case was originated or issued on or before March 14, 2008" (p.5) and any other financial instrument approved by the Federal Reserve System that will promote financial market stability (CBO, 2009). The purchase of these assets would allow banks and financial institutions to improve their balance sheets and thereby enhance their reputation among investors. In addition, TARP aims to restore lending to pre-crisis levels and to sustain a normal flow of credit during the crisis. The Government expects that once troubled assets are removed from financial institutions' balance sheets, interbank and consumer lending will return to pre-recession levels. Northehr (2008) explains that as banks and financial institutions regain lending confidence, interbank lending interest rates will decrease, which will promote greater liquidity in the economy. Nevertheless, given the time pressure and the difficulty to value these "troubled assets", $250 billion were assigned to the CPP by the U.S. Treasury to purchase preferred stock and debt securities from firms in financial distress. Veronesi and Zingales (2010) point out that this preferred stock pays a dividend of 5% to the U.S. Treasury, which will rise to 9% if they are held for more than five years, and that the debt securities purchased will generate an interest rate of 7.7%, which may increase to 13.8% after the same five year period. This provides an opportunity for taxpayers to benefit further from TARP bailouts.

Previous research on the effect of government policy announcements on capital markets finds conflicting results. A 2009 study by the International Monetary Fund finds no strong evidence that

macroeconomic or financial policies are effective in reducing market turmoil. More specifically, policy announcements perceived as targeted at individual systemic firms tend to increase fear in the market, even if perceived as beneficial in the long-run (Aït-Sahalia et al., 2009). Fratianni and Marchionne (2010) explain that general announcements of government intervention are observed to positively impact returns during the 2007-2009 crisis, however, specific announcements of capital injection to individual firms lead to negative returns.

Veronesi and Zingales (2010) examine the 2008 financial crisis and point to positive gains from the government's intervention. According to their estimates, the intervention had a net cost to tax-payers of between $21 and $44 billion dollars while generating between $86 and $109 billion in net value. They therefore argue that Paulson's[1] intervention was an overall success.

Since the TARP intervention was primarily through the issuance of preferred stock, Kim and Stock (2010) examine the impact of TARP on both trust preferred stock and non-trust preferred stock for the nine largest banks that issued TARP preferred stock as well as the smaller banks that did not issue TARP preferred stock. They find that trust preferred stock had higher abnormal returns relative to non-trust preferred stock for the nine largest banks in the days surrounding the October 14th announcement date. On the other hand, they find that trust preferred stock did not out-perform non-trust preferred stock for the two-day announcement window. The differing reaction implies that market volatility may be affected to varying degrees depending on the announcement of aid to different firm types and sizes.

A specific provision of the TARP program was a hard cap on executive compensation of $500,000. Kim (2010) finds that although investors react positively when the TARP was announced, the subsequent announcement of the salary cap elicited a negative market response. Such an apparently conflicting market reaction may either serve to cancel each other or may in fact increase overall market volatility.

Hence although the effect of policy announcements has been studied to some extent, important questions remain unanswered; what is the market response when these announcements are *implemented*, i.e., do markets react when bailout funds are actually transferred to troubled firms? In addition, do volatility and investor confidence change with the allocation of funds?

Market-wide financial distress has triggered anxiety and uncertainty among investors during the most recent economic crisis. These feelings are reflected in the fluctuations of investor sentiment measures. Investor sentiment, as defined by Baker and Wurgler (2007), "is a belief about future cash flows and investment risks that is not justified by the facts at hand" (p. 129) i.e., decisions are made subjectively despite the relevant information available. Lerner et al. (2004) point out that investor sentiment is a factor that can have an impact on the economic decision-making of investors.

Overall, research finds that certain events impact optimism, fear, and other emotions in investors, which lead to a reduced or increased willingness to take risks in their economic decisions and alter their expectations of future economic outcomes. For example, Kaplansky and Levy (2010) document an average market loss of more than $60 billion per aviation disaster even though the estimated loss from the disaster is approximately $1 billion. Edmans et al. (2007) extend investor sentiments to potential mood effects from sporting events on stock market activity and find a significant market decline after soccer losses. Furthermore, Hirshleifer and Shumway (2003) show that weather affects more than just mood as sunshine is strongly significantly correlated with stock returns. Given these findings, we anticipate that TARP disbursements may impact more than the recipient companies as the effect should affect investor sentiments.

Previous studies document a relationship between investor sentiment and volatility. Brown (1999) finds that unusually high levels of individual investor sentiment are associated with greater volatility of closed-end investment funds. Furthermore, Lee et al. (2002) find that both negative and positive changes in sentiment have an impact on volatility, although with different magnitudes.

[1] Veronesi and Zingales (2010) refer to the TARP intervention as Paulson's Gift since it was announced by the US Treasury Secretary Henry M. Paulson Jr.

They document an asymmetric effect, where negative shocks in sentiment have a larger impact on volatility than do positive shocks. De Long et al. (1990) show that noise traders, who trade on rumors and sentiment as if it were information, generate excess volatility in asset prices. Given these findings of a relationship between investor sentiment and stock-market volatility, we test both measures simultaneously to ascertain if the TARP bailouts affect either or both, and if so, to what extent.

Based on our review of previous findings, we derive three specific hypotheses. First, we hypothesize that actual bailout fund allocations, which are different from announcements and promises, reduce stock market volatility and investor fear in the short-run as recipient firms will have increased liquidity and improved financials. Our second hypothesis flows from our first hypothesis. We expect to see a significant reduction in the volatility of TARP recipient industries (e.g., banking and automotive) compared to non-recipient industries. In addition, Schwert (1989, 1990) points out that volatility is substantially higher during economic recessions and major banking crises so if the objectives of the TARP program are achieved, i.e., reversal of the banking crisis, the bailouts should result in lower volatility for affected industries. Third, previous research such as that by Wei and Zhang (2006) document that smaller firms tend to be more volatile on average, hence we hypothesize that there will be smaller volatility reduction in larger firms.

3. Data and Methodology

We utilize data that covers the economic crisis beginning in December 2007 and runs until September 2009. The sample period consists of 442 trading days, during which 46 bailouts occur.[2] We employ the rate of return on the New York Stock Exchange Composite Index (NYSE) from the Center for Research in Security Prices (CRSP) to develop a proxy for market volatility. We apply the following formula to estimate market volatility:

$$V_t = \sqrt{\frac{1}{T-1}\sum_{i=1}^{T}(R_t - \overline{R})^2} \quad (1)$$

where V_t is the unbiased daily estimate of volatility (standard deviation) of the returns at time *t*, *T* is number of observations, R_t is the return at time *t* and $\overline{R}$ is the mean of the returns.[3] Following Ederington and Guan (2006), we calculate market volatility by using the one-month rolling standard deviation of the NYSE value-weighted index. They suggest that the historical standard deviation performs just as well as Bollerslev's (1986) GARCH (1, 1) model. We also follow the same procedure to calculate the volatility of Fama and French's (1997) finance, banking, insurance, and automobile industry portfolios. Given our third hypothesis of differential size effects, it is also important to calculate volatility for the ten value-weighted portfolios constructed by size. We also follow Ederington and Guan's (2006) methodology for our size-related volatility calculations.

We test all the volatility series for unit roots using the Augmented-Dickey Fuller (ADF) test (Dickey and Fuller, 1981). The tests reveal that the data are non-stationary in the levels. Therefore, we first-difference the data and after so doing, the variables are stationary. Thus, we use the change in volatility in our study.[4]

We determine the specific dates of TARP fund allocations by collecting data from the U.S. Treasury's TARP transaction report hosted by the Office of Financial Stability.[5] The list comprises 655 institutions that received federal government funds from December 2007 to September 2009.

To test the impact of TARP bailouts on investor sentiment, we employ the Chicago Board of

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[2] The number of trading days during the time covered.

[3] See Hull (2006) pp. 461-462 for details on estimating volatility.

[4] The change in volatility is defined as: $\Delta V_t = V_t - V_{t-1}$.

[5] Online at: http://financialstability.gov/. Accessed on September 14, 2010.

Options Exchange's (CBOE) market implied volatility of the Standard & Poor's 500 index (VIX) retrieved from DataStream. The VIX is an implied forward-looking volatility measure of the S&P 500 index, which represents expected future market volatility over the next 30 calendar days (Whaley, 2009). Baker and Wurgler (2007) explain that the VIX is known as a fear index amongst investors and as a proxy for investor sentiment. To test for robustness in our results, we examine the impact of bailout allocations with a similar proxy for investor fear, the CBOE's implied volatility of the S&P 100 (VXO). The difference among the two investor-fear measures is that the VXO builds on the average implied volatilities of the Black-Scholes (1973) calculated options of the S&P 100 index, whereas the VIX is based on the average price of options in the S&P 500 (Kaplansky and Levy, 2010).

To study the effect of bailouts on general stock market volatility, on volatility of ten portfolios constructed by size, and on volatility of the TARP bailout recipient industries, we adopt an event study methodology as used in previous research (Kaplanski and Levy, 2010; Brown and Warner, 1980, 1985). Specifically, we estimate the following model:

$$\Delta V_t = \alpha \ + \beta \, \Delta V_{t-1} + \sum_{i=-1}^{3} \lambda_i A_{ti} + \varepsilon_t, \tag{2}$$

in which ΔV_t is the change in volatility of the relevant index or portfolio, a is the estimated regression intercept, ΔV_{t-1} is the change in volatility at lag 1, A_{ti}, i = -1, 0, 1, 2, 3, are dummy variables that capture the bailout effect on volatility on a five day event window around the day of allocation of TARP funds,[6] and ε_t is the error term. A_{ti} takes the value of one on the i^{th} day and zero otherwise. A_{t0} is the bailout day, A_{t-1} is the day prior to the bailout, and A_{t1}, A_{t2}, and A_{t3} are the first, second, and third days following the bailout respectively. We include the day prior (A_{t-1}) to bailouts to check for information leakage effects. We examine as many as 5 lagged changes in volatility to account for significant serial correlations in our model. However, we keep only lag 1 in our model since other lags are not significant.

Next, we examine the impact of bailouts on investor fear with a similar event study methodology. We employ the following equation:

$$Fear_t = \alpha \ + \beta \, Fear_{t-1} + \sum_{i=-1}^{3} \lambda_i A_{ti} + \varepsilon_t, \tag{3}$$

in which $Fear_t$ is the relevant investor fear index, a is the estimated regression intercept, $Fear_{t-1}$ is the investor fear index at lag 1 to account for serial correlation,[7] A_{ti}, i = -1, 0, 1, 2, 3, are dummy variables that capture the effect of bailouts on investor fear during the five day event window, and ε_t is the error term. As before, A_{ti} takes the value of one on the i^{th} day and zero otherwise.

4. Estimation Results

4.1 Bailouts: Market

Table 1 reports the results from estimating equation 2 for the volatility of the NYSE composite index. Results indicate that bailouts significantly decrease stock market volatility. We observe a statistically significant reduction in the change of stock market volatility on the day bailout funds are granted to troubled firms (A_{t0}) and the day after (A_{t1}). Interestingly, the volatility decrease is greater on the day subsequent to the bailout (A_{t1}) by almost double the magnitude of the day of the bailout itself (A_{t0}). We attribute this late reaction to delays in the dissemination of information.

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[6] Other event window lengths were used, only significant results are found within the five day time widow employed. Before the third day subsequent or before one prior to bailouts, no significant coefficients were observed.

[7] Again, we find that only the first lag was statistically significant.

Our findings suggest that government economic interventions can induce a reduction in general stock market volatility in the short-run and agrees with previous research that indicate volatility reductions. Our findings therefore support our hypothesis that volatility is reduced by allocation of bailout funds in the short-run.

Table 1
TARP fund disbursements: Market

Case	a	ΔV_{t-1}	Bailout Disbursement Event Window					*Adjusted* R^2
			λ_{-1}	λ_0	λ_1	λ_2	λ_3	
NYSE Composite Index	0.00011	-0.00036	0.00001	-0.00042**	-0.00081***	-0.00017	-0.00003	0.040

Notes : The table reports the results of the regression: $\Delta V_t = \alpha + \beta \Delta V_{t-1} + \sum_{i=-1}^{3} \lambda_i A_{ti} + \varepsilon_t$, in which ΔV_t is the first-difference of daily volatility on the New York Stock Exchange (NYSE) value weighted index, a is the estimated regression intercept, ΔV_{t-1} is the first-difference of volatility at lag 1 to account for serial correlation, A_{ti}, i =-1, 0, 1, 2, 3, are dummy variables that capture the bailout disbursement effect on changes in volatility at different days in the five day event window, and ε_t is the error term. A_{ti} takes the value of one on the i^{th} day of the bailout, otherwise the value is zero. The sample consists of 442 trading days from December 2007 to September 2009, during which 46 event days (days of bailout allocations) are observed. We calculate standard errors using the Newey-West (1987) adjustment, with a lag truncation of 5. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

4.2 Bailouts: Ten Portfolios Classified by Size

Table 2 reports the results from estimating equation 2 for the volatility of the ten portfolios formed by size deciles based on market capitalization. Decile 1 represents firms with the smallest market capitalization, while decile 10 represents firms with the largest market capitalization.

Table 2
TARP fund disbursements: Ten portfolios classified by size deciles

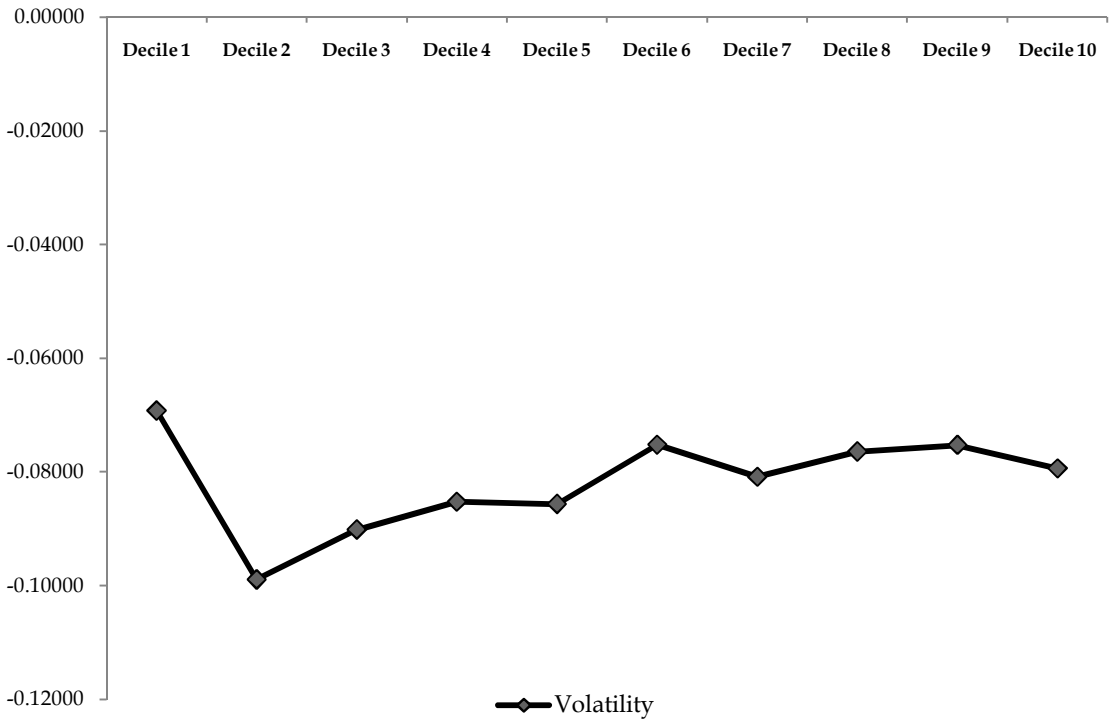
Case	a	ΔV_{t-1}	Bailout Disbursement Event Window					*Adjusted* R^2
			λ_{-1}	λ_0	λ_1	λ_2	λ_3	
Decile 1	0.00775	0.08517	-0.00041	-0.03227*	-0.06926***	0.02590	0.00078	0.053
Decile 2	0.01000	0.08439*	0.00085	-0.03041	-0.09897***	0.02569	-0.00004	0.055
Decile 3	0.00984	0.08601*	-0.00275	-0.03267	-0.09019***	0.02773	0.00039	0.054
Decile 4	0.00941	0.02492	0.00127	-0.03181	-0.08530***	0.01918	0.00347	0.045
Decile 5	0.01059	0.01525	0.00119	-0.03279	-0.08569***	0.01871	-0.00177	0.046
Decile 6	0.00995	0.01976	-0.00343	-0.02628	-0.07525***	0.01406	-0.00366	0.039
Decile 7	0.01066	0.00466	0.00227	-0.03404*	-0.08091***	0.01969	-0.00778	0.042
Decile 8	0.01143	-0.03455	-0.00379	-0.03207*	-0.07646***	0.01367	-0.00748	0.034
Decile 9	0.01041	-0.01347	0.00509	-0.03365*	-0.07531***	0.01043	-0.00797	0.031
Decile 10	0.01135	-0.00162	0.00080	-0.04284**	-0.07941***	0.00793	0.00008	0.038

The table reports the results of the regression: $\Delta V_t = \alpha + \beta \Delta V_{t-1} + \sum_{i=-1}^{3} \lambda_i A_{ti} + \varepsilon_t$, in which ΔV_t is the first-difference of daily volatility on value weighted portfolios constructed by size deciles, a is the estimated regression intercept, ΔV_{t-1} is the first-difference of volatility at lag 1 to account for serial correlation, A_{ti}, i =-1, 0, 1, 2, 3, are dummy variables that capture the bailout disbursement effect on changes in volatility at different days in the five day event window, and ε_t is the error term. A_{ti} takes the value of one on the i^{th} day of the bailout disbursement, otherwise the value is zero. The sample consists of 442 trading days from December 2007 to September 2009, during which 46 event days (days of bailout allocations) are observed. We calculate standard errors using the Newey-West (1987) adjustment, with a lag truncation of 5. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

We find a significant decrease in the change in volatility across all size deciles on the day subsequent to bailout allocations (A_{t1}). We find that the effect of government bailouts on volatility is for the most part of lower magnitude as firm size increases. As hypothesized, a statistically significant but smaller magnitude reduction in volatility on the day of the disbursement of TARP funds (A_{t0}) is observed for the largest firms.

Figure I graphically shows the differential impact of government bailouts on ten portfolios formed by size deciles. This finding supports research conducted by Wei and Zhang (2006), who report less and more stable volatility in large firms compared to smaller firms.

Figure I



The graph depicts the impact of TARP bailouts (λ_1) on the change in volatility of the ten portfolios classified by size deciles (Fama and French, 1992). Decile 1 represents the smallest firms in the market, while decile 10 represents the largest.

4.3 Bailouts: Portfolios Classified by Industry

Table 3 reports the results from estimating equation 2 for TARP bailout recipient industries. We specifically look at the bank, insurance, financial, and auto industry portfolios as classified by Fama and French (1997). We find that all relevant industries, with the exception of the automakers, have a statistically significant volatility reduction on the day subsequent to bailout fund allocations (At1). Further, the insurance industry shows a significant negative change in volatility up to the second day (At2) after bailouts.

We observe a greater absolute effect in volatility changes for the banking and financial industries. These two industries received the most Federal bailout funds from the Troubled Asset Relief Program. Our findings also support Schwert's (1989) assertion of reduced volatility for the financial sector as a result of the bailouts. Surprisingly, the results of the auto industry are, although of the expected sign, statistically insignificant. We attribute the statistically insignificant results to the fact that only a small proportion of the firms in this industry received bailouts compared to the other three industries.

Table 3
TARP fund disbursements: Portfolios classified by industry

Case	a	ΔV_{t-1}	Bailout Disbursement Event Window					*Adjusted* R^2
			λ_{-1}	λ_0	λ_1	λ_2	λ_3	
Banks	0.01551	0.13067**	0.04269	-0.05862	-0.08540*	-0.06388	0.01107	0.027
Insurance	0.01706	0.04869	0.00538	-0.02337	-0.05114*	-0.07826**	-0.01031	0.022
Financial	0.01647	0.06293	0.03684	-0.05818	-0.08380**	-0.08771	0.02291	0.022
Autos	0.01170	-0.09467**	-0.04320	-0.01429	-0.03475	-0.01198	-0.01544	0.012

The table reports the results of the regression: $\Delta V_t = \alpha + \beta \Delta V_{t-1} + \sum_{i=-1}^{3} \lambda_i A_{ti} + \varepsilon_t$, in which ΔV_t is the first-difference of daily volatility on value weighted portfolios constructed by industry, a is the estimated regression intercept, ΔV_{t-1} is the first-difference of volatility at lag 1 to account for serial correlation, A_{ti}, i =-1, 0, 1, 2, 3, are dummy variables that capture the bailout disbursement effect on changes in volatility at different days in the five day event window, and ε_t is the error term. A_{ti} takes the value of one on the i^{th} day of the bailout disbursement, otherwise the value is zero. The sample consists of 442 trading days from December 2007 to September 2009, during which 46 event days (days of bailout allocations) are observed. We calculate standard errors using the Newey-West (1987) adjustment, with a lag truncation of 5. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

4.4 Bailouts: Investor Sentiment

Table 4 summarizes the results for estimating equation 3. Results show that investor fear reduces with bailouts. We observe a significant decrease in both fear indexes, VIX and VXO, on the second day subsequent to bailouts (A_{t2}). These results support our third hypothesis that government interventions in the form of bailouts to financially distressed firms reduce investor fear in the short-run. Our findings are also consistent with previous studies such as those by De Long et al. (1990) and Brown (1999) that find that changes in investor sentiment are related to changes in volatility in the market.

Table 4
TARP fund disbursements: Investor sentiment

Case	a	$Sent_{t-1}$	Bailout Disbursement Event Window					*Adjusted* R^2
			λ_{-1}	λ_0	λ_1	λ_2	λ_3	
VIX	0.79928**	0.97933***	-0.13805	-0.33848	0.73135	-1.23536***	0.05144	0.951
VXO	0.97820**	0.97448***	-0.15438	-0.35242	0.28640	-1.16741**	0.19229	0.943

The table reports the results of the regression: $Fear_t = \alpha + \beta Fear_{t-1} + \sum_{i=-1}^{3} \lambda_i A_{ti} + \varepsilon_t$, in which $Fear_t$ is the inventor fear index, a is the estimated regression intercept, $Fear_{t-1}$ is the investor fear index at lag 1 to account for serial correlation, A_{ti}, i =-1, 0, 1, 2, 3, are dummy variables that capture the bailout disbursement effect on investor sentiment at different days in the five day event window, and ε_t is the error term. A_{ti} takes the value of one on the i^{th} day of the bailout disbursement, otherwise the value is zero. The sample consists of 442 trading days from December 2007 to September 2009, during which 46 event days (days of bailout allocations) are observed. We calculate standard errors using the Newey-West (1987) adjustment, with a lag truncation of 5. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

5. Concluding Remarks

In response to the recent economic crisis of 2007-2009, the United States government passed the Emergency Economic Stabilization Act of 2008. As part of this act, the TARP was designed to purchase "troubled" assets from firms in financial distress. By purchasing impaired assets, the Federal government would in effect inject significant amounts of liquidity into the financial sector with the hope of jump-starting the economy and reducing investor anxiety. However, given the difficulty and the pressure to price these "troubled" assets in a short time period, $250 billion were assigned to the CPP by the U.S. Treasury to purchase preferred stock and debt securities from firms

in financial distress. This allowed a faster distribution of the TARP funds, and, at the same time, allowed taxpayers to benefit for the interests and dividend generated by these securities.

We employ an event-study methodology to assess the impact of TARP bailouts on: 1) the change in volatility of the New York Stock Exchange composite index; 2) the change in volatility of ten portfolios constructed by market capitalization; and 3) the change in volatility of the main TARP recipient industries. We additionally analyze the reaction of the VIX and VXO fear indexes to TARP fund disbursements. By measuring volatility changes, we assess whether the TARP program achieves its primary aim of stabilizing markets through liquidity infusions. Our analysis of ten size portfolios and different industries allows us to determine the differential impact of the TARP program on firm size and recipient industries. We also evaluate investor perception of the TARP program by using changes in two fear indexes.

First, we find that stock market volatility is significantly reduced on the day of the allocation of bailout funds and the day after. Second, we observe that, in general, smaller firms exhibit greater reductions in volatility the day following bailouts when compared to larger firms. Third, the volatility of TARP recipient industries is significantly reduced the day after bailouts, except for the automotive industry. Finally, on the second day subsequent to bailouts, investor fear is significantly attenuated. In general, the evidence suggests that government intervention, in the form of TARP bailouts and security purchases, helps diminish short-run volatility and investor anxiety. This implies that federal programs, such as the TARP, attenuates institutional and investor anxiety in the short-run.

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