SHORT-TERM EFFECTS OF PUBLIC BAILOUTS
OF PRIVATE FIRMS

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By

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ABSTRACT

Using event study methodology, this paper examines the short-term effects on the greater domestic economy of nine government bailouts of the private sector: Lockheed (1970), Penn Central Railroad (1971), Franklin National Bank (1974), Chrysler (1980), Continental Illinois National Bank and Trust Company (1984), Savings and Loan (multiple institutions 1989), Long-Term Capital Management (1998), the Airline Industry (2001) and the most recent bailouts enacted through the Troubled Asset Relief Program (2008 and 2009). This paper seeks to answer whether government bailouts of the private sector have an impact on the attitudes of the overall market and on overall economic output in the short term and whether bailout size or industry matter regarding the final outcome.

As the results show, the public bailout of a private firm or industry appears to have a small, but significant, positive impact on the S&P 500 in the very short term, with the positive results showing up as quickly as one quarter after the bailout event. Due to the ease and efficiency with which trading can be done, investor expectations of the financial markets are quickly factored into the pricing and indexing, thus enabling the S&P to serve as a leading indicator of economic recovery or recession.

The speed with which the S&P incorporates new information is even more pronounced when the bailout occurs in the financial industry, with a statistically significant increase in the
S&P of 8.1% the quarter after a financial industry bailout versus 5.0% for bailouts in general, signifying an increase in investor confidence in the government’s ability to manage and mitigate a financial crisis.

When measuring the impact on overall economic growth or GDP, however, the presence of a bailout does not appear to significantly influence GDP either way in the very short term. If there is indeed an impact on GDP, positive or negative, it likely ripples through the economy at large at a slower rate and thus, is not picked up by our short-term data.

This changes, however, when the bailout occurs in the financial industry, with a statistically significant drop in GDP in the quarter following the bailout. The drop in output can perhaps be attributed to the lagged effect of the negative economic event that caused the need for the bailout in the first place. The fact that this occurs only in the quarter after a financial industry bailout and not after bailouts in general demonstrates the frightening speed with which the highly-interconnected financial industry impacts the performance of the economy as a whole, supporting the need for additional financial regulation, transparency and risk management practices.

Interestingly, the results of the paper follow much of the pattern we are seeing from the bailouts 18 months ago, with stock prices rising a few months after the bailout while the larger economy is just now, 18 months later, experiencing real economic growth. To fully understand the effects of a public bailout of a private firm or industry, though, additional research will need to be conducted with an extended time horizon from which to measure long-term impacts as well as potential unintended consequences stemming from the moral hazard of bailout policies.
ACKNOWLEDGEMENTS

The completion of this thesis would not have been possible without the help and support of the professors, students and administration of the Georgetown Public Policy Institute. Specifically, I would like to thank Eric Gardner for his advice on data collection and manipulation, Nicholas Veasey for his technical assistance and my advisor, John Nail, for his guidance, ideas and thoughtful feedback along the way.

Many thanks,

LISA MARIE ORLOWSKI
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INTRODUCTION

In light of the recent economic downturn spurred by the breakdown of the financial and housing sectors in late 2007, renewed attention has been focused on the efficacy and efficiency of government response to private sector crises. In the wake of the Great Recession, the Keynesian model of countercyclical spending and expansionary fiscal policy is gaining traction as a tool for reigniting growth while the Federal Reserve’s role in maintaining low interest rates is seen as necessary, though perhaps not sufficient, for the unfreezing of tight credit markets.

This paper attempts to study a less conventional economic policy that seems to be increasing in frequency – the public bailout of private companies and industries.

In defining a bailed out company, I use the definition proposed by Faccio, Masuils and McConnell of Vanderbilt University, who describe a bailed out entity as a “financially troubled firm that receive[s] a transfer payment or capital infusion from [its] home government so as to avoid failure or dissolution” (2603). In defining the term in such a way, one can see immediately that a bailout is unambiguously good for a firm and its stakeholders when the alternative is “failure or dissolution.” Further studies on the firm-specific effects of bailout supports this theory. Veronesi and Zingales of the University of Chicago concur, finding that the 2008 bailout of the U.S. financial sector netted a gain between $128 and $131 billion in enterprise value for the ten banks involved, as measured by market capitalization and market value of debt for each firm (1). And although other evidence points to the continued underperformance of bailed out firms relative to their peers (Faccio et al.), there is no denying that an underperforming firm is more beneficial to stakeholders than one that has ceased to exist, wiping out all hope of equity returns and fulfillment of debt obligations.
Beyond the benefits received by the company and its immediate stakeholders, though, do public bailouts of private firms benefit the economy at large?

Using event study methodology, this paper examines the short-term effects on the greater domestic economy of nine government bailouts of the private sector: Lockheed (1970), Penn Central Railroad (1971), Franklin National Bank (1974), Chrysler (1980), Continental Illinois National Bank and Trust Company (1984), Savings and Loan (multiple institutions 1989), Long-Term Capital Management (1998), the Airline Industry (2001) and the most recent bailouts enacted through the Troubled Asset Relief Program (2008 and 2009). In doing so, this paper answers the following questions:

- Do government bailouts of the private sector have an impact on the attitudes of the overall market and on overall economic output?

- Does bailout size or industry matter regarding the final outcome?

By examining the past, it is the ultimate goal of the paper to enable the reader to extrapolate these findings to future events in order to enable a reasonable prediction based on empirical evidence of the overall economic effects of a future bailout or a further extension of the Troubled Asset Relief Program (TARP) initiated by President George W. Bush and continued under the economic policies of President Barack Obama.
**BACKGROUND**

The recent government bailouts are not without precedent. The table below details three decades of U.S. bailouts, their dates, their size and their rationale (ProPublica):

**TABLE 1: United States Historical Bailout Record, 1970 - 2009**

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Date Aid Approved</th>
<th>Type</th>
<th>Rationale</th>
<th>Cost in 2008 Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lockheed</td>
<td>December 1970 (Q4)</td>
<td>$250 million in loan guarantees</td>
<td>- Job protection in California - National defense</td>
<td>$1.4 billion</td>
</tr>
<tr>
<td>Penn Central Railroad</td>
<td>August 1971 (Q3)</td>
<td>$676.3 million in loan guarantees; subsequent creation of Conrail in 1974 and additional capital infusions in 1976 and 1980</td>
<td>- Too big to fail - Importance to nation’s infrastructure</td>
<td>$3.2 billion</td>
</tr>
<tr>
<td>Franklin National Bank</td>
<td>October 1974 (Q4)</td>
<td>$1.75 billion assumption of debts</td>
<td>- Too big to fail - Interconnection within the financial system</td>
<td>$7.8 billion</td>
</tr>
<tr>
<td>Chrysler</td>
<td>December 1979 (Q4)</td>
<td>$1.5 billion loan</td>
<td>- Industry’s importance to the nation’s economy - Job protection - Too big to fail</td>
<td>$4.0 billion</td>
</tr>
<tr>
<td>Continental Illinois National Bank &amp; Trust</td>
<td>May 1984 (Q2) / July 1984 (Q3)</td>
<td>Equity infusion equal to 80% ownership</td>
<td>- Too big to fail - Prevention of bank run - Interconnection within the financial system</td>
<td>$9.5 billion</td>
</tr>
<tr>
<td>Savings &amp; Loans Institutions</td>
<td>February 1989 (Q1)</td>
<td>Asset purchase and liquidation, FDIC insurance payments and closure costs</td>
<td>- Economy-wide liquidity issues</td>
<td>$293.3 billion</td>
</tr>
<tr>
<td>Long-Term Capital Management</td>
<td>September 1998 (Q3)</td>
<td>Bailout by other banks supervised by the Federal Reserve</td>
<td>- Financial interconnectedness with Wall Street, leading to repercussions within the greater economy</td>
<td>$3.6 billion</td>
</tr>
<tr>
<td>Airline Industry</td>
<td>September 2001 (Q3)</td>
<td>$5 billion in compensation for mandatory grounding and $10 in loan guarantees and other federal credit instruments</td>
<td>- Public perception - Desire not to “let the terrorists win” - Too big to fail?</td>
<td>$18.6 billion</td>
</tr>
<tr>
<td>Troubled Asset Relief Program Round 1</td>
<td>October 2008 (Q3)</td>
<td>Purchase of senior preferred stock in nine of banks; capital infusions; cleaning up of balance sheets</td>
<td>- Increased interconnectedness within financial system - Too big to fail - Unfreeze credit markets</td>
<td>$350.0 billion</td>
</tr>
<tr>
<td>Troubled Asset Relief Program Round 2</td>
<td>January 2009 (Q4)</td>
<td>Same as Round 1</td>
<td>- Same as Round 1</td>
<td>$350.0 billion</td>
</tr>
</tbody>
</table>
In reviewing the table above, it is important to note that the bailout money for Long-Term Capital Management (LTCM), while negotiated and brokered by the Federal Reserve, was actually provided by private corporations in the following amounts (Lowenstein):

- $300 million each from Bankers Trust, Barclays, Chase, Credit Suisse First Boston, Deutsche Bank, Goldman Sachs, Merrill Lynch, J.P. Morgan, Morgan Stanley, State Street Bank and UBS
- $125 million from Societe Generale
- $100 million each from Lehman Brothers and Paribas

Anticipating market crashes and credit freezes stemming from the enormous losses of the highly inter-connected hedge fund, the Federal Reserve convinced the banks that held trades with LTCM (and thus, those most likely to also suffer losses in the face of its failure) to act together to avoid economic collapse. As detailed in his book, *When Genius Failed: The Rise and Fall of Long-Term Capital Management*, Roger Lowenstein documents the intimate involvement of the United States government, including senior members of the Federal Reserve and the Treasury Department, in the orchestration and execution of the bailout. Thus, despite the fact that the funding for the bailout came from private sources, the deep involvement of the government in its orchestration and the pervasive fear of far-reaching economic fallout from LTCM’s failure warrants the inclusion of the event on this list.
Although academic literature abounds on both financial and monetary policy, studies on the effects of bailouts appear to be fewer, with the bulk of the material back-weighted to more recent years (2008 and 2009) – not surprising, given current events – and characterized by a theoretical, qualitative nature. Of those papers that quantitatively address firm-specific bailout effects, however, most find positive outcomes in terms of immediate stock market reactions for private entities who are the recipients of a bailout. In an event study conducted by Kho, Lee and Stulz on market reaction to bank bailouts, they find that “in general, banks with exposures to crisis. . .are affected adversely by currency events and positively by bailouts” (ii). Support for the individual benefits accrued to bailed-out firms is also found in the Veronesi and Zingales study of the banks involved in the 2008 and 2009 TARP bailouts. As previously mentioned in the introduction, according to their findings, the U.S. financial sector netted a gain between $128 and $131 billion in enterprise value for the ten banks involved (1). This gain was fueled by an average market-adjusted return of 10% for the implicated banks over the event period (Veronesi and Zingales, 3). There is little discussion in the literature, however, on the wider implications for the broader market economy of bailouts in the short run. This paper fills this hole by studying the short-term effects of historical bailout across the wider domestic economy in the United States.

Of the remaining material out there, bailout literature can be characterized, on aggregate, by concerns over moral hazard and the inefficiencies of a bailout as compared to firm failure or bankruptcy. Given this broad agreement on the negative potential of a bailout, other papers seek to explain why governments use this tool, offering explanations ranging from political
connections and expediency to propping up firms or industries for the sake of public perception or to prevent systemic risk. Thus, the literature can be characterized by three main themes:

1) Moral hazard disincentives for risk management

2) Market efficiencies lost through bailouts

3) Bailout justification, including public perception and the avoidance of systemic risk

A fourth prong of the literature focuses specifically on bailouts of entire countries, as opposed to singular firms or industries within a country, and cites similar concerns over the moral hazard precedents set by bailouts and the inefficient use of funds to prop up otherwise failing nation states (see Brodo and Schwartz; and Kho, Lee & Stulz.). Because this paper focuses specifically on the bailout of the private sector within the United States, this area of the literature will not be explored in detail.

As mentioned above, the most oft repeated theme in bailout literature is concern over moral hazard. The reason for this seems obvious. As Poole clearly explains, when bailouts become too commonplace as a policy tool, “firms, expecting aid if they end up in trouble, hold too little capital and take too many risks . . . a policy of bailing out failing firms will increase the number of financial crises and the number of bailouts” (149). Clearly, for any government contemplating a bailout solution, precedent setting of this type will be a major concern.

The adverse consequences of a bailout’s disincentive for risk management are discussed in length by Panageas who seeks to model a firm’s optimal risk management strategy in a world where bailouts exist. In his paper, Panageas models the incentives of a firm to take risks alongside the incentives of stakeholders to bail the firm out should it run into trouble. Panageas finds that “the stakeholder incurs a discrete cost or externality if the firm is terminated. The presence of this cost or externality makes the stakeholder willing to bail out the firm . . . once
bankruptcy looms” (3). The paper concludes with the finding that, because of the stakeholders’ implicit guarantee, a firm’s “optimal risk management rule should induce the stakeholder to bail out the firm” (4), through risky behavior that tends to have higher returns during good times, but “not so [risky] that the stakeholder will find it prohibitively costly to bail out the firm” (3), producing a risk management strategy designed to “increase volatility in order to exploit the implicit protection” (ii).

Speaking more directly on bailouts provided to the private sector by the government (as opposed to the ambiguous stakeholders of Panageas’s theoretical study), in their 2009 paper entitled “Collective Moral Hazard, Maturity Mismatch and Systemic Bailouts,” Emmanuel Farhi and Jean Tirole discuss the role of monetary policy in the bailout of troubled firms and industries, noting the imprecision with which interest rates can be controlled and the imperfect targeting of those firms the government is attempting to bailout (3). Moral hazard plays a role here, too, as the authors argue that “by lowering the cost of capital [through loose monetary policy], the central bank creates an investment boom, which will make future rescues more compelling, given that . . .the temptation to lower the interest rates increases with the size of assets to be rescued” (38). Thus, in adjusting monetary policy to accommodate specific troubled firms or industries, the government may actually be sowing the seeds for the next crisis.

Beyond the moral hazard issue, other literature highlights the inefficiencies created in the economic system through bailouts. As noted by Faccio, Masulis and McConnell, “bailouts transfer capital to firms that the capital market is apparently unwilling to serve. Assuming that the capital market allocates funds to their highest value uses, then, by definition, bailouts are an inefficient use of capital” (2617). This idea characterizes bailouts as propping up firms or industries that the market would not have supported otherwise, allowing the weak to survive and
draining the system of resources that could have gone toward more profitable endeavors. This theme goes back as far as 1942 to Peter Schumpeter’s theory of “creative destruction,” an economic Darwinism that proposes that the market rightly punishes the weak through failure, allowing the strong to survive and economy to prosper in the long run. Bailouts, more recent literature suggests, are a perversion of this natural process, leading to a weaker system with increased incentives for risk-taking. Speaking on the recent auto bailout, Jackson (quoted in Zupan) predicts that “even with conditions put around them, bailouts will continue the existence of those companies within an industry that are least deserving of continuation on almost any scale” (101). From this creative destructionist perspective, the answer to the inefficiency question seems to reside with the more traditional route for troubled firms – bankruptcy. As Jackson (quoted in Zupan) suggests:

Bankruptcy is a process for reorganizing troubled companies. . .rooted in the economic goal of increasing efficiency. Bailouts, by contrast, are a means of rescuing troubled companies where, for good or ill, politics tend to mix with and override fundamental economic considerations (97-98).

So, if bailouts are so potentially dangerous to the economy, what are the political considerations that induce government to take these measures? Zingales suggests that time and expediency are a major factor in the current bailout frenzy: “Chapter 11 procedures are generally long and complex, and the crisis has reached a point where time is of the essence” (1). Faccio, Masulis and McConnell offer a different explanation for bailouts in their empirical study of 450 politically connected firms from 35 countries, with findings that the incremental likelihood of a
bailout for a firm with political connections is 6.93% greater than those firms without similar connections, suggesting that bailouts may also be a function of political ties and reciprocal back-scratching (2627).

A third argument for bailouts recognizes the psychological impact of a bailout as opposed to a Chapter 11 filing. Poole describes the government’s actions to prevent the failure of LTCM as providing not only additional liquidity but also “moral support to the markets” (153). In the case of auto companies, Jackson (quoted in Zupan) makes the point that no one wants to buy a car from a company in bankruptcy and claims the stigma of Chapter 11 would become a self-fulfilling prophesy, wiping out a company that might otherwise have had a chance to reorganize and survive (99). Lewinsohn takes this idea further with his study of the 2001 airline industry bailouts, saying that, in terms of public perception, the government had to keep the airline industry afloat after the September 11th attacks or risk the economy and the nation appearing weak, both domestically and abroad:

The spectacle of carrier bankruptcies arising immediately after hijacked airplanes had killed thousands of Americans would have dampened consumer confidence, further imperiling the airlines’ demand outlook. It would also have sent an ominous signal that the government wished to avoid (471).

This psychological impact of bailouts as measured by changes in stock market indices is an important element in this paper’s final model.

Finally, there is a difference in the literature’s findings between bailouts in the financial sector and bailouts in any other sector in terms of fending of systemic risk. “Too big to fail” has
been the rationale behind nearly every government bailout in recent history. As Bordo and Schwartz observe, “the rationale for saving big institutions, even if insolvent, was the fear of contagion” (9). This is an even more salient point when the bailout involves large swaths of the financial sector. As Phillipon and Schanbel point out:

> Concerns for systemic risk and contagion make it difficult to restructure financial balance sheets in the midst of a crisis. Aside from the costs of its own failure, the bankruptcy of a large financial institution may trigger further bankruptcies because of counterparty risks and runs by creditors. A risk-averse government may decide to avoid restructuring because there is a positive probability of a breakdown of the entire financial system (3).

Brickley (quoted in Zupan) compares the financial sector to the life force of an economy in that:

> The banking and financial system in an economy is like the circulatory system in a human being. . . economies can’t function with major disruptions in the flow of credit . . . Allowing a large manufacturing company to file for bankruptcy, even one as large as GM, would not have the devastating system-wide effects that would occur if the government allowed large financial institutions. . . to default on their obligations (104).

In attempting to define U.S. policy in regard to bailouts and systemic risk, Gerard Lyons, chief economist at Standard Chartered Bank said in 2008 after the collapse of Lehman Brothers that
“the U.S. authorities signaled that they are not going to step in and protect firms that do not pose a systemic risk” (quoted in Clark, et al). This concept, that government bailouts occur only when the failure of a firm would have widely felt repercussions across the broader economy, is the foundation upon which much of this paper’s analysis is based.
CONCEPTUAL FRAMEWORKS AND HYPOTHESES

The conceptual framework is based on the foundations of both micro- and macro-economic theory and explains the relationship between key factors in the economic environment.

National Income Identity

Operationalizing economic output in the form of Gross Domestic Product (GDP), the National Income Identity, as explained by Ben Harrow on Harrow EduWeb, broadens the microeconomic framework of supply equals demand to include the macroeconomic factors of personal expenditures on goods and services (private consumption), government expenditures, private domestic investment spending (which includes expenditures by businesses on assets and inventories) and net export spending, defined as export minus import expenditures, forming the basis of the identity:

\[ GDP = C + G + I + (E - M) \]

\( (Aggregate \ Supply = Aggregate \ Demand) \)

Where,

- GDP = Gross domestic product, as a proxy for national income/economic output
- C = Consumption (personal) spending
- G = Government spending
- I = Investment (business) spending
- E = Export spending
- M = Import spending

Clearly, for the identity to hold, if G (government spending) were to increase, in theory, GDP, or economic output, would rise as well.

Circulation of Macroeconomics

Several factors and key relationships within the economic framework exist beyond what can be explained by the National Income Identity. As depicted online in the New World
The Circulation of Macroeconomics framework helps to examine these factors and assign causal direction to the relationships:

**Figure 1: Circulation of Macroeconomics**

Whereby all government, household, foreign and corporate savings (including bank deposits and purchases of securities such as stocks and bonds) feed into the financial market to produce liquidity and investment into the commodity market from which corporate profit and demand for labor is derived. Investment in this context can be seen as the financial institutions lending money to the commodities market (and thus, will be influenced by interest rates).

Labor demand then translates into household profits through wages which can then feed money into the government and the commodity market.
Note that the feeders into the commodity market, which serves as the basis for corporate profits and labor demands, are liquidity in the financial market (allowing for investments), government spending and personal consumption (which feeds directly from household wages/labor demand).

Thus, based on the acceptance of this framework, it would hold that bailouts that provide increased liquidity to the financial markets and promote labor demands in other industries will stimulate the commodity market, increasing corporate profits and demand for labor, translating into higher household wages and personal consumption which in turn will further stimulate the commodity market, etc., to ultimately increase output and GDP (a measure of economic health and recovery).

The effects of bailouts on investor confidence, as measured by the S&P index, cannot be inferred directly from the model, but it stands to reason that investors will feel more or less confident in the economy based on the economic situation that creates the need for the bailout and/or confidence in the government’s ability to rectify the situation through the use of a bailout.

**Research Question:**

Do public bailouts of private companies or industries have an effect on the economy in the short term? If so, does the size of the bailout or the industry in which the bailout takes place matter?

**Hypotheses:**

In addressing the above question, both the conceptual frameworks and the following hypotheses guide the resulting research:
**H₁:** All else equal, government bailouts of private firms reassure and stabilize the markets and provide needed liquidity, leading to increased market confidence and output in the short term.

**H₀:** All else equal, bailouts of private firms have no impact on the short-term economic output or market confidence.
DATA AND METHODS

Given the above hypotheses, the following models have been designed to operationalize the question. To compare changes in economic variables across time, all data except for the dummy variables represent the percentage change in the variable from one reporting quarter to the next, as calculated using logged differences of the variables. Thus, using economic output (GDP) as the dependent variable, the model is:

\[% \Delta GDP_Q = \beta_0 + \beta_1 \% \Delta S&P \text{ Index}_Q + \beta_2 \% \Delta S&P \text{ Index}_{Q-1} + \beta_3 \% \Delta \text{Money Supply}_Q \\
+ \beta_4 \% \Delta \text{Money Supply}_{Q-1} + \beta_5 \% \Delta \text{Government Spending}_Q \\
+ \beta_6 \% \Delta \text{Government Spending}_{Q-1} \\
+ \beta_7 \text{Bailout Dummy}_Q + \beta_8 \text{Bailout Dummy}_{Q-1} + \varepsilon\]

This model demonstrates the theory that economic output is dependent on government spending (fiscal policy), the money supply (monetary policy), general market attitudes and confidence (as operationalized by the S&P index) and tests whether the presence of a bailout in the current or prior quarter also has an impact.

I also wanted to test, however, whether bailouts have a psychological impact on investor and market confidence as this has been the partial rationale for several historical bailouts. To test this, I simply used the S&P 500 Index as the dependent variable as a way of operationalizing investor attitudes and market confidence:

\[% \Delta S&P \text{ Index}_Q = \beta_0 + \beta_1 \% \Delta GDP_Q + \beta_2 \% \Delta GDP_{Q-1} + \beta_3 \% \Delta \text{Money Supply}_Q + \\
\beta_4 \% \Delta \text{Money Supply}_{Q-1} + \beta_5 \% \Delta \text{Government Spending}_Q + \\
\beta_6 \% \Delta \text{Government Spending}_{Q-1} + \beta_7 \text{Bailout Dummy}_Q + \\
\beta_8 \text{Bailout Dummy}_{Q-1} + \varepsilon\]
After determining the significance and direction of bailout impacts on each dependent variable, I conducted further analysis to determine whether the bailout size or bailout industry has an impact. Therefore, I added additional variables into the model to as noted below:

The following models include an interaction variable for bailout size, where bailout size is noted in 2008 dollars:

\[
\% \Delta GDP_Q = \beta_0 + \beta_1 \% \Delta S&P Index_Q + \beta_2 \% \Delta S&P Index_{Q-1} + \beta_3 \% \Delta Money Supply_Q \\
+ \beta_4 \% \Delta Money Supply_{Q-1} + \beta_5 \% \Delta Government Spending_Q \\
+ \beta_6 \% \Delta Government Spending_{Q-1} \\
+ \beta_7 \text{Bailout Dummy}_Q + \beta_8 \text{Bailout Dummy}_{Q-1} + \beta_9 (\text{Size} * \text{Bailout})_Q \\
+ \beta_{10} (\text{Size} * \text{Bailout})_{Q-1} + \epsilon
\]

and,

\[
\% \Delta S&P Index_Q \\
= \beta_0 + \beta_1 \% \Delta GDP_Q + \beta_2 \% \Delta GDP_{Q-1} \\
+ \beta_3 \% \Delta Money Supply_Q + \beta_4 \% \Delta Money Supply_{Q-1} \\
+ \beta_5 \% \Delta Government Spending_Q \\
+ \beta_6 \% \Delta Government Spending_{Q-1} + \beta_7 \text{Bailout Dummy}_Q \\
+ \beta_8 \text{Bailout Dummy}_{Q-1} + \beta_9 (\text{Size} * \text{Bailout})_Q + \beta_{10} (\text{Size} * \text{Bailout})_{Q-1} \\
+ \epsilon
\]

To test whether industry matters, the following models replace the general bailout dummy variable with a financial industry bailout dummy variable:
\[
\%\Delta GDP_Q = \beta_0 + \beta_1 \%\Delta S&P \text{ Index}_Q + \beta_2 \%\Delta S&P \text{ Index}_{Q-1} + \beta_3 \%\Delta \text{Money Supply}_Q \\
+ \beta_4 \%\Delta \text{Money Supply}_{Q-1} + \beta_5 \%\Delta \text{Government Spending}_Q \\
+ \beta_6 \%\Delta \text{Government Spending}_{Q-1} \\
+ \beta_7 \text{Financial Bailout Dummy}_Q + \beta_8 \text{Financial Bailout Dummy}_{Q-1} + \epsilon
\]

and,

\[
\%\Delta S&P \text{ Index}_Q \\
= \beta_0 + \beta_1 \%\Delta GDP_Q + \beta_2 \%\Delta GDP_{Q-1} \\
+ \beta_3 \%\Delta \text{Money Supply}_Q + \beta_4 \%\Delta \text{Money Supply}_{Q-1} \\
+ \beta_5 \%\Delta \text{Government Spending}_Q \\
+ \beta_6 \%\Delta \text{Government Spending}_{Q-1} + \beta_7 \text{Financial Bailout Dummy}_Q \\
+ \beta_8 \text{Financial Bailout Dummy}_{Q-1} + \epsilon
\]

**Data Sources**

Data was compiled from a variety of sources and formatted to reflect each variable on a quarterly basis from first quarter (Q1) 1959 to third quarter (Q3) 2009, resulting in observations of 203 periods. The specific bailout events studied are described in Table 1 for a total event set of nine with events actually occurring in 11 quarters.

As discussed previously, to better compare the impact of the change in variables across time, all economic variable data are analyzed by their percentage change from quarter to quarter using the logged difference of that variable.

Data was collected from the following sources:

- **GDP** = Bureau of Economic Analysis
- **Government Spending** = Total federal expenditures in billions of dollars from the Bureau of Economic Analysis

- **Money Supply** = M2 money supply in billions of dollars, from the Board of Governors of the Federal Reserve System


- **Bailout Date** = ProPublica, represents the date approved by Congress

- **Bailout Size** = ProPublica, in 2008 dollars

- **Bailout Industry** = ProPublica, dummy variable indicating financial industry

### Descriptive Statistics

The following tables present an overview of the data in terms of general descriptive statistics such as frequency, mean, minimum, maximum and median.

#### Table 2A: Bailout Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarters Affected</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Average Size</td>
<td>$95.5</td>
<td>$146.2</td>
</tr>
<tr>
<td>Median Size</td>
<td>$9.5</td>
<td>$9.5</td>
</tr>
</tbody>
</table>

As the table above shows, of the 203 quarters spanned by our data from first quarter (Q1) 1959 to third quarter (Q3) 2009, 11 quarters are affected by the presence of a bailout with an average size of $95.5 billion, while 7 quarters are affected by a financial bailout specifically. Financial bailouts, on average, appear to be larger in size, with a mean size of $146.2 billion.
As can be seen in the tables above, the mean of both our dependent variables (quarterly percent change of S&P and quarterly percent change of GDP) is lower in the quarters with the bailout than the average overall. These preliminary findings suggest that the presence of a bailout has the opposite effect of what we had expected, lowering output and reducing investor and market confidence rather than raising them. This data alone, however, is insufficient to answer the question. The rest of this paper examines any lagged effects from a bailout in the previous quarter and tries to determine a causal relationship between our dependent and independent variables of interest.
EMPIRICAL RESULTS AND DISCUSSION

By running the two main models described above, it is shown that bailouts do not have a significant effect on the overall economy as measured by GDP, at least in the very short term, but they do have a positive effect on the S&P 500 Index (see Tables 3 and 4 below). As demonstrated in Table 3, the presence of a bailout in the previous quarter predicts a 5.0% increase in the S&P 500 Index, controlling for changes in GDP, money supply and government spending over the same time period. Interestingly, however, a bailout in the current quarter does not result in a statistically significant effect on the S&P, perhaps the result of the market withholding judgment on the bailout until initial results can be observed.

The difference in effect of bailouts on GDP and the S&P may very well be the result of differences in reaction time. While equity markets, as reflected by the S&P Index, have the ability to fluctuate daily and react very quickly to news, GDP levels are slower to react as the wheels of the economy churn more slowly and are dependent on relatively slower processes such as hiring and firing, manufacturing and outsourcing. Supporting this theory is the fact that, of the four significant variables influencing current quarter GDP, three are the effects resulting from changes to the variables in the prior quarter (see Table 4) while only one (government spending) influences GDP in the current quarter. Thus, it is probable that bailouts do have an effect in the longer term on GDP, but that our model, which deals specifically with events in the current quarter and one quarter prior does not capture this effect.

Alternatively, although measures such as the S&P Index can reflect changes in investor mood nearly instantaneously, it may take investors a while to evaluate and react to the anticipated effects of a bailout and thus, it may be too soon to look for effects of a bailout on S&P in the current quarter, while one quarter out, the market has evidently had time to observe
and predict the likely outcome of a bailout and adjust its investment strategy accordingly – in this case, it would appear that investors view a bailout as a confidence-boosting event, potentially in contrast to the downside of the alternative of a failing company or industry.

### Table 3: Bailout Effects on S&P 500 Index

<table>
<thead>
<tr>
<th>Explanatory Variable: Changes = Logged Variable Differences</th>
<th>Dependent Variable: Change in Logged S&amp;P Value</th>
<th>P-Value Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Current Quarter</td>
<td>0.9229</td>
<td>0.084 (91.6%)</td>
</tr>
<tr>
<td>GDP Previous Quarter</td>
<td>-0.5631</td>
<td>0.274 (72.6%)</td>
</tr>
<tr>
<td>Money Supply Current Quarter</td>
<td>1.4576</td>
<td>0.017 * (98.3%)</td>
</tr>
<tr>
<td>Money Supply Previous Quarter</td>
<td>-0.2691</td>
<td>0.667 (33.3%)</td>
</tr>
<tr>
<td>Government Spending Current Quarter</td>
<td>-0.0253</td>
<td>0.949 (05.1%)</td>
</tr>
<tr>
<td>Government Spending Previous Quarter</td>
<td>-0.8583</td>
<td>0.034 * (96.6%)</td>
</tr>
<tr>
<td>Bailout in Current Quarter</td>
<td>-0.0169</td>
<td>0.389 (61.1%)</td>
</tr>
<tr>
<td>Bailout in Previous Quarter</td>
<td>0.0504</td>
<td>0.012 ** (98.8%)</td>
</tr>
</tbody>
</table>

*Significance at the 95% Confidence Interval

**Significance at the 98% Confidence Interval
TABLE 4: Bailout Effects on GDP

<table>
<thead>
<tr>
<th>Explanatory Variable:</th>
<th>Dependent Variable:</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes = Logged Variable Differences</td>
<td>Change in Logged GDP Value</td>
<td>Confidence Level</td>
</tr>
<tr>
<td>S&amp;P Current Quarter</td>
<td>0.0064</td>
<td>0.560</td>
</tr>
<tr>
<td>S&amp;P Previous Quarter</td>
<td>-0.0271</td>
<td>0.037 *</td>
</tr>
<tr>
<td>Money Supply Current Quarter</td>
<td>0.0076</td>
<td>0.931</td>
</tr>
<tr>
<td>Money Supply Previous Quarter</td>
<td>0.2677</td>
<td>0.003 **</td>
</tr>
<tr>
<td>Government Spending Current Quarter</td>
<td>0.1496</td>
<td>0.007 **</td>
</tr>
<tr>
<td>Government Spending Previous Quarter</td>
<td>0.1351</td>
<td>0.017 **</td>
</tr>
<tr>
<td>Bailout in Current Quarter</td>
<td>-0.0036</td>
<td>0.210</td>
</tr>
<tr>
<td>Bailout in Previous Quarter</td>
<td>-0.0046</td>
<td>0.109</td>
</tr>
</tbody>
</table>

*Significance at the 95% Confidence Interval or above
**Significance at the 98% Confidence Interval or above

When testing the effects of bailouts specifically in the financial industry as opposed to all bailouts, results of the effects on the S&P 500 Index mimic those of all bailouts in general in that bailouts in the current quarter have no significant effect, i.e., they have not yet been “priced into” the market. However, like the overall bailout results above, financial industry bailouts do have a
significant positive effect on the S&P in the following quarter and it appears that the effect is even stronger than that of bailouts overall with an 8.1% increase in the S&P 500 predicted in a quarter following a financial bailout (see Table 5) versus a 5.0% increase following a bailout of any industry.

These findings may demonstrate that financial bailouts are, in fact, more important in boosting the confidence of the investor than bailouts in general, perhaps due to the systemic nature of the financial industry.
Surprisingly, despite the findings above that bailouts in general do not have a significant effect on the GDP, either in the current or prior quarters, financial industry bailouts do in fact have a slightly negative impact on GDP in the following quarter with a nearly 1.0% drop in GDP.

### Table 5: Financial Industry Bailout Effects on S&P 500 Index

<table>
<thead>
<tr>
<th>Explanatory Variable:</th>
<th>Dependent Variable:</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes = Logged Variable Differences</td>
<td>Change in Logged S&amp;P Index</td>
<td>Confidence Level</td>
</tr>
<tr>
<td>GDP Current Quarter</td>
<td>1.1015</td>
<td>0.037 * (96.3%)</td>
</tr>
<tr>
<td>GDP Previous Quarter</td>
<td>-0.6451</td>
<td>0.202 (79.8%)</td>
</tr>
<tr>
<td>Money Supply Current Quarter</td>
<td>1.5759</td>
<td>0.009 ** (99.1%)</td>
</tr>
<tr>
<td>Money Supply Previous Quarter</td>
<td>-0.3911</td>
<td>0.526 (47.4%)</td>
</tr>
<tr>
<td>Government Spending Current Quarter</td>
<td>-0.0785</td>
<td>0.840 (16.0%)</td>
</tr>
<tr>
<td>Government Spending Previous Quarter</td>
<td>-0.8667</td>
<td>0.030 * (97.0%)</td>
</tr>
<tr>
<td>Financial Industry Bailout in Current Quarter</td>
<td>-0.0371</td>
<td>0.131 (86.9%)</td>
</tr>
<tr>
<td>Financial Industry Bailout in Previous Quarter</td>
<td>0.0814</td>
<td>0.001 ** (99.9%)</td>
</tr>
</tbody>
</table>

*Significance at the 95% Confidence Interval or above

**Significance at the 98% Confidence Interval or above
predicted in the quarter following a financial industry bailout after controlling for changes in the S&P Index, money supply and government spending (see Table 6).

**Table 6: Financial Industry Bailout Effects on GDP**

<table>
<thead>
<tr>
<th>Explanatory Variable: Changes = Logged Variable Differences</th>
<th>Dependent Variable: Change in Logged GDP Value</th>
<th>P-Value Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>---Coefficient---</td>
<td>---P&gt;</td>
</tr>
<tr>
<td>S&amp;P Current Quarter</td>
<td>0.0082</td>
<td>0.454</td>
</tr>
<tr>
<td>S&amp;P Previous Quarter</td>
<td>0.0288</td>
<td>0.012 **</td>
</tr>
<tr>
<td>Money Supply Current Quarter</td>
<td>-0.0078</td>
<td>0.929</td>
</tr>
<tr>
<td>Money Supply Previous Quarter</td>
<td>-0.0078</td>
<td>0.003 **</td>
</tr>
<tr>
<td>Government Spending Current Quarter</td>
<td>0.1666</td>
<td>0.003 **</td>
</tr>
<tr>
<td>Government Spending Previous Quarter</td>
<td>0.1319</td>
<td>0.019 **</td>
</tr>
<tr>
<td>Financial Industry Bailout in Current Quarter</td>
<td>0.0019</td>
<td>0.597</td>
</tr>
<tr>
<td>Financial Industry Bailout in Previous Quarter</td>
<td>-0.0096</td>
<td>0.008 **</td>
</tr>
</tbody>
</table>

*Significance at the 95% Confidence Interval or above

**Significance at the 98% Confidence Interval or above
Because it is so small (less than 1%), the negative effect on GDP of financial industry bailouts may seem unworthy of discussion. However, given that the United States Gross Domestic Product in the third quarter of 2009 was roughly $14.3 trillion, even 1.0% of such a large sum (approximately $143 billion) is probably worthy of at least a brief mention. Thus, it is worth noting the opposite directional effects that financial industry bailouts have on the S&P 500 and GDP in the following quarter. While financial industry bailouts have a positive effect on the direction of the S&P, seemingly reassuring investors and increasing confidence in the marketplace, they have a small, but negative effect on GDP despite controlling for other potentially spurious factors such as S&P, money supply and government spending. It is important to note here, then, the difference between the S&P as a leading indicator and the GDP as a lagging indicator. While the S&P can quickly incorporate information and react positively to the event of a bailout, one quarter out, GDP is likely still feeling the effects of the economic or financial crisis that prompted the need for a bailout in the first place. Thus, although GDP demonstrates negative results after a bailout, this lagged effect must be taken into account before determining causality.

Having established both overall bailout effects as well as effects specific to bailouts in the financial industry on the S&P 500 Index and GDP, the effect of bailout size on these variables will now be considered.

Table 7 documents the results of the regressions run using an independent variable that interacts the bailout variable with a size variable. As we can see, the size of a bailout in general appears to have no significant effect on the S&P 500 either in the current or previous quarters. Compared to our results in Table 3 above, it would seem that the simple presence of a public bailout of a private firm in the previous quarter is enough to renew confidence in investors,
whatever the size. However, when it comes to bailouts in the financial sector, it appears that size of the bailout has a significant influence on the S&P. However, as the final line of data in Table 7 demonstrates, that effect represents only a 0.03% change in the S&P with each additional $1 billion dollars spent on financial industry bailouts. Given that the value of financial industry bailouts in this sample fluctuate from $3.6 billion (LTCM) to $350.0 billion (first and second rounds of TARP), this represents a 10.0% positive swing in the S&P from the smallest financial bailout in the sample to the largest. It is possible then, that given the systemic nature of the financial industry and the risks associated with its collapse that the increase in S&P value associated with increased bailout size comes not, perhaps, from investor confidence in the economic system, but from a collective sigh of relief of having been saved from the brink of economic crisis. Larger bailouts, then, reflect the rescue of the economy from a larger threat, thus resulting in a higher level of reassurance and reinvestment when it appears (the quarter after the bailout) that crisis has been averted.

The following Tables 7 and 8 demonstrate the empirical results of the influence of bailouts, their size and their industry on both the S&P and GDP in the short term. As shown, the effect of bailout size on GDP is for the most part insignificant, with the exception of the Financial Industry Bailout Size Effects in the Previous Quarter being significant, yet too small to be substantive.

The next section will review these findings and conclude with discussion of the potential policy implications suggested by the results.
### Table 7: Bailout Size Effects on S&P

<table>
<thead>
<tr>
<th>Explanatory Variable: Interaction Variable = Bailout*Size</th>
<th>Dependent Variable: Change in Logged S&amp;P</th>
<th>P-Value</th>
<th>Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>----------------------------------------</td>
<td>---------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Bailout Size Effects Current Quarter</td>
<td>-0.0002</td>
<td>0.254</td>
<td>(74.6%)</td>
</tr>
<tr>
<td>Bailout Size Effects Previous Quarter</td>
<td>-0.0003</td>
<td>0.251</td>
<td>(74.9%)</td>
</tr>
<tr>
<td>Financial Industry Bailout Size Effects Current Quarter</td>
<td>-0.0002</td>
<td>0.157</td>
<td>(84.3%)</td>
</tr>
<tr>
<td>Financial Industry Bailout Size Effects Previous Quarter</td>
<td>0.0003</td>
<td>0.010 **</td>
<td>(99.0%)</td>
</tr>
</tbody>
</table>

*Significance at the 95% Confidence Interval or above

**Significance at the 98% Confidence Interval or above
<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Dependent Variable: Change in Logged GDP</th>
<th>P-Value</th>
<th>Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interaction Variable = Bailout*Size</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bailout Size Effects Current Quarter</td>
<td>-0.0002</td>
<td>0.386</td>
<td>(61.4%)</td>
</tr>
<tr>
<td>Bailout Size Effects Previous Quarter</td>
<td>-0.0006</td>
<td>0.057</td>
<td>(94.3%)</td>
</tr>
<tr>
<td>Financial Industry Bailout Size Effects Current Quarter</td>
<td>-0.0001</td>
<td>0.345</td>
<td>(65.5%)</td>
</tr>
<tr>
<td>Financial Industry Bailout Size Effects Previous Quarter</td>
<td>-0.0001</td>
<td>0.002 **</td>
<td>(99.8%)</td>
</tr>
</tbody>
</table>

*Significance at the 95% Confidence Interval or above

**Significance at the 98% Confidence Interval or above
CONCLUSION

To conclude, the public bailout of a private firm or industry appears to have a small, but significant, positive impact on the S&P 500 in the very short term, with the positive results showing up as quickly as one quarter after the bailout event. Because of the ease and efficiency with which trading can be done, investor expectations of the financial markets are quickly factored into the pricing and indexing, enabling the S&P to serve as a leading indicator of economic recovery or recession. Thus, it makes sense that any positive effects expected from the government rescue of a failing company would appear in the S&P quite quickly.

The speed with which the S&P incorporates new information is even more pronounced when the bailout occurs in the financial industry, with a statistically significant increase in the S&P of 8.1% the quarter after a financial industry bailout versus 5.0% for bailouts in general, signifying an increase in investor confidence in the government’s ability to manage and mitigate a financial crisis.

When measuring the impact on overall economic growth or GDP, however, the presence of a bailout does not appear to significantly influence GDP either way in the very short term. If there is indeed an impact on GDP, positive or negative, it likely ripples through the economy at large at a slower rate and thus, is not picked up by our short-term data.

This changes, however, when the bailout occurs in the financial industry, with a statistically significant drop in GDP predicted in the quarter following the bailout. The drop in output can perhaps be attributed to the lagged effect of the negative economic event that caused the need for the bailout in the first place. The fact that this occurs only in the quarter after a financial industry bailout and not after bailouts in general demonstrates the frightening speed with which the highly-interconnected financial industry impacts the performance of the economy.
as a whole, supporting the need for additional financial regulation, transparency and risk management practices.

Interestingly, the results of the paper follow much of the pattern we are seeing from the bailouts 18 months ago, with stock prices rising a few months after the bailout while the larger economy is just now, 18 months later, experiencing real economic growth. To fully understand the effects of a public bailout of a private firm or industry, though, additional research will need to be conducted with an extended time horizon from which to measure long-term impacts as well as potential unintended consequences stemming from the moral hazard of bailout policies.
REFERENCES


