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The Effect of Debt Ceiling Announcements on the Banking Industry's Stock Returns: An Event Study Approach

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Abstract:

In the wake of the debt ceiling crisis in the summer of 2011, the effect of the United States' massive and growing national debt on asset markets has become a greater concern. With the banking and finance industry now taking up an increasing share of the United States economy, it is important to understand how ongoing increases in the national debt affect the value of firms in this industry. In particular, negative market reactions to increases in the allowable debt (the debt ceiling) may reduce investor wealth and perhaps also the willingness of banks to facilitate flows of capital and investment. In this thesis, an event study methodology is used to examine how announcements of increases in the debt ceiling affect the stock returns of firms in the banking industry and whether these potential effects have changed over time from year 1984 to 2006. However, this study finds that, overall, debt ceiling announcements have had statistically insignificant effects on the stock returns of commercial banks and created minimal abnormal return in the firms' stocks. Thus, these findings support the idea that from 1984 to 2006 the rising debt, as illustrated by the debt ceiling, insignificantly impacted the stock returns of the banking industry.

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I. Introduction

In the United States, the growth of the nation's sovereign debt has become increasingly more of a hot button issue in both economic and political debate. Over the past several decades, the national debt level has grown significantly. Currently, the national debt totals over 15 trillion dollars, over 48 thousand dollars per United States citizen[1]. As the debt obligations continue to rise, there has been growing concern over the liquidity of the government as well as other potential repercussions from its size.

The United States debt ceiling is a threshold set by Congress that limits the level of debt issued by the government. The debt ceiling was instilled in 1917, so that Congress did not need to acquiesce to every spending request by the Treasury[2]. However, historically as the debt level has approached this ceiling, Congress increases the ceiling to allow the government further spending leeway. Recently, as the debt has become exponentially larger, the issue of raising the debt ceiling has created severe political and economic controversy.

In the summer of 2011, the United States suffered a debt-ceiling crisis that eventually led to Standard and Poor's downgrading the US Treasury rating. As the debt approached the limit, constant political debate ensued over the best procedure to reduce the US debt while also preventing a default. This uncertainty caused the markets to fluctuate drastically as each news event reached the public. The issue of raising the debt ceiling undoubtedly contributed to constant volatility in the markets. As a result, this raises the question of whether raising the debt ceiling has historically impacted stock market returns, specifically in the banking industry.

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[1] National Public Debt Outstanding. United States Treasury. Retrieved December, 2011.
[2] "A Brief History of the U.S. Federal Debt Limit". Freegovreports.com. 2010-01-28. Retrieved 2011-08-07

The financial services and banking industry is not only a crucial aspect of the United States and global economies, but it has also been taking up an increasingly larger share of employment in the US. From 1980 to 2008, the amount of workers employed in the "financial activities" sector rose from around 2.5 million to approximately 8.3 million[3]. During this same period, total employment in the United States increased from 99 million to approximately 140 million, a 41% increase compared to the 232% increase in the financial sector. In addition, the financial sector currently holds the third largest share of market capitalization in the New York Stock Exchange behind the Consumer Goods and Basic Material sectors[4]. With continued growth in the financial sector, the United States' reliance on a strong banking industry has followed. As Fisher explains in his speech in Brazil in 2003, strong financial markets make a country less susceptible to recession and promote greater growth through the ease of investment funding[5].

This study is specifically interested in examining the effects of raising the debt limit on the banking industry because the banking industry is expected to be most exposed and susceptible to the rising sovereign risk of the United States. With more debt on their balance sheets while also mediating the flow of the US treasuries in secondary markets, the Banking Industry is undoubtedly exposed to the potential mal-effects of a rise in the debt ceiling (and debt level) than any other industry. Banks, more than any other industry, hold and are exposed to the United States debt. One of the main holders of the US debt is money market mutual funds managed by banks as well as similarly

[3] Federal Census Bureau Reports. "Employment" and "Industry Specification." 2008. United States Census Bureau. Retrieved December 28th, 2011.
[4] Historical Industry Market Capitalization. 2008. Yahoo.finance.com. Retrieved December 28th, 2011.
[5] Fisher, Stanley. 2003. "The Importance of Financial Markets in Economic Growth." Citigroup.

managed financial funds[6]. The increasing risk and potential losses on banks' holdings weaken their balance sheets, increase funding costs, and could possibly reduce their access to secondary markets[7]. Assuming that investors are aware of a banks exposure and react rationally to all available information, it is expected that the banking sector might be affected negatively by growing sovereign debt.

As a country begins to accumulate debt, at some point the leverage of the government's balance sheet becomes risky. If any shock occurs to the economy that requires excess fiscal expenditures while also decreasing revenue, for example a recession, the nations debt could pose a serious problem. With less income and increases spending, it could become difficult for a country to fund their debt[8]. Therefore, this study aims to not only investigate the effect of debt ceiling announcements on banks' stock returns but also how these affects have changed over time. It is expected that investors react accordingly because that growing sovereign debt increases each note's liquidity risk. However, if they deem that the level and budget of the United States government is not yet a concern, then the debt ceiling announcements should hypothetically have zero impact on the banking industry's stock returns. As the US debt has grown consistently over the past several decades, it follows that if the debt has impacted stock returns at some point, then the size of this impact will increase as the size of the debt has expanded. Nevertheless, the United States debt obligations are almost unanimously considered risk-free investments. As a result, it is possible that raising the debt ceiling (and debt) will have little effect on investors and stock prices.

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[6] Anand, Hitesh. July, 2011. "Who Are the Largest Holders of US Debt?" Wealthson. http://www.wealthson.com/1549/who-are-the-largest-holders-of-us-debt

[7] Panetta, Fabio et al.. July, 2011. "The Impact of Sovereign Credit Risk on Bank Funding Conditions." Committee on the Global Financial System (CGFS). Bank for International Settlements.

[8] Panetta et al, 2011.

Another possible reason that the accumulating United States debt could have an impact on the stock returns for the banking industry is the potential effect that issuing more treasury notes could have on the bond markets and interest rates. In a simplistic supply and demand model of the market for US Treasuries, the increase in supply in the market due to the new issuance of treasuries will increase equilibrium interest rates. The increasing yield on a treasury note will undoubtedly affect the funding for banks. Historically, the rates on banks' notes, depending on the company's credit rating, are issued and trade a certain amount of basis points above the treasury yield. Therefore, if the yield on a treasury increases as a result of increased supply in the market, this will cause the rates on banks' notes to increase as well. The increased rates on the notes banks issue will thus increase the funding costs of the firm. As a result, the increased costs to the bank should decrease their value, which is expected to be reflected in their stock price. However, this is based on the assumption that the bank issues new debt. If they only have debt outstanding, simply trading on the secondary markets, the potential increase in the yield of a treasury will only affect the prices at which the outstanding notes trade. This will result in no cost incurred to the bank.

Therefore, as the growing United States debt has progressively become more of an issue coupled with its relationship with and the importance of the banking industry, the purpose of this paper is to investigate the effect that the growing debt has had on the stock returns of the banking industry. In doing so, this study will use an event study methodology and with the event of raising the debt ceiling serving as a proxy for the growing debt will measure and test the significance of the impact these events have on banks' stock returns.

The balance of this paper is ordering in the following manner. Section II summarizes relevant literature on the effects of sovereign debt growth, actions of investors in the equity markets, and other relevant research. Section III presents the data and the empirical model that will be applied in this study. Lastly, Section IV summarizes and analyzes the results, and Section V offers concluding interpretations.

II. Related Literature:

The issue of gross national debt has been analyzed and written about for years. Most of this literature recognizes the mal-effects of being over leveraged, written from a broad range of perspectives and with a variety of foci. However, none of which directly touch on the issue of raising the debt ceiling to accommodate the United States immense overspending and its subsequent effects on the banking industry's stock returns.

When looking into relevant literature, two aspects are important to this paper: the effects of growing national debt and the rationality of investors in equity markets. Early studies tend to use empirical evidence to examine the main economic advantages to lowering a national debt level. Using theoretical analysis, Meade (1958) showed that reducing a nation's debt level will encourage workers to work more, save more and increase private investment[9]. As a result, the increased investment demand should put upward pressure on asset prices. Thus, it can be deduced that stock prices (and returns) will rise as a result of reducing the federal debt.

An evident problem that exists between the dynamic of a macroeconomic variable such as a Nation's sovereign debt and the stock market is the question of whether investors react rationally to economic conditions and if they act rationally. Chen, Roll

[9] Meade, J.E. 1958. "Is the National Debt a Burden?" Oxford Economic Papers. Vol. 10, No. 2. Pp. 163-183.

and Ross (1986) performed a study to analyze what economic forces drive stock prices. Using time series analysis with derived economic variables, they were able to show that certain economic conditions such as industrial production, unexpected and expected inflation, and risk premiums are significant in the predicting stock market returns[10]. They conclude that stock prices do depend on macroeconomic conditions and they consequently react depending on their exposure. This is relevant in this study because, assuming that the banking industry is adequately exposed to US debt, the abnormality of stock market returns after a rise in the debt ceiling should be visible if an impact exists.

Contrarily, Summers (1985) attempts to show that stock market values do not accurately show a company's value and that investors do not rationally price in economic conditions which would not only run counter to Chen, Roll, and Ross's findings but would undermine the results of this study. By using test of market efficiency over a period of 50 years prior to his research, he sets out to show that stock values do not accurately portray sensible valuations[11]. He elaborates on Brainard, Shoven, and Weiss' (1986) finding that the low stock values could not have been correlated with economic conditions of the time[12]. In his analysis, Summers recognizes that investors react to only the news that they are exposed to and he understands that stock prices almost instantaneously react to news. In doing so, he is speculative of the valuation errors that may result. Therefore, in his research he fails to show that the stock market is an

[10] Chen, Nai- Fu, Roll, Richard, and Ross, Stephen A. 1986. "Economic Forces and the Stock Market." The Journal of Business. Vol. 59, No. 3, pp. 383-403.
[11] Summers, Lawrence H. 1986. "Does the Stock Market Rationally Reflect Fundamental Values." The Journal of Finance. Vol. 41. No. 3. New York, New York, pp. 591-601.
[12] Brainard, William C. Shoven, John B. and Weiss, Laurence. "The Financial Valuation of the Return of Capital." Brookings Paperson Economic Activity (1980), pp. 453-502.

inefficient market and simply cautions treating stock prices as an accurate and rational correlation to firm values.

While research on the relationship between macro variables and the volatility of stock market returns is relevant in this study, another relevant and important research topic is the implications of accumulating sovereign debt. Afonso and Sousa (2008) investigated the effects of fiscal policy including looking at debt and government spending and their effects on macroeconomic conditions that furthermore affect stock prices. They show that government spending shocks result in a statistically significant "crowding out" effect, which increases interest rates[13]. Subsequently, private investment falls and real asset prices decline. Therefore, their study shows that government spending and especially growing government debt can have a significant effect on private investment which can filter to the equity markets.

More specifically, in July of 2011, a study group established by the Committee on the Global Financial System submitted a paper analyzing the effect that sovereign credit risk can have on banking funding conditions. With rapid increases in budget deficits globally, they recognize that many countries are no longer viewed as a "risk free" investments, and many more in the future will share this same fate. In their paper, they note main impacts on a bank that can result from a sovereign crisis, a downgrade, or increasing risk due to growing sovereign debt. First, losses on government holdings by banks will result in weaker balance sheets. Furthermore, the increased sovereign risk will reduce the banks access to funding due to decreased collateral and liquidity. In addition,

[13] António Afonso and Ricardo M. Sousa, 2008. "The Macroeconomic Effects of Fiscal Policy," Working Papers 2008/56, Department of Economics at the School of Economics and Management (ISEG), Technical University of Lisbon.

the paper finds that a downgrade of government securities can often reduce the ratings on the bank depending on the banks exposure. Citing the European debt crisis, they note that sovereign debt often times is not as risk-averse and liquid as expected[14]. Therefore, in times of distress and to reduce risk, they explain that the banks need to take certain strides to protect against increased sovereign risk and increase funding and liquidity. However, these risk aversion efforts incur costs to the bank. Therefore, the paper shows that growing sovereign debt and a decrease in "creditworthiness" have significant ill effects on the value and operations of the banking industry.

In 1982, Mexico experienced a severe debt crisis, during which the country was forced to default on their foreign and domestic obligations. Their defaulting on loans resulted in a rapid decline in the Mexican banks' stock values. In Smirlock and Kaufold's (1987) paper, they investigate whether the reactions of stock prices were proportionate to each bank's exposure to the risky debt. Using a time series regression, they analyze the debt default on the changes in stock returns. They conclude that investors were able to accurately distinguish between banks with low or high exposure to the debt. This is relevant in this paper because it shows that investors rationally react and price in events, specifically the nations' debt levels. Furthermore, they are aware of the exposures of the banking industry[15]. Therefore, if the debt ceiling is raised by congress because of upward pressure from the United States debt level, it is expected that the stock returns of a bank with a gross amount of US treasuries on its balance sheet should experience a decline following such an announcement.

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[14] Panetta et al, 2011.

[15] Smirlock, Michael and Kaufold, Howard.1987. "Bank Foreign Lending, Mandatory Disclosure Rules, and the Reaction of Bank Stock Prices to the Mexican Debt Crisis. "The Journal of Business , Vol. 60, No. 3 (Jul., 1987), pp. 347-364.

Because this study employs an event study methodology, it is important to note in what ways this methodology has been used. The purpose of the event study methodology is to enable economists to measure and analyze the effect that an economic event has on the value of a firm. Assuming the rationality of investors and the market, the methodology has enabled economists to study the effects of mergers and acquisitions, earnings announcements, new capital issuances, as well as macroeconomic events such as in this paper. There have in fact been several economists who have analyzed the effect of various macroeconomic events and variables on daily stock returns, none of which explore the issue of a growing national debt directly.

Schwert (1981) investigated the reaction of daily stock returns to news concerning inflation during the period 1953 to 1978. Because of nominal contracts between two parties, Schwert writes that "unexpected inflation increases the wealth of the debtor and decreases the wealth of the creditor.[16]" Therefore, unexpected inflation would decrease the wealth of the firm, in most cases the debtors, decreasing their value and potentially stock prices. In an event study, however, Schwert found a weak relationship between unexpected inflation shocks and stock prices, with the events' impacts insignificant.

Pearce and Roley (1985) additionally examined the effects of several macroeconomic conditions on stock returns. In their study, they controlled for expectations by using survey data, which allowed them to more accurate gauge the effect of each event on the market. In their results, they found that prices did respond to monetary information for a period from September, 1977 to October, 1982. They investigated the effect of changes in money supply, money demand, and discount rate on

[16] Schwert, G.W. 1981. "The Adjustment of Stock Prices to Information about Inflation." Journal of Finance, 36, 15-29.

the returns of stocks across industries as well as over time[17]. They note that building on previous studies, they covered a wider time period. However, they also showed in their analysis that news concerning the unemployment, output, as well as the consumer price index produced insignificant effects on stock prices.

In addition, Hardouvelis (1987) used a broader approach considering a larger set of 15 macroeconomic variables throughout August 1984. The focus of this paper was to distinguish, using a large set of variables, the effects of monetary versus nonmonetary news and their respective effects on stock returns. Furthermore, a main interest was to investigate the role of the Federal Reserve and its actions on stock market prices. Similar to Pearce and Roley (1985), Hardouvelis showed that monetary news predominantly had an impact on stock prices while the other variables showed a weak and insignificant relationship[18].

McQueen and Roley (1993) used an event study methodology to investigate the relationship between various macroeconomic news events and the daily stock returns of firms. In doing so, they built on previous event studies, involving similar relationships between macroeconomic variables and daily stock returns, which showed varied results. Furthermore, before McQueen and Roley's study, little had been shown to support a significant response of stock prices to macroeconomics news. One main flaw, they posit, is the fact that previous studies assume that the response to news concerning macroeconomic events is constant across all business cycles[19]. They note that in Cutler,

[17] Pearce, D.K. and Roley, V.V. 1985. "Stock Prices and Economic News." Journal of Business, 58, pp. 49-67.
[18] Hardouvelis, G.A.. 1987. "Macroeconomic Information and Stock Prices." Journal of Economics and Business, 39. pp. 131-140.
[19] McQueen, G. and Roley, V.V. 1993. "Stock Prices, News, and Business Conditions." Oxford University Press.

Poterba, and Summers (1989) study using vector autoregressions to measure the effect of news of macroeconomic events, they assume that an increase in industrial output at the end of the Great Depression should induce a result similar to an increase in output after a decade of growth[20]. Therefore, in their paper, McQueen and Roley investigate the effects of macroeconomic news across different business cycles. They considered unemployment, the trade deficit, inflation, as well as other macro indices. Their results helped to explain why previously there was little evidence to show macroeconomic variables have little impact on stock market prices.

III. Data and Empirical Model

3.1 Data

The data range for this study spans from 1984 until 2006. Using the debt ceiling announcements during this period, this study will test the significance of the abnormal return on the banking industry's stock returns resulting from these announcements. The ending year 2006 is used as a result of the rapid evolution of the banking industry as well as to avoid potential interference from the recent financial crises. The beginning date of year 1984 has been determined by the amount of data available. Prior to 1984, there is not enough data from the list of commercial banks to be consistent with the other results. The announcement dates have been taken from the historical debt ceiling timeline[21]. However, it is understood that the effect of these announcements may not be priced in on

[20] Cutler, D.M, Poterba, J.M., and Summers, L.H. 1989. "What Moves Stock Prices?" Journal of Portfolio Management, 15. pp. 4-12.
[21] "Table 7.1—Federal Debt at the End of Year: 1940–2016". *Historical Tables*. Office of Management and Budget. Retrieved November 18, 2011.

the exact day and could vary. As a result, sensitivity and precaution will be employed in order to correctly assign the "event."

When accumulating data for the banking industry, this study will use the historical daily closing prices for the United States' largest publically traded commercial banks, according to the 2006 Fortune 500 ranking, as well as their daily trading volumes[22]. The list of commercial banks comes from the 2006 Fortune 500 rankings; their historical prices are then tracked back all the way to their inception as a publically traded bank (i.e. Initial Public Offering). However, due to the complex nature and evolution of the financial services industry, mergers and acquisitions have absorbed or eliminated many of the banks that used to be prevalent. Due to this factor, additional prices and volumes are recorded for many banks that no longer exist or are currently part of another firm, which will supplement the initial data pool. The supplemental data or additional banks added to augment the existing data is determined using subjective liberties. If deemed to add consistency and significance to the analysis, these banks will be included. Using the daily closing prices for the collected list of banks, daily percent stock returns are calculated. These daily percent returns are then multiplied by the corresponding daily trading volume and then divided by the total volume for the entire list of data on that particular day. The sum of all these values will result in a total daily stock return across the whole banking portfolio, weighted by the trading volume. Using a weighted average of the daily stock returns will put greater importance and significance on the largest banks, which are more likely to have a larger exposure to the effects of the debt ceiling announcements.

[22] *Annual Ranking of America's Largest Corporation*s. 2006. Fortune Magazine.

In addition, the Standard and Poor's 500 Index will be used as the market return in this study. Historically, it consistently has been a good indicator of overall market performance. For every instance that the debt ceiling was raised during our study range, we will test the impact of the announcement on the stock performance of the banks publically traded at that time.

3.2 Event Study Methodology

To study the effect of debt ceiling announcements on the stock market returns of the banking industry, I will employ an event study methodology, specifically the Market Model. The purpose of this methodology is to test the significance of the effect of an event, in this case the announcement of raising the debt ceiling, on the return on a particular asset. In this study, aggregated stock returns of the "banking industry" have been accumulated in a portfolio, which will then be treated as a single asset. The model consists of several main parts: *Event Definition, Selection Criteria, Normal Return, Abnormal Return, Estimation Procedure,* and *Testing Procedure.*

3.2.1 *Event Definition*

In order to assemble the Event Study model for this study, the first step is to determine the event in which we are measuring. As previously identified, the events of interest are the debt ceiling announcements between 1984 and 2006. However, as noted above, the actual event date is sensitive to investor knowledge. If investors anticipate the announcement, then the potential impact of the event could be priced into the stock returns prior to the announcement. As a result, when running regressions, investigative procedures will be used to best estimate the actual event date.

3.2.2 *Selection Criteria*

The selection criteria for this study is outlined in section *3.1 Data*. A portfolio for the a list of commercial banks, weighted by trading volume, will be used in a market model approach where their returns are regressed against a market return, here the S&P 500.

3.2.3 Normal Return: Market Model

The normal return is a measure of the return on the asset if the event had not taken place. In order to calculate the normal return over the event window—as defined as the period of time during which the abnormal return from the event will be measured—the actual return on the asset must be regressed against the market return for a period of time leading up to the event, called the estimation window. Once acquiring the estimators for the normal return, the normal return can then be projected over the event window, which we will use to calculate the abnormal return. The normal return of the weighted average stock returns can be expressed as follows:

$$R_t = \beta_t R_{mt} + \varepsilon_t$$

Where R_t is the return on the asset during period t, R_{mt} is the market return during that same period t, and ε_t is a zero mean error term. During the estimation window, it is assumed that there is zero abnormal return. After acquiring the estimators from the regression over the estimation period, the results are used in calculating the abnormal returns by projecting the "normal return" if the event had not occurred. This is explained further below.

3.2.4 Abnormal Return: Market Model

The abnormal return is essentially the difference between the actual measured return on the stock and the normal return over the event window. The abnormal return can be expressed in the following equation:

$$AR_l = R_l - E[R_l]$$

where R_t is the actual observed return over the event window day "l" and where…

$$E[R_l] = \beta^* R_{ml} + \varepsilon^*$$

β^* in the above equation is the estimated coefficient on the market return acquired from the regression during the estimation window. Similarly, ε^* is the constant from the estimation window regressions for time period t. The difference in the observed market return and the estimated return produces the abnormal return for period "l."

For this study, we will aggregate the abnormal return over the entire event window. As a result, it is necessary to calculate the Cumulative Abnormal Return (CAR):

$$CAR = \sum_{l=1}^{L} AR_l$$

which is the sum of all of the abnormal returns for the event window days "l" to "L."

3.2.5 *Estimation Procedure*

For this model, the normal return will be measured during an estimation window of the 120 days leading up to the event. After this period will be the event window, a 3-day period, during which the normal return will be projected and, using the expected value from the regression results, the abnormal return will be calculated. The abnormal returns will then be aggregated over the duration of the event window, resulting in the CAR. The 120-day estimation window is pending its availability. Several times since 1984, the United States has raised the debt-ceiling consecutive times within 120 days of

each other. In such cases, the estimation window will begin after the conclusion of the event window for the previous announcement, at which point the idea that the abnormal return of the stocks is once again assumed to be zero.

3.2.6 *Testing Procedure*

In testing the significance of the Cumulative Abnormal Returns measured during the event window over the 3-day period, in order for the tests to be run, certain main assumptions are required. First, we assume that the abnormal returns of the securities during the event window are normally distributed. Second, we assume cross-sectional independence, that the residuals of the regressions during the estimation window are independent across the different securities in our model. Furthermore, during the estimation window, we assume that this is a period of "normal return" and the residuals during this period (abnormal return) are assumed to be 0. A last assumption is needed in order to test the CAR, that was aggregated over a multi-day event window. Because the standard error used in this event study does not account for the potential correlation between error terms, we must assume that there is no autocorrelation between the abnormal returns over the event window.

In order to test the significance of the CAR against the null hypothesis that the CAR is equal to 0, or that there is no observed abnormal return from the debt ceiling announcements, a standard parametric t-test is employed. As outlined above, the CAR is expressed by the equation below:

$$CAR = \sum_{l=1}^{L} AR_l$$

Where AR is each daily abnormal return over the 3-day event window. The t-statistic for the CAR is shown below:

$$t = \frac{\sum_{l=1}^{L} AR_l}{S(\sum_{l=1}^{L} AR_l)}$$

Where l denotes the days of the event window over which the abnormal returns are cumulated. However, since the CAR is equal to the summation of the AR over the event window:

$$t = \frac{CAR}{S(CAR)}$$

where:

$$S(CAR) = \sum_{l=1}^{L} S(AR_l)$$

And where the S(AR) is expressed as follows:

$$S(AR_l) = \sqrt{\frac{\sum_{t=1}^{T}[AR_t - \frac{1}{T}\sum_{t=1}^{T} AR_t]}{T - d}}$$

The standard deviations of the abnormal returns are estimated by a time series of the residuals of the abnormal returns during the estimation window where "t" to "T" with "T-d" degrees of freedom. Because the standard deviations of the CARs are the sum of the standard deviations of the daily abnormal returns during the event window, it is necessary to first calculate the standard deviations of the abnormal returns.

Therefore, the standard deviation of the CAR is the sum of the standard deviation of the abnormal returns for each of the days included in the CAR. However, since all of them are estimated using the same estimation window, the standard deviation remains constant for each day's abnormal return. As a result, the standard deviation of the CAR is simply the S(AR) multiplied by the amount of days of the event window, in this case,

three. The t-statistic is distributed as Student-t with T-d degrees of freedom, where T is the amount of days in the estimation window and d, from the regression, is 2.

3.3 Regressions Using Dummy Variables

Another more simplistic method to measure the effect of an event on stock market returns is to use event dummies that can distinguish between days before and after the event has occurred. In order to perform this method, the same regression will be used as used in the event study estimation window, regressing the banks' stock returns against the market return. However, now a dummy variable will be added to differentiate between a day during the estimation before the event and a day during the event window, when we would see a potential impact on stock prices as a result of the event. The equation can be expressed as below:

$$R_t = \beta_{1t} R_{mt} + \beta_{2t} D + \varepsilon_t$$

Where R_t is the return on the asset during period t, R_{mt} is the market return during that same period t, D is the dummy for the and event window, and ε_t is a zero mean error term. Thus, D will be "0" for all days during the estimation window and will hold a value of "1" for the days in the estimation window. From these regressions we can test the significance on the coefficient of the dummy variable using a simple t-test where:

$$t = \frac{\beta_2}{SE(\beta_2)}$$

Where t is distributed normally as a student-t distribution with T-d degrees of freedom. If the coefficient on the dummy variable proves to be significant then it shows the event causes a "break" in the relationship the banks' stock returns and the market return. Assuming that raising the debt level would have a negative impact on the banking industry's stock prices, then it is that expected the coefficient on the dummy variable

would be negative. This means that during the event window, the event would decrease the banks stock returns by the amount of the coefficient. Therefore, using these dummy variables is a simplistic approach to investigating the potential impact of debt ceiling announcements on bank stock returns.

IV. Results

In the analysis of the effect that raising the debt ceiling has on the stock returns of the commercial banks, the event study methodology was unable to return strong evidence that over time that debt ceiling announcements have created abnormal stock returns for banks. In the following sections, the results are outlined and explained.

4.1 Estimation Window Regressions

When the regressions for the estimation windows were run in order calculate the estimators of the normal return, I found a strong positive correlation between the return of the banks' stock and the market return, the Standard and Poor's 500 index. Assuming that the S&P 500 is a good indicator of market performance, which is a generally accepted assumption, this result suggests that during this period there was likely no visible return in the banks stocks abnormal from the market return. Moreover, significant coefficients for the S&P 500 are necessary in order for the abnormal returns to be more properly measured and tested. Because the standard deviations of the CARs are estimated based on the residuals of the regressions, the smaller the amount of variance during the estimation window will result in smaller standard deviations for the CARs. Therefore, it is more likely for the tests to produce a statistically significant result and reject the null that the CAR is equal to 0. If the coefficients on the market return during the estimation window had failed to be significant, this would result in far greater standard deviations

for the test statistics, resulting in insignificant CARs. Thus, I would fail to reject the null when potentially the abnormal return from the event window could in fact be significantly different from 0. Therefore, the significance of the coefficients suggests that the event study should produce accurate results based on the estimators acquired from the regressions shown in Table 1.

TABLE 1: Estimation Window Regressions Results

Event	Date	Coefficient on S&P 500 (Market Return)
1	25-May-84	1.2180***
2	6-Jun-84	2.4474**
3	13-Oct-84	1.9119***
4	14-Nov-85	1.0499***
5	12-Dec-85	1.3095***
6	21-Aug-86	1.0619***
7	21-Oct-86	1.0595***
8	15-May-87	1.3186***
9	10-Aug-87	0.9731***
10	29-Sep-87	0.8783***
11	7-Aug-89	0.9936***
12	8-Nov-89	0.6678***
13	9-Aug-90	0.7148***
14	28-Oct-90	0.7794***
15	5-Nov-90	-
16	6-Apr-93	0.6087***
17	10-Aug-93	1.1712***
18	29-Mar-96	0.7495***
19	5-Aug-97	1.0314***
20	11-Jun-02	0.9821***
21	27-May-03	1.0062***
22	16-Nov-04	1.0389***
23	20-Mar-06	0.7746***

***Statistically significant at the .01 level, **at the .05 level, and *at the .10 level

Another result that the regression coefficients in Table 1 show is the relationship between the performances of commercial banks in comparison with the market return. The coefficients on the market return mean that if the market stock return increases by the 1, or 100% daily return, then the percent stock return on the portfolio of banks would

increase by the amount of the coefficient, or coefficient times 100 percent. In the results displayed in Table 1, the majority of the coefficients range from approximately 0.6 to 1.3, disregarding several outliers. From these numbers, we can induce the performance of the banking industry's stocks relative to the rest of the market. For the coefficients below 1, then over the estimation window, the market return was greater than the return of the banking industry. For example, for Event 16, for a 100% increase in the return of the S&P 500, the stock return of the banking industry, as represented by the portfolio used in this analysis, will only increase by 60.87%. Therefore, the percent increase in the return of the market is approximately 40% greater than that of the banking industry. The opposite holds true for the events whose coefficients are greater than 1. Nevertheless, excluding the Events 2 and 3 who are outliers and Event 15 for which there was not enough data to run a regression, the mean coefficient on the S&P 500 stock return was 0.9694. The mean of the coefficients, being so close to 1, shows that overall the banking industry's stock performance follows closely with the overall market performance. Their relationship is almost directly proportional, where a 100% increase in the market return would result in a 100% increase in the stock return of the commercial banks in the portfolio used in this study. In calculating the mean of the coefficients in Table 1, outliers, Events 2 and 3, were omitted because compared to the rest of the data, they are much higher. The estimation window for Event 2, on June 6th, 1984, was only a period of 3 days because it occurred shortly after the previous announcement date on May 25, 1984. As a result, although the coefficient is significant at the .05 level, with such few observations, the coefficient might be skewed due to the 3 day estimation window. However, Event 3 had a proper 120 day estimation window and is significant at the .01

level. Nevertheless, it was ignored in calculating the average coefficient because it is unlikely that the banking industry would experience twice as much return than the rest of the market. With a coefficient of 1.9119, if the market return increases by 100%, this suggests that the banking industry's return would increase by 191.19%, almost 100 percentage points greater than the market. It is unlikely that over time any industry would experience this amount of growth greater than the market, unless as an emerging industry or due to technology. Lastly, Event 15, like Event 2, occurred very shortly after another event, and as a result, the estimation window was not long enough to produce any results.

4.2 Cumulative Abnormal Returns

In Table 2, I present the results for the debt ceiling announcements occurring during the period from 1984 to 2006. The table shows the Cumulative Abnormal Returns (CARs) aggregated over each of the 3-day event windows. From initially examining the data and returns surrounding the day on which raising the debt ceiling was actually announced, it was decided that often times the announcement was anticipated prior to the event. As a result, the event window set for the 23 events was from "l" to "l+2" where l was the day prior to which the announcement was made. Over these three days, the abnormal returns were accumulated and the CAR on day "l+2" (the sum of the abnormal returns over the three day period) was tested for its significance using a standard deviation as explained above. It is probable that the day on which the effects of these announcements would vary across all 23 events. However, in an effort to be consistent and avoid data mining, the same event window characteristics were used throughout the time period. In theory, this could result in missing abnormal returns that occur outside of

the event window. Nevertheless, for this study, it is assumed that all abnormal return occurs within the outlined event window. The CARs and results from the significance tests are summarized in Table 2. The number of observations during the estimation windows are also shown as the t-statistics calculated from the below CARs were distributed with N-d degrees of freedom.

TABLE 2: Cumulative Abnormal Returns Results

Event	Date	N Observations during Estimation Window	CAR
1	25-May-84	120	0.0522
2	6-Jun-84	4	0.0562
3	13-Oct-84	87	-0.0118
4	14-Nov-85	120	0.0110
5	12-Dec-85	16	0.0057
6	21-Aug-86	120	-0.0093
7	21-Oct-86	39	0.0058
8	15-May-87	120	-0.0452
9	10-Aug-87	56	-0.0309*
10	29-Sep-87	32	-0.0301**
11	7-Aug-89	120	-0.0038
12	8-Nov-89	63	-0.0212*
13	9-Aug-90	120	0.0056
14	28-Oct-90	53	0.0031
15	5-Nov-90	2	-
16	6-Apr-93	120	-0.0131
17	10-Aug-93	84	-0.0100
18	29-Mar-96	120	-0.0170
19	5-Aug-97	120	-0.0099
20	11-Jun-02	120	0.0184
21	27-May-03	120	0.0035
22	16-Nov-04	120	0.0085
23	20-Mar-06	120	-0.0033

***Statistically significant at the .01 level, **at the .05 level, and *at the .10 level

Overall, the results suggest that historically over the period from 1984 to 2006, raising the debt ceiling had an insignificant effect on the stock market returns of commercial banks in the United States. None of the periods for which there was a standard 120 day estimation window produced significant results. The results for these events whose tests were performed with greater degrees of freedom are expected to be more accurate than those with fewer. Thus, this provides strong evidence that the Events 1, 4, 6, 8, 11, 13, 16 and 18 through 23 did not significantly impact the stock returns of the banks. For these events, we failed to reject the null that CAR is equal to zero.

Furthermore, we failed to reject the null for Events 2, 3, 5, 7, 14, and 17. All of these events occurred fewer than 120 days after a previous event and as a result had a shortened estimation window. The shorter estimation period resulted in fewer degrees of freedom and a wider t-distribution, therefore, making it necessary for the t-value to be larger in order to be determined significant. It is possible that, if the estimation period could have been measured for a longer duration, the CARs for these events may have been significant. Events 3 and 17 were the only events of this group that produced hypothesized negative result. As detailed earlier, it is expect that raising the debt ceiling would result in a decrease in the stock returns for banks. Therefore, although these events could have produced significant results if they had more degrees of freedom, Events 2, 5, 7, and 14 possibly could produce a positive CAR. This result would suggest that these announcements actually had a positive effect on the banks' stock prices.

The only events that produced significant results were Events 9, 10, and 12. Events 9 and 10 occur within 60 and 100 days after Event 8, respectively. Event 9, on August 10, 1987, with a CAR of -0.0309 is significant at the .10 level and Event 10,

occurring 34 days after Event 9 on September 29, 1987, is significant at the .05 level with a CAR of -0.301. Over 3 events during a period of 100 days, the United States' debt ceiling was raised for an average amount of $2.49 trillion, totaling over $7.4 trillion. Previously, the largest increase in the debt ceiling level had been $2.3 trillion, a level which all three of these events surpassed. The first announcement of the three, Event 8 on May 15th, 1987, was not as out of the ordinary, raising the debt level $2.32 trillion, but certainly the country having to raise the level over $5 trillion more over the next few months certainly could have caused concern in investors. As a result, the CAR in the stock returns of the banking industry was significant for the following two events, with Event 10 being significant at the .05 level. Furthermore, if the t-distributions for these two events were able to have more degrees of freedom, the variance in the distribution would have been lessened and the results could have been even more significant. On Monday, October 19th 1987, the stock market crashed, with the Dow Jones Industrial Average dropping by the largest point drop in history, plummeting 508 points. Causes and proceedings culminating with stock market crash in 1987 could have affected the significance of Events 9 and 10 in 1987. However, with the crash occurring after these announcements, it is unclear if they are at all related. Further research and consideration is required to explore their conceivable connection[23].

The other event that produced a CAR that rejected that null was Event 12, which was significant at the .10 level. Like Events 9 and 10, this event, occurring on November 8, 1989 occurred just 65 days after Event 11. Over the three day event window, a CAR of -0.0212, or -2.12%, was accumulated. The announcement in August 1989 marked the first time it had been raised since the events in 1987. In August, the debt ceiling increased

[23] "Setting the Record Straight on the Dow Drop". New York Times. 1987-10-26.

by $2.87 trillion. Shortly thereafter, in November the United States called for another record increase of over $3 trillion. This consecutive increase appears to be the cause of a significant abnormal return in the stock returns of the banking industry. The three significant events in this study all have an abbreviated estimation window, coming shortly after a previous heightening of the debt ceiling. It seems that raising the debt ceiling a second time (or third in the case of Event 10) in a brief period of time provokes an impact in stock prices.

A problem that could have weakened the results of the event study was the autocorrelation between the abnormal returns over the event window. By not controlling for this in the standard deviation, it could have potentially led to the rejection of null hypotheses, when in fact the CAR was not statistically significant. However, except for possibly with the three events that produced significant results, the ignorance of the autocorrelation of abnormal errors, did not skew the conclusion that the results of the test produced. If anything, without controlling for autocorrelation, the results were more significant than they should have been, but nonetheless, we still failed to reject. In addition, it is possible that the abnormal returns could occur later than expected in this study, in which case a longer event window would be necessary to capture these abnormal returns.

4.3 Regression Results Using Dummy Variables: Results

The purpose of these regressions is to supplement the event study and introduce another way to test for the significance of a particular event on stock returns. In these regressions, the banks' daily stock returns were regressed against the market return, S&P 500, as well as a dummy variable. The dummy variable was used to identify the event

date, where during the estimation window, the dummy was equal to 0 and during the event window equal to 1. Therefore, if there was a change in the trend or relationship between the banks stock returns and the market return (if the event affected the banks' stock) then the coefficient on the event dummy would be significant.

TABLE 3: Dummy Variable Regression Results

Event	Date	Coefficient on S&P500 (Market Return)	Coefficient on Event Dummy
1	25-May-84	1.358683***	0.0046843
2	6-Jun-84	2.146622**	0.0068451
3	13-Oct-84	1.909707***	-0.004016
4	14-Nov-85	1.023788***	0.0015032
5	12-Dec-85	1.35079***	0.0025653
6	21-Aug-86	1.031623***	-0.008185
7	21-Oct-86	0.9977569***	-0.0036367
8	15-May-87	1.202343***	-0.0128069
9	10-Aug-87	0.9845564***	-0.0081974*
10	29-Sep-87	0.8467639***	-0.0049474
11	7-Aug-89	0.9759472***	-0.0023013
12	8-Nov-89	0.6857118***	-0.0025796
13	9-Aug-90	0.6756847***	0.0047863
14	28-Oct-90	0.8402263***	-0.0053842
15	5-Nov-90	-	-
16	6-Apr-93	0.6387377***	-0.0031268
17	10-Aug-93	1.128805***	0.0011635
18	29-Mar-96	0.7982379***	0.0002152
19	5-Aug-97	1.035761***	-0.0060374
20	11-Jun-02	1.000502***	-0.0002804
21	27-May-03	1.005591***	-0.0015356
22	16-Nov-04	1.030605***	0.0009354
23	20-Mar-06	0.7792825***	-0.0000766

***Statistically significant at the .01 level, **at the .05 level, and *at the .10 level

As expected, the results of the regressions show that the events were not statistically significant in affecting the banks' stock returns. The only result that was significant was Event 9, at the .10 level, which in the event study proved to also produce

a CAR significant at the .10 level. In the regression, the coefficient on the event dummy means that if it is a day during the event window, during which the dummy is equal to 1, the banks' stock return for the day will decrease by the amount of the coefficient. In Event 9, the results show that a day during the event window would lead to a decline of 0.008185 or 0.8185% in the banks' stock returns. For this particular event, the results of this regression echo the results from the event study itself and the abnormal return that was calculated and tested.

However, while Event 9 produced results that were consistent with the results from the event study, the coefficients for the event dummies for Events 10 and 12 were not statistically significant. Although it is expected that the dummy variables for these events would be significant because their CARs were significant, several main reasons could contribute to the inconsistency. First, the simple regression using a dummy variable is a much more simplistic approach and does not account for the aggregation of abnormal returns over the period as the CAR does. Furthermore, having an event window that spans over several days, the CAR can still be significant if the stock returns reaction to the news is delayed or if it is priced in a day early. However, in this case, a day during the event window that does not produce abnormal returns could potentially cause the entire coefficient to be insignificant due to the lack of observations and brevity of the event window.

V. Limitations

In this study, there were several main limitations to the research, the application of the methodology, and the eventual arrival at results. Mainly, only one specific scenario was used to be tested: with firms' securities pooled into a single portfolio, several main

assumptions about standard errors, and with a single and constant duration for abnormal return. With more time and further research, the possible impacts and varied results that could potentially result from different techniques could be explored.

One of the first limitations of this research is how the security or asset was formulated to represent the "banking industry." In this study, the banks' stocks were pooled together to form a single security so that the effects of raising the debt ceiling could be easily tested across multiple firms simultaneous. However, assuming that the returns of each firm were uncorrelated could be misleading. In fact, one firms' stock returns could very possibly impact the returns of other related firms, resulting in distorted results. Instead of testing them individual, this paper assumes cross-sectional independence, that the residuals are uncorrelated across securities. This allows the firms returns to be tested collectively. With more time, it would be advisable to treat all the firms separately and test the impacts of these events on individual firms, which might lead to more significant and meaningful results.

Another limitation of this research was the standard error that was used in testing the statistics. With assuming mean independence across time as well as autocorrelation of abnormal returns, it greatly simplified the standard error used in the testing procedure. In future research and the continuation of this study, it would be useful to control for time correlation instead of assuming it does not exist. By adjusting and controlling for time correlation, the results would not only be more accurate but could potentially contribute to a more significant piece of research.

VI. Conclusion

The accumulation of federal debt has become over the years increasingly more of a hot-button issue. Especially, after the United States debt crisis in the summer of 2011, leading to the eventual downgrade of the US Treasury by Standard and Poor's, the rising debt levels potentially could have an impact in capital markets. With the banking industry taking up increasingly a larger share and importance in the global economy, the possible impact that the growing sovereign debt has on the market valuation is of greater interest. Thus, as a result, this paper set out to explore the relationship that the United States rising debt historically has had on the stock returns of the banking industry. In doing so, the events of raising the debt ceiling were used as proxies for the national debt level, and using an event study methodology, the effects of these events were measured and tested for their significance.

In this paper, the main method to investigate the relationship between stock returns and debt ceiling announcements was an event study methodology. In estimating the normal return of the banks' stocks during the estimation window leading up to the announcement, the relationship between the banks' stock prices and the S&P 500 proved to be strong and significant. Therefore, the market return leading up to the event was a good estimate of the return that commercial banks experienced over this period. Furthermore, on average the coefficient on the market return was close to 1, therefore showing that the return for banks was very consistent with that of the entire market. However, the results from testing the significance of the CAR of each event were a lot less telling. In fact, despite three events, on August 10th, 1987, September 29th, 1987, and November 8th, 1989, all events failed to reject the null of 0 cumulative abnormal return.

The events in August 1987 and November 1989 were significant at the .10 level whereas the September 1987 event was significant at the .05-level. During each of these events, the estimation periods were shorter because these announcements came shortly after a previous announcement. In other words, the United States debt ceiling was heightened more than once within a period of 120 days, or in the case of 1987, it was raised 3 times within that same time frame. The rapidity of consecutive announcements could undoubtedly contribute to the significance of the results. On the other hand, the short estimation window used for these tests limits the observations and degrees of freedom. As a result, it limits the accuracy of the test results, because they abnormal returns are assumed to be distributed approximately normally as N, number of observations, increases. With limited observations, the results certainly could be askew as a result.

Nevertheless, despite three observances producing significant results, the event study results as a whole showed a weak and insignificant relationship between the announcements and stock market returns. However, it could have been expected that raising the debt level would have little impact on the stock returns of the banking industry. Until recently, the issue of raising the national debt level had not come under as much scrutiny, both economically and politically. In the summer of 2011, the political stagnation concerning raising the debt level provided record swings in stock prices and eventual led to its downgrade. But, historically the United States treasury had been viewed as a "risk-free" investment. It follows that raising the debt allowance could potentially have little impact in markets if still considered to be "risk-free." The results from this event study show that investors from 1984 to 2006 have continued to view US Treasuries as "risk-free" investments. As a result, raising the debt level would cause little

to no reaction in investors, as reflected in insignificant abnormal return for the events in this study.

In accordance with the results from the event study, the regressions using a dummy variable for the events produced insignificant coefficients. The only significant result, consistent with the event study, was the event on August 10th 1987. Overall, these regressions showed that the events did not significantly affect or impact the linear relationship between the market return and the banks' stock returns.

There are recognizable issues omitted in this paper. First, in measuring the abnormal returns for the stocks as a result of the event announcements, I was unable to control for events outside of the debt ceiling announcements that would affect the stock prices. Furthermore, this problem exists throughout the estimation window. Further research and adjustments are necessary to isolate the true "normal return" of the stocks over the estimation period. Events outside of the scope of interest of this paper affect the stock returns and skew the results and measurements of the abnormal returns. This study did not exclude potential occurrences and simply assumed the announcements were the only events that potentially would result in abnormal return. Further work and research is necessary to control for these types of circumstances in order to obtain more accurate results. Another problem that exists is the potential correlation between the stock returns of the firms included in the "banking industry" portfolio, whose weighted average stock returns were used for the event study. In order to do this event study, it was necessary to assume that all of the banks' stock returns were uncorrelated. Furthermore, the potential existence of autocorrelation between abnormal returns over the event window was not investigated and rather assumed to be a non-issue. In future work, the existence of the

autocorrelation could be controlled for using adjusted standard errors. Despite the above listed omitted considerations, the results were quite consistent.

Sizable research remains to investigate the relationship between the growing United States debt and the stock returns of the banking industry. Advanced work could seek to control for the issues outlined above and possible extend the study past 2006 to the present time, including the 2011 debt crisis. Moreover, the study of the summer of 2011 would be helpful to study over the entire debt ceiling discussion, measuring the effect of individual news events on the market returns. Nonetheless, this paper was successful in showing that, from 1984 to 2006, the events when the United States' debt ceiling was raised overall insignificantly impacted the stock returns of the banking industry.

References:

1. National Public Debt Outstanding. United States Treasury. Retrieved December, 2011.
2. "A Brief History of the U.S. Federal Debt Limit". Freegovreports.com. 2010-01-28. Retrieved 2011-08-07
3. Federal Census Bureau Reports. “Employment” and “Industry Specification.” 2008. United States Census Bureau. Retrieved December 28th, 2011.
4. Historical Industry Market Capitalization. 2008. Yahoo.finance.com. Retrieved December 28th, 2011.
5. Fisher, Stanley. 2003. “The Importance of Financial Markets in Economic Growth.” Citigroup.
6. Anand, Hitesh. July, 2011. “Who Are the Largest Holders of US Debt?” Wealthson. http://www.wealthson.com/1549/who-are-the-largest-holders-of-us-debt
7. Panetta, Fabio et al.. July, 2011. “The Impact of Sovereign Credit Risk on Bank Funding Conditions.” Committee on the Global Financial System (CGFS). Bank for International Settlements.
8. Meade, J.E. 1958. “Is the National Debt a Burder?” Oxford Economic Papers. Vol. 10, No. 2. Pp. 163-183.
9. Chen, Nai- Fu, Roll, Richard, and Ross, Stephen A. 1986. “Economic Forces and the Stock Market.” The Journal of Business. Vol. 59, No. 3, pp. 383-403.
10. Summers, Lawrence H. 1986. “Does the Stock Market Rationally Reflect Fundamental Values.” The Journal of Finance. Vol. 41. No. 3. New York, New York, pp. 591-601.
11. Brainard, William C. Shoven, John B. and Weiss, Laurence. "The Financial Valuation of the Return of Capital." Brookings Paperson Economic Activity (1980), pp. 453-502.
12. António Afonso and Ricardo M. Sousa, 2008. "The Macroeconomic Effects of Fiscal Policy," Working Papers 2008/56, Department of Economics at the School of Economics and Management (ISEG), Technical University of Lisbon.
13. Smirlock, Michael and Kaufold, Howard.1987. “Bank Foreign Lending, Mandatory Disclosure Rules, and the Reaction of Bank Stock Prices to the Mexican Debt Crisis. ”The Journal of Business , Vol. 60, No. 3 (Jul., 1987), pp. 347-364.
14. Schwert, G.W. 1981. “The Adjustment of Stock Prices to Information about Inflation.” Journal of Finance, 36, 15-29.
15. Pearce, D.K. and Roley, V.V. 1985. “Stock Prices and Economic News.” Journal of Business, 58, pp. 49-67.
16. Hardouvelis, G.A.. 1987. “Macroeconomic Information and Stock Prices.” Journal of Economics and Business, 39. pp. 131-140.
17. McQueen, G. and Roley, V.V. 1993. “Stock Prices, News, and Business Conditions.” Oxford University Press.

18. Cutler, D.M, Poterba, J.M., and Summers, L.H. 1989. “What Moves Stock Prices?” Journal of Portfolio Management, 15. pp. 4-12.
19. Campbell, John Y., Lo, Andrew W., MacKinlay, A. Craig. 1997. The Econometrics of Financial Markets. Princeton University Press. Princeton, NJ.
20. Serra, Ana Paula. 2002. “Event Study Tests: *A Brief Survey*.” Working Papers da FEP. No. 117. May, 2002. Universidade do Porto.
21. "Table 7.1—Federal Debt at the End of Year: 1940–2016". Historical Tables. Office of Management and Budget. Retrieved November 18, 2011.
22. Annual Ranking of America’s Largest Corporations. 2006. Fortune Magazine.
23. "Setting the Record Straight on the Dow Drop". New York Times. 1987-10-26.