Senior Project
Department of Economics

"An Assessment of Firm Performance Post Gramm-Leach Bliley Act"

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Abstract

This study seeks to examine the impact of the repeal of Glass-Steagall on firm performance. Data from SEC filings of Report and Income are used from 1990-2006 to form a consistent time series data set, and the averages from each reported period are used across all institutions. I utilize GARCH and EGARCH estimation techniques to capture the volatility of returns in modeling firm performance. In the study I proxy firm performance with return on equity and use leverage as a risk measure in the model. Results suggest that there was in improvement in the robust model, but there was no improvement when firms were sorted by size[1].

[1] I would like to sincerely thank Dr. Francesco Renna and Dr. Munpyung O for their assistance over the course of this project.

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I. Introduction

This paper examines the impact of the Financial Services Modernization Act or the Gramm-Leach-Bliley (GLB) Act of 1999 over whether firm performance was affected after its enactment. Reports of Condition and Income (Call Reports) data are used to assess the impact of deregulation across the industry. The Financial Services Modernization Act or the Gramm-Leach-Bliley (GLB) Act of 1999 repealed the Glass-Steagall Act of 1933 and allowed banks, brokerage firms, and insurance companies to merge.

The impact of the repeal of Glass-Steagall has had far reaching consequences where some experts have attributed it to the financial crisis. The allowance of mergers between banks increased opportunities for them to diversify how assets were funded. Subsequently, critics argued that banks began to take risks they did not fully understand, and the combination of commercial and investment banking left firms with little understanding of how to operate. In effect, financial firms made, sold, and securitized risky mortgages, which fueled a massive housing bubble and built a highly leveraged scheme that contributed to the housing bubble burst[2].

This study examines whether firm performance in the financial industry has changed after the repeal of Glass-Steagall. It differs from previous studies for a variety of reasons. One of the major differences is the use of time series data versus panel or cross sectional. Previous papers, such as Hassan, Lai, and Mamum (2004) analyze a larger sample size but exclude institutions that are not in existence the entire course of the study. A major provision of GLB Act was it allowed firms to merge into huge conglomerates, such as when PNC bought out National City.

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[2] Referenced from Kim Chipman and Christine Harper, "Citigroup's Parsons Says Ending Glass-Steagall Led Crisis" *The San Francisco Chronicle*

Consequently, eliminating those firms not in existence over the course of a data[3] does not capture the implications of such mergers described above. In order fully capture the entire banking industry, which includes mergers or the dissolution of any financial institution, the averages of each quarter were taken and incorporated into the creation of the data set.

This study proxies firm performance with return on equity, previously suggested by Berger and Bonaccorsi di Patti (2006) as a standard benchmark in the banking industry. Consistent with Brandt and Jones (2006), returns are volatile, and in effect, cannot be approximated with basic least squares estimation[4]. Furthermore, in order to accurately capture the volatility of return on equity, namely time-series clustering, negative correlation with returns, log normality, and long memory, Generalized Autoregressive Conditional Heteroskedasticity (GARCH) and Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) methods are used[5]. The main objective of this paper is to examine whether deregulation in the financial services industry has impacted firm performance.

Results suggest that firm performance has improved in the robust sample following the repeal of Glass-Steagall, but are more inconclusive when firms are grouped according to size. The rest of the study is organized as follows: Section 2 briefly summarizes the GLB Act and Glass-Steagall. Section 3 reviews the previous literature and presents the hypotheses. Section 4 develops the empirical model. Section 5 summarizes the data and its creation in forming consistent time series. Section 6 conveys the results of the study. Section 7 concludes the results. Section 8 describes the limitations of study and offers suggestions for future research. Section 9 provides the appendices.

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[3] See Hendershott, Lee, and Tompkins (2002) ; Bhargava and Fraser (1998) ; Cyree (2000)
[4] Refer to Figure 1 for graphs of data.
[5] GARCH and EGARCH models referenced in this study are solely GARCH(1,1) and EGARCH(1,1)

II. Glass-Steagall and Gramm-Leach Bliley

After the Great Depression lawmakers worked together to ensure it would never be repeated. In effect, the Glass-Steagall Act was passed on February 27, 1932. The act was separated into two provisions. Zamanian (2007) stated the first took the United States off the gold standard, allotting the Federal Reserve greater control of the money supply. Control of the money supply allows a nation to combat inflation. Zamanian (2007) continued that a year later, on June 16, 1933, the Banking Act amended provisions that separated commercial and investment banking. As Cyree (2000) argues, many advocates of Glass-Steagall claimed that potential conflicts of interest between commercial and investment banking are too severe and remain separate entities from one another. Some conflicts are cited by Cyree (2000) as the use of underwritten equity loans by bank customers to repay other outstanding bank loans or if customers used loans to purchase other bank underwritten securities.

The erosion of Glass-Steagall began in 1986, when the Federal Reserve allowed Bank Holding Company's (BHCs) to underwrite previously ineligible debt and equity through related bank affiliates or subsidiaries under Section 20 of the Glass-Steagall Act (Cyree, 2000). This allowed BHCs to underwrite ten-percent of subsidiary revenues in "ineligible" corporate debt and equity. Consequently, many banks pushed for deregulation. These institutions found loopholes in the Glass-Steagall Act, particularly Section 20, which stated banks were "prohibited from affiliating with other financial institutions that were 'engaged principally' in the issue, floatation, underwriting, public sale, or distribution of financial assets" (Zamanian, 2007). Zamanian continues that financial institutions took to court what is actually meant by "engaged principally", and in 1996 the interpretation was widened to allow for banks to underwrite up to twenty –five percent of revenue in corporate bonds and equity. Companies such as Bank of

America, Citigroup, Deutsche Bank, Wells Fargo, J.P. Morgan, and Barclays Bank immediately took advantage of this ruling and held items which they defined as "Section 20 Securities Affiliates".

Inevitably, banks pushed so hard that Glass-Steagall was repealed through the Gramm-Leach Bliley Act, supported by President Bill Clinton in 1999. This enabled financial companies to engage in "any activity that is financial in nature". Investment and commercial banking were no longer separate entities as consumers had the option to use the same institution to fulfill all of his or her needs. As suggested by Zamanian (2007), banks were able to take advantage of economies of scale, lowering costs and increasing their profitability. These institutions were now able to expand the possibilities for investment, and often did as evidenced by the housing market bubble.

Previous studies have analyzed industry benefits for either commercial or investment banks and its effect on firm performance around increased investment activity and opportunities. This paper differs from those in that it utilizes time series data and all institutions financial in nature to analyze whether performance was impacted after the enactment of GLB.

III. Literature Review

There is much literature over the repeal of Glass-Steagall and its effect on firm performance. Generally, previous research has reviewed the effects of the GLB Act on performance in either commercial or investment banks, but has not combined them together. Various studies have reviewed performance or changes in the risk of banking around the increased underwriting powers associated with Gramm-Leach Bliley. Before the GLB Act was passed, banks had to diversify gains using various methods. Kwast (1989) reviews the potential for these diversified gains as banks expanded into underwriting securities. He found that returns on securities activities were greater than returns on non-securities activities. However, in a study conducted by Saunders and Smirlock (1987), their results suggested that securities firms experienced a significant decline in market value. Although two conflicting viewpoints, neither study accounted for firm size as a determinant in its effect on market value.

As mentioned by Cyree (2000), the erosion of Glass-Steagall began in 1987. Apilado, Gallo, and Lockwood (1993) reviewed the market reaction amongst groups of banks for the increased underwriting powers enacted in 1987. They found that most of the positive excess returns were earned by the Money Center Bank Group. However, returns for investment banks were negative and insignificant. They also found that risk did not decline significantly for any of the groups around the initial increase in underwriting power for commercial banks.

Bhargava and Fraser (1998) also studied the 1987 announcement of increased underwriting powers and the three other Federal Reserve Board decisions that allowed commercial banks to participate in increased investment activities via Section 20 subsidiaries. They utilized a multivariate regression, but found no wealth effects for commercial or investment banks. Hendershott, Lee, and Tompkins (2002) also found no wealth effect on commercial banks. They hypothesized there was no effect on these banks because laws have allowed them to "have a fairly substantial presence in other sectors". Results from Hendershott, Lee, and Tompkins (2002) did, however, find a significantly positive wealth effect of one event on both the insurance and brokerage industries.

Results from a study by Cyree (2000) suggested that the demise of Glass-Steagall had an overall positive impact on the banking industry. In the study, he analyzed firm performance on commercial and investment banking. Overall, results suggested that both types of banks experienced an improvement. Cyree (2000) argued that overall, commercial bank underwritten securities performed better or no worse than investment bank securities. Furthermore, he found smaller banks that are unable to capitalize on the increased investment banking activity could be at a competitive disadvantage in the long run. This is consistent with Hassan, Lai, and Mamum (2004) as they also inferred positive gains in banking and insurance firms where larger firms benefited the most. Miles (2002) constructed a time series study to assess the financial deregulation and volatility in emerging markets across the globe. Results were inconclusive as he argued that varying capital structures affected the outcome of performance and volatility.

Collectively, prior research has analyzed the implications from the Gramm-Leach Bliley Act at either a firm level or by type of bank, commercial or investment. Past research has also indicated that investment banking may be more profitable, although there is higher risk and lack of diversification than with commercial banking. However, there is little research that analyzes the effects of GLB over commercial, investment, and combined banking industries.

With the repeal of Glass-Steagall, financial institutions were now able to engage in both commercial and investment banking. Mergers between investment and commercial banks have led to the formation of banking conglomerates such as JP Morgan & Chase or Bank of America. To ensure robustness, this must be taken into account. In order to account for mergers, it is important to include all firms regardless of existence into the formation of the data set. From the above literature review, I present and test the following two hypotheses:

H1. The repeal of Glass-Steagall has improved bank performance.

The first hypothesis is to test whether firm performance improved after the repeal of Glass-Steagall. As suggested previously by Kwast (1989), investment banking is more profitable than commercial banking. Gande, Puri, and Saunders (1999) show that commercial banks underwrite less risky and smaller debt in comparison to investment banks. However, effects of this provision may have had delayed effects on improvement in firm performance. If consistent Hassan, Lai, and Mamum (2004), firm performance should improve. I test this hypothesis by the creating a dummy variable for year and then measuring the significance of it. I hypothesize a positive impact post Glass-Steagall.

H2. Financial institution size affects its performance.

The second hypothesis is to test whether firm size affects performance. Firm size is measured by average total assets and divided into three groups. Consistent with Berger and Bonaccorsi di Patti (2006), this is done to account for differences in technology, investment opportunities, diversification, and other factors related to size. Hassan, Lai, and Mamum (2004) found greater benefits for larger firms, and I would expect to find the same. From this, I hypothesize that large firms benefit the most, followed by medium and then the smallest firms.

IV. The Empirical Model

Estimation with time series utilizing discrete time must be from a stochastic, or random, process. Appropriate model estimation using discrete time is only applicable if the structural relationship described by the equation is time invariate, or stationary. Essentially, the characteristics of the stochastic process used to estimate the equation cannot change over time, and cannot be represented by a simple algebraic model. Diebold (2007) states that all covariance stationary series are white noise, which is a purely random process and the building block for time series models.

Unfortunately, time series data is seldom covariance stationary and cannot be approximated with normal discrete time estimation. Rossi (2004) argued that financial data often exhibits similar empirical regularities such as non-stationary asset prices, non-normal distribution (fat tails), volatilities of different variables moving together, and the leverage effect.

The leverage effect is where changes in stock prices tend to be negatively correlated with changes in volatility. For example, a firm has been shown to be higher levered as stock prices fall. To transform this non-stationary series stationary, Bollerslev (1986) presented the Generalized Auto-Regressive Conditionally Heteroskedastic (GARCH) and Exponential Generalized Auto-Regressive Conditionally Heteroskedastic (EGARCH) models.

GARCH estimation allows the conditional variance of a series to evolve according to an autoregressive type process correcting for the violation of assumptions for covariance stationary series (Teräsvirta, 2006). Bollerslev (1986) and Taylor (1986) independently generalized the ARCH process to derive the Generalized Auto-Regressive Conditionally Heteroskedastic (GARCH) process. This model is a weighted average of past squared residuals, but it has declining weights that never go completely to zero. Here, all past errors contribute to forecast volatility. Because the GARCH (p,q) process can be represented as an infinite order ARCH process, GARCH estimation is generally more parsimonious and will be utilized in this study.

Following Miles (2002), the unconditional variance is pertinent in measuring the volatility of returns because investors are more concerned with estimation of conditional variance on its own past.

$$FP_{t,i} = \beta_1 + \beta_2 FP_{t-1,i} + \beta_3 RISK_{t-1,i} + \varepsilon_{t,i} \quad (1)$$

$$ROE_{t,i} = \beta_1 + \beta_2 ROE_{t-1,i} + \beta_3 LEV_{t-1,i} + \beta_4\, REPEAL + \beta_5 TREND + \beta_6 TREND2 + \varepsilon_{t,i} \quad (2)$$

$$\sigma_t^2 = \omega + \sum_{i=1}^{q} \theta_i\, \varepsilon_{t-i}^2 \gamma \varepsilon_{t-i}^2 d_{t-1} + \sum_{j=1}^{p} \delta_j\, \varepsilon_{t-i}^2 \gamma \sigma_{t-j}^2 \quad (3)$$

Equation (1) represents the most basic model where $FP_{t,i}$ is firm performance of firm *(i)* at time *(t)* and $\beta_3 RISK_{t-1,I}$ is a risk measure of firm *(i)* at time *(t)*. Equation (2) is the derived model from Equation (1). Here, $ROE_{t,i}$ proxies firm performance with the average return on equity at time *(t)* for firm size *(i)*, $ROE_{t-1,i}$ is the lagged average return on equity of firm size *(i)* at time *(t)*,

$LEV_{t-1,i}$ denotes risk and is the leverage ratio[6] at time (*t*) for firm size (*i*), TREND is the linear trend, TREND2 is quadratic trend, and ε_t is the error term. The variable of interest, REPEAL, is a dummy which measures the change in firm performance after the repeal of Glass-Steagall.

In Equation (3), the conditional variance follows an asymmetric GARCH(*p,q*) process. In such, σ_t^2 represents the autoregressive (AR) portion and the ε_t^2 terms the moving average (MA). The middle term, $\gamma\varepsilon_{t-i}^2 d_{t-1}$, represents the asymmetric portion of the conditional variance. The dummy variable d_{t-1} is is equal to one if $\varepsilon_t < 0$ and zero otherwise. In effect, negative shocks raise volatility more than positive innovations and is based on a finding by Black (1976).

Furthermore, I hypothesize the signs of the exogenous variables in my model. LEV, as defined in Equation (3), measures the proportion of assets financed with equity. A ratio of over 0.5 signals a firm's preference to finance with equity versus debt. As previously suggested by Kwast (1989), taking on more risk, or financing with more debt than equity, should reduce the volatility of returns and in effect, improve firm performance[7]. Increased opportunities for investment after the repeal of Glass-Steagall allowed banks to take more risks they may not have fully understood. Therefore, the parameter estimate should be negative, which indicates an increase in assets financed with debt hurt firm performance. If my first hypothesis is correct, financial firm performance will improve and thus I would expect REPEAL to be positive. Furthermore, as technology and information evolve over time, TREND and TREND2 should also be positive.

The conditions of the GARCH model ensure that the conditional variance is positive and that $ROE_{t,i}$ is covariance stationary. This simple structure presents limitations on GARCH

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[6] Refer to Section V. for derivation of the leverage ratio. measure.
[7] Refer to Section VIII. for limitations on the use of leverage to proxy risk.

models. Three key limitations of GARCH estimation are present in this analysis. Rossi (2004) presents the following arguments against this estimation technique:

1. Shocks may persist in one norm and die out in another, so the conditional moments[8] of GARCH may explode even when the process is strictly stationary.
2. Since this modeling technique specifies the behavior of the square of the data, a few large observations can dominate the sample.
3. Most importantly, the assumption that only the magnitude and not the positivity or negativity of unanticipated excess returns determines σ_t^2. This means that the model is not responsive to asymmetric shocks, known as the leverage effect.

Since GARCH models do not take into account the direction of such shocks, Exponential Generalized Auto-Regressive Conditional Heteroskedasticity (EGARCH) will also be estimated.

$$\ln\sigma_t^2 = \omega_j + \beta_j ln\left(\sigma_{j,t-1}^2\right) + \gamma \frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha \left[\frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}}\right] \tag{4}$$

Equation (4) represents the conditional variance of the EGARCH (*p,q*) process. In the conditional variance of the EGARCH (*p,q*) process, $\omega_j, \beta_j, \gamma,$ and α are parameters to be estimated. Furthermore, $ln\sigma_t^2$ is the natural log of the conditional variance, β_j measures the persistence in conditional volatility irrespective of anything happening in the market, γ measures the asymmetry or the leverage effect, and α represents a magnitude effect or the symmetric effect of the model. Rossi (2004) presents the values that the leverage affect can assume:

- If $\gamma = 0$, the model is symmetric.

[8] Defined by Diebold (2007) as expectations of powers of random variables that convey different sorts of information conditional on past values.

- If $\gamma < 0$, then the positive shocks (good news) generates less volatility than negative shocks (bad news)
- If $\gamma > 0$, positive innovations are implied to be more destabilizing than negative innovations

The standard GARCH model is one of the most applied techniques in correcting for conditional heteroskedasticity. Teräsvirta (2006) suggests it is natural to compare EGARCH approximations against GARCH, and thus I will adopt the same approach.

V. Data

To test the above hypotheses, quarterly data from SEC Conditions of Report and Income (Call Reports) between 1990 and 2005 is used. Although data is available after 2005Q4, this was chosen to eliminate bias from the financial crisis. All regulated financial institutions in the United States are required to submit quarterly financial information. The data is measured in thousands of 2012 United States dollars. In order to encapsulate the varying characteristics of firms, I follow Berger and Bonaccorsi di Patti (2006) to create three sized data sets based on firm average total assets. The full sample is also used in order to ensure robustness. In order to form consistent time series in the sized samples, data was trimmed if assets are greater than one trillion dollars[9].

Firms are grouped by average total assets to derive three categories of firm size. The first groups firms from zero to one billion dollars, the second greater than one billion dollars to ten billion dollars, and the third greater than ten billion dollars to a trillion dollars. Due to the small amount of firms with assets greater than one trillion dollars, those firms have been eliminated from the firm size data set to form consistent time series. In the robust sample, those firms are

[9] Refer to Table 2 for Variable Definitions and Sources

not excluded. The data used is the average of all reporting financial institutions for each respective quarter and ranges between 9,000 to 23,000 firms. The use of averages is quintessential to ensure all financial institutions are included in the analysis, regardless of the firm's existence and to account for mergers.

In the model, firm performance is proxied by return on equity, a standard measure in the banking industry.

$$EQUITY_{t,i} = \text{Total Assets}_{t,i} - \text{Total Liabilities}_{t,i} \quad (5)$$

Before firm performance can be computed, Equation (5) derives equity. In Equation (5), total assets are the average total assets of all financial institutions at time (*t*) for firm size (*i)* and total liabilities are average total liabilities of all financial institutions at time (*t*) for firm size (*i*).

$$ROE_{t,i} = \frac{\text{Profit}_{t,i}}{\text{Equity}_{t,i}} \quad (6)$$

[10]

Firm performance, as proxied by return on equity, is calculated in Equation (6). In Equation (6), profit is the average profit of all reporting financial institutions at time (*t*) for firm size (*i*) and equity is defined previously in Equation (5). After calculation $ROE_{t,i}$ was adjusted for seasonality with the Census X12 method. Furthermore, firms are grouped into four different categories. ROE_FULL represents the robust sample, ROE_SM, encompasses firms with average total assets between zero and one billion dollars, ROE_MED is composed of firms with average total assets between one billion and ten billion dollars, and ROE_LG represents firms with average total assets between ten billion and one trillion dollars.

Risk is proxied by a leverage estimate, the equity to assets ratio. This measures the proportion of assets financed with equity. Furthermore, the higher the ratio, the larger proportion

[10] Refer to Figure 1 for graphs of return on equity.

of assets financed with assets. This is consistent with Berger and Bonaccorsi di Patti (2006) as they argue this is a common variable to proxy leverage[11].

$$LEV_{t,i} = \frac{\text{Equity}_{t,i}}{\text{Total Assets}_{t,i}} \quad [12] \tag{7}$$

Equation (7) defines the leverage ratio where equity is defined in Equation (5) and total assets are the average total assets of all reporting financial institutions at time (*t*) for firm size (*i*). After calculation, $LEV_{t,i}$ was seasonally adjusted with the Census X12 method. From this, firms are grouped in four different categories. LEV _FULL represents the robust sample, LEV_SM includes firms with average total assets between zero and one billion dollars, LEV_MED is composed of firms with average total assets between one billion and ten billion dollars, and LEV_LG represents firms with average total assets between ten billion and one trillion dollars.

In order to test whether firm performance has improved, I create a year dummy where REPEAL = 0 from 1990Q1 - 1999Q3 otherwise REPEAL = 1 between 1999Q4 - 2005Q4. The time period before the enactment of GLB is referenced when REPEAL equals zero. Subsequently, the repeal of Glass-Steagall is represented when REPEAL equals one. TREND accounts for evolving preferences and advances in technology. It assumes the value of one in the first quarter, two in the second. TREND2 is TREND squared. As per Diebold (2007), trend is what remains after the seasonal and cyclical components of time series are identified, and is the long term movement of effects that are not consistent with calendar events. Components of trend include but are not limited to growth, price inflation, and other general economic changes.

As suggested by the summary statistics, the average return on equity was the largest in small firms[13]. Conversely, the average leverage ratio was the largest in small firms, followed by

[11] For alternative approximations of risk refer to limitations and suggestions in Section VIII.
[12] Refer to Figure 2 for graphs of leverage.
[13] Refer to Tables 1 and 2 for summary statistics and variable definitions.

large firms, and then by medium. Although the data set includes observations past 1993, Mester (1997) reports that the average return on equity for investment banks was between 17.5% and 11% for commercial banks from 1990 to 1993, respectively, which is consistent with the results from the summary statistics.

VI. Data Analysis and Results

The above sections have presented the outline of the research in my study. In this study, Call Reports are averaged across all institution financial in nature to assess the impact of firm performance post Glass Steagall. The dummy variable REPEAL was created to measure the effect of deregulation in the financial services industry on firm performance. If statistically significant, this would suggest a break in firm performance. From this, recall the hypotheses tested. The first was as follows:

H1: Firm performance has improved post Glass-Steagall.

In my robust results estimation, the REPEAL dummy is positive, statistically and economically significant, which suggests there was an improvement in firm performance across the entire financial industry. In effect, results suggest that return on equity improved by 8.99% in GARCH estimation and 9.19% in EGARCH. LEV_FULL is positive in both models, which indicates firm performance will improve as assets are financed with equity. In GARCH and EGARCH estimation, a one-percent increase in assets financed with equity infers a 4.5% or 4.7% improvement in firm performance, respectively. Furthermore, TREND in GARCH estimation is negative but not economically significant. TREND2 in EGARCH is negative and not economically significant either. The AR(1) estimate in both models implies a positive shock in the first period and indicates firm performance was sensitive to news in the previous quarter. The standardized residuals[14] and squared residuals in the both models are all within the Bartlett band, which suggests the data is stationary[15]. Furthermore, the Durbin Watson statistic (DWS) [16] indicates no serial correlation in GARCH estimation although possible negative serial correlation may be present in EGARCH. The adjusted R-Squared value of 0.87 in both models is relatively high. Although both models appear to be an appropriate fit for the data, the possible serial correlation in the EGARCH model combined with higher Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) values in GARCH suggest that this data is most appropriately modeled with GARCH estimation[17].

The second hypothesis categorizes firms by size, and is accomplished by grouping average total assets. The second hypothesis tested is below:

H2. Firm size has affected performance post Glass-Steagall.

When financial institutions were grouped according to size, the REPEAL dummy was statistically and economically significant in all models estimated. GARCH and EGARCH models infer that firm performance regressed between 2.1% and 20.4%.

VI.I Small Firm Estimation Results

My results suggest that small firm performance deteriorated the most after the repeal of Glass-Steagall. REPEAL indicates that average return on equity decreased by 20.4% and 16.1% in GARCH and EGARCH estimation, respectively. Furthermore, the adjusted r-squared value was 0.77 and 0.79 in EGARCH. TREND was only excluded in GARCH estimation and exhibited a negative linear trend that was neither economically or statistically significant in EGARCH. The inclusion of TREND in EGARCH was done to fix issues with serial correlation.

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[14] Standardized residuals represent the fit of the ARMA equation and squared residuals represent the fit of either GARCH or EGARCH models.
[15] Refer to Figures 5-8 for graphs of the residuals.
[16] Refer to Table 7 for boundaries of the Durbin Watson Statistic.
[17] Refer to Figures 3 and 4 for the estimated fit.

DWS for both models is within the required boundaries and both residuals are within the required Bartlett bands[18]. The AR(1) estimate indicates positive return volatility and is sensitive to a one quarter lag in both models. Furthermore, LEV_SM parameter estimate is negative in both models and consistent with my hypothesis. In effect, a ten percent increase in assets financed with equity decreases its return by 7.1%.

Both models provide an adequate fit for the data. Although EGARCH estimation exhibits greater explanatory power and larger AIC and SIC values, it is not the better model. The GARCH model is more appropriate because all exogenous variables are statistically significant.

VI.II Medium Firm Estimation Results

The results from medium firm estimation imply performance was least affected in the sized samples. REPEAL indicates that return on equity decreased by 5.2% and 2.1% in GARCH and EGARCH estimation. GARCH estimation infers that TREND is positive and TREND2 is negative. Although both variables are statistically significant they attribute little economic significance. TREND2 in EGARCH estimation is also negative and has little economic significance. Furthermore, LEV_MED is negative in both models and suggest a ten percent increase in assets financed with equity will decrease returns by 2.6% in both models. Finally, the AR(1) estimate in both models suggests a positive shock from the previous quarter on return volatility. Both standardized and squared residuals are within the required Bartlett band.

Appropriate model selection in the medium sized sample is much clear. The adjusted R-Squared value of 0.67 in EGARCH indicates better explanatory power compared to 0.56 in GARCH. AIC and SIC values are also larger in the EGARCH model, and DWS suggests possible negative serial correlation in GARCH estimation, but none in EGARCH. Therefore, I conclude that EGARCH is a more appropriate fit for the medium firm data.

[18] Refer to Table 7 for boundary conditions of Durbin Watson Test Statistic.

VI.III Large Firm Estimation Results

Contrary to my hypothesis, the REPEAL dummy suggests that large firm performance has not improved. Return on equity in large firms decreased by 16.6% and 9.7% in GARCH and EGARCH estimation, respectively. A time trend component is only used in EGARCH estimation as TREND2 is negative and statistically significant, but not economically. LEV_LG was significant in both models and the predicted coefficients barely changed between the two. Results imply that a ten percent increase in assets financed with equity will decrease returns by 6.5% . The AR(1) estimate in GARCH models infers a positive shock from two previous quarters while EGARCH suggests a positive shock from the previous quarter.

Similar to the medium firm models, the adjusted r-squared is better in EGARCH than GARCH at 0.55 and 0.49, respectively. Serial correlation is not a factor in either model as the DWS value is 1.74 in both. Furthermore, standardized residuals and squared residuals are within the required Bartlett band. AIC and SIC values are larger in EGARCH estimation which suggests a better fit of the data. From this, I conclude that the EGARCH model is a more appropriate fit of large firm data.

<u>VII. Conclusion</u>

This study examined the impact of financial firm performance after the repeal of Glass-Steagall. In order to encapsulate the impact of mergers that stemmed from GLB, all financial institutions, regardless of length of existence were utilized in the composition of this data set. GARCH and EGARCH estimation techniques were utilized and compared to capture the volatility of returns. I hypothesized that firm performance would improve after the repeal of

Glass-Steagall, and that firm size would dictate whether it improved or not. The results of my study indicate the appropriate fit for the data was split between GARCH and EGARCH models.

Robust sample estimation verified the findings of Hassan, Lai, and Mamum (2004) in that firm performance did improve. Although performance did improve, risk did not contribute to an improvement in returns for the whole financial industry. In effect, assets financed with equity rather than debt increased returns, which is contrary to what I had predicted. This could be possible because the sample period before GLB was much larger than after, contributing a bias in the effect of risk as firms had less options to finance assets with before the repeal of Glass-Steagall.

Results suggested that when firm size was considered performance actually deteriorated. This contradicts prior research of Hassan, Lai, and Mamum (2004) and my hypotheses. Although this contrasts with my hypothesis, there is a reasonable explanation. If banks took more risk, or financed assets with debt versus equity, the return on equity could decrease. Because of this, the measurement of firm performance may not be entirely accurate and cannot be used to definitively assess the actual impact of the repeal of Glass-Steagall.

Results from small firm performance inferred they were negatively impacted the most when assets were financed with equity rather than debt. This makes sense as small firms have fewer resources than larger firms to generate returns, and in effect, must explore other options. The explanatory power of both models was the best in small firm estimation, suggesting performance is mostly affected by the amount of risk those firms take. Subsequently, medium firms had the second best explanatory power and large firms had the worst. This implies large firm performance is impacted by more than just its risk preference, which is intuitive as they have larger economies of scales and more options to finance assets.

Firm performance across the entire industry, small firms, and medium firms was affected by a shock from one quarter before hand. Contrarily, large firm performance was affected by shocks two quarters beforehand. This infers that large firms are slower than small and medium firms to adjust to changes within the market.

In conclusion, the results of my study are inconclusive as to whether firm performance has actually improved. Alternative measures of firm performance should be used to better analyze the effects of the repeal of Glass-Steagall. Although the results of my study are contradictory when comparing the robust sample to the sized samples, some policy implications could be derived. Due to the unique nature of banks, it is difficult to suggest future policy from the robust model. To correct for this, one could model similar structured banks by size and this could give a better analysis towards future policy suggestions. Further supplementation over the use of the sized bank modeling is that the deregulation could have contributed to the start of the financial collapse. This is further supplanted by my estimation results as I did see firm performance worsen after the repeal of Glass-Steagall.

VIII. Limitations of Study and Suggestions for Future Research

One of the difficulties of this study is taking the average for all financial institutions for a given time period. By averaging the data, outliers have a much larger impact on the calculated variables. For instance, with GLB, companies such as J.P. Morgan Chase have such larger economies of scale and may factor more significantly into the computation of these variables. This could explain why without any regressors ROE is estimated to be 0.5% higher than the historical average. Although this is an issue, it is essential to include every firm whether they have been in existence for the entirety of the data set.

Another issue of this study is the lack of control variables for firm performance. This study focuses just on risk, but other pertinent variables such as location, per capita personal income, and other exogenous variables may impact actual firm performance. The risk variable could also be better represented in future studies as the use leverage suggests a firm's preference to debt or equity. This paper assumes that increased opportunities for investment after the deregulation led banks to take more risk, or finance with more debt. This may not necessarily be the case especially if a firm is already overleveraged as they may finance with more equity in order to get back to their optimal capital structure. Subsequently, the abundance of literature on optimal capital structure could be used to better model firm performance, and in effect create a better measure of risk.

Previous studies have analyzed firm performance on a firm specific level, or excluded financial institutions that have not been existence over the entire course of the study. This could cause bias in estimation, but including these variables does pose a problem. Previously, data has been collected by S&P 500 companies and allowed a more approximate estimate of debt or equity issuance, which would capture risk better than leverage. However, this data is not inclusive of all firms. As such, accounting measures are used in this study. For instance, the use of accounting leverage. This may present an issue as the equity on a firm's balance sheet could include equity from the previous year, five years ago, etc. and is not the actual equity issuance for the respective year. It could be possible to derive debt and equity issuance through the Call Reports.

Finally, comparisons across firm sizes and the full industry cannot be conclusively measured. This is because the same exogenous variables are not included across the model. The data was adjusted to correct for serial correlation, and to allow a correct interpretation of the specific model in question. By not adjusting the impact of trend based on each sample, it was not possible for me to eliminate serial correlation in all the models. Consequently, the different samples cannot be accurately compared or contrasted. The models I presented in my paper are forecastable, but not comparable.

Future research could include more explanatory variables, alternative measures of firm performance (e.g. return on assets, profit efficiency, Tobin's Q), more appropriate measures of risk, advanced estimation techniques such as ARIMA or more groups of firms to better capture the qualities of different firm sizes.

IX. Appendices

Figure 1
Return on Equity Seasonally Adjusted

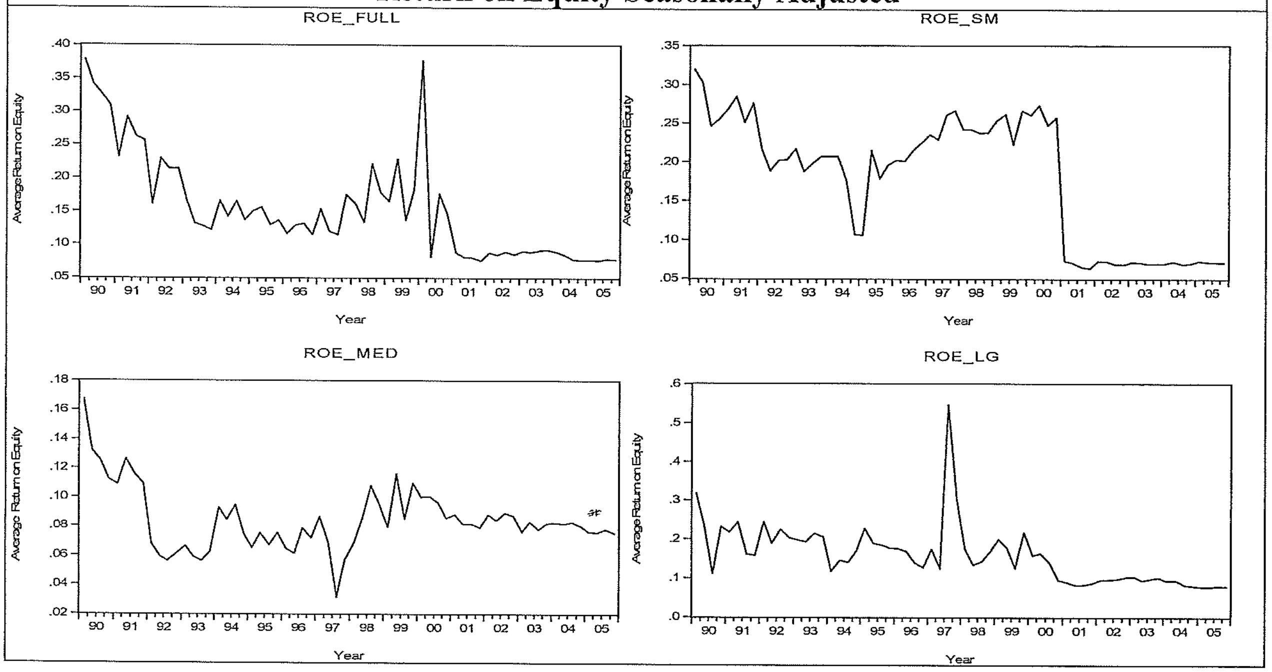

Figure 2
Leverage Seasonally Adjusted

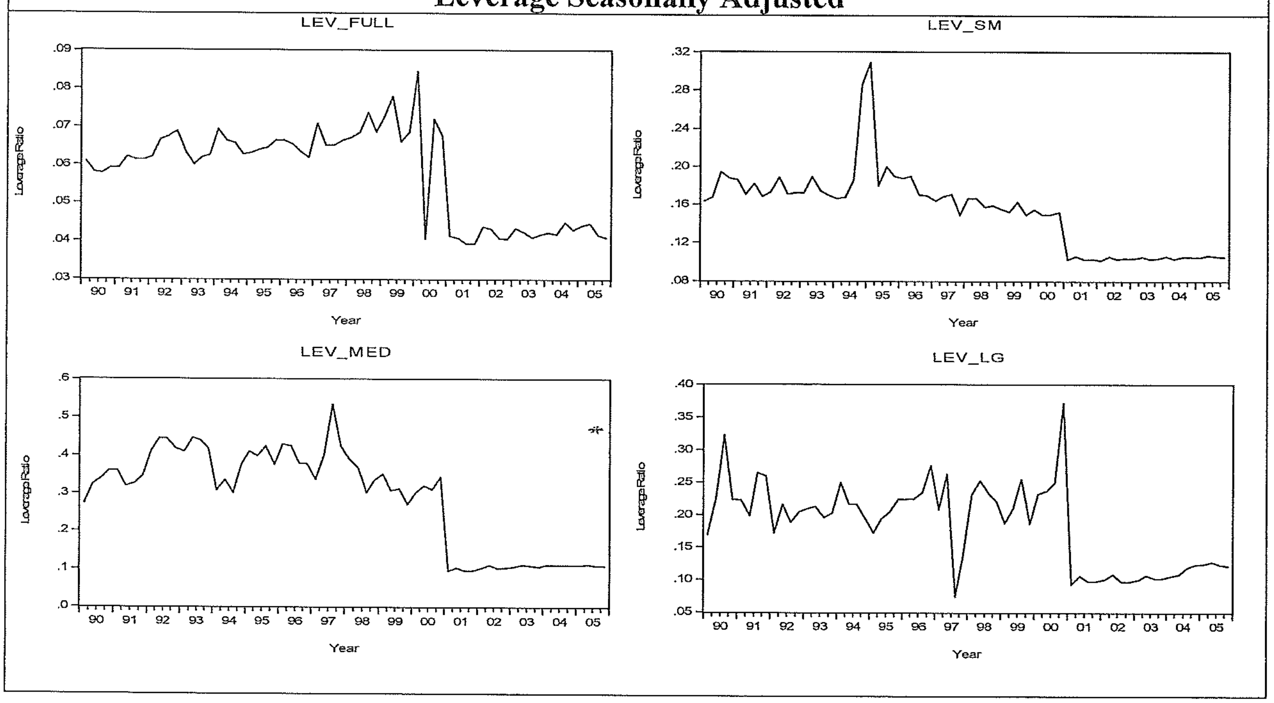

Figure 3
GARCH Estimation Fit

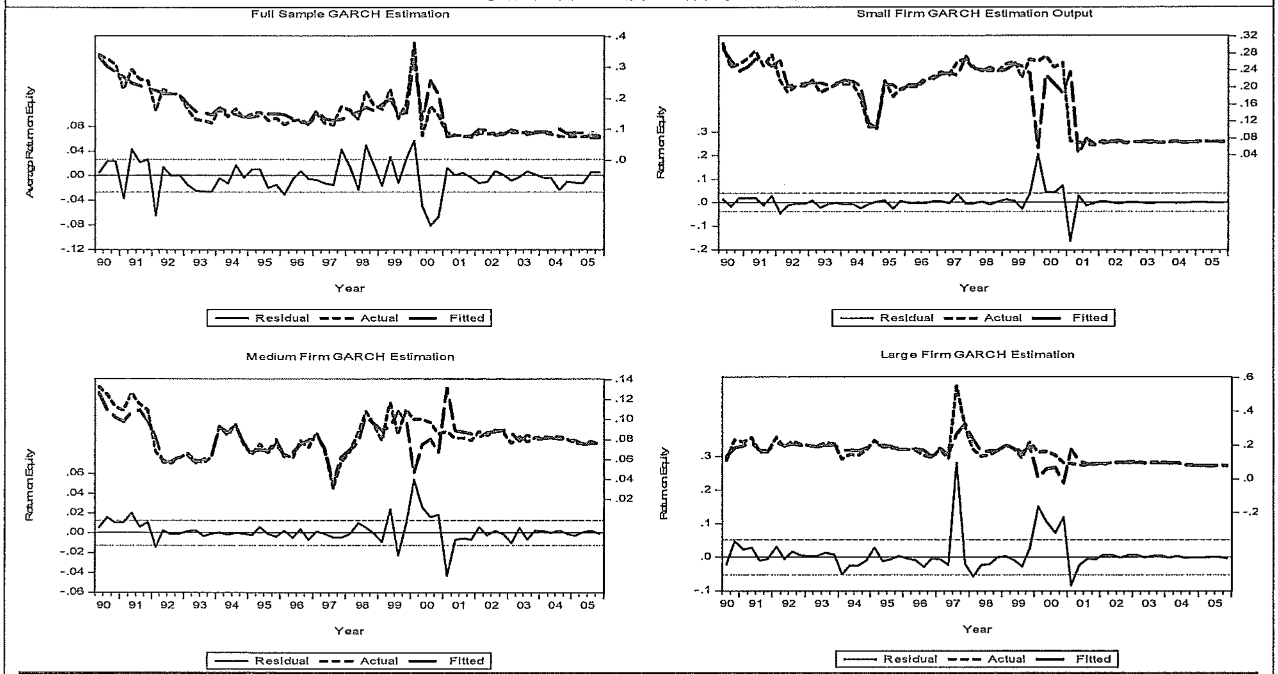

Figure 4
EGARCH Estimation Fit

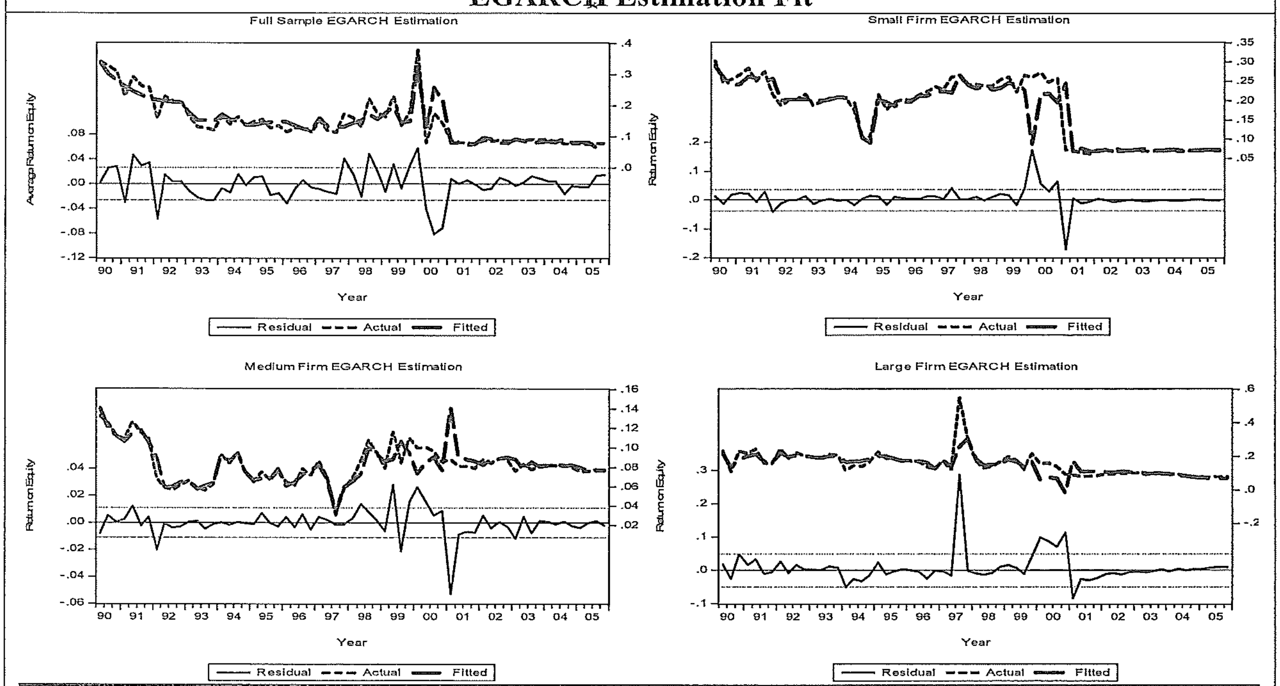

Figure 5
GARCH Residuals

Full Sample

	AC	PAC	Q-Stat	Prob
1	0.045	0.045	0.1324	
2	-0.131	-0.134	1.2904	
3	0.001	0.014	1.2904	0.256
4	-0.064	-0.084	1.5740	0.455
5	0.143	0.157	3.0131	0.390
6	0.046	0.008	3.1619	0.531
7	-0.155	-0.120	4.9110	0.427
8	0.004	0.019	4.9121	0.555
9	0.058	0.044	5.1683	0.639
10	-0.125	-0.149	6.3712	0.606
11	0.006	0.008	6.3737	0.702
12	-0.160	-0.170	8.4283	0.587
13	0.010	0.057	8.4369	0.674
14	0.085	-0.019	9.0412	0.699
15	-0.066	-0.023	9.4117	0.741
16	0.083	0.106	10.017	0.761
17	-0.113	-0.147	11.154	0.742
18	-0.050	0.007	11.379	0.786
19	0.116	0.047	12.637	0.760
20	0.005	-0.010	12.639	0.813
21	-0.162	-0.169	15.201	0.710
22	-0.185	-0.239	18.629	0.546
23	-0.148	-0.131	20.881	0.466
24	-0.005	-0.123	20.884	0.528
25	0.090	-0.008	21.757	0.535
26	-0.120	-0.079	23.346	0.499
27	-0.189	-0.251	27.430	0.335
28	0.064	0.073	27.913	0.363

Small Firms

	AC	PAC	Q-Stat	Prob
1	-0.050	-0.050	0.1683	
2	-0.173	-0.176	2.1771	
3	0.153	0.139	3.7784	0.052
4	0.026	0.009	3.8237	0.148
5	-0.025	0.028	3.8668	0.276
6	0.087	0.075	4.4078	0.354
7	0.069	0.074	4.7530	0.447
8	-0.124	-0.099	5.9005	0.434
9	0.172	0.176	8.1360	0.321
10	0.012	-0.041	8.1480	0.419
11	-0.125	-0.046	9.3742	0.403
12	0.137	0.089	10.875	0.367
13	0.029	-0.007	10.944	0.448
14	-0.333	-0.306	20.218	0.063
15	-0.068	-0.121	20.612	0.081
16	0.136	-0.007	22.216	0.074
17	-0.197	-0.145	25.654	0.042
18	-0.064	-0.064	26.033	0.054
19	-0.020	-0.113	26.069	0.073
20	-0.029	0.062	26.150	0.096
21	0.004	0.035	26.151	0.126
22	-0.113	-0.161	27.431	0.124
23	-0.060	0.045	27.801	0.146
24	-0.085	-0.064	28.555	0.158
25	0.014	-0.061	28.577	0.195
26	-0.022	0.075	28.629	0.234
27	-0.076	-0.035	29.292	0.252
28	0.025	-0.080	29.364	0.295

Medium Firms

	AC	PAC	Q-Stat	Prob
1	-0.093	-0.093	0.5659	
2	0.034	0.026	0.6433	0.423
3	0.132	0.139	1.8396	0.399
4	-0.133	-0.112	3.0585	0.383
5	0.070	0.041	3.4014	0.493
6	-0.012	-0.011	3.4110	0.637
7	0.004	0.031	3.4120	0.756
8	0.183	0.165	5.9116	0.550
9	-0.039	0.001	6.0280	0.644
10	-0.227	-0.271	10.012	0.350
11	0.019	-0.064	10.039	0.437
12	-0.191	-0.144	12.961	0.296
13	-0.019	-0.000	12.990	0.370
14	-0.063	-0.100	13.322	0.423
15	-0.193	-0.192	16.491	0.284
16	0.244	0.180	21.694	0.116
17	-0.105	0.007	22.674	0.123
18	-0.126	-0.059	24.120	0.116
19	0.096	0.029	24.980	0.125
20	-0.165	-0.121	27.572	0.092
21	0.059	0.036	27.908	0.112
22	0.094	0.087	28.785	0.119
23	-0.246	-0.261	34.971	0.039
24	0.074	-0.178	35.550	0.046
25	-0.017	-0.085	35.580	0.060
26	-0.193	-0.099	39.702	0.031
27	0.068	-0.064	40.230	0.037
28	0.017	0.055	40.265	0.048

Large Firms

	AC	PAC	Q-Stat	Prob
1	-0.030	-0.030	0.0585	
2	-0.170	-0.171	1.9746	
3	0.062	0.052	2.2330	0.135
4	-0.113	-0.144	3.1110	0.211
5	-0.015	-0.002	3.1277	0.372
6	0.062	0.013	3.4022	0.493
7	-0.110	-0.103	4.2816	0.510
8	-0.188	-0.205	6.8652	0.333
9	0.075	0.021	7.2908	0.399
10	0.293	0.270	13.833	0.086
11	-0.052	-0.031	14.040	0.121
12	-0.013	0.015	14.053	0.171
13	0.052	0.034	14.276	0.218
14	-0.300	-0.260	21.725	0.041
15	-0.049	-0.129	21.931	0.056
16	0.125	0.009	23.271	0.056
17	-0.095	0.012	24.063	0.064
18	-0.065	-0.031	24.440	0.080
19	-0.020	-0.124	24.477	0.107
20	-0.024	-0.100	24.532	0.138
21	0.085	0.020	25.224	0.153
22	0.176	0.075	28.295	0.103
23	-0.170	-0.200	31.232	0.070
24	-0.151	0.011	33.614	0.054
25	0.032	-0.025	33.721	0.069
26	0.048	-0.022	33.971	0.085
27	0.023	0.004	34.032	0.107
28	-0.032	-0.101	34.151	0.131

Figure 6
GARCH Squared Residuals

Full Sample

Lag	AC	PAC	Q-Stat	Prob
1	-0.067	-0.067	0.2945	
2	0.065	0.061	0.5792	
3	0.161	0.171	2.3540	0.125
4	-0.082	-0.066	2.8165	0.245
5	0.039	0.007	2.9249	0.403
6	0.263	0.261	7.9077	0.095
7	-0.082	-0.033	8.3988	0.136
8	0.005	-0.065	8.4007	0.210
9	0.156	0.107	10.252	0.175
10	0.003	0.090	10.253	0.248
11	-0.037	-0.092	10.360	0.322
12	-0.127	-0.278	11.649	0.309
13	-0.149	-0.134	13.455	0.265
14	-0.146	-0.121	15.247	0.228
15	-0.124	-0.218	16.550	0.221
16	0.046	0.024	16.731	0.271
17	-0.129	-0.021	18.211	0.252
18	0.007	0.108	18.216	0.311
19	-0.029	0.020	18.296	0.370
20	-0.150	-0.042	20.430	0.309
21	-0.099	-0.007	21.382	0.316
22	-0.060	-0.034	21.744	0.355
23	-0.070	0.036	22.242	0.386
24	-0.053	-0.091	22.534	0.428
25	0.006	-0.079	22.538	0.488
26	0.028	0.034	22.626	0.542
27	0.131	0.125	24.565	0.487
28	-0.076	-0.138	25.246	0.505

Small Firms

Lag	AC	PAC	Q-Stat	Prob
1	-0.150	-0.150	1.4904	
2	0.081	0.060	1.9287	
3	-0.114	-0.096	2.8127	0.094
4	0.156	0.126	4.4921	0.106
5	-0.114	-0.069	5.4155	0.144
6	0.184	0.145	7.8533	0.097
7	-0.164	-0.102	9.8306	0.080
8	0.193	0.133	12.617	0.050
9	-0.086	-0.004	13.174	0.068
10	0.369	0.325	23.716	0.003
11	-0.161	-0.044	25.758	0.002
12	0.097	0.016	26.513	0.003
13	-0.142	-0.060	28.167	0.003
14	0.115	-0.026	29.272	0.004
15	-0.151	-0.066	31.220	0.003
16	-0.048	-0.247	31.417	0.005
17	-0.054	0.057	31.676	0.007
18	0.096	-0.093	32.513	0.009
19	-0.127	-0.042	34.011	0.008
20	0.059	-0.137	34.342	0.011
21	-0.149	-0.057	36.514	0.009
22	0.029	-0.033	36.599	0.013
23	-0.063	0.004	37.011	0.017
24	-0.019	-0.032	37.049	0.023
25	-0.096	-0.002	38.037	0.025
26	-0.083	-0.033	38.796	0.029
27	-0.041	-0.042	38.987	0.037
28	-0.033	-0.065	39.118	0.048

Medium Firms

Lag	AC	PAC	Q-Stat	Prob
1	-0.063	-0.063	0.2617	
2	-0.086	-0.090	0.7531	0.386
3	0.251	0.242	5.0563	0.080
4	0.271	0.314	10.155	0.017
5	-0.189	-0.120	12.666	0.013
6	-0.008	-0.078	12.671	0.027
7	0.193	0.035	15.391	0.017
8	-0.043	-0.032	15.525	0.030
9	-0.148	-0.053	17.183	0.028
10	-0.017	-0.116	17.206	0.046
11	-0.129	-0.249	18.526	0.047
12	0.197	0.341	21.638	0.027
13	-0.043	0.124	21.788	0.040
14	-0.110	-0.064	22.794	0.044
15	0.102	0.045	23.678	0.050
16	0.088	-0.103	24.352	0.059
17	-0.084	0.061	24.982	0.070
18	-0.182	-0.183	28.003	0.045
19	0.197	-0.065	31.631	0.024
20	-0.112	-0.161	32.817	0.025
21	-0.154	0.030	35.135	0.019
22	-0.120	-0.137	36.567	0.019
23	-0.055	-0.080	36.875	0.024
24	-0.173	-0.161	40.028	0.015
25	-0.044	0.102	40.235	0.020
26	-0.126	-0.004	42.001	0.018
27	-0.060	-0.093	42.408	0.022
28	-0.063	-0.084	42.870	0.027

Large Firms

Lag	AC	PAC	Q-Stat	Prob
1	-0.026	-0.026	0.0448	
2	0.012	0.011	0.0539	
3	-0.070	-0.070	0.3858	0.535
4	-0.013	-0.017	0.3972	0.820
5	-0.070	-0.070	0.7404	0.864
6	-0.015	-0.024	0.7562	0.944
7	-0.019	-0.021	0.7810	0.978
8	0.019	0.008	0.8067	0.992
9	-0.082	-0.088	1.3159	0.988
10	0.179	0.169	3.7515	0.879
11	-0.060	-0.056	4.0290	0.909
12	-0.071	-0.092	4.4252	0.926
13	-0.057	-0.039	4.6927	0.945
14	0.216	0.216	8.5477	0.741
15	-0.070	-0.067	8.9591	0.776
16	0.062	0.048	9.2959	0.812
17	-0.061	-0.045	9.6265	0.843
18	-0.073	-0.097	10.102	0.861
19	-0.094	-0.049	10.911	0.861
20	-0.030	-0.068	10.998	0.894
21	-0.019	-0.022	11.032	0.923
22	0.093	0.104	11.886	0.920
23	-0.068	-0.053	12.353	0.930
24	0.044	-0.085	12.556	0.945
25	-0.062	-0.016	12.964	0.953
26	-0.045	-0.058	13.189	0.963
27	-0.043	-0.029	13.394	0.971
28	-0.073	-0.115	14.014	0.973

Figure 7
EGARCH Residuals

Full Sample

Lag	AC	PAC	Q-Stat	Prob
1	0.128	0.128	1.0807	
2	-0.086	-0.104	1.5806	
3	0.033	0.060	1.6529	0.199
4	-0.058	-0.083	1.8889	0.389
5	0.032	0.064	1.9624	0.580
6	0.032	0.001	2.0371	0.729
7	-0.137	-0.131	3.4140	0.636
8	-0.108	-0.077	4.2852	0.638
9	0.006	0.009	4.2879	0.746
10	-0.124	-0.139	5.4846	0.705
11	-0.081	-0.057	5.9961	0.740
12	-0.137	-0.164	7.5118	0.676
13	0.025	0.084	7.5620	0.752
14	0.073	-0.004	8.0071	0.785
15	0.023	0.014	8.0522	0.840
16	0.139	0.135	9.7430	0.781
17	-0.048	-0.107	9.9515	0.823
18	-0.014	0.012	9.9696	0.868
19	0.095	0.022	10.815	0.866
20	0.023	-0.008	10.865	0.900
21	-0.188	-0.213	14.318	0.765
22	-0.142	-0.157	16.346	0.695
23	-0.084	-0.062	17.070	0.707
24	-0.082	-0.105	17.784	0.719
25	0.044	0.021	17.994	0.758
26	-0.083	-0.064	18.757	0.765
27	-0.177	-0.161	22.329	0.617
28	0.104	0.136	23.587	0.600

Small Firms

Lag	AC	PAC	Q-Stat	Prob
1	0.090	0.090	0.5340	
2	0.018	0.010	0.5568	
3	0.213	0.212	3.6622	0.056
4	0.142	0.110	5.0568	0.080
5	0.014	-0.008	5.0697	0.167
6	0.017	-0.030	5.0900	0.278
7	0.076	0.026	5.5144	0.356
8	0.122	0.105	6.6136	0.358
9	0.234	0.241	10.777	0.149
10	0.015	-0.031	10.793	0.214
11	-0.038	-0.109	10.908	0.282
12	0.064	-0.060	11.236	0.339
13	0.066	0.028	11.591	0.395
14	-0.171	-0.146	14.049	0.298
15	-0.089	-0.070	14.719	0.325
16	0.041	-0.009	14.867	0.387
17	-0.127	-0.145	16.311	0.362
18	-0.092	-0.071	17.079	0.381
19	-0.115	-0.103	18.304	0.370
20	0.083	0.182	18.958	0.394
21	-0.116	-0.083	20.273	0.378
22	-0.155	-0.099	22.669	0.305
23	-0.075	-0.019	23.250	0.331
24	-0.081	-0.015	23.934	0.351
25	-0.058	0.034	24.297	0.388
26	-0.046	0.103	24.534	0.431
27	-0.050	0.047	24.818	0.473
28	0.002	0.013	24.819	0.529

Medium Firms

Lag	AC	PAC	Q-Stat	Prob
1	-0.120	-0.120	0.9496	
2	0.195	0.183	3.4892	0.062
3	-0.115	-0.077	4.3862	0.112
4	-0.136	-0.200	5.6717	0.129
5	0.053	0.063	5.8676	0.209
6	0.041	0.119	5.9857	0.308
7	0.031	-0.018	6.0541	0.417
8	0.111	0.070	6.9656	0.432
9	0.090	0.160	7.5802	0.476
10	-0.117	-0.132	8.6328	0.472
11	0.011	-0.059	8.6426	0.566
12	-0.234	-0.143	13.030	0.291
13	0.102	0.083	13.888	0.308
14	-0.033	-0.013	13.980	0.375
15	0.043	-0.049	14.135	0.440
16	0.031	0.010	14.217	0.509
17	-0.050	-0.012	14.440	0.566
18	-0.212	-0.260	18.532	0.356
19	0.077	0.100	19.080	0.387
20	-0.188	-0.049	22.457	0.262
21	0.097	-0.012	23.380	0.271
22	0.094	0.073	24.259	0.281
23	-0.178	-0.166	27.492	0.193
24	0.019	-0.134	27.530	0.234
25	-0.171	-0.034	30.679	0.163
26	-0.066	-0.047	31.164	0.184
27	0.007	-0.007	31.169	0.222
28	0.075	0.080	31.821	0.239

Large Firms

Lag	AC	PAC	Q-Stat	Prob
1	0.058	0.058	0.2225	
2	0.000	-0.003	0.2225	0.637
3	0.111	0.111	1.0564	0.590
4	0.035	0.022	1.1391	0.768
5	-0.016	-0.018	1.1571	0.885
6	0.091	0.083	1.7559	0.882
7	-0.026	-0.044	1.8062	0.937
8	-0.178	-0.174	4.1747	0.759
9	0.086	0.093	4.7337	0.786
10	-0.050	-0.064	4.9251	0.841
11	-0.209	-0.173	8.3512	0.595
12	-0.121	-0.119	9.5185	0.574
13	-0.075	-0.062	9.9771	0.618
14	-0.286	-0.241	16.810	0.208
15	-0.159	-0.164	18.956	0.167
16	0.078	0.086	19.488	0.192
17	-0.076	0.003	20.007	0.220
18	-0.089	-0.100	20.721	0.239
19	0.018	-0.037	20.752	0.292
20	0.069	0.123	21.208	0.325
21	-0.044	-0.066	21.394	0.374
22	0.202	0.088	25.480	0.227
23	-0.022	-0.069	25.529	0.272
24	-0.131	-0.149	27.327	0.242
25	0.097	-0.088	28.334	0.246
26	0.028	-0.142	28.418	0.289
27	0.155	0.184	31.143	0.223
28	0.031	-0.090	31.258	0.261

Figure 8
EGARCH Squared Residuals

Full Sample

Lag	AC	PAC	Q-Stat	Prob
1	-0.038	-0.038	0.0966	
2	0.056	0.054	0.3035	
3	0.267	0.272	5.1698	0.023
4	-0.155	-0.146	6.8462	0.033
5	0.027	-0.017	6.8965	0.075
6	0.171	0.133	8.9974	0.061
7	-0.148	-0.073	10.591	0.060
8	0.105	0.060	11.413	0.076
9	0.048	-0.005	11.585	0.115
10	-0.045	0.042	11.741	0.163
11	0.002	-0.082	11.741	0.228
12	-0.109	-0.134	12.690	0.242
13	-0.178	-0.155	15.280	0.170
14	-0.169	-0.205	17.672	0.126
15	-0.149	-0.106	19.555	0.107
16	0.043	0.117	19.713	0.139
17	-0.108	-0.043	20.759	0.145
18	-0.006	0.014	20.762	0.188
19	-0.083	-0.133	21.407	0.209
20	-0.079	0.007	21.997	0.232
21	-0.128	-0.150	23.587	0.212
22	-0.088	-0.076	24.359	0.227
23	-0.072	-0.007	24.885	0.252
24	-0.006	0.011	24.889	0.302
25	-0.074	-0.098	25.484	0.326
26	0.065	-0.035	25.950	0.356
27	0.077	0.041	26.625	0.375
28	-0.052	-0.107	26.943	0.412

Small Firms

Lag	AC	PAC	Q-Stat	Prob
1	0.102	0.102	0.6859	
2	-0.180	-0.192	2.8633	
3	-0.119	-0.082	3.8336	0.050
4	0.129	0.124	4.9887	0.083
5	0.081	0.019	5.4511	0.142
6	-0.081	-0.065	5.9181	0.205
7	-0.118	-0.064	6.9394	0.225
8	-0.062	-0.074	7.2232	0.301
9	0.063	0.025	7.5229	0.377
10	0.086	0.059	8.0932	0.424
11	-0.048	-0.042	8.2779	0.506
12	-0.090	-0.039	8.9304	0.539
13	-0.198	-0.217	12.126	0.354
14	0.082	0.070	12.686	0.392
15	-0.038	-0.141	12.811	0.463
16	-0.099	-0.079	13.669	0.475
17	-0.119	-0.067	14.927	0.457
18	0.054	0.016	15.196	0.510
19	0.053	-0.045	15.458	0.563
20	0.050	0.045	15.693	0.614
21	0.089	0.106	16.472	0.626
22	-0.067	-0.094	16.915	0.658
23	-0.144	-0.141	19.051	0.582
24	0.003	-0.027	19.052	0.642
25	-0.048	-0.159	19.298	0.684
26	0.011	-0.024	19.310	0.735
27	0.145	0.235	21.696	0.653
28	0.100	0.004	22.861	0.641

Medium Firms

Lag	AC	PAC	Q-Stat	Prob
1	-0.144	-0.144	1.3720	
2	-0.088	-0.111	1.8912	0.169
3	0.242	0.219	5.8748	0.053
4	0.020	0.084	5.9019	0.116
5	0.009	0.067	5.9075	0.206
6	-0.061	-0.106	6.1765	0.289
7	0.208	0.181	9.3480	0.155
8	-0.030	-0.008	9.4161	0.224
9	-0.178	-0.134	11.809	0.160
10	0.010	-0.144	11.817	0.224
11	0.119	0.100	12.932	0.228
12	-0.112	-0.036	13.931	0.237
13	0.023	0.094	13.974	0.302
14	-0.156	-0.284	16.012	0.248
15	0.138	0.177	17.647	0.223
16	0.040	0.076	17.784	0.274
17	-0.155	0.029	19.911	0.224
18	0.041	-0.210	20.067	0.271
19	-0.131	-0.162	21.671	0.247
20	-0.084	-0.136	22.347	0.267
21	-0.192	-0.117	25.923	0.168
22	0.080	-0.007	26.561	0.186
23	-0.022	-0.053	26.609	0.226
24	-0.250	-0.161	33.170	0.078
25	-0.047	-0.023	33.411	0.096
26	0.065	0.036	33.875	0.111
27	-0.131	-0.053	35.830	0.095
28	-0.023	-0.041	35.893	0.118

Large Firms

Lag	AC	PAC	Q-Stat	Prob
1	-0.071	-0.071	0.3345	
2	0.009	0.004	0.3403	0.560
3	-0.035	-0.034	0.4238	0.809
4	0.004	-0.001	0.4248	0.935
5	-0.143	-0.143	1.8643	0.761
6	0.230	0.214	5.6535	0.341
7	-0.159	-0.144	7.5062	0.277
8	-0.096	-0.125	8.1900	0.316
9	0.066	0.081	8.5169	0.385
10	0.011	-0.013	8.5264	0.482
11	0.011	0.065	8.5357	0.577
12	0.046	-0.041	8.7022	0.649
13	-0.012	0.028	8.7132	0.727
14	0.011	0.067	8.7225	0.794
15	0.068	0.004	9.1159	0.824
16	0.215	0.271	13.156	0.590
17	-0.086	-0.096	13.818	0.612
18	-0.103	-0.115	14.777	0.612
19	-0.108	-0.082	15.854	0.603
20	-0.074	-0.119	16.381	0.632
21	-0.001	0.076	16.381	0.693
22	0.093	-0.039	17.247	0.696
23	-0.093	-0.018	18.140	0.698
24	0.010	0.061	18.150	0.749
25	0.086	0.011	18.944	0.755
26	0.046	0.093	19.180	0.788
27	-0.043	-0.129	19.386	0.820
28	0.048	0.035	19.660	0.845

TABLE 1

Summary Statistics							
Variable	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev.**	**Skewness**	**Kurtosis**
ROE_FULL	0.1538	0.1348	0.3782	0.0756	0.0775	1.2731	4.0264
ROE_SM	0.1788	0.2047	0.3191	0.0631	0.0819	-0.3282	1.5629
ROE_MED	0.0843	0.0816	0.1674	0.0314	0.0217	1.0299	5.4332
ROE_LG	0.1586	0.1523	0.5460	0.0769	0.0759	2.2469	11.8427
LEV_FULL	0.1840	0.1889	0.2896	0.0937	0.0636	0.0669	1.6840
LEV_SM	0.1538	0.1637	0.3093	0.1012	0.0419	0.9150	5.3994
LEV_MED	0.2863	0.3246	0.5338	0.0946	0.1316	-0.4057	1.6948
LEV_LG	0.1847	0.2006	0.3718	0.0740	0.064	0.1531	2.904
Number of observations is 64.							

TABLE 2

Variable Definitions, Summary Statistics, and Data Sources

Variable	**Definition**	**Source**
ROE_FULL	Average return on equity for all financial institutions, years 1990Q1-2005Q4, adjusted for seasonality.	Call Reports
ROE_SM	Average return on equity for firms with assets between 0-$1 million, adjusted for seasonality.	Call Reports
ROE_MED	Average return on equity for firms with assets between $1 million-$10 million adjusted for seasonality.	Call Reports
ROE_LG	Average return on equity for firms with assets between $10 million-$100 million adjusted for seasonality.	Call Reports
LEV_FULL	Average leverage ratio for all financial institutions, years 1990Q1-2005Q4, adjusted for seasonality.	Call Reports
LEV_SM	Average leverage ratio for firms with assets between 0-$1 million adjusted for seasonality.	Call Reports
LEV_MED	Average leverage ratio for firms with assets between $1 million-$10 million, adjusted for seasonality.	Call Reports
LEV_LG	Average leverage ratio for firms with assets between $10 million-$100 million adjusted for seasonality.	Call Reports
REPEAL	Dummy variable; 0 when data is between 1990Q1-1999Q3 and 1 when data is between 1999Q4-2005Q4.	N/A
TREND	Linear trend variable that accounts for evolving preferences, technology, and other shocks not associated with actual calendar events.	N/A
TREND2	Trend squared.	N/A

TABLE 3						
Robust Sample Dependent Variable = ROE_FULL						
GARCH(1,1)				EGARCH(1,1)		
Variable	Parameter Estimate	Z-Statistic	P-Value	Parameter Estimate	Z-Statistic	P-Value
Intercept	-0.12174	-4.4857	0	-0.14934	-5.56663	0
TREND	-0.00115	-2.25426	0.0242	-	-	-
TREND2	-	-	-	-1.77E-05	-2.87881	0.0040
LEV_FULL	4.55013	15.37852	0	4.66419	5.93896	0
REPEAL	0.08997	7.74437	0	0.09150	5.93896	0
AR(1)	0.83382	33.13254	0	0.83187	38.02342	0
MA(1)	-0.57174	-7.04152	0	-0.64072	-6.81558	0
Adjusted R-Squared		0.86538		0.86683		
DW-Statistic		1.73155		1.60362		
AIC		-4.79055		-4.67022		
SIC		-4.48439		-4.33004		
Number of observations is 64.						

TABLE4						
Small Firm Sample Dependent Variable = ROE_SM						
GARCH(1,1)				EGARCH(1,1)		
Variable	Parameter Estimate	Z-Statistic	P-Value	Parameter Estimate	Z-Statistic	P-Value
Intercept	0.35104	56.42351	0	0.34584	24.5807	0
TREND	-	-	-	-0.0005	-1.1098	0.2671
LEV_SM	-0.70621	-19.50592	0	-0.7655	-35.123	0
REPEAL	-0.20441	-50.56667	0	-0.1605	-9.971	0
AR(1)	0.6825	13.19001	0	0.74042	12.1444	0
MA(1)	0.17388	3.64105	0.0003	0.04643	0.60699	0.5439
Adjusted R-Squared		0.76766		0.79179		
DW-Statistic		1.94606		1.7918		
AIC		-5.25535		-5.6807		
SIC		-4.9832		-5.3405		
Number of observations is 64.						

TABLE 5						
Medium Firm Sample Dependent Variable = ROE_MED						
	GARCH(1,1)			EGARCH(1,1)		
Variable	**Parameter Estimate**	**Z-Statistic**	**P-Value**	**Parameter Estimate**	**Z-Statistic**	**P-Value**
Intercept	0.16009	11.64824	0	0.18237	96.58981	0
TREND	0.00123	2.00355	0.0451	-	-	-
TREND2	-2.05E-05	-2.25866	0.0239	-1.32E-05	-8.74688	0
LEV2_MED	-0.26265	-14.70564	0	-0.26417	-66.41868	0
REPEAL	-0.05268	-7.14792	0	-0.02161	-4.93743	0
AR(1)	0.6387	8.61266	0	0.76309	35.47365	0
Adjusted R-Squared		0.56366		0.67547		
DW-Statistic		1.62854		2.04686		
AIC		-6.70847		-7.21686		
SIC		-6.40231		-6.91069		

Note: Number of observations is 64.

TABLE 6						
Large Firm Sample Dependent Variable = ROE_LG						
	GARCH(1,1)			EGARCH(1,1)		
Variable	**Parameter Estimate**	**Z-Statistic**	**P-Value**	**Parameter Estimate**	**Z-Statistic**	**P-Value**
Intercept	0.32741	38.09205	0	0.33433	44.3934	0
TREND2	-	-	-	-2.33E-05	-15.587	0
LEV_LG	-0.65939	-16.48967	0	-0.65302	-17.849	0
REPEAL	-0.16612	-37.75841	0	-0.09681	-19.228	0
AR(1)	-	-	-	0.2953	3.53233	0.0004
AR(2)	0.23611	5.93937	0	-	-	-
MA(1)	0.3397	5.3826	0	-	-	-
Adjusted R-Squared		0.49646		0.55268		
DW-Statistic		1.74129		1.74559		
AIC		-4.11492		-4.42483		
SIC		-3.84045		-4.11867		

Note: Number of observations is 64.

TABLE 7

Durbin Watson Boundary Conditions

Number of Exogenous Variables	Negative Serial Correlation	Possible Negative Serial Correlation	No Serial Correlation	Possible Positive Serial Correlation	Positive Serial Correlation
4	DW<1.44	1.44<DW<1.73	1.73<DW<2.27	2.27<DW<2.56	DW>2.56
5	DW<1.41	1.41<DW<1.77	1.77<DW<2.23	2.23<DW<2.59	DW>2.59
6	DW<1.37	1.37<DW<1.81	1.81<DW<2.19	2.19<DW<2.63	DW>2.63

****Note: Table describes boundary conditions when number of observations is between 60 and 80 at the 5% significance level.***

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