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An Event Study Analysis of American Bank Holding Company Equity Returns upon Basel III Announcement

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Claremont McKenna College

**An Event Study Analysis of American Bank Holding Company
Equity Returns upon Basel III Announcement**

submitted to

Professor Marc Weidenmier

by

Brian R. Delaney

for

Senior Thesis

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To my friends, thank you for the laughs and unbridled support.

To my family, thank you for everything.

Abstract

This study examines the trading activity of a large cross section of American bank holding companies upon various sub-events associated with the introduction of Basel III. An event study methodology was applied to various sub-composite portfolios, as determined by regulatory capitalization and leverage ratios. The results suggest that statically significant abnormal negative returns occurred on the announcement to negotiate due to heightened regulatory uncertainty, especially amongst the least capitalized and highest leveraged banks. However, this effect is complemented by statically significant positive returns upon the release of the initial guidelines. Reactions to subsequent events report to be less significant.

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I. Introduction

American Bank Holding Companies (BHC) were high volatility assets during the 2008 financial crisis—both in enterprise value and reputational credence. With the detrimental defaults of financial institution heavyweights such as Lehman Brothers and Washington Mutual, banking regulations clearly needed updated guidelines. In the wake of this crisis, both bankers and investors stood by for answers—ones that could not be addressed in the course of a day, a month, or even a year. The Basel Committee for Banking Supervision (BCBS) ignited a process to overhaul the legacy banking regulatory framework.

Regulators from member nations entered into negotiations that would incorporate competing domestic agendas, of which the United States presented a key tenant. The American banking landscape is varied, diverse, and vast. Although much of the focus of the financial crisis fixated on various “too big to fail” institutions, every institution now took on a high degree of regulatory risk. Investors were forced to scan the field of possible data and adjust valuations accordingly.

Our study examines five distinct sub-events associated with the unveiling of Basel III. The results suggest that the value of BHC’s declined following the announcement of new regulation. However, as the details of the regulations become known, investors realize the incoming competitive advantages of existing American regulatory stringency. Overall, banks appear to have benefitted from the reactions to Basel III.

II. Background

Institutional and Regulatory Background

In the wake of the 2008 financial crisis, the BCBS synthesized the economic disaster as to update necessary capitalization and liquidity requirements. The committee produced the single most “complete overhaul of U.S. bank capital standards since the U.S. adoption of Basel I in 1989” (Davis, Polk, & Wardell Visual Memo, 4). The banking accord strived to push regulatory framework in line with the relative risk of the global markets. Financial institutions’ enterprise values were directly affected by the ruling, with only certain excepted savings and loan holding companies and BHC’s not being strictly held to the guidelines.¹ This piece of regulation forever perverted the course of banking.

Basel III follows its original foundation of Basel I and its logical reorganization, Basel II. The construction and unveiling of lasting financial regulation cannot simply be released in the course of a single day, but rather the unfolding of the final rules is comprised of various major sub-events. **Table 1** chronicles these sub-events, but also provides insight into the publically available information for each corresponding date.² The sub-events chosen for this study fall in line with those used in previous case studies, for consistency (Wilf 2013, 13). These sub-events each prompted various degrees of equity valuation speculation as investors developed a deeper understanding for the direction of regulation. Accordingly, these “surprise” press releases unleashed mixed trading sentiment across the financial services landscape (Wilf 2013, 29-32). The BCBS operates with a veiled privacy

¹ Refer to the Davis Polk & Wardell Visual Memo for more information on those few banks not forced to comply with Basel III

² See http://www.bis.org/list/press_releases/index.htm for a complete list of Basel III press releases

in attempt to ensure a competitive banking marketplace (Zaring 1998, 287-290). The details of discussion topics are never publically discussed. Rather information is transmitted through press releases. The releases vary in their timing, as the BCBS has sometimes opted to release details the same day as deliberations or released information weeks after formal meetings have concluded.

The corresponding event-based trading rests in the uncertainty surrounding BCBS meetings. The economic significance of these events is predicated upon their result remaining fundamentally unknown. Hence, the fact that the BCBS participants actively negotiate on behalf of their constituents legitimizes their effects on the markets with a semi-strong or weak form of the efficient market hypothesis (Wilf 2013, 15).³ Sheila Bair, the US FDIC Chairman throughout the Basel III negotiations declared that the deliberations were decidedly fragmented in regards to the US banking landscape, as many of the largest financial interests found themselves in wildly varied capital and liquidity positions as a result of the residential credit crunch (Bair 2012, 257-272). Hence, the press releases should be considered an introduction of legitimate new public information, as opposed to the confirmation of previously accepted information.

Basel III's Impact

An essential component to this landmark regulation is its treatment of institutions with inequity—the capitalization guidelines will theoretically be calibrated with the perceived riskiness of an institution. Not all banks are regulated equally. Nor is it correct

³ Wilf posits that active negotiation is absent in G-20 summits, the content of which is widely preunderstood.

to suggest that Basel III's predecessors did not attempt to adjust for riskiness with respect to setting appropriate calibration levels of regulatory capital. Basel III would ideally bring financial institutions back aligned with the perceived riskiness of the global markets. Banks are assigned acceptable guidelines as dictated by their risk profile: asset composition, capitalization, consolidated asset value, systemic importance, etc. All of which, in some form, are considered when judging regulatory compliance.

Basel III overhauled the procedure for calculating risk-based capital ratios (RBCR). The basic components of any RBCR are as follows:

$$RBCR = \frac{\textit{Regulatory Capital}}{\textit{Risk - Weighted Assets}}$$

The new legislation, on the whole, requires higher minimum RBCR's, as well as incentivizes banks to maintain capital buffers in excess of minimum requirements to avoid capital distribution lockups, penalties, and suspension of executive bonuses (Davis, Polk, & Wardell Visual Memo, 21). It tightened the eligibility for adequate regulatory capital instruments, as well as adjusted the constitution of tangible common equity. One of the most significant developments of the deployment of Basel III for the recalculation of risk-weighted assets (RWA). The accord generally marked up the risk-weighted value of OTC derivatives, cleared derivatives, high volatility commercial real estate loans, certain home equity exposures, and the majority of securitizations. Accordingly, higher assigned RWA values will render higher degrees of regulatory capital held against it. As banks are forced to comply with the capital guidelines, available leverage and profitability instruments become constrained, and thus banks must idiosyncratically forge their own. (Davis, Polk, & Wardell Visual Memo, 20). The asset composition of respective banks will ultimately

play integral roles in the costs associated with current and future compliance. The exact effect of such will be discussed later in this paper.

Not all banking organizations are subject to the same guidelines. For example, banks satisfying any of the following criteria must adopt the advanced approach to capitalization: greater than \$250 billion of total consolidated assets, greater than \$10 billion of on-balance sheet foreign exposures, or elects to do so with federal banking regulatory approval. The advanced approach sets separate guidelines for calculating RWA's for those qualified banks. The equity-related regulatory transition between previous and the Basel III final guidelines is outlined in **Figure 1** (Davis, Polk, & Wardell Visual Memo, 7, 21). The new rules built upon the previously-established two-tier system. A four percent tier 1 equity ratio and a four percent tier 2 equity ratio for all banking institutions—a decidedly less elegant solution to financial and systemic risk management than its successor. The Basel III rule applies the globally-systemically important bank holding company surcharges to an internally determined list of banks with high enough counterparty risk to the global markets to warrant additional capital coverage. However, the Basel III final rule failed to outline the proposals for this additional surcharge, of which the final enforceability is more ambiguous. The common equity tier 1 countercyclical buffer only applies to banks adopting the advanced approach to risk-weighting and minimums are calibrated on a scaled for size and asset composition basis (Davis, Polk, & Wardell Visual Memo, 7, 20-21).

The Anatomy of Capital Ratios

Regulatory capitalization fails to protect against expected losses. It is precisely intended for the opposite—to safeguard the economy from experiencing unexpected

banking losses with contagion potential to not only destroy value within the financial institution space but in peripheral industries as well. Traditional balance sheet items prove helpful in determining the financing strategy of a bank. Yet, it is important to note the limitations of such measures as book value of shareholder's equity, as it fails to convey the solvency of the institution. The book value of shareholder's equity theoretically functions as a proxy for the firm's asset value to eclipse liabilities—hence the residual value of the firm. Narrowly defined, this can be solely constituted as retained earnings and common stock. Logically, there exist little nexus between total book equity and solvency, although the link is not entirely absent.

Regulatory capital attempts to disclose a financial institutions' economic health by providing more narrowly defined conceptions of capital—that which can be used to pay creditors in the event of insolvency. It highlights and manipulates relevant balance sheet items to create proxies from which investors may draw conclusions about the bank's financing strategy more transparently than possible using just basic EDGAR financial statements (Tarullo 2008, 265). Narrowly defined capital comprises Tier 1. It can be easily deployed to settle financial / cash obligations less ambiguously than its broader-defined counterpart, Tier 2 capital. One of Basel III's most impactful changes to the regulatory landscape is the call for additional capital tiers beyond the existing framework. As capital becomes increasingly narrowly defined, banks will be forced to adjust their financing strategies to comply with the ruling—a costly endeavor. However, the understanding that these costs be somewhat evenly distributed across the industry is misleading. Any given BHC's financing and business strategy will inevitably inform the firm's options for moving into compliance.

In addition to the imposition of narrowly-defined regulatory capital, Basel III reevaluated the means of calculating RWA's. These calculations discount or assign premiums to certain assets in an attempt to convey their operational capabilities in the event of insolvency, as well as the likelihood of experiencing unexpected losses (Tarullo 2008, 111). The safest of assets (cash, guaranteed loans, synthetically-protected credits, etc.) can be risk-weighted as low as 0%, while more risky assets (highly leveraged credits, high volatility real estate) can be held at 100%. As a result, banks would be forced to hold an equity position that scales upwards with risk—dampening the profitability magnification of leverage. Basel III would ultimately assign some asset (certain OTC derivatives, equity exposures, unsettled transactions) risk weights well in excess of 100%, often as high as 1250%—making the imposition of complementary equity holdings wildly costly (Davis, Polk, & Wardell, Risk Weights Tool). Hence, the current capitalization and asset composition of banks will be affected in ways that are completely dependent on the final rulings, and small changes in such rules will yield mixed results for seemingly similar US BHC's.

III. Literature Review

There exists a critical mass of literature which examines equity returns of financial institutions across global markets upon the announcement of Basel III and its sub-events. Several additional papers proved relevant to this paper's focus, as aspects of event studies chronicling equity returns for other financial regulatory fixtures, such as dividend and accounting policies, expounded some helpful analytical tools. Regardless of the focus, economists examined financial institution trading activity in attempt to highlight or dispel rumors of abnormal returns over a prudent time horizon.

Before we can examine Basel III's impact on equity returns, it is helpful to establish the sentiment surrounding the broader financial regulatory landscape throughout this tumultuous point in time. Nine major pieces of regulation forged the observable set of events for Shafer (2013). The study examined Dodd-Frank, the Volcker Rule, Vickers Commission rulings, and Basel III, amongst others. Equity returns and CDS spreads of the largest European and US BHC's were tested for abnormal returns, as compared against the market index—to which the results were mixed. The market responded most radically to structural reforms, such as the Volcker rule and the Vickers Regime, although these effects appear to dampen with wider trading windows, suggesting that pending financial regulation disruption in the market is minor (Shafer 2013, 26-31).

The events comprising the Basel III portion of the analysis also yielded mixed results. Basel III resulted in abnormal negative returns for US banks in regard to only a few

of the sub-events, yet did not produce abnormal returns for British, Swiss, and German banks. Most importantly, equity valuations slid for US banks on announcement of meetings, however saw no such change upon announcement of the new capital requirements. The European banks did not flinch at the formation and announcement of Basel III over 80 and 140 day trading windows, decisively longer than our study (Shafer 2013, 26-29).

Wilf (2013) adopted an alternative approach to determining the existence of abnormal returns for the largest US BHC's. En route, the study attempts to dispel rumors that banks kneaded the framework of Basel III in order to preserve firm value at the expense of global financial stability. Wilf accomplished this feat through comparing cumulative abnormal returns of each of the 45 largest US BHC's with a bespoke counterfactual index. She identified a portfolio of non-financial firms whose trading activities historically correlate with that of each specific financial firm. On aggregate, the net effect of Basel III yielded negative abnormal cumulative returns, though these returns failed to be consistent across all sub-events (Wilf 2013, 29-32). This study employed a larger trading window and focused on large-scale distributional effects of the regulation, as opposed to immediate investor reaction. This study failed to further breakdown the composition of the firms receiving the most robust abnormal returns, but rather questioned the credibility of the regulation, as speculators grew skeptical of the implementation of an international banking accord within a contentious domestic banking environment. Accordingly, Wilf discovered that investors deemed the regulatory framework as credible and affecting of bank equity value (Wilf 2013, 33).

In light of Wilf's recent discovery on behalf of US banks, Bruno (2014) examined Europe's bank equity returns throughout the formation of Basel III. Although this study employed a more traditional event study methodology, it unveiled negative cumulative abnormal returns in anticipation of regulatory triggers. Moreover, banks across Europe failed to react homogeneously, as banks considered core members of the Eurozone witnessed outsized returns as compared to their counterparts on the geopolitical outskirts (Bruno 2014, 22-25). In addition to geopolitical orientation, this study identified trends in liquidity and capitalization, as it became clear that more liquid banks saw larger abnormal negative returns as compared to less liquid banks. Yet, banks with higher tier 1 capital ratios saw larger negative cumulative returns than those less well capitalized (Bruno 2014, 29).

Some of the relevant literature focuses on accounting discretion of banks in the midst of the crisis. Huizinga and Laeven (2009) employed Tobin's q , a useful metric to measure discounts and premiums associated with banking assets. Let MV be the market value of the bank, while A_i be the accounting value of the asset i and let L_i be the accounting value of the liability i . As such, we can express the market value of the firm as below⁴:

$$MV = \sum v_i^a A_i - \sum v_i^l L_i$$

⁴ For the original exposition of Tobin's q , reference Tobin (1969)

where v_i^a is the market value of the asset i and v_i^l is the market value of the liability i .⁵

Thus, we may define q as the market value of equity of the bank plus the book value of all liabilities divided by book value of all assets as below:

$$q = \frac{MV + \sum L_i}{\sum A_i}$$

Basic substitution yields:

$$q = 1 - \sum d_i^a a_i + \sum d_i^l l_i$$

Where $d_i^a = 1 - v_i^a$, $d_i^l = 1 - v_i^l$, $a_i = \frac{A_i}{\sum A_i}$, and $l_i = \frac{L_i}{\sum A_i}$. Accordingly, d_i^a and d_i^l denote discounts implicit in the bank's equity pricing of the firm's underlying assets and liabilities relative to book value. Should the assets and liabilities be valued precisely at market value, $q = 1$. Any such perversion would imply that the market valuation of at least a single asset or liability differs from accounting value (Huizinga and Laevan 2009, 7-8).

⁵ DeYoung and Yon (2008) discuss that this measure ignores the fact that market value may be sensitive to the co-mingling of certain assets and liabilities (DeYoung and Yon 2008, 18-24)

IV. Hypothesis

Development

The inspiration for this study began in the summer of 2015, when I accepted a job as an investment banking summer analyst within a global investment bank's financing arm. That summer was spent learning the language of Basel III and regulatory networks. The contemporary salience of international banking accords appeals to my own interest in overlaying conjectural debate upon a quantitative inquiry.

This study attempts to erode the mystique behind a number of fundamental questions in regards to banking regulation. How did investors anticipate Basel III would affect firm value? Did investors consider the BCBS' measures enforceable, and would regulators punish American banks due to their contribution to the crisis? In what ways did the accord affect firm value differently across various American BHC profiles? Previous studies have examined these fundamental questions across the entire industry, however my time working as a practitioner made it evanescently clear that few banks operate similarly. However the question of how exactly they trade remained unclear. Capitalization presents just one of the many factors that influence future profitability, as well as investor sentiment towards such.

Notional Discussion on Regulatory Networks

Singer (2004) discusses the conditions under which international regulatory accords are implemented most harmoniously. The study posits that regulators often actively resist international regulatory cooperation. However, in times of heightened institutional pessimism regulators seek international harmonization as a means of quelling domestic political pressures to achieve stability. Should Singer's framework hold true in this context, the extreme political pressure would catalyze cooperation to create a regulatory landscape that both enables BCBS-elected countries to compete internationally, but also satisfies domestic interests. Should investors deem this achievement implementable, American BHC's (or some subset thereof) will benefit from a combination of reputational risk management and the rendering of a sustainable capital structure (Singer 2004, 531-533).

A critical component to understanding the conjectural debate of the origins of value within international regulation rests in the bifurcation between public and private goods.⁶ The international banking accord can be examined as the first movement of codified bank capital minimums as a global public goods provision in the form of providing private goods for US BHC's.⁷

The public goods perspective posits that international accords usher in an era of heightened financial stability while maintaining competitive advantage across countries (Kapstein 1989, 337-341). The appeal of financial stability to any regulator is intuitive.

⁶ Public good: non-rival, non-excludable. Private good: rival, excludable.

⁷ See Kapstein (1989) and Oatley and Nabors (1998) for a more complete explanation. These papers fixate on Basel I, however the same conceptual framework applies to Basel III.

Regulators prove their worth in balancing this imperative with domestic competitiveness. This tradeoff between profitability and stability has since been dubbed the “regulator’s dilemma” (Kapstein 1989, 323-324). Kapstein (1989) argues that cooperation amongst regulators on international accords dampens this predicament, as it theoretically increases financial stability while holding competitiveness relatively constant. As such, financial stability is rendered a public good.

Oatley and Nabors (1998) argue that adopting a private goods perspective suggests that heightened regulatory constraints increases the competitiveness of firms in countries with existing regulatory stringency. The introduction of international accords and their subsequent implementation forces countries with lower existing regulatory stringency to be held to a higher capitalization standard, with the inverse holding true for economic zones with existing capital rules closer in line to the introduced augmentation (Oatley and Nabors 1998, 36-37) . Hence, the accord could provide a private benefit to certain profiles of banks in disproportion to global competitors.

These competing views predict possible mixed results for US BHC’s. In the public goods case, Wilf argues that US bank firm value would be adversely affected due to compliance adjustment and operational repositioning costs (Wilf 2013, 7-11). The private goods case would benefit US banks, as their competitive advantage of existing regulatory stringency will be realized. The study performs lasso regressions on America’s largest banks to render that the competing effects yield a net negative effect on firm value. However, this strategy appears limiting in some regards. Projecting conclusions on the US banking industry using equity returns of only the largest banks fails to fully expound the

effect of the regulation. Absolutely useful, but Wilf's study strives to draw conclusions about the banking system with these banks as proxies, while our study hopes to draw conclusions using a cross section of the industry. With American BHC's bolstering varying existing capitalizations, the accord would affect banks asymmetrically—not just in market capitalization, but across RBCR's, risk-based leverage ratios, and others metrics with similar implications.

Due to Basel III's predecessors, the enforceability of the accord will likely not be challenged. Yet, the component documents of the rules are remarkably detailed, with the ultimate penalties being somewhat muddled beyond that of reputational risk (Davis, Polk, & Wardell Visual Memo, 21). The ruling forces investors to synthesize its contents, whether it be in analysis or in anticipation and adjust their conception of firm value accordingly. Hence, Basel III's granularity will likely affect US banks on the industry level, but perhaps more definitively according to their capitalization characteristics. This study strives to gauge investor sentiment in the extreme short term.

The Hypothesis

This study will test the existence of abnormal returns for various portfolios of US BHC's equity returns. These abnormal returns will be considered a reality when a statistically significant residual (either positive or negative) value is discovered in excess of the expected trading path for that day. Hence, a generalized least squares (GLS) augmented fixed effects estimator will be employed to detect abnormal returns.

The regression analysis will utilize binary dummy variables to the effect that the corresponding constant will encapsulate pricing movements for banks in the examined

portfolio. Statistically significant positive constants would suggest banks in that portfolio have experienced firm value appreciation due to the corresponding events. The regulatory effects of a private good operates as the prominent distributional agent. The inverse holds for negative returns, as the public good effect has influenced investors to discount firm value. It is understood that the various sub-events will not yield similar results, as the volatile 15 months en route to the final ruling inevitably fostered competing viewpoints about the overall health of the banking sector (Dow 2010, 1-5).

In light of the available information set and previous literature, the following forms the fundamental platform of hypothesis the empirical analysis will address to demonstrate the ways Basel III affected firms with various capitalization characteristics.

Hypothesis 1: The cumulative effect of the accord will ultimately be accretive to firm value.

Hypothesis 2: The initial investor reaction will negatively affect firm value due to regulatory uncertainty or expected punitive, noncompetitive capital measures.

Hypothesis 3: The limited release of the proposals will yield positive abnormal returns due to the elimination of some degree of regulatory risk, especially amongst the least well-capitalized BHC's.

Hypothesis 4: Subsequent events will garner far less effect on firm value, both cumulatively and within certain characteristic groups, as investors synthesized the existing information set to conceptualize the lasting constraint of Basel III within the BHC space.

V. Empirical Analysis

Data

We obtained daily closing stock and index prices using S&P Capital IQ for the period February 1st 2004 through January 31th of 2011 for the informational purposes of our study. The hypothesis testing focused on heterogeneous investment reactions to BCBS announcements in regards to Basel III's final rules. Accordingly, financial statement and regulatory statement data was aggregated at the firm-wide level. S&P Capital IQ proved adequate in obtaining such data by using the industry-specific module to leverage FR 9-YC forms filed publically through the Federal Financial Institutions Examination Council's National Information Center. This study relies heavily on both daily market returns and quarterly regulatory filings. Quarterly regulatory measures are assumed to remain constant throughout their relevant quarter, and no anticipatory changes were made. The implication of this method is regulatory capitalization was assumed to be constant throughout a period, while market capitalization fluctuates.

As this study's focus remains bank capitalization's relationship with returns, bank selection became vital. Banks were not excluded from the selection pool on the basis of total consolidated assets or equity value, except for those whose values fell outside of Basel III's applicability. The sample began with a list of 176 publically traded American BHC's. Banks became ineligible for the sample should banking activities be determined to fall outside of its core competency or if the information set became incomplete at any point

during the data collection period.⁸ The final sample consisted of 113 banks, all of which contained the full information set and is listed on **Table 2**.

Our study broke down the prevailing banks into various buckets, depending on the statistical test being performed. Regulatory data was used to generate leverage and capital ratios, including tier 1 leverage ratio, tangible tier 1 leverage ratio, tier 1 risk-based capital ratio, risk-weighted assets as a percentage of consolidated assets, and Tobin's q was generated using EDGAR and regulatory filings. Tier 2 risk-based capital ratio was excluded from our sample due to incomplete information issues. Our study opted to trifurcate each of the mentioned capitalization measures into three buckets. The sorting criteria for each group is detailed in **Table 3**.

The process for determining the sub-events of the BCBS' announcement of the Basel III framework is as follows. The finalized list would only include actionable events executed in regards to the Basel III framework. The BCBS maintains a robust newsfeed from which all relevant publications are released. Publications filed under their Basel III module, in addition to other relevant press releases, were examined for salience and gravity of content. While the BCBS released numerous documents examining specific facets of capitalization and liquidation in the wake of the financial crisis, this study selected documents and releases dealing with the entire Basel III capitalization framework. The trading window revolved around the ultimate release of relevant documents to the sub-event, as opposed to the announcement of the BCBS meeting, as all BCBS meetings follow a public schedule, however the contents of such remain immediately private, then are

⁸ Eligible events include a delisting, or failure to file an FR 9-YC as a component of BHC requirements.

released at a later date. The three-day trading window begins on the day the documents are released. This window is narrow by design as to capture the essence of investor reaction to the regulation.

Bruno (2014). examined the credibility of the media anticipating the events of the BCBS meeting in order to confirm that the released documents in fact disseminate new information to the market. The study found that although media substantially covered the topic, empirical analysis suggests that no such anticipation is apparent in the financial data (Bruno 2014, 17-19). This discovery prompted our study to open the trading window on document release, not days prior.

Methodology

The influence of Basel III sub-events on BHC public equity returns is examined through an event study approach. The daily abnormal return for a security i on day t is as follows:

$$AR = R_{it} - (\alpha_i + \beta_i R_{mt}) + \epsilon_i$$

Where R_{it} is the holding period return of the equity on day t , R_{mt} is the holding period return of a value-weighted index to reflect the market portfolio on day t , while α_i and β_i represent the GLS estimates for equity i . The CAPM market model parameters are generated using five years of trading data from the beginning of the observation period—August 2004-July 2009. ϵ_i is a stochastic error term. The estimation window ends prior to the opening of the first trading window to prevent informational leakage into the observation period. For a single stock, the average one-day abnormal return from day t to day $t+n$ is as follows:

$$\overline{CAR}_t = \frac{1}{n} \sum_{i=1}^n CAR_i \quad \forall CAR_i = \sum_{i=t}^{t+n} AR_{it}$$

This study then applies a final term to the model of daily abnormal returns as such:

$$AR = R_{it} - (\alpha_i + \beta_i R_{mt}) + \beta_t Time + \beta_j D_k + \epsilon_i$$

where D_k , represents a dummy variable that equals 1 for any bank which passes the criteria for the given event day and capitalization group. The nature of the various criteria are expounded later in this section. β_j is the GLS estimator for the respective dummy variable. Each of the five sub-events corresponds to an appropriate measure, which in turn generates a new β_j for a given trading window. $\beta_t Time$ encapsulates a basic time-weighted adjustment to break the day-to-day trading momentum effects in the observation period.

Any study attempting to measure the trading effects of landmark legislation must also consider the cumulative wealth effect of the endeavor. Hence, did BHC's stand to realize or destroy value through the announcement of Basel III? To assess the overall impact in a given trading window, we aggregate the CARs for either all events or a single event (Wagster 1996, 1328-1331). We then operate z-score tests to assess the significance of these returns where:

$$H_0: \sum \beta_j = 0 \quad \forall j = \{1,2,3,4,5\}$$

where β_j is the coefficient on the dummy variable to the CAR for a corresponding event j. We then isolate the variable in which regulatory details were released to attempt to

separately understand the wealth effects of the actual legislation versus the signaling effect of forthcoming regulation.

Assessing the cumulative wealth effects of landmark regulation presents statistical turbidity. The ultimate goal of this study is not just to understand the effect of the unveiling of Basel III, but also to unpack the effect of the sub-events on various BHC capitalization profiles. The BHC's were broken down to three distinct portfolios to identify groups that are less, adequately, and more capitalized with respect to each of the relevant metrics. The full list of calculated metric and the respective portfolio criterion are disclosed on **TABLE 3**. BHC's are not restricted from switching portfolio grouping across events as to maintain the integrity of contemporaneous effects of current capitalization. Hence, the number of observations deviates between events and capitalization buckets. Trading effects for respective capitalization groups were examined across all events and on a single-event basis.

VI. Results and General Discussion

The results of the regression analysis of a composite portfolio across all events is displayed in **Table 4 – Table 10**. This composite portfolio holds an equally-weighted value of all 113 BHC's in this study, attempting to measure the cumulative effect across all events, as well as event by event. The cumulative effect yields a slightly positive, statically significant return at the ten percent level. The final cumulative effect posits that US BHC's stood to benefit from the introduction of Basel III. American banks reap the benefit of the distributional effects of the accord's private goods, as their competitive advantage as a more-developed regulatory environment produces value in excess of international competitors. Beyond the effects of the removal of financial uncertainty, investors unveiled their sentiments towards a more stable financial system, as the introduction of additional regulatory capital constraints will both decrease volatility and global earnings robustness. Investors rendered the benefits of stability more accretive to value than the dampening of future earnings in more advantageous economic climates, such as the US.

In order to render the means by which the regulation affected US BHC's across the sector, we must split the composite portfolio to several sub-composite portfolios and test for abnormal returns. Banks sorted into each analysis' third group experienced the most frequent appreciation of equity pricing. Abnormal returns were detected in tier 1 leverage ratio, tier 1 risk-based capital ratio, and Tobin's q at the 10 percent level, and within tangible tier 1 leverage ratio at the five percent level. The highest leveraged banks within the various constitutions of group three benefitted from the introduction of Basel III, as it

became understood that these banks will pivot towards compliance—generating significantly less discounted earnings. BHC's belonging to the various group twos also experienced abnormal returns, with tangible tier 1 leverage ratio, tier 1 risk-based capital ratio, and risk-weighted assets as a percentage of total consolidated assets also experiencing abnormal returns. Moving farther up the capitalization chain, banks belonging to group one only saw abnormal returns when testing against RWA's as a percentage of total consolidated assets, as banks holding what was currently considered higher-quality assets should reap the competitive benefits of a private good in excess of the low cost of pivoting towards compliance.

The announcement of the agreement between BCBS members to overhaul the global banking regulatory framework saw extremely significant negative returns, as the CAR over the observation window yielded a -0.43% regression metric—rejecting our null hypothesis of no abnormal returns. This adverse reaction most likely originates in investor sentiment in regards to increased regulatory risk. Barring any outsized optimism in regards to the ultimate benefits of the regulation, this reaction is expected. This expectation spurs from such regulatory risk incorporating into cash flow valuations en route to rendering an appropriate stock price. Put simply, event one can be viewed as spiking the associated discount rates of firm-related equity cash flows, as all US BHC's will be subject to the new regulation at some point in the near or distant future (the enforceability timeline was unknown at the time). Riskier cash flows translate to a lower equity value.

Being that the cumulative effect of event one yielded statically significant abnormal negative returns, it remains logical that the majority of capitalization groups also

experienced such returns. This logic is reflected in the results, however patterns of investor reactions emerge. With heightened regulatory uncertainty, we would expect less well-capitalized BHC's to witness equity devaluation. Banks belonging to group two and group three produced seven of the eight statistically significant negative return values. Banks with higher tier 1 leverage ratios were negatively affected, however banks with lower tangible tier 1 leverage ratios also experienced devaluation. Banks with high tangible leverage ratios relative to basic leverage ratios report a higher percentage of assets being intangible—hence having less value in a solvency event. In light of this, our result follows the logic that investors punish banks who report high leverage, but curiously those with low tangible leverage as well. This apparent logical schism between the treatments of these groups most likely originates in investor skepticism towards the tangibility of such assets. Simply, banks with the lowest tangible leverage ratios relative to basic leverage ratios are most likely to have overstated the tangibility of their assets in the past, and Basel III would most likely punish them for this overstatement. By the introduction of Basel III, many banks had already taken massive intangible asset write-downs, and it appears investors might anticipate more to follow. Similarly, statically significant negative returns were detected in the groups with the highest Tobin's q values. Investors recognize that previous reporting practices might prompt investors to rethink past market premiums placed on assets or liabilities. Assuming Basel III will punish banks with highest premiums on their assets, investors reacted poorly to the announcement to negotiate.

Event two appears to erase the detrimental effects of the previous announcement. The publication of select proposals on behalf of the BCBS offered investors the first flavor of the regulation. Investors recognized that the forthcoming proposals would most likely

be accretive to firm value. Hence, American banks will benefit from their existing system atop the financial regulatory hierarchy.

Breaking the composite portfolio down to respective capitalization groups, patterns emerge that are in some respects complementary to the announcement to negotiate. The distributional effects of America's current regulatory constraints will provide a meaningful safeguard against the drawbacks of being undercapitalized. In fact, it appears that the reactions put forth in the previous event was unjustified, as the release of select regulatory details convinced investors that the most leveraged banks will benefit from the need to comply with Basel III in excess of the costs. Less leveraged banks saw a far less significant accretion of equity value. Those with the lowest RWA as a percentage of total consolidated assets saw equity appreciation. Those with currently advantageous RWA constructions will certainly be less affected than those banks with higher risk assets, as the recalculation of RWA's presented one of the key tenants of Basel III's updates. Yet on the whole, seemingly more aggressive banks saw appreciation due to the understanding that Basel III will not destroy their viability beyond the benefits of a more-stable domestic banking system. Put metaphorically, a rising financial tide will raise a boat much higher than expected when the boat is perceived to be leakier than it is.

Event three comprised no statistically significant cumulative effect on the entire composite portfolio. It saw the BCBS' announcement of their settlement upon the final rules, however the granular details of the revised rules were released at a later date. This result suggests that investors failed to recognize the salience of this event on the ultimate effect of bank valuation. The cumulative effect of this event fails to be statically significant

at the ten percent level, yet is significant at a level just above it. As such, the cumulative effect is not meaningless. The corresponding GLS estimator is decisively closer to 0 than the previous two events months earlier. Event three showcases evidence of investor disenchantment with the rulings, with cumulative effects beginning to dampen and significant abnormal returns within sub-composite portfolios becoming more infrequent. Subsequent events reflect a deepening of this sentiment and will be discussed later.

Event three witnessed statistically significant abnormal returns on four sub-composite portfolios. They were tangible tier 1 risk based leverage ratio and tier 1 risk-based capital ratio within group 2, and tier 1 leverage ratio and Tobin's q within group 3. Similarly to the previous events, higher leveraged BHC's and those with seemingly higher quality assets experienced positive abnormal returns. This reaction can be held in similar regard to the reaction to event two. The arrival of the final rules, although not public, can be seen as a reduction in overall regulatory risk—as the fact that the BCBS has reached some form of a final product and those banks with the highest regulatory risk benefit most definitively from a reduction in such.

Event four failed to yield any cumulative abnormal return, despite the release of the final regulatory details. This response, or rather lack thereof, posits that investors already adopted viewpoints on how Basel III would affect BHC valuation. When the final details were released, some evidence of meaningful perversions of expected trading paths remain, however such evidence is minimal. Until the final costs of compliance are calculated, investor sentiment on the effect of Basel III will not be corroborated. From the lack of reaction or regulatory details we can more easily draw conclusions about investor

confidence, not effectiveness in synthetization. Only a single sub-composite portfolio experienced abnormal returns—tangible tier 1 leverage ratio's group two. Perhaps simply a continuation of event three's reaction to the portfolio, as no discernable pattern can reasonably be rendered from this single measure.

Event Five continued to showcase confidence on behalf of investors. This study brought no evidence of statistically significant returns, either cumulatively or within a sub-composite portfolio, at the release of the final rules. Investor apathy is certainly not the most salient understanding of this reaction. Given the volatility of bank valuation in prior sub-events, banking valuations already changed their expected trading contour in order to incorporate relevant Basel III items. The affirmations of capitalization requirements presented no such material information to move equity values of BHC's. This finding does not imply that the final rules failed to have a material effect on banking valuations, as reactions of previous events would suggest otherwise. Moreover, the ultimate effect of Basel III's final rules might not be inconsequential. A visceral reaction on behalf of investors could be perceptually substituted with the aggregate effect of the regulation transpiring over longer-term trading windows as investors come to gain an organic understanding of its implications. This notion invites future research.

VII. Conclusion

Much of what makes the study of regulatory networks compelling is their undeniable importance and need to incorporate conjectural components into any desired outcome. The existence of the regulator's dilemma alone invites practitioners to understand potential wealth transfers between constituents of regulatory frameworks. These transfers can occur within a closed system, or it can be delivered from an exogenous force.

This event study discovered that the sub-events comprising the release of Basel III constitute a salient gateway to the emotionality of investors. With sentiments shaken in the financial crisis, investors scrambled to adjust valuations to reflect riskiness of the marketplace—one which bolstered regulatory risk as a lasting constraint. American BHC's seemed to brace for a detrimental blow to equity value, before rallying on the understanding that the group of banks would benefit from its current position of regulatory stringency. Basel III was perceived to increase American bank value through its establishment of a more stable international banking system. Although future earnings robustness is ultimately dampened through heightened capitalization requirements, American banks operating within a fundamentally stronger global marketplace is certainly helpful. However, the beneficial distributional effects of the costs of compliance presents a more likely explanation of our results.

This study is limited in that it relies heavily on theoretical conjecture to render understandings about bank equity valuation in the wake of extreme downward volatility.

A relatively short trading window attempts to capture the visceral reactions prompted by the regulatory fallout. While this fallout can certainly be detected, knowing the absolute motivations behind this trading activity will remain somewhat speculative. Future research will hopefully demystify some degree of this speculation.

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IX. Appendix

Table 1- Event Timing Details

Event Number	Event Description	BCBS Meeting Date	BCBS Press Release Date	Days Between Meeting and Release	Regulatory Details (Y/N)
1	Agreement to Negotiate	2009 Sept 6	2009 Sept 7	1	No
2	Preliminary Proposals	2009 December 8-9	2009 Dec 17	8	Yes
3	Announcement of Final Rules	2010 July 14 - 15	2010 Jul 26	11	No
4	Minimum Levels Release	2010 Sept 12	2010 Sep 12	0	Yes
5	Final Rules Release	2010 Nov 30 - Dec 1	2010 Dec 16	15	Yes

Figure 1 – Capitalization Changes

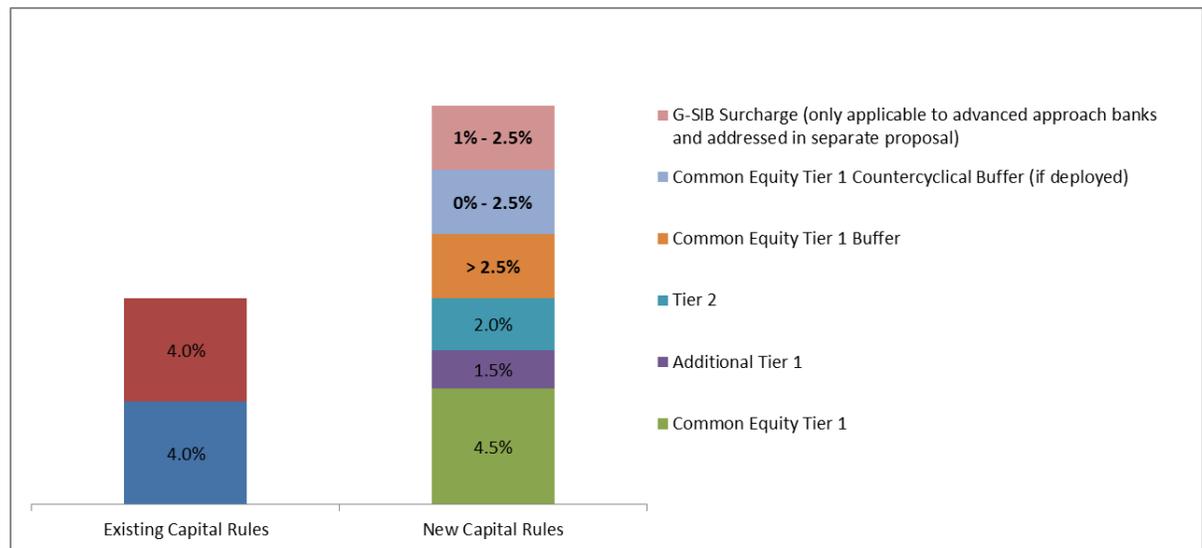


Table 2 – List of BHC’s

Ticker	Company Name	Ticker	Company Name
NasdaqGS:SRCE	1st Source Corporation	NYSE:KEY	KeyCorp.
NasdaqGS:ABCB	Ameris Bancorp	NasdaqGS:LKFN	Lakeland Financial Corp.
NYSE:BAC	Bank of America Corporation	NYSE:MTB	M&T Bank Corporation
NYSE:BOH	Bank of Hawaii Corporation	NasdaqGS:MCBC	Macatawa Bank Corp.
NasdaqCM:BMRC	Bank of Marin Bancorp	NasdaqGS:MBFI	MB Financial Inc.
NasdaqGS:OZRK	Bank of the Ozarks, Inc.	NasdaqGS:MBTF	MBT Financial Corp.
NasdaqGS:BANR	Banner Corporation	NasdaqGS:MBWM	Mercantile Bank Corp.
NYSE:BBT	BB&T Corporation	NasdaqGS:MBVT	Merchants Bancshares Inc.
NasdaqGS:BBCN	BBCN Bancorp, Inc.	NasdaqGS:NPBC	National Penn Bancshares Inc.
NasdaqGS:BPFH	Boston Private Financial Holdings, Inc.	NasdaqGS:NBTB	NBT Bancorp, Inc.
NasdaqGS:BMTC	Bryn Mawr Bank Corp.	NasdaqGS:NTRS	Northern Trust Corporation
NasdaqGS:CCBG	Capital City Bank Group Inc.	NasdaqGS:NRIM	Northrim Bancorp Inc.
NYSE:COF	Capital One Financial Corporation	NasdaqCM:ORRF	Orrstown Financial Services Inc.
NasdaqCM:CACB	Cascade Bancorp	NasdaqGS:PCBK	Pacific Continental Corp.
NasdaqGS:CATY	Cathay General Bancorp	NasdaqGS:PMBC	Pacific Mercantile Bancorp
NasdaqGS:CSFL	CenterState Banks, Inc.	AMEX:PRK	Park National Corp.
NasdaqCM:CFCB	Centrue Financial Corporation	NasdaqGS:PGC	Peapack-Gladstone Financial Corp.
NasdaqGS:CNBK.A	Century Bancorp Inc.	NasdaqGS:PNFP	Pinnacle Financial Partners Inc.
NYSE:C	Citigroup Inc.	NasdaqGS:BPPO	Popular, Inc.
NasdaqCM:CZNC	Citizens & Northern Corp.	NYSE:PB	Prosperity Bancshares Inc.
NasdaqGS:CCNE	CNB Financial Corp.	NYSE:RF	Regions Financial Corporation
NasdaqGS:COLB	Columbia Banking System Inc.	NasdaqGS:STBA	S&T Bancorp Inc.
NYSE:CMA	Comerica Incorporated	NasdaqGS:SASR	Sandy Spring Bancorp Inc.
NasdaqGS:CBSH	Commerce Bancshares, Inc.	NasdaqGS:SBCF	Seacoast Banking Corp. of Florida
NasdaqCM:COB	CommunityOne Bancorp	NasdaqGS:BSRR	Sierra Bancorp
NasdaqGS:CNOB	ConnectOne Bancorp, Inc.	NasdaqGS:SFNC	Simmons First National Corporation
NasdaqCM:EGBN	Eagle Bancorp, Inc.	NasdaqGS:SSB	South State Corporation
NasdaqGS:EWBC	East West Bancorp, Inc.	NasdaqGS:SBSI	Southside Bancshares Inc.
NYSE:FNB	F.N.B. Corporation	NasdaqGS:SYBT	Stock Yards Bancorp, Inc.
NasdaqGS:FITB	Fifth Third Bancorp	NYSE:SCNB	Suffolk Bancorp
NasdaqGS:FISI	Financial Institutions Inc.	NasdaqGS:SNBC	Sun Bancorp Inc.
NasdaqGS:FBNC	First Bancorp	NYSE:STI	SunTrust Banks, Inc.
NYSE:FBP	First Bancorp	NasdaqGS:SIVB	SVB Financial Group
NasdaqGS:BUSE	First Busey Corporation	NYSE:SNV	Synovus Financial Corporation
NasdaqGS:FCNC.A	First Citizens Bancshares Inc.	NYSE:TCB	TCF Financial Corporation
NasdaqGS:FFBC	First Financial Bancorp.	NasdaqGS:TCBI	Texas Capital BancShares Inc.
NYSE:FHN	First Horizon National Corporation	NYSE:BK	The Bank of New York Mellon Corporation
NasdaqGS:FMBI	First Midwest Bancorp Inc.	NYSE:SCHW	The Charles Schwab Corporation
NasdaqGS:FUNC	First United Corporation	NasdaqGS:FNLC	The First Bancorp, Inc.
NasdaqGS:FMER	FirstMerit Corporation	NYSE:PNC	The PNC Financial Services Group, Inc.
NasdaqGS:GABC	German American Bancorp Inc.	NasdaqGS:TOWN	Towne Bank
NasdaqGS:GBCI	Glacier Bancorp, Inc.	NasdaqGS:TCBK	TriCo Bancshares
NasdaqGS:GSBC	Great Southern Bancorp Inc.	NasdaqGS:TRMK	Trustmark Corporation
NasdaqGS:GBNK	Guaranty Bancorp	NYSE:USB	U.S. Bancorp
NasdaqGS:HMPR	Hampton Roads Bankshares Inc.	NasdaqGS:UMBF	UMB Financial Corporation
NasdaqGS:HBHC	Hancock Holding Company	NasdaqGS:UMPQ	Umpqua Holdings Corporation
NasdaqGS:HTLF	Heartland Financial USA, Inc.	NasdaqGS:UBSH	Union Bankshares Corporation
NasdaqGS:HTBK	Heritage Commerce Corp.	NasdaqGS:UBSI	United Bankshares Inc.
NasdaqGS:HFWA	Heritage Financial Corporation	NasdaqGS:UCBI	United Community Banks, Inc.
NasdaqGS:HOMB	Home Bancshares, Inc. (Conway, AR)	NYSE:VLY	Valley National Bancorp
NasdaqGS:HBNC	Horizon Bancorp	NasdaqGS:WASH	Washington Trust Bancorp Inc.
NasdaqGS:HBAN	Huntington Bancshares Incorporated	NasdaqGS:WSBF	Waterstone Financial, Inc.
NasdaqGS:IBKC	IberiaBank Corp.	NYSE:WBS	Webster Financial Corp.
NasdaqGS:INDB	Independent Bank Corp.	NYSE:WFC	Wells Fargo & Company
NasdaqGS:IBCP	Independent Bank Corporation	NasdaqGS:WABC	Westamerica Bancorp.
NYSE:JPM	JPMorgan Chase & Co.	NYSE:WAL	Western Alliance Bancorporation
		NasdaqGS:ZION	Zions Bancorporation

Table 3 – Capitalization Group Criteria

Ratio	Group 1	Group 2	Group 3
Tier 1 Leverage Ratio	< .08	.08-.10	>.10
Tangible Tier 1 Leverage Ratio	< .09	.09-.12	>.12
Tier 1 Risk-based Capital Ratio	< .12	.12-.15	>.15
Risk-weighted Assets / Total Consolidated Assets	< .75	.75-.80	>.80
Tobin's q	<. 97	.97-1.02	>1.02

Table 4 – Results for all BHC's across All Events

Composite Portfolio Across Events	All Banks
All Events	0.0014 0.082
Event 1	-0.0043 0.012
Event 2	0.0048 0.010
Event 3	0.0027 0.114
Event 4	0.0016 0.357
Event 5	0.0018 0.307

The above statistics show the β_j as a result of the GLS regression with the corresponding p-value below.

Table 5 – Grouped BHC’s across All Events

Composite Portfolios - All Events	Group 1	Group 2	Group 3
Tier 1 Leverage Ratio	0.0012 0.617	0.0008 0.442	0.0020 0.054
Tangible Tier 1 Leverage Ratio	0.0006 0.677	0.0017 0.084	0.0036 0.041
Tier 1 Risk-based Capital Ratio	0.0004 0.789	0.0021 0.010	0.0024 0.071
Risk-weighted Assets / Total Consolidated Assets	0.0018 0.063	0.0018 0.067	0.0002 0.880
Tobin's q	0.0014 0.496	0.0012 0.289	0.0019 0.052

The above statistics show the β_j as a result of the GLS regression with the corresponding p-value below.

Table 6 – Grouped BHC’s, Event One

Sub-composite Portfolios - Event One	Group 1	Group 2	Group 3
Tier 1 Leverage Ratio	-0.0055 0.290	-0.0037 0.091	-0.0055 0.026
Tangible Tier 1 Leverage Ratio	-0.0053 0.067	-0.0051 0.018	0.0033 0.542
Tier 1 Risk-based Capital Ratio	-0.0040 0.198	-0.0081 0.010	0.0057 0.262
Risk-weighted Assets / Total Consolidated Assets	-0.0031 0.213	-0.0039 0.397	-0.0071 0.011
Tobin's q	-0.0039 0.307	-0.0056 0.052	-0.0040 0.061

The above statistics show the β_j as a result of the GLS regression with the corresponding p-value below.

Table 7 – Grouped BHC’s, Event Two

Sub-composite Portfolios - Event Two	Group 1	Group 2	Group 3
Tier 1 Leverage Ratio	0.0058 0.303	0.0030 0.161	0.0075 0.002
Tangible Tier 1 Leverage Ratio	0.0043 0.151	0.0039 0.075	0.0114 0.004
Tier 1 Risk-based Capital Ratio	0.0027 0.404	0.0062 0.010	0.0101 0.010
Risk-weighted Assets / Total Consolidated Assets	0.0063 0.010	0.0035 0.422	0.0038 0.201
Tobin's q	0.0013 0.736	0.0076 0.007	0.0083 0.001

The above statistics show the β_j as a result of the GLS regression with the corresponding p-value below.

Table 8 – Grouped BHC’s, Event Three

Sub-composite Portfolios - Event Three	Group 1	Group 2	Group 3
Tier 1 Leverage Ratio	-0.0006 0.915	0.0035 0.133	0.0039 0.079
Tangible Tier 1 Leverage Ratio	0.0013 0.673	0.0044 0.047	0.0036 0.321
Tier 1 Risk-based Capital Ratio	0.0010 0.794	0.0058 0.01	0.0012 0.637
Risk-weighted Assets / Total Consolidated Assets	0.0021 0.297	0.0061 0.245	0.0032 0.378
Tobin's q	0.0060 0.234	-0.0001 0.967	0.0052 0.020

The above statistics show the β_j as a result of the GLS regression with the corresponding p-value below.

Table 9 – Grouped BHC’s, Event Four

Sub-composite Portfolios - Event Four	Group 1	Group 2	Group 3
Tier 1 Leverage Ratio	0.0015 0.773	0.0004 0.879	0.0029 0.187
Tangible Tier 1 Leverage Ratio	0.0002 0.944	0.0042 0.056	-0.0009 0.813
Tier 1 Risk-based Capital Ratio	0.0004 0.91	0.0032 0.15	0.0015 0.564
Risk-weighted Assets / Total Consolidated Assets	0.0020 0.338	0.0020 0.709	0.0013 0.72
Tobin's q	0.0028 0.574	0.0016 0.466	0.0012 0.614

The above statistics show the β_j as a result of the GLS regression with the corresponding p-value below.

Table 10 – Grouped BHC’s, Event Five

Sub-composite Portfolios - Event Five	Group 1	Group 2	Group 3
Tier 1 Leverage Ratio	0.0057 0.295	0.0008 0.731	0.0006 0.791
Tangible Tier 1 Leverage Ratio	0.0028 0.371	0.0013 0.55	0.0013 0.727
Tier 1 Risk-based Capital Ratio	0.0034 0.381	0.0021 0.349	-0.0003 0.904
Risk-weighted Assets / Total Consolidated Assets	0.0013 0.513	0.0022 0.666	0.0039 0.98
Tobin's q	0.0049 0.366	0.0020 0.382	-0.0005 0.774

The above statistics show the β_j as a result of the GLS regression with the corresponding p-value below.