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**“IF MEN WERE ANGELS, NO GOVERNMENT WOULD BE NECESSARY”:
TWO ESSAYS ON THE EFFECTS OF REGULATIONS ON BANKING SECTOR
VALUATION AND RISK**

presented by Henry Balani

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“IF MEN WERE ANGELS, NO GOVERNMENT WOULD BE NECESSARY”:
TWO ESSAYS ON THE EFFECTS OF REGULATIONS ON BANKING SECTOR
VALUATION AND RISK

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through the program. I drew encouragement from my classmates, each of us pushing the others along, up and down that dissertation mountain. On reflection, the time we had in class was a high point in my DBA journey and the evenings in the dorms and dinners are memories I will always cherish. I wish all you of the best in your individual journeys.

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“IF MEN WERE ANGELS, NO GOVERNMENT WOULD BE NECESSARY”¹:
TWO ESSAYS ON THE EFFECTS OF REGULATIONS ON BANKING SECTOR
VALUATION AND RISK

HENRY BALANI

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ABSTRACT

The banking sector plays a central role in economic development by providing financial services for a country’s growth and stability. When banks seek to maximize profits, they may engage in non-compliant behavior that negatively impacts market growth and stability. Regulatory oversight is therefore common in this sector. Regulations can lead to improved transparency and reporting, however, can also be a burden due to complexity, increasing costs of compliance with varying impacts on stock valuations of banks. While the intent is to correct behavior for non-compliance, we continue to see ongoing negative banking events post-2000, evidenced by the London Interbank Offered Rate (LIBOR) and subprime mortgage crisis, as well as the abuse of the banking system by money launderers, raising the issue that regulations are not effective in changing bank behavior.

Essay 1 seeks to examine the effectiveness of regulatory signals by measuring valuation and risk impact based on enforcement actions on banks. I found that overall, bank returns are positively impacted by the announcement of enforcement actions as the fines are less harsh and not as large as expected. When testing bank-specific attributes, I found that larger banks were more negatively impacted by penalties while larger size fines had a positive effect on valuation.

¹ Hughes, 2015.

There was no significant impact of risk on bank returns on the day of the fine. However, banks that experienced the greatest increase in risk had the higher returns six months after the fine. When testing the impact of the fine on competitor banks, I found that there was no significant impact, suggesting no spillover effect. When testing competitor bank characteristics, I found that the fined banks with higher returns impacted competitor banks positively. Larger competitive banks were more positively impacted, while competitive banks with higher market risks reacted negatively. Similar to the fined banks, competitor banks that experienced the greatest increase in risk had higher returns six months after the fine. Overall, the results indicated that enforcement actions are not effective and do not send a strong signal to the banking industry to correct behavior.

Essay 2 attempts to assess the impact of the introduction of the fourth European Union (EU) Anti-Money Laundering Directive (4AMLD) on European banks by examining whether eight milestone dates impacted stock valuation and risk. I found that valuations and risk were positively impacted when a time series analysis was conducted over the milestone event dates. An examination of bank-specific characteristics based on a cross sectional regression revealed that riskier, larger banks have higher returns as a result of the introduction of the 4AMLD. Also, banks with a higher return on assets see more positive returns. However, banks that rely more on non-traditional income streams have lower returns. In EU countries where Gross Domestic Product (GDP) per capita is higher, banks experience more positive returns than in poorer countries. Similarly, banks in less corrupt countries see more positive returns. Banks in countries with lower levels of governance, where governments are less effective and have less stable political systems and regulatory oversight, experience positive returns as a result of the introduction of the 4AMLD. The results show that with the introduction of the 4AMLD, banks

gained greater clarity and guidance related to identifying and reporting on money laundering transactions, allowing banks in countries with lower levels of governance to comply effectively based on the clarity of requirements and the framework of the 4AMLD.

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DISSERTATION OVERVIEW

The banking sector occupies a unique position, providing financial services that impact economic development in all countries. Banks facilitate the movement of funds that provide the foundation for commercial lending and investment activity in both the public and private sectors. Banks influence monetary policy by redistributing a large percentage of a country's money supply. In the United States and other developed economies, the banking sector is a private, for-profit business created to benefit shareholders primarily. As a result, banks may engage in profit maximizing activities at the expense of market stability.

Regulations are required to ensure bank activity supports continued economic development and market stability. Banking regulations, however, can be complex and burdensome, with regulators imposing enforcement actions for non-compliance that can range from monetary fines, cease and desist orders, as well as suspension of banking licenses in cases of significant violations. The cost of compliance can also be prohibitive, negatively impacting valuations and increasing operational risk. Despite the existence of regulatory oversight, we continue to see banking violations that have resulted in negative financial market events. Recent events have included the financial market manipulations of LIBOR; repackaging of mortgage-backed securities that caused the global financial meltdown of 2008; and money laundering through the financial system financing terrorist activities since 2001. Regulators continuously introduce new regulations to combat or limit money laundering (e.g., the European Union's [EU] recent money laundering regulations).

This dissertation attempts to determine the effects of enforcement actions and the effectiveness of the introduction of regulations from a bank financial valuation and risk perspective. While regulatory enforcement actions are designed to correct non-compliance and

bad behavior, regulatory penalties can be either strong (e.g., U.S. regulators imposed a monetary penalty on Wegelin Bank for money laundering activities only to see it shut down; Raymond & Browning, 2013) or weak (e.g., multiple fines against Standard Chartered), signaling sub-optimal behavioral outcomes (Proteus & Silver-Greenberg, 2014).

To determine the effectiveness of regulation, in my first essay I examine the effect of regulatory enforcement actions on valuations and risks in the banking sector to identify if specific characteristics send stronger signals. The goal was to determine if the stronger signals impact bank valuation and risk subsequently correcting non-compliant behavior for both the fined and competitor banks. In Essay 2, I study the valuation and risk effects of the introduction of the Fourth Anti-Money Laundering Directive (4AMLD) on EU banks by conducting an event analysis to determine the significance of various risk, bank, and country characteristics. Unique characteristics that are examined in both essays include size and risk, with specific characteristics including the type of penalty and frequency of fines for Essay 1 and financial measures, corruption, and governance for Essay 2.

The findings from this dissertation will provide academics, regulators, policy analysts, and investors with a greater understanding of how regulatory enforcement actions and the introduction of specific anti-money laundering regulation in the EU impact financial valuations and risks based on bank characteristics. Academics will gain a better understanding of how empirical models of valuation and risk are impacted by banking regulations specifically related to financial market manipulations and money laundering. Regulators and policy analysts will be able to assess how the financial markets are impacted by the introduction of regulations and enforcement penalties on banks. Finally, investors will rationalize their financial allocations based on greater understanding of the impact of regulations founded on general market impact

and specific risk and bank characteristics. Overall, developing a greater understanding of the effect of regulations on valuations and risk has a significant impact on the soundness of the financial industry, given the central role banks play in economic development.

ESSAY 1: DO REGULATORY ENFORCEMENT ACTIONS SEND A STRONG SIGNAL TO THE BANKING INDUSTRY? AN ANALYSIS OF RECENT BANKING EVENTS

ABSTRACT

Banks play an important role in an economy and may engage in profit seeking behavior counter to economic development and market stability. Regulatory actions on banks are enforced to curb non-compliant behavior in the banking industry. However, post-2000 we have seen three major banking events that have raised public awareness of non-compliant banking behavior that has had varying impact on the global economy. Both the London Interbank Offered Rate (LIBOR) and subprime mortgage events led to the global economic recession of 2008, while the money laundering abuses of the banking industry continue to facilitate terrorist financing. All three bank events demonstrate continued non-compliant banking behavior, leading to regulatory enforcement actions. This essay seeks to examine the effectiveness of regulator's enforcement actions in changing bank behavior by measuring the valuation and risk impact on the fined and competitor banks as well as specific characteristics as a result of these actions.

The results showed mostly positive valuation returns on the fined banks. When examining specific bank characteristics, larger banks saw a more negative return while larger penalties had a more positive effect on returns compared to smaller banks. Competitor banks' returns, in comparison, were only weakly impacted by the penalties on the fined banks. However, similar to the fined banks, returns were positively impacted six months after the fine measured against risk shift. A spillover effect also occurred where fined banks' positive returns impacted competitor banks' returns positively. Larger competitor banks reacted more positively to penalties on the fined bank, suggesting size is a factor in impacting valuations. Again, similar

to the fined banks, competitor bank returns were positive even six months after the penalty on the fined bank when measuring risk shift. We saw a counterintuitive result where returns were positively impacted, suggesting that enforcement actions are perceived as being less harsh than expected, or that the revelation that the fine is perceived as reducing the risk of the bank, resulting in positive returns. Overall, the results suggest that enforcement actions do not send a strong signal to the banking industry to change banks' behavior as they continue to engage in non-compliant behavior.

Background

The banking sector is a key player in a country's economy, providing the foundation for commercial lending and investment which stimulate economic growth. Consequently, the banking sector is heavily regulated by the government to ensure continued functioning of the economy. However, banks are sometimes willing to engage in non-compliant regulatory behavior that maximizes profits (Araujo, 2008). Non-compliant regulatory behavior includes activities by banking staff that violate established regulations. An example is when banks in the United States choose to process profitable payment transactions from Iranian sanctioned entities, knowing full well that these transactions are in violation of local anti-money laundering (AML) regulations. This may result in terrorist funding activities and potential negative consequences on economic development. To minimize these negative consequences, regulators have imposed enforcement actions on non-compliant banks to correct behavior and limit future non-compliant activity.

The nature of the banking industry also means that negative impacts from a regulatory enforcement action on a bank can easily 'spill over' to competitor banks. Kaufman (1994) found that in the banking industry, this spillover phenomenon occurs faster, spreads more broadly within the industry, results in a larger number of failures with larger losses, and spreads beyond the banking sector with a negative impact on the financial system and the macro-economy. For example, the recent global banking crisis of 2008, partially triggered by non-compliant banking behavior, led to a loss of confidence by the public of the banking system, destabilizing the economy and leading to a global recession.

As such, it is important that regulators, through enforcement actions, send a strong signal intended to motivate the banking industry to correct behavior and ensure compliance and to

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reduce the potential of future economic crisis. Spence (1973) argued that signals must be perceived to be costly to motivate behavioral changes. The author described how an informed party (i.e., regulators) will conduct an action to influence the desired behavior from an uninformed party (i.e., banks). The goal is to persuade the uninformed party to correct a behavior that would be considered undesirable. The informed party designs the signal to motivate a particular response. The receiver of the signal will interpret the signal to determine the intended purpose and credibility of the sender and modify behavior accordingly. In this case, regulators look to modify behaviors of the bank. By issuing an enforcement action, the regulator desires a bank to limit non-compliant behavior. Depending on the severity of the enforcement action, the bank will then make a decision as to modify its non-compliant behavior. However, we continue to see suboptimal non-compliant behavior by banks even after an enforcement action, suggesting that signals are not strong enough. It is therefore unclear if regulatory enforcement actions have been effective in addressing the various banking events, given the ongoing banking scandals and repeated violations that we see today. This provides motivation for this study.

Post-2000, we have seen three major banking events that have raised public awareness of non-compliant banking behavior that has had varying impact on the global economy. These banking events have resulted in a majority of the regulatory actions on the banking sector that form the basis for this study.

The LIBOR scandal, in which bankers colluded in setting interest rates to profit from trades, took place during the 2000's ("CFTC Orders Barclays," 2012). Manipulating interest rates is considered a regulatory offense as it is an attempt to shape the derivatives markets which set rates for mortgages and commercial loans across the broader financial market. As a result,

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many global banks have paid significant monetary fines including UBS for \$1.5 billion, Rabobank for \$1 billion, the Royal Bank of Scotland for \$612 million, Barclays for \$450 million, amongst others for violating the Securities Exchange Act of 1934 (“Tracking the Libor Scandal,” 2016).

The 2008 subprime mortgage crisis was another high-profile banking event that contributed to the resulting global recession. While there were many contributory factors to the economic downturn, banks that facilitated the packaging of mortgage-backed securities with aggressive and illegal selling techniques led to the eventual collapse of the housing market. This housing collapse was a major factor in triggering the global financial crisis (Shiller, 2012). Multiple banking regulations were violated, including the Securities Exchange Act, the Home Mortgage Disclosure Act, and the Truth in Lending Act. To date, bank penalties have totaled \$150 billion directly from this event (Shoen, 2015).

The terrorist attacks of September 11, 2001 in the United States also brought to attention the abuse of the U.S. financial system in facilitating money laundering and terrorist financing (Roth, Greenburg, & Wille, n.d.). Money laundering is the process of concealing the existence of income derived from criminal activity and subsequently disguising the source of that income through the financial system to make it appear legitimate (Zdanowicz, 2009). The Bank Secrecy Act of 1970 (BSA) and the Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (USA PATRIOT) Act of October 2001 require banks to identify and report potential money laundering activity. In January 2013, the oldest Swiss bank Wegelin & Co. shut down after paying a penalty of \$58 million to U.S. regulators for non-compliance (“Swiss Bank Wegelin, 2013”). Other global banks also violated the BSA and

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PATRIOT Act, receiving penalties for non-compliance including recent fines on the Agricultural Bank of China for \$215 million and Intesa Sanpaolo for \$235 million both in 2016.

The goal of these enforcement actions is to correct the non-compliant bank behavior by sending a strong signal to both the fined and competitor banks to take compliance with banking regulations seriously. However, it is unclear whether these regulatory penalties have been effective in correcting the banking industry's behavior. Since the start of the 2008 financial crisis, between May 2007 and July 2015, global banks have paid \$162.2 billion in penalties imposed by U.S. regulators (Stabe & Stanley, 2015). During this period, approximately 300 separate regulatory actions have been enforced that have included monetary penalties and cease and desist orders (Stabe & Stanley, 2015). Cease and desist orders are official regulatory injunctions requiring a bank to halt illegal activities identified by the regulator. The number of fines has also been increasing over the years, with 2016 seeing a record number of penalties related to money laundering violations (over 40) and record penalties for the LIBOR scandal of \$17 billion for Bank of America in August 2014 ("BofA Reaches \$17 Billion Settlement," 2014), suggesting that banks are not taking banking regulations seriously. The size of money laundering penalties has also grown, ranging from \$1.2 million for the Royal Bank of Scotland to \$8.9 billion for BNP Paribas in 2014 (Douglas, 2014). Smaller penalties could be considered an insignificant event for a bank. However, as the size of the penalties increases, the intention of regulators in correcting bad behavior signals a possible negative impact on bank valuations. This has not always been the case. Standard Chartered's stock price closed up slightly on the day of the announcement of the money laundering fine of \$300 million on August 19, 2004 (Protess & Bray, 2014). Similarly, Zions Bank incurred an \$8 million fine on February 11, 2011 for violations of the BSA and USA PATRIOT Act, however, the stock price was up 1.8% (Solsman,

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2011). Therefore, it is unclear whether these enforcement actions have been substantial enough to be taken seriously by banks, forcing banks to correct behavior to improve compliance with regulations.

There are several goals to this paper. My first goal is to examine if the regulatory enforcement actions send a strong signal to the bank that committed the non-compliant activity by examining the impact on valuation and risk. My second goal is to identify which bank characteristics are considered significant for the penalized bank. My third goal is to understand if the enforcement actions on the fined bank send a strong signal to the ten closest competitor banks. Given that the banking industry is subject to spillover (Kaufman, 1994), a negative event like an enforcement action should also affect competitor banks. My final goal is to identify which bank characteristics send a strong signal to the ten closest competitor banks. These characteristics include the size of the bank, the size and type of penalty, and the risk profile of the bank. I tested the strength of the signal that the fines related to the monetary penalties send to the fined banks and the banking industry by measuring the valuation of the fined banks and the closest competitors. To examine if the characteristics are significant, I ran cross sectional regressions of both the fined banks' and the competitor banks' valuations based on these characteristics. If the valuation of the returns was significant and negative, the penalties send a stronger signal to banks based on the individual characteristics. This also indicates that the monetary penalties are effective in punishing both the fined banks and the competitor banks.

To the best of my knowledge, this paper will be the first to examine the strength of the signal that enforcement actions send to the fined banks and competitors in the banking industry. Academics will gain a better understanding of how empirical models of valuation and risk are impacted by banking regulations specifically related to financial market manipulations and

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money laundering. Regulators and policy analysts will be able to assess how the financial markets are impacted by the introduction of regulations and enforcement penalties on banks. Finally, investors will rationalize their financial allocations based on greater understanding of the impact of regulations based on general market impact and specific bank characteristics.

Summary of Findings

The results of this study suggest that enforcement actions do not send a strong signal to the banking industry. When testing the mean cumulative abnormal returns using a *t*-test, the mean returns were significantly positive. Results were similarly positive when using the Wilcoxon signed rank test. With the exception that larger banks may see a more negative return (due to the negative and significant coefficient), other bank characteristics resulted in positive returns. Larger penalties also impacted returns more positively. When accounting for the impact of risk, I saw either no effect on returns or a positive effect when measuring against total non-interest income (a proxy for risk). I also saw a positive effect on returns six months after the penalty based on three common measures of risk (standard deviation, Root Mean Square Error (RMSE), and beta). Banks with higher total non-interest income (another proxy of risk) also saw a positive impact on returns. Even when banks were fined subsequent times, the results weakly suggested returns are positively impacted. The types of penalties (AML, MBS, LIBOR) or the agency issuing the penalty including the Department of Justice (DOJ), Department of Treasury (DOT), Securities and Exchange Commission (SEC), Federal Housing Finance Agency (FHFA) did not significantly affect returns.

When examining the effects on competitor banks, I found that when testing the mean cumulative abnormal returns using a *t*-test², the mean returns, while negative, were not

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significant, suggesting that returns for competitor banks are not affected by the penalties.

Similar to the fined banks, I also saw a positive effect on returns six months after the penalty based on the three common measures of risk (standard deviation, RMSE, and beta). The returns of the fined bank, when regressed against the returns of the competitor bank were also positive and significant, which suggests that fined banks with higher returns elicit stronger positive returns for competitor banks. Larger competitor banks reacted more positively to enforcement penalties on the fined bank, suggesting bank size is a significant factor, however weak. Results also suggested that larger competitor banks benefit from the enforcement penalty at the expense of the larger fined banks. There was evidence of spillover between the fined and competitor banks where the correlation of returns were positive, suggesting that competitor banks with a higher degree of similarity of operations see a more positive return as a result of enforcement actions on the fined banks.

Literature Review

The Role of Bank Regulations

Bank regulations are designed to curb the negative consequences that banks have on an economy. Morgan (2002) found that regulatory oversight is necessary due to the opacity of banks that expose the financial system to systemic risk. Flannery et al. (2004) found that government regulations tend to improve transparency by requiring banks to report detailed financial information publicly to investors regularly. Supervision of the banking industry by regulators along with formal enforcement actions designed to highlight the lack of compliance helps to increase the level of transparency.

In the United States, high-profile federal banking regulations include the Securities Exchange Act, Sarbanes-Oxley (SOX) Act, the BSA, and the Dodd-Frank Act (Compliance

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Alliance, n.d.). The Securities Exchange Act of 1934 provides oversight of firms that have raised capital in public financial markets and are publicly listed (Securities Exchange Act of 1934, 2012). The SOX Act of 2002 was introduced to heighten transparency of financial statements by improving the reporting process as a result of high-profile scandals at Enron and other firms. Akhigbe and Martin (2006) found that in the wake of the passage of SOX, financial institutions (except securities firms) benefitted with positive valuation effects. The BSA of 1970 requires banks to report financial transactions over \$10,000 (Buchanan, 2004), also improving transparency. Combined with the USA PATRIOT Act, these regulations were designed to identify money laundering and terrorist financing activities in the financial services sector. The Dodd-Frank Act of 2010 was introduced to stabilize the banking system and provide financial services consumer protection in the wake of the 2008 global financial crisis (Dodd-Frank Act, 2010).

Effect of Regulations on Banks

Banking regulations can have varying effects on a bank's operational efficiency, size, and risks. Several studies have shown that regulations can have positive effects on the banking industry. Sundaram et al. (1992) found that as a result of the introduction of the Financial Institutions Reforms, Recovery and Enhancement Act of 1989, banks and saving and loans saw positive abnormal returns. Akhigbe and Whyte (2001) found that the introduction of the FDIC Improvement Act (FDICIA) of 1991 had a positive effect on bank stock returns with a significant reduction in bank risk. Poorly capitalized, large and high credit risk banks experienced the greatest risk reduction. Akhigbe and Martin (2006) found that the passage of SOX resulted in significant positive valuation firm effects. Kalyvas and Mamatzakis (2014) found that regulations protect investors from management expropriation, exerting a positive

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impact on bank efficiency. Kiesel et al. (2015) found that the introduction of EU Regulation 263/2012, which was designed to limit speculation on credit default swaps, resulted in stabilization of European markets and firm valuations.

Regulations can also have negative effects on bank valuations. González (2005) analyzed 251 banks in 36 countries and found that regulations increase banks' risk taking by reducing the charter value, suggesting a negative relationship between regulations and the stability of a banking system. Madura and Premti (2014a) found that the events signaling the Volcker rule imposed heavy restrictions on bank proprietary trading, resulting in negative valuation effects for large money-center banks. Chortareas et al. (2012) found that supervisory and regulatory policies that result in capital restrictions and bank activities can impede efficient operations of banks. Bouheni (2014) found that strengthening the regulatory and supervisory framework, specifically the existence of deposit insurance schemes, can also increase risk-taking, reducing bank stability.

Regulations can impact bank valuations differently depending on the size and level of capitalization of banks. Madura and Bartunek (1995) found that the small and medium-sized banks' valuations were positively affected by the introduction of the FDICIA, while larger banks were negatively affected; the authors studied 89 banks in the period leading up to the introduction of the FDICIA at the end of 1991. The study also found that banks with high capital asset ratios experienced higher valuation returns. However, it is also interesting to note that Liang et al. (1996) did not find significant differences in valuations between small and larger banks upon the introduction of the FDICIA.

Penalties Related to Non-Compliance

Regardless of whether regulations have positive or negative effects, sometimes banks do not comply with the regulation and as a result suffer penalties. Over the years, there have been penalties due to various negative financial market events triggered by non-compliant banking industry activities. Market manipulation was a common occurrence with 73 regulatory penalties between 2007 and 2015. A majority of these market manipulations related to the rigging of interest rates, foreign exchange rates, and municipal bond issues. Regulations prohibit banks from colluding in setting inter-banking lending rates. Rigging activities violate the Securities Exchange Act of 1934 with penalties totaling \$16 billion issued by various regulatory authorities including the Office of the Comptroller of Currency (OCC), the Internal Revenue Services (IRS), the Federal Reserve, the New York Attorney General's Office, the New York Department of Financial Services, the SEC and the DOJ. The market manipulation of the LIBOR and the Euro Interbank Offered Rate (Euribor) affects rates for derivatives and debt products like mortgages and student loans. Deliberately manipulating these rates by colluding with other banks results in artificial rates that benefit the banks at the expense of borrowers. Many global banks were involved in these non-compliant activities; the largest fine to date levied against Deutsche Bank for \$2.5 billion in April 2015 to settle the violation (Protest & Ewing, 2015).

The collapse of the housing market in the United States was partly triggered the 2008 global financial crisis. A major cause was the re-packaging of subprime mortgages into a new form of mortgage-backed securities that were incorrectly rated (Coffee, 2009). These securities were traded as complex derivatives that misled investors as to the true risks of these securities, violating various regulations including the Home Mortgage Disclosure Act of 1975, the Truth in Lending Act of 1968, and the Securities Exchange Act of 1934. Between the same period of

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2007 and 2015, there were 125 regulatory penalties totaling \$121 billion related to violating securities regulations by misleading investors about the risks of the mortgage backed securities. Banks were primarily held accountable for the housing collapse; the largest fine to date was placed on Bank of America for \$17 billion by the DOJ as a settlement to resolve allegations of fraudulent selling of mortgage backed securities (“BofA Reaches \$17 Billion Settlement,” 2014).

Since 1998, regulatory penalties related to the failure of AML compliance on banks has risen steadily. In 2009, Lloyds Bank was fined \$350 million by U.S. regulators due to violations of sanction regulations as a result of illegal financial transactions with Iranian entities. Lloyds Bank removed customer information from wire transfers, allowing these transactions to pass undetected through sanction filters in U.S. banks (Quinn, 2009). Fines against banks have increased with the highest fine on record being against BNP Paribas in 2014 for \$8.9 billion for similar violations (Douglas, 2014). The resulting impact on pre-tax bank profit is also significant as banks are required to take a charge to their profit and loss statement and to pay these fines in cash typically 90 days from the enforcement action. HSBC’s profit fell 17% in 2012 as a result of paying a \$1.92 billion penalty for non-compliance, equivalent to 9% of its pre-tax profits (“HSBC to pay \$1.9B,” 2012; Werdigier, 2013). Standard Chartered Bank was fined \$677 million in 2012, also representing 9% of its fiscal year pre-tax profit (Yost & Pylas, 2012). These one-time extraordinary events do not take into account the resulting increase in the ongoing operational cost of remediating compliance operations as a result of the enforcement actions. These data suggest that fines resulting from anti-money laundering (AML) regulations do indeed affect a bank’s operating costs and profitability.

While the purpose of these regulatory penalties is to correct banks’ illegal behavior and send a signal to take compliance seriously, it is, however, unclear whether these penalties fulfill

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these purposes. Raymond James, a financial services broker, was fined \$17 million by the Financial Industry Regulatory Authority on May 18, 2016 for systemic AML compliance failures (“FINRA fines Raymond James,” 2016). However, for the two weeks after the fine, from May 19 through May 31, the stock price rose from \$51.57 to \$56.07 (NYSE, 2016). The financial services sector, in general, did not see any significant impact during the same period. Another example is related to the LIBOR scandal. The U.S. DOJ fined five global banks (Barclays, Citi, Chase, the Royal Bank of Scotland, and UBS) more than \$5 billion in combined penalties due to price manipulations of LIBOR (Viswanatha, 2015). Shares of the U.S. banks fell slightly. However, Barclay’s stock jumped more than 3% after the penalties were announced. Part of the reason for the rise was the unexpected announcement that the total fine of £1.5 billion was less than the £2 billion that was allocated by the bank (Jakab, 2017). Again, similar Tier 1 bank stocks did not see a drop in valuations. The Barclays LIBOR incident in particular highlighted investors’ relief that penalties were not as large as anticipated and that regulators did not suspend licenses, resulting in stock jumps even after the negative news. Counterintuitive stock reactions are seen in other industries as well. Volkswagen was ordered by regulators to pay an additional \$1 billion on December 20, 2016 related to the emissions scandal; however, on the day after the announcement, the company’s stock price rose 2.5% (Tabuchi, 2016). This evidence shows that these fines did not go far enough to send a strong signal to the wrongdoers and that investors expected a harsher punishment. The purpose of this study is to analyze the effectiveness of these penalties in sending a signal to the banking industry.

Spillover Effects on the Banking Industry

The banking industry has several unique characteristics that make it susceptible to spillover effects. Spillover occurs when an external event, like a bank run, leads to a negative

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valuation impact on a bank which then spreads to other banks, causing similar bank runs and negative impact on the other banks' valuations. Kaufman (1994) reviewed the literature on the spillover effect in the banking industry and concluded that the spillover effect is more prominent in the banking industry. He attributed this to the uniqueness of the sector which leads to rapid effects, greater spread to other banks, larger losses within and beyond the industry, and potential adverse effects on the broader economy. Banks traditionally offer similar products that are relatively homogeneous, making it easy for depositors to switch banks due to perceived risks. Bessler and Nohel (2000) found that this homogeneity is due to the syndication of large loans between banks, resulting in rival banks having similar customers and high correlation of assets. This correlation means that new information about one bank could also reveal information about assets of other banks. Kaufman also found that because banks frequently provide short-term loans to each other, their interconnectivity leads to a greater possibility of spillover from an external event. Further, bank deposits are fairly liquid which results in customers easily withdrawing funds at the first sign of a negative event, increasing the risks of spillover across the industry.

The banking sector is a highly regulated industry where negative shocks can have significant financial effects on the economy. Many studies have examined the nature of spillover effects and their characteristics within the banking industry. Aharony and Swary (1996) studied the spillover effect of five large bank failures in the Southwest region of the United States during the mid-1980s and found that distance and capital adequacy are negatively related to the size of the spillover effect while the size of the bank is positively related. They found that rival banks that were closer to the failed banks and with lower capital adequacy experienced lower abnormal returns, while rival banks of similar size saw higher abnormal returns. Docking et al. (1997)

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found that negative shocks triggered by announcements of loan-loss reserves by regional banks between 1985 and 1990 decreased the value of both the money-center banks and the rival non-announcing regional banks. They found that size and amount of loan-loss reserves of the rival banks are characteristics that determine the spillover effect. Bessler and Nohel (2000) found negative spillover effects where announcements of dividend cuts by money-center banks resulted in negative abnormal returns of non-announcing money-center banks and to a lesser extent on large regional banks. Akhigbe and Madura (2001) examined whether negative news related to publicized bank failures results in spillover effects of rival banks and found that spillover effects do exist and the impact on the valuations of the banks is stronger when the failed bank is a multi-bank holding company, publicly held, and relatively large. If the rival banks are smaller with low capital levels, the negative valuations are less pronounced, suggesting that size is an important characteristic when determining the extent of spillover. The authors' scope of study included 99 publicized bank failures over the 1990 to 1996 period.

Spillover effects also occur internationally. Gay et al. (1991) found that three bank failures in Hong Kong between 1982 and 1985 caused a decline in the returns of rival banks. Gropp et al. (2009) found evidence of contagion among big European banks between January 1994 to January 2003. They also found that that contagion increased with the introduction of the euro in 1999. Specifically, Gropp et al. (2009) found large money-center banks to be the most affected due to cross-border interbank exposures.

Spillover effects can also occur across different industries and countries. Lang and Stulz (1992) studied bankruptcy announcements of cross-industry firms and found that bankruptcy announcements had higher negative valuation effects in highly leveraged industries where the competitors were highly correlated. The study covered 59 bankruptcies across 41 industries

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between January 1970 and December 1989. Ferreira and Gama (2007) found that between 1989 and 2003, sovereign debt rating and credit outlook changes that affect one country's stock market returns can also spill over into other countries' stock market returns as well. The authors found that geographic proximity between country stock markets also results in greater spillover effects.

Spillover effects can also be indeterminate. Aharony and Swary (1983) analyzed the three largest bank failures between 1973 and 1976 and found no evidence of spillover as a result of fraud in the failed banks. Slovin et al. (1999) found that while dividend reductions at the announcing money-center banks resulted in negative valuation at regional banks, dividend reductions at regional banks resulted in a positive competitive effect on geographic rivals. The authors conducted the analysis over the period between 1975 and 1992.

Given the propensity of the spillover of information in the banking industry, regulators could use these penalties to send a strong signal to other banks in the industry to take compliance with regulations seriously. However, as the previous examples demonstrate, it is unclear if the actions by the regulators do so. This paper seeks to examine if penalties are effective in sending a strong signal to both the fined bank that receives the penalty as well as the rest of the banking industry so as to change behavior to comply with banking regulations.

Hypotheses

Overview

This section describes four groups of hypotheses. The first group tests for the effects of penalties on the fined banks to determine if the penalties sent a strong signal to the fined banks. The second group tests for effects of the penalties on the fined bank based on the fine and bank characteristics. The third group tests for the effect of the penalties on competitor banks. Finally,

the fourth group describes the effect of the penalties on the competitor banks based on the fine and bank characteristics.

The Effect of Penalties on the Fined Banks

Regulations are intended to ensure banks positively impact economic growth and to send a strong signal to correct non-compliant negative behavior and ensure similar behavior does not occur again. Regulatory penalties that are intended to enforce the regulations can include monetary fines or non-monetary cease and desist orders. These outcomes are typically considered negative events by the market with possible impact both financially and on the bank's reputation. This should result in a negative impact on stock returns based on the negative event. For example, when Deutsche Bank was penalized \$14 billion by U.S. regulators on September 16, 2016 in relation to the mortgage crisis of 2008, its stock price fell 9% on that day and lost 47% for the year, on top of receiving negative press coverage which impacted the bank's reputation (Razin, 2016). Zions Bank incurred an \$8 million fine on February 10, 2011 for violations of the BSA and USA PATRIOT Act, however the stock price was up 1.4% the following day (Solsman, 2011). While regulatory penalties are intended to send a strong signal to banks to punish the banks and correct behavior, it is unclear if the penalties are effective enough in doing so. If the penalties do send a strong signal, we should observe a significant post-event negative reaction on the stock returns of the bank that was penalized. To the contrary, if the signal of the penalty is not strong enough to punish the bank, then we should observe either an insignificant or positive reaction on bank stock valuations. I measured the effects of the fined bank's cumulative abnormal return on days (0, 1) based on the Market (*CARMM*), Fama-French (*CARFF*), and Fama-French momentum (*CARFFMOM*) models. The coefficients of the market model were estimated in the window 365 days and 30 days prior to the event (-365, -30). I also

measured if there was any impact of risk on the fined bank's CAR at the time of the penalty as well as one and six months after the penalty. The hypothesis here is that the regulatory penalty sends a strong signal resulting in a negative reaction on the fined bank's stock valuation and risk.

The Effect of the Penalties on the Fined Bank Based on the Fine and Other Bank Characteristics. In this section, I develop several hypotheses on how the fined banks would be affected by the penalty depending on the fine and bank characteristics.

Bank size. Large, global banks typically receive more press and investor coverage given their market strength and influence. Regulators recognize the impact larger banks have on the banking industry and may impose larger penalties on larger banks specifically to send a stronger signal to the market. The intent is to make an example of these larger banks. Large, global banks with high public recognition like Bank of America, Chase, Citigroup, and Wells Fargo have collectively paid \$146 billion for various regulatory violations resulting from the 1998 mortgage crisis and currency market manipulation (Cox, 2015). Larger banks may also receive greater publicity with greater reputational damage as a result of a penalty. However, larger banks should also have greater resources to invest in compliance programs to prevent the occurrence of a regulatory penalty in the first place. As a result, a penalty could be considered unexpected, resulting in a higher negative valuation impact. The hypothesis here is that regulatory penalties should result in greater negative returns for larger banks.

However, larger financial services firms may have greater lobbying power and their ability to influence government and industry regulators may help to lower penalties. Larger banks often have dedicated resources that work directly with policymakers and lawmakers to formulate guidance on banking issues. They may be able to influence legislation that benefits them by lowering penalties for their institutions in the event of a regulatory violation. Larger

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financial services firms may also be considered *too big to fail* (TBTF), which can cause systemic failures across the banking industry in the event of a large fine. This prompts lower penalties or preferential treatment in the event of a regulatory violation, indicating an implicit government guarantee. Varmaz et al. (2015) found that TBTF guarantees are priced in by equity investors. The authors also indicated that while government aid to large banks in distress may stabilize the financial system, smaller banks are placed at a competitive disadvantage. Moral hazard is also a possible outcome, with TBTF financial institutions willing to engage in ongoing bad behavior and investors pricing in preferential behavior by regulators. During the housing crisis of 2008, there was a concern that American International Group (AIG) was TBTF. According to the Financial Crisis Inquiry Commission Report, the U.S. government concluded that AIG's default would have brought down the financial system requiring a bailout of \$180 billion (The Financial Crisis Inquiry Commission, 2011). It is also interesting to note that AIG has to date not received monetary penalties directly related to 2008 financial crisis despite actions that lead to near insolvency (Gethard, 2017). During the crisis, the Federal Reserve made emergency loans totaling about \$9.9 trillion to 10 of the largest financial institutions, accounting for 83% of the emergency credit extended to all U.S. financial institutions, clearly demonstrating preferential behavior. Gandhi and Lustig (2015) found that banks deemed TBTF saw a less negative return as "the government absorbs some of the large bank's tail risk" (p. 733). For both the hypothesis and counter-hypothesis, I measured the size of the fined bank by the log of total assets (*LOGAT*; Bouheni, 2014).

Penalty size. Larger penalties have a greater financial impact on a bank's operating profits as larger fines lower operating profits and reduce the ability for ongoing operations and future investments. As a result, the size of the penalty signals a larger valuation impact. For

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example, BNP Paribas saw a net loss as a result of the \$8.9 billion money laundering penalty in 2014, only to return to net profit in the third quarter of 2014 (Nikolaeva & Blamont, 2014). Similarly, German-based Commerzbank saw yearly profit halved due to the \$642 million fine by U.S. regulators in March of 2015 (Becker, 2016).

Larger penalties may also receive more publicity, as was the case for the BNP Paribas fine in July 2014 where the \$8.9 billion. The French government commented on the “unreasonableness” of the fine, generating more publicity (Ahmed, 2014). Larger penalties also send a signal to the banking industry that the regulators imposing the penalties are serious about ensuring compliance. Regulators may be looking to set an example of the banking sector for a violation and choose to impose a large penalty to correct behavior for a particular type of violation. The LIBOR currency market and interest rate rigging that occurred in 2008 resulted in significant fines totaling \$5.8 billion for six major banks, signaling to the market regulators’ seriousness about addressing this scandal (Crowe, 2015). The hypothesis here is that the larger regulatory penalty results in a more negative return for the bank.

The fined bank penalty size was measured by using a relative size measure (LOGFINESIZE) to allow for cross comparison between banks based on total assets. The size of the fine was normalized based on the log of the fined bank penalty divided by the log of total assets.

Bank risk. Riskier banks engage in behavior to seek higher returns at the possible expense of regulatory compliance. For example, Russia’s First Czech-Russian Bank and China’s Bank of Kunlun engaged in sanctioned Iranian transactions and charged premium fees compared to fees associated with non-sanctioned country transactions (Faucon, 2012). Handling sanctioned transactions creates greater risks of a regulatory penalty. The Bank of Kunlun was

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eventually sanctioned by U.S. regulators, unable to conduct U.S. dollar banking transactions (U.S. Department of the Treasury, 2012). Investors may also feel that the fined bank could repeat the risky behavior that resulted in the original fine. A penalty on a risky bank may also be only the tip of the iceberg and other risky behavior could be uncovered upon further investigation. As such, the signal may be stronger for these riskier banks resulting in a higher negative valuation from a regulatory penalty. The hypothesis here is that regulatory penalties should result in more negative returns for riskier banks.

I used four measures of risk. The standard deviation of returns (*STDEV*) and beta are common proxies for measuring bank risk, calculated six months prior to the penalty (Madura & Premti, 2014b). While beta measures systematic risk, *STDEV* measures total risk and considers how much the current return is deviating from historical returns. Beta typically measures how sensitive a bank is to market conditions (e.g. changes in interest rates and changes in regulations) while standard deviation also contains bank-specific risks (e.g. the risk of the bank being fined or the chief executive officer being fired) in addition to the beta. A third measure of risk is *RMSE* and measures firm specific or idiosyncratic risks. The one-month and six-month risk shift was also measured to test if returns are impacted over time. Bank risk can also be proxied by the level of non-traditional banking activities reported as non-interest income. Non-traditional banking activities include services outside of typical deposit and lending activities. These banking activities may include but are not limited to securities brokerages, insurance sales, venture capital, investment banking, and asset securitization (DeYoung & Torna, 2013). DeYoung and Torna (2013) also found that these non-traditional banking activities were considered higher risk, contributing to higher bank failures during the financial crisis, resulting

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in a greater negative effect on bank valuations. The amount of non-traditional banking activities is measured as non-interest income divided by total current operating revenue (*TNIINORM*).

Subsequent fines. Banks that receive subsequent penalties for similar offenses incur greater reputational impact. This is because investors perceive the fined bank as not being able or willing to correct the offending behavior. Investors may be concerned that regulators would send a stronger signal to the offending bank by imposing an additional penalty. As a result, these banks will see more negative returns as a result of multiple penalties. Standard Chartered Bank was fined in August and December 2012 for similar money laundering offenses (Protesse & Bray, 2014). While the second penalty of \$300 million was significant, regulators also suspended Standard Chartered's dollar clearing ability in its New York branch for high-risk retail clients. The impact of this action on future banking operations is considered significant, impacting the bank's reputation and ability to generate future client revenue. As such, the regulatory penalties should result in more negative returns for banks that are fined multiple times.

The frequency of fines (*SUBSEQFINEDUM*) was measured where 0 is a single fine for a single penalty, 1 is multiple fines for the same offense, and 2 is multiple fines for different offenses by the same financial institution.

Control variables. Banks that receive penalties can have either a United States based headquarter location (e.g. Chase, Citibank) or a headquarter location outside the United States (e.g. HSBC, Barclays). I controlled for the headquarter bank location by using an indicator variable (*USBankDUM*) with 1 for United States based banks and 0 otherwise. Different regulators that hand down enforcement actions include the SEC (*SECDUM*), DOJ (*DOJDUM*), DOT (*DOTDUM*) and the FHFA (*FHFADUM*); I controlled for the different regulators with

dummy variables where 1 indicates if the enforcement action was issued by that regulator and 0 otherwise.

The Effect of Penalties on the Competitor Banks

The goal of regulatory penalties is to send a signal to both the offending bank and to the banking industry in general to correct the behavior. The banking sector is notorious for spillover of information from one fined bank to its competitors. Kaufman (1994) conducted a review of the literature and found that the spillover effect in the banking industry is more prevalent as banks are relatively homogeneous offering similar services. Bank deposits are fairly liquid resulting in customers easily withdrawing funds at the first sign of negative events, making it easier for customers and investors to switch to competitors. As a result, if the fine on the bank is significant there is a chance that the closest competitor will also eventually be fined as well. The expectation is that competitors will also be negatively impacted by the penalty on the fined bank. However, competitors will only be affected if the fine is large enough to send a strong signal. A negative valuation will suggest that regulatory penalties are sending a strong signal to competitors and that the penalties are taken seriously by competitor banks. If the valuation is either not significant or positive, this will mean that the penalties do not send a strong enough signal to the competitor banks. I measured the effects of the competitor bank's cumulative abnormal return (CAR) on days (0, 1). The coefficients of the Market (*CARMMM*), Fama-French (*CARFFM*), and Fama-French momentum (*CARFFMMOM*) models were estimated in the window (-365, -30).

The effect of the penalties on the competitor banks based on the fine and bank characteristics. Banks with similar characteristics are more likely to operate in the same way and therefore the closer the competitor banks based on these characteristics, the more likely the competitor banks will be affected by the regulatory penalty of the affected bank. I next examine the effect of the signal that the penalty sends to the competitor depending on the competitor characteristics.

Competitor size. Larger competitor banks are also more likely to get fined as regulators are looking to send a strong signal to the banking industry, similar to other large fined banks. Targeting larger competitor banks generates more publicity for the fine increasing the likelihood of a penalty. Larger banks can be more transparent based on public reporting requirements, making it more likely for regulators to identify opportunities for additional illegal activity. Also, regulators typically have limited resources and are more likely to target larger banks to send a strong signal to the banking industry. The hypothesis here is that larger competitor banks may see a greater negative return as a result of a penalty on the fined bank.

However, large competitor banks may also have similar lobbying power as the affected bank, and the ability to influence regulators may help to prevent a penalty on the competitor banks. Similar to other larger banks, competitor banks may also have dedicated resources to work directly with lawmakers to provide guidance on banking issues. These banks may be able to influence regulators to decrease the likelihood that a competitor bank incurs a regulatory penalty despite the affected bank incurring a penalty. Larger banks are also more complex and may be involved in complicated derivative trading and other less transparent activities, making it increasingly difficult for regulators to identify and prosecute non-compliant behavior. The hypothesis here is that larger competitive banks may see a lower negative return as a result of a

penalty on the fined bank. Competitor bank size was measured by the log of total assets (*LOGATMATCH*).

Competitor risk. Banks that are high risk are more likely to break the rules to maximize profits. These high-risk banks may be willing to provide services to sanctioned entities where they can charge higher service fees. This was the case for several banks including HSBC and Standard Chartered Bank, both of which engaged in high-risk activities by knowingly removing references to Iranian sourced transactions to avoid United States sanctions policy to earn processing fees (Glass, 2012). Investors seek to evaluate the risk levels of the competitors and make an investment decision based on the likelihood of being fined, that is, the riskier the competitor, the higher the likelihood that the bank will be fined based on the original fine on the affected bank. Correspondingly, competitors with higher risk levels may experience a greater negative valuation impact, indicating that higher risk levels send a strong signal as a result of a regulatory penalty. This was calculated six months before the penalty. The hypothesis states that higher risk competitors may see a greater negative return as a result of regulatory penalties on the fined bank. The standard deviation of returns (*STDEVMatch*), beta (*BETAMatchEW*), root mean square error (*RMSEMatch*), and the level of non-traditional banking activities (*TNIINORMM*) were also used to measure competitor risk.

Degree of similarity. The greater the degree of similarity of the bank's operations means that there is a higher likelihood of similar behavior between the fined and competitor bank. Premti (2014) demonstrated that the closest competitors are subject to higher contagion effects due to the similarity of their operations. The correlation of returns (*CORR*) between the affected and competitor bank acts as a proxy to capture the degree of similarity between banks. Therefore, the closest competitors should have lower negative returns as a result of the

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regulatory penalty. I measured the degree of similarity between banks by the correlation of returns between the fined bank and competitor bank that have a size within 20% of the total assets of the fined bank in the event window (-365, -30). The hypothesis here is that competitor banks with a high correlation of returns will see lower negative returns as a result of regulatory penalties.

Competitors which eventually get fined. Investors may have some idea of which banks eventually get fined in the future. If a competitor gets a fine for an offense similar to the fined bank on the day that the affected bank is fined, we should observe a lower negative return for the competitor bank because the market expects the competitor bank to eventually receive a penalty in the future. If the competitor bank eventually does get fined, then the market has some idea that the competitor banks engage in non-compliant behavior and will see a lower negative return. This hypothesis tests whether the market has a sense of which banks will be fined in the future. To measure the effect, a dummy variable (*EVENTFINED*) was used to indicate the competitor being eventually fined where 1 indicates the competitor bank was eventually fined for a similar offense as the fined bank and 0 indicates the competitor bank has not been fined. The hypothesis here is that competitor banks that are eventually fined will see a lower negative return as a result of regulatory penalties on the fined bank.

Effect on previously fined bank. It is possible that a fined bank's close competitor may have been previously fined. In that case, the competitor may have already paid its dues, and it is unlikely that this competitor would be fined again. Therefore, the competitor bank that has been previously fined for similar offenses will have a lower abnormal return on the day of another bank being fined as investors would have already discounted the negative valuation impact due to the previous fine on the competitor bank. A dummy variable (*PREVFINED*) was used to

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measure the effect of the competitor bank being previously fined where 1 is a competitor for the previously fined bank, 0 otherwise. The hypothesis here is that the competitor bank that was previously fined for the same offense will see a lower negative return as a result of regulatory penalties on the fined bank.

Effect of competitor bank headquarter location. Similar to the fined banks, competitor banks can have either a United States based headquarter location (e.g., Chase, Citibank) or a headquarter location outside the United States (e.g., HSBC, Barclays). I controlled for the headquarter bank location by using an indicator variable (*USBANKDUM*) with 1 for United States based banks and 0 otherwise. The hypothesis here is that competitor banks with headquarter locations in the United States are affected by regulatory penalties on the fined bank.

Data and Methods

In this essay, I studied enforcement actions focused on correcting market manipulation, mortgage derivatives, and AML limited to United States based financial institutions. I obtained the list of financial institutions which incurred enforcement actions from the *Financial Times* compilation of settlements collected from May 2007 to May 2015 (Stabe & Stanley, 2015), validated by regulator websites publishing the fines and by other reputable news sources. Following Akhigbe and Martin (2006), I included banks identified with Standardized Industrial Code (SIC) code 602X and savings institutions using code 603X. Findings showed a total of 250 regulatory penalties with 100 unique banks as several banks have had multiple penalties. Financial bank data was obtained from Compustat. I obtained daily returns for both the fined and competitor banks from the CRSP database.

This event study used the market model to measure the effects of fines on a bank's CAR on days (0, 1). The coefficients of the market model were estimated in the window 365 days

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prior to 30 days prior to the event (-365, -30). Event studies are commonly used to evaluate the possibility of abnormal returns based on specific events (MacKinlay, 1997). I also used the Fama-French three factor model and the Fama-French-Carhart momentum models to confirm the robustness of the result. To test the signal strength of the regulatory penalty on the fined bank, I conducted a *t*-test and a Wilcoxon signed-rank test to determine the significance of the mean and median CAR of the fined bank, respectively. If the penalties sent a strong signal, a significant negative reaction should have been observed on the stock valuations of the bank that was fined. If the signal of the penalty was not strong enough, either an insignificant or positive reaction should have been observed on the bank's stock valuation.

I then tested the strength of the signal on the fined bank for each bank characteristic as described in the hypothesis section. I did this by running a cross-section regression model with the CAR of the fined bank as the dependent variable. If the strength of the signal for each characteristic was strong, a significant valuation impact (more or less negative depending on the hypothesis) of each characteristic on the fined bank's CAR should have been observed. An insignificant or positive reaction on the bank's stock valuation indicates a weak signal.

To test the strength of the signal of the regulatory penalties on the competitor banks, I first identified the 10 closest competitors of each fined bank by employing methodology described by Premti (2014). Each affected bank was matched against the 10 closest competitor banks with total assets within a 20% range. Also, I maintained the sample of the top 10 competitor banks with the highest correlation of returns with the fined bank estimated in the event window (-365, -30). I estimated the total sample size of competitor banks to be 646 banks.

To determine the strength of the signal that the penalties had on the competitor banks, I conducted similar *t*-tests and Wilcoxon signed rank tests as the fined banks. For competitor

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banks, an insignificant or positive reaction indicated the signal was not strong enough to correct non-compliant behavior.

Finally, I ran a regression model to determine which bank characteristic sends a strong signal to competitor banks as a result of regulatory penalties on the fined bank. I determined this by using the CAR of the competitor bank as the dependent variable with the strength of the signal for each characteristic tested for its significance. If the strength of the signal for each characteristic was strong, a significant negative valuation impact should be observed on the competitor bank's CAR. An insignificant or positive reaction on the competitor bank's stock valuation indicated a weak signal.

The following regression model was used to test the characteristics of the fined banks.

Table 1 provides a description of the variables.

$$\begin{aligned} CAR(0,1) = & \beta_0 + \beta_1 * LOGAT + \beta_2 * LOGPENALTYSIZE + \beta_3 * RISK (STDEVBANK, RMSEBank, \\ & BetaBankEW \text{ or } TNINORM) + \beta_4 * RISK SHIFT (STDEVshift6m, RMSEshift6m, BETAshift6m) \\ & + \beta_5 * SUBSFINDUM + \beta_6 * CTRL + \varepsilon \end{aligned} \quad (1)$$

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Table 1

Description of Variables

Variable	Comment
<i>CAR(0,1)</i>	Fined or competitive bank CAR measured on days zero and one. Three models were used: market model (<i>CARMM</i>), Fama-French model (<i>CARFF</i>), and Fama-French plus momentum model (<i>CARFFMOM</i>)
<i>LOGAT</i>	Fined bank asset size as measured by log of total assets.
<i>LOGPENALTYSIZE</i>	Fined bank monetary penalty size. The size of the fine was normalized based on the size of the bank by calculating the ratio of the log of the fine by the log of total assets
<i>STDEVBANK</i>	Standard deviation of returns calculated as the post regulation minus the pre-regulation stock price (<i>SP</i>) divided by the pre-regulation stock price six months prior to the penalty ($SP_{post} - SP_{pre} / SP_{pre}$)
<i>RMSEBankEW</i>	Root mean square error equal weighted returns.
<i>BetaBankEW</i>	Beta of bank equal weighted returns
<i>STDEVshift6m</i>	Standard deviation of returns risk shift six months–fined or competitor bank
<i>RMSEshift6m</i>	Root mean square error risk shift six months equal weighted–fined of competitor bank.
<i>BETAshift6m</i>	Beta shift six months–fined or competitor bank
<i>SUBSFINDUM</i>	Frequency of fine where 0 is a single fine for a single penalty and 1 is multiple fines for the same offense
<i>TNIINORM</i>	The level of non-traditional banking activities for the fined bank, including services outside of typical deposit and lending activities divided by total current operating revenue

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The following regression model was used to test the characteristics of the competitor banks. Table 2 provides a description of the variables.

$$CAR(0,1) = \beta_0 + \beta_1 * CARBank + \beta_2 * LOGATMATCH + \beta_3 * RISK (STDEVMatch, RMSEMatchEW, BetaMatchEW, TNIINORMM) + \beta_4 * RISK SHIFT (STDEVshift6m, RMSEshift6m, BETAshift6m) + \beta_5 * CORR + \beta_6 * EVENTFINED + \beta_7 * PREVFINED + \beta_8 * USBANKDUM + \varepsilon \quad (2)$$

Table 2
Description of Variables

<i>CARBank</i>	CAR of fined bank.
<i>LOGATMATCH</i>	Competitor bank asset size as measured by log 10 of total assets.
<i>STDEVMatch</i>	Standard deviation of returns for the competitor bank.
<i>RMSEMatchEW</i>	Root mean square error equal weighted competitor bank.
<i>BETAMatchEW</i>	Beta of competitor bank equal weighted.
<i>TNIINORMM</i>	Measures the level of non-traditional banking activities for the competitor bank including services outside of typical deposit and lending activities divided by total current operating revenue.
<i>CORR</i>	Correlation of returns measuring similarity of operations between the fined bank and the competitor bank.
<i>EVENTFINED</i>	Dummy variable where 1 indicates the competitor was eventually fined for a similar offense as affected bank and 0 indicates competitor bank has not been fined.
<i>PREVFINED</i>	Dummy variable where 1 is a competitor of the previously fined bank, 0 otherwise
Control variables (<i>CTRL</i>)	
<i>pentypeAML</i>	Dummy variable where 1 indicates enforcement action relates to the AML event, 0 otherwise
<i>pentypeMBS</i>	Dummy variable where 1 indicates the enforcement action relates to the MBS event, 0 otherwise
<i>USBANKDUM</i>	Dummy variable where 0 is for banks with overseas headquarter location and 1 is for banks with United States headquarter location.
<i>USMBANKDUM</i>	Dummy variable where 0 is for competitor banks with overseas HQ location and 1 is for banks with United States HQ location
<i>DOJDUM</i>	Dummy variable where 1 indicates an enforcement action was handed down by the DOJ, 0 otherwise
<i>DOTDUM</i>	Dummy variable where 1 indicates an enforcement action was handed down by the DOT, 0 otherwise.
<i>SECDUM</i>	Dummy variable where 1 indicates an enforcement action was handed down by the SEC, 0 otherwise
<i>FHFADUM</i>	Dummy variable where 1 indicates an enforcement action was handed down by the FHFA, 0 otherwise

Results

Summary Statistics on Fined Banks

The initial sample of 310 enforcement actions on banks based in the United States was retrieved from the *Financial Times* compilation of settlements and validated by individual regulatory websites. Total monetary penalties for the period ranging between May 2004 and December 2016 was \$193 billion for all 310 enforcement actions. To be included in the sample, banks must have had market returns data available for the 220 trading days between the end of the estimation window and the beginning of the event window. I retrieved a total of 250 observations from the Compustat database. Financial institutions that were private at the time of the enforcement action or had incomplete records on Compustat were excluded from the sample.

Table 3 provides summary statistics related to the financial institutions that were subject to enforcement actions between May 2004 and December 2016. Results showed 240 separate fines with a mean size of \$683 million, with the smallest fine of \$200,000 levied against Eastern National Bank on October 24, 2008 for failing to maintain adequate procedures to detect money laundering and the largest fine of \$16.7 billion on Bank of America as settlement to resolve allegations of misselling mortgage backed securities. Ten observations related to cease and desist enforcement actions that did not carry monetary penalties.

The average bank in the sample had \$1.48 trillion in assets with a standard deviation of \$862 billion, ranging from \$520 million to \$2.8 trillion, reflecting a large diversity of banks that have incurred enforcement actions. The average bank generated 41% of its income from non-interest sources (normalized by total current operating revenue).

Table 3

Summary Statistics for Fined Banks

Variable	Number of Observations	Mean	Standard Deviation	Min.	Max.
Penalty Size	240	\$ 683 M	\$ 1.92 B	\$ 200 K	\$ 16.7 B
Total Asset Size	235	\$ 1,484 B	\$ 861.8 B	\$ 520 M	\$ 2,807 B
Total Non-Interest Income (<i>TNII</i>)	221	\$28.5 B	\$ 17.7 B	\$ 2.5 M	\$ 58.7 B
Normalized Total Non- Interest Income (<i>TNII</i> <i>NORM</i>)	180	0.4120	0.1148	0.0215	0.7759
Standard Deviation of Returns (<i>STDEV</i>)	196	0.0196	0.0112	0.00795	0.09460
<i>BetaBankEW</i>	196	1.444	0.47351	-0.03003	2.87115
Root Mean Square Error Equal Weighted (<i>RMSEEW</i>)	196	.014255	.008067	.0059009	.0781536
Dept. of Justice Dummy (<i>DOJDUM</i>)	250	0.188	0.39149	0	1
Dept. of Treasury Dummy (<i>DOTDUM</i>)	250	0.256	0.42730	0	1
Securities Exchange Commission Dummy (<i>SECDUM</i>)	250	0.12	0.32561	0	1
Federal Housing Finance Agency Dummy (<i>FHFADUM</i>)	250	0.148	0.35581	0	1

Note. This table provides summary statistics specifically for the fined banks used for the cross-section regressions. Penalty size refers to the amount of the fine handed out by the regulatory agency and was obtained from published sources referenced against regulatory agencies' public databases. Total asset size was obtained from Compustat, representing total assets divided by liabilities of a company. *TNII* measures the level of non-traditional banking income for the fined bank, including services outside of typical deposit and lending activities including (but not limited to) venture capital and investment banking activities. *TNII**NORM* is total non-interest income divided by total current operating revenue. *STDEV* measures the annual rate of return of an investment to measure volatility. *BetaBankEW* measures systematic risk of the bank using an equal weighted index fund obtained from CRSP based on U.S. stocks. *RMSEEW* measures firms specific or idiosyncratic risks using equal weighted index fund obtained from CRSP. *DOJDUM*, *DOTDUM*, *SECDUM*, and *FHFADUM* are control variables where 1 indicates if the enforcement action was issued by that respective regulator, 0 otherwise.

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Total risk, as measured by the standard deviation of returns (*STDEV*), had a mean of 0.02 ranging from 0.0079 to 0.0945. Standard deviation and beta were measured in the year before the event. Beta (equal weighted) had a mean of 1.44. Idiosyncratic risk was measured by the standard deviations of residuals (i.e., the *RMSE* of the market model that was used to estimate CAR). The equal weighted *RMSE* was on average 0.0143. Overall, the results suggested that banks in the sample have a high level of market risk with the potential for higher returns.

The four major agencies that regulate the financial services industry and that enforce penalties are the DOJ (*DOJDUM*), the DOT (*DOTDUM*), the SEC (*SECDUM*), and the FHFA (*FHFADUM*). Of the 250 observations, 19% were penalties from the DOJ, 26% from the DOT, 12% from the SEC, and 14% from the FHFA. The remaining 29% were penalties from various other agencies. The U.S. banking sector includes both banks headquartered in the United States and other countries.

Table 4 provides a breakdown of HQ locations. The sample shows a majority of the fined banks (67%) have HQ locations in the United States.

The Effect of Penalties on the Fined Banks

To determine if the average CAR of the sample was significantly different from zero *t*-tests were calculated. Results are provided in Table 5. A positive and significant result indicates that bank returns react more positively to enforcement penalties. I used an estimation window of 220 trading days with a gap of 22 business days between the end of the estimation window and the beginning of the event window. I calculated the CAR on the day of and the day after the enforcement action based on the market (*CARMM*), Fama-French three factor (*CARFF*) and Fama-French plus momentum (*CARFFMOM*) models. The sample also includes banks that had

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Table 4

Headquarter Locations

Headquarter location	Frequency	Percentage
Canada	6	2.4
Switzerland	19	7.6
Germany	10	4
Great Britain	45	18
Netherlands	2	1
United States	168	67
Total	250	100

Note. This table provides summary results for bank headquarter locations. All non-United States banks are required to register as a domestic bank subject to federal, state, and local charter requirements irrespective of ultimate headquarter location.

Table 5

Results from t-Test for Cumulative Abnormal Returns

Model	With duplicates			No duplicates		
	Market Model (<i>CARMM</i>)	Fama-French Three Factor Model (<i>CARFF</i>)	Fama-French Plus Momentum (<i>CARFFMOM</i>)	Market Model (<i>CARMM</i>)	Fama-French Three Factor Model (<i>CARFF</i>)	Fama-French Plus Momentum (<i>CARFFMOM</i>)
N	250	250	250	196	196	196
Mean	0.00333*	0.00413**	0.00368**	0.00255*	0.00314*	0.00276*
<i>p</i> value	(0.0686)	(0.0268)	(0.0499)	(0.0152)	(0.1293)	(0.1861)
<i>t</i> statistic	1.8292	2.2272	1.9708	1.8434	1.9235	1.9268
Wilcoxon Signed-Rank Test						
<i>z</i> score	1.804*	3.242**	3.039**	1.253*	2.270*	2.105*
<i>p</i> value	(0.0713)	(0.0012)	(0.024)	(0.2104)	(0.0232)	(0.0353)

Note. Market model uses abnormal returns according to the Capital Asset Pricing Model; Fama-French three factor model uses abnormal returns defined with respect to the Fama-French three factor model; Fama-French plus momentum model uses abnormal returns defined with respect to the Carhart (1997) model.

*, **, *** represent the level of significance at 10%, 5% and 1% respectively.

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more than one fine on the same day, which may cause the t -test and Wilcoxon tests to be biased. For banks with multiple penalties on the same day, the t -test results would be skewed to whatever the CAR for the day happened to be while the CAR would remain the same. To remove this bias, I dropped banks that have more than one fine on the same day and reran the t -test and Wilcoxon tests. A total of 54 observations were dropped for multiple fines on the same day.

For the sample that included duplicate fines, banks return, on average, a positive 0.33% on the day that the fine is announced, based on the *CARMM* model. The results were robust and significant when applied to the *CARFF* and *CARFFMOM* models, showing average CAR returns of 0.41% and 0.36%, respectively. As a test for robustness, I also included the Wilcoxon signed-rank test. While the t -test is a test of the mean, the Wilcoxon test is a test of the median and takes into account both the sign and the magnitude of the abnormal performance when computing whether the CAR is significantly different from zero. The results of the Wilcoxon tests, shown in Table 5, were positive and significant, supporting the t -test. For the sample with no duplicates, the results were similarly positive and significant with *CARMM* average of 0.26%, the *CARFF* average of 0.31%, and the *CARFFMOM* average of 0.28%. The Wilcoxon test also showed a positive and significant result for all three models. These results suggest that even when banks receive only one fine on the same day, returns are positively affected. Overall, the results show that on average, bank returns react more positively as a result of an enforcement fine, suggesting that enforcement actions do not send a sufficient signal to correct bad behavior.

The overall positive CAR is surprising, suggesting that bank's returns are positive on the day of the fine. This result could be explained by either fines being perceived as less harsh than expected or that the revelation of the fine is perceived as reducing the risk of the bank, driving

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positive returns. A bank is commonly informed at an early stage that they are under an investigation that may lead to a fine. The bank allocates reserves to cover the cost of the fine when it is the subject of an investigation. These reserves are often larger than the actual fine as they can be easily re-allocated at a future date. Banks can also negotiate a discount with the regulators by demonstrating cooperation and willingness to remediate. Deutsche Bank was successful with the U.K. Financial Conduct Authority and received a 30% discount for settling an AML control deficiency in bank operations (Financial Conduct Authority, 2017). Once an enforcement fine is announced, the market may not consider the penalties to be as harsh as initially expected, especially if the reserve allocation was larger than the actual fine amount. The market may also feel that the settlement allows the bank to reduce future uncertainty, reducing the drag on the stock, potentially boosting stock valuations. Goldman Sachs settled claims related to the MBS scandal, agreeing to a \$5 billion fine. Stock prices rose 1.5% the day after the announcement (Goldstein, 2016).

Another potential reason for the positive CAR is the insignificant impact on the risk of the bank at the time of the fine. In other words, markets perceive that the size of the fine will not significantly impact valuations and the risk of the bank. Significant changes in risk can, however, potentially impact returns where a reduction in risk at a future time period can result in more positive returns. To investigate if there is any impact of risk over time on fined bank returns, I calculated the difference between the risk during and after the enforcement fine, conducting both *t*-tests and Wilcoxon signed-rank test for the *STDEV*, *BETA* and *RMSE* risk variables and the risk shift over one month and six months for the equal weighted index. Table 6 shows that the results for all risk measures were mostly positive but insignificant for the one- and six-month periods. This suggests that there is no significant risk reduction as a result of the fine,

Table 6

Risk Shift Based on t-Test and Wilcoxon Signed-Rank Test

<i>t</i> -Test	<i>BetaShift6ME</i> <i>W</i>	<i>BetaShift1MEW</i>	<i>STDEVShift6M</i>	<i>STDEVShift1M</i>	<i>RMSEShift6MEW</i>	<i>RMSEShift1MEW</i>
N	249	249	249	249	249	249
Mean	-0.0222	0.018	0.001	0.0009	0.00088	0.00054
<i>p</i> value	0.404	0.7429	0.2561	0.3825	0.1851	0.4824
<i>t</i> statistic	-0.836	0.3284	1.1384	0.8748	1.3289	0.704
Wilcoxon Signed-Rank Test						
<i>z</i> score	-2.33	-0.116	-1.929	-0.9	-1.313	-1.599
<i>p</i> value	0.0198**	0.908	0.0537*	0.3683	0.1893	0.1097

Note. This table provides results based on *t*-test and Wilcoxon signed-rank tests for the fined bank risk shift. These tests determine the significance of the mean and median of the variable, respectively. *BetaShifte6MEW* and *BetaShifte1MEW* measure the shift in beta risk six months and one month, respectively, based on the equal weighted index. *STDEVShift6M* and *STDEVShift1M* measure the shift in standard deviation six months and one month related to the event, respectively. *RMSEShift6MEW* and *RMSEShift1MEW* measure the shift in root mean square error risk six months and one month related to the event, respectively, based on the equal weighted index.

but perhaps an insignificant risk increase based on the mean coefficient values of the t -test. The Wilcoxon signed-rank test for risk shift showed that the change in risk is negative and significant at the 10% level only after a 6-month period. Results suggest that while more banks experience a decrease in risk after the fine (compared to those that experience an increase), the decrease in risk is not large enough to conclude that the positive CARs observed in Table 5 were due to a decrease in risk after the fine is revealed. In fact, the t -test showed that on average, banks experience an insignificant increase in risk as a result of the fine.

Multivariate Regression Analysis—Fined Banks

Table 7 reports the results of the regression analysis. To test for the effects of the penalties on the various fined banks' characteristics, a multivariate ordinary least squares (OLS) regression analysis was conducted. The multivariate regression tests individual bank characteristics on the fined bank's CAR, including the size of the bank, size of the fine, the *BETA*, *STDEV*, and *RMSE* measures of risk, and the agencies implementing the enforcement actions. Testing bank characteristics against the CAR provided a greater understanding of which characteristics were significant in impacting bank valuation based on the hypothesis previously described. I checked for multi-collinearity using variance inflation factors (VIF), and the results reported multi-collinearity between *STDEV* and *RMSE* across all three market models. Therefore, I ran separate models for *BETA*, *STDEV*, and *RMSE* (equal weighted) to circumvent multi-collinearity. Value weighted models were also run as a test of robustness and were found to have consistent results with the equal weighted models. Also, I tested three models for robustness—the market, the Fama-French, and the Fama-French with momentum models. As a result, nine separate models which included the specific risk variables were run against *CARMM*,

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Table 7

Full Regression Model Fined Banks

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	<i>CARMM</i>	<i>CARFF</i>	<i>CARFFMO</i> <i>M</i>	<i>CARMM</i>	<i>CARFF</i>	<i>CARFFMO</i> <i>M</i>	<i>CARMM</i>	<i>CARFF</i>	<i>CARFFMO</i> <i>M</i>
<i>LOGAT</i>	-0.0165** (-2.44)	-0.0170** (-2.50)	-0.0198*** (-2.76)	-0.0161** (-2.39)	-0.0166** (-2.51)	-0.0195*** (-2.77)	-0.0136* (-1.82)	-0.0135* (-1.77)	-0.0157* (-1.91)
<i>LOGFINESIZE</i>	0.00571* (1.91)	0.00762* * (2.50)	0.00823*** (2.69)	0.00575* (1.91)	0.00773* * (2.55)	0.00836*** (2.72)	0.00469 (1.52)	0.00612* (1.93)	0.00677** (2.10)
<i>STDEVBank</i>	0.09 (0.24)	0.15 (0.44)	0.03 (0.10)						
<i>RMSEBankEW</i>				0.298 (0.60)	0.402 (1.05)	0.273 (0.83)			
<i>BetaBankEW</i>							-0.00245 (-0.32)	-0.000186 (-0.02)	-0.00199 (-0.26)
<i>STDEVshift6m</i>	0.759** (2.32)	1.232*** (3.65)	1.210*** (3.51)						
<i>RMSEshift6m</i>				0.936** (2.12)	1.591*** (3.68)	1.516*** (3.45)			
<i>BETAshift6m</i>							0.0182* (1.79)	0.0214* (1.67)	0.0239* (1.96)
<i>TNIINORM</i>	0.121***	0.123***	0.136***	0.119***	0.122***	0.134***	0.0910**	0.0797*	0.0900*

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	(3.32)	(3.21)	(3.36)	(3.33)	(3.38)	(3.38)	(2.39)	(1.80)	(1.96)
<i>SUBSEQFINDUM</i>	0.00 (0.36)	0.01 (0.69)	0.01 (0.90)	0.00 (0.09)	0.00 (0.30)	0.00 (0.47)	0.01 (1.29)	0.0151* (1.87)	0.0162** (2.25)
<i>USBankDUM</i>	-0.0117* (-1.70)	-0.01 (-1.46)	-0.0134* (-1.89)	-0.01 (-1.58)	-0.02 (-1.42)	-0.0126* (-1.81)	-0.02 (-1.19)	-0.03 (-0.70)	-0.01 (-0.99)
<i>DOJDUM</i>	0.00142 (0.17)	-0.00392 (-0.47)	-0.00613 (-0.71)	0.00146 (0.18)	-0.00387 (-0.44)	-0.00613 (-0.68)	0.00282 (0.36)	-0.00181 (-0.21)	-0.00414 (-0.48)
<i>DOTDUM</i>	(0.01) (-1.21)	(0.01) (-0.94)	(0.01) (-1.14)	(0.01) (-1.14)	(0.00) (-0.79)	(0.01) (-1.00)	(0.01) (-0.90)	(0.00) (-0.72)	(0.00) (-0.79)
<i>SECDUM</i>	0.00289 (0.35)	0.00794 (0.88)	0.00173 (0.20)	0.0032 (0.39)	0.00847 (1.01)	0.00235 (0.28)	0.00837 (0.92)	0.0164 (1.37)	0.00973 (0.93)
<i>FHFADUM</i>	0.00451 (0.63)	0.00152 (0.22)	-0.0000273 (-0.00)	0.00561 (0.83)	0.00302 (0.47)	0.00171 (0.27)	0.00882 (1.27)	0.00758 (1.08)	0.00673 (0.96)
Constant	0.000789 (0.03)	-0.0154 (-0.62)	-0.00687 (-0.28)	-0.00174 (-0.06)	-0.0181 (-0.71)	-0.00937 (-0.37)	0.00283 (0.11)	-0.0112 (-0.43)	-0.00522 (-0.19)
N	144	144	144	144	144	144	144	144	144
R ²	0.217	0.278	0.292	0.215	0.277	0.278	0.21	0.192	0.237

Note. This table provides regression results for the fined banks. *t* statistics in parentheses. *LOGAT* measures the fined bank's asset size in log. *LOGFINESIZE* measures the log of the fine size divided by log of total assets. *STDEVBank* measures the standard deviation of returns of the fined bank. *RMSEBankEW* is the root mean square error of fined bank equal weighted index. *BetaBankEW* is the beta of fined bank equal weighted index. *STDEVshift6m* is the standard deviation of returns risk shift six months. *RMSEshift6M* is the root mean square error risk shift six months equal weighted index related to the event. *Betashift6m* is the beta shift six months related to the event. *TNIINORM* is the fined bank's total non-interest income divided by total current operating revenue. *SUBSEQFINDUM* is the subsequent fine dummy variable where 1 indicates the bank was fined multiple times, 0 otherwise. *USBankDUM* is the fined bank headquarter location dummy variable where is 1 for U.S. headquarters, 0

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otherwise. Department of Justice dummy variable (*DOJDUM*), Department of Treasury dummy variable (*DOTDUM*), Securities Exchange Commission dummy variable (*SECDUM*) and Federal Housing Finance Agency dummy variable (*FHFADUM*) are control variables where 1 indicates if the enforcement action was issued by that respective regulator, 0 otherwise.

*, **, *** represent the level of significance at 10%, 5% and 1% respectively.

CARFF, and *CARFFMOM*. To correct for heteroscedasticity, which can occur due to the potential correlation of the risk variables, White standard errors are reported (White, 1980).

Bank Size. I found that the coefficient of bank size (measured by the log of assets, *LOGAT*) was negative and significant across all models. This result suggests that regulatory penalties result in a more negative return for larger banks due to enforcement actions. It is possible that regulators looking to send a stronger signal to the market choose to impose enforcement actions on larger banks. The intent is to make an example of larger banks resulting in potential greater reputational damage and valuation impact. Another possible explanation for the negative returns for larger banks could be due to *noisy trading* where penalties of larger banks are more publicized in the news and investors react by selling the stock, driving down the returns. The hypothesis that the regulatory penalties send a strong signal resulting in greater negative returns for larger banks is supported. The counter hypothesis that larger banks have a greater influence over regulators in reducing fine sizes due to preferential treatment is not supported based on these results. In this case, the idea of TBTF banks that can cause systemic failures across the banking industry in the event of a large fine is also not supported.

Penalty Size. I found that the coefficient of fine size (measured by the log of fine size divided by the log of total assets, *LOGFINESIZE*) was positive and significant across all three models. These results are counter-intuitive and suggest that banks with larger fines have a more positive effect on their returns compared to banks with smaller fines. One possible explanation here is that whenever a large fine is issued the market may have anticipated an even larger fine, discounting the impact of the penalty on the fined bank's returns. The market may also anticipate that the size of the penalties is trivial when compared to the bank's book value, as was the case for HSBC, which was fined \$1.9 billion by U.S. regulators for AML violations. The

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stock price was up 0.56% on the day of the announcement (Viswanatha & Wolf, 2012). Banks also allocate reserves to pay for potential fines. The reserve amount may be in excess of the actual penalty, and when a penalty is announced the impact could be smaller than the allocated reserves, driving positive market returns. I also ran an alternative version of the model for robustness, in which the log of total assets was replaced by the log of total current operation revenue (TCOR). These results were not reported to conserve space; however, they were consistent with the results of Table 7. The results do not support the hypothesis that the larger regulatory penalty results in a more negative return for the bank.

Bank Risk. I next measured the effect of risk on bank returns. I used *STDEV* to measure total risk and *BETA* to measure market risk. I also used *RMSE* to measure firm specific or idiosyncratic risk. As explained previously, I accounted for multi-collinearity by running separate models with *STDEV* (Models 1 to 3), *RMSE* (Models 4 to 6), and *BETA* (Models 7 to 9). For *BETA* and *RMSE*, I measured risk using the equal weighted index. Value weighted models were also run as a test of robustness and were found to have consistent results to the equal weighted models. The results were not significant across all measures of risk. These results suggest that the level of risk before the fine does not affect the bank CAR due to a fine. One explanation is that the market does not view regulatory penalties affecting banking operations sufficient to impact the level of risk of the bank. The hypothesis that the regulatory penalties should result in more negative returns for riskier banks is not supported.

While there is no significant impact of risk on the bank CAR at the time of the fine, risk shift could, however, occur, because before the fine there could be uncertainty and with the announcement of the fine additional information may be revealed that could potentially impact the level of risk. To measure the risk shift, I calculated the difference between the risk before

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and six months after the enforcement fine for the risk variables *STDEV*, *RMSE* and *BETA* (*STDEVshift6m*, *RMSEshift6mEW*, *BETAshifte6mEW*, respectively), specifically for the equal weighted index. The results showed that the coefficient of risk shift was positive and significant for all three measures of risk after six months. The results were similarly positive and significant when calculated for the one-month risk shift. These results suggest that banks which experienced the greatest increase in risk as a result of the fine had higher CAR on the day of the fine. The results raise the possibility that while risks do not impact CAR before the fine, the increase in risk may further contribute to the positive CARs observed as a result of the risk shift. The positive CAR further supports the notion that enforcement actions do not send a strong signal at the time of the fine.

I found that the coefficient of non-traditional banking (measured by normalizing non-interest income by total current operating revenue, *TNIINORM*) was positive and significant across all models, suggesting that fined banks with higher non-interest income (higher risk) react more positively in terms of CAR compared to banks with lower non-interest income (lower risk) as a result of the enforcement action. DeYoung and Torna (2013) found that these non-traditional banking activities were considered higher risk, contributing to more bank failures during the financial crisis, resulting in a greater negative effect on bank valuations. Non-traditional banking activities include (but are not limited to) venture capital and investment banking activities that are inherently at higher risk of default but offer higher rewards if managed effectively. The results suggest that banks with a greater number of non-traditional banking activities considered the penalties were not large enough to correct risk-related behavior and continued to conduct risky activities even after the penalties. Non-traditional banking services typically provide higher margins compared to traditional bank deposit and cash management

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activities. If a bank has a large portfolio of non-traditional banking services, it may be willing to consider the penalty as a cost of doing business, with the profits covering the cost of a potential future fine. This assumes that no additional portfolio changes were required in addition to the monetary penalty.

Subsequent Fines. I next tested for the effects on banks that received subsequent fines as a result of an original fine and the impact on valuation (*SUBSEQFINDUM*). The intent was to test if banks that received subsequent fines for a similar offense exhibited a valuation impact. Results were significant and positive for only two of the nine models. This suggests that subsequent fines do not affect banks differently than the original fines for similar offenses.

Control Variables. The coefficient of the location of the fined bank headquarters (measured by the dummy variable *USBankDUM* where 1 indicates banks with HQ locations in the United States, 0 otherwise) showed that the coefficient was negative and significant. The results suggest United States based banks' returns were lower as a result of a fine compared to non-United States based banks and that fines send a stronger signal to banks with HQ locations in the United States. The United States is also considered a strict enforcer of regulations with the seven largest money laundering sanctions related fines against banks from U.S. regulatory agencies ("The Seven Largest," 2014). BNP Paribas paid \$8.9 billion for sanctions violations, HSBC paid the second largest fine of \$ 1.9 billion, and ING Bank payed a fine of \$619 million. Investors react more negatively to fines on United States based banks than non-United States based banks, in part due to stricter regulations and implementation.

The coefficient of the regulatory agency involved in the enforcement action [measured by the type of agency (DOJ, DOT, SEC and FHFA) where 1 indicates the agency that enforced the fine, 0 otherwise] showed positive coefficients; however, they were insignificant, suggesting that

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there is no significant impact on returns based on the four agency penalties compared to other agency penalties. The results also suggest that investors do not differentiate based on the agency conducting the enforcement action.

Competitor Banks Summary Statistics

Penalties on fined banks can also spill over to competitor banks in the industry. I tested the effects that penalties had on competitors and examined various characteristics of the competitor bank effect on returns.

Table 8 provides summary statistics for competitor banks matched to the fined banks based on asset size +/- 20% of the fined banks. If more than 10 banks were matched to the fined bank, only the top 10 banks with the highest correlation of returns were included. If less than 10 competitor banks were matched, then all the competitor banks were listed. Based on the matching parameters, there were a total of 660 observations.

The average competitor bank in the sample had \$1.3 trillion in assets (compared to the fined banks with \$1.5 trillion in assets), with a standard deviation of \$942 billion, ranging from \$454 million to \$2.8 trillion, reflecting a large diversity of banks that matched the fined banks. Competitor banks' total current operating revenue (*TCOR*) averaged \$42.6 billion with a standard deviation of \$33.1 billion, ranging from \$26.6 million to \$132.6 billion. In terms of total non-interest income, competitor banks averaged \$16.9 billion with a standard deviation of \$14.3 billion, ranging from \$4 billion to \$58.7 billion. The average competitor bank generated 35% of its income from non-interest sources (*TNIINORM*) with a standard deviation of 16%.

Total risk, as measured by the standard deviation of returns (*STDEVMatch*) had a mean of 0.02, ranging from 0.019 to 0.009. Standard deviation was measured in the year prior to the event. Idiosyncratic risk was measured by the standard deviations of residuals as measured by

Table 8

Summary Statistics Competitor Banks

Variable	Observations	Mean	SD	Min	Max
Total Asset Size	660	\$ 1,305 B	\$ 9,416 B	\$ 454 M	\$ 2,807 B
Total Non-Interest Income	646	\$ 16.9 B	\$ 14.3 B	\$ 4 B	\$ 58.7 B
Normalized Total Non-Interest Income (<i>TNIINORMM</i>)	646	0.3518	0.1649	-1.5334	0.9891
Standard Deviation of Returns (<i>STDEVMatch</i>)	660	0.0193	0.0090	0.0060	0.0740
Root Mean Square Error Equal Weighted (<i>RMSEMatchEW</i>)	660	0.0151	0.0071	0.0025	0.0715
Standard Deviation Shift 1 Month (<i>stdevShift1m</i>)	670	0.000135	0.0067875	-0.0379005	0.0319511
Standard Deviation Shift 6 Month (<i>stdevShift6m</i>)	670	0.0007028	0.0098556	-0.0267174	0.0714341
Root Mean Square Error Equal Weighted 1 Month (<i>RMSEShift1mEW</i>)	670	0.0002343	0.0062607	-0.0450665	0.0386134
Root Mean Square Error Equal Weighted 6 Month (<i>RMSEShift6mEW</i>)	670	0.0010438	0.0080842	-0.037679	0.0737442
Correlation of Returns (<i>CORR</i>)	660	0.5192519	0.1853633	0.0001786	0.9987349
Match Bank Eventually fined (<i>EVENTFINED</i>)	660	0.2740	0.4465	0	1
Match Bank Previously fined (<i>PREVFINED</i>)	660	0.2970	0.4573	0	1
<i>USMatchBankDUM</i>	646	0.3845	0.4834	0	1

Note. This table provides summary statistics specifically for the competitor banks used for the cross-section regressions. Total asset size was obtained from Compustat representing total assets divided by liabilities of a company. Total non-interest income measures the level of non-traditional banking income for the competitor, including services outside of typical deposit and lending activities including (but not limited to) venture capital and investment banking activities. Normalized total non-interest income (*TNIINORMM*) is total non-interest income divided by total current operating revenue for the competitor bank. The standard deviation of returns (*STDEVMatch*) measures the annual rate of return of an investment to measure volatility for the competitor bank. The standard deviation shift one month (*stdevShift1m*) and six month (*stdevShift6m*) refer to the one and six months shift in risk related to the event, respectively. Root mean square error equal weighted one month (*RMSEShift1mEW*) and six month (*RMSEShift6mEW*) measure the shift of the bank-specific or idiosyncratic risks using equal weighted index fund one month and six months related to the event respectively. The correlation of returns (*CORR*) measures the similarity of operations between the fined and competitor bank. Only the top 10 matches with similar returns are included. The *MatchBankEventuallyfined* (*EVENTFINED*) dummy variable indicates the competitor was eventually fined, where 1 indicates the competitor was eventually fined for a similar offense as the

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finer bank and 0 indicates the competitor bank has not been fined. MatchBankPreviouslyfined (PREVFINED) is a dummy variable used to measure the effect of the competitor bank being previously fined, where 1 is competitor for previously fined bank, 0 otherwise. USMatchBankDUM is a dummy variable for the competitor bank headquarter location, where 1 indicates United States headquarters, 0 otherwise.

the *RMSE*. Equally weighted *RMSE* was on average 0.0151. I also measured the risk shift of the standard deviation of returns and *RMSE*. Standard deviation for the one-month shift averaged 0.000135 and the six-month shift averaged 0.0007. *RMSE* for the one-month equal weighted index was 0.0002; *RMSE* for the six-months equal weighted index was 0.0003.

Table 8 also provides the summary statistics for competitor banks that were eventually fined (*EVENTFINED*) as well those previously fined as a result of an enforcement action on the original bank (*PREVFINED*). A total of 27% of competitor banks were eventually fined and 30% were previously fined. Regarding location of the competitor banks (*USMatchBankDUM*), 38% were based in the United States with the remaining 62% located outside the U.S. Table 9 provides a breakdown of the locations of the headquarters for competitor banks.

The Effect of Penalties on Competitor Banks

As detailed in Table 10, I ran *t*-tests to determine the significance of the average CAR for competitor banks. Similar to the method used for the fined banks, I used an estimation window of 220 continuous trading days with a gap of 22 business days between the end of the estimation window and the beginning of the event window. I calculated the CAR on the day of and the day after the enforcement action based on the market, Fama-French three factor, and Fama-French plus momentum models. The results were not significant, suggesting there is no impact on competitor bank returns as a result of an enforcement fine on the fined bank.

To test for robustness, I used the Wilcoxon signed-rank test to determine if the competitor CAR was significantly different from zero. Table 10 shows the CAR market model (*CARMMM*) with a negative and significant coefficient, suggesting that competitor banks were impacted at the 10% level by the announcement of a fine on the fined bank and showed negative returns upon the announcement. The competitor sample also included fined banks that had more

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Table 9

Competitor Banks Headquarter Locations

HQ Location	Frequency	Percentage
Argentina	5	0.77
Austria	2	0.31
Brazil	1	0.15
Canada	45	6.97
Germany	65	10.06
Spain	62	9.60
Great Britain	75	11.6
India	1	0.15
Ireland	1	0.15
Japan	126	19.50
Korea	14	2.17
United States	249	38.45
Total	646	100

Note. This table provides summary results for the competitor banks headquarter locations. All non-United States banks are required to register as a domestic bank subject to federal, state and local charter requirements irrespective of ultimate headquarter location.

Table 10

Results from t-Test and Wilcoxon Signed-Rank Test for Competitor Cumulative Abnormal Returns

	With duplicates			No duplicates		
Model	Market Model (<i>CARMMM</i>)	Fama-French Three Factor Model (<i>CARFFM</i>)	Fama-French Plus Momentum (<i>CARFFMMOM</i>)	Market Model (<i>CARMMM</i>)	Fama-French Three Factor Model (<i>CARFFFMM</i>)	Fama-French Plus Momentum (<i>CARFFMMOM</i>)
N	640	640	640	152	152	152
Mean	-0.0012	-0.00049	-0.00007	0.00105	0.0014	0.00149
<i>p</i> value	0.1669	0.5919	0.9405	0.547	0.4499	0.4116
<i>t</i> statistic	-1.3840	-0.5363	-0.0747	0.6037	0.7576	0.8233
	Wilcoxon Signed-Rank Test					
<i>z</i> score	-1.834*	-1.384	-0.457	0.642	0.464	0.714
<i>p</i> value	(0.0667)	(0.1663)	(0.6477)	0.5209	0.643	0.4754

Note. This table provides results based on *t*-test and Wilcoxon signed-rank test for the competitor cumulative abnormal returns. These tests determine the significance of the mean and median of the variable, respectively. Market model (*CARMMM*) uses abnormal returns according to the Capital Asset Pricing Model. Fama-French three factor model (*CARFFM*) uses abnormal returns defined with respect to the Fama-French three factor model; Fama-French plus momentum model (*CARFFMMOM*) uses abnormal returns defined with respect to the Carhart (1997) model.

*, **, *** represent the level of significance at 10%, 5% and 1% respectively

than one fine on the same day, which may cause the t -test and Wilcoxon tests to be biased. To remove the bias, I dropped fined banks that had more than one fine on the same day and reran the t -test and Wilcoxon test against the competitor CAR with the duplicates removed. Table 10 shows the results that included the duplicates on the left panel and with duplicates removed on the right panel. Results were insignificant across all three models for the t -test and Wilcoxon test. These results suggest that regulatory penalties on the fined bank have no impact on competitor banks' returns even after duplicate fines are removed. Overall, these results support the notion that enforcement actions on fined banks do not affect competitor banks sufficiently.

As indicated previously in Table 5, fined banks saw a positive impact on returns from enforcement penalties. While extant literature indicates the possibility of spillover effects, I did not find a similar positive impact on competitor returns based on enforcement actions on the fined banks. There may be several explanations for this. The size of the penalties on the fined banks were not as harsh as initially expected, indicating to competitor banks that enforcement penalties are not a significant concern. Competitor banks may have believed that they are not involved in illegal activities and chose not to allocate reserves to cover future potential penalties on their banks, with no impact on earnings.

Multivariate Regression Analysis—Competitor Banks

Table 11 reports the results of the regression analysis. I tested the effects of penalties of fined banks against the competitor banks' size, the $BETA$, $STDEV$, and $RMSE$ measures of risk, and similar characteristics. The multivariate regression tests individual bank characteristics of the competitor bank's CAR. Similar to the fined banks, three market models were tested—the market model ($CARMMM$), the Fama-French model ($CARFFM$), and the Fama-French with momentum ($CARFFMMOM$). To detect for multi-collinearity, I measured the variance inflation

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Table 11

Regression Model Results (Competitor Banks)

	<i>CARMMM</i>	<i>CARFFM</i>	<i>CARFFMMO</i> <i>M</i>	<i>CARMMM</i>	<i>CARFFM</i>	<i>CARFFMMO</i> <i>M</i>	<i>CARMMM</i>	<i>CARFFM</i>	<i>CARFFMMO</i> <i>M</i>
<i>CARBank</i>	0.106** (2.56)	0.110** (2.44)	0.124*** (2.59)	0.106*** (2.60)	0.109** (2.44)	0.121** (2.54)	0.0907** (2.28)	0.0916** (2.11)	0.106** (2.23)
<i>LOGATMATCH</i>	0.00332** (2.03)	0.00258 (1.37)	0.00102 (0.56)	0.00390** (2.38)	0.00316* (1.66)	0.0016 (0.88)	0.00196 (1.33)	0.00149 (0.88)	0.000376 (0.23)
<i>STDEVMatch</i>	-0.045 (-0.31)	-0.074 (-0.47)	-0.212 (-1.35)						
<i>RMSEMatchEW</i>				0.00907 (0.05)	-0.0246 (-0.13)	-0.201 (-1.05)			
<i>BetaMatchEW</i>							- 0.00976*** (-4.24)	- 0.00825*** (-3.39)	-0.00672*** (-2.80)
<i>stdevShift6m</i>	0.398*** (2.79)	0.419** (2.42)	0.394** (2.57)						
<i>RMSEShift6mEW</i>				0.541*** (3.05)	0.536*** (2.59)	0.496*** (2.61)			
<i>betaShift6mEW</i>							0.00484* (-1.78)	0.00520* (-1.82)	0.00444 (-1.54)

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<i>TNIINORMM</i>	-0.0173* (-1.76)	-0.0195* (-1.74)	-0.0185* (-1.73)	-0.0173* (-1.77)	-0.0197* (-1.77)	-0.0189* (-1.78)	-0.0177** (-2.44)	-0.0197** (-2.25)	-0.0173** (-2.07)
<i>CORR</i>	0.00366 (0.63)	0.00467 (0.77)	0.00467 (0.82)	0.00224 (0.42)	0.0026 (0.44)	0.00088 (0.16)	0.0108* (1.78)	0.00956 (1.54)	0.00722 (1.24)
<i>EVENTFINED</i>	0.0000982 (0.04)	0.000606 (0.24)	0.00166 (0.65)	-0.000793 (-0.34)	-0.000355 (-0.14)	0.000537 (0.21)	0.00371 (1.48)	0.00312 (1.15)	0.00226 (0.82)
<i>PREVFINED</i>	0.00267 (1.04)	0.00333 (1.19)	0.00356 (1.28)	0.00288 (1.13)	0.00355 (1.26)	0.00391 (1.39)	0.00202 (0.78)	0.00282 (0.95)	0.00374 (1.29)
<i>USMBANKDUM</i>	-0.00164 (-0.57)	-0.00149 (-0.47)	-0.00337 (-1.11)	-0.00103 (-0.36)	-0.000758 (-0.24)	-0.00261 (-0.86)	-0.00243 (-0.86)	-0.00155 (-0.45)	-0.00263 (-0.84)
Constant	-0.0160* (-1.89)	-0.0107 (-1.02)	0.0011 (0.11)	-0.0198** (-2.26)	-0.0142 (-1.29)	-0.0014 (-0.14)	-0.0000368 (-0.00)	0.0022 (0.22)	0.00755 (0.79)
N	618	618	618	618	618	618	618	618	618
<i>R</i> ²	0.059	0.056	0.062	0.066	0.058	0.06	0.06	0.047	0.044

Note. This table provides regression results for the competitor banks. *t* statistics in parentheses. *CARBank* represents the cumulative abnormal return of the fined bank. *LOGATMATCH* measures the competitor's bank asset size measured in log. *STDEVMatch* measures the standard deviation of returns of the competitor bank. *RMSEMatchEW* is the root mean square error of the competitor bank equal weighted index. *BetaMatchEW* is the beta of competitor bank equal weighted index. *STDEVshift6m* is the standard deviation of returns risk shift six months. *RMSEshift6mEW* is the root mean square error risk shift six months equal weighted index in relation to the event. *betashift6mEW* is the beta shift six months equal weighted index in relation to the event. *TNIINORMM* is the competitor bank's total non-interest income divided by total current operating revenue. *CORR* measures the similarity of operations between the fined and competitor bank. *EVENTFINED* is a dummy variable indicates the competitor was eventually fined, where 1 indicates the competitor was eventually fined for a similar offense as the fined bank and 0 indicates the competitor bank has not been fined. *PREVFINED* is a dummy variable used to measure the effect of the competitor bank being previously fined, where 1 is competitor for previously fined bank, 0 otherwise. *USMBANKDUM* is a dummy variable for the competitor bank headquarter location, where 1 is for United States headquarters, 0 otherwise.

*, **, *** represent the level of significance at 10%, 5% and 1% respectively

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factor (VIF). I found multi-collinearity between *STDEV* and *RMSE* across all three market models. To correct for problems with multi-collinearity, separate models were run for *BETA*, *STDEV*, and *RMSE* (equal weighted). Value weighted models were also run as a test of robustness and were found to have consistent results with the equal weighted models. As a result, nine separate models which included the specific risk variables were run against *CARMM*, *CARFF*, and *CARFFMOM*. To correct for heteroscedasticity, which can occur due to the potential correlation of the risk variables, White standard errors are reported (White, 1980).

When the CAR of the fined banks (*CARBank*) was regressed against the CAR of the competitor bank, results showed significant and positive coefficients, robust across all models. These results suggest that fined banks with higher returns elicit a stronger positive response for competitor banks. The results suggest a spillover effect occurs between the fined bank and competitor bank and that enforcement actions against the fined bank sends a signal to competitor banks, positively impacting returns. The positive returns for competitor banks are similar to the positive returns of the fined banks.

Competitor Size. The coefficient of bank size (measured by the log of assets, *LOGATMATCH*) was positive and significant for the market and Fama-French models. These results suggest that larger competitor banks react more positively to enforcement penalties on the fined bank, suggesting bank size is a significant factor, however weak. Note that from Table 7, bank size was also a significant factor for the fined banks. However the coefficient, in that case, was negative. These results suggest that larger competitor banks react positively to penalties on the fined banks as these competitor banks may perceive the negative publicity on their competitors (the fined bank) results in less compliance pressure from regulators. Regulators typically have limited resources, especially when prosecuting larger banks, and once a larger

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bank is identified, other large banks may feel they are not the subject of investigation, lowering the perceived risk of a future investigation. The hypothesis that there is a negative return on the competitor bank as a result of a penalty on the fined bank is not supported.

Competitor Risk. Similar to the fined banks, I measured the effect of risk on competitor bank returns as a result of an enforcement penalty on the fined bank. I used *STDEV* to measure total risk, *BETA* to measure market risk, and *RMSE* to measure firm specific or idiosyncratic risk. For *RMSE* and *BETA* I measured using the equal weighted index. Results for *BETAMatchEW* showed negative and significant results. These results suggest that competitor banks with higher market risks react more negatively regarding returns as a result of penalties on the fined bank. The market may perceive that competitor banks that are similarly risky may incur a future penalty. The results do not support the hypothesis that higher risk competitors (when measured by standard deviation, beta and RMSE) see a greater negative return as a result of regulatory penalties on the fined bank.

To test for the effect of risk shift on the competitor bank's returns, I calculated the difference between the risks before and after the enforcement fine for *STDEV* and *RMSE* over six month's post-enforcement of the fine announcement using the equal weighted index. The results showed that the risk shift was positive and significant for all measures of risk (*stdevShift6m*, *RMSEShift6mEW*, *betaShift6mEW*), similar to the fined bank. These results suggest that competitor banks that experienced the greater increase in risk as a result of the enforcement action on the fined banks had higher CARs on the day of the fine. The positive coefficients suggest that competitors that reacted positively on the day of the fine did not see the fine as a threat and continued to engage in risky behavior after the fine. These results are similar to the fined banks, suggesting that competitor bank returns are similarly impacted by penalties on the

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fined banks. Similar to the fined banks, the implication here for competitor banks is that the fines do not send a strong signal at the time of the fine and are not significant enough to change the competitor bank's risk profile after six months. Further, the positive returns on the day of the fine may not discourage competitor banks to engage in risky behavior to drive positive returns triggered by an enforcement action on the fined bank.

The coefficient of non-traditional banking (measured by normalizing non-interest income by total current operating revenue for the competitor banks, *TNINORMM*) was negative and significant across all models, suggesting that competitor banks with lower non-interest income (lower risk) reacted more positively in terms of CAR compared to competitor banks with higher non-interest income (higher risk). The results support the hypothesis that higher risk competitors (when measured by non-interest income) see a greater negative return as a result of regulatory penalties on the fined bank.

Degree of Similarity. The correlations of returns (*CORR*) were positive and slightly significant only for the market model, suggesting that competitor banks with a higher degree of similarity of operations see a more positive return as a result of enforcement actions on the fined banks. The result suggests that competitor banks react similarly to the fined banks as a result of an enforcement action. The hypothesis that competitor banks with a high correlation of returns will see lower negative returns as a result of regulatory penalties is not supported.

Competitors Which Eventually Get Fined. The coefficient of whether competitor banks which were eventually fined (*EVENTFINED*) was positive and insignificant. This result suggests that markets do not have a sense of which competitor banks will eventually be fined in the future. The hypothesis that competitor banks that are eventually fined will see a lower negative return as a result of regulatory penalties on the fined bank is not supported.

Effect on Previously Fined Bank. For competitor banks that were previously fined (*PREVFINED*), the results were similarly insignificant. This suggests that there is no variation on how competitor banks that have been previously fined react as a result of an enforcement action on the competitor bank. The hypothesis that the competitor bank that was previously fined for the same offense will see a lower negative return as a result of regulatory penalties on the fined bank is not supported.

Effect of Competitor Bank Headquarter Location. The coefficient of the location of the competitive bank headquarters (measured by the dummy variable *USMBANKDUM*, where 1 indicates banks with HQ locations in the U.S, 0 otherwise) was generally negative and insignificant, suggesting that the HQ location of competitor banks was not a factor. The hypothesis here that competitor banks with HQ locations in the United States are affected by regulatory penalties on the fined bank is not supported.

Conclusion

After analyzing the sample of 250 fined banks and 646 competitor banks, I found varied outcome on the effect of regulatory penalties on bank returns. When the fined bank received a regulatory enforcement, the fined bank's CAR was positive and significant, suggesting a positive impact on returns upon the announcement of the fine. This result could be due to fines being smaller than expected or fines reduced the risk of the bank due to the lifting of uncertainty before the actual fine. I further examined the risk reduction hypothesis and found no significant risk shift as a result of the fine. This result suggests that the positive CAR is due primarily to the fine not being as large as anticipated.

When assessing the fined bank returns based on individual bank characteristics, there were several outcomes. Results suggest that for larger banks there is a more negative return as a

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result of an enforcement fine. When measuring for risk, there was no significant shift on returns at the time of the enforcement fine. However there was a significant positive impact on returns both one month and six months out. These results suggest that banks that experience the greatest increase in risk as a result of a fine had higher CAR on the day of the fine. The positive risk findings six months out may not discourage fined banks from continuing to engage in higher risk behavior. Non-interest income is another proxy for bank risk, and here results were positive, suggesting that fined banks with higher non-interest income react more positively regarding their returns.

This study also attempted to measure the effect of the fined bank's enforcement actions on competitor banks as a result of spillover. Results showed that the competitor bank's returns were not significantly affected by penalties on the fined banks. Regressing the fined bank CAR against the competitor bank CAR resulted in the positive and significant coefficient, suggesting that fined banks with higher returns elicit a stronger positive response for competitor banks' returns. The size of competitor banks was also a significant factor, suggesting that larger competitor banks react more positively to enforcement penalties on the fined bank, supporting the spillover effect hypothesis. Similar to fined banks, there was no significant impact on returns for competitor banks at the time of the enforcement fine. However, competitor banks saw the positive significant impact on returns six months out. These results suggest that competitor banks that experience the greater increase in risk as a result of a fine on the fined banks had higher CARs on the day of the fine.

When measuring competitor bank non-interest income, the significant negative results suggest that competitor banks with lower non-interest income react more positively compared to the fined banks with higher non-interest income. Competitor banks with a high degree of

similarity as fined banks (as measured by correlation of returns) were not affected as a result of an enforcement action on the fined banks. I also tested whether competitor banks that were eventually fined or previously fined were impacted and found that the results were not significant. When testing the location of the competitor bank's HQ (United States vs. non-United States), I found HQ locations were not significant in impacting returns.

Limitations and Opportunities for Future Research

This research is limited to banking institutions subject to banking regulatory oversight with financial data available from Compustat. There are other non-banking financial institutions that are also subject to regulatory oversight that have not been included, such as insurance and securities businesses. There are approximately 120,000 insurance firms (SIC code 6411); securities firms as listed by SIC code 6211 include approximately 23,000 firms ("Business List," n.d.). There are opportunities to extend the scope of this study to cover NBFIs.

For this essay, the statistical significance cutoff was 10%. In financial and economics research, the statistical significance is considered weak. Findings based on 10% significance should be interpreted based on the weakness of the statistical significance. This essay is based on similar event studies (Madura & Prenti, 2014; Klapper & Love, 2004; Akhigbe & Martin, 2006) where the 10% cutoff is considered significant.

For this research, only United States based entities and agencies were included. Bank regulations are found across many countries and regulators in Europe, and Asia has also been active in issuing regulatory penalties for their banks. In the United Kingdom, the Financial Conduct Authority has regulatory oversight on United Kingdom based banks and has issued penalties in the past. In Singapore and Hong Kong, the Monetary Authority of Singapore and the

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Hong Kong Monetary Authority), respectively, provide oversight. There are opportunities to extend the approach across other countries and agencies.

Another limitation of this research is the specific focus on penalties related to mortgage backed securities, money laundering, and LIBOR. Banks and other financial institutions are also subject to other types of penalties, which for this research has not been specifically categorized. Other types of financial activities like fraud, consumer theft, and cyber-crime also have regulatory oversight requirements that can lead to penalties that can be examined.

Finally, the area of regulatory penalties in the financial services sector continues to receive substantial attention in the industry, with penalties ongoing in the sector. The most recent banking enforcement fine was on Deutsche Bank which was fined \$41 million for money laundering lapses on May 30, 2017 (Hamilton & Arons, 2017). These fines suggest regulatory authorities continue to look for ways to correct bad banking behavior, perhaps unsuccessfully. Continued analysis incorporating latest enforcement actions may suggest findings other than the conclusions derived from this essay.

ESSAY 2: VALUATION AND RISK EFFECTS OF THE FOURTH ANTI-MONEY
LAUNDERING DIRECTIVE ON THE BANKING INDUSTRY: A EUROPEAN UNION
CROSS COUNTRY ANALYSIS

ABSTRACT

Existing finance literature demonstrates competing views regarding the impact of banking regulations on bank valuations and risk. Banks can experience either positive or negative valuation effects depending on whether benefits of regulation outweigh the costs of compliance. One area of bank regulation that has recently gained attention targets the reduction of money laundering activities through the global financial network. Increasingly, criminals leverage the banking system to *clean* their illicit funds, aided by banks that maximize profit seeking behavior. Regulators attempt to reduce this criminal activity by introducing regulations requiring banks to increase due diligence activities and report illicit transactions, potentially impacting valuations. This study examines the bank and risk valuation effects of the introduction of the Fourth Anti-Money Laundering Directive (4AMLD) in the European Union (EU), which was adopted June 26, 2015.

Based on a time series analysis over the event period, results showed that returns were positively affected by the introduction of the 4AMLD and that riskier banks saw higher returns. A cross sectional regression found that larger banks saw higher returns compared to smaller banks. Also, banks with a higher return on assets saw more positive returns. However, banks that rely more on non-traditional income streams saw greater negative returns. In EU countries where gross domestic product (GDP) per capita is higher, banks experienced more positive returns than in poorer countries. Similarly, banks in less corrupt countries saw more positive returns. Banks in countries with lower levels of governance, where governments are less

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effective and have less stable political systems and regulatory oversight experience saw positive returns as a result of the 4AMLD. The introduction of the 4AMLD provides banks greater clarity and guidance to operate, allowing banks in countries with lower levels of governance to benefit compared to banks in countries with higher levels of governance.

The findings from this dissertation provide academics, regulators, policy analysts, and investors with a greater understanding of how the introduction of specific AML regulation in the EU impacts financial valuations and risks based on bank characteristics. Academics will gain a better understanding of how empirical models of valuation and risk are impacted by the introduction of the 4AMLD. Regulators and policy analysts will be able to assess how the financial markets are impacted by the introduction of regulations. Finally, investors will rationalize financial allocations based on greater understanding of the impact of regulations, general market impact and specific bank characteristics.

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Banks serve important functions in the global economy including lending, facilitating the movement of funds, and providing the infrastructure by which financial transactions are settled between parties. Recent banking crises demonstrate that a poorly functioning banking sector can negatively impact economic development (Klingbiel, 2002). Studies show that regulations are essential in reducing systemic risk and the impact of the banking sector in propagating financial crisis in an economy (Kaufman & Scott, 2003). To this end, various regulations have recently been introduced, including the Dodd-Frank Act of 2010 in the United States and Third Basel Accord globally, with the goal of ensuring a stable financial system (Barth & Caprio, 2002; Santos, 2001).

However, the introduction of regulations has varying effects on bank profitability and risk. Financial institutions have been extensively studied to better understand how regulations affect both ongoing operations and valuations (Demirgüç-Kunt, 2003; Naceur & Omran, 2011; Pasiouras et al., 2009). Literature has yielded mixed results on the impact of profitability and valuations of banks resulting from the introduction of regulations. Negative impacts are attributed to the costs of compliance, which increase with the introduction of regulations. However, there is no significant benefit to operations, resulting in negative effects on firm valuations (Akhigbe & Martin, 2006). The positive impact of regulations is reflected in the greater transparency of operations (Bendeck, 1988), improved reporting (Iatridis & Dalla, 2011), and investor protection from management expropriation (Kalyvas & Mamatzakis, 2014).

One area of banking that has recently started receiving attention from regulators across the globe is the area of money laundering activities. Money laundering is the process of concealing the existence of income derived from criminal activity and subsequently disguising the source of that income through the financial system to make it appear legitimate (Zdanowicz,

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2009). The global banking system is integral to the process of money laundering as criminals prefer the global reach and ability to transfer large amounts of funds quickly and efficiently. Major AML regulations were introduced in many parts of the world after the U.S. terrorist attacks of September 11, 2001, including the United States and the EU, requiring banks to identify and report suspicious transactions that may involve money laundering.

The impact of other forms of regulations on bank valuations has been extensively studied. Pasiouras et al. (2009) investigated the impact of regulations related to the three pillars of the Second Basel Accord which were instituted to increase capital adequacy requirements, supervisory power, and market discipline mechanisms; the authors found that the regulations affected the costs and profit efficiencies of banks. However, there has been little research conducted specifically on AML regulations in the EU. Further, there is little research that identifies the specific characteristics of the banking industry that result in a negative or positive effect on valuations and risk of banks as a result of AML regulations. This event study attempts to fill this gap in the literature and assess the impact of announcement milestones related to the 4AMLD on the banking industry, in addition to examining whether specific bank characteristics have a significant valuation and risk effect.

This essay focuses on the introduction of EU regulations to address money laundering issues within the European financial services sector. The EU was formed in 1993, consisting of 28 European countries in a political and economic union (“The EU in Brief,” n.d.). The EU is a complex bureaucracy with multiple agencies involved with developing regulations, soliciting political and industry feedback before implementing any new regulations (“EU Institutions and Other Bodies,” n.d.). The 28 EU member countries include Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece,

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Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom (“EU Member Countries in Brief,” n.d.). As a result of Brexit, the United Kingdom announced plans to leave the EU by 2019 (Hunt & Wheeler, 2017). For this study, the United Kingdom was still included as the event dates related to the introduction of the 4AMLD are before the planned exit. The United Kingdom will continue to be subject to the 4AMLD until the exit date, which has not been determined, when domestic regulations will then apply (Lloyd, 2016).

The banking industry is a significant conduit for money laundering, requiring extensive development before implementation. The introduction of the 4AMLD in the EU went through several significant milestones where the aspects of the regulation were announced and deliberated in the European Commission, Parliament, and Council and subsequently shared publicly. In all, there were eight significant events between the announcements of the proposal on February 5, 2013 and the publication of the directive on June 25, 2015. Banks were most affected by this regulation as the major conduit for financial transactions across borders. To measure the total effect of the 4AMLD, this event study assessed the impact on the cumulative abnormal returns of banks on each of the significant event dates.

Studying the impact of the 4AMLD on bank valuations and risk provides both regulators and investors an informed understanding of the effects of AML regulations to help shape policy and investment decisions, respectively. Results of this study will also provide regulators and industry analysts guidance on future effects of AML regulations on bank valuations and risk. To my knowledge, no similar studies currently exist that focus on the financial impacts of AML regulations in the EU.

Background

The stability of a financial system can be affected by criminal activities such as money laundering and terrorist financing. The Financial Action Task Force (FATF) highlights criminal proceeds from drug trafficking, arms trades, prostitution, kidnapping, terrorism, and tax evasion need to be laundered through the banking system to appear legitimate (FATF, 2015). Terrorist financing became a significant concern when the National Commission on Terrorist Attacks upon the United States found that terrorists used funds laundered through the banking system to finance the September 11, 2001 attacks on the United States (Roth, Greenburg, & Wille, n.d.). Subsequent investigations determined that comprehensive screening procedures brought about by regulations could have identified the suspicious transactions and reduced the probability of financing terrorist activities (Garry, 2013).

Various regulations have been introduced in the banking sector over the years. Hovarth and Huizinga (2015) found that many banks globally were affected during the global financial crisis of 2008. European banks in particular were hit hard. This led to calls for regulatory reform of the banking sector and the establishment of the European Financial Stability Facility to ensure liquidity and greater transparency of operations. Subsequent regulations around the world were targeted toward preparing banks for avoiding another financial crisis. Cosimano and Hakura (2011) found that capital adequacy requirements, in particular, were addressed with the introduction of Basel III regulations. Capital adequacy requirements, however, are not sufficient to address another financial crisis. Bartlett (2002) observed that criminal activities in the banking industry due to money laundering also negatively impact economic growth and bank valuations. Hence, there was a need for regulation that prevents such criminal activities, especially money laundering. It is important to recognize that regulations can have different

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impacts on banks' costs and transparency depending on the unique characteristics of each bank (Pasiouras et al., 2009). These characteristics include the effects of transparency, size, corruption, complexity and non-traditional banking activities.

Anti-Money Laundering Regulations

Regulations specifically focused on curbing money laundering were first introduced in the EU with the First Anti-Money Laundering Directive in 1991 (The Council of the European Communities, 1991). As a result of the terrorist attacks in the United States on September 11, 2001, the United States introduced the USA PATRIOT Act in October 2001. The EU updated its regulations in the form of the 2nd money laundering directive in December 2001 (Mitsilegas & Gilmore, 2007), adopting broader definitions of money laundering acts ("Europe," n.d.). Both directives significantly increased AML regulations and enforcement actions.

The EU regulations related to curbing money laundering were introduced following the growing realization that the financial system was being used to launder the proceeds of criminal activities and to fund terrorist activity. In 2006, the Third Directive was introduced, which expanded the types of institutions that were obligated to implement AML detection procedures to include non-financial institutions like law firms, notaries, accountants, real estate agents, casinos, and trust services exceeding €15,000. The most recent directive, 4AMLD, was passed into EU law June 25, 2015 (European Parliament and the Council of the European Union, 2015).

Key Requirements and Impact of the 4th Anti-Money Laundering Directive

The 4AMLD is substantially similar to other AML regulations around the world, specifically the USA PATRIOT Act of October 26, 2001 which significantly increased the obligations of banks to conduct additional compliance-related checks on all financial transactions and customers (Dolar & Shughart, 2007). Both the 4AMLD and USA PATRIOT Act increased focus on

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identifying terrorist financing activity through the banking system. Over the course of the introduction of the various AML directives, the regulatory compliance burden continued to increase on banks with the provisions of the 4AMLD impacting EU based banks' valuations (Deloitte, 2015).

The 4AMLD also extends beyond financial institutions to include credit institutions, auditors, external accountants, and tax advisors; legal professionals that handle financial transactions including buying and selling real estate, securities, management of companies, and the setting up of trusts, foundations, and similar structures; and gambling services including casinos (EU, 2015).

Compliance requirements include lowering the reporting threshold for risk-based decisions resulting in investors gaining greater visibility for riskier transactions. Information on beneficial owners submitted to a central register in each member state increases the transparency of high-risk transactions and identification of known money launderers. The criminalization of tax avoidance as a precursor to AML offense results in the reduction or even closure of lucrative tax management services provided by banks, potentially reducing profitable client services.

The 4AMLD also requires banks to screen against sanctioned entities and both local and foreign politically exposed persons (PEPs). PEPs are government officials who are typically more vulnerable to corruption and, as a result, require additional due diligence by banks. While there is a profit incentive for banks to onboard PEPs as customers, this additional due diligence directly increases the cost of compliance operations. The definition of PEPs under the 4AMLD has also expanded to include directors, deputy directors, and board members of international organizations. Banks are required to identify the ultimate beneficial owners of a financial transaction including life or other investment related insurance policies and real estate. Increased

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reporting requirements, including the reporting of cash payments of €10,000 or more (down from €15,000), could potentially result in increased costs of compliance operations. Regarding penalties, fines can reach maximum pecuniary sanctions of at least €5 million or 10% of the total annual turnover (and at least €5 million for a natural person). A natural person in jurisprudence is a real human being as opposed to a legal person which may be a private or public organization (United States Department of State, 2014). For non-financial institutions, penalties can amount to twice the amount of the benefit derived from the breach or at least €1 million. In the case of AML violations, financial institutions may also lose their operating license in the EU. All of these changes and increased penalties suggest a potentially strong negative impact on a bank's profitability and valuations due to non-compliance with the 4AMLD.

4AMLD Event Dates

The most recent recommendations of FATF were released in 2013 guiding EU member countries (FATF, 2013) to improve AML regulations. Based on the FATF recommendations, the European Commission initiated revisions of the existing 3rd Anti-money Laundering Directive by issuing a proposal inviting public feedback on the 4AMLD February 8, 2013. Significant changes to the proposal included enhancements of existing AML regulations and a directive on information accompanying transfers of funds to secure due traceability of transfers. The proposal was the first major public announcement of potential changes to the 3rd Anti-Money Laundering Directive ("European Parliament Backs Stronger Rules," 2015). As part of the EU's adoption process for new legislation, various deliberations, both public and private, were held between the Commission, Presidency, and member states. Event dates identified all relate to public deliberations or notices which the market assesses and reacts to (4th AMLD, n.d.). In all, eight significant milestone events occurred over the course of the introduction of the 4AMLD.

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On August 8, 2013, the European Data Protections Supervisor released an opinion related to the impact of the proposed regulation to data privacy. Data privacy was becoming a major issue for financial institutions related to money laundering as increased due diligence was required for detecting suspicious transactions. There was greater pressure for more customer data balanced against privacy concerns. The opinion provided the public clarification on the issues to allow for firm operational assessments. The third significant public event was the release of the *Presidency Compromise* document on November 22, 2013, clarifying language concerning electronic money which was also becoming a greater concern related to facilitating money laundering. Use of electronic money, also known as digital currency, was seen as an opportunity to streamline and reduce costs of international money transfer using bitcoins and other types of virtual currencies. Around the same time on October 13, 2013, a major U.S. investigation into the use of bitcoins to facilitate an online black market called Silk Road was made public (Weiser, 2015). The underground website was identified as a major conduit for money laundering, drug trafficking, and other black-market activities and was subsequently shut down, and the founder was arrested. May 26, 2014 saw the release of the *General Approach* document guiding financial institutions related to electronic money. This document consolidated the member states' issues and provided further guidance on the EU's policy. June 13, 2014 saw the final updated *Presidency Compromise*, which also included an updated general approach to addressing money laundering issues. A joint declaration by all EU member states was made February 2, 2015 to include comments from member states. The joint declaration also included input from the EU Commission and Council aligning with member state positions. Another significant milestone occurred on April 29, 2015 with the release of the communication from the EU Commission to the Parliament supporting the Council's position signaling the agreement to

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adopt the 4AMLD. June 26, 2015 marked the final 4AMLD Regulation (EU) 2015/847 and Directive (EU) 2015/849 being enforced. This document required the formalization of the regulation and directive into law in each EU member state.

It is important to recognize that the introduction of 4AMLD represents a significant change in the approach to addressing both the challenges of identifying money laundering and terrorist financing and the stable functioning of the financial system in the EU. The issue of electronic money and new channels of money laundering within the financial services community raised concerns as to the operational impact within compliance departments. New channels of money laundering required banks to ensure they were able to identify suspicious activity while also ensuring they met regulatory requirements. Significant monetary investments were required in the form of new procedures and tools to ensure compliance with regulations (Böszörmenyi & Schweighofer, 2015). Non-compliance with the regulations could result in significant penalties, including the loss of banking licenses as a result of the discovery of money laundering within financial institutions.

Summary of Findings

Based on a time series analysis, the results showed a positive impact on returns from the introduction of the 4AMLD. Bank market risk was, however, not impacted by the 4AMLD. When conducting the time series analysis against each of the eight events, two specific events demonstrated positive and significant impact on returns. On August 8, 2013, the European Data Protection Supervisor issued a much-anticipated report on the impact of data protection on money laundering. The report laid out details on how banks would deal with data privacy issues related to client transactions. This clarity provided the market certainty on these issues, resulting in positive market returns. The second event on June 26, 2015 relates to the full adoption of the

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4AMLD by the European Union. The announcement provided certainty that the directive would be adopted by all EU member countries, allowing financial institutions to budget, plan, and implement the new recommendations. A cross sectional analysis was also conducted to assess the impact of several risks, bank- and country-specific characteristics, against bank returns. The findings showed that larger banks saw the higher impact on returns as a result of the introduction of the 4AMLD compared to smaller banks, in part due to the greater availability of resources of larger banks to comply. Banks with higher returns on assets also experienced a positive impact on returns as the greater clarity provided for the appropriate allocation of compliance officers and staff and the more efficient use of assets. However, banks that relied more on non-traditional income streams had a lower impact on returns. When comparing EU countries with higher levels of Gross Domestic Product (GDP) per capita (richer countries), results showed that banks in these richer countries saw the higher impact on returns compared to banks in poorer countries. The results indicated that poorer countries with weaker financial services infrastructure were more challenged in implementing the 4AMLD. In countries with lower perceptions of corruption (i.e., less corrupt), comparative impact on returns was higher. However, in countries where overall level governance was lower (measured by a governance principal component analysis), banks saw the higher impact on returns. This suggests that the market believes that the positive aspects of the 4AMLD, providing clarity and a framework to deal with money laundering concerns, is a positive development and that the benefits outweigh the costs, resulting in positive market returns for in these countries.

Literature Review

The Impact of Regulation on Valuations and Risk

Banks provide a range of financial services to various industries and consumers. Banks need to be seen as reliable with healthy valuations and as an essential partner in the conduct of monetary policy, providing capital liquidity as required (Diamond & Rajan, 2000). Caprio et al. (2007) and Levine and Zervos (1998) found that well-functioning banks promote growth. Due to their impact on economic development, banks tend to be more heavily regulated than other industries to ensure there is no unnecessary risk-taking (Barth et al., 2008). In some countries where the financial system is underdeveloped, banks are state-owned to ensure government control by maintaining regulatory oversight (Porta et al., 2000). The intent of regulatory oversight is to prevent abuse of the financial system and develop a stable banking system to promote economic development. Several studies have found that regulations do achieve the goals of stability in the financial system, reflected in positive effects on valuations and reductions in risk. Bendeck (1988) found that bank regulations introduces a reduction in risk, but at the cost of reducing the profitability in the banking industry. Pasiouras et al. (2009) found that the introduction of regulations enhanced market discipline and increased the supervisory power of the regulators, increasing both costs and profit efficiency.

Studies also have found positive impacts of regulations relating to the reduction of risks. Akhigbe and Whyte (2001) found that the introduction of the Federal Deposit Insurance Corporation Improvement Act (FDICIA) in 1991 had a positive effect on bank stock returns with a significant reduction in bank risk. In a later study, Akhigbe and Whyte (2003) found that the Riegle-Neal Act of 1994 resulted in a significant decline of risk in the banking sector. Madura and Premti (2014b) found that with the introduction of the Volcker Rule (part of the Dodd-Frank

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Act), banks experienced a reduction in risk. This reduction in risk was in response to the first event that signaled the development of the Volcker rule. Czyrnik and Klein (2004) found that with the introduction of the Gramm-Leach-Bliley Act of 1999, also known as the Financial Services Modernization Act, the values of commercial and investment banks increased significantly. Mamun et al. (2005) found that the Gramm-Leach-Bliley Act resulted in positive effects on valuations for larger banks in particular due to their ability to diversify risk. However, Akhigbe and Whyte (2001a) and Geyfman and Yeager (2009) found that with the passage of the GLB Act, while the value of larger banks increased significantly, banks also experienced increased risks.

In the EU, regulations have had positive effects on firm valuations. Kiesel et al. (2015) found that the introduction of EU Regulation 263/2012, which was designed to limit speculation on credit default swaps, resulted in stabilization of European markets and firm valuations. In Greece, Iatridis and Dalla (2011) found that the introduction of regulations related to the International Financial Reporting Standards resulted in positive effects on valuations for firms due to the increased requirements in reporting financial statements, resulting in increased transparency. Goh et al. (2016) found similar results in France with the adoption of the International Financial Reporting Standards. Bouheni (2014) conducted a cross-country study of the biggest banks from six European countries (France, United Kingdom, Germany, Italy, Spain, and Greece) and found that regulations decrease risk taking and enhance bank stability.

Regulations are designed to promote sound disclosure and governance practices with the intention of driving transparency, efficiency, and stability in the financial sector. However, there can also be a negative impact on firms. The cost and operational complexity of compliance can be burdensome. Regulators develop rules and enforcement procedures to induce banks to behave

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in desirable ways. However, with imperfect information about the banking sector, regulators may introduce inefficient methods that are not designed to promote efficient economic activity (Barth et al., 2001). Barth et al. (2008) found that greater regulatory restrictions on banking are associated with lowering of banking sector efficiency. The negative impact of valuations is centered around the cost of compliance where the introduction of regulations increases the required costs of compliance (Akhigbe & Martin, 2006; Engel et al., 2007). Pasiouras et al. (2009) found that less cost-efficient banks with higher loan provisions and lower liquidity tend to have lower credit ratings.

Different regulations can have unintended consequences with potentially negative effects on valuations. Madura and Premti (2014a) found that changes in the banking environment as a result of introducing the Volcker Rule alter bank risks; they found that events signaling the Volcker Rule impose heavy restrictions on bank proprietary trading with a negative impact on money-center banks. Basu and Dimitrov (2010) also found the similar negative impact on valuation as a result of the introduction of the Sarbanes-Oxley Act (SOX), in this case due to the increase of outsiders onto corporate boards directly impacting compliance costs. Carow and Larsen (1997) found a negative effect of the imposition of the FDICIA as a result of the increased cost of compliance. Kamal et al. (2012) found that with the implementation of Regulation Fair Disclosure, decimalization, and SOX, firms added to the Standard and Poor's 500 index showed a significant decrease in their returns around the announcement date, and the authors argued that this was due to the reduction in information asymmetry. In Taiwan, Wang et al. (2005) found that the introduction of RFD resulted in lower returns post-regulation than pre-regulation, also due to the reduction in information asymmetry.

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In Europe, the Basel Accords were designed in response to bank failures in the 1970s and 1980s to ensure banks stayed liquid by maintaining adequate capital ratios to prevent a future financial crisis (Kobrak & Troege, 2015). In a cross-country analysis of European banks, Pasiouras et al. (2009) found that Basel II regulations that relate to stricter capital requirements reduce profit efficiency. Tchana (2014) found that larger reserve requirements increase banking instability and valuation. González (2005) conducted an international comparison of banks and found a negative relationship between regulatory restrictions and the stability of a banking system.

The mixed results of regulations' impact on profitability are based on both the intent of different regulations as well as the various characteristics of the banking industry (Smith et al., 1986). Size as a firm characteristic has been extensively examined in the literature. Cornett and Tehranian (1990) found that as a result of the Depository Institutions Deregulation and Money Control Act of 1980, large commercial banks experienced significant positive abnormal returns while shareholders of small commercial banks experienced significant negative returns due to different economic incentives of the banks. Madura and Bartunek (1995) found that that the FDICIA proposal favorably affected small and medium banks' valuations but negatively affected large banks. Similarly, Akhigbe and Martin (2006) found that with the passage of SOX, the size of the bank was a factor in impacting valuations, with smaller banks' valuations less favorable due to the cost of the required compliance in meeting the regulation; the authors also found that banks with fewer independent audit committees and fewer disclosures resulted in less favorable effects on valuation as a result of regulations.

Pasiouras et al. (2009) found that the introduction of regulations that enhance market discipline and increase the supervisory power of the regulators will increase both costs and profit

efficiency. Similarly, Akhigbe and Whyte (2001) found that banks experienced positive returns and risk reduction following the passage of the FDICIA. Specifically, banks that were poorly capitalized with large and high credit risks experienced the greatest reduction in risks. This is in contrast with Carow and Larsen's (1997) findings that banks saw the negative effect on returns due to compliance costs.

Cross-country and environmental factors also affect bank efficiency as a result of regulation. Barth and Caprio (2002) found that the introduction of regulations resulted in the mixed results on valuations related to cross-country analysis. Specifically, Dietsch and Lozano-Vivas (2000) found that a sample of Spanish and French banks highlighted differences in bank efficiency due to environmental variables, specifically macroeconomic, structural issues, and accessibility of banking services within each country. Berg et al. (1993) found differences in banking efficiency between Norway, Sweden, and Finland.

Overall, these studies focused on the solvency of the banking system with regulators interested in the impact of regulations on wealth effects and risks. While other types of financial regulation have been discussed, to the best of my knowledge, the impact of 4AMLD has not been examined. The goal of this study is to understand how this regulation affects bank valuations generally in the EU and which types of banks were most impacted by the regulation.

Impact of Anti-Money Laundering Regulations

While AML regulations were introduced globally in the early 1970s, the academic literature has to date not focused on the valuation impact of these regulations related to the financial sector. The September 11, 2001 terrorist attacks in the United States and the recognition that laundered money was used to finance these attacks highlight the need for research on the impact of money laundering and terrorist financing in banking valuations.

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Another factor is the large penalties imposed on major European banks that facilitated money laundering on behalf of criminals. For example, HSBC was fined \$1.9 billion in December 2012 and BNP Paribas was fined \$8.9 billion in July 2014 (Pratley, 2014). Each fine was considered the largest at the time of the fine.

Extant literature in this area has typically focused on the sources, processes of money laundering, the global extent of the problem, and the challenges in monitoring the flow of laundered money (Aluko & Bagheri, 2012; Buchanan, 2004; Walker & Unger, 2009). Buchanan (2004) found that money laundering is a global phenomenon, primarily due to the increasing globalization of trade, allowing for both legitimate and illegitimate financial transfers across borders aided by greater integration of markets. Walker and Unger (2009) found that estimating money laundering is difficult due to the limited amount of data available related to cross country criminal activities; the authors also found that while the confiscation of assets is one way to combat crime, the size and flows of organized crime is equally difficult to estimate. Aluko and Bagheri (2012) found that greater amount of money laundering occurs in developing countries where enforcement controls are not as mature as developed countries. Criminals take advantage of the lax controls and exploit the financial systems in these countries. Existing literature also describes types of money laundering (Irwin & Liu, 2012) and AML programs internationally and the programs' effectiveness regarding identifying the criminal elements (Arnone & Borlini, 2010).

Several studies have attempted to measure the effectiveness of AML regulations in reducing money laundering activities, particularly related to the effect of the USA PATRIOT Act. Dolar and Shughart (2012) found that the introduction of the act placed proportionately greater compliance costs on smaller financial institutions. Fisher et al. (2005) indicated that

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community banks are disproportionately impacted by the regulatory burden due to their limited human, financial, and other resources.

Chong and Lopez-De-Silanes (2015) found that tougher AML regulations have an impact in reducing money laundering activities across countries. Specifically, the introduction of regulations criminalizes these activities and improves disclosure. Sathye and Islam (2011) found that in Australia, the more effective the AML regulation is, the more costly it is for money launderers to launder their funds, resulting in lower levels of money laundering overall. Ferwerda (2009) found that AML regulations deter potentially criminal behavior, effectively lowering the crime rate. Ferwerda (2009) also found that additional characteristics including the role of laws, the institutional framework, law enforcement, and international cooperation are all factors for reducing criminal activities that encourage money laundering.

The effectiveness of AML regulations regarding reducing money laundering has also been examined geographically. Kemal (2014) found that money laundering is most prevalent in the Pakistan banking sector with AML regulations focused on this sector. The author also found that AML training is effective in identifying money laundering activities in banks (Kemal, 2014). Hansen (2013) found that money laundering impacts economic development in the Organization for Economic Cooperation and Development countries driven by illicit financial flows from developing countries. These illicit financial flows stem from money laundering, tax evasion, and bribery activities. Regarding regulations in general, Naceur and Omran (2011) found that for a broad selection of Middle East and North African countries, bank capitalization and credit risk have a positive and significant impact on banks' net interest margin, cost efficiency, and profitability.

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The domain of AML academic research is relatively recent, focusing on areas describing regulation but not any causal effect of the theory or financial implications underlying the regulation (Silets & Cleef, 2003). Gill and Taylor (2002) stated that “there is still very little information on cost benefits in anti-money laundering work and this is an area ripe for research” (p. 11). Currently, there is a gap in the academic literature on how AML regulations affect bank valuations. It is also important to note that the 4AMLD is relatively recent with the introduction of the directive in February 2013 and the publication in the *Official Journal of the European Union* in June 2015 (“European Parliament Backs Stronger Rules, 2015).

Finance-based literature, in general, has to date not focused on assessing the impact of money laundering regulations, especially the impact of 4AMLD on bank valuations. This is in part due to the nature of regulatory fines, as these fines have only recently become quite large. To the best of my knowledge, no studies have been undertaken that specifically assess the impact of the 4AMLD on bank valuations in the EU, providing an opportunity for a meaningful contribution to the finance literature.

Hypotheses

Overview

Extant literature has shown that the introduction of regulations has varying impact on firm valuations driven by various bank characteristics. In this section, the 4AMLD regulations are examined to understand if there is a positive or negative impact on bank returns’ valuation and risk. Competing hypotheses are then developed with cross -sectional regressions conducted to identify how 4AMLD could affect bank valuations and risk for each of these bank characteristics.

The Effect of the 4th Anti-Money Laundering Directive on Bank Valuation. Several studies have found that banking regulations result in significant valuations on firm values. Akhigbe and Martin (2006) found that the introduction of the SOX legislation improved profitability and firm valuations. Demirgüç-Kunt (2003) found that tighter regulations on bank entry and activities boost net margins and valuations. Schwerter (2011) found similar results in relation to the introduction of Basel III regulations in Europe.

These studies have attributed the positive valuation effects to increased transparency, which results in investors being able to lower risks when making investment decisions. Similarly, the 4AMLD mirrors SOX and Basel III regulations in that banks are required to improve their monitoring and reporting standards for risky investment decisions (Böszörmenyi & Schweighofer, 2015). The resulting effect makes these decisions more transparent for investors. As part of 4AMLD, banks are required to identify and provide data on the ultimate beneficial owners of financial transactions to a central register in each EU member country, reflecting tighter regulations as described by Demirgüç-Kunt (2003). Both requirements increase transparency with potentially positive effects on bank valuation. The hypothesis is that the passage of 4AMLD could result in a positive effect on bank valuation

A counter hypothesis can be considered. The introduction of regulations can also have a negative impact on bank valuations due to the increased cost of compliance. Operationally, firms have to allocate funds to meet regulatory requirements. Harvey (2004) found that a negative impact on valuations caused by regulations increases the operational costs without significant benefit for the banks that already have AML operations in place. In analyzing the impact of SOX regulation, Akhigbe and Martin (2006) found that the costs of regulation exceeded the benefits of improved transparency brought about by the introduction of the

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regulation. The authors found that firms with fewer independent audit committees, without a financial expert and fewer disclosures, of smaller size, and with less involved CEOs would be expected to incur additional costs to comply with the regulation, experiencing lower valuation effects.

Similarly, Chung and Keppo (2012) found a decline in profitability of banks due to the introduction of the Volcker Rule. When looking specifically at the cost of compliance, Sathye (2008) found that Australian banks find AML regulations a substantial financial burden due to the impact on competitive market position. Overall, these studies attribute the decline in valuation to the increased cost of compliance. Similarly, the 4AMLD requires banks to adhere to additional compliance screening requirements, increasing the cost of compliance and leading to a negative effect on valuations. The counter-hypotheses here is that the passage of 4AMLD could result in a negative effect on bank valuations.

The Effect of 4th Anti-Money Laundering Directive on Bank Risk. Studies have shown mixed results related to the effect of regulations on bank risk. Akhigbe and Whyte (2001) and Geyfman and Yeager (2009) both found increased valuations and risks resulting from the introduction of the Gramm Leach Bliley Act of 1999 in the U.S. Regulations can increase bank risks from an operational perspective as increasing regulation requires banks to introduce new technology and processes that can potentially disrupt existing operations. The introduction of new regulations requires technology changes to existing processes, increasing the risk of not complying with the new regulations with potential for future fines for non-compliance. In addition, staff requires training to learn how to use the systems. New technology solutions need to be installed and tested. Data on existing solutions need to be migrated to the new systems. Overall, transition activities are expected to result in increased risks of compliance with

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regulations resulting in increased risk. Similar to other bank regulations, 4AMLD regulations require banks to identify lower transaction amounts for screening and increase reporting requirements beyond current processes, potentially increasing risks. As a result, the passage of 4AMLD could increase bank risk.

Conversely, regulations can also reduce bank risks as they can provide a clearer definition of compliance requirements. Banks can develop the appropriate procedures to ensure compliance and subsequently, reducing their operational risks. Tchana (2008) surveyed empirical studies of banking regulations and stability and found that banking regulation results in a more stable banking environment driven by the greater clarity of regulations. Madura and Premti (2014b) found that banks experienced reductions in risk in response to the first event signaling the impending implementation of the Volcker Rule. Risks were reduced as trading activities were shifted from banks to non-banks, reducing risks to the banking system and reducing moral hazard. Related to the 4AMLD specifically, regulations can improve a bank's ability to detect money laundering risks, which may result in lower risks of banks fines. Alternatively, the passage of the 4AMLD could reduce bank risk.

There are several measures of risk. The SD and beta are common proxies for measuring bank risk, calculated six months prior to the penalty (Madura & Premti, 2014b). While beta measures systematic risk, SD measures total risk and how much the current return is deviating from historical returns. Beta typically measures how sensitive a bank is to market conditions (not limited to changes in interest rates and regulations). The higher the beta, the higher the degree of risk relative to the market (Babcock, 1972). The standard deviation also contains bank-specific risks, including but not limited to the risk of the bank being fined and the risk of

CEO turnover in addition to the beta. The third measure of risk is the root mean square error (RMSE) and measures firm specific or idiosyncratic risks.

Cross-Sectional Analysis Using Bank Measures

In this section, I develop hypotheses on how the introduction of the 4AMLD could affect banks' returns regarding both valuations and risks based on bank level measures. Cross-sectional regressions were conducted to test the various bank characteristics.

The Effect of Risk. I first examined how risk-specific variables affect valuation. Banks' risk appetite can affect bank returns in that higher risk activities can lead to higher returns. Banks that are willing to take on more risks are looking to drive greater revenue generating activities (Naceur & Omran, 2011) but are also more impacted by the introduction of regulation, with a greater impact on valuations. Banks that engage in riskier behavior are more likely to incur penalties as they may be careless in complying with regulations. AML regulations, in particular, propose a risk-based approach where banks measure the level of risks for customer transactions to determine due diligence and operational processes accordingly (Sathye & Islam, 2011). A lack of definitive rules regarding due diligence and operational processes can lead to riskier banks applying lower standards in complying with regulations, with a higher risk of being fined in the future. This reasoning results in the hypothesis that the 4AMLD could have a more negative effect on bank valuations of riskier banks.

Conversely, riskier banks can benefit more from the introduction of the 4AMLD. These riskier banks recognize the potential negative reputational impact of penalties and announcements. The 4AMLD regulations provide a visible framework in which banks can comply and demonstrate to the public their willingness to lower their risk profile and reduce potential future fines. As a result, riskier banks that comply may see a more positive effect. The

counter-hypothesis here is that 4AMLD could have a more pronounced positive effect on riskier banks. Standard deviation, beta, and RMSE were used to measure risk.

The Effect of Size. Size as a bank characteristic can also have an impact on valuations. Various studies have found that the size of firms can have mixed results on firm returns when regulations are introduced. Boyd and Runkle (1993) found that deposit insurance regulation impacts valuations of both large and small banks. J. R. Barth et al. (2013) found that size, among other factors, has an impact on returns as a result of external regulations. However, the impact is indeterminate.

While larger banks are more diversified, this does not necessarily translate into the reduction of risks or valuations (Demsetz & Strahan, 1997). Depending on the regulation, larger banks can have increased diversification of financial products with both positive and negative effects on valuation due to increased profits and risks respectively from non-traditional banking activities. Bank size has been demonstrated to be significant in explaining bank failure with regulations impacting the extent of the failure (Misra & Aspal, 2013). McLaughlin (2008) found that smaller firms with greater information asymmetry show a greater negative impact on firm valuation as a result of regulation. Chhaochharia and Grinstein (2007) found that small firms show negative abnormal returns due to regulations.

As a result of the introduction of regulations, smaller banks have to invest a disproportionately larger proportion of assets to implement the relevant compliance systems. Smaller banks have to divert limited resources to non-revenue producing compliance activities, potentially impacting future profitability. Smaller banks are also more likely to fail when compared to larger banks if regulations are too burdensome. Larger banks can be seen as too big to fail where their continued operations have been de facto guaranteed as a result of a negative

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impact on the economy as a result of the large size of the bank. Gandhi and Lustig (2015) found that large banks have significantly lower risk-adjusted valuations than small and medium sized banks due to implicit government regulations that provide implicit guarantees that large banks are too big to fail. Subsequent regulations result in a less negative impact on valuation as financial analysts factor the government guarantee into account (Boyd & Runkle, 1993). Conversely, smaller banks see a greater negative effect on valuations from implementing regulations like 4AMLD as they have to devote greater resources as a proportion of assets to comply with the regulations. As a result, the introduction of the 4AMLD could have a more pronounced negative effect on smaller banks.

Larger banks, on the other hand, typically have greater resources devoted to detecting potential money laundering and can comply with regulations in a more cost effective way (Docking et al. 1997). Larger banks operate in concentrated banking systems that enhance market power and boost bank profits that provide a buffer against adverse shocks, including new regulations like 4AMLD. Larger banks are more complex and face greater challenges in implementing new regulations, potentially driving up costs. Larger banks could also be targeted for disproportionately larger fines as regulators may seek to make an example of them in the banking industry, knowing that the large fines would make the press and demonstrate regulators are being tough. Larger banks could, therefore, be at a higher risk of being fined with resulting greater negative effects on returns. Larger banks may also see a disproportionately lower return on valuations as the incremental gain from implementing new regulations does not outweigh the costs as perceived by investors. As a result, large banks may also see a negative effect from implementing regulations like 4AMLD. The counter-hypothesis here is that 4AMLD could have

a more pronounced negative effect on larger banks. For both the hypothesis and counter-hypothesis, I measured the size of the bank based on the log of total assets (*LOGIOAT*).

The Effect of Non-Traditional Banking Activities. Non-traditional banking activities are another proxy for risk and include services outside of typical deposit and lending activities. These banking activities may include but are not limited to securities brokerages, insurance sales, venture capital, investment banking, and asset securitization (DeYoung & Torna, 2013). DeYoung and Torna (2013) found that these non-traditional banking activities were considered higher risk, contributing to higher bank failures during the financial crisis, resulting in a greater negative effect on bank valuations. Non-traditional banking activities are still subject to AML regulations similar to traditional banking activities as they involve the movement of funds and therefore need to be screened for potential money laundering activities. However, recent regulatory actions have focused mostly on money laundering violations in traditional banking activities.

In the United States, the Gramm-Leach-Bliley Act of 1999 allowed banks to conduct non-traditional banking activities in deregulated financial markets (Mamun et al., 2005). The EU adopted similar banking infrastructure deregulation between 1980 and 1991 to allow greater competition in the financial services industry (Gual & Neven, 1992). Standard banking regulations related to non-traditional banking activities do not provide comprehensive oversight of these activities, resulting in greater willingness to take risks in the form of money laundering activities with greater negative effect on valuations.

These non-traditional banking services are more profitable. When the financial crisis of 2008 occurred, EU banks were pressured to take on these non-traditional banking services, exposing them to greater money laundering risks due to the lack of regulatory oversight.

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Investors perceive banks with a high percentage of non-traditional banking activities as unable or unwilling to comply with the required 4AMLD regulations, resulting in a greater negative effect. As a result, 4AMLD could have a more pronounced negative effect on banks conducting non-traditional banking activities. I measured non-traditional banking activities (*TNIIREV*) as a percentage of non-interest income calculated as non-interest income divided by total revenue.

The Effect of Return on Assets. Another bank-specific financial control measure is returns on assets (*ROAEUR*), which measures the efficient use of assets to generate earnings. The 4AMLD provides operational clarity on compliance requirements, allowing for more efficient allocation of resources to meet these requirements. Firms typically look to optimize the use of assets to maximize returns. The hypothesis here is that as a result of the introduction of the 4AMLD, banks with higher returns on assets will see more positive returns as the greater clarity provides for the appropriate allocation of compliance officers and staff and the more efficient use of assets. I measured return on assets as a ratio of net income to assets.

The Effect of Previous Anti-Money Laundering Fines. Previous money laundering fines (*AMLFINEDUM*) can also effect the returns of the bank. If a bank has incurred fines based on non-compliance in other areas, this negative event can also affect subsequent valuations as investors would have incorporated previous non-compliance activity. To control for such effects, a dummy variable identifying previous fines was included, where 1 indicates a previous fine, 0 otherwise.

Cross-Sectional Analysis Using Country Measures

In this section, I develop hypotheses on how 4AMLD could affect banks' returns regarding both valuations and risks based on country level measures.

The Effect of Gross Domestic Product per Capita. In countries with higher Gross Domestic Product (GDP) per capita (richer countries), the financial services industry tends to be more developed with a mature, regulated banking system and more developed credit markets when compared to countries with lower GDP per capita (poorer countries). Banks in richer countries are familiar with regulations and quickly adapt processes to incorporate new regulations. In richer countries, the introduction of the 4AMLD provides these countries' financial systems a competitive edge compared to poorer countries that may be unfamiliar with adopting regulations. The market anticipates that poorer countries have weaker financial services infrastructure and are more challenged in implementing the required 4AMLD compliance requirements. The operational costs may outweigh the benefits for countries with lower GDP, leading to lower returns for banks in these countries. In contrast, banks in richer countries are able to address the 4AMLD requirements with lower operational impact and potentially higher returns. The hypothesis here is that banks in countries with higher GDP per capita will see higher returns compared to banks in countries with lower GDP per capita. I measured GDP per capita based on data from the *CIA World Factbook* (Central Intelligence Agency, n.d.a).

The Effect of Corruption. Corruption is directly tied to money laundering as funds obtained through corrupt activities are laundered through the financial system (Chaikin, 2008). Banks are the primary conduit for laundering corrupt funds. Money laundering regulations are designed to reduce corruption levels in a country, and in the long run, corruption leads to significantly lower firm returns (Lee & Ng, 2009). Shera (2011) found that countries with high levels of corruption have a negative effect on bank performance with overall lower levels of economic growth. Excessive regulations make it easier for officials who have significant

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discretionary powers to engage in rent seeking through extortion. Wallis (2004) described systematic corruption where politicians influence banks to extend credit only to groups that support the ruling party. Dridi (2013) found that in jurisdictions with complex regulations, bribery is common with firms facing higher costs of capital. Bankers may try to influence regulators with job offers or other bribes (Barth et al., 2008). Tanzi and Davoodi (1997) found that firms that pay the highest bribes are not necessarily the most efficient, diverting capital away from economically efficient activities. This may potentially increase the cost of operations with a negative impact on firm valuations. As a result, additional regulations like the 4AMLD can result in a greater negative effect on bank valuations in countries with high levels of corruption due to the non-productive allocation and increased cost of capital. In addition, in highly corrupt countries, money laundering is a significant revenue driver for banks. AML regulations that require banks to detect and eliminate money laundering can impact profitability. The hypothesis is that 4AMLD could have a more pronounced negative effect on banks in countries with high levels of corruption.

In countries with low levels of corruption, the same type of bank may see greater negative effects on returns than banks in countries with high levels of corruption. This is because in countries with low levels of corruption, money laundering regulations only add additional costs to the bank's operations without additional benefit, resulting in lower announcement returns. Additionally, the same type of bank in a high corruption country will see lower negative returns as the effects of corruption have already been included in the valuation and new regulations implemented are not seen as effective. The counter-hypothesis is that 4AMLD could have a more pronounced negative effect on banks in countries with low levels of corruption. For both the hypothesis and counter-hypothesis, I measured the level of country

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level corruption (*CPI*) using the Transparency International Corruption Perception Index.

Transparency International is a non-government organization that publishes annual rankings of countries on a scale of public perception of corruption which is used widely in academic and professional studies (Lee & Ng, 2009; Serpel et al., 2005; Shera, 2011). The Corruption Perception Index is considered a poll of polls, reflecting composite information from up to 12 individual surveys and ratings (Lee & Ng, 2009). The scale used ranges from 1 to 100 where a 1 equals the highest level of perceived corruption and 100 the lowest. Countries that receive higher scores are considered less corrupt. For example, the 2014 results showed that out of the 174 countries assessed, Denmark was the least corrupt with a score of 92 and Somalia was the most corrupt with a score of 8 (“Corruption Perceptions Index 2014,” 2014).

The Effect of Governance. Disclosure and governance characteristics drive bank valuation. Akhigbe and Martin (2006) found that banks with fewer independent audit committees and fewer disclosures have less favorable effects on valuation as a result of regulations, in this case, the passage of SOX. Gu and Hackbarth (2013) found that firms with higher levels of governance and transparency see higher abnormal returns.

Similar to corruption, the hypothesis here is that the introduction of the 4AMLD could have a more pronounced negative effect on banks in countries with higher governance indicators as additional regulations like the 4AMLD can have a greater negative effect on bank valuations in countries due to the non-productive allocation and increased capital and income expense. AML regulations that require banks to detect and eliminate money laundering require investments in complex, costly systems that can impact profitability. The hypothesis is that 4AMLD could have a more pronounced negative effect on banks in countries with low levels of governance.

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In countries with high levels of governance, the same type of bank may see greater negative effects on returns than banks in countries with low levels of governance. This is because in countries with high levels of governance, money laundering regulations only add additional costs to the bank's operations without additional benefits, resulting in lower announcement returns.

Kaufmann et al. (2010) defined governance as the traditions and institutions by which authority in a country is exercised. This includes (a) the process by which governments are selected, monitored and replaced; (b) the capacity of the government to effectively formulate and implement sound policies; and (c) the respect of citizens and the state for the institutions that govern economic and social interactions among them. Kaufmann compiled a governance dataset, the Worldwide Governance Indicators (WGI), which contains broad dimensions of governance: voice and accountability, political stability, government effectiveness, regulatory quality, and rule of law. WGI is a country-level research dataset summarizing the views on the quality of governance provided by a large number of enterprise, citizen and expert survey respondents in industrial and developing countries.

I used the measures of governance available as part of the WGI dataset. The measures of governance include voice and accountability, which reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Government effectiveness reflects perceptions of the quality of public services, the quality of civil service and the degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Political stability measures perceptions of the likelihood of political unrest. Regulatory quality reflects perceptions of the

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ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Rule of law reflects perceptions of the extent to which agents have confidence in and abide by the rules of society and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

Data and Methods

Following Akhigbe and Martin (2006), I included banks with standardized industrial codes 602X. Banks are affected by AML regulations including the 4AMLD as they facilitate financial transactions in various ways. The 28 EU countries included in the sample are Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom (“EU Member Countries in Brief,” n.d.). Regarding the adoption of the euro, Bulgaria, Croatia, Czech Republic, Denmark, Hungary, Poland, Romania, Sweden, and the United Kingdom continue to use their local currency. For these countries, I converted the local currency to euros before running the analysis. Publicly available bank financial information was retrieved from the Compustat Global database. Initial results from the Compustat Global Fundamentals Annual database revealed that in 2014, there were 173 EU banks with headquarter locations in the EU out of a total of 1,037 banks globally with SIC 602X.

I conducted event studies to determine the significance of the impact of the 4AMLD on bank valuations and risks. Event studies are commonly used to evaluate the possibility of abnormal returns based on specific events (MacKinlay, 1997). For this event study, as mentioned earlier, eight events corresponding to each significant 4AMLD announcement date

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were analyzed. Each event represents a step towards the passage of legislation of the 4AMLD in the EU (“4th Anti-Money Laundering Directive, n.d.). To test if there was any impact of the 4AMLD on bank valuation and bank risk, I conducted a time series analysis to determine significance. A cross-sectional regression analysis was then conducted to test the characteristics for both valuations and risk. Key event dates and ranges for the eight events are listed in Table 1. It is important to recognize that while there were other activities that drove the development of the directive, the events listed were known to the public with the potential of impacting market returns.

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Table 1

Event Dates Related to Introduction of the 4th Anti-Money Laundering Directive

Event Number	Event Description	Date
1	European Commission released revision of Anti-Money Laundering Directive proposal	February 8, 2013
2	The European Data Protection Supervisor opinion related to impact on money laundering was released	August 8, 2013
3	The Presidency Compromise document was released, including clarifying language with respect to electronic money	November 22, 2013
4	The General Approach document was released	May 26, 2014
5	Final updated Presidency Compromise was released	June 13, 2014
6	Joint Declaration by all European Union member states issued	February 2, 2015
7	Communication from European Union Commission to Parliament supporting Council's position was released	April 29, 2015
8	The 4th Anti-Money Laundering Directive enters into force	June 26, 2015

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An initial time series analysis based on an ordinary least squares (OLS) regression method measured the valuation and control for risk shift effects of specific banks in response to the eight EU announcements pertaining to the 4AMLD. Adding a dummy variable for AML and the risk shift allowed for simultaneous analysis of both the returns and systemic risk following an event (Bhargava & Fraser, 1998). I measured the abnormal returns and risk for all events combined, as well as by individual event dates. The model is described as follows:

$$R_{p,t} = \alpha + \beta_1 * R_{m,t} + \beta_2 * 4AMLD + \beta_3 * 4AMLD \text{ RISK-SHIFT} + e_t \quad (1)$$

where:

- $R_{p,t}$ is the bank portfolio return on day t ;
- β_1 is the coefficient of the bank portfolio return to the market return as estimated by the model;
- $R_{m,t}$ is the market return on day t using the European Morgan Stanley Capital Index and the Financial Times Stock Exchange indices;
- β_2 is the coefficient of the bank portfolio return related to the introduction of 4AMLD regulation on valuations as estimated by the model;
- $4AMLD$ is a dummy variable where 1 on all event dates and day after for all eight event dates, 0 for any other dates;
- β_3 is the estimated shift in the risk of the bank portfolio following the first event;
- $4AMLD \text{ RISK-SHIFT}$ is a dummy variable that equals one on the dates following the first 4AMLD event date (February 8, 2013) multiplied by $R_{m,t}$, the interaction term test for a risk shift following the 4MLD event date;
- α is the intercept;
- and e_t is the error term.

To check the robustness of the results, the bank portfolio return was measured using the Morgan Stanley Capital Index (MSCI) and Financial Times Stock Exchange (FTSE) Europe top 100 indices, accounting for risk shifts. The MSCI Europe index provided a relevant stock market benchmark for computing European bank stock returns as the index captures large and

mid-cap representations across European countries (Hovarth & Huizinga, 2015). The FTSE Eurotop 100 index, which represents the performance of the 100 most highly capitalized blue chip companies in Europe, was also used as a market benchmark as a measure of robustness. Two additional risk measures beyond the shift in beta were used to measure the 4AMLD risk shift. I measured the total risk of the banks by the standard deviation of returns (which includes both the bank- and market-specific risk) and the idiosyncratic risk of the bank which was measured by the RMSE (bank-specific risk) of the regression model listed above. These risk measures were captured in the six-month period prior to and after the first event date. To determine if there was any significant change in risk, *t*-tests were also run.

To correct for potential heteroscedasticity, robust standard errors were reported for all models (White, 1980). Heteroscedasticity may have occurred as the dependant variable, the bank portfolio return, was predicted by different banks across 28 different countries. Each EU member countries' results are reported along with the aggregate. Using a *t*-test, the results of this model demonstrate if the passage of 4AMLD did indeed have an effect on bank valuation for all EU countries. A positive result signals that the regulations had a positive effect on bank valuations. A negative result indicates the market perceived that the 4AMLD had a negative effect on bank valuations. Similarly, if the sensitivity of the bank portfolio return is significant and positive (negative), the 4AMLD had a positive (negative) effect on bank valuations. If the coefficient of the 4AMLD *RISK-SHIFT* variable is significant and positive (negative), the first event will have increased (decreased) the risk of bank stocks following the announcement.

I then applied a cross-sectional OLS regression analysis to explain the valuation and risk-shift effects on banks due to the 4AMLD based on the various characteristics outlined in the hypothesis section. The time series model was applied to each bank to derive the estimated

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valuation impact as a result of the 4AMLD. Each characteristic was regressed by all EU countries against the cumulative abnormal return based on the event date and day after to determine the significance of that characteristic in supporting the hypothesis. The model is as follows:

$$CAR(0,1) = \alpha + RISK + \beta_2 RISKSHIFT + \beta_3 BANKSIZE + \beta_4 TNIIREV + \beta_5 ROAEUR + \beta_6 AMLFINEDUM + \beta_7 GDPCAPITA + \beta_8 CORRUPTION + \beta_9 GOVERNANCE + e \quad (2)$$

where $CAR(0,1)$ is the dependent variable and represents the cumulative abnormal return or the abnormal share price response on the day of (0) and the day after (1) the event date. Each independent variable was tested against the CAR to determine if that variable results in an abnormal share response. The greater the CAR (either negative or positive), the greater the valuation and risk effect of the bank.

Several measures of risk were used. Beta is a proxy for the degree of bank risk. The higher the beta, the higher the degree of risk relative to the market (Babcock, 1972). The standard deviation of returns (*STDEV*) is also another common proxy for measuring bank risk (Madura & Premti, 2014b). Return data retrieved from the Compustat Global database were used to calculate the standard deviation. This was calculated as the post-regulation return minus the pre-regulation return stock price divided by the pre-regulation stock price six months before the event date. The third measure of risk is the root mean square error and measures firm specific or idiosyncratic risks.

BANKSIZE was measured by the log of total assets (*LOG10AT*) of the bank (Bouheni, 2014). Non-traditional banking activities (*TNIIREV*) was measured as non-interest income divided by total revenue. I measured return on assets (*ROAEUR*) as a ratio of net income to assets. All financial indicators were retrieved from the Compustat Global database.

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Previous money laundering fines (*AMLFINEDUM*) can also effect the returns of the bank. If a bank has received bank fines based on non-compliance in other areas, this negative event can also affect subsequent valuations as investors would have incorporated previous non-compliance activity. To control for such effects, a dummy variable identifying previous fines during the event period was included.

GDP per capita data was obtained from the *CIA World Factbook* for 2014 and converted to euros at the prevailing exchange rate. *CORRUPTION* was measured by the Transparency International Corruption Perception Index. Transparency International is a non-governmental organization that publishes annual rankings of countries on a scale of public perception of corruption which is used widely in academic and professional studies (Lee & Ng, 2009; Serpel, Patricia Torres, & Shachmurove, 2005; Shera, 2011).

GOVERNANCE measures were obtained from the WGI dataset and include government effectiveness, political stability, regulatory quality, rule of law, and voice and accountability. A principal component analysis was conducted on the WGI governance measures to obtain a single parsimonious measure of governance and regressed against the CAR. Principal component analysis (PCA) was used because each measure of governance is closely related, and the technique allows for the reduction of measures into a smaller set of uncorrelated components. Since principal component analysis is a data reduction method, there is a need to retain an appropriate number of factors based on the trade-off between simplicity (retaining as few factors as possible) and completeness (explaining most of the variation in the data). A scree plot of the eigenvalues determined the remaining factor for a single measure of governance. To check the robustness of the results, individual governance measures were regressed against the CAR. To identify multi-collinearity, the VIF of all measures were analyzed. A fixed effects regression

was also conducted to control for any unobserved heterogeneity. Based on collinearity between the governance measures, government effectiveness and political stability were determined to be least correlated and were used in the regression.

Results

The sample of EU based banks was retrieved from the Compustat Global database between February 6, 2012, and June 27, 2016 (one year before and after the event dates). Observations that were not retrieved relate to financial institutions that were either private during the period or had incomplete records on Compustat Global, restricting the ability to provide financial statements and market valuation data. A total of 173 observations were retrieved for analysis.

Within the EU member group of 28 countries as of June 27, 2016, there are nine countries that have not adopted the euro (Bulgaria, Croatia, Czech Republic, Denmark, Hungary, Poland, Romania, Sweden, and the United Kingdom). The United Kingdom announced plans to leave the EU by 2019 (Hunt & Wheeler, 2017). For this study, the United Kingdom was still included as the event dates related to the introduction of the 4AMLD are before the planned exit. The United Kingdom will continue to be subject to the 4AMLD until the exit date, which has not been determined, at which point domestic regulations will then apply (Lloyd, 2016). Annual financial data and daily stock prices retrieved from Compustat Global for non-euro countries were converted to euro based on the prevailing exchange rate before calculating individual bank financial data. All other euro-based countries' financial data were used as retrieved from Compustat Global.

Table 2 provides summary statistics related to the sample based on 2014 fiscal and year end data (a year prior to the publication of the final directive). The top panel provides results of

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Table 2

Summary Statistics

Variable	Observations	Mean	SD	Min.	Max.
<i>Risk-Specific Measures</i>					
<i>STDEV</i>	173	0.0273	0.1841	0	0.1311
<i>STDEVShift</i>	173	0.0046	0.0426	-0.0461	0.4042
<i>BetaFTSE</i>	173	0.6486	0.7993	-0.6935	2.7552
<i>BetaShiftFTSE</i>	173	-0.0435	0.6047	-1.4422	4.3154
<i>RMSEFTSE</i>	173	0.0258	0.0186	0	0.1314
<i>RMSEShiftFTSE</i>	173	0.0046	0.0426	-0.0456	0.4044
<i>Bank-Specific Measures</i>					
Total Assets	166	€213,577,700	€538,240,400	€10,858,310	€3,150,694,000
Total Non-Interest Income (<i>TNII</i>)	162	€1,465,605	€4,651,313	(€10,257,160)	€3,4261,090
<i>TNII/Revenue</i> ratio	162	0.2647	1.2332	-2.7181	15.316
Return on Assets	157	-0.0140	0.1790	-2.2210	0.0495
<i>AML FINE Dummy</i>	173	0.2023	0.4029	0	1
<i>Country-Specific Measures</i>					
GDP Per Capita	173	€ 27,834	€7,437	€14,361	€74,436
Corruption Perception Index	173	65.35	18.60	43	92
Rule of Law Index	173	1.2358	0.6882	-0.08	2.12
Government Effectiveness Index	173	1.1845	0.5304	0	2.02
Voice and Accountability Index	173	1.1536	0.3316	0.34	1.63
Political Stability Index	173	0.6895	0.3261	0.024	1.39
Regulatory Quality Index	173	1.1607	0.4912	0.345	1.90
Governance PCA	173	-1.1157	2.0270	-4.208	3.25

Note. This table provides summary statistics. Euro amounts are represented in thousands (‘000s). The top panel lists risk-specific measures, the middle panel the bank-specific measures related to individual banks in the portfolio, and the bottom panel lists country-specific measures. All 28 EU member states are included in the sample. Risk-specific measures include SD, beta and root mean squared error. Beta is a proxy for the degree of bank risk. The higher the beta, the higher the degree of risk relative to the market (Babcock, 1972). The standard deviation

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of returns (*STDEV*) is a proxy for measuring bank risk (Madura & Premti, 2014b). Return data retrieved from the Compustat Global database was used to calculate standard deviation. This was calculated as the post-regulation return minus the pre-regulation return stock price divided by the pre-regulation stock price six months prior to the event date. A third measure of risk is the root mean square error which measures firm specific or idiosyncratic risks. The risk shift measures were calculated as the post-regulation return minus the pre-regulation return stock price divided by the pre-regulation stock price six months prior to the event date. *STDEVShift* measures standard deviation shift; *BetaShiftFTSE* measures beta shift; *RMSEShiftFTSE* measures root mean square error shift. *FTSE* was measured based on the Financial Times Stock Exchange market index. The middle panel identifies bank-specific measures. Total assets was obtained from Compustat Global representing total assets divided by total liabilities of a company. Total non-interest income (*TNII*) measures the level of non-traditional banking income for the fined bank including services outside of typical deposit and lending activities including (but not limited to) venture capital and investment banking activities. The *TNII/revenue* ratio is normalized total non-interest income divided by total revenue. Return on assets was calculated as a ratio of net income to assets. *AMLFINEDUM* is a dummy variable identifying previous fines where 1 indicates a previous fine and 0 otherwise. The bottom panel identifies country-specific measures. GPD per capita for the 28 EU countries was obtained from the *CIA World Factbook*. Corruption Perception Index comes from the Transparency International Corruption Perception Index. Transparency International is a non-government organization that publishes annual rankings of countries on a scale of public perception of corruption. The scale used ranges from 1 to 100, where a 1 equals the highest level of perceived corruption and 100 the lowest. Countries that receive higher scores are considered less corrupt. The rule of law, government effectiveness, voice and accountability, political stability, and regulatory quality indices are individual measures of governance that are part of the Worldwide Governance Indicators compiled by Kaufmann et al. (2010). Governance Principal Components Analysis (PCA) was calculated based on a principal component analysis of the five Worldwide Governance Indicators measures.

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the risk-specific measures. The standard deviation of returns, calculated six months prior to the first AMLD event date, has a mean of 0.0273 with a standard deviation of 0.1841. The standard deviation risk shift has a mean of 0.0046 with a standard deviation of 0.0426. Results for beta show a mean of 0.6486 and standard deviation of 0.7993. The beta shift has a mean of -0.0435 with a standard deviation of 0.6047. The root mean square error measure has a mean of 0.0258 with a standard deviation of 0.0186. RMSE shift has a mean of 0.0046 and a standard deviation of 0.0426. While risk measures are described here for the FTSE index, the MSCI results were qualitatively similar and were not included for brevity.

The middle panel provides summary statistics related to bank-specific variables. The average bank in the sample had €214 billion in assets with a standard deviation of €538 billion, ranging from €11 million (Centrum Finansowe Bank in Poland) to €3.2 trillion (HSBC in the United Kingdom), reflecting a large diversity of banks impacted by the 4AMLD regulations. Total non-interest income had a mean of €1 billion with a standard deviation of €5 billion. The ratio of total non-interest income against revenue was 0.2647 with a standard deviation of 1.2332. Return on assets was measured as a ratio of net income over assets and has a mean of -0.014 with a standard deviation of 0.179, ranging from a minimum of -2.221 to a maximum of 0.0495. Of the banks in the sample, 20% have had previous money laundering penalties during the event period with a standard deviation of 40%.

The bottom panel of Table 2 provides results of country-specific variables. Of the 28 member countries, the average GDP per capita was €27,834 with a standard deviation of €7,437, with the lowest at €14,361 (Bulgaria) and the highest at €74,436 (Luxembourg). Country GDP per capita within the 28 EU member countries varies greatly with Germany, the United Kingdom, and France having higher GDP per capita compared to poorer countries like Bulgaria,

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Greece, and Romania. The average EU GDP per capita was €37,800 in 2015 (Central Intelligence Agency, n.d.b). Note that country GDP per capita was converted from U.S. dollars based on December 31, 2014, exchange rates retrieved from Compustat.

The Corruption Perception Index from Transparency International measures corruption on a scale from 1 to 100 where a 1 equals the highest level of perceived corruption and 100 the lowest. Countries in the EU sample on average had a rating of 65 with a standard deviation of 19, compared to the world average of 43, suggesting that EU countries are on average less corrupt when compared to other countries globally. The country with the lowest score (perceived most corrupt) was Bulgaria at 43, and the highest score (perceived least corrupt) was Denmark at 92.

Measures of governance were obtained from the Worldwide Governance Indicators produced by Kaufmann (2010). The rule of law index reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence; the government effectiveness index reflects perceptions of the quality of public and civil services; the voice and accountability index reflects perceptions of a representative government; the political stability index measures perceptions of the likelihood of political instability; and the regulatory quality index reflects perceptions of the ability of the government to formulate and implement sound policies. The index ranges from -2.5 (weak governance) to 2.5 (strong governance) for all five indicators. On average, countries in the EU had an index of 1.24 related to the rule of law, 1.18 related to government effectiveness, 1.2 related to voice and accountability, 0.69 related to political stability, and 1.16 related to regulatory quality. The data shows that on average EU countries have high rule of law (stronger

courts and enforcement) and low political stability (likelihood of government changes). To address multi-collinearity between the governance variables, I conducted a PCA to reduce the measures into a smaller set of unrelated components and to identify a common construct for governance. PCA identified one principal component with the highest eigenvalue of 4.1 representing 82% of all components. The component met the required criteria of parsimony and was subsequently used in the regression (*GovPCA*). The governance PCA had a mean of -1.1157 with a standard deviation of 2.027, ranging from -4.208 to 3.25. The regression analysis tested the governance principal component and as a test of robustness included the government effectiveness, political stability, and regulatory quality measures that were least correlated.

Results of Time Series Analysis

The time series analysis measured the valuation and risk effects of the identified bank portfolio in response to the eight identified milestone events related to the introduction of the 4AMLD. The model also measured the shift in risk as a result of the 4AMLD. The dependent variable was the daily return for the specified bank portfolio (*RETURNS*). To compute the cumulative abnormal returns, banks must have had daily market returns one year before and after the event dates, between February 8, 2012 and June 24, 2016, to cover the period of the eight announcement dates of the 4AMLD (announcement dates fell between February 8, 2013 and June 26, 2015).

Two different specifications were applied—the MSCI Europe index and the FTSE Europe top 100 indices as proxies for the market portfolio. The MSCI Europe index provides a relevant stock market benchmark for computing European bank stock returns as the index captures large and mid-cap representations across European countries (Hovarth & Huizinga, 2015). The FTSE Eurotop 100 index, which represents the performance of the 100 most highly capitalized blue

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chip companies in Europe, is also used as a market benchmark for robustness tests. For each index specification, two separate models were tested, with the first model testing the 4AMLD dummy incorporating the risk shift and the second model without the risk shift. A total of four models were tested.

Table 3 provides the results from applying the time series model. Results showed that across all the models, the goodness of fit is fairly strong, with the R^2 statistic ranging from 57.5% to 60%. The coefficient of the beta of the bank portfolio was 0.6 on average and positive and significant for both the MSCI and FTSE indices at the 1% level across all models. The 0.6 beta suggests that banks in this portfolio are not as risky as other firms in the market (beta greater than 1 suggests asset risks are higher than the market, beta at 0 suggests risk-free assets).

The coefficient of the 4AMLD dummy variable was positive and significant across all models at the 5% level. The estimated coefficient ranged between 0.0029 and 0.0031, which suggests that the portfolio of bank returns increased by about 0.2% per event date on average over the eight event dates (for a total of 16 days based on the event day and day after) that were identified as signals related to the introduction of the 4AMLD. The results were robust for both the MSCI and FTSE market indices. These results provide evidence of the positive impact on returns based on information released and the likelihood of legislation changes over each of the eight event dates.

The coefficient of the *4AMLD RISK SHIFT* variable for the bank portfolios were negative and not significant for both indices where the interaction term was included. The results suggest that there was no impact on bank's market risk as a result of the introduction of the 4AMLD. As a test of robustness, the time series analysis was rerun capturing the risk shift from the last announcement date (June 26, 2015) to determine any significant shift in risks at the end of the

Table 3

Time Series Analysis between February 8, 2013 and June 26, 2015

Eight events combined	Model 1	Model 2	Model 3	Model 4
	MSCI		FTSE	
<i>Returns</i>	0.630*** (17.19)	0.625*** (41.41)	0.631*** (16.35)	0.604*** (39.23)
<i>4AMLD Dummy</i>	0.00290** (2.19)	0.00290** (2.19)	0.00305** (2.23)	0.00305** (2.23)
<i>4AMLD Risk Shift</i>	-0.00647 (-0.16)		-0.032 (-0.76)	
Constant	-0.0000101 (-0.06)	-0.00000986 (-0.06)	0.0000175 (0.11)	0.0000187 (0.11)
<i>N</i>	1144	1144	1144	1144
<i>R</i> ²	0.601	0.601	0.575	0.575

Note. The table shows the results of the time series analysis. MSCI stands for Morgan Stanley Capital Index; FTSE stands for Financial Times Stock Exchange index. Models 1 and 2 relate specifically to the MSCI Europe market index while Models 3 and 4 relate to the FTSE Europe top 100 index. Returns measure the bank portfolio return based on the MSCI and FTSE indices. The 4th Anti-Money Laundering Directive (*4AMLD Dummy*) is a dummy variable that equals 1 for the milestone event days associated with the 4AMLD events between February 8, 2013 to June 26, 2015, 0 otherwise. *4AMLD Risk Shift* is the interaction between a dummy variable set equal to 1 for all days since the first event date of February 8, 2013. *t*-statistics are reported in parentheses.

*, **, *** represent the level of significance at 10%, 5% and 1% respectively.

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event period (the risk shift dummy was set to 1 on the last event date). Results were similarly negative and insignificant as with the risk shift dummy set to 1 on the first announcement date (February 8, 2013). The insignificant results suggest that the 4AMLD did not affect the risk of the banks in the portfolio either at the first or last milestone date of the event period.

Additionally, I applied a time series analysis in which I separated the effect of each individual date to determine if any individual event date was significant. The results are shown in Table 4. The overall returns and the coefficient of the 4AMLD dummy variable were positive and significant, similar to the combined portfolio. Results also showed that across all the models, the goodness of fit is fairly strong, with the R^2 statistic ranging from 57.6% to 60.3%. The results for individual 4AMLD events, however, varied with Event 2 (August 8, 2013) and Event 8 (June 26, 2015), resulting in positive and significant returns. Event 2 related to the release of the European Data Protection Supervisor's opinion about the impact of data protection on money laundering. On this date, a number of recommendations were laid out which provided the market clarity on data privacy issues in meeting the regulatory requirement. Prior to the announcement, there was uncertainty as to the data privacy implications as the directive required additional due diligence on suspected transactions, requiring greater and more sensitive data to be collected. Event 8 related to the enforcement of the 4AMLD, with the full directive adopted by the European Union directing member countries to adopt the legislation in individual countries. This announcement provided certainty to the market on the specifics of the legislation and final adoption, allowing financial institutions to begin budgeting for the required infrastructure and processes to comply with the 4AMLD. The results indicate that the markets did not react to the other six event dates.

Table 4

Time Series Analysis by Individual Event Dates

	MSCI		FTSE	
Returns	0.630*** (-17.18)	0.624*** (-41.19)	0.631*** (-16.33)	0.603*** (-39.01)
4AMLD Dummy	0.00290** (2.19) (-0.35)	0.00290** (2.19) (-0.35)	0.00305** (2.23) (-0.44)	0.00305** (2.23) (-0.44)
Aug 8, 2013	0.00668* (-1.79)	0.00667* (-1.79)	0.00716* (-1.86)	0.00714* (-1.85)
Nov 22, 2013	0.000679 (-0.18)	0.000676 (-0.18)	0.000927 (-0.24)	0.000914 (-0.24)
May 26, 2014	0.00526 (-1.41)	0.00526 (-1.41)	0.00579 (-1.50)	0.00577 (-1.50)
June 13, 2014	-0.00157 (-0.42)	-0.00156 (-0.42)	-0.00203 (-0.53)	-0.00202 (-0.52)
Feb 2, 2015	0.000859 (-0.23)	0.000875 (-0.23)	0.0011 (-0.29)	0.00117 (-0.30)
April 29, 2015	0.00439 (-1.18)	0.00441 (-1.18)	0.00453 (-1.17)	0.0046 (-1.19)
June 26, 2015	0.00554* (-1.48)	0.00553* (-1.48)	0.00517* (-1.34)	0.00514* (-1.34)
4AMLD Risk Shift	-0.00732 (-0.18)		-0.0329 (-0.78)	
_cons	-0.00000112 (-0.01)	-0.000000818 (-0.01)	0.0000296 -0.18	0.0000308 -0.19
<i>N</i>	1144	1144	1144	1144
<i>R</i> ²	0.603	0.603	0.577	0.576

Note. The table shows the results of the time series analysis measured separately for each event date. MSCI stands for Morgan Stanley Capital Index; FTSE stands for Financial Times Stock Exchange index. Models 1 and 2 relate specifically to the MSCI Europe market index while Models 3 and 4 relate to the FTSE Europe top 100 index. Returns measure the bank portfolio return based on the MSCI and FTSE indices. *4AMLD Dummy* is a dummy variable that equals 1 for the milestone event days associated with the 4th Anti-Money Laundering Directive (4AMLD) events between February 8, 2013 and June 26, 2015, 0 otherwise. *4AMLD Risk Shift* is the interaction between a dummy variable set equal to 1 for all days since the first event date of February 8, 2013). *t*-statistics are reported in parentheses. *, **, *** represent the level of significance at 10%, 5% and 1% respectively.

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As a test of robustness, I also included two additional risk measures beyond the shift in beta used to measure the 4AMLD risk shift. I measured the total risk of the banks by the standard deviation of returns (which includes both the bank- and market-specific risk) and the idiosyncratic risk of the bank, which is measured by the RMSE (bank-specific risk) of the regression model listed above. These risk measures were captured in the six-month period prior to and after the first event date. To determine if there was any significant change in risk, t -tests were run. Table 5 shows that the t -tests were not significant across all measures of risk across the two market indices, suggesting no risk shift in any of the measures as a result of the introduction of the 4AMLD. Subsequently, the rest of the analysis only measured the effect of the CAR and not the shift in risk.

Results of the Cross-Sectional Analysis

The cross-sectional analysis tested the relationship of the bank's CAR to the 4AMLD events against several risk, bank, and country-specific characteristics. The purpose was to understand the effects of the introduction of the 4AMLD on banks depending on bank characteristics based on the regression model. To correct for any potential estimation problems caused by heteroscedasticity, all models were applied with robust standard errors as in White (1980). Heteroscedasticity was possible due to the possible lack of independence between various market events that could have affected returns of the same banks on the same day as the 4AMLD event announcement. Three risk measures (SD, beta, and root mean squared error) were used to measure robustness. SD measured total risk (both bank and market risk) and how much the current return deviated from historical returns. Beta typically measures how sensitive a bank is to total market conditions (e.g., changes in interest rates, changes in regulations), while SD also contains bank-specific risks (e.g., the risk of the bank being fined, CEO being fired) in

Table 5

Risk shift Illustrated by t-Test

<i>t-Test</i>	<i>STDEV Shift</i>	<i>BetaShiftFTSE</i>	<i>BetaShiftMSCI</i>	<i>RMSEShiftFTSE</i>	<i>RMSEShiftMSCI</i>
<i>N</i>	173	173	173	173	173
Mean	0.0046	-0.0435	-0.016	0.046	0.00458
<i>p</i> -value	0.1587	0.3453	0.7445	0.1576	0.1588
<i>t</i> -statistic	-0.836	-0.9463	-0.3264	1.4194	1.4151

Note. This table shows the *t*-test results for risk shift. *STDEVShift* measures standard deviation shift; *BetaShiftFTSE* measures beta shift; *RMSEShiftFTSE* measures root mean square error shift. Beta Shift was measured using the FTSE and MSCI indices. Root Mean Square Error Shift was measured using the FTSE and MSCI indices. MSCI stands for Morgan Stanley Capital Index; FTSE stands for Financial Times Stock Exchange index. *, **, *** represent the level of significance at 10%, 5% and 1% respectively.

addition to the beta. The third measure of risk was the root mean square error and measured bank-specific or idiosyncratic risks.

I also measured the effect of governance on bank valuations. Kaufmann (2010) identified specific governance measures of a country: voice and accountability; political stability; government effectiveness; regulatory quality, and rule of law. The governance measures were correlated, as shown in Table 6, with government effectiveness, showing a high degree of collinearity with rule of law and regulatory quality. To address multi-collinearity a PCA was conducted. As an additional test of robustness, a fixed effects regression was also run to control for any possible unobserved heterogeneity that was not already captured by the bank and country-specific measures.

Results of the cross-sectional regression are provided in Table 7. There are six separate models for the CAR as the dependent variable for the FTSE and MSCI market indices. The CAR measured the effect of how investors perceive the effect of regulations on bank returns. To correct for problems with multi-collinearity, separate models were run for *STDEV*, *BETA*, and *RMSE* for each pair of market indices. Models 1 and 2 used standard deviation measure of risk, Models 3 and 4 tested the beta measure of risk, while Models 5 and 6 tested the root mean squared error measure of risk. Each of the models was determined by the *F*-values to be significant, and the goodness of fit for Models 1 to 6 was measured by the R^2 statistic, which ranged from 25.4% to 30%.

Risk-Specific Variables Measured Against the Cumulative Abnormal Return. The top panel of Table 7 shows risk-specific variables against returns. The coefficient of the standard deviation (Models 1 and 2) and the coefficient of the RMSE (Models 5 and 6) were positive and significant at the 5% level, suggesting that 4AMLN had a more positive effect for riskier banks

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Table 6

Correlation of Governance Variables

	Government Effectiveness	Political Stability	Regulatory Quality	Voice and Accountability
Government Effectiveness	1			
Political Stability	0.4982	1		
Regulatory Quality	0.9026	0.5533	1	
Voice and Accountability	0.8742	0.5987	0.8979	1

Note. This table provides the correlation between the various governance measures as identified by the World Governance Indicators compiled by Kaufmann et al. (2010).

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Table 7

Cross-Sectional Regression—Cumulative Abnormal Return as Dependent Variable

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	<i>CAR_FTSE</i>	<i>CAR_MSCI</i>	<i>CAR_FTSE</i>	<i>CAR_MSCI</i>	<i>CAR_FTSE</i>	<i>CAR_MSCI</i>
Risk-Specific Measures						
<i>STDEV</i>	0.134** (2.33)	0.128** (2.25)				
<i>STDEVShift</i>	-0.02 (-0.87)	-0.029 (-1.15)				
<i>Beta</i>			0.00352 (1.65)	0.0217 (1.07)		
<i>BetaShift</i>			0.005 (1.24)	0.0033 (0.86)		
<i>RMSE</i>					0.132** (2.29)	0.126** (2.21)
<i>RMSEShift</i>					-0.0215 (-0.98)	-0.0304 (-1.26)
Bank-Specific Measures						
<i>LOG10AT</i>	0.003*** (4.16)	0.00298*** (4.02)	0.00236** (2.49)	0.00257*** (2.65)	0.00322*** (4.37)	0.00313*** (4.23)
<i>TNIREV</i>	-0.00158* (-1.80)	-0.00163* (-1.83)	- (-2.23)	-0.00223** (-2.19)	-0.00151* (-1.76)	-0.00158* (-1.81)
<i>ROAEUR</i>	0.00259 (0.74)	0.00177 (0.48)	0.0105*** (2.67)	0.00945** (2.48)	0.00234 (0.69)	0.00151 (0.41)
<i>AMLFINEDUM</i>	-0.00143 (-0.83)	-0.00146 (-0.85)	-0.00112 (-0.64)	-0.00118 (-0.67)	-0.00131 (-0.77)	-0.00135 (-0.79)
Country-Specific Measures						
<i>GDPCAPITA</i>	0.00385*** (2.89)	0.00380*** (2.86)	0.00481*** (3.30)	0.00488** (3.35)	0.00398*** (2.97)	0.00391*** (2.92)
<i>CPI</i>	0.000223** (2.41)	0.000234** (2.36)	0.000370** (2.26)	0.000380* (2.25)	0.000224** (2.42)	0.000227** (2.37)
<i>GovPCA</i> *	-0.00358*** (-3.48)	-0.00358*** (-3.42)	-0.00493*** (-3.13)	- (-3.12)	- (-3.54)	-0.00357*** (-3.48)
Constant	-0.0385*** (-4.41)	-0.0381*** (-4.27)	-0.0456*** (-3.22)	-0.0468*** (-3.21)	-0.0387*** (-4.50)	-0.0384*** (-4.37)
<i>N</i>	154	154	154	154	154	154
<i>R-sq</i>	0.297	0.3	0.271	0.254	0.297	0.3

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Note. This table shows the results of the cross-sectional model in which the dependent variable is the cumulative abnormal returns by the MSCI and FTSE indices. MSCI stands for Morgan Stanley Capital Index; FTSE stands for Financial Times Stock Exchange index. The models were tested separately by three measures of risk—standard deviation, beta and root mean square error (*RMSE*), as well as their risk shifts. A total of six separate models were tested. The top panel measures risk, the middle panel measures bank-specific, while the bottom panel measures country-specific. All financial measures are based in euros. The standard deviation of returns (*STDEV*) is a proxy for measuring bank risk (Madura & Premti, 2014b). Return data retrieved from the Compustat Global database was used to calculate standard deviation. This was calculated as the post-regulation return minus the pre-regulation return stock price divided by the pre-regulation stock price six months prior to the event date. A third measure of risk is the root mean square error which measures firm specific or idiosyncratic risks. The risk shift measures were calculated as the post-regulation return minus the pre-regulation return stock price divided by the pre-regulation stock price six months prior to the event date. *STDEVShift* measures standard deviation shift; *BetaShiftFTSE* measures beta shift; *RMSEShiftFTSE* measures root mean square error shift. *FTSE* was measured based on the Financial Times Stock Exchange market index. The middle panel identifies bank-specific measures. Total assets was obtained from Compustat Global representing total assets divided by total liabilities of a company. *AMLFINEDUM* is a dummy variable identifying previous fines where 1 indicates a previous fine and 0 otherwise. *LOG10AT* measures the log of assets; The TNII/revenue ratio (*TNIIREV*) is normalized total non-interest income divided by total revenue. *ROAEUR* measure return on assets; *AMLFINEDUM* is a dummy variable where 1 is for banks that have received a penalty during the event period, 0 otherwise. Country-specific measures include *GDPCAPITA* that measures Gross Domestic Product per capita in euros; *CPI* is the Corruption Perception Index from Transparency International; Government Effectiveness is an index from the WGI measuring government effectiveness; political stability is an index measuring political stability; regulatory quality measures the quality of regulations. Principal component analysis was conducted on the five governance variables: government effectiveness, political stability, regulatory quality, rule of law, and voice and accountability. One principal component (*GovPCA*) was identified with an eigenvalue of 4.1 that represented 82% of the components. *t* statistics in parentheses.

*, **, *** represent the level of significance at 10%, 5% and 1% respectively.

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(both for the FTSE and MSCI market indices) compared to banks with lower risks. The coefficient of the beta was not significant for the FTSE and MSCI market indices (Models 3 and 4).

The positive coefficients suggest that with the introduction of the 4AMLD, the market saw new regulations providing clarity of rules for riskier banks to continue to offer risky banking services that are compliant with the 4AMLD regulations. Markets may have also expected banks to reduce risky activities to stay compliant. The 4AMLD also provides clarity around due diligence requirements related to beneficiaries of investment related insurance policy products (Article 21), which are typically considered riskier, non-traditional banking services. The 4AMLD compliance requirements also include lowering the reporting threshold for risk-based decisions and ensuring regular reporting to the regulators. This increased risk reporting requirement results in investors gaining greater visibility to riskier transactions, allowing for more informed investment decision-making. The 4AMLD also includes improved risk management guidelines and frameworks that provide banks the ability to manage risks effectively, allowing greater opportunity to continue to provide higher risk banking services that are more profitable and that drive higher portfolio returns.

The risk shift variables for all three measures of risk (*StDevShift*, *BetaShift*, *RMSEShift*) across all models were not significant, suggesting that shift in risk from the introduction of the 4AMLD does not significantly impact returns. Overall, the introduction of the 4AMLD benefitted the banks that previously had the highest risk.

Bank-Specific Variables Measured Against the Cumulative Abnormal Return. The middle panel of Table 7 provides results based on bank-specific variables. The coefficient of bank size (measured by the log of assets, *LOG10AT*) was positive and significant at 1% across

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all models. These results suggest that larger banks saw higher positive returns compared to smaller banks as a result of the introduction of the 4AMLD. The 4AMLD introduced greater regulatory complexity, with banks needing to enhance monitoring and reporting requirements, typically requiring greater investments and driving up operational costs. The level of due diligence to review individual transactions can be significant, as multiple checks and enhanced due diligence is required for higher risk customers. Larger banks benefit from economies of scale in their operations and are able to allocate their investment costs across a larger number of customer transactions, lowering the compliance cost of screening each transaction. Smaller banks, however, do not benefit as much from the introduction of the 4AMLD as they have limited economies of scale when compared to larger banks. The increase in compliance cost per transaction is higher for smaller banks than larger banks due to the lower number of transactions that need to be checked. Additionally, the 4AMLD lowered the threshold for reporting cash transactions to €10,000, down from the previous requirement of €15,000. Smaller banks are disproportionately affected as their customer base typically deposits lower amounts compared to larger banks, requiring a proportionately greater number of checks than for larger banks. The 4AMLD also requires banks to screen against local Politically Exposed Persons (PEPs), in addition to foreign PEPs, increasing the number of accounts that need to be screened for due diligence compliance requirements (PEPs are typically senior government officials). Smaller banks may not have the required infrastructure and data intelligence gathering capabilities as the larger banks and have to rely more on manual intervention to comply with the regulatory requirement of enhanced screening processes for PEPs. As a result, smaller banks incur proportionately higher compliance costs per customer transaction when compared to larger banks, driving up overall costs and driving down overall returns.

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The coefficient of the ratio of total non-interest income to revenue (*TNIIREV*) was negative and significant for both the FTSE and MSCI indices across all models. The results suggest that banks with lower total non-interest income see a more positive return compared to banks with higher total non-interest income. The introduction of the 4AMLD sought to limit other forms of non-interest income streams by increasing the due diligence requirements on these lines of business. Non-interest income products can attract customers from other EU countries (and beyond) incited by the higher potential returns of these products. Examples of non-interest income products include the sale of securities, assets, investment transactions, and fees for banking services. Regulators are concerned with higher money laundering risks related to non-interest income transactions, particularly the sales of securities and assets. The risk is higher across country borders, and compliance processes have to account for these cross-border transactions, requiring additional and more in-depth screening of these transactions. Overall, operational costs rise and margins on these products are reduced, with banks that rely more on these non-interest income products disproportionately impacted, resulting in a more negative return.

The coefficient of returns on assets (*ROAEUR*) was positive and significant for both the FTSE and MSCI indices at the 5% level (Models 3 and 4), suggesting that banks with higher returns on assets see more positive abnormal returns compared to banks with lower returns on assets. Firms typically look to optimize the use of their assets with the goal to maximize returns; assets under a bank's control include staff and technology. With the introduction of the 4AMLD, a clearer framework for operational compliance was provided to address monitoring and reporting requirements. Banks under 4AMLD are required to implement additional monitoring and reporting solutions, with staff trained on how to identify and escalate potential

suspicious money laundering transactions for senior compliance management to review. The 4AMLD lowers the thresholds required to report all cash transactions (€10,000 down from €15,000) and provides specifics of the reporting and escalation processes. This allows banks' management to allocate the appropriate staff and make the technology investments required to meet the reporting requirements. Banks with higher returns on assets are able to more efficiently allocate appropriate compliance related assets to generate earnings, driving up returns.

The coefficient of the AML fine dummy (*AMLFINEDUM*) was negative, however, insignificant across all models, suggesting that banks that had a previous AML fine have no effect on returns.

Country-Specific Indicators Measured Against the Cumulative Abnormal Return.

The bottom panel of Table 7 measures country-level specific risks against returns. Macro-level data for the 28 EU member countries were collected and used for the regression.

The coefficient of GDP per capita (*GDPCAPITA*) was positive and significant at 1% across all models. The results suggest that in higher GDP countries (i.e., richer countries), banks see higher returns compared to countries with lower GDP (i.e., poorer countries). There are several explanations for this. The financial services industry tends to be more developed and mature in countries with higher GDP per capita. The introduction of the 4AMLD provides these countries' financial systems a competitive edge compared to poorer countries as the more mature infrastructure can anticipate and react to the new regulations. Conversely, the market anticipates that poorer countries have weaker financial services infrastructure and are more challenged in implementing the required 4AMLD compliance requirements. In markets with poorer infrastructure, the reporting requirements of the 4AMLD may be more challenging and central authorities may be unable with their existing capabilities to compile and analyze the reports

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effectively to determine if transactions are suspicious. New analytical detection processes, staff, and technology may require implementation. Costs for implementing these new processes may be high in countries where the overall infrastructure required to support these processes has not been established. The operational costs may outweigh the benefits for countries with lower GDP, leading to lower returns for banks in these countries. In contrast, banks in richer countries are able to address the 4AMLD requirements with lower operational impact and potentially higher returns.

The coefficient of the Corruption Perception Index was positive and significant across all models at the 5% level, suggesting that banks in countries with higher CPI scores have higher returns compared to banks in countries with lower CPI scores (a higher CPI score means lower levels of corruption). Effectively, banks in countries with lower levels of corruption see higher returns than in countries with higher levels of corruption as a result of the 4AMLD. The banking sector is a core component of a country's economy, and investors and customers seek safety and predictability related to financial services to generate economic wealth. They rely on the soundness and recognition of legal processes in the banking system to complete their transactions and ensure ongoing financial activity. However, banks are also the primary conduit for laundering corrupt funds (Chaikin, 2008), and in countries with higher perceptions of corruption, there is greater uncertainty that clean funds are not mixed with dirty money. There is a greater risk as to the completion of financial transactions across borders as enforcement agencies in other less corrupt countries may freeze transactions they deem suspicious. There is also a greater concern as to the longer term viability of banks in more corrupt countries, as their investment and growth strategies may be influenced by corrupt policies that do not account for long term growth. Lee and Ng (2009) found that firms from more corrupt countries trade at

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significantly lower market multiples compared to firms in less corrupt countries. Overall, the results support findings that corruption hinders economic growth and that 4AMLD has a more pronounced negative effect on banks in countries with high levels of corruption.

I next tested the effects of governance on bank returns. Kaufmann (2010) identified specific governance measures of a country: voice and accountability, political stability, government effectiveness, regulatory quality, and rule of law. To identify possible multi-collinearity, the governance measures were correlated as shown in Table 6 with government effectiveness showing a high degree of collinearity with rule of law and regulatory quality. The lowest degree of collinearity was between government effectiveness and political stability. To address multi-collinearity, I conducted a PCA to reduce the measures into a smaller set of unrelated components and to identify a common construct for governance. PCA identified one principal component, with the highest eigenvalue of 4.1 that represented 82% of all components. The component met the required criteria of parsimony and was subsequently used in the regression (*GovPCA*). The VIF scores for the regression, including *GovPCA*, were lower than 10, suggesting acceptable levels of collinearity (Handley & Angst, 2015; Lennox et al., 2012; Vaithilingam & Nair, 2007). When regressed against the CAR, the coefficient was negative and significant across all models at 1%. The results suggest that in countries with low levels of governance, banks see higher returns compared to countries with higher levels of governance. The 4AMLD provides EU member countries the required clarity and framework to combat money laundering. In countries with lower levels of overall governance, the market perceives the benefits of implementing the regulation to outweigh the costs of compliance.

Separately, as a test of robustness, I also conducted a fixed effects regression to control for unobserved heterogeneity that was not already captured by the bank-specific measures.

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Based on the correlation between the governance measures as identified in Table 6, I controlled for multi-collinearity by selecting the least correlated measures, in this case, government effectiveness and political stability; regulatory quality was dropped as part of the fixed effects regression. The results of the coefficients are provided in Table 8 where the coefficients are substantially similar in direction and significance to the cross-sectional regression of Table 7. I also ran fixed effects regression dropping government effectiveness instead of regulatory quality with similar results.

The coefficient of government effectiveness was negative and significant across Models 3 and 4, suggesting that in countries with less effective governments, banks see a higher impact on returns in response to the 4AML. Government effectiveness relates to the perceptions of the quality of public services, the quality of civil service, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (Kaufmann et al., 2010). The 4AML requires governments to boost the supervisory and oversight capacity of their regulators, establishing country-level monitoring and analytical capabilities to identify potential suspicious money laundering transactions at a macro-level. Upon identification of suspicious transactions, regulators should also be able to work with enforcement agencies to block these transactions and enforce penalties in the event of potential violations of the regulation. The 4AML was intended to provide a positive framework for governments to improve their effectiveness in combating money laundering. The results suggest that banks that operate in countries with less effective governments have the most to gain from the introduction of the 4AML. The results also suggest that the benefits to improve public and civil services (including regulatory oversight) outweigh the costs of implementing the new regulations.

Table 8

Fixed Effects Regression—Cumulative Abnormal Return as Dependent Variable

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	CAR_FTSE	CAR_MSCI	CAR_FTSE	CAR_MSCI	CAR_FTSE	CAR_MSCI
Risk-Specific Measures						
<i>STDEV</i>	0.08** (-2.04)	0.074* (2.31)				
<i>STDEVShift</i>	-0.03 (-1.24)	-0.038 (-1.63)				
<i>Beta</i>			0.00243 (-1.39)	0.00123 (-0.74)		
<i>BetaShift</i>			0.0017 (-0.85)	0.00039 (-0.22)		
<i>RMSE</i>					0.0765* (-1.96)	0.0709* (-1.81)
<i>RMSEShift</i>					-0.0292 (-0.94)	-0.0383* (-1.22)
Bank-Specific Measures						
<i>LOG10AT</i>	0.0022** (-2.56)	0.00209** (-2.41)	0.00133 (-1.19)	0.00156 (-1.4)	0.00232*** (-2.67)	0.0022** (-2.53)
<i>TNIREV</i>	-0.00144 (-1.60)	-0.00149 (-1.64)	-0.00203** (-2.06)	-0.00197** (-2.03)	-0.00136 (-1.55)	-0.00141 (-1.60)
<i>ROAEUR</i>	0.0008 (-0.64)	-0.0013 (-0.65)	0.00637** (1.49)	0.00889** (2.30)	0.00229 (0.67)	0.00141 (0.38)
<i>AMLFINEDUM</i>	-0.00127 (-0.73)	-0.00131 (-0.65)	-0.00126 (-0.63)	-0.00126 (-0.62)	-0.00119 (-0.60)	-0.00121 (-0.61)
Country-Specific Measures						
<i>GDPCAPITA</i>	0.00382* (-1.27)	0.0038** (-1.25)	0.00438* (-1.35)	0.00453** (-1.39)	0.00392 (-1.31)	0.00389 (-1.28)
<i>CPI</i>	0.00012 (-0.94)	0.000125 (-0.96)	0.000224* (-1.77)	0.000228* (-1.77)	0.00012 (-0.94)	0.000124 (-0.96)
<i>GovernmentEff</i>	-0.00828 (-1.49)	-0.00839 (-1.49)	-0.0116** (-1.97)	-0.0120** (-2.01)	-0.00843 (-1.52)	-0.00854 (-1.52)
<i>Political Stability</i>	-0.00789* (-1.82)	-0.00776* (-1.76)	-0.00822** (-1.74)	-0.00850* (-1.79)	-0.00784* (-1.81)	-0.00766* (-1.75)
Constant	-0.0108 (-1.48)	-0.0104 (-1.43)	-0.0103 (-1.33)	-0.0109 (-1.40)	-0.0111 (-1.53)	-0.0108 (-1.47)
N	154	154	154	154	154	154
R-sq	0.301	0.302	0.266	0.251	0.301	0.304

Note. This table shows the results of the fixed effects regression model in which the dependent variable is the cumulative abnormal returns by the MSCI and FTSE indices. MSCI stands for Morgan Stanley

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Capital Index; FTSE stands for Financial Times Stock Exchange index. The models were tested separately by three measures of risk—standard deviation, beta and root mean square error (*RMSE*), as well as their risk shifts. A total of six separate models were tested. The top panel measures risk, the middle panel measures bank-specific, while the bottom panel measures country-specific. All financial measures are based in euros. The standard deviation of returns (*STDEV*) is a proxy for measuring bank risk (Madura & Premti, 2014b). Return data retrieved from the Compustat Global database was used to calculate standard deviation. This was calculated as the post-regulation return minus the pre-regulation return stock price divided by the pre-regulation stock price six months prior to the event date. A third measure of risk is the root mean square error which measures firm specific or idiosyncratic risks. The risk shift measures were calculated as the post-regulation return minus the pre-regulation return stock price divided by the pre-regulation stock price six months prior to the event date. *STDEVShift* measures standard deviation shift; *BetaShiftFTSE* measures beta shift; *RMSEShiftFTSE* measures root mean square error shift. *FTSE* was measured based on the Financial Times Stock Exchange market index. The middle panel identifies bank-specific measures. Total assets was obtained from Compustat Global representing total assets divided by total liabilities of a company. *AMLFINEDUM* is a dummy variable identifying previous fines where 1 indicates a previous fine and 0 otherwise. *LOGIOAT* measures the log of assets; The TNII/revenue ratio (*TNIREV*) is normalized total non-interest income divided by total revenue. *ROAEUR* measure return on assets; *AMLFINEDUM* is a dummy variable where 1 is for banks that have received a penalty during the event period, 0 otherwise. Country-specific measures include *GDPCAPITA* that measures Gross Domestic Product per capita in euros; *CPI* is the Corruption Perception Index from Transparency International; Government Effectiveness is an index from the WGI measuring government effectiveness; political stability is an index measuring political stability; regulatory quality measures the quality of regulations. Other governance indicators were not included in the regression model as they were identified to be highly correlated with each other causing multi-collinearity. Results are significantly similar to Table 6, the Ordinary Least Squares regression model. *t* statistics in parentheses.

*, **, *** represent the level of significance at 10%, 5% and 1% respectively

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The coefficient of political stability was negative and significant (between 5% and 10%) for most models (see Table 8). The results suggest that in countries with lower levels of political stability, banks see higher cumulative abnormal returns compared to countries with higher levels of political stability. The banking system in any country is a key driver of economic growth and operates more efficiently in a stable political climate. Potential destabilizing influences in the political climate can, in turn, destabilize the banking system due to uncertainty over future economic policies. A requirement of the 4AMLD is the creation of central country-specific registrars of ultimate beneficial owners. In countries with lower levels of political stability, the requirement for an ultimate beneficial owners registry provides the market greater confidence that money laundering activities can be identified more effectively, leading to higher returns.

Conclusion

The introduction of the 4AMLD regulations provided a framework for EU banks to identify and report potential criminal money laundering activity. Results suggested that banks reacted positively to the introduction of the 4AMLD based on the positive impact on returns. When reviewing the risk-specific variables against returns, results suggest that riskier banks have higher returns. Riskier banks have greater potential to benefit from the introduction of 4AMLD due to the attributes of the regulation. As a result, higher risk banks that demonstrate adoption of the 4AMLD guidelines signal to the market a willingness to manage risks, resulting in improved valuations. Results revealed that risk shifts as a result of 4AMLD were not significant, suggesting the shift in risk from the introduction of the 4AMLD did not significantly impact returns.

When examining bank-specific characteristics, results suggested that larger banks see higher returns compared to smaller banks when subjected to 4AMLD guidelines. Larger banks

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typically have greater resources available to comply with new regulations and operational budgets are not as proportionately impacted when compared to smaller banks. The introduction of the 4AMLD required banks to conduct more extensive due diligence on customers compared with previous regulations. Smaller banks typically do not have the resources or are unable to implement sophisticated due diligence processes in order to comply. Banks with fewer resources or with less efficient asset resource allocations have to obtain additional budget, even diverting funds targeted for investment growth, in order to comply. Results also showed banks that rely more on non-traditional income activities experience lower returns. The 4AMLD includes provisions that require greater due diligence in regard to non-traditional financial products, which are more susceptible to money laundering. The greater due diligence increases operational costs and reduces profitability, potentially reducing profitability and returns disproportionately for smaller banks. Banks with higher returns on assets also experience positive returns as the greater clarity provides for the appropriate allocation of compliance officers and staff and the more efficient use of assets.

When comparing EU countries with higher levels of GDP per capita (richer countries), results showed that banks in these richer countries see the higher impact on returns compared to banks in poorer countries. The results found that poorer countries with weaker financial services infrastructure were more challenged in implementing the 4AMLD. In countries with lower perceptions of corruption (i.e., less corrupt), comparative impact on returns are higher. The positive CPI coefficient suggests that in countries where corruption is lower, abnormal returns are higher. Corruption typically misallocates public resources, leading to inefficient investments that reduce economic growth. Investors feel that in countries with low corruption, economic growth is more sustainable, leading to higher returns.

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Regulations typically require an effective government and political stability to ensure successful implementation. Results suggested that in countries where overall governance (as measured by PCA) is weak, returns are higher. Results for specific measures were consistent with the overall governance measure. In countries with lower levels of government effectiveness and political stability, banks see higher returns, suggesting that the ability to introduce new regulations like the 4AMLD is a significant factor.

To summarize, the regression results suggested that the 4AMLD benefits richer countries, less corrupt countries, and countries with poorer governance. Overall, the results demonstrate the positive impact of the 4AMLD on EU member countries. Money laundering is a key concern globally, and the 4AMLD regulations benefit the banking sector by providing clarity and the required framework in which to comply.

Limitations and Opportunities for Future Research

Bank-specific data was drawn from the Compustat Global database, limiting the sample size. While there are a total of 228 banks with EU-based headquarter locations, only 157 observations with complete financial data were available. Other non-banking financial institutions, including insurance and securities businesses that are also subject to regulatory oversight and the 4AMLD were not included. There are opportunities to extend the scope of this study to cover more NBFIs that were impacted by the introduction of the 4AMLD.

Measuring valuations and risks in response to regulatory events also has limitations. While eight event dates have been highlighted as significant, other events during the introduction of the 4AMDL may also have had an impact. Between the period of the initial announcement (February 5, 2013) and the final enforcement (June 26, 2015), other events occurred that could have had an effect on the overall results. For example, the terrorist attacks in Paris in January

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2015 were a significant political event in Europe, potentially accelerating the adoption of the 4AMLD. While every attempt was made to identify significant event days, the selection may be considered incomplete.

For this essay, the statistical significance cutoff was at 10%. While in financial and economics research the statistical significance may be considered weak, based on similar event studies (Akhigbe & Martin, 2006; Klapper & Love, 2004; Madura & Premti, 2014), the 10% cutoff is still considered significant.

There are opportunities for future research based on this approach. Other banking regulations have been introduced both in Europe and elsewhere where the impact on valuations and risks can be assessed. Specifically, upcoming amendments to the 4AMLD are currently being reviewed with a new 5th Anti-Money Laundering Directive proposed for implementation sometime in June 2018. Similar milestone events can be examined for significance and compared to the introduction of the 4AMLD to provide investors and policy analysts a better understanding of the impact of regulatory events on market returns. There have been regulations related to capital limits that can also be examined.

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