CRANFIELD UNIVERSITY

DANIEL EFE AGHANYA

THE CONSEQUENCES OF FINANCIAL REGULATION

CRANFIELD SCHOOL OF MANAGEMENT
Doctoral Program

Submitted for the degree of Doctor of Philosophy (PhD)
Academic Year: 2013 - 2017

Supervisor: Professor Sunil S. Poshakwale
Associate Supervisor: Doctor Vineet Agarwal
October 2017

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ABSTRACT

Given the importance of the financial services for capital accumulation, financial stability, and global financial intermediaries, the last decade has witnessed widespread calls for vigilant regulation of the sector, especially since 2007 to 2009 financial crisis. This has reinvigorated the debates on the economic benefits and costs of regulating the financial services. In this work, I examine the impact of financial regulation on the financial sector to better understand its influence on compliance costs, quality of financial reporting, and risk-taking, as well as the wider impact on the stock market liquidity and price informativeness. I also examine the impact of the UK's decision to leave the European Union (BREXIT) on the UK stock market and industry. In the first paper, I review the empirical evidence on the literature on financial regulation published over the past thirty-five years with the aim: (1) to extend my understanding of its impact on the financial sector, (2) evaluate whether the regulation achieves the purpose it was designed, and (3) provide insights and suggestions for future research. I find several useful insights have been generated over the past two decades. Despite this progress, I find that most empirical studies were done in the United States, research on other regulatory context is under-researched. Further, most empirical research on costs of regulation exclude the financial sector, and we know that this sector is highly regulated. There is a need for more empirical research to provide insight on the regulatory cost burden to the financial sector.

In the second paper, I examine how the Statutory Audit and Corporate Reporting Directives (SACORD) affect the compliance costs, risk-taking and quality of financial reporting of the EU banks. Using a natural experiment, I find that post SACORD, compliance costs of the EU banks increase by 11 to 26 percent. Further, there is a significant increase in risk-taking and a decline in the reporting quality. I conclude that as far as the EU banks are concerned, these regulations do not appear to have the desired effects of improving the reporting quality and constraining risk-taking.

In the third paper, I investigate the impact of the MiFID on stock price informativeness and liquidity in the European Union (EU). Using data from 28 EU countries and the Difference in Differences approach, I find that post-MiFID the stock prices reflect greater firm-specific information and the market becomes more liquid. Consistent with the 'Hysteresis Hypothesis' the evidence shows that the impact of MiFID regarding price

informativeness is greater for countries that have superior quality of regulation. The results are robust with respect to the choice of price informativeness and liquidity proxies as well as the control variables.

Finally, in the fourth paper, I analyse the impact of UK referendum outcome (Brexit) on stock prices, along three key arguments made by proponents. I document that restricting EU labour movement is associated with a decline in market value by 9.64% to 10.35% over a 10-day event window. Further, sectors with a majority of their business operations outside the EU fared better than sectors that requires a lot of workforce from the EU. I find evidence that highly regulated sectors benefit more from expected deregulation of EU-derived laws except for the financial institutions. Additionally, internationally focused companies' performed better than domestically focused firms. In sum, my evidence shows that the market expectations about labour restrictions, streamlining regulation and trade policies significantly affect firm values.

Keywords:

Brexit; Stock returns; event study; trade policy; price contribution analysis; economic consequences; financial system; costs and benefits; regulatory burden; Capital markets; transaction costs; bid-offer spread; propensity score matching; financial regulation; accounting disclosure; financial system; financial stability; difference-in-differences.

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LIST OF ABBREVIATIONS

AMEX	American Stock Exchange
AR	Abnormal returns
Brexit	Britain exiting the EU
CAPM	Capital asset pricing model
CAR	Cumulative abnormal returns
CRD	Corporate Reporting Directive
DID	Difference-in-differences
EEC	European Economic Community
EU	European Union
MAD	Market Abuse Directive
MADJCAR	Market-adjusted cumulative abnormal returns
MiFID	Markets in Financial Instruments Directive
MPs	Members of Parliament
NASDAQ	National Association of Securities Dealers Automated Quotations
NYSE	New York Stock Exchange
OBS	Off Balance Sheet
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
PC	Price contribution
PCA	Principal Component Analysis
RPTs	Related Party Transactions
SACORD	Statutory Audit and Corporate Reporting Directives
SAD	Statutory Audit Directive
SOX	Sarbanes-Oxley Act
TPD	Transparency Directive
UK	United Kingdom
U.S.	United States
UKIP	UK Independence Party
VC	Variance contribution

1 Introduction

"[E]ffective regulation and supervision of individual financial institutions will always be crucial to ensuring a well-functioning financial system…."

Ben S. Bernanke, Former Chairman, Federal Reserve Bank

Over the years, the financial sector has evolved from one reliant on traditional banking to a highly complex, opaque, and interconnected financial system. In the light of the aftermath of the global financial crisis and the increasing importance of financial system as key elements in the management of the economy, the last decade has witnessed the increasing calls for its extensive regulation. Financial regulation is a response to curb perceived abuses, reduce risk, protect consumers against market imperfections, restore public confidence, and avert potential contagious effect on the financial system. Today, despite the continued advocacy of free markets and competitions, the financial sector has remained heavily regulated. Over the past two decades, the public debates of about the impact of financial regulation have attracted the attention of academic research. Some scholars argue that financial regulation are costly to implement and imposes regulatory burden on firms (e.g., King, 2013) while others take the opposite view and contend that the benefits of regulation exceed the costs (e.g., Bushman and Williams, 2015). Against this backdrop, this thesis examines the impact of regulation regarding, the costs and benefits, and in the context of the financial sector.

1.1 Aims and objectives of the research

1) In this sub-section, I present the aims and objectives of my research. First, the research explores the growing literature on the costs and benefits of financial regulation relating to financial services, drawing on international evidence published over the past three decades (survey of literature in Paper 1). Several findings emerge. First, most research on financial regulation show a substantial focus in the United States; however, evidence from other countries such as the European Union is lacking. Thus, examining the impact of financial regulation in countries other than the US would provide wider evidence of the costs and benefits of financial regulation. Second, there is a paucity of evidence on the costs of financial regulation relating to the financial sector, most empirical analyses to date

exclude the financial sector though it is one of the highly regulated sectors. Such studies deserve more attention. Finally, there is a lack of academic research on the impact of the capital market regulations on stock market's pricing efficiency and liquidity. Thus, there is a need for further research based on the following gaps which emerge from the review of the extant literature: There is very little research that offers insights of the impact of the Statutory Audit and Corporate Reporting Directives (SACORD) on the compliance costs, excessive risk-taking and quality of financial reporting of the EU banks. No empirical evidence shows how this EU-led regulation that requires greater oversight by auditors for ensuring improved corporate governance, internal controls and greater disclosures, affect compliance costs, quality of reporting and risk-taking. As such, the objective of empirical paper 2 is to investigate the potential costs and consequences of compliance with SACORD regulations for the EU banks.

2) There is limited evidence of economic benefits of capital market regulation in the EU. Research presented in this thesis fills the gap by assessing the effect of the implementation of MiFID (EU-wide capital market regulatory change) in promoting the informativeness of the stock prices, reducing transaction costs and improving stock liquidity in the capital market. The study also attempts to evaluate whether the impact is same across EU member states and whether it is influenced by the quality of prior regulation. Thus, paper 3 examines the impact of MiFID on stock price informativeness and liquidity.

3) Finally, the surprising outcome of the referendum in the UK to leave the EU led to substantial adverse reactions in the financial markets. To understand the impact of the BREXIT on the capital market, paper 4 provides empirical evidence of BREXIT's impact on by considering the likely effects on the supply of labour, the extent of the EU regulation and UK's trade with the EU.

1.2 Thesis structure

The thesis is organised in the research paper format, with chapters arranged in the form of a journal articles and a conclusions chapter at the end that sums up the key implications arising from this research. Table 1.1 summaries the structure of the thesis. In paper 1, I review the

literature related to the financial regulation to develop a sound understanding of the consequences of financial regulation. In paper 2, the study investigates the effects of Statutory Audit and Corporate Reporting Directives (SACORD) on compliance costs, risk-taking and quality of financial reporting. Paper 3 examines the impact of the Markets in Financial Instruments Directive (MiFID) on stock price informativeness and liquidity in the European Union. Finally, Paper 4 investigates the effect of the BREXIT on stock prices.

Table 1.1 Summary of thesis structure

Each paper contains related literature, methodology, results and discussion of key findings. Even though the papers are standing apart, they are related to the investigation of the consequences of regulation on the financial sector.			
Paper	Title	Dissemination	Intended Contribution
1	Literature Review		The review provides an understanding of the economic consequences of financial regulation and offers suggestions for future investigation.
2	Statutory Audit and Corporate Reporting Directives, Compliance Costs, Risk-taking, and the Reporting Quality of the EU Banks	Under review in the Journal of Money, Credit and Banking	The paper provides evidence of the impact of SACORD on costs, reporting quality and risk-taking.
3	Market in Financial Instruments Directive (MiFID), stock price informativeness and liquidity	Under review in the Journal of International Money and Finance	The paper provides evidence of the effects of MiFID on stock price informativeness and liquidity.
4	Stock price reactions to 2016 UK referendum: restricting EU labour movement, regulation, and trade		The paper provides evidence of capital market reactions to expectation of Brexit relating to restricting labour movement, deregulation of EU-derived laws, and trading with other EU member states.
	Conclusions to sum up the study		

Paper 1

2 The effects of Disclosure and Financial Regulation on the Financial Sector: A Review of Empirical Evidence and Suggestions for Future Research

Abstract

In the light of the importance of financial services as key elements in the management of the economy, the last decade has witnessed widespread calls for stricter regulation of financial services. This paper reviews the empirical evidence on the literature published over the past 35 years on the impact of disclosure and financial regulation on financial services to develop a theme that identifies the trends, contributions and the interaction between financial regulation and financial services. It is evident from the review that there are different perspectives on financial services regulation, each with alternative views and related research opportunities. Based on these analyses, the review provides an understanding of the economic consequences of financial regulation and suggestions for future investigation.

Keywords: Economic consequences, financial regulation, financial system, costs and benefits, regulatory burden

***JEL Classification*: G18, G28, G38**

2.1 Introduction

This paper summarises the empirical literature on the impact of financial regulation and disclosure on the financial sector, drawing on international evidence from the 1980s until the present day, provides insights and suggestions for future research.

The global financial crisis of 2007-2009 was considered the most severe credit crisis since the Great Depression of the 1930s. The credit crisis that started in the United States (U.S.) in 2007 quickly spread and had a severe adverse impact on the global financial markets and eventually the economy. The losses suffered by the financial services were catastrophic. While some

banks were marginally affected by the crisis, others went into mergers and acquisition to stay afloat, and the rest were either rescued by the government or failed. For example, the Swiss government rescued UBS, the tenth largest bank in the world with a $65 billion bailout package. The Dutch government bailed out ING with $13 billion while Citigroup and Bank of America each received $45 billion from the U.S. government as bailout packages. The crisis also affected the non-financial sectors (Duchin et al., 2010) while some countries suffered substantial economic depression (Metiu, 2012). For instance, the European Union (EU) and the International Monetary Fund (IMF) bailed out Iceland with $4.6 billion assistance package in 2008 and a $110 billion package in November 2010; Greece received $146.2 billion three-year bailout package in 2010 while Portugal received a $116 billion assistance package in 2011.

The 'light touch' regulation came under the scanner and failed to restrict the financial actors from taking excessive risks driven by the short-termist approach for improving profit performance. (Rixen, 2013). Not surprisingly, as Knight (2009) highlights, regulatory gaps in restricting risky activities among financial jurisdictions created regulatory arbitrage opportunities for the financial firms during the credit cycle period of 2002 to 2007, making the financial system less resilient to shocks. Although, extant literature provides evidence that other drivers such as excessive use of credit default swaps, disruptions in the interbank money market, moral indecency of the credit rating agencies, lack of effective regulatory supervision and control, lack of adequate oversight of shadow banking and offshore financial centres, and the lack of adequate mechanism for Government-Sponsored Enterprises also contributed to the failure of the financial system (Ryan, 2008; Khademian, 2009; Caprio et al., 2010; Kothari and Lester, 2012; Rixen, 2013; among others).

In the aftermath of the crisis, questions were raised about the effectiveness of regulation and the policymakers were under pressure to fix the regulatory failure through financial reforms (e.g., Rixen, 2013). As a result, the U.S. government in a bold move to address the crisis introduced the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank Act) (see Acharya et al., 2010). Advocates of tighter regulation have justifiably argued that the purposes of greater information disclosure and stricter financial regulation are to increase market discipline (e.g., Balasubramnian and Cyree, 2014), develop financial sector (Barth et al., 2004), and improve accounting disclosures (Brown et al., 2014). For instance, Mary Jo White, Chairman of the United States Securities and Exchange Commission notes:

> "The strength of the U.S. capital markets depends on investors knowing that they can rely on the financial information that is available to them when they make investment decisions. High-quality accounting standards are the foundation upon which this reliance is built. The Commission has an important responsibility to investors and our markets to ensure that the accounting standards reliably produce the information our markets demand."[1]

However, opponents to stricter regulation point to the negative impact it would have on compliance costs, financial reporting quality and firm performance (e.g. Pasiouras et al., 2006; Marosi and Massoud, 2007; Duarte et al., 2008; Kamar et al., 2009).

The aftermath of the financial crisis ended the era of light touch regulation and birthed the period of stricter regulation of the financial sector. Today, because of the critical role performed by the financial sector in modern market economies, they are heavily regulated. While stricter regulation is justified because of the attendant benefits (e.g., Barth et al., 2004; Asaftei and Kumbhakar, 2008; Uhde and Heimeshoff, 2009; Yan et al., 2012), a number of academics have argued that the regulatory burden outweighs the benefits (e.g., Gonzalez, 2005; Laeven and Levine, 2009; Francis and Osborne, 2012; Baker and Wurgler, 2015). Thus, this study reviews the empirical literature on the economic consequences of stricter financial regulation on the financial sector and provide suggestions for future research. I survey international evidence because the consequences of financial regulation have become a global issue. For this study, I use a broad definition of financial regulation relating to the financial services industry and for this reason, do not focus on a particular or narrower regulation in details.

The rest of the paper is organised as follows. Section 2.2 explains the reasons for regulating the financial services. Section 2.3 provides the critical review of the empirical evidence on this topic. Section 2.4 discusses evidence of strategic responses to the impact of financial regulation. Finally, Section 2.5 summarises the main arguments and discusses implications for future research and regulation.

[1] Remarks by Mary Jo White, public statement on Globally Accepted Accounting Standards, January 5, 2017. Available at: https://www.sec.gov/news/statement/white-2016-01-05.html. Accessed 01:03:17

2.2 Why regulate the financial services

The financial institutions play a vital role in the management of the economy. Over time, these institutions have become highly complex and interconnected creating an opaque system of risks distribution (Kroszner and Strahan, 2011) thus requiring regulatory interventions (King, 1990). Lack of effective government supervision and accountability of the financial services has led to market imperfections and systemic risks to the economy (Klomp and Haan, 2012; Rixen, 2013). Thus policymakers regulate the financial sector to limit the possibility of systemic risks and its adverse impact on the real economy (Klomp and Haan, 2012). Stricter financial regulation is design to address instability, consumers and investors protection against a variety of market failures and imperfections, and increase the public confidence in the financial system (see Zingales, 2009). The goals of stricter regulation as Goodhart et al. (1998) and Demaestri and Guerrero (2005) highlight, are to ensure the stability of the financial system, consumer protection against monopolistic exploitation, and improve the efficiency of the financial system.

The Organization for Economic Cooperation and Development (OECD) (2010, P.286) asserts that, "financial regulation is particularly concerned with influencing or controlling the behaviour of certain classes of participants in the financial system in order to ensure prudence, safety, integrity and transparency of the core actors, institutions, systems and markets of the financial system". By extension, and for the purpose of this review, I use a broad definition of financial regulation as set of rules and controls, monitoring, enforcement and imposing sanctions aim to facilitate financial intermediation, stimulate results the system could not accomplish on its own in order to safeguard and enhance the stability and functioning of the overall financial system.

2.3 The effect of financial regulation

An empirical survey of literature on the impact of financial regulation on the financial sector provides the material for developing a comprehensive theme. I categorise the empirical literature into themes representing the levels of analysis of the studies, with the aim of guiding future research. These are:

2.3.1 Impact on regulatory costs

The debates over the effects of financial regulation have never been as contentious as in the last decade. What are the costs of financial regulation? Do costs and regulatory burden

outweigh the benefits to management, shareholders and other stakeholders? For instance, Iliev (2010) assesses the compliance costs of regulation on non-financial firms in the United States and show that the implementation of Sarbanes-Oxley Act (SOX) Section 404 regulation imposed significant direct costs for firms with audit fees growing by 98% or $697,890. He finds that small firms were worst affected and delisting did not save them from the costs burden of regulation. Surveying empirical literature in the financial sector, the Federal Financial Institutions Examination Council (1992) notes that the compliance costs of banks constitute about 6-14% of their operating expenses in 1991. Elliehausen and Lowrey (2000) provide an early test on the costs of banking regulation by examining the effects of implementing the Truth in Savings Act in the U.S. and find that banks incur significant compliance costs regardless of the extent of changes required to implement the regulation. Demirguc-Kunt et al. (2004) examine the effects of bank regulations, market structure, and institutions on net interest margins using a sample of approximately 1400 banks across 72 countries. They find evidence that stricter regulation on banking activities increases the cost of financial intermediation.

Next, surveying the literature on banks' liquidity and capital regulations, King (2013) in his study of the trade-offs between Basel III liquidity regulation and net-interest-margin, shows a negative association between the implementation of Basel III liquidity requirement and a reduction in bank net-interest-margin by 70-88 basis points on average, and argues that the requirements will adversely affect bank profitability. Baker and Wurgler (2013) present evidence showing that adoption of Basel III will increase the cost of capital of banks by about 60-90 basis points. De Haan and Van Den End (2013) examine the impact of Dutch quantitative liquidity requirement rule on liquidity management of 62 Dutch banks and find banks holds more liquid assets than is necessary, although more solvent banks hold fewer liquid assets. Finally, Baker and Wurgler (2015) show that strict capital requirements would lead to 85 basis points increase in bank cost of capital.

With respect to the stock market, Duarte et al. (2008) study the effect of implementing Regulation Fair Disclosure (Reg FD) on the cost of capital of listed firms and find the cost of capital of NASDAQ firms modestly increase by 10-19 basis points per annum, although the regulation did not affect the cost of capital of NYSE/AMEX listed firms. Gomes et al. (2007) examine NASDAQ and NYSE firms for the period 1997-2002 and report that the cost of capital for small and midsize firms increased by 138 basis points per annum following the passage of Reg FD, a finding that is inconsistent with Reg FD goal of levelling the playing field for all market participants. They point out that the unintended consequences of Reg FD especially on

small firms were a result of a lack of analysts' information caused by a sharp decline in analysts' research on smaller firms. In this regards, Wu and Zang (2009) highlight that the decline may be due to the higher turnover of top quality analysts. Zhang (2007) examines capital market reactions to the passage of SOX regulation and find a statistically significant negative cumulative abnormal return of 4.46% using Canada, Asia and EU stocks as benchmarks, and negative cumulative abnormal return of 8.21% using Canadian stocks only as benchmarks, suggesting that SOX imposes high regulatory burden on firms. Finally, Bushee and Leuz (2005) provide an early test on the effect of Securities and Exchange Commission (SEC) disclosure regulation eligibility rule on the Over-The-Counter Bulletin Board (OTCBB) firms and find a post-SOX increase in costs for smaller firms. Overall, there is a paucity of evidence of the costs implication of financial regulation relating to financial services. Further, the empirical evidence appears to focus more on the United States. There is a paucity of evidence of estimates of regulatory costs in other countries.

2.3.2 Regulatory benefits

In this subsection, I discuss some empirical studies that examine the beneficial effects of stricter financial regulation on the financial sector.

2.3.2.1 Effects on firm efficiency and performance

One of the key components of sustainable development of the financial services alongside market discipline, financial infrastructure, and business ethics, is the efficiency of the financial system. Given the critical role that the financial services play in the economy, regulatory authorities are quite concerned about maintaining the efficiency in the financial system. More specifically, regulators are mindful of regulatory costs because the price of financial services reflects the costs of financial regulation and aim to ensure that the financial system lowers cost inefficiencies and foster competition while optimizing financial efficiency. For instance, Kaufman (1991) finds capital adequacy regulations align bank goals with depositors and creditors, improving bank efficiency. Barth et al. (2004) assess the effect of bank regulation and supervision in 107 countries; they provide evidence that bank regulation promotes development and improve the performance of the banking sector. Demirguc-Kunt et al. (2004) investigate the impact of bank regulations on net interest margins using a sample of over 1400 banks across 72 countries, they find a positive association between the stricter bank regulation and higher net interest margins. Asaftei and Kumbhakar (2008) assess the impact of Romania

central bank 1999 regulation on banking efficiency; they document that cost of bank operations reduced by 15 basis points and bank technical efficiency increased post the central bank regulation.

Besides, Pasiouras (2008) assesses the effect of bank regulations on the efficiency of 715 commercial banks across 95 countries in 2003 and finds an association between stringent capital adequacy and higher supervision and the increase in bank technical efficiency. Chortareas et al. (2012) using data from banks across 22 European Union countries over the period from 2000-2008), study the impact of the EU financial regulation on bank efficiency. They provide empirical evidence that bank capital regulations and higher supervisory powers promote efficient operations of banks. Although, they document that restricting bank activities is associated with higher bank inefficiency. Consistent with these findings, in a more recent study, Barth et al. (2013) examine 4050 banks across 72 countries and provide empirical evidence of a positive association between stricter capital regulation, higher supervisory power, market discipline, and bank efficiency. On the contrary, they find restricting bank activities lower bank efficiency. Kashyap et al. (2010) demonstrate that a 10-percent increase in capital ratios would increase bank's cost of capital by 25-45 basis points. More recently, Kisin and Manela (2016) estimate that a 10-percent increase in capital requirement would raise bank's cost of capital by three basis points.

2.3.2.2 Effects on stock performance

The association between financial regulation and stock performance has attracted significant interest, and the evidence indicates most studies find a positive impact of financial regulation on stock performance. For example, Irani and Karamanou (2004) assess stock market reaction to Reg FD adoption and find a positive reaction to the adoption. Li et al. (2008) analyse the stock price reactions to critical events surrounding the passage of SOX Act and examine if the reactions are related to firm earnings' management. They find a significant positive abnormal return on each SOX event, suggesting that SOX has a net beneficial effect. Hail and Leuz (2006) examine equity financing costs using the ex-ante measures of cost of capital and document stronger securities regulation is associated with lower costs of capital. Chen et al. (2010) investigate the effect of Reg FD on the cost of capital using NYSE and NASDAQ firms from 1998 to 2002; the authors document a decrease in the cost of capital for medium and large firms while the cost of capital for smaller businesses remains unaffected. Similarly, Daske et al. (2008) show that cost of capital decreased and market liquidity increased by 3% to 6% for

mandatory adopters of International Financial Reporting Standard (IFRS) reporting. Yan et al. (2012) examine the impact of Basel 3 reforms on the UK economy and document a positive temporal and long-lasting net benefit of about 0.35% and 14.32% respectively. A recent study by Fogel et al. (2015) document a positive market reaction to the passage of SOX and Jobs Act.

In an interesting study, Greenstone et al. (2006) provide evidence indicating OTC firms affected by the mandatory disclosure requirements of the 1964 Securities legislation had positive abnormal returns of about 3.5 percent in the weeks surrounding the event date. Shi et al. (2013) find that a standard deviation tightening of disclosure regulation leads to nearly 20 percent reduction in the actual cost of issuing new equity in the primary market. Grout and Zalewska (2006) show financial regulation has a positive impact on the efficient operation of markets. Jain and Rezaee (2006) study the capital market reaction to SOX regulation in the U.S., they find evidence of significant positive U.S. market returns, suggesting that SOX regulation is value increasing. Zhang (2007) also examines the stock market reaction to SOX regulation, reaching a conclusion opposite to that of Jain and Rezaee (2006). On the other hand, Chow (1983) documents a negative association between the 1933 and 1934 Securities Acts passage and stock market reaction to the announcement of the events, suggesting that regulations had unintended consequences for bondholders and Shareholders, a finding supported by Gomes et al. (2007). Simaan et al. (2003) analyse the effect of pre-trade transparency and find opaqueness of the market could lower spread and improve price competition, suggesting that stricter capital market regulation is not beneficial to the market. Litvak (2007) shows a strong negative relationship between SOX Act and the declining stock price of cross-listed firms subject to the Act.

In summary, the empirical literature indicates mixed support for the impact of financial regulation on firm and stock market performance. Moreover, the type of regulation examined, the sample size used, the methodological approach utilised, period researched, and regulatory environment studied could influence the empirical findings. Meanwhile, most studies use before and after comparisons and rely on the reaction of stock markets to assess the net benefits of any financial regulations. As a result, it is difficult to control for contemporaneous changes in events. Additionally, there is a paucity of evidence of many other significant capital market regulations outside the U.S. such as the Transparency Directive, Market Abuse Directive and Markets in Financial Instruments Directive (MiFID). These and many others regulations

outside the U.S. warrant further investigation to provide richer insights on the impact of financial regulation.

2.3.2.3 Effects on stability and soundness of the financial sector

The ability to provide stable conditions for firms and reduce systemic risks through regulatory intervention is essential to maintain market credibility (e.g., Benink and Llewellyn, 1995). Supporting this view, Alan Greenspan, the former chairman of the Board of Governors of the U.S. Federal Reserve system warns of the existence of a possibility of a chain reaction that can trigger financial implosion if not checked through regulation.[2] Also, as the Financial Stability Board (FSB) (2011) suggests, the success of the policy framework to address systemic risks associated with systemically important financial institutions are tied to consistent government implementation of regulatory frameworks and the need to set-in-motion robust, consistent mechanisms to curb the systemic risk. Bushman and Williams (2015) contend that increase disclosure promotes transparency and thus help reduce risk-taking and enhance banks' financial stability.

That said, I survey the broad literature on finance and economics to gain more insight on the effects of financial regulation on soundness and stability of the financial system. For example, Uhde and Heimeshoff (2009) using data from banks across 25 European countries over the period from 1997 to 2005 show that bank capital regulations promote financial stability. This result connects to Barth et al. (2004), who show that bank regulation increases the stability of the banking sector. Demirguc-Kunt et al. (2008) show that regular and accurate financial reporting to regulators and investors increase bank soundness. Also, Gauthier et al. (2012) provide evidence that regulatory capital lowers individual banks default and systemic crisis probabilities by about 25%. Finally, Granja (2016) documents that the adoption of state-level disclosure regulation for state banks reduced their failure rate by two percent relative to the national banks. On the contrary, Pasiouras et al. (2006) find a negative relationship between capital requirements regulation and bank's soundness, and between restrictions on banking

[2] Alan Greenspan, former chair Board of Governors of the Federal Reserve System Remarks at the VIIIth Frankfurt International Banking Evening Frankfurt am Main, Germany. (May 7, 1996). Available at: https://fraser.stlouisfed.org/docs/historical/greenspan/Greenspan_19960507.pdf. Accessed 21.05.2015.

activities and business performance. They argue that capital regulation and restrictions on banking activities lower their overall performance and soundness respectively.

2.3.2.4 Effects on information asymmetry

One of the aims of financial regulation is to increase firm disclosure and provide equal access to the information environment and thereby lowering the amount of information asymmetry (Llewellyn, 2000). The corporate finance literature emphasises reduction in information asymmetry following tighter financial regulation. Consistent with this prediction, Madura and Premti (2014) document a relationship between the passage of Reg FD, Global Analysts Research Settlement and the Galleon Group case, and a reduction in the magnitude of information linkage. Bushee and Leuz (2005) examine the consequences of the U.S. SEC's disclosure regulation eligibility rule on the Over-The-Counter Bulletin Board (OTCBB) firms and find a significant improvement in firm information disclosure and an increase in liquidity of businesses after the adoption. Eleswarapu et al. (2004) investigate whether Reg FD affects NYSE firms trading costs by analysing the trading pattern around earnings announcements. They find a decline in information asymmetry after the adoption of Reg FD, and more especially for smaller firms. Chiyachantana et al. (2004) confirm this association and find a significant decline in trading activity of institutional firms before earnings announcements, consistent with the decrease of information asymmetry. The authors also find an increase in retail trading after the earnings announcement, consistent with level playing field for all. Shroff et al. (2013) document an increase in firm pre-Securities Offering Reform (SEO) disclosure frequency, suggesting a reduction in information asymmetry.

Other empirical findings of the effects of stricter financial regulation on lowering information asymmetry include Shi et al. (2013), who document a significant negative relationship between IPO disclosure requirements and IPO under-pricing, consistent with the U.S. SEC disclosure regulation goals on improving information efficiency. Balasubramnian and Cyree (2014) find that the passage of Dodd-Frank Act is associated with a decrease in discount for size on yield spreads, most especially for too-big-to-fail (TBTF) banks, suggesting that the adoption of Dodd-Frank Act (DFA) improved market discipline, consistent with the intent of DFA. On the other hand, Battalio and Schultz (2011) find evidence that SEC short sale restrictions led to high hedging costs and increase in information asymmetry. Finally, Sidhu et al. (2008) investigate the bid-ask spreads for ADR firms and NASDAQ firms in the U.S., and document

that adverse selection costs of the bid-ask spread did not increase for ADR firms but increased by 36% for NASDAQ firms' post-FD.

Overall, the evidence from the extant literature suggests that the various financial regulations (e.g. Reg FD, SOX, IFRS, etc.) appear to have succeeded in lowering information asymmetry. The findings support the idea that increase in the financial regulations seems to have a desirable effect on information asymmetry.

2.3.2.5 Effects on stock analysts behaviour

Stock analysts play a crucial role in analysing, interpreting and communicating to nonprofessional and unsophisticated investors' stock recommendation, which is the analyst assessment of firm's current performance and future earnings potential. However, policymakers are concerned with the bias of analysts' overly optimistic stock recommendation and seek how to help investors to adjust for such bias (Kelly et al., 2012). Thus, a number of regulations (such as the Research Objective Standards of the Chartered Financial Analyst Institute, and the Research Analysts and Research Reports of National Association of Securities Dealers) are introduced to curb analyst's behaviour, improve credibility of equity research, restore public confidence and level the playing field for all investors (Guan et al., 2012). Mensah and Yang (2008) investigate the forecasting behaviour of financial analysts and report a marginal decline in herding behaviour among financial analysts following the adoption of Regulation Fair Disclosure. Hovakimian and Saenyasiri (2010) assess the impact of Global Settlement regulation on analysts' forecasting behaviour and find a reduction of insider information especially for firms' with opaque information environment after the regulation adoption.

Focusing on analysts' forecasts and reports, Gintschel and Markov (2004) examine the impact of Reg FD on analysts' information outputs and find a significant decline in the dissemination of analysts' reports post-Reg FD, suggesting that Reg FD reduced the flow of private information from business managers to analysts. Kadan et al. (2009) document a decline in the optimistic recommendations of the sell-side analysts after the implementation of Global Settlement and SEC regulations, consistent with the U.S. Securities and Exchange Commission reform agenda. Liu et al. (2014) show improvement in analysts following and forecast accuracy following the implementation of the U.S. mandatory eXtensible Business Reporting Language (XBRL), suggesting the regulation improves analysts forecast decisions. Herrmann et al. (2008) document significant reduction in analysts forecast optimism of internationally diversified firms and improvement in analysts forecast. Bailey et al. (2003) document an

increase in analyst forecast dispersion, while Palmon and Yezegel (2011) find that Reg FD adoption is associated with a reduction in the dispersion between upgraded and downgraded firms and thus the reduction in analyst's predictive value. Lee et al. (2014) record a decline in security mispricing based on the analyst forecast revision after the enactment of SOX, Reg FD and Global Settlement.

In sum, the evidence from the literature suggests that financial regulation curtailed the flow of private information from managers to analysts, improving a level playing field. However, it is not sure whether the empirical evidence is influenced by market developments such mergers that significantly increased the turnover of top quality analysts and thus lowers research quality (see Wu and Zang, 2009).

2.3.2.6 Effects on quality of financial reporting.

The absence of fraudulent financial reporting, restatements, reduced earnings management are prerequisites of sound financial reporting practices (Lobo and Zhou, 2006; Koh et al., 2008). In a non-financial setting, Iliev (2010) finds SOX's Section 404 management evaluation, and independent audits of internal control lead to more conservative reported earnings, suggesting that this specific provision had a significant effect on corporate disclosure. Consistent with Iliev (2010), Dowdell Jr et al. (2014) find internal control over financial reporting (ICFR) improves firms reporting quality. Also consistent with Iliev (2010), Altamuro and Beatty (2010) examine the effects of ICFR regulation on financial reporting in the banking sector and find a positive relation between the regulation and the increase in the validity of loan loss provision, and improvement in earnings quality. Bischof (2009) documents the adoption of IFRS 7 is positively associated with banks higher disclosure quality.

Also, the empirical findings of Gebhardt and Novotny-Farkas (2011) indicate that the adoption of IAS 39 impairment regulation lowers income smoothing behaviour of European banks. Agostino et al. (2011) report that the introduction of International Financial Reporting Standards (IFRS) improves the information content of both book value and earnings of banks. In a more recent study, Barth et al. (2014) show a positive association between IAS 39 implementation and higher net income in the European financial industry compared to local standards. Heflin and Hsu (2008) find that implementation of the U.S. SEC's non-GAAP disclosure regulation helped reduce the likelihood of managers' use of non-GAAP earnings disclosures for earnings forecasts. They also document a decline in the relation between abnormal stock returns and forecast errors. On the contrary, Kilic et al. (2013) find evidence

that banks that are more likely to be affected by the adoption of SFA 133 smooth their income through loan loss provisioning. Meanwhile, Vashishtha (2014) and Thakor (2015) argue that financial regulation may reduce bank's disclosure quality. In sum, the empirical literature reports fairly mixed evidence, more academic research is required.

2.3.2.7 Effects on mitigating financial misconduct

Misconduct can substantially damage the reputation of the financial sector due to penalties, undermine its prospects (European Central Bank, 2016), and may become a possible source of systemic risk (European Systemic Risk Board, 2015). Financial restatements, mis-selling of financial products, tax evasion, money laundering, options backdating, accounting fraud and insider trading are some of the more common forms of financial misconducts. For example, Roger McCormick and a team of researchers from the London School of Economics and Political Science shows that ten banks paid fine of about £150 billion for misconduct during the period 2008-2012.[3] Fernandes and Ferreira (2009) document that insider trading law improves stock price informativeness, suggesting that the regulation lowers insider trading by informationally more efficient stock prices. Frijns et al. (2008) find a negative association between insider trading regulations and the decline in bid-ask spread, implying a reduction in insider trading. Cohen et al. (2010) show the adoption of Regulation FD in the U.S. lowers the ability to profit from insider trading. Madura and Premti (2014) find that full enforcement of regulations of Reg FD, Global Analysts Research Settlement and the Galleon Group case discourage insider trading. A notable exception is Seyhun (1992) findings, which documents no relation between insider trading regulation in the U.S. and insider trading activities and profits but find evidence of a negative association between enforcement activities and reduction in insider trading activities. Also, Cheng et al. (2011) provide evidence that banking regulation could induce earnings management arising from equity incentives.

2.3.3 Studies on strategic responses to financial regulation

Prior literature in earlier themes discussed suggests that financial regulation is beneficial (for example, Barth et al. 2013; Akhigbe et al., 2016). However, when the cost burdens are high, and the regulation is not beneficial to firms (e.g., Battalio and Schultz, 2011; Baker and

[3] http://www.lse.ac.uk/website-archive/newsAndMedia/news/archives/2013/11/ConductCostsProject.aspx. Accessed 20.05.2016.

Wurgler, 2013; King, 2013), financial institutions could employ strategies such as financial innovation and organisational reforms aimed at exploiting the regulation. Firms' response to regulation differs depending on how the business managers evaluate the impact, perceive the future, and assess the risks involved (Sarasvathy, 2001). These strategic outcomes include delisting and going private and dark, change in business model, and excessive risk-taking.

2.3.3.1 Effects on deregistering or delisting

In assessing the empirical literature on deregistering or delisting and going dark and private in a more general setting, Kamar et al. (2009) examine firm's decision to delist and document a positive association between SOX implementation and smaller firms delisting from the stock market. Bessler et al. (2012) find support for the impact of regulation influencing firms to embark on a deliberate strategy to delist from the stock market. They document higher compliance costs as one of the factors responsible for financial and non-financial German firms from the U.S. stock exchange. Chaplinsky and Ramchand (2012) also find support for these implications. They investigate the reasons motivating foreign firms to delist from the U.S. stock exchange and find higher regulatory costs post-SOX as a major factor. Engel et al. (2007) and Mohan and Chen (2007) provide evidence of an increase in firms' deliberate strategy to go private after the adoption of SOX. Finally, Foley et al. (2014) find that weak governance regulation in home country influences cross-listed firms to opt out of SEC governance regulation. Turning to the studies on the financial sector, Marosi and Massoud (2007) examine the reason firms in the U.S. stock markets decide to go dark and document that higher compliance costs post-SOX and particularly on smaller firms influence their deliberate decision to go dark. Consistent with Marosi and Massoud (2007), Leuz et al. (2008) document that increase in regulatory and compliance costs post-SOX increases the propensity of firms and banks to go dark, mostly for smaller firms with higher level of distress.

2.3.3.2 Effects on changes in business model

Concerning changes in business models, regulation can restrict firm's behaviour by forcing firms to readjust their business model (Kim, 2013). Harle et al. (2010) emphasise that the implementation of new financial regulations will put pressure on financial services profitability that may require adjustments in the business model. Consistent with this view, Francis and Osborne (2012) document a positive association between an increase in capital requirements and banks modifying their business model to raise lower-quality capital to minimise capital compliance costs. Dietrich et al. (2014) investigate the impact of net stable funding ratio

(NSFR) under Basel III on banks and find no association between NSFR and banks profitability but find that NSFR influences banks' business model. Their findings suggest that banks adjust their business model with the implementation of NSFR to restore their bank to sustainable profitability.

2.3.3.2.1 Shadow banking

Research has also pointed to the significant influence of financial regulation on shadow banking (e.g., Bernanke and Lown, 1991; Berger and Udell, 1994). The higher capital requirements intensify the probability that banks will shift towards a more lightly regulated shadow banking system. Indeed, as Pozsar et al. (2013) point out, the size of the U.S. shadow banking liabilities grew from below $5 trillion in 1990 to about $15 trillion in 2012. They conclude that higher capital and liquidity requirements are likely to motivate greater volume of shadow banking activity. Consistent with the notion that regulatory capital requirement may increase shadow banking activities, Kashyap et al. (2010) find that more stringent bank capital ratio raises the concerns about migration to shadow banking. They conclude that higher capital requirements are likely to motivate banks to move a larger volume of traditional banking activity to the shadow banking sector. Similarly, Acharya et al. (2013) document that banks engage in shadow banking to reduce regulatory capital requirements and most especially for banks with less capital. Consistent with this finding, Demyanyk and Loutskina (2016) document that bank holding companies in the U.S. lend through their mortgage firms to circumvent financial regulation and conserve their capital. The mortgage firms are not subject to a strict regulatory regime of depository institutions.

2.3.3.2.2 Internationalization strategy

Finally, financial regulation can also influence banks' internationalisation strategies. For example, in recent times, HSBC considers relocating its headquarters from the UK due to soaring compliance costs.[4] An early study by Buch (2003) provides evidence that home country regulatory barriers are a key factor driving banks' internationalisation strategies. Houston et al. (2012) assessing the effects of cross-country differences in regulations on international bank flows from 26 mostly OECD countries document that banks from countries with stricter domestic regulations have transferred funds to countries with lighter regulation. Ongena et al. (2013) find substantial evidence that more stringent domestic bank regulation results in lower

[4] FT.com (2015). HSBC threatens to move headquarters from UK, April 24. Accessed 21.05.2016

lending standards abroad, suggesting that banks are circumventing tighter local regulations by increasing their risk-taking overseas. Finally, Karolyi and Taboada (2015) using a sample of 7,297 domestic and 916 majority cross-border bank mergers, find that tighter domestic regulation influences cross-border bank acquisitions.

2.3.3.3 Effects on excessive risk-taking

As discussed earlier, regulation intends to reduce risk-taking (e.g., Bushman and Williams, 2012; Akhigbe et al., 2016). However, stricter regulation may prove costly and encourage financial firms to engage in excessive risk taking to increase performance (e.g., Schliephake and Kirstein, 2013). Gonzalez (2005) documents stricter regulation reduces banks' charter value and therefore increase their incentive to take more risks. Laeven and Levine (2009) find evidence of a mixed association between bank regulation and risks taking. They provide evidence that banks with powerful equity holders assume more risk and suggest that bank ownership structure influences the risks taking. Francis and Osborne (2012) find evidence that the likelihood of using countercyclical capital requirements in constraining imprudent risk management activities may be ineffective in achieving the purpose if banks can easily satisfy the capital requirements with lower-quality capital elements.

2.4 Summary

This study reviews the empirical literature on the economic consequences of financial regulation and offers useful insights for the greater understanding of critical issues involved in examining the effects of financial regulation.

Much of the empirical evidence suggests that disclosure regulation is associated with a reduction in information asymmetry. While the empirical research has progressed in recent years, questions regarding the association between financial regulation and corporate information environment of the financial firms remain unanswered. To improve our understanding, there is a need for more empirical research on the interactions between mandatory disclosures, higher voluntary disclosures and their investment-risk choices. Also, the empirical literature has deepened our understanding of the relationship between financial regulation and stock returns, volume trading, etc. Despite this progress, there is a paucity of empirical evidence on the effects of financial regulation on stock market valuation and volatility. Studies examining the association of financial regulation, market valuation and

volatility may allow the researcher to improve their understanding of how financial regulation affects firm's earnings stream and market valuation.

Ordinarily, firms may experience increased pressure on profitability when regulatory costs are higher than the benefits and will try to undertake some business strategies to restore profitability. The findings indicate that financial regulation influences firm strategic responses, particularly for smaller firms. Most empirical studies focus on the U.S.; there is a need for more empirical research on other regulatory context to help provide an understanding of the association between financial regulation and business strategies of financial firms affected by such regulation. Moreover, study to investigate the strategic responses of firms before and after penalties arising from weak monitoring activities is essential.

Again, most empirical studies focus on U.S. regulations such as SOX, Reg FD and SEC regulations. The economic consequences of many other important regulations such as Markets in Financial Instruments Directive (MiFID) and the Transparency Directive, among others are under-researched. Further, because the regulatory regimes and institutional structure of other countries (e.g., European Union) differ from that of the U.S. (Soderstrom and Sun, 2007; Boskovic et al., 2010), it is imperative to conduct a detailed investigation of other regulatory environments (see Leuz and Wysocki, 2016). Welch (2000) stresses that evidence based on from U.S. capital market cannot be generalised to other markets. Further, evidence on the causal effects of financial regulation are scanty and also limited to the U.S. market.

In summary, the literature on the effects of financial regulation on the financial services has snowballed over the past two decades. In this review, the focus was on presenting the findings to date of the empirical research and its consequences, and offer suggestions for further investigation. What is evident from the review is that there are different perspectives of financial regulation with alternative views and related research opportunities. Findings in the academic literature will not only be beneficial to academia, but also to investors and regulators.

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Paper 2

3 Statutory Audit and Corporate Reporting Directives, Compliance Costs, Risk-taking, and the Reporting Quality of the EU Banks

Abstract

The paper examines how the Statutory Audit and Corporate Reporting Directives (SACORD) affect the compliance costs, risk taking and quality of financial reporting of the EU banks. Using a natural experiment, I find that post SACORD, compliance costs of the EU banks increase by 11 to 26 percent. Further, there is a significant increase in risk-taking and a decline in the reporting quality. I conclude that as far as the EU banks are concerned, these regulations do not appear to have the desired effects of improving the reporting quality and constraining risk-taking.

Keywords: Financial regulation; Accounting disclosure; Financial system; Financial stability; Difference-in-differences.

JEL Classification: G18, G21

3.1 Introduction

The importance of regulation for ensuring an effective financial system is extensively discussed in the extant literature (see e.g. Dermine 2006, Klomp and Haan 2012). A key objective of financial regulation is to enhance the functioning of the financial system so that it is able to absorb shocks and maintain financial stability as disruptions can potentially have severe real economic effects (Acharya and Ryan 2016). The European Parliament and the Council of the European Union issued the directive 2006/43/EC (SAD) which aims to harmonise statutory audit processes across the European Union (EU) member states. Further, another directive 2006/46/EC (CRD) was issued which primarily deals with credible financial reporting. The regulations aim to harmonise the auditing standards and demand greater external oversight by the statutory auditors. The auditors are required to follow the International Auditing Standards (IAS), report on the appropriateness of internal controls, and verify that a corporate governance

statement is included in the annual report. In addition, the directives require greater disclosures of Off Balance Sheet (OBS) and the Related Party Transactions (RPTs). These regulatory requirements are expected to have significant financial and investment implications for the EU firms. In view of the additional scrutiny expected from the statutory auditors, they are likely to charge higher fees to cover the costs of added audit efforts. Further, increased oversight of internal control systems and greater disclosures required by the regulations should lead to less risk taking and improved financial reporting. This paper empirically examines the impact of the Statutory Audit and Corporate Reporting Directives (SACORD hereafter) on the compliance costs, risk taking and quality of financial reporting of the EU banks.

There are two important reasons why I focus my research on banks. First the extant literature has typically ignored banks from their study of the impact of regulations (e.g., Bargeron, Lehn, and Zutter 2010, Iliev 2010, De George, Ferguson, and Spear 2013). The financial crisis of 2007-09 has clearly shown banks play a central role in the financial system and have an unambiguous relation with systemic risk (e.g., Delis, Molyneux, and Pasiouras 2011, Bord and Santos 2014). Second, as suppliers of credit, banks are largely responsible for the payments system. By borrowing short term and lending long term, banks transform debts maturities and manage and monitor financial risks. Thus, their key role in the smooth running of the financial system cannot be overemphasised. The combined assets of the EU banks represent about half of global banking assets with branches and subsidiaries around the world (Lehmann and Nyberg 2014). Therefore, a study of the impact of emerging regulations on the EU banks has global implications.

Although SACORD regulations apply to all public listed firms in the EU, provisions in SACORD have greater implications for the EU banking sector. For example, Article 3 of the CRD amends the 4th Directive (78/660/EEC) and the Credit Institutions Directive (86/635/EEC) and includes a provision that requires listed banks to include a corporate governance statement in its annual report. Further, the provision strengthens the effectiveness of supervisory authorities by ensuring financial statements are prepared and published in accordance with the legislation (Article 50b of 78/660/EEC). Article 3 also includes provision for imposition of financial penalties on banks and financial institutions that infringe national provisions (Article 60a of 78/660/EEC).[5] Also the Basel Committee on Banking Supervision

[5] During the period 2008-2012, ten banks paid fines of about £150 billion for various misconducts (McCormick 2013).

(BCBS) (2014, p.3) notes, “Effective corporate governance is critical to the proper functioning of the banking sector and the economy as a whole”. The quote suggests sound corporate governance improves the financial stability of banks. Extant literature too has shown that corporate governance can influence quality of financial reporting and risk taking in banks (e.g., DeYoung, Peng, and Yan 2013, Moreno and Takalo 2016).

The need for effective regulation of the financial system arises because market participants are exposed to asymmetric information. A number of studies show that increased disclosures reduce information asymmetry and improve the information environment by providing investors equal access to information (Leuz and Verrecchia 2000). However, the existing literature also highlights that cost-benefit analysis of regulation is necessary to understand its economic consequences (e.g., LaFond and You 2010).

The extant literature is unanimous on the issue that regulation increases compliance costs. For instance, Iliev (2010) reports 74 to 87 percent increase in the compliance costs for the US firms following the SOX regulation. De George, Ferguson, and Spear (2013) find 23 percent increase in the audit costs of the Australian firms after the introduction of the International Financial Reporting Standards (IFRS). The paper contributes to this strand of literature by offering empirical evidence of the impact of the SACORD on compliance costs of the EU banks.

In contrast, the evidence of the effects of regulation on risk taking is mixed. One strand of the literature posits that increased disclosure can deter banks from excessive risk-taking through outside discipline (e.g., Chen and Hasan 2006, Bushman and Williams 2012). Akhigbe et al. (2016) find evidence which suggests a decline in risk taking by banks and financial institutions following the introduction of the Dodd–Frank regulation. On the other hand, some studies report a positive association between increase in regulation and increase in bank risk-taking. Evidence suggests that the illiquid and harder to observe nature of banks’ portfolios make it difficult for the market to discipline risk-taking (Flannery, Kwan, and Nimalendran 2013), spurring bank managers to take excessive risks. Bouvard, Chaigneau, and De Motta (2015), and Moreno and Takalo (2016) propose theoretical models and argue that despite the benefits of increased disclosures, the associated costs of regulations impose a significant financial burden which can influence banks to take more risks. Given the inconclusive evidence, more research on the impact of regulation on risk-taking is required (Acharya and Ryan 2016). The SACORD is an EU-wide regulation and a thorough investigation of its effects

on the risk-taking by the EU banks will offer rich insights to the regulators and other stakeholders.

One of the key objectives of the SACORD is to improve quality of financial reporting.[6] However, there is empirical evidence which suggests that increased disclosure requirements can lead to a decline in the reporting quality as banks respond by changing assets composition and their classification in the financial reports (Thakor 2015, Iselin and Nicoletti 2017). The paper also investigates whether the SACORD regulations have improved the quality of financial reporting. A robust evidence of the impact on the reporting quality will be highly valuable to the regulators in understanding the effectiveness of the regulations.

Banks play a key role in the economy and as such, their effective regulation is critical for ensuring the financial and economic stability. Regulators have responded to the last financial crisis with a slew of new regulations. However, the existing evidence on the costs and benefits of regulations is not conclusive. In this context, my paper makes a novel contribution by providing evidence on the costs and benefits of new EU regulations that are a part of the Financial Services Actions Plan (FSAP). Specifically, I examine the EU regulations regarding the conduct of statutory audit and corporate reporting standards that require greater oversight by auditors for ensuring improved corporate governance, internal controls and greater disclosures. To the best of my knowledge, this is the first paper that provides a comprehensive evidence of the potential costs and economic consequences of compliance with SACORD regulations for the EU banks.

I employ a difference-in-differences (DID) estimation approach commonly used for examining the effects of changes in regulation (e.g., Altamuro and Beatty 2010, Petacchi 2015). It is important that the effects associated with SACORD are isolated. For this purpose I exploit the staggered implementation of SACORD in employing the DID specification for examining the impact on compliance costs, risk taking and the quality of financial reporting of the EU banks. For robustness, I follow an approach similar to the one used by Bargeron, Lehn, and Zutter (2010), and Dambra, Field, and Gustafson (2015) and use the US and Canadian banks as control sample. Importantly, to mitigate the concern that changes in my sample composition

[6] Bischof (2009) and Bushman (2014) argue that disclosure regulations are expected to improve the quality of financial information.

might affect my results, I ensure that both treatment and control samples have at least one observation in the pre- and post-regulation period.

My results offer a robust evidence of a significant impact of the SACORD regulations on the EU banks. I find that without using the control sample, the compliance costs for the EU banks increase by 11 to 13 percent. Further using the control sample of the non-EU banks, the relative increase in the compliance costs is even greater (20 to 26 percent). In terms of the impact on the risk-taking, I find a significant increase in risk-taking by the EU banks following the introduction of the SACORD. Finally, I observe a decline in the reporting quality which suggests that the increased disclosure requirements of the additional regulations are counter-productive as far as the quality of financial reporting by the EU banks is concerned.

The rest of the survey is organised as follows. Section 3.2 provides a discussion of relevant literature and SACORD provisions with regard to financial reporting, disclosures and risk taking. Section 3.3 explains data and methods used in the study. Section 3.4 presents and discusses empirical findings. Section 3.5 concludes the paper.

3.2 Literature review and hypotheses development

3.2.1 SACORD and compliance costs

Many EU banks expect that increased regulation will significantly increase compliance costs. HSBC's recent consideration to relocate its headquarters from the UK is a case in point (Arnold, Oakley, and Hughes 2015). The following provisions of SACORD lead us to predict that these will adversely affect the compliance costs of the EU banks.

Directive 2006/43/EC on statutory audits (SAD) aims to harmonise the quality of audits in the EU, whereas Directive 2006/46/EC on corporate reporting (CRD) aims to promote credible financial reporting processes. The overall objectives of SAD and CRD are to improve corporate governance, transparency and disclosure of accounting information. These regulations aim to promote reliable financial reporting, improve comparability and enhance public confidence in the audit function.

Article 26 of the SAD requires adoption of the International Auditing Standards (IAS) and article 2 of the CRD demands disclosure of Off-Balance Sheet (OBS) arrangements and Related Party Transactions (RPTs). Further, Article 1(7)(2) of CRD requires statutory auditors to verify that annual reports include a corporate governance statement by the board of directors.

These measures aim to enhance confidence in the audit quality and the credibility of financial reports.[7]

I argue that the adoption of the IAS will significantly increase auditors' workload and costs. Further, over the years, the use of OBS activities (e.g., standby letters of credit, guarantees, special purpose entities, etc.) in the banking sector has increased significantly (Mills and Newberry 2005). Before the introduction of the SACORD, banks were not required to disclose the OBS assets and liabilities in the financial statements. However, post SACORD, banks will be required to disclose these items in the notes to the annual accounts.

Previous research suggests that banks consider RPTs as instruments that can be used to facilitate personal gains, profit expropriation and fraudulent reporting (e.g., Ryngaert and Thomas 2012). According to the American Institute of Certified Public Accountants (2001), these transactions are difficult to identify and auditors have to rely on the management to provide information on RPTs. Lo and Wong (2016) show that adequate disclosure of RPTs can complement weak corporate governance and improve the value relevance of financial statements.

To the extent that the statutory auditors are now required to conduct their audit in accordance with the IAS requirements, and carry out quality assurances on OBS and RPTs, I expect a significant increase in the audit fees. This argument is consistent with previous evidence which suggests that new regulations significantly increase compliance costs (see, for example, Ashbaugh-Skaife et al. 2009, Iliev 2010, Battalio and Schultz 2011). Since SACORD legislation will significantly increase both the extent and quality of statutory audit work, auditors will charge a higher fee to compensate for the additional work. This will lead to a significant increase in audit costs post-SACORD. Thus my first null hypothesis is:

$H1_0$: The compliance costs for the EU banks would not change post-SACORD.

[7] http://www.kapitalmarktrecht-im-internet.eu/en/Areas%20of%20Law/Company_Law/European_Law/96/Directive_2006_46_EG.htm (accessed 02.07.15).

3.2.2 SACORD and risk taking

I expect SACORD to affect risk taking because of the following reasons. First, to ensure the effectiveness of the internal control systems and promote credible financial reporting processes, Article 41(1) of the SAD requires that the audit committee should consist of at least one independent director with financial expertise. Article 41(2b) requires public-interest entities (PIEs) [8] to form an audit committee with specific responsibility to monitor the effectiveness of internal control, internal audit, and risk management systems. Article 41(4) requires the statutory auditor to report to the audit committee any material weaknesses in the internal control systems. Further, Article 1(7) of CRD entails the board to include in the annual financial report, a corporate governance statement that outlines the internal control and risk management systems. Second, greater disclosure requirements in SACORD as discussed above and Article 2 of the CRD regarding disclosure of OBS and RPTs will increase transparency and influence the risk-taking of the EU banks.

The extant literature has found a link between audit and reporting regulations and risk taking. For instance, Sun and Liu (2014) examine the effects of audit committee on bank risk-taking and report a negative association between audit committee's effectiveness and risk. Bushman and Williams (2015) argue that publicly disclosed financial reports are a key source of transparency that can help in reducing risk-taking and enhancing financial stability of banks. For example, Akhigbe et al. (2016) report a reduction in risk-taking by the US banks after the passage of the Dodd–Frank regulation.

There is, however, a body of research which argues that more regulation can be counter-productive. Goldstein and Sapra (2013) develop a theoretical model and illustrate how increased disclosure requirements can lead to sub-optimal behaviour of banks and encourage them to invest inefficiently. Morrison and White (2013) show that increased disclosures can cause interbank contagion where the failure of one bank may weaken creditors' confidence in regulator's competence. Further, Moreno and Takalo (2016) argue that increasing transparency

[8] Article 2 of the CRD defines public-interest entities (PIEs) as publicly listed companies, credit institutions, insurance entities and any other entities designated by the member states as public-interest entities because they are of significant public interest.

can increase depositors' uncertainty about the solvency of banks, exacerbating panic and rollover risks that eventually create incentives for increased risk-taking.[9]

These competing arguments call for an empirical enquiry. While SACORD is expected to reduce risk-taking by requiring greater disclosures, the opacity of banks' risk assets exposures (Morgan 2002), complexity of their financial structure and investment-risk choices (Bushman and Williams 2015), the moral hazard created by the government backed financial safety nets, the weak force of market discipline for excessive risk-taking (Dam and Koetter 2012), and shareholders' short-run interests to maximise their share value (DeYoung, Peng, and Yan 2013) can undermine its intended effect and induce banks to take more risk. Thus my second null hypothesis is:

$H2_0$: Risk-taking by the EU banks will not change post SACORD.

3.2.3 SACORD and quality of financial reporting

It is widely reported that greater disclosures enable investors to more effectively prevent managerial rent extraction, strengthen market discipline, and increase transparency of sensitive financial information.[10] Prior literature also suggests increased disclosures are associated with improved financial reporting quality (see, Bischof 2009).[11] For instance, Gebhardt and Novotny-Farkas (2011) report a reduction in income smoothing behaviour of the European banks post-IFRS adoption. Further, Altamuro and Beatty (2010) find a positive association between the implementation of the mandated internal control provisions of the Federal Depository Insurance Corporation Improvement Act (FDICIA) and higher reporting quality. On the contrary, Vashishtha (2014) argues that since shareholders are concerned about costs, they may be satisfied with fewer disclosures. Similarly, Thakor (2015) develops a theoretical model and demonstrates that banks may choose to disclose less as more disclosure may increase their fragility.

[9] Hyytinen and Takalo (2002) argue that costs associated with more disclosures may offset or over-compensate the benefits accruing from higher transparency.

[10] See Leuz and Wysocki (2016) for a survey of the disclosure literature

[11] Barth and Schipper (2008; p.173) define financial reporting quality as "the extent to which financial reports reveal an entity's underlying economics in a way that is readily understandable by those using the financial reports."

Overall, in view of the new reporting requirements, I expect the adoption of SACORD will improve the reporting quality of the EU banks. On the contrary, the reporting quality may decline because shareholders may want fewer disclosures so that the firm's market value of the assets and revenue are protected from competitors, and managers may want to protect their own interests (Laux 2014). Thus my third and final null hypothesis is:

$H3_0$: The quality of financial reporting will not change post SACORD.

3.3 Sample selection, methods, and descriptive statistics

3.3.1 Data and Sample Selection

I collect data from DataStream using annual financial statements of all listed banks in the EU, US and Canada from 2004 to 2013.[12] The missing information is extracted from the annual reports of firms from Perfect Filing database. I choose 2004 as the start date because audit fee data are available only for a small number of the EU banks prior to that. Although my focus is to study the effects of the SACORD on audit costs, I also include non-audit fees since previous research has shown a significant positive association between audit fees and non-audit fees (e.g., Schmidt 2012).

I classify all observations from 2004 to the year before SACORD adoption as pre-SACORD and all observations from the year of implementation to 2013 as post-SACORD (see Table 3.1 for an overview of the sample composition by country).[13] For a bank to be included in my sample, I require at least five years of data on key accounting variables. Further, I exclude banks which commenced their operation after 2008 and/or banks for which audit fees is not available. My final sample comprises 464 listed banks, 137 banks (1,296 bank-years) from the EU and 327 banks (3,227 bank-years) from the US and Canada.

[12] I use listed banks because audit fees and stock return data for unlisted banks are not available.
[13] Although, Norway is not a member of the EU, it has adopted the EU directive(s) in pursuance of access to the European's single market. Therefore, I include Norway in my treatment sample. I exclude Cyprus, Estonia, Latvia, Malta and Romania because of lack of sufficient data.

3.3.2 Research Methods

3.3.2.1 Difference-in-differences

I use the Difference-in-Differences (DID) analysis that is commonly used for examining the unique effects of regulatory changes (e.g., Dambra, Field, and Gustafson 2015, Debbaut, Ghent, and Kudlyak 2016, Petacchi, 2015). The DID estimation combines the difference between the treatment and the control samples and pre-post comparison evaluation methodologies. It assumes that both samples would have followed parallel paths over time if the treatment sample is not affected by a specific intervention and estimates the change in outcome over time in the two samples (Wooldridge 2012). A key challenge in implementing the DID involves identifying a control sample that is not affected by the regulation (e.g., Leuz and Wysocki 2016). I use two different methods to identify the control sample for my DID specification. First, I exploit the different SACORD adoption dates for the countries included in my sample in Table 3.1 to obtain the differences-in-differences estimates of the effect of the regulation on costs, risk taking and reporting quality. The staggered implementation of the SACORD over time allows us to use the EU banks in the sample as both control and treatment sample. Particularly, banks in any country within the EU that has not adopted the directive are considered as control firms, whereas banks in a country that has adopted the directive are considered as treatment firms. For example, all banks in Italy are control banks until 2010 (see Agrawal 2013, Giroud 2013, Christensen, Hail, and Leuz 2016 for similar empirical identification strategy). Thus, if SACORD is impacting the audit fees, any increase should be concentrated in the EU Banks post SACORD. In Table 3.1 I provide SACORD adoption dates for different countries included in the sample.

******Insert Table 3.1 about here******

Second, I also use a different control sample comprising the US and Canadian banks for ensuring robustness of my results. There is a general agreement in the extant literature that developed economies like the US, UK and the EU are exposed to similar underlying economics (Gerakos, Lang, and Maffett 2013) and financial regulation (Coates and Srinivasan 2014). These countries also share similar institutional arrangements (La Porta, Lopez-De-Silanes, Shleifer 2006), and have comparable capital market environments and regulations (Bargeron, Lehn, and Zutter 2010). Previous studies on the U.S. market use European and Canadian firms as control sample. For example, Bargeron, Lehn, and Zutter (2010), Lee, Strong, and Zhu (2014), and Dambra, Field, and Gustafson (2015) use firms from the UK, Canada, Germany

and France as control sample for investigating the effects of SOX, Regulation Fair Disclosure and the JOBS Act respectively. I follow a similar approach and use listed banks in the US and Canada as the control sample as these are not affected by the SACORD.

With an aim to ensure that the parallel trends assumption of difference-in-differences estimation is satisfied in the pre-treatment years spanning 2004-2007, I follow Rosenbaum and Rubin (1985) and match my sample variables by year before the implementation of the SACORD. I identify the matched sample through a probit regression using firm size (LnAssets), profitability (ROA), business risks (Nloan/TA), business complexity (LnAccruals/TA), income diversity (NIR/Rev), profitability (ROA), and financial distress (LTDebt/TA, LnSTDCFO). The results of the probit regressions are not reported here but can be made available on request. I use the nearest neighbor matching without replacement, employing a caliper distance of 0.03 to avoid bad matches. I analyse the differences in matching covariate balance between the EU and the non-EU banks, by following Focke, Maug, and Niessen-Ruenzi (2017) and compute the normalized differences in the pre-SACORD periods.[14]

Results not tabulated here show that my matched samples are similar with respect to the treatment variables in both periods on all but one variable. Further, the absolute value of the normalized differences (Δx) for all variables in the matched sample is below the 0.25 threshold, indicating that the differences in the covariates between the two groups are not economically significant. Thus, my treatment and control sample are similar in terms of the matched variables.[15]

A possible concern with my DID analysis is the likelihood of endogeneity of the policy measures, which may bias my results. However, the formulation of the directives across the EU member countries to improve corporate governance and financial reporting quality precedes my sample period by several years. Thus, SACORD is not a consequence of the need to improve regulation by any particular country in response to any particular event. It is unlikely that the policymakers would have anticipated the ensuing financial crisis and introduced the SACORD regulations in 2006 with effective dates from 2008. Therefore, for these reasons, reverse causality is unlikely to be an issue my analysis (see Christensen, Hail, and Leuz 2016

[14] Imbens and Wooldridge (2009) suggest the computed normalized differences should not exceed 0.25 to remove specification sensitivity in the regression.

[15] The results are not tabulated here but can be made available on request.

for similar arguments). Further, the member states also have some discretion in the implementation that can differ in the areas such as devoted resources and penalties imposed.

3.3.2.2 The SACORD and the Audit costs

For testing my first hypothesis, I estimate the following baseline DID model.[16] The aim is to examine whether the SACORD explains the cross-sectional time series variation in changes in the audit fees:

$$Auditfees_{it} = \alpha_t + \theta_i + \beta_1 EUR * PsSACORD_t + \emptyset Controls_t + \varepsilon_{it} \quad \textbf{(3-1)}$$

In the above equation, I use the natural logarithm of audit fees (Auditfees) as a proxy for compliance costs (see De George, Ferguson, and Spear 2013, Iliev 2010) partitioned on pre-SACORD period (2004 to the year prior to the adoption) and post-SACORD period (year of adoption to 2013). a_t is year fixed effects, θ_i is firm fixed effects, β_1 is the coefficient of myprimary variable of interest which captures the interaction between the indicator for the EU Banks (EUR=1 if EU Bank) and the SACORD's post-adoption period (PsSACORD=1 if post SACORD). If EU banks experience an increase in audit fees post-SACORD, then the coefficient β_1 that captures the differential changes in audit fees should be positive.

$Controls_t$ denotes a vector of control variables included to isolate the effects of the SACORD on the EU banks. To account for any systematic difference in the compliance costs associated with the sample, I control for other company-specific characteristics in my model. Natural logarithm of total assets (LnAssets) is a control for audit effort and firm size (Whisenant, Sankaraguruswamy, and Raghunandan 2003). Loss indicator (Loss_Ind) is a dummy variable that equals one if a firm reports a loss for the year, and Return on assets (ROA) are the profitability control variables (De George, Ferguson, and Spear 2013, Lang and Stice-Lawrence 2015). The standard deviation of cash flows from operations (LnSTDCFO) and long-term debt scaled by total assets (LTDebt/TA) are measures of financial distress (Chen, He, Ma, and Stice, 2016). Accruals (LnAccruals/TA) and number of geographic business operations (LnGeoSegmts) are control variables for business complexity (Iliev 2010). In addition, I

[16] I do not include a dummy variable for the main effect since in the firm fixed effects model, such a dummy would be dropped from the regressions and the fixed effects effectively converts Eq. (1) into a difference-in-differences specification (see Iliev, Miller and Roth 2014).

measure bank risk using net loans to total assets (Nloan/TA) and nonperforming loans to total assets (NPL/TA) (Berger, Imbierowicz and Rauch 2016). I include the number of audit committee members (LnAuditCommN) as a control for the board's effective oversight (Badolato, Donelson, and Ege 2014). Tobin's q (Tobin's Q) is a measure of firm performance (Badertscher, Jorgensen, and Katz 2014). I include non-interest income scaled by revenue (NIR/Rev) to control for income diversity and higher dependence on off-balance-sheet activities (Ellul and Yerramilli 2013). Following Ho, Huang, Lin, and Yen (2016), I control for financial crisis (FINCRS) via a dummy which equals one during the period 2007 to 2009, and zero for other non-crisis periods. I control for the effect of Basel II (Base II) by way of a dummy that equals one from the period countries adopted the banking regulation.[17] I also control for the impact of International Financial Reporting Standards (IFRS) via a dummy that equals one from 2005 for countries that adopted the IFRS.[18]

To account for country specific effects, I include the natural logarithm of real GDP per capita (LnGDPPerCap) obtained from World Development Indicator (WDI). I also include Heritage Foundation's economic freedom index (EconFreedm) that comprises various economic development indicators such as government integrity, fiscal health, monetary freedom, investment freedom, etc. to control for institutional factors that might affect the overall level of bank efficiency in a country (Dinger and Hagen 2009).[19] All variables are defined in the Appendix.

My DID analysis is robust to firm and year fixed effects that account for any time-invariant and cross-sectional heterogeneity in audit fees and also addresses potential endogeneity concerns (see Petacchi 2015). The estimated standard errors are clustered at the firm level and corrected for heteroscedasticity (Petersen, 2009).[20]

3.3.2.3 The SACORD regulation and risk taking

For testing my second hypothesis, I estimate the regression model as specified in equation (2). I include firm fixed effects to control for unobserved firm-specific trends in risk taking and the

[17] See the appendix for details. Also see European Parliament Briefing note on US implementation of Basel II. Available at: http://www.europarl.europa.eu/document/activities/cont/201110/20111012ATT29102/20111012ATT29102EN.pdf

[18] I do not control for types of audit firms as almost all the EU banks in my sample are audited by the BIG 4.

[19] http://www.heritage.org/index/explore

[20] The results are robust to clustering standard errors by country.

firm-year fixed effects to control for unobserved time varying post treatment trends in risk taking at the firm level. Specifically, the regression model is defined as:

$$RISK_{it} = \alpha_t + \theta_i + \beta_1 EUR * PsSACORD_t + \gamma X + \varepsilon_{it} \quad \textbf{(3-2)}$$

where RISK in equation (2) is measured using four different proxies for risk taking. First, I use stock return volatility estimated as the natural logarithm of the standard deviation of daily stock returns in the fiscal year (Goetz, Laeven, and Levine 2016). Higher volatility indicates higher risk taking. I exclude the bank-year observations for which I do not have stock price data for more than 30% in a Year.

Second, following Goetz, Laeven, and Levine (2016), I compute a Z-score for each bank that is considered a composite risk measure of bank stability.

$$Z\text{-}Score_{rtn} = Ln\left(\frac{ROA + CAR}{\sigma(SDSR)}\right) \quad \textbf{(3-3)}$$

where ROA is the return on assets, CAR is the capital asset ratio and $\sigma(SDSR)$ is one year standard deviation of daily stock returns for each bank. The Z-score estimates the number of standard deviations by which profits would have to fall before a bank becomes bankrupt (Roy, 1952).

Third, following Laeven and Levine (2009), I use another version of the Z-score where the dispersion is measured as the standard deviation of return on assets.

$$Z\text{-}Score_{roa} = Ln\left(\frac{ROA + CAR}{\sigma(ROA)}\right) \quad \textbf{(3-4)}$$

where ROA is the annual return on assets, CAR is annual equity capital to assets ratio of each bank and $\sigma(ROA)$ is standard deviation of annual values of return on assets calculated over 3-year overlapping periods starting from the current period t to t-2.[21] Since the Z-score is highly skewed, I use its natural logarithm (e.g., Houston, Lin, Lin, and Mae 2010, Laeven and Levine

[21] 21 firm-year observations were less than zero and therefore these were excluded.

2009). In my analysis, I multiply it by (-1) to ensure that a higher Z-score reflect higher risk-taking.

The fourth and final measure of risk is calculated as the natural log of the ratio of nonperforming loans to total assets ratio (LnNPL/TA) (Berger, Imbierowicz and Rauch 2016).[22] A high ratio would be an indication of greater risk-taking.

I use deposits scaled by total assets (Deposit/TA) to control for market power (Marrouch and Turk-Ariss 2014) and cash flow from operations scaled by total assets (CFO/TA) as proxy for cash holding (Chen, Li, and Zou, 2016). Further, I include the natural log of the percentage of institutional shareholding (LnInst_Investor) in a firm to control for institutional influence on risk taking. Other controls remain the same as in equations (1) and (2). All variables are defined in the Appendix.

3.3.2.4 SACORD regulation and reporting quality

For testing my third hypothesis regarding the SACORD's impact on the reporting quality of the EU banks, I use three proxies: reporting behaviour, earning smoothness and asset quality. Following Daske, Hail, and Leuz (2013), I measure reporting behaviour (LnReport_Behvr) as the ratio of the absolute value of accruals to the absolute value of cash flows from operations. I measure earning smoothness (LnSmooth) as ratio of the standard deviation of net income before extraordinary items scaled by total assets and the standard deviation of cash flow from operations scaled by total assets over the years *t–4* through *t* (Hribar, Kravet, and Wilson 2014) with a minimum of three years. In addition as a robustness check, I use the ratio of loan-loss provision to total assets (LnLLP/TA) as a measure of reporting quality similar to Altamuro and Beatty (2010).[23] Prior research widely shows that banks exploit Loan Loss Provisions (LLP) to smooth earnings hence reducing the reporting quality (see Gebhardt and Novotny-Farkas 2011). Therefore, I expect the implementation of SACORD to improve reporting quality. Due to the skewed distributions of the reporting quality measures, I use their natural logarithm in my analysis. I multiply the measures by (-1) so that higher values indicate more transparent reporting. I run the following regression:

[22] Non-performing loans are 90-plus days delinquent but not yet included in the Loan Loss Provisions.
[23] Loan loss provisions, a measure of accounting quality is an indicator of financial stability (see Bushman and Williams 2012, Acharya and Ryan 2016).

$$Rpt\_Qlty_{it} = \alpha_t + \theta_i + \beta_1 EUR * PsSACORD_t + \gamma X + \varepsilon_{it} \quad \textbf{(3-5)}$$

where Rpt_Qlty in equation (4) is my proxy for measuring the reporting quality. EUR*PsSACORD is as previously defined, and *X* is a vector of control variables previously defined in equation (2).

3.4 Empirical analysis and results

3.4.1 Descriptive Statistics

Panel A of Table 3.2 reports the descriptive statistics for the variables used in my analyses for EU banks. The mean value of audit fees is €5.9 million, with a standard deviation of €12.4 million and the mean total audit fees is €7.1 million. The median values are considerably lower in both cases indicating skewness in the fees. Bank assets also show similar skewness with mean €187 billion and median €18 billion. Given the skewness of the fees and size distribution, I use the natural logarithm of audit fees, total fees and the book value of assets in all my empirical specifications. Average bank earns a positive return on assets of 1.4 percent and 12.0 percent of sample firm-years recorded losses. The mean (median) income diversity (NIR/REV) is 28.5 (27.7) percent, indicating that banks rely more on loans to generate revenue. Further, mean value of NPL/TA and LLP/TA is 2.7 and 5.2 percent, while the median value is 1.2 and 0.4 percent, respectively. Given the skewness of NPL/TA and LLP/TA, I use their natural logarithm in my specifications. The mean (median) annual natural logarithm stock return volatility (LnσStkrtn) is 3.21 (3.26), and the average annual negative natural log of Z-score(rtn) and Z-score(roa) is 6.12 and 3.51 respectively. The mean Z-score(roa) is similar to that reported by Houston, Lin, Lin, and Mae (2010) and the range in the Z-scores reflects the cross-sectional variation in the level of bank risks.

******Insert Table 3.2 about here******

Panel B of Table 3.2 shows the descriptive statistics of the matched sample for the regression variables. It is interesting to note that the mean audit fees (total fees) of €6.5 (€7.6) million before logarithm transformation for the EU banks is not statistically different from benchmark banks of €7.7 (€8.9) million. Further, the EU banks' mean (median) assets of €212 (€12.5) billion, are higher than €186 (€14.2) billion for the non-EU banks, but again, the difference is statistically not significant. Treatment (control) sample performance ratio (Tobin's Q) is

significantly higher with mean of 92.6 (90.9) percent, suggesting EU banks performance exceed control sample. Treatment (control) sample audit complexity (LnAccruals/TA) is significantly higher with mean log of -4.66 (-4.85), indicating increased complexity of the audit task and risk. Additionally, treatment sample mean natural logarithm of audit committee members (LnAuditCommN) is 1.33, relative to the control sample of 1.70 and the difference is significant at the 1 percent level. The average of annual log of Z-Score(rtn) of treatment (-5.84) is significantly higher than the treatment sample (-6.21), indicating that EU banks appear to exhibit lower financial stability.

Finally, the correlation matrix (results not tabulated here but are available on request) shows that Audit fees is positively correlated (0.82) with firm size and with audit complexity (0.61). This is consistent with previously reported findings which suggest that firm size and audit complexity are the key determinants of audit fee.[24] None of the correlations between the independent variables are greater than 0.6, hence, multicollinearity is unlikely to be a problem.[25]

3.4.2 The effects of SACORD on compliance costs

Table 3.3 presents results of the effect of SACORD on compliance costs. The key variable of interest is the interaction between the dummy for the EU banks and post-SACORD adoption period ($EUR * PsSACORD$). The coefficient captures the effect on audit (or total) fees of the EU banks that are affected by the regulations. In column (1), I present the results of the DID specification for audit fees only for the EU banks. The coefficient of EUR∗ PsSACORD is positive (β=0.12) and statistically significant at the 5 percent level (t =2.13). This suggests that SACORD adoption significantly increased the EU banks' audit fees by 12.6 percent.[26]

******Insert Table 3.3 about here******

In column (3), I report parallel results of the effects of the SACORD on audit fees based on the matched sample. The coefficient on the key variable of interest remains positive and

[24] See Hay, Knechel, and Wong (2006) for a survey of the literature on the determinants of audit fees

[25] I calculate the variance inflation factors (unreported) and find the VIF are less than 3 for all the regressions.

[26] Kennedy (1981) suggests the appropriate transformation to get a similar interpretation for dummy variables: $\hat{P} = 100 * \left(\exp\{\hat{c} - 0.5 * \hat{V}(\hat{c})\} - 1\right)$ where $\hat{P}$ is the percentage change in the dependent variable given a change in the dummy variable from zero to one, $\hat{c}$ is the coefficient estimate for the dummy variable, and $\hat{V}(\hat{c})$ is the OLS estimate of the variance of the coefficient. It is the transformed coefficient that is discussed in the text.

statistically significant at the 5 percent level (β=0.19, t=2.10). This suggests that post SACORD, audit fees of the EU banks increased by 20.4 percent. These results provide a strong evidence of a significant increase in the compliance costs of the EU banks following the adoption of the SACORD.

The results in columns (2) and (4) for the total fees are similar. Column (2) with the EU banks only shows a positive and statistically significant coefficient at the 5 percent level for EUR*PsSACORD (β=0.10, t=2.05) suggesting that the total fees paid by the EU banks to the auditors increased by 10.6 percent following the implementation of the SACORD regulation. The results for the matched sample in column (4), show that the coefficient ($EUR * PsSACORD$) is also positive and significant at the 1 percent level (β=0.23, t= 2.62). This suggests that the fees paid by the EU banks increased by 25.7 percent post SACORD.

Overall, the findings suggest that the average increase in compliance costs of the EU Banks without additional control sample is between 11 to 13 percent, and 20 to 26 percent relative to the non-EU banks post SACORD. The results in Table 3.3 strongly reject my null hypothesis $H1_0$ of no change in compliance costs post SACORD. The evidence suggests that implementation of the SACORD has significantly increased the compliance costs for the EU banks. This is consistent with the findings reported by previous studies. For example, Iliev (2010) reports an increase in audit fees of between 74 and 87 percent for firms that complied with section 404 of the Sarbanes-Oxley Act (SOX) of 2002. In the same vein, De George, Ferguson, and Spear (2013) report an increase in audit costs of 23 percent following IFRS adoption in Australia.

Finally, the explanatory power of the model is high with an adjusted R-Squared of above 77 percent in all four regressions, suggesting that the model accounts for the determinants of audit fees. In addition, my results are generally consistent with regard to significance of the control variables (e.g., Petacchi 2015). For instance, the coefficients on Assets and NIR/Rev variables loads positively and statistically significant at the 5 percent level or better in all four regressions.[27] These results suggest that larger, less stable banks, and those with greater income diversity incur higher audit fees. Additionally, the coefficient on financial crisis (FINCRS) is positive and statistically significant at the 10 percent level or better. This suggests that the

[27] My main results are unchanged when I use the natural logarithm of revenue or market capitalization as a proxy for size.

financial crisis has increased the audit fees because of the increase in perceived risk. This is consistent with Koh and Tong (2013), who document evidence of higher audit fees due to increase audit risk and additional audit engagement.

Interestingly, I find that the coefficient on Basel II is positive and significant at the 5 percent level in only one of the four regressions. This could be because Basel II did not increase auditor's risk as it does not require the statutory auditors to attest the bank's internal risk assessment models used to estimate loan's probability of default. Further, consistent with Iliev (2010), LnGeoSegmts is positively related to higher compliance costs and statistically significant at the 5 percent level or better for three of the four regressions. These results indicate that more complex banks require considerable audit efforts which is reflected in the higher audit fees.

3.4.3 Robustness tests

I perform two additional tests to assess the robustness of my results. First, the implementation of the SACORD regulation coincides with the global financial crisis and economic recession that ensued. Consequently, to mitigate the possible impact of confounding events on my results, I rerun the analyses with hypothetical implementation years of SACORD adoption. If my earlier reported results are affected by the confounding events and the implementation of the SACORD is not an exogenous event, then the measured effects should remain statistically significant when hypothetical implementation years of SACORD are used (see Petacchi 2015).

******Insert Table 3.4 about here******

Results in Table 3.4, show that the measured effects are generally insignificant. In columns (1) and (2), the results using 2011 as the assumed year of SACORD implementation, show that the coefficient for $EUR * PsSACORD$ is significant only at the 10 percent level for audit fees ($\beta = 0.10$, t=1.77) and statistically insignificant for total fees ($\beta = 0.08$, t=1.61) for EU only sample. Columns (3) and (4) present the results using the matched sample. The key variable of interest ($EUR * PsSACORD$) is not statistically significant. Similarly for year 2012, the coefficient on $EUR * PsSACORD$ is statistically insignificant.[28] This is in stark contrast to the

[28] I skipped 2009 and 2010 because of the staggered adoption by EU member countries. Ialso skipped the pre-SACORD period because of other regulations e.g., IFRS, BASLE II implemented during that period.

results for year 2008 which support my findings that the SACORD has led to higher compliance costs.

Next, audit fees could also increase due to increases in bank assets. Therefore as a further robustness test, I rerun my analyses by excluding observations with large increases in total assets (in excess of 10 percent) in the year after the SACORD implementation.[29] Untabulated results confirm that my findings reported in Table 3.3 are robust to the choice of an alternative control sample. My robustness tests lend major support to my findings that SACORD has had a significant impact on the compliance costs of the EU banks and that confounding events, firm size, and choice of control sample have not affected my results.

3.4.4 The effects of SACORD on bank risk-taking

In this section, I test my second null hypothesis $H2_0$ regarding the impact of the SACORD on risk-taking. In Panel A of Table 3.5, I present the findings on risk taking as proxied by the natural logarithm of stock return volatility (LnσStkrtn), LnZ-Score(rtn), LnZ-Score(roa) and nonperforming loans (LnNPL/TA). The results show that all the specifications yield similar results. Regardless of the risk proxy I use, the coefficient of the variable of interest (EUR*PsSACORD) is positive and statistically significant at the 1 percent level. In economic terms, when I use return volatility (LnσStkrtn) as a measure of risk (column 1), banks' reported risk rises by 12 percent (=1*0.38/3.21) after the adoption of SACORD. Table 3.5 also shows that the adoption of SACORD is associated with an increase in banks risk by 12 percent (=1*0.747/6.12) when Z-Score(rtn) is used as a measure of risk (column 2) and by 15 percent when Z-Score(roa) is used as proxy of risk.[30] Finally, the economic effect/significance of SACORD on nonperforming loan ratio (NPL/TA) is substantial: the regulatory policy change increases the ratio by 112.6 percent in panel A respectively (calculated following Kennedy 1981). In other words, the coefficient of interest (EUR*PsSACORD) suggests that risk taking proxied by the ratio of nonperforming loans increases by 41.2 percent (=1*112.58/2.73) post SACORD.

******Insert Table 3.5 about here******

[29] I remove 98 and 242 firm-years from the treatment and the control sample respectively using 10% cut-off rate because yearly average total assets increase by 10 percent post-SACORD. In untabulated results, I show that my main inferences remain unchanged.
[30] Calculated based on DeYoung and Roland (2001).

Panel B of Table 3.5 presents parallel results for the matched sample. Except for Z-score(roa), the coefficient of the key variable of interest (EUR*PsSACORD) is positive and statistically significant at the 1 percent level for all risk proxies. The SACORD effects are similar to ones reported in Panel A. The findings indicate that the EU banks' risk taking increases by 10 percent and 11 percent when Stock return volatility and Z-Score(rtn) respectively are used as risk proxies.[31]

My results strongly reject the null hypothesis $H2_0$ of no change in risk taking by the EU banks post SACORD. The results indicate that EU banks increase risk taking activities following the adoption of the SACORD. My findings lend support to the notion that banks may be motivated to take more risks to offset the adverse effects of greater disclosures as argued by Moreno and Takalo (2016).

In terms of control variables, except for column (4) in panels A and B of Table 3.5, the coefficient on FINCRS is positive and statistically significant at the 1 percent level, suggesting increased risk taking following the financial crisis. These results are also consistent with Frame and White (2007), who argue that the significant decline in effective capital during the financial crises increases the incentives for banks to take more risks. Similarly, For the Basel II, the coefficients for three of the four proxies for risk taking of panel A and B in Table 3.5 indicate that the regulation may not be effective in limiting excessive risk taking. The results are consistent with evidence provided by Mariathasan and Merrouche (2014).

3.4.5 The effects of SACORD on the reporting quality

In this section, I examine the effects of SACORD on the reporting quality of the EU banks. Panel A of Table 3.6 shows results for the EU banks only sample where I use LnReport_Behvr, LnSmooth and LnLLP/TA as the dependent variables. The coefficients of EUR*PsSACORD in columns (1) to (3) are negative and statistically significant at the 5 percent level or better (β=-0.54, β=-0.22, β=-0.76). In economic terms, these results suggest a decline of 23 to 48 percent in the reporting quality post-SACORD. Panel B reports the results for the matched sample. I find that the coefficients of the variable of interest remain negative and statistically significant at 1- percent (β=-0.50, β=-0.55) in columns (1) and (3) respectively, and column (2)

[31] I also test the robustness of bank risk taking by using loan loss provision (LnLLP/TA) as a proxy (e.g., Williams 2004). In Table 3.6, where I use it as a proxy for reporting quality, I find evidence consistent with the results reported in table 3.5.

is statistically insignificant. Overall, these results lead us to reject my null hypotheses $H3_0$ and conclude there is a significant decline in the financial reporting quality of EU banks post SACORD. My results complement the arguments of Thakor (2015) that banks may choose to disclose less information if the disclosures are likely to increase their fragility.

******Insert Table 3.6 about here******

3.5 Conclusions

In the aftermath of the 2007-09 financial crisis, many new financial regulations have been created and existing regulations have been revised. However, extant research does not offer conclusive evidence of the costs and benefits of regulations and whether more regulations improve transparency and moderate risk taking. The extent to which banks are regulated has important implications for the financial stability as well as the competitiveness of the financial sector. Banks play a critical role in the economy by allocating capital efficiently. As such their effective regulation is needed to ensure financial stability. However, excessive regulation can stifle competition and increase compliance costs which could reduce profits and encourage banks to take greater risks. The EU issued new regulations regarding the conduct of statutory audit and corporate reporting standards that require greater oversight by auditors for ensuring improved corporate governance, internal controls and greater disclosures. This paper investigates the effects of SACORD regulations for the EU banks in terms of compliance costs, risk taking, and the quality of reporting. The paper makes important contributions to the extant literature on the cost implications and effectiveness of regulations in reducing risk by improving quality of financial reporting including risk disclosures.

I focus on the impact of the SACORD on the EU banks as they represent a substantial part of global banking industry. I use a sample of 137 listed EU banks affected by the SACORD for the period 2004 to 2013. I use a robust analytical approach including a variety of control variables and a control sample of 327 US and Canadian listed banks and present evidence of the impact of these regulations on compliance costs, risk taking and the quality of reporting of the EU banks. My results show that post SACORD, the increase in audit fee ranges from 13 to 20 and to total audit fees from 11 to 26 percent.

Next, I investigate how the SACORD regulations affect risk taking as they require the EU firms to provide greater risk disclosures. Contrary to the expectations, my results indicate that

the regulations led to a significant increase in risk-taking activities by the EU banks. My results lend support to the previously reported findings that greater disclosures incentivise banks to take more risks. Finally, I examine whether the SACORD regulations improve the quality of financial reporting. My findings suggest that following the adoption of SACORD, the reporting quality of the EU banks has worsened. The results suggest that the SACORD regulations have been ineffective in constraining risk-taking and improving the quality of reporting by the EU banks.

I acknowledge that identifying the impact of financial regulation like the SACORD is empirically challenging. However, in my research design, I consider a number of factors and events which could affect my findings. First, I are confident that the SACORD regulations were indeed exogenous events which affected the EU banks. My robustness tests demonstrate that the confounding events have not had any influence on my results. Second, my evidence of increase in compliance costs and risk taking and the decline in the reporting quality remains robust even when I use an alternative control sample comprising the US and Canadian banks. Finally, I consider the possibility that increase in compliance costs could be attributed to the firm size as it is highly correlated with the audit fees. Despite removing firms which show high annual asset growth from my sample, my findings remain robust and confirm that the adverse impact on compliance costs is not a consequence of firm size.

My findings have several key implications. First, financial regulation imposes additional costs. Second, increased regulation seems to incentivise more risk taking. Finally, the implementation of additional regulation seems to be counter-productive in terms of improved quality of financial reporting for informed decision making by investors.

A.1 APPENDIX

VARIABLE DEFINITIONS

LnAuditCommN	Natural logarithm of 1 plus the size of the audit committee (from BoardEx).
LnAccruals/TA	The natural logarithm of the ratio of the absolute value of accruals (difference between net income before extraordinary items and cash flow from operations) scaled by ending total assets
LnAuditfees	Natural logarithm of total audit and audit-related fees charged by the external auditor for audit related work winsorized at the 1st and 99th percentiles.
Basel II	Basel II dummy equals 1 for the EU banks from 2006, for the Canadian banks, from 2007, and for the US banks, from 2008. (see Aiyar, Calomiris, and Wieladek 2014). The EU banks adopted Basel II in 2007 but the transition period started earlier (Aiyar, Calomiris, and Wieladek 2014). Since Basel II it was not adopted by all US banks and also difficult to identify which US banks are Basel II compliant, we assume that all US banks adopted Basel II in 2008.
BizDisclos_Ind	Natural log of Business extent of disclosure index from World Development Indicators.
CFO/TA	Cash flow from operations scaled by total assets
Deposit/TA	Total bank deposits scaled by total assets.
EconFreedm	Economic freedom index from the Heritage Foundation (EconFreedm)
FINCRS	Financial crisis dummy equals 1 between 2007-2009.
LnGeoSegmts	Natural logarithm of 1 plus the number of geographic segments from DataStream.
IFRS	International Financial Reporting Standards dummy equals 1 when IFRS was implemented in EU in 2005-2013 and 2011-2013 in Canada.
LnInst_Investor	Percentage of institutional shareholding.
LnLLP/TA	Natural logarithm of loan loss provision scaled by total assets.
Loss_Ind	Dummy variable equal 1 if the bank reported a loss in the current year.
LTDebt/TA	Leverage ratio, measured as the ratio of long term debts to total assets.
NIR/Rev	Non-interest-revenue scaled by total revenue winsorized at the 1st and 99th percentiles.
Nloan/TA	Net loans scaled by Total assets.
LnNPL/TA	Natural log of Nonperforming loans scaled by Total assets.
LnReport_Behvr	The natural logarithm of the ratio of the absolute value of accruals scaled by the absolute value of cash flows (multiplied by –1 so that higher values indicate more transparent reporting) and winsorized at the 1st and 99th percentiles. Accruals are the difference between net income before extraordinary items and the cash flow from operations.
ROA	Return on assets. Ratio of income before extraordinary items to assets.
LnGDPPerCap	Natural logarithm of real per capita income. Source: World Development Indicators (WDI) of the World Bank and Eurostat.

LnSmooth	Earning smoothness is measured as the natural logarithm of the of the standard deviation of net income before extraordinary items (scaled by total assets) divided by the standard deviation of cash flow from operations (scaled by total assets) over the years t – 4 through t. I (multiplied by –1 so that higher values indicate more transparent reporting).
LnSTDCFO	Natural logarithm of the standard deviation of cash flows from operations scaled by total assets where the standard deviation is calculated using the prior years t-4 to t with a minimum of three years.
LnσStkrtn	Natural logarithm of the standard deviation of daily stock returns measured over one year.
LnAssets	Natural logarithm of total assets measured in millions of Euros
Tobin's Q	Tobin' q is measured as: (Equity market value + Liabilities book value)/(Equity book value + Liabilities book value).
LnTotalfees	Natural logarithm of total audit fees, audit related fees and non-audit fees paid to the auditors winsorized at the 1st and 99th percentiles.
LnZ-score(roa)	It is measured as the natural logarithm of return-on-assets and the ratio of equity over total assets divided by the standard deviation of return on assets calculated over 3-year overlapping periods starting from the current period t to t-2 ((Net income / Assets (book value) + Capital / Assets (book values))/ (Standard deviation of return on assets)
LnZ-score(rtn)	It is measured as the natural logarithm of return-on-assets and the ratio of equity over total assets divided by the standard deviation of daily stock market returns over one year ((Net income / Assets (book value) + Capital / Assets (book values))/ (Standard deviation of daily market returns over one year).

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Table 3.1 Sample distribution and entry-into-force dates

Country	Unique firms	Observations (N)	Entry-into-force dates
Austria	2	20	August, 2008
Belgium	2	20	Sept, 2008
Bulgaria	1	9	Sept, 2008
Czech republic	1	10	April, 2009
Denmark	18	151	Sept, 2008
Finland	2	20	Sept, 2008
France	21	205	Sept, 2008
Germany	5	50	April, 2009
Greece	1	10	April, 2009
Hungary	1	10	Sept, 2008
Ireland	2	20	August, 2010
Italy	20	193	March, 2010
Lithuania	1	8	Sept, 2008
Luxembourg	1	10	Sept, 2008
Netherlands	3	29	Sept, 2008
Norway	11	110	April, 2009
Poland	7	70	April, 2009
Portugal	4	36	Sept, 2008
Slovakia	1	10	Sept, 2008
Slovenia	1	9	Sept, 2008
Spain	9	86	August, 2010
Sweden	4	40	April, 2009
United kingdom	19	171	Sept, 2008
Control sample			
Canada	9	90	N/A
United States	318	3,137	N/A

NOTES: The sample consists of all countries in the European Union except for Cyprus, Estonia, Latvia, Malta and Romania excluded because of lack of sufficient data. I also include Norway from the European Economic Area (EEA) as explained in the text. The control samples are banks from the US and Canada.

Table 3.2 Summary statistics

Panel A: Summary statistics of EU only firms

Variable	N	Q1	Mean	Median	Q3	Std. Dev.
AuditFees (€'000)	1,212	222	5,885	659	4,980	12,385
TtlAuditfees (€'000)	1,212	234	7,080	875	5,950	14,724
Total Assets (€'Mill)	1,296	4,458	187,000	17,900	132,000	408,000
Loss_Ind	1,290	0.00	0.12	0.00	0.00	0.32
LnGeoSegmts	1,290	0.69	1.05	0.69	1.39	0.55
LTDebt/TA	1,290	7.49	19.44	17.32	27.66	15.42
NLoan/TA	1,290	60.72	68.88	72.11	83.26	18.50
ROA	1,255	0.80	1.39	1.24	1.68	1.96
Tobin's Q	1,265	89.52	91.22	92.86	94.78	8.08
NIR/Rev	1,242	20.48	28.51	27.65	34.40	15.26
LnSTDCFO	1,217	-1.43	-0.78	-0.92	-0.23	0.96
LnAccruals/TA	1,290	-5.36	-4.67	-4.62	-3.94	1.27
LnAuditCommN	1,284	1.10	1.33	1.39	1.79	1.05
LnGDPPerCap	1,296	10.48	10.58	10.63	10.82	0.49
EconFreedm	1,296	1.06	1.35	1.31	1.67	0.37
LnσStkrtn	1,270	-3.61	-3.21	-3.26	-2.86	0.59
LnZ-score(rtn)	1,268	7.18	6.12	6.06	5.00	1.93
LnZ-score(roa)	1,270	4.13	3.51	3.34	2.70	1.34
NPL/TA	996	0.45	2.73	1.23	3.43	3.99
LLP/TA	1,166	0.17	5.22	0.40	1.06	48.09
CFO/TA	1,290	0.70	1.16	1.10	1.64	2.34
Deposit/TA	1,247	33.06	45.27	45.43	56.02	17.96
LnInst_Investor	1,277	0.00	2.33	2.94	3.97	1.80

Panel B: Summary statistics for treatment and control groups (matched sample)

	Treatment						Control						
	N	**Q1**	**Mean**	**Median**	**Q3**	**Std. Dev.**	**N**	**Q1**	**Mean**	**Median**	**Q3**	**Std. Dev.**	Diff. in Mean
AuditFees (€'000)	354	181	6,468	504	5,492	13,670	358	458	7,650	1,422	6,301	15,292	-1,182
TtlAuditfees (€'000)	354	210	7,593	553	6,479	15,849	358	458	8,876	1,470	7,751	17,431	-1,282
Total Assets (€'Mill)	366	2,826	212,000	12,500	83,000	493,000	366	2,554	186,000	14,200	133,000	389,000	26,000
Loss_Ind	366	0.00	0.12	0.00	0.00	0.32	366	0.00	0.16	0.00	0.00	0.37	-0.04*
LnGeoSegmts	366	0.69	1.08	0.69	1.39	0.55	366	0.69	0.81	0.69	0.69	0.31	0.27
LTDebt/TA	366	5.23	11.80	9.74	17.66	8.78	366	5.83	12.54	10.48	15.98	11.99	-0.74
NLoan/TA	366	53.78	64.95	67.79	80.30	18.81	366	57.73	64.25	66.96	73.65	14.30	0.70
ROA	366	0.76	1.33	1.26	1.87	1.02	366	1.07	1.34	1.44	1.94	2.57	0.01
Tobin's Q	366	90.86	92.55	93.09	94.88	3.36	366	88.75	90.93	90.61	92.70	4.24	1.62***
NIR/Rev	366	0.19	0.27	0.26	0.34	0.13	366	0.14	0.26	0.27	0.36	0.15	0.01
LnSTDCFO	366	-1.39	-0.89	-0.98	-0.33	0.78	366	-1.47	-0.84	-0.92	-0.33	0.94	-0.05
LnAccruals	366	-5.25	-4.66	-4.62	-3.96	1.20	366	-5.43	-4.85	-4.66	-3.79	1.45	0.19*
LnAuditCommN	363	0.69	1.33	1.39	1.61	1.21	361	1.61	1.70	1.79	1.79	0.27	-0.37***
LnNPL/TA	366	0.41	1.65	0.88	2.10	1.99	366	0.35	1.82	0.97	2.33	2.38	-0.18
LnGDPPerCap	366	10.51	10.62	10.66	10.97	0.54	366	10.78	10.80	10.80	10.81	0.02	-0.17***
EconFreedm	366	1.09	1.43	1.51	1.77	0.37	366	1.40	1.48	1.50	1.59	0.13	-0.05***
LnσStkrtn	365	-3.55	-3.17	-3.24	-2.82	0.53	366	-3.11	-3.27	-2.73	0.67	365	-0.1
LnZ-score(rtn)	365	-6.84	-5.84	-5.87	-4.87	1.60	366	-7.45	-6.21	-6.43	-5.23	1.88	0.37***
LnZ-score(roa)	366	-3.82	-3.34	-3.24	-2.74	1.06	366	-4.34	-3.58	-3.43	-2.80	1.48	0.24**
NPL/TA	366	0.41	1.65	0.88	2.10	1.99	366	0.35	1.82	0.97	2.33	2.38	-0.18
LLP/TA	366	0.17	6.43	0.48	2.17	52.88	366	0.18	0.95	0.41	1.24	1.30	5.48**
CFO/TA	366	0.70	1.17	1.14	1.61	0.93	366	1.05	1.38	1.38	1.88	0.94	-0.21
Deposit/TA	366	38.89	50.11	50.79	63.06	17.64	364	60.46	66.82	68.02	74.54	11.34	-16.71***
LnInst_Investor	364	0.00	2.47	2.94	4.06	1.74	363	0.00	2.11	2.48	3.22	1.42	0.36***

NOTES: Table 3.2, Panel A reports the summary statistics of EU only banks. Panel B reports the descriptive statistics for my matched sample. Test statistics are computed using a t-test (two-tailed test) for a significant change in means, statistically significance denoted as ***, **, and * for 1%, 5% and 10% respectively, assuming independence.

Table 3.3 Multivariate analysis of audit and total fees of EU banks and matched sample

	EU banks only				Matched Sample			
	LnAuditfees		LnTotalfees		LnAuditfees		LnTotalfees	
Columns	**(1)**		**(2)**		**(3)**		**(4)**	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
EUR*PsSACORD	0.120**	2.13	0.102**	2.05	0.190**	2.10	0.233***	2.62
IFRS	0.083	1.11	0.035	0.49	0.047	0.68	0.050	0.75
FINCRS	0.069**	2.26	0.079***	2.62	0.082**	2.20	0.061*	1.77
Basel II	0.116**	2.05	0.079	1.36	0.020	0.37	-0.026	-0.54
LnGeoSegmts	0.206	1.61	0.280**	2.41	0.454***	3.78	0.518***	4.17
Loss_Ind	0.059	0.90	0.059	0.90	0.003	0.05	0.020	0.34
LnAssets	0.503***	4.25	0.655***	5.84	0.537***	5.51	0.507***	4.99
LTDebt/TA	0.001	0.22	-0.001	-0.36	-0.006	-1.55	-0.005	-1.34
NLoan/TA	0.003	0.98	0.005	1.43	0.007*	1.96	0.007**	2.16
LnGDPPerCap	-0.546	-0.71	-0.509	-0.67	1.138	1.19	1.247	1.30
EcoFreedm	0.002	0.19	0.003	0.27	-0.013	-1.23	-0.011	-0.97
Tobin's Q	0.038*	1.73	0.041*	1.81	0.017	1.01	0.020	1.18
ROA	0.051*	1.64	0.076**	2.55	-0.013	-0.44	0.000	-0.01
LnSTDCFO	0.010	0.31	0.014	0.39	-0.001	-0.02	-0.011	-0.32
LnNPL/TA	0.003	0.30	0.008	0.84	0.063***	3.18	0.062***	3.14
NIR/Rev	0.557**	2.08	0.590**	2.27	1.029***	2.82	0.953***	2.70
LnAuditCommN	0.116**	2.26	0.082**	2.18	0.003	0.05	0.002	0.04
LnAccruals/TA	0.008	0.73	0.002	0.15	-0.005	-0.44	-0.009	-0.81
Intercept	-0.529	-0.06	-3.864	-0.47	-15.958	-1.61	-17.073*	-1.70
Impact (%)	12.60		10.62		20.41		25.73	
Number of observations	921		921		706		706	
Adj. R-squared (%)	77.41		80.22		78.92		78.45	
Firm fixed effects	YES		YES		YES		YES	
Year fixed effects	YES		YES		YES		YES	

NOTES: This table presents the effect of SACORD on audit fees and total fees. The dependent variables are the Natural logarithm of audit fees and total Fees. In estimating (1) to (4), EUR*PsSACORD is an interaction dummy variable equals to one if the bank is EU and the period is from the adoption year to 2013. I include year and firm fixed effects to control for any fundamental differences in the fees across years and firms. Implied fee increase refers to the effect of implementing SACORD regulation on mean banks in EU in € thousands. Matched sample analysis is based on size (LnAssets), profitability (ROA), financial distress (LnSTDCFO, LTDebt/TA), business complexity (LnAccruals/TA), income diversity (NIR/Rev) and business risk (Nloans/TA, NPL/TA). All other firm characteristics are as defined in the Appendix. The models are estimated by difference-in-differences with standard errors that are robust to heteroscedasticity and clustered at the firm level. Statistical significance denoted as ***, **, and * for 1%, 5% and 10% respectively (using a two-sided test). NPL/TA, NIR/Rev and LnAccruals/TA are winsorized at the 1st and 99th percentile.

Table 3.4 The dynamic effect of SACORD regulation on audit costs

	EU banks only		Matched Sample	
	LnAuditfees	LnTotalfees	LnAuditfees	LnTotalfees
EUR*PsSACORD[2008]	0.120**	0.102**	0.190**	0.233***
	[2.13]	[2.05]	[2.10]	[2.61]
EUR*PsSACORD[2011]	0.098*	0.081	0.0145	0.004
	[1.77]	[1.61]	[0.39]	[0.11]
EUR*PsSACORD[2012]	0.048	0.035	0.038	-0.037
	[1.27]	[0.99]	[-1.20]	[-1.12]
Observation	921	921	706	706
Adj. R-squared (%)	0.77	0.80	0.80	0.84
Controls	YES	YES	YES	YES
Firm fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES

NOTES: This table presents the results from regressing audit fees and total fees on indicator variables for two years following the implementation of the regulation. The regressions include (but are not reported here) a constant term and control variables used in model 1 (not reported here for brevity), and are estimated by difference-in-differences with standard errors that are robust to heteroscedasticity and clustered at the firm level. The explanatory variables are defined as follows: EUR*PsSACORD[2011] is an indicator variable that equals one for 2011 financial yearend and the following years; and EUR*PsSACORD[2012] is an indicator variable that equals one for 2012 financial yearend and the following years. Matched sample analysis is based on Fiscal Year, size (LnAssets), profitability (ROA), financial distress (LnSTDCFO), and business risk (Nloans/TA). The models are estimated by difference-in-differences with standard errors that are robust to heteroscedasticity and clustered at the firm level. The t-statistics are reported in brackets below their coefficient estimates. Statistical significance denoted as ***, **, and * for 1%, 5% and 10% respectively (using a two-sided test).

Table 3.5 The SACORD regulation and banks' risk taking

Panel A: EU Banks only sample

Columns	LnσStkrtn (1)		LnZ-score(rtn) (2)		LnZ-score(roa) (3)		LnNPL/TA (4)	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
EUR*PsSACORD	0.377***	8.24	0.747***	6.37	0.532***	4.29	0.758***	8.65
IFRS	0.027	0.82	0.096	1.24	0.033	0.24	0.123	0.84
FINCRS	0.373***	13.80	0.633***	8.23	0.265***	3.20	-0.032	-0.47
Basel II	0.146***	3.22	0.333***	2.86	0.036	0.26	0.521***	3.70
LnGeoSegmts	-0.183	-1.41	-0.168	-1.00	-0.471**	-2.19	-0.072	-0.22
Loss_Ind	0.350***	6.17	1.030***	6.62	0.648***	5.19	0.526***	4.44
LnAssets	0.075	0.76	0.080	0.33	-0.316	-1.31	-0.433*	-1.82
LTDebt/TA	0.000	-0.25	-0.003	-0.78	-0.008	-1.39	-0.016*	-1.89
NLoan/TA	-0.003	-1.59	-0.003	-0.46	-0.011*	-1.89	0.003	-0.46
LnGDPPerCap	-2.027	-4.28	-4.725***	-3.14	-2.106*	-1.87	-4.674***	-4.30
EconFreedm	0.012	1.24	0.041	1.61	-0.001	-0.04	-0.032	-1.30
Tobin's Q	0.016*	1.90	0.294***	5.89	0.141***	4.04	-0.039	-0.90
LnSTDCFO	0.051*	1.96	0.085	1.44	0.168**	2.08	-0.070	-0.88
CFO/TA	0.003	0.50	-0.008	-0.50	0.031	1.11	-0.025	-0.73
NIR/Rev	-0.090	-0.51	-0.602	-1.49	-0.575	-1.10	0.048	0.08
LnAuditCommN	-0.111**	-2.59	-0.253**	-2.42	-0.182	-1.51	0.162	1.08
LnAccruals/TA	0.015	1.40	0.061**	2.35	0.025	0.93	0.033	1.22
Deposit/TA	-0.001	-0.19	-0.002	-0.17	-0.003	-0.51	0.014*	1.79
LnInst_Investor	-0.014	-0.95	-0.060*	-1.90	0.016	0.35	-0.022	-0.62
Intercept	14.948***	2.96	13.328	0.88	12.962	1.18	61.952***	5.19
No of observations	1148		1148		1144		951	
Adj. R-squared (%)	61.96		78.60		43.96		73.85	
Firm fixed effects	YES		YES		YES		YES	
Year fixed effects	YES		YES		YES		YES	

Notes: This table shows the regression results for the risk taking behaviour of banks post-SACORD. The dependent variables are the log value of bank Z-score(rtn) from Goetz and Laeven and Levine (2016); natural log value of bank Z-score(roa) from Laeven and Levine (2009). Multiplied by (-1) to make a larger Z-score reflects a higher risk taking. The natural log of stock return volatility (LnsStkrtn) from Goetz and Laeven and Levine (2016); and the natural logarithm of nonperforming loan ratio (LnNPL/TA) from Berger, Imbierowicz and Rauch (2016) are also proxies used for risk taking. The models are estimated by difference-in-differences with standard errors that are robust to heteroscedasticity and clustered at the firm level. *, **, *** denote significance at 10%, 5% and 1%, respectively. All other firm characteristics are as defined in the Appendix. Tobin's Q, ROA, NIR/Rev, LnNPL/TA are LnAccruals/TA winsorized at the 1st and 99th percentile.

Panel B: Matched sample

Columns	LnσStkrtn		LnZ-score(rtn)		LnZ-score(roa)		LnNPL/TA	
	(1)		(2)		(3)		(4)	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
EUR*PsSACORD	0.324***	3.58	0.689***	3.15	0.369	1.51	0.711***	3.72
IFRS	-0.024	-0.59	-0.058	-0.63	0.130	0.61	0.096	0.72
FINCRS	0.405***	9.87	0.706***	7.47	0.235*	1.80	-0.116	-1.22
Basel II	0.645***	11.55	1.392***	10.16	0.209	1.37	0.889***	6.49
LnGeoSegmts	-0.315**	-2.53	0.101	0.28	0.437	0.70	-0.247	-1.00
Loss_Ind	0.339***	5.93	0.819***	5.44	0.357**	2.29	0.520***	4.13
LnAssets	-0.357***	-3.89	-0.828***	-3.27	-0.189	-0.56	-0.168	-0.66
LTDebt/TA	0.000	-0.06	0.001	0.12	-0.010	-0.97	0.009	1.09
NLoan/TA	-0.008***	-3.00	-0.017**	-2.26	-0.013	-1.56	-0.011	-1.10
LnGDPPerCap	-3.337***	-3.79	-5.805***	-3.00	-2.267	-1.03	-2.259	-1.09
EconFreedm	0.044***	3.55	0.059**	2.21	-0.028	-0.82	-0.035	-1.08
Tobin's Q	0.010	0.75	0.291***	7.07	0.139***	3.72	-0.063*	-1.91
LnSTDCFO	0.051*	1.87	0.164**	2.04	0.310***	2.65	0.068	0.79
CFO/TA	0.004	0.26	-0.077	-1.61	-0.089*	-1.73	0.027	0.61
NIR/Rev	-0.178	-0.71	-1.038	-1.90	-0.839	-0.98	-1.062*	-1.88
LnAuditCommN	-0.158***	-2.87	-0.456***	-3.33	-0.136	-0.49	0.024	0.12
LnAccruals/TA	0.016	1.17	0.057*	1.75	0.065*	1.65	0.061**	2.25
Deposit/TA	0.000	-0.02	-0.003	-0.29	-0.001	-0.12	0.039***	3.89
LnInst_Investor	0.000	-0.02	-0.039	-1.01	0.008	0.17	-0.016	-0.48
Intercept	34.822***	3.99	40.049**	2.00	14.565	0.65	33.379	1.64
No of observations	716		716		717		715	
Adj. R-squared	72.59		72.74		39.10		71.90	
Firm fixed effects	YES		YES		YES		YES	
Year fixed effects	YES		YES		YES		YES	

Notes: This table shows the regression results for the risk taking behaviour of banks post-SACORD. The dependent variables are the log value of bank Z-score(rtn) from Goetz and Laeven and Levine (2016); natural log value of bank Z-score(roa) from Laeven and Levine (2009). Multiplied by (-1) to make a larger Z-score reflects a higher risk taking. The natural log of stock return volatility (LnsStkrtn) from Goetz and Laeven and Levine (2016); and the natural logarithm of nonperforming loan ratio (LnNPL/TA) from Berger, Imbierowicz and Rauch (2016) are also proxies used for risk taking. The models are estimated by difference-in-differences with standard errors that are robust to heteroscedasticity and clustered at the firm level. *, **, *** denote significance at 10%, 5% and 1%, respectively. All other firm characteristics are as defined in the Appendix. Tobin's Q, ROA, NIR/Rev, LnNPL/TA are LnAccruals/TA winsorized at the 1st and 99th percentile.

Table 3.6 The effect of SACORD on reporting quality
Panel A: EU Banks only sample

	LnReport_Behvr		LnSmooth		LnLLP/TA	
	(1)		(2)		(3)	
	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.
EUR*PsSACORD	-0.541***	-6.00	-0.221**	-2.05	-0.758***	-6.43
IFRS	0.020	0.14	-0.217**	-2.19	0.406***	3.28
FINCRS	-0.185***	-2.84	0.045	0.70	-0.359***	-5.21
Basel II	0.109	0.83	-0.201**	-2.36	-0.283**	-2.16
LnGeoSegmts	-0.231	-1.45	-0.122	-0.47	-0.082	-0.31
Loss_Ind	-0.749***	-5.81	-0.392***	-2.72	-0.724***	-5.48
LnAssets	0.212	1.21	0.637***	2.70	0.212	0.92
LTDebt/TA	-0.002	-0.52	0.003	0.58	-0.003	-0.63
NLoan/TA	0.008	1.26	0.007	1.08	0.001	0.08
LnGDPPerCap	0.908	0.66	-0.179	-0.15	3.493***	2.55
EconFreedm	0.001	0.08	0.015	0.62	-0.035	-1.59
Tobin's Q	-0.025	-0.80	-0.071**	-2.36	0.020	0.79
LnSTDCFO	-0.096*	-1.74	-0.471***	-4.93	0.063	1.18
NIR/Rev	-0.498	-1.01	0.064	0.12	0.149	0.38
LnAuditCommN	-0.079	-0.76	0.033	0.31	0.014	0.18
LnAccruals/TA	-0.088***	-2.61	0.030	1.21	-0.037	-1.61
Deposit/TA	-0.010*	-2.09	0.010	1.36	-0.003	-0.39
LnInst_Investor	0.015	0.54	0.006	0.12	-0.044	-1.41
LnNPLTA	-0.043**	-2.46	-0.059***	-2.75	-0.038***	-3.10
Intercept	-10.079	-0.67	-3.015	-0.24	-38.709***	-2.57
Number of observations	958		959		908	
Adj. R-squared (%)	37.82		64.95		78.61	
Impact (%)	-48.22		-30.32		-22.83	
Firm fixed effects	YES		YES		YES	
Year fixed effects	YES		YES		YES	

Notes: This table presents regression analysis of changes in reporting behaviour associated with SACORD regulation. The dependent variable (LnReport_Behvr) is measured as the absolute value of accruals scaled by the absolute value of cash flows from operations (Daske et al., 2013). LnSmooth is measured as the natural logarithm of the of the standard deviation of net income before extraordinary items (scaled by total assets) divided by the standard deviation of cash flow from operations (scaled by total assets) over the years t – 4 through t (Hribar, Kravet, and Wilson 2014). The third proxy (LnLLP/TA) is the natural logarithm of loan loss provision scaled by total assets (Altamuro and Beatty, 2010). I multiplied by –1 so that higher values indicate more transparent reporting. The models are estimated by difference-in-differences with standard errors that are robust to heteroscedasticity and clustered at the firm level. *, **, *** denote significance at 10%, 5% and 1%, respectively. All other firm characteristics are as defined in the Appendix.

Panel B: Matched sample

	LnReport_Behvr		LnSmooth		LnLLP/TA	
	(1)		(2)		(3)	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
EUR*PsSACORD	-0.502***	-3.15	-0.156	-0.74	-0.554***	-2.93
IFRS	0.345**	2.05	-0.172	-1.06	0.348**	2.06
FINCRS	-0.119	-1.17	0.162*	1.74	-0.310***	-3.93
Basel II	-0.470***	-3.20	-0.284*	-1.90	-0.857***	-5.92
LnGeoSegmts	-0.272	-0.77	-0.131	-0.28	0.930***	3.98
Loss_Ind	-0.622***	-4.36	-0.518***	-4.16	-0.692***	-4.63
LnAssets	0.672***	2.63	0.282	0.85	0.357	1.36
LTDebt/TA	-0.010	-1.02	0.007	0.81	0.002	0.19
NLoan/TA	0.008	1.11	0.001	0.08	0.009	1.05
LnGDPPerCap	2.736	1.56	0.061	0.05	5.329***	2.66
EconFreedm	-0.043	-1.39	-0.010	-0.27	-0.098***	-3.38
Tobin's Q	-0.026	-0.66	-0.100***	-2.83	0.084***	2.71
LnSTDCFO	0.019	0.25	-0.460***	-4.22	0.147*	1.66
NIR/Rev	-0.004	-0.01	-0.478	-0.55	0.651	1.02
LnAuditCommN	-0.454**	-2.52	-0.109	-0.80	-0.025	-0.19
LnAccruals/TA	-0.149***	-3.63	-0.049	-1.50	-0.030	-0.90
Deposit/TA	-0.004	-0.50	0.002	0.32	-0.008	-0.87
LnInst_Investor	0.088**	2.32	0.060	0.99	0.012	0.35
LnNPL/TA	-0.102**	-2.15	-0.068*	-1.88	-0.164***	-4.26
Intercept	-33.920*	-1.84	5.606	0.39	-63.190***	-2.97
Number of observations	717		715		671	
Adj. R-squared (%)	45.72		69.12		79.10	
Impact (%)	45.13		Nil		4.17	
Firm fixed effects	YES		YES		YES	
Year fixed effects	YES		YES		YES	

Notes: This table presents regression analysis of changes in reporting behaviour associated with SACORD regulation. The dependent variable (LnReport_Behvr) is measured as the absolute value of accruals scaled by the absolute value of cash flows from operations (Daske et al., 2013). LnSmooth is measured as the natural logarithm of the of the standard deviation of net income before extraordinary items (scaled by total assets) divided by the standard deviation of cash flow from operations (scaled by total assets) over the years t – 4 through t (Hribar, Kravet, and Wilson 2014). The third proxy (LnLLP/TA) is the natural logarithm of loan loss provision scaled by total assets (Altamuro and Beatty, 2010). I multiplied by –1 so that higher values indicate more transparent reporting. The models are estimated by difference-in-differences with standard errors that are robust to heteroscedasticity and clustered at the firm level. *, **, *** denote significance at 10%, 5% and 1%, respectively. All other firm characteristics are as defined in the Appendix.

Paper 3

4 Market in Financial Instruments Directive (MiFID), stock price informativeness and liquidity

Abstract

The paper examines the impact of the MiFID on stock price informativeness and liquidity in the European Union (EU). Using data from 28 EU countries and the Difference in Differences approach, I find that post-MiFID the stock prices reflect greater firm specific information and the market becomes more liquid. Consistent with the 'Hysteresis Hypothesis' my evidence shows that the impact of MiFID in terms of price informativeness is greater for countries that have superior quality of regulation. My results are robust with respect to the choice of price informativeness and liquidity proxies as well as the control sample.

Keywords: Capital markets; disclosure regulation; transaction costs; bid-offer spread; propensity score matching.

JEL Classification: G18, G28

4.1 Introduction

The European Union (EU) enacted the Market in Financial Instruments Directive (MiFID) in 2004 with an aim to improve informational efficiency and liquidity of the capital markets by increasing competition and investor protection.[32] The MiFID regulation was a part of the Financial Services Action Plan (FSAP) and became effective from November 2007. It is arguably the most far-reaching piece of legislation in the EU securities market. It aims to level the playing field for all market participants through market integration, increased competition and transparency across the EU.[33] In the words of Charlie McCreevy, the European

[32] Directive 2004/39/EC replaces and repeals the 1993 Investment Services Directive (Directive 93/22/EEC or ISD) in its entirety.
[33] http://ec.europa.eu/internal_market/securities/docs/isd/dir-2004-39-implement/dir-6-2-06-final_en.pdf

Commissioner for Internal Market and Services, "…MiFID as a whole is a ground-breaking package of measures. It will transform the landscape for the trading of securities and introduce much needed competition and efficiency throughout Europe's financial markets."[34] Motivated by the far-reaching impact of the MIFID, I seek to answer two questions. First, does the implementation of the MiFID increase the informativeness of the stock prices? Second, does the MIFID regulation reduce transaction costs and improve stock liquidity?

To address the first question, I investigate the effect of this EU-wide capital market regulatory change on stock price informativeness. Empirical literature suggests that stock prices reflect the amount of aggregate information transmitted via the trading activities of different market participants (e.g., Grossman and Stiglitz (1980), Kyle (1985), and Wang and Zhang (2015)) and provide valuable guidance to the investors. Easley and O'Hara (2009) argue that increased regulatory interventions in the financial market should mitigate investor concerns regarding ambiguity and encourage wider participation. Research also indicates that regulatory reforms in the financial markets increase transparency (e.g., Pagano and Roell (1996) and lead to more informative stock prices (Dasgupta et al. (2010), and Dong et al. (2016)). Further, Jin and Myers (2006) show that countries with greater transparency have more informative stock prices. Similarly, Fernandes and Ferreira (2009) document that implementation of insider trading regulation is associated with increased market transparency and price informativeness.

To address the second question, I investigate whether the adoption of the MiFID reduces transaction costs and improves liquidity. The previous evidence on the impact of disclosure related regulations on liquidity is mixed. For example, Flood et al. (1999) provide evidence that greater pre-trade disclosures narrow bid–ask spreads. Boehmer et al. (2005) and Christensen et al. (2016) suggest that stock market regulation can curtail investor-perceived risks by increasing market transparency and liquidity. Cumming et al. (2011) also show that stock exchange trading rules including MiFID improve market liquidity. On the contrary, increasing capital market transparency can be costly to investors. Fishman and Hagerty (1995) show that more disclosures can increase insiders' profitability and widen non-insiders' bid-ask spread. Bloomfield and O'Hara (1999) find that trade disclosures not only increase information

[34] See Charlie McCreevy's speech at the Institute for European Affairs, Dublin on June 30, 2006. Available at: http://europa.eu/rapid/press-release_SPEECH-06-430_en.htm

efficiency but also increase spreads, implying a reduction in the liquidity. In another study, Madhavan et al. (2005) show that greater pre-trade transparency leads to higher execution costs and increased volatility. Further, Rindi (2008) argues that increasing transparency reduces the number of informed investors and thereby the liquidity. In a related study, Boulatov and George (2013) show that increased disclosure requirements can lead to informed traders withdrawing from the market causing the widening of the bid-ask spreads. Similarly, Agarwal et al. (2015) also show that the mandatory portfolio disclosure requirements of the Securities and Exchange Commission (SEC) improve liquidity but also impose additional costs on the informed traders.

To the best of my knowledge, this is the first study to offer evidence of the economic impact of the MiFID for the EU capital markets. My study makes three important contributions to the literature. First, I show that the implementation of the MiFID regulation has economically benefited the EU capital markets in terms of price informativeness and liquidity. Second, my research extends the literature by showing that the regulatory outcomes in terms of price informativeness are stronger for the EU countries that have superior quality of regulation. Third and final, unlike most prior studies on price informativeness that focus either on pre-trade transparency (e.g., Flood et al. (1999), and Bessembinder et al. (2009)) or post-trade transparency (e.g., Lyons (1996), and Zhao and Chung (2007)), I examine the impact of the MiFID on both pre and post-trade transparency of individual stocks. My paper is significantly different from Cumming et al. (2011) since I provide evidence of the MiFID's impact on the both price informativeness and liquidity of the EU capital markets. Further, I also use a large sample of firm level data as well as more appropriate control sample.

I use a comprehensive sample of 5,888 EU incorporated firms that have publicly traded stocks over the period January 2006 to September 2008. I employ a Difference-in-Differences (DID) research design with country, industry, calendar-quarter and firm fixed effects. The DID approach I use follows Giroud (2013) and Christensen et al. (2016) and exploits the staggered implementation of the MiFID across the 28 EU countries to obtain the estimates of the effects of the regulation on price informativeness and liquidity. The MiFID implementation that occurred at different points in time provides better identification for causal inferences and attenuates the effects of concurrent economic and institutional changes unrelated to the regulation (see, for example, Leuz and Wysocki (2016)). To provide further robustness to my research design, I also use an alternative control sample constructed by matching each EU firm

with a firm from the US and Canada based on firm characteristics such as size, stock price, stock turnover, returns, volatility, book-to-market, firm age, and dividend yield.

My empirical results demonstrate that stock price informativeness improves significantly after the implementation of the MiFID. In economic terms, the results of the DID estimates using the sample of EU only firms show that post-MiFID, price informativesness improves by 9 to 28 percentage points and by 4 to 24 percentage points using the matched sample. My evidence shows that the adoption of the MiFID lowers bid-ask spread by 52 basis points (12 percent) for the EU only sample and by 38 basis points (10 percent) relative to the matched sample. The results confirm the economic benefits of the MiFID in terms of price informativeness, lower transaction costs and improved liquidity. I also find that MiFID's impact on stock price informativeness is greater for the EU countries that have stronger regulatory environment. However, there is no conclusive evidence of the differential impact on the liquidity. Notably, endogeneity arising from reverse causality is not a concern in my study because MiFID is an EU wide regulation that has not been enacted in response to a specific event (see, Cumming et al. (2011)).

The rest of the paper is organised as follows. Section 4.2 provides a discussion of relevant MiFID provisions and the related literature. Section 4.3 describes the data and empirical methods. Section 4.4 discusses the empirical findings and Section 4.5 concludes.

4.2 The MiFID and related literature

In this section, I summarize the MiFID legislation, and draw upon extant literature to formulate my hypotheses.

4.2.1 Markets in Financial Instruments Directive (MiFID)

The MiFID passed by the EU legislature in April 2004 is a harmonisation directive. It aims to foster efficiency of trading services through fair competition and greater transparency of the EU-wide capital markets. It intends to increase the accessibility of markets and promote competition by narrowing the information gap between the informed and uninformed investors.

The MiFID abolishes the "concentration rule"[35] to improve market quality, liquidity and foster competition. It fragments the markets into the regulated markets (RMs), the Multilateral Trading Facilities (MTFs) and the Systematic Internalisers (SIs).[36] The RMs are the traditional exchanges that bring together buyers and sellers in financial instruments through an order book or through dealers. The MTFs have similar trading functionalities to RMs but with lower regulatory requirements. Under the MiFID regime, the MTFs cannot route transactions to other exchanges that have better prices because they are not classified as broker-dealers. The MTFs can be operated either by an operator of a RM or by an investment firm. The SIs are retail market makers who internalise equity trades by executing client orders on their own account outside a regulated market or MTF.[37]

Additionally to enable market participants to observe information during the trading process, the MiFID introduces the pre- and post-trade transparency for the three-tiers of the market. For the pre-trade transparency, articles 27, 29 and 44 of the directive require that current orders and quotes relating to shares should be available to the public in real time. Pre-trade information gives the market participants the opportunity to monitor the conditions in the market at each price point for all securities concurrently to help them make informed trading decisions. However, MTFs have a number of waivers available to them. For example, based on order size or market model, the MTFs may only have to report executed trades.[38]

Regarding post-trade transparency, articles 28, 30, and 45 of the Directive require all market intermediaries to make public, details of executed trades as close to real time as possible with the exception of deferment of the publication of large and block trades. Further, articles 19 to 24 introduce the suitability requirements to ensure that investment and portfolio management firms act in their clients' best interests.

[35] The "concentration rule" required that firms execute client orders only through the primary market. Its abolition leads to fragmentation of markets and increased competition between trading centres (e.g., Ferrarini and Wymeersch (2006), and Aitken et al. (2017)).

[36] As defined in Article 4(1)(7), (14) and (15)

[37] See Article 4(7)

[38] See Article 29.

4.2.2 The MiFID and the stock price informativeness

Existing research shows that increased security market regulations can help improve investor protection by promoting transparency and competition, and fair and efficient functioning of the capital markets (see, for example, La Porta et al. (2006), and Christensen et al. (2016)). Increased transparency positively impacts information production and aggregation, which in turn influences the degree to which security prices incorporate firm-specific information (e.g., Grossman and Stiglitz (1980), and Jin and Myers (2006)). Glosten (1999) provides anecdotal evidence that greater market transparency increases commonality of information, leading to more efficient price discovery. Santomero (1974) shows that the implementation of the electronic quote system on NASDAQ is associated with improved pricing efficiency of the capital market. In the same spirit, Dong et al. (2016) show that adopting eXtensible Business Reporting Language is associated with lower stock return synchronicity, and reduction in price delay. In a related study, Bris et al. (2007) and Saffi and Sigurdsson (2011) examine the impact of the restrictions on short-selling and find that they reduce price efficiency, indicating a decline in the informational content of stock prices.

In summary, the extant literature suggests a more transparent information environment is critical for reducing information asymmetry among market participants and facilitating incorporation of firm-specific information in the stock prices. This implies that, the MiFID's implementation should lead to higher price informativeness. Therefore my first null hypothesis is:

H1: The implementation of the MiFID will have no effect on stock price informativeness.

4.2.3 The MiFID and liquidity

Liquidity reflects investors' ability to sell large quantities of an asset quickly, with minimal trading costs and at a price close to its current market price. Empirical evidence demonstrates that market transparency and fragmentation reduce transaction costs and increase trade execution speed (O'Hara and Ye (2011)), enhance trading activity (He et al. (2014)), facilitate market liquidity (Cumming et al. (2011)), lower volatility (Boneva et al. (2016)), and reduce market breakups and breakdowns (Gao and Mizrach (2016)). Further, improved transparency increases liquidity (see, e.g., Kyle (1985)) and lowers information acquisition costs (Hakansson (1977)). Consistent with this view, Boehmer et al. (2005) find improvement in liquidity and

reduction in transaction costs following the introduction of the pre-trade transparency via the NYSE OpenBook. Similarly, Chung and Chuwonganant (2009) show that the implementation of SuperMontage rule in the US leads to a decline in the bid-ask spreads and improves market liquidity. Zhao and Chung (2007) investigate the impact of the Securities and Exchange (SEC) Rule 605 on market quality and document a decline in spread and improvement in market quality, implying that greater transparency reduces execution costs and improves liquidity. Hachmeister and Schiereck (2010) analyse the impact of post-trade transparency in the German stock market and find a significant positive association between transparency and liquidity. Lang et al. (2012) examine the relation between firm-level transparency and stock market liquidity in several markets and report reduced transaction costs and greater liquidity.

On the contrary, some researchers question whether market transparency is beneficial or socially optimal (e.g., Angeletos and Pavan (2007)). A strand of research suggests transparency increases trading costs and reduces liquidity (e.g., Bloomfield and O'Hara (1999), Rindi (2008), and Bessembinder et al. (2009)). For example, Bessembinder and Kaufman (1997) show that market fragmentation allows "cream skimming" by informed investors and reduces liquidity. Madhavan (1996) and Madhavan et al. (2005) investigate transparency of the order book and show that transparency can increase price volatility and reduce market liquidity. Further, Simaan et al. (2003) examine the effects of pre-trade transparency on the quotation behaviour of NASDAQ market makers and find that more opaqueness of the market reduces spreads and improves price competition. Related literature on dark pools (e.g., Boulatov and George (2013)) also shows that hidden orders improve liquidity and market quality compared to the displayed market. Given these contrasting views, I surmise that the MiFID's effects on liquidity are not a priori obvious and hence I hypothesize:

H2: Implementation of the MiFID will have no effect on stock liquidity.

4.2.4 Regulatory environment, stock price informativeness and liquidity

There are two strands of literature that argue that the effects of the regulatory change on stock informativeness and liquidity could be dissimilar across countries. First, the 'catch-up' literature (e.g. Abramovitz (1986)) suggests that the effect of a new regulation should be higher in countries with relatively weaker securities regulation because they benefit from the backlog of not-yet-introduced regulatory policies. Second, the 'hysteresis' literature (e.g., Bhattacharya

and Daouk (2002), and Christensen et al. (2016)), suggests that impediments such as market, political and institutional forces that hinder prior regulation can also affect the new regulation. Since the magnitude of the MiFID's impact on price informativeness and liquidity could differ across countries depending on the quality of their existing regulations, I hypothesize:

H3: The impact of MiFID on price informativeness and liquidity will not differ between countries with strong and weak regulation

4.3 Sample and measurement of key variables

4.3.1 Sample

To investigate the impact of the MiFID on stock price informativeness, and liquidity, my initial sample comprises all domestically incorporated and listed firms from the EU between 1st January 2006 and 30th September 2008. For the matched sample, I also collect data for the listed US and Canadian firms over the same period. I use daily stock returns, end of the day bid-offer spreads, intraday high and low prices, and turnover volumes and convert the data to US Dollars using end of the day exchange rates. I collect quarterly market value of equity, dividend yield, net income, and per capita GDP and convert all currency-denominated variables to US Dollars using end of the quarter exchange rates. Regulatory quality indexes for countries included in my sample are collected annually. All my data is from DataStream and Bloomberg.[39]

The data comprises 11 quarters and encompasses two sub-periods: the pre-MiFID period from the first quarter of 2006 to the quarter in which MiFID is adopted, and the post-MiFID period from the quarter after the MiFID's adoption to the third quarter of 2008. To reduce the possible influence of small stocks, I follow Christensen et al. (2016) and exclude firms with an average equity market value of less than $5 million over the sample period. I also require my sample firms to have at least four quarterly observations as well as at least one observation in both the

[39] I use DataStream as a primary source of data. I supplement the bid-ask spread from Bloomberg for some European countries like Czech Republic, Latvia, Luxembourg, Romania, Slovakia, and Slovenia.

pre- and post-MiFID periods (e.g., Jones et al. (2016), and Kausar et al. (2016)). Finally, I exclude all firms with missing industry classification code. My final sample consists of 5,888 unique firms with 59,682 firm-quarters from the EU; and 7,430 firms with 76,919 firm-quarters from the US and Canada.

4.3.2 Measurement of the variables

My empirical analyses require the measurement of stock price informativeness, and liquidity variables. In this subsection, I discuss the main variables used in my analyses.

4.3.3 Measures of stock price informativeness

I estimate the stock price informativeness using the $1\text{-}R^2$ statistic. This measure, first developed by Roll (1988), is widely used as a proxy for the firm-specific stock return variation that is not explained by the market (e.g., Ferreira et al. (2011), and Chan and Chan (2014)).

There is an argument in the literature whether $1\text{-}R^2$ reflects price informativeness or noise trading (e.g., Hutton et al. (2009)). West (1988) shows theoretically that more firm-specific return volatility is positively associated with noise trading or in the words of Roll (1988), it may well reflect "occasional frenzy unrelated to concrete information" (p. 566). On the contrary, Durnev et al. (2003) empirically document that higher idiosyncratic volatility captured by $1\text{-}R^2$ reflects greater firm-specific information. A large and growing body of empirical evidence shows that higher firm-specific stock return variation is positively associated with higher stock price informativeness.[40] I thus use $1\text{-}R^2$ statistic as a measure of price informativeness.

My proxies of stock price informativeness (SPI) use R^2s obtained from four different approaches (I do not report these for brevity): (i) Piotroski and Roulstone (2004), (ii) Jin and Myers (2006) and Gul et al. (2011), (iii) Durnev et al. (2003), and (iv) Carhart (1997) four-factor model. Starting with the first quarter of 2006, I estimate the stock price informatievness

[40] A non-exhaustive list of studies that use price non-synchronicity as a measure of stock price informativeness includes empirical literature on cross-listings (Fernandes and Ferreira (2008)), insider trading laws (Fernandes and Ferreira (2009)), opaqueness of stock market (Hutton et al. (2009)), perks (Gul et al. (2011)), corporate governance characteristics (Ferreira et al. (2011)), government ownership and political institutions (Ben-Nasr and Cosset (2014)), dividend changes (De Cesari and Huang-Meier (2015)), and labour investment efficiency (Ben-Nasr and Alshwer (2016)).

for all sample firms using daily returns during the quarter (e.g., Busch and Obernberger (2016)). Since the four proxies are likely to capture similar fundamental construct, aggregation will reduce the measurement errors in the individual proxies and improve the model estimates.[41] I, therefore, use factor analysis to create an aggregate stock price informativeness (SPI_Factor) measure using all four SPI proxies.[42]

4.3.4 Measures of liquidity and transaction costs

I follow the literature (e.g. Christensen et al. (2016), and Fong et al. (2017)) and use five different proxies for liquidity (I do not report these for brevity): (i) the bid-ask spread as a percentage of closing mid-price, (ii) Corwin and Schultz (2012) high-low spread estimator, (iii) Lesmond et al. (1999) zero return day indicator, (iv) Amihud (2002) illiquidity measure, and (v) Roll (1984) implied effective spread.

Similar to the stock price informativeness, the five liquidity proxies capture the same information. Therefore, to reduce the differences in the relative quality of the liquidity measures, minimize estimation errors, and for parsimony, I once again use factor analysis and derive two composite liquidity proxies (LqFac1 and LqFac2). [43]

4.3.5 Baseline specification and the difference-in-differences approach

I employ the DID specification in my analyses to examine the MiFID's impact on stock price informativeness and liquidity. Specifically, the basic regression model is:

$$\psi_{it} = \beta_0 + \beta_1 EUR\_MiFID + \gamma Controls_t + \sum \beta_m Fixed\ Effects_m + \varepsilon_{it} \qquad \textbf{(4-1)}$$

where ψ_{it} is my stock price informativeness or the liquidity proxy for firm i in quarter t, β_1 is the regression coefficient of my primary variable of interest (EUR_MiFID) which is the interaction between the indicator for EU firms (EUR=1 if EU firms) and the MiFID (MiFID=1 after adoption). I do not include the dummy variables for EUR and post-MiFID, because their effects are subsumed by the time fixed effects and firm fixed effects, respectively. $Controls_t$

[41] The four proxies are indeed highly correlated with each other (I do not report these for brevity).
[42] Lang et al. (2012) and Christensen et al. (2016) use a similar approach.
[43] See Table D.4.3 for the results of the PCA.

constitute several firm and country control variables. $Fixed\ Effects_t$ constitutes country, industry, firm and quarter-year fixed effects to ensure robustness to heteroscedasticity as well as to account for EU-wide heterogeneity, local shocks, and other common time-varying factors that may affect both the stock markets and business cycle patterns. I cluster the standard errors at the firm level to adjust for heteroscedasticity as well as cross- and serial-correlation.

I follow prior literature (e.g., Jin and Myers (2006), and Christensen et al. (2016)) and control for firm-level variables that have been shown to affect stock price informativeness and liquidity. I control for the firm size (Ln_Mktval), growth opportunities (BTM), firm's trading activity (LnShareturnover), overall uncertainty of the stock price (LnStkRtn_volat), agency costs (DivYield), and market performance (Stk_Rtn).[44] A loss indicator (Loss) equals to one if the net income before extraordinary items is negative in the last financial period and zero otherwise (Haw et al. (2012)). The variable LnGDPPerCAP controls for the level of economic development that might affect the overall efficiency of the stock market.[45]

I also include dummy variables to control for the effects of other regulatory interventions that may influence my results, namely the Transparency Directive (TPD) and Market Abuse Directive (MAD).[46] The TPD aims to improve quality of public information through monitoring and enforcing compliance with financial reporting provisions whereas the MAD is concerned with preventing insider trading and market manipulation (see Christensen et al. (2016) for a survey). Except for the dummies, regulatory quality variables, and GDPPerCAP, I winsorize the variables at the top and bottom 1% level to reduce the influence of outliers. All variables are explained in Appendix A.

[44] Quarterly stock returns (Stk_Rtn) are the cumulative of the daily stock returns for the quarter. Following Griffin et al. (2010), I filtered returns and delete single-day returns in excess of 200% to remove supposedly erroneous values.

[45] http://data.worldbank.org/data-catalog/worldwide-governance-indicators

[46] I do not control for financial crisis because it coincides with the MiFID's implementation. In any case, since the financial crisis affected all the EU countries as well as US and Canada, it is unlikely to influence my DID results. Other similar empirical research (e.g., Christensen et al. (2016), and Jones et al. (2016)) also does not control for financial crisis.

4.3.6 The difference-in-differences approach

The DID approach requires a control sample that is not affected by the MiFID. I take two approaches to identify the control sample. First, I take advantage of the staggered implementation of the MiFID across the EU (see Table 4.1) and use the EU firms as their own control to isolate the causal effects on stock price informativeness and liquidity (see e.g., Giroud (2013), and Leuz and Wysocki (2016) for similar approach).[47] Second, as there is limited variation in the implementation dates across the EU countries, I use an alternative control sample of the US and Canadian firms. The existing research argues that developed economies share similar institutional arrangements (La Porta et al. (2006)) and are exposed to similar capital market regulations (Bargeron et al. (2010)). Previous studies use listed firms in the EU, Canada, and Australia as control sample for examining the effects of Sarbanes Oxley, RegFD, and the JOBS Act (Bargeron et al. (2010), Lee et al. (2014), Dambra et al. (2015)).

4.3.7 Propensity score matching (PSM)

A potential concern with using the US and Canadian firms as control sample is that they are larger in number and have better data coverage which could significantly influence the results. In order to minimize the selection bias associated with the treatment and control groups of firms, I use the Propensity Score Matching (PSM) developed by Rosenbaum and Rubin (1983) to identify the control sample.

The PSM procedure removes observable differences between the treatment and control sample (Shipman et al. (2017)) and mitigates the parallel trends assumption concerns (Kausar et al. (2016)). If the propensity-score matching is successful, the treatment and control sample are similar on all observable dimensions. I generate the propensity scores using a logistic model and match each treatment observation to a corresponding control observation with the closest propensity score without replacement (one-to-one matched-pairs). I apply a caliper restriction of 0.01% to avoid bad matches. My logistic regression matches the treatment and control firms on the variables that explain stock price informativeness and liquidity: size (Ln_Mktval), closing price (Ln_StkPrice), stock price volatility (StkRtn_volat), trading volume (Shareturnover), firms that made loss in the last financial period (Loss), growth opportunities

[47] Initially all firms are in the control group. However, they move to the treatment group when the country they belong to implements the MiFID (e.g., Giroud (2013)).

(BTM), agency costs (DivYield), and past returns (Stk_Rtn). I match the treatment sample with the control sample in both, pre- and post- MiFID periods. I use a logistic model and in addition to calculating the t-statistics of the PSM, I also normalize differences (Δx) in the matching covariates using the procedure outlined in Imbens and Wooldridge (2009) and Focke et al. (2017). A normalized difference of less than 0.25 is considered acceptable.

The results of my propensity score matching (I do not report these for brevity) for both pre and post-MiFID show that my treatment and control sample firms are significantly different to each other on all nine variables before matching. I find the difference in means of the treatment and control sample is statistically insignificant for all but one variable (stock return volatility). Further, the absolute value of the normalized differences (Δx) for all the variables are well below the 0.25 threshold, indicating the treatment and control sample are similar.

In most empirical research, there are concerns about potential endogeneity. However, MiFID is an EU-wide regulation and is a part of the Financial Services Action Plan (FSAP). Hence, endogeneity due to reverse causality is not an issue here. Further, Fang et al. (2014) indicate that the DID methodology alleviates reverse causality concern, and Roberts and Whited (2013) suggest that the DID technique with PSM mitigates the concerns about endogeneity.

4.4 Empirical Results

4.4.1 Descriptive Statistics

Table 4.1 presents the distribution of the number of firms and firm quarters for each of the countries in my sample. It shows the number of firms varies between 12 for Slovakia to 1700 for the UK. Further, the UK contributes approximately 29% of the observations and the three largest markets in the EU (UK, France, and Germany) together contribute 53% of the sample. Most EU countries have implemented MiFID in the fourth quarter of 2007. However, few countries have implemented the MiFID either before or after November 2007.

[Insert Table 4.1]

Table 4.2 Panel A presents the summary statistics for main variables in my sample. The mean and median of the four stock price informativeness measures ($\psi_1, \psi_2, \psi_3, \psi_4$) are similar

suggesting that the proxies are not skewed. Following Fernandes and Ferreira (2008), these measures are logistically transformed. The mean (median) of Ln (1+Bid-Ask spread) is 0.044 (0.021) and for Ln(1+High-Low spread) it is 0.033 (0.029). The liquidity proxy, Ln(1+Zero return days) suggests that on average 11% of the total sample were non-trading days. Table 4.2 also reports the descriptive statistics of the control variables. The mean (median) market value is $1,361 ($103) million before logarithmic transformation, suggesting the firm size is highly skewed. As is apparent, the mean (median) quarterly returns are -1.82% (0.26%). About 26 percent of sample observations made a loss during these periods. Panel B provides summary statistics for the matched sample. It shows that the treatment and the control samples are different in terms of stock price informativeness and liquidity. It also shows that the independent variables are largely similar across the two samples.

[INSERT Table 4.2]

Panel C of Table 4.2 reports the Pearson's correlation coefficients for the variables used in the regression analyses. Not surprisingly, the four firm-specific return variation measures are highly correlated (77 to 91 percent). The stock price informativeness factor (SPI_Factor) which is the first component of the Principal Component Analysis (PCA) is highly correlated (90 percent and above) with all four price informativeness proxies. This suggests that my SPI_Factor is capturing the price information reflected by the four proxies. For the liquidity measure, the five proxies show low correlations. However, the first two components from the PCA are highly correlated with the liquidity proxies suggesting that they capture the information of individual proxies. None of the independent variables seems to be highly correlated suggesting that multicollinearity is not a major concern.

4.4.2 The MiFID and the stock price informativeness

In this section, I examine the causal effects of the adoption of the MiFID on stock price informativeness. Table 4.3 presents my results of five different specifications of the regression. Panel A reports the results of each of the four proxies and the aggregate variable for the EU only firms whereas Panel B presents the results for the matched sample. Results in Panel A show that all specifications yield similar results i.e., the coefficients of EUR_MiFID are significantly positive at the 1% level. This suggests that post MiFID, the degree of price informativeness has improved. Column (1) shows that, in economic terms, a change in security

market regulation from 0 to 1 is associated with an increase in price informativeness of 18.5 percent of SPI1 (ψ_1)[48] that corresponds to a 10.7% of the median.[49] The results reported in columns (2) to (4) are consistent with those in column (1) and suggest that the adoption of MiFID is positively associated with the increase in price informativeness (9 to 28 percent or 5 to 13 percent of median SPI). In the column (5) of Panel A, I find similar results for the aggregate factor (SPI_Factor). The coefficient of the variable of interest is positive (β=0.15) and highly significant (t =5.87), suggesting that EU stocks have become more informative after the adoption of MiFID.

Next, I test the robustness of my results by using alternative control sample of the US and Canadian firms using the propensity score matching while retaining country, industry, firm and quarter-year fixed effects included in Panel A. The results presented in Panel B are similar to those in Panel A. The coefficients for the primary variable of interest (EUR_MiFID) in column (1) is positive and highly significant at the 1% level (β=0.19, t=11.09), confirming my previous finding that MiFID is associated with higher firm-specific return variation. The magnitudes of the effects of the other firm-specific return variation measures are generally similar across all model specifications in columns (2) to (5). From an economic perspective, results in Columns (1) to (4) suggest that a change in EUR_MiFID from 0 to 1 increases stock price informativeness between 4 and 25 percent (3 to 12 percent in terms of median values). My evidence is consistent with Cook and Tang (2010) who provide similar results regarding the impact of Regulation FD on stock price informativeness.

Finally, my results are also consistent with regard to significance of the control variables. For example, the coefficient for market capitalization (Ln_Mktval) is negative for all model specifications indicating that smaller firms have more informative stock prices (e.g., Aslan et al., 2011; De Cesari and Huang-Meier (2015)). In addition, the coefficients for stock return volatility for all specifications are positive and statistically significant (e.g., see Andrei and Hasler (2015)). Interestingly, the coefficient of Market Abuse Directive (MAD) is not

[48] Calculated following Kennedy's (1981) suggestion for dummy variables: $\hat{P} = 100 * \left(\exp\{\hat{c} - 0.5 * \hat{V}(\hat{c})\} - 1\right)$ where $\hat{P}$ is the percentage change in the dependent variable given a change in the dummy variable from zero to one, $\hat{c}$ is the coefficient estimate for the dummy variable, and $\hat{V}(\hat{c})$ is the OLS estimate of the variance of the coefficient.

[49] Calculated as 0.185/1.728, where 1.728 is the median SPI1 from Panel B of Table 4.2.

significant for all but one specification which suggests that the MAD regulation has had very limited impact on my sample firms. I find that the coefficient of the Transparency Directive (TPD) is negative and statistically significant for all specifications, suggesting that the TPD lowers price informativeness. While this finding may appear anomalous, it is consistent with Gao and Liang (2013) and Banerjee et al. (2017) who argue that greater accounting disclosures do not always lead to increased stock price informativeness. All other control variables are statistically insignificant. In summary, the evidence in table 4.3 rejects my hypotheses (H1) and indicates that post-MiFID, stock market price informativeness has improved for the EU firms.

[INSERT Table 4.3]

4.4.3 The MiFID and liquidity

In this section, I investigate whether the adoption of MiFID affects transaction costs and liquidity by estimating the following regression model:

$$Liquidity_{it} = \alpha_t + \theta_i + \beta_1 EUR\_MiFID_t + \gamma X + \sum \beta_m Fixed\ Effects_m + \varepsilon_{it} \quad \textbf{(4-2)}$$

where the dependent variable, Liquidity in equation (2) is variously one of the five liquidity proxies i.e., Bid-ask spread, High-Low Spread, Zero return day factor, Amihud Illiquidity factor, and Roll implied effective spread. I also use two aggregate liquidity factors derived from the PCA.[50] X is a matrix of control variables previously defined in equation (1) and $\sum \beta_m Fixed\ Effects_m$ are country, industry, firm and calendar-quarter fixed effects.

In Panel A of Table 4.4, I report the regression results for the EU only firms. In terms of my key variable of interest (EUR_MiFID), the estimates are statistically significant at the 5 percent level or better and exhibit negative sign in 5 of the 7 regressions. The evidence suggests a significant reduction in transaction costs and improvement in market liquidity post-MiFID.[51]

[50] See Table A.2 of the Appendix for the PCA results.

[51] An important caveat of the study is that my analysis does not compute transaction costs but infer that the liquidity estimation method used as proxy for transaction costs following Boehmer et al. (2005) and Abdi and Ranaldo (2017).

More specifically, column 1 reports the impact of the MiFID on the bid-ask spread. The result indicates that MiFID has a negative and statistically significant effect on the bid-ask spread (β=-0.005, t= -4.64). In economic terms, the adoption of the MiFID lowers bid-ask spread by 52 basis points (=$e^{-0.0052}$-1) for the EU firms. Since the pre-MiFID average bid-ask spread is 4.21 percent this represents a reduction of 12 percent. Similarly, using the high-low spread as the dependent variable in column (2), liquidity improves substantially by 15 basis points (=$e^{-0.0015}$-1). Since the pre-MiFID average is 3.08 percent, it suggests a reduction of spread by 5%.

For robustness, I repeat the analysis with the matched sample. From results in panel B, I find that the MiFID's impact is negative and statistically significant at the 1 percent or better in five specifications. The results are qualitatively similar to those in panel A and suggest that the MiFID lowers transaction costs and improves liquidity. Specifically, in column 1, the coefficient estimate for the key variable of interest (EUR_MiFID) is negative and strongly significant (β=-0.004, t= -5.44). The effect is economically large because the average spread declines by 38 basis points (=$e^{-0.00376}$-1) or by 10% relative to matched control firms. Overall, the empirical evidence strongly rejects the null hypothesis (H2) and suggests that MiFID has reduced trading costs and improved market liquidity.

[INSERT Table 4.4]

4.4.4 Regulatory quality and the impact of MiFID

My analyses so far show that the implementation of the MiFID is associated with increased stock price informativeness and liquidity. In this section, I investigate whether the heterogeneity in the regulatory quality among countries has any effect on MiFID's impact on stock price information and liquidity. Enforcement theory of Djankov et al. (2003) suggests that the outcome of regulatory intervention depends on not only on the implementation of the new regulation but also on the past regulatory environment. Thus, to assess the quality of regulation of the EU countries in my sample, I use four proxies: World Bank Regulatory quality index (Estimate of Governance), World Economic Forum Global Competitiveness indexes (Strength of Investor Protection index, and Trustworthiness & Confidence index), and Djankov et al. (2008) Anti-self-dealing index. In table 4.5, I present the 2006 scores for each of the four regulatory quality indexes. I use scores for 2006 being a pre-MiFID year.

[INSERT Table 4.5]

I follow Christensen et al. (2016) and partition the data in Table 4.5 based on the median scores for the OECD countries. I use two dummy variables. The first takes the value of '1' if the score is below the median value and '0' otherwise. The second dummy takes value of '1' for above the median score countries and '0' otherwise. I then test for significant differences in the price informativeness and liquidity using the Wald tests as in Christensen et al. (2016) by using the following model:

$$\psi_{it} = \beta_0 + \beta_1 EUR\_MiFID * LowReg + \beta_2 EUR * MiFID * HighReg + \gamma Controls_t + \sum \beta_m Fixed\ Effects_m + \varepsilon_{it} \quad \textbf{(4-3)}$$

where the regulatory variables (LowReg and HighReg) are two non-overlapping binary partitioning indicators. LowReg is set to 1 for countries with low past regulatory quality and HighReg is set to 1 for those with high past regulatory quality. All other variables are the same as defined in equation (1).

Table 4.6 reports the regression results for stock price informatievness. For brevity, I only tabulate the coefficient estimates and t-statistics of the key variables of interest. The results indicate that countries with higher regulatory quality show a larger improvement in price informativeness. In column 1 of Panel A, using SPI_Factor as the dependent variable for EU firms only sample, the coefficient of EUR_MiFID*Low regulatory countries is 0.11 (t=4.41), and that of high regulatory countries is 0.18 (t=7.02). Although, the results suggest that the stock prices in both low and high-quality regulatory regimes are more informative after the implementation of the MiFID, the Wald test confirms that increase in the price informativeness is significantly higher in countries with better regulatory quality (p-value=0.00). Columns (2 & 4) show a similar impact using the Strength of Investor Protection index and Trustworthiness and Confidence index. However, results in columns (3) for Anti-self-dealing Index show no significant difference between low and high regulatory quality regimes. Panel B presents results for the matched sample. The evidence is qualitatively similar to panel A, except that the Anti-Self-Dealing is also significant. I also analyse the MiFID's impact using individual price informativeness proxies (not tabulated here) and find similar results. Overall, my findings suggest that the MiFID's impact on stock price informativeness is higher for countries that have superior regulatory quality. This leads us to reject my null hypothesis H3 with regard to the differential impact of the MiFID on price informativeness.

[INSERT Table 4.6]

Next, using the same empirical approached as in Table 4.6, I examine the differential impact of the MiFID on liquidity using the first factor (LqFac1) obtained from the PCA. Panel A of Table 4.7 reports results for EU only countries and Panel B for the matched sample. I find that while the liquidity improves for both low and high regulatory quality countries, the evidence of the differential impact of the MiFID is not conclusive. However, high regulatory quality countries show a significantly higher improvement in liquidity in one of the four in Panel A and two of the four specifications in Panel B.[52] I therefore cannot reject my null hypothesis H3 with regard to the differential impact of the MiFID on the market liquidity.

[INSERT Table 4.7]

4.5 Conclusion

The MiFID aims to provide market participants greater access to information in the EU. In this paper, I provide empirical evidence whether MiFID has succeeded in improving stock price informativeness and market liquidity. My results show that post-MiFID, the price informativeness improves significantly by 9 to 28 percent (for EU only firms) and 4 to 25 percent (for the matched sample). Furthermore, my empirical results indicate that post-MiFID, the market liquidity also improves significantly. For example, the execution costs proxied by the bid-ask spread decline by 52 basis points for EU only firms and by 38 basis points for the matched sample. The above results taken together suggest a decline in information asymmetries and increase in the market liquidity following the adoption of the MiFID.

I also present evidence of the differential impact of the MiFID based on the existing regulatory quality of the EU countries. I show that the increase in price informativeness is significantly higher for countries that have superior quality of regulation. However, I do not find conclusive evidence with the regard differential impact of the MiFID on the market liquidity.

[52] I check robustness of my results by using the second liquidity factor (LqFac2) and individual liquidity proxies, which are not tabulated here. I do not find consistent evidence that the MiFID's impact on liquidity is influenced by the quality of existing regulation.

My results show that disclosure regulations that provide easier and cheaper access to information can have significant economic benefits in terms of improved informational efficiency and market liquidity. My evidence with regard to price informativeness is also consistent with the 'Hysteresis Hypothesis' that suggests the economic benefits of new regulation are likely to be greater for countries that have superior regulatory quality.

A.1 Appendix

A. Variable definitions

Variables	Description
(SPI) ψ_(1 to 4)	Firm-specific return variation measures
Anti-self-dealing index	The Anti-Self-Dealing Index from Djankov et al. (2008)
BTM	Book-to-market is the ratio of book value of equity and the quarterly market value of equity
DivYield	Dividend yield is the Dividend Per Share divided by the end of the quarter stock price.
LqFac1	The liquidity factor is an aggregate firm-specific return variation measure and represents the first factor obtained from the PCA with the five liquidity variables
LqFac2	The liquidity factor is an aggregate firm-specific return variation measure and represents the second factor obtained from the PCA with the five liquidity variables
Ln(1+ ILLIQ)	Natural log of one plus the quarterly mean of the daily absolute stock return divided by the dollar value of trading volume
Ln(1+Bid-Ask)	Natural lo log of one plus the quarterly mean of the daily closing bid, ask spread scaled by the midpoint between bid and ask prices
Ln(1+High-Low)	Natural log of one plus the quarterly mean High-Low measure
Ln(1+Roll)	Natural log of one plus the quarterly mean Roll measure
Ln(1+Zeros)	Natural log of one plus the proportion of trading days with zero daily stock returns out of all potential trading days in a given quarter.
Ln_Mktval	Natural log of stock price times the number of shares outstanding (in US$ million) measured at the end of the quarter.
LnGDPPerCAP	Natural log of quarterly Gross Domestic Product Per Capita
LnShareturnover	Natural log of the quarterly mean of the daily turnover (i.e., US$ trading volume divided by the market value at the end of each trading day)
LnStkRtn_volat	Natural log of the standard deviation of daily stock returns in a given quarter.

Loss	A dummy variable that equals one if the net income before extraordinary items is negative in the last financial period and zero otherwise.
MAD	A dummy variable equal to one for periods after the implementation of the Market Abuse Directive
Regulatory Quality	Measured by World Bank Regulatory quality index (Estimate of Governance)
SPI_Factor	The stock price informative factor is an aggregate firm-specific return variation measure and represents the scores of a single factor obtained from factor analysis with the four stock firm-specific return variation variables.
Stk_Rtn	Stock return is the cumulative stock return in the quarter.
Strength of Investor Protection	World Economic Forum Global Competitiveness index (Strength of Investor Protection)
TPD	A dummy variable equal to one to control for Transparency Directive.
Trustworthiness & Confidence	World Economic Forum Global Competitiveness index (Trustworthiness & Confidence)

A.2 Appendix

PCA results for SPI and Liquidity

	stock price informativeness factor		Liquidity factor	
	EU Firms	PSM	EU Firms only	PSM
Eigenvalues:				
First factor	3.435	3.468	2.124	2.162
Second factor	0.244	0.232	1.234	1.097
Third factor	0.230	0.214	0.721	0.975
Fourth factor	0.091	0.085	0.582	0.407
Fifth factor			0.339	0.358
First factor scoring coefficients:				
ψ_1	0.278	0.276		
ψ_2	0.265	0.265		
ψ_3	0.273	0.271		
ψ_4	0.263	0.262		

First and second factors scoring coefficients	**LqFac1**	**LqFac2**	**LqFac1**	**LqFac2**
$Ln(1 + Bid - Ask)$	0.464	-0.035	0.514	-0.001
$Ln(1 + High - Low)$	-0.150	0.625	-0.182	0.619
$\mathrm{Ln}(1 + \mathrm{Zeros})$	0.019	0.543	0.615	-0.191
$\mathrm{Ln}(1 + \mathrm{Roll})$	0.453	-0.181	0.012	0.508
$Ln(1 + ILLIQ)$	0.318	0.133	0.000	0.142

The estimation sample for the factor analysis comprises the maximum number of observations from the models in appendix B over our sample period (i.e., first quarter of 2006 through third quarter of 2008). We report the eigenvalues and scoring coefficients of the measures of firm-specific return variation and liquidity. We use the factor analysis to aggregate the proxies used for "*stock price informativeness"* and *"liquidity"*. The stock price informativeness factor is the factor score with an eigenvalue greater than one while the liquidity factors are the factor scores with an eigenvalue greater than one.

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Table 4.1 Sample composition and entry-into-force dates of the MiFID

Country	Unique Firms	Firm-Quarters	MiFID entry-into-force Dates*
Austria	94	961	November, 2007
Belgium	143	1,446	November, 2007
Bulgaria	16	155	November, 2007
Cyprus	89	940	November, 2007
Czech Republic	15	124	July, 2008
Denmark	178	1,850	November, 2007
Estonia	15	156	November, 2007
Finland	131	1,412	November, 2007
France	810	8,231	November, 2007
Germany	622	6,359	November, 2007
Greece	245	2,613	November, 2007
Hungary	32	318	December, 2008
Ireland	41	416	November, 2007
Italy	272	2,788	November, 2007
Latvia	13	141	May, 2007
Lithuania	40	423	November, 2007
Luxembourg	15	150	November, 2007
Malta	13	137	November, 2007
Netherlands	119	1,243	November, 2007
Norway	214	2,076	November, 2007
Poland	277	2,760	May, 2008
Portugal	51	527	November, 2007
Romania	148	1,404	February, 2007
Slovakia	12	105	November, 2007
Slovenia	50	456	August, 2007
Spain	151	1,530	February, 2008
Sweden	382	3,853	November, 2007
United Kingdom	1,700	17,108	November, 2007
Additional control sample			
Canada	1,573	16,411	N/A
United States	5,857	60,508	N/A

The table presents the number of unique firms and firm-quarter observations for each of the 28 European countries in the sample. It also shows the month in which the EU member states adopted the Market in Financial Instruments Directive (MiFID). I also include firms from the US and Canada as additional control sample.

*Source: EC (2011)[53]

[53] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011SC1126&rid=1

Table 4.2 Summary statistics

Panel A: EU Firms only sample						
	N	**Q1**	**Mean**	**Median**	**Q3**	**Std. Dev.**
Dependent variables:						
Price Informativeness proxies:						
SPI1 (ψ_1)	59,668	1.060	1.821	1.832	2.576	1.160
SPI2 (ψ_2)	59,668	0.941	1.637	1.665	2.340	1.056
SP13 (ψ_3)	59,668	1.280	2.340	2.232	3.259	1.564
SPI4 (ψ_4)	59,668	0.983	1.741	1.734	2.468	1.116
SPI_Factor	59,667	-0.681	0.000	0.047	0.719	1.000
Liquidity proxies:						
Ln(1+Bid-Ask)	56,280	0.008	0.044	0.021	0.053	0.059
Ln(1+High-Low)	55,513	0.019	0.033	0.029	0.042	0.021
Ln(1+Roll)	59,433	0.000	0.012	0.007	0.018	0.015
Ln(1+Zeros)	59,459	0.000	0.111	0.030	0.143	0.172
Ln(1+ ILLIQ)	59,053	0.006	0.564	0.090	0.621	0.999
LqFac1	51,859	-0.693	0.000	-0.421	0.369	1.000
LqFac2	51,859	-0.629	0.000	-0.192	0.394	1.000
Independent variables:						
Market value ($'M)	59,682	28	1,361	103	541	3,929
LnStkRtn_volat	59,682	0.486	0.846	0.836	1.200	0.563
Quarterly_Stk_Rtn (%)	59,682	-14.456	-1.815	0.263	11.954	28.042
LnShareturnover	59,682	-8.075	-6.993	-6.832	-5.735	1.764
BTM	57,175	0.011	0.503	0.359	0.694	0.633
LnGDPPerCaP	59,682	9.212	9.147	9.236	9.287	0.464
Loss	59,682	0.000	0.258	0.000	1.000	0.437
DivYield (%)	59,682	0.000	1.558	0.510	2.500	2.211

Panel B: Treatment and control groups (Matched Sample)

	Treatment						Control						
	N	**Q1**	**Mean**	**Median**	**Q3**	**Std. Dev.**	**N**	**Q1**	**Mean**	**Median**	**Q3**	**Std. Dev.**	Diff. in Mean
Dependent variables:													
SPI1 (ψ_1)	35,547	0.915	1.728	1.752	2.534	1.213	35,550	0.943	1.906	1.987	2.826	1.321	-0.178***
SPI2 (ψ_2)	35,547	0.820	1.561	1.598	2.309	1.105	35,550	1.015	1.832	1.881	2.616	1.117	-0.271***
SP13 (ψ_3)	35,547	1.109	2.224	2.127	3.196	1.617	35,550	1.119	2.518	2.495	3.685	1.810	-0.294***
SPI4 (ψ_4)	35,547	0.884	1.684	1.690	2.454	1.163	35,550	1.047	1.995	2.096	2.901	1.302	-0.311***
SPI_Factor	35,546	-0.782	-0.107	-0.057	0.595	0.959	35,549	-0.693	0.107	0.250	0.889	1.028	-0.214***
Ln(1+Bid-Ask)	33,606	0.006	0.039	0.017	0.044	0.056	29,020	0.002	0.039	0.011	0.045	0.068	0.000
Ln(1+High-Low)	33,406	0.022	0.036	0.032	0.046	0.021	35,443	0.021	0.044	0.034	0.059	0.036	-0.008***
Ln(1+Roll)	35,457	0.000	0.012	0.007	0.019	0.016	35,503	0.000	0.021	0.011	0.027	0.029	-0.009***
Ln(1+Zeros)	35,471	0.000	0.080	0.016	0.075	0.143	35,551	0.031	0.180	0.075	0.292	0.198	-0.1***
Ln(1+ILLIQ)	35,328	0.002	0.476	0.046	0.444	0.932	35,553	0.000	0.447	0.027	0.366	0.918	0.029***
LqFac1	31,268	-0.619	-0.137	-0.476	-0.032	0.835	28,676	-0.555	0.150	-0.387	0.493	1.134	-0.287***
LqFac2	31,268	-0.569	-0.141	-0.253	0.163	0.676	28,676	-0.599	0.154	-0.187	0.576	1.243	-0.295***
Independent variables:													
Market value ($'M)	35,553	31	1,583	121	740	4,220	35,553	28	2,294	119	868	7,233	-711***
LnStkRtn_volat	35,553	0.601	0.961	0.939	1.294	0.535	35,553	0.438	0.972	0.907	1.497	0.778	-0.011**
Stk_Rtn (%)	35,553	-11.69	1.47	1.87	14.35	27.42	35,553	-10.71	1.38	0.95	11.68	30.26	0.09
LnShareturnover	35,553	-7.722	-6.662	-6.479	-5.413	1.726	35,553	-7.553	-6.661	-6.390	-5.252	2.015	-0.001
BTM	35,553	0.059	0.513	0.375	0.695	0.615	35,553	0.223	0.507	0.465	0.725	0.590	0.006
LnGDPPerCaP	35,553	9.214	9.171	9.240	9.304	0.455	35,553	9.423	9.423	9.424	9.431	0.012	-0.252***
Loss	35,553	0.000	0.313	0.000	1.000	0.464	35,553	0.000	0.308	0.000	1.000	0.461	0.005
DivYield (%)	35,553	0.000	1.407	0.440	2.310	2.003	35,553	0.000	1.415	0.000	2.020	2.539	-0.008

Panel C: Pearson's correlation coefficients

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. SPI1 (ψ_1)	**1.00**	0.85	0.91	0.81	0.96	0.40	0.16	0.24	0.43	0.08	0.44	0.15	-0.64	0.26	0.08	-0.38	0.05	-0.02	0.23	-0.20
2. SPI2 (ψ_2)	0.83	**1.00**	0.79	0.79	0.92	0.39	0.15	0.23	0.42	0.07	0.43	0.14	-0.60	0.24	0.08	-0.35	0.05	0.03	0.22	-0.18
3. SP13 (ψ_3)	0.90	0.78	**1.00**	0.80	0.94	0.41	0.16	0.25	0.44	0.08	0.45	0.16	-0.63	0.27	0.07	-0.38	0.05	-0.01	0.23	-0.19
4. SPI4 (ψ_4)	0.80	0.77	0.79	**1.00**	0.91	0.40	0.16	0.25	0.42	0.07	0.44	0.17	-0.61	0.26	0.08	-0.38	0.05	0.00	0.22	-0.18
5. SPI_Factor	0.95	0.91	0.94	0.90	**1.00**	0.43	0.17	0.26	0.46	0.08	0.47	0.17	-0.67	0.28	0.08	-0.40	0.05	0.00	0.24	-0.20
6. Ln(1+Bid-Ask)	0.39	0.39	0.41	0.39	0.43	**1.00**	0.26	0.37	0.56	0.12	0.85	0.27	-0.55	0.47	0.04	-0.44	-0.02	-0.02	0.26	-0.18
7. Ln(1+High-Low)	0.02	0.02	0.03	0.05	0.03	0.10	**1.00**	0.57	0.08	0.08	0.03	0.90	-0.33	0.74	0.02	-0.13	-0.09	-0.05	0.34	-0.23
8. Ln(1+Roll)	0.17	0.17	0.18	0.19	0.19	0.21	0.36	**1.00**	0.27	0.12	0.29	0.82	-0.37	0.57	0.05	-0.27	-0.05	0.05	0.24	-0.17
9. Ln(1+Zeros)	0.28	0.27	0.29	0.28	0.30	0.46	0.01	0.13	**1.00**	0.08	0.92	0.02	-0.51	0.20	0.02	-0.25	-0.03	0.10	0.19	-0.18
10. Ln(1+ ILLIQ)	0.31	0.32	0.33	0.31	0.34	0.57	0.14	0.28	0.21	**1.00**	0.08	0.23	-0.11	0.11	0.02	-0.10	0.00	0.02	0.05	-0.08
11. LqFac1	0.43	0.42	0.44	0.42	0.46	0.88	-0.06	0.23	0.81	0.66	**1.00**	0.00	-0.54	0.25	0.02	-0.35	-0.04	0.06	0.22	-0.17
12. LqFac2	0.07	0.07	0.08	0.10	0.09	0.12	0.84	0.78	-0.09	0.31	0.00	**1.00**	-0.30	0.72	-0.03	-0.19	-0.06	-0.02	0.30	-0.20
13. Ln_Mktval	-0.56	-0.55	-0.55	-0.53	-0.59	-0.55	-0.15	-0.23	-0.44	-0.47	-0.60	-0.16	**1.00**	-0.48	-0.08	0.43	-0.11	0.09	-0.35	0.25
14. LnStkRtn_volat	0.19	0.19	0.22	0.25	0.23	0.30	0.72	0.42	0.09	0.29	0.17	0.69	-0.30	**1.00**	0.07	-0.25	-0.07	-0.08	0.37	-0.27
15. Stk_Rtn	0.07	0.07	0.06	0.10	0.08	-0.01	-0.01	-0.01	-0.06	-0.07	-0.08	-0.02	-0.04	0.01	**1.00**	0.04	0.07	-0.06	-0.11	-0.02
16. LnShareturnover	-0.26	-0.25	-0.26	-0.23	-0.27	-0.33	0.11	-0.12	0.04	-0.38	-0.26	-0.03	0.24	0.01	0.08	**1.00**	-0.02	0.02	-0.23	0.12
17. BTM	0.05	0.05	0.05	0.04	0.05	-0.01	0.12	0.13	-0.11	0.20	-0.04	0.18	-0.13	0.08	0.08	-0.09	**1.00**	-0.08	-0.13	0.09
18. LnGDPPerCAP	-0.07	-0.02	-0.07	-0.08	-0.06	-0.05	-0.19	-0.05	0.00	-0.19	-0.06	-0.16	0.12	-0.13	-0.08	0.07	-0.13	**1.00**	0.03	0.05
19. Loss	0.16	0.16	0.16	0.15	0.17	0.19	0.17	0.11	0.24	0.11	0.25	0.13	-0.25	0.23	-0.16	-0.06	-0.10	0.07	**1.00**	-0.23
20. DivYield	-0.15	-0.14	-0.14	-0.15	-0.16	-0.15	-0.13	-0.09	-0.16	-0.08	-0.17	-0.10	0.22	-0.15	-0.04	0.05	0.06	0.07	-0.20	**1.00**

Panel A presents the summary statistics for the EU firms. Panel B presents the summary statistics for matched treatment and control sample along with the difference in means between two groups tested for significance using a two-tailed t-test. The lower triangular in Panel C presents the Pearson correlations for EU firms only while the upper triangular presents the Pearson correlations for the matched treatment and control group. The stock return variation factor (SPI_Factor) is the aggregation of the four stock price informativeness measures using principal component analysis with varimax rotation. LqFac1 and LqFac2 are the first two components obtained from the PCA of the five liquidity proxies. All variables (except SPI_Factor, LqFac1, LqFac2, LnGDPPerCAP and dummy variable) are winsorized at the 1st and 99th percentile and are as defined in Appendix A.

Table 4.3 Effect of MiFID on Stock price informativeness

Panel A: EU only sample

	1	2	3	4	5
	SPI1	**SPI2**	**SPI3**	**SPI4**	**SPI_Factor**
EUR_MiFID	0.170***	0.084***	0.248***	0.174***	0.146***
	[5.50]	[2.94]	[6.21]	[5.81]	[5.87]
Ln_Mktval	-0.169***	-0.161***	-0.217***	-0.186***	-0.162***
	[-13.16]	[-14.50]	[-11.77]	[-14.19]	[-15.57]
LnStkRtn_volat	0.304***	0.275***	0.510***	0.413***	0.328***
	[27.04]	[26.25]	[32.66]	[34.73]	[35.18]
Stk_Rtn	0.001***	0.001***	0.001***	0.001***	0.001***
	[5.57]	[6.81]	[4.77]	[3.31]	[6.11]
LnShare_turnover	-0.007	0.001	-0.016**	-0.014***	-0.008*
	[-1.26]	[0.19]	[-2.14]	[-2.75]	[-1.76]
BTM	0.01	0.004	-0.009	-0.005	0.001
	[0.63]	[0.26]	[-0.40]	[-0.29]	[0.05]
LnGDPPerCAP	-0.797***	-0.937***	-0.357	-0.311	-0.561**
	[-2.85]	[-3.63]	[-0.92]	[-1.11]	[-2.47]
Loss	-0.005	-0.012	-0.004	-0.036**	-0.013
	[-0.37]	[-0.99]	[-0.23]	[-2.59]	[-1.22]
DivYield	-0.008**	0.000	-0.004	-0.006*	-0.004*
	[-2.36]	[0.09]	[-0.79]	[-1.67]	[-1.37]
TDP	-0.071***	-0.08***	-0.058***	-0.047***	-0.058***
	[-5.41]	[-6.61]	[-3.22]	[-3.50]	[-5.39]
MAD	-0.002	0.010	-0.201**	-0.019	-0.038
	[-0.04]	[0.19]	[-2.31]	[-0.32]	[-0.79]
Number of observations	57,160	57,159	57,159	57,159	57,159
Adj. R-squared (%)	56.6	56.1	53.2	52.3	62.5
Effects on SPI (%)	18.5	8.7	28.0	19.0	15.7
Median SPI (%)	10.1	5.2	12.5	11.0	8.4
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Qtr-year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes

This table reports the effect of MiFID on stock price informativeness. The dependent variables (columns (1) to (4)) are proxies for firm-specific return variation. The SPI_Factor is an aggregate firm-specific return variation measures and represents the scores of a single factor obtained from PCA with the four stock firm-specific return variation proxies. All variables (except Age, Regul_Quality, and dummy variable) are winsorised at the 1st and 99th percentile. I include country, industry, calendar-quarter and firm fixed effects to control for any fundamental differences in stock price informativeness, but do not report the coefficients. I follow Jones et al. (2016) and classify industry based on one-digit ICB sector index codes available from DataStream. Standard errors are clustered at the firm level and are robust to heteroscedasticity and serial correlation. Clustering at the country level produces similar results. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively (two-tailed).

Panel B: Matched sample

	1	2	3	4	5
	SPI1	**SPI2**	**SPI3**	**SPI4**	**SPI_Factor**
EUR_MiFID	0.185***	0.175***	0.220***	0.042**	0.125***
	[11.09]	[11.55]	[9.57]	[2.53]	[10.20]
Ln_Mktval	-0.174***	-0.149***	-0.225***	-0.161***	-0.142***
	[-16.19]	[-15.35]	[-14.16]	[-15.13]	[-17.98]
LnStkRtn_volat	0.031**	0.036**	0.105**	0.033***	0.039***
	[2.57]	[3.14]	[6.27]	[2.74]	[4.20]
Stk_Rtn	0.000	0.000	0.000	0.000	0.000
	[-0.07]	[1.30]	[-0.43]	[0.69]	[0.42]
LnShare_turnover	-0.004	0.012**	-0.008	-0.007	-0.001
	[-0.69]	[2.26]	[-0.91]	[-1.19]	[-0.15]
BTM	0.044***	0.039***	0.068***	0.042***	0.039***
	[3.11]	[3.07]	[3.24]	[2.99]	[3.74]
LnGDPPerCAP	-0.350	0.261	0.105	0.659*	0.143
	[-1.05]	[0.83]	[0.22]	[1.89]	[0.56]
Loss	0.005	-0.007	0.016	-0.022	-0.003
	[0.37]	[-0.56]	[0.8]	[-1.59]	[-0.26]
DivYield	-0.004	0.003	-0.005	-0.003	-0.002
	[-1.07]	[0.71]	[-0.87]	[-0.85]	[-0.58]
TDP	-0.072***	-0.054***	-0.071***	-0.013	-0.042***
	[-4.82]	[-3.92]	[-3.43]	[-0.88]	[-3.80]
MAD	0.074	-0.003	-0.103	0.071	0.014
	[0.87]	[-0.04]	[-0.81]	[0.79]	[0.23]
Number of observations	70,566	70,567	70,566	70,566	70,565
Adj. R-squared (%)	60.9	57.8	57.9	58.3	66.6
Effects on SPI (%)	20.3	19.2	24.5	4.3	13.3
Median SPI (%)	11.6	12.0	11.5	2.5	7.4
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Qtr-year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes

This table reports the effect of MiFID on stock price informativeness. The dependent variables (columns (1) to (4)) are proxies for firm-specific return variation. The SPI_Factor is an aggregate firm-specific return variation measures and represents the scores of a single factor obtained from PCA with the four stock firm-specific return variation proxies. All variables (except Age, Regul_Quality, and dummy variable) are winsorised at the 1st and 99th percentile. I include country, industry, calendar-quarter and firm fixed effects to control for any fundamental differences in stock price informativeness, but do not report the coefficients. Standard errors are clustered at the firm level and are robust to heteroscedasticity and serial correlation. I follow Jones et al. (2016) and classify industry based on one-digit ICB sector index codes available from DataStream. Clustering at the country level produces similar results. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively (two-tailed).

Table 4.4 Effect of MiFID on liquidity

Panel A: EU firms only sample

	Ln(1+Bid-Ask)	Ln(1+High-Low)	Ln(1+Zeros)	Ln(1+ILLIQ)	Ln(1+Roll)	LqFac1	LqFac2
Columns	**1**	**2**	**3**	**4**	**5**	**6**	**7**
EUR_MiFID	-0.005***	-0.001**	-0.009***	-0.104***	0.001*	-0.090***	0.012
	[-4.64]	[-2.32]	[-5.68]	[-3.24]	[1.96]	[-4.87]	[0.39]
Ln_Mktval	-0.019***	-0.002***	-0.053***	-0.287***	-0.002***	-0.409***	-0.092***
	[-21.00]	[-5.97]	[-29.35]	[-21.04]	[-6.05]	[-29.72]	[-5.93]
LnStkRtn_volat	0.012***	0.021***	-0.021***	0.071***	0.009***	-0.095***	0.97***
	[18.17]	[69.69]	[-23.35]	[6.61]	[38.42]	[-11.48]	[68.62]
Stk_Rtn	0.000***	0.000	0.000***	-0.001***	0.000***	0.000***	-0.001***
	[3.06]	[-1.46]	[-4.22]	[-7.30]	[-5.37]	[-3.65]	[-5.08]
LnShare_turnover	-0.006***	0.001***	-0.004***	-0.118***	-0.002***	-0.110***	-0.037***
	[-16.15]	[7.29]	[-7.74]	[-20.27]	[-15.85]	[-22.67]	[-5.55]
BTM	0.000	0.001	0.008***	0.037*	0.001***	0.018	0.041*
	[-0.22]	[1.35]	[3.80]	[1.81]	[3.06]	[0.92]	[1.67]
LnGDPPerCAP	0.058***	-0.017***	-0.092***	1.507***	0.009*	1.233***	0.196
	[4.37]	[-3.00]	[-4.61]	[5.13]	[1.84]	[5.92]	[0.72]
Loss	-0.002**	0.000**	-0.005***	-0.049***	-0.001***	-0.049***	-0.018
	[-2.42]	[1.56]	[-4.35]	[-3.51]	[-3.90]	[-4.56]	[-1.29]
DivYield	-0.001***	0.000***	-0.001***	-0.032***	0.000***	-0.026***	-0.009***
	[-7.19]	[0.03]	[-3.36]	[-8.09]	[-3.49]	[-9.55]	[-2.94]
TDP	0.001	0.000**	0.002**	0.053***	0.000	0.018**	-0.016
	[1.15]	[-2.38]	[2.14]	[5.21]	[-1.42]	[2.59]	[-1.58]
MAD	-0.016***	0.008***	0.005	-0.215***	-0.003***	-0.226***	0.000
	[-4.01]	[4.68]	[0.85]	[-3.58]	[-2.90]	[-3.59]	[0.00]
No of observations	53,959	53,940	56,972	56,649	56,946	50,469	50,469
Adj. R-squared (%)	79.4	76.5	94.4	67.9	35.3	87.8	87.8
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Qtr-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the effect of MiFID on liquidity. The dependent variable in columns (1) to (5) are proxies for liquidity. LqFac1 and LqFac2 are the first two components obtained from the PCA of the five liquidity proxies. All variables (except LqFac1, LqFac2, LnGDPPerCAP and the dummy variables) are winsorised at the 1st and 99th percentile. I include calendar-quarter and firm fixed effects to control for any fundamental differences in liquidity across time and firms. Estimated standard errors are clustered at the firm level and are robust to heteroscedasticity and serial correlation. I follow Jones et al. (2016) and classify industry based on one-digit ICB sector index codes available from DataStream. Clustering at the country level produces similar results. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively (two-tailed).

Panel B: Matched sample

	Ln(1+Bid-Ask)	Ln(1+High-Low)	Ln(1+Zeros)	Ln(1+ILLIQ)	Ln(1+Roll)	LqFac1	LqFac2
Columns	1	2	3	4	5	6	7
EUR_MiFID	-0.004***	-0.0003	-0.002	-0.050***	-0.003***	-0.039***	-0.098***
	[-5.44]	[-0.86]	[-1.48]	[-2.93]	[-8.39]	[-4.60]	[-8.26]
Ln_Mktval	-0.02***	-0.002***	-0.053***	-0.125***	-0.003***	-0.343***	-0.081***
	[-22.37]	[-3.37]	[-36.39]	[-10.07]	[-6.51]	[-28.58]	[-5.16]
LnStkRtn_volat	0.013***	0.023***	-0.03***	0.03***	0.014***	-0.146***	0.837***
	[19.39]	[55.01]	[-21.12]	[3.36]	[42.22]	[-15.45]	[63.29]
Stk_Rtn	0.000	0.000	0.000***	0.000***	0.000**	0.000**	-0.001***
	[-1.09]	[-0.04]	[-6.83]	[-3.81]	[-2.25]	[-2.08]	[-3.68]
LnShare_turnover	-0.008***	0.003***	-0.01***	-0.038***	-0.003***	-0.117***	-0.013**
	[-18.59]	[13.10]	[-15.50]	[-6.79]	[-17.64]	[-21.11]	[-1.97]
BTM	-0.002*	-0.001	0.002	-0.048***	-0.001*	-0.014	-0.035
	[-1.78]	[-1.01]	[1.01]	[-3.15]	[-1.79]	[-0.81]	[-1.60]
LnGDPPerCAP	0.119***	0.002	-0.036	0.754**	0.005	0.935***	0.169
	[7.80]	[0.27]	[-1.60]	[2.15]	[0.70]	[5.22]	[0.67]
Loss	-0.004***	0.000	-0.008***	-0.007	-0.002***	-0.061***	-0.049***
	[-5.47]	[0.02]	[-6.69]	[-0.49]	[-6.88]	[-6.93]	[-4.12]
DivYield	-0.002***	0.000	-0.002***	-0.009**	0.000***	-0.022***	-0.012***
	[-8.48]	[-1.36]	[-6.46]	[-2.20]	[-5.38]	[-9.90]	[-4.12]
TDP	0.002***	0.000	0.005***	-0.016	-0.001***	0.025***	-0.035***
	[2.97]	[-0.86]	[4.72]	[-1.05]	[-3.06]	[3.73]	[-4.02]
MAD	-0.027***	0.006***	-0.001	0.047	-0.004**	-0.238***	0.042
	[-4.25]	[3.03]	[-0.18]	[0.66]	[-2.18]	-0.039***	[0.55]
No of observations	61,994	68,315	70,486	69,932	70,423	59,289	59,289
Adj. R-squared (%)	82.5	76.6	92.5	53.5	53.8	89.3	75.4
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Qtr-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The table reports the effect of MiFID on liquidity. The dependent variable in columns (1) to (5) are proxies for liquidity. LqFac1 and LqFac2 are the first two components obtained from the PCA of the five liquidity proxies. All variables (except LqFac1, LqFac2, LnGDPPerCAP and the dummy variables) are winsorised at the 1st and 99th percentile. I include calendar-quarter and firm fixed effects to control for any fundamental differences in liquidity across time and firms. Estimated standard errors are clustered at the firm level and are robust to heteroscedasticity and serial correlation. I follow Jones et al. (2016) and classify industry based on one-digit ICB sector index codes available from DataStream. Clustering at the country level produces similar results. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively (two-tailed).

Table 4.5 Regulatory quality of the sample countries

Countries	Regulatory Quality 2006		Strength of Investor Protection 2006		Anti-self-dealing index		Trustworthiness & Confidence 2006	
Austria	1.65	(1)	3.70	(0)	0.21	(0)	5.29	(0)
Belgium	1.32	(0)	7.00	(1)	0.54	(1)	5.31	(0)
Bulgaria	0.57	(0)	6.00	(1)	0.65	(1)	4.87	(0)
Cyprus	1.28	(0)					5.85	(1)
Czech republic	1.10	(0)	5.00	(0)	0.33	(0)	4.98	(0)
Denmark	1.81	(1)	6.30	(1)	0.46	(1)	5.99	(1)
Estonia	1.30	(0)	6.00				4.84	(0)
Finland	1.62	(1)	5.70	(1)	0.46	(1)	5.57	(1)
France	1.23	(0)	5.30	(0)	0.38	(0)	4.71	(0)
Germany	1.57	(1)	5.00	(0)	0.28	(0)	6.02	(1)
Greece	0.84	(0)	3.00	(0)	0.22	(0)	4.33	(0)
Hungary	1.21	(0)	4.30	(0)	0.18	(0)	5.10	(0)
Ireland	1.85	(1)	8.30	(1)	0.79	(1)	6.30	(1)
Italy	0.95	(0)	5.00	(1)	0.42	(1)	4.11	(0)
Latvia	1.00	(0)	5.70	(0)	0.32	(0)	5.75	(1)
Lithuania	0.97	(0)	5.30	(0)	0.36	(0)	4.54	(0)
Luxembourg	1.68	(1)		(0)	0.28	(0)	6.75	(1)
Malta	1.10	(0)					6.44	(1)
Netherlands	1.68	(1)	4.70	(0)	0.20	(0)	5.92	(1)
Norway	1.23	(0)	6.70	(1)	0.42	(1)	5.58	(1)
Poland	0.71	(0)	5.70	(0)	0.29	(0)	4.14	(0)
Portugal	1.06	(0)	6.00	(1)	0.44	(1)	4.84	(0)
Romania	0.46	(0)	5.70	(1)	0.44	(1)	4.28	(0)
Slovakia	1.14	(0)	4.30	(0)	0.29	(0)	6.28	(1)
Slovenia	0.78	(0)	5.70				5.03	(0)
Spain	1.16	(0)	5.00	(0)	0.37	(0)	5.27	(0)
Sweden	1.44	(1)	4.30	(0)	0.33	(0)	5.59	(1)
United kingdom	1.84	(1)	8.00	(1)	0.95	(1)	6.92	(1)
Canada	1.55	(1)	8.30	(1)	0.64	(1)	5.97	(1)
United States	1.65	(1)	8.30	(1)	0.65	(1)	5.82	(1)

The table presents the country scores on the four indexes as of 2006 used to measure the quality of prior regulation. Higher values imply better regulatory quality. I use the median scores for 35 OECD countries and classify countries with above median scores as high regulatory quality countries (1) and those with below median scores as low regulatory quality countries (0). The World Bank Regulatory Quality Index as of 2006 measures "the ability of the government to formulate and implement sound policies and regulations" (Kaufmann et al., 2009). The World Economic Forum (WEF) Strength of Investor Protection index as of 2006 captures a country's level of legal protection of investors. The Anti-Self-Dealing Index is a "measure of legal protection of minority shareholders against expropriation by corporate insiders" (Djankov et al., 2008; p. 430). The WEF Trustworthiness and Confidence Index as of 2006 capture the efficiency, stability and trustworthiness of the financial system.

Table 4.6 Effect of MiFID on stock price informativeness when prior regulation differs

Panel A: EU Countries only

	Regulatory Quality	**Investor Protection**	**Anti-self-dealing index**	**Trustworthiness & confidence**
EUR_MiFID*				
-LowReg	0.113***	0.121***	0.147***	0.114***
	[4.41]	[4.72]	[5.80]	[4.36]
-HighReg	0.182***	0.171***	0.144***	0.168***
	[7.02]	[6.61]	[5.48]	[6.66]
Number of observations	57,159	57,159	55,964	56,105
Adj. R-squared (%)	62.5	62.5	62.7	62.7
Wald tests for differences across coefficients (p-value):				
Low/High	0.0000	0.0000	0.8843	0.0000
Panel B: Matched sample				
EUR_MiFID*				
-LowReg	0.078***	0.089***	0.107***	0.840***
	[5.03]	[6.07]	[7.15]	[5.34]
-HighReg	0.155***	0.164***	0.145***	0.148***
	[11.52]	[11.58]	[10.23]	[11.10]
Number of observations	70,565	70,121	70,044	70,565
Adj. R-squared (%)	66.6	66.7	66.7	66.6
Wald tests for differences across coefficients (p-value):				
Low/High	0.0000	0.0000	0.0136	0.0001
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Qtr-year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

The table reports the effect of MiFID on the stock price informativeness conditional on the level of prior regulation. The dependent variable SPI_Factor is the first component from the PCA on the four stock price informativeness proxies and is an aggregate firm-specific return variation measure. Countries with index scores lower (higher) than the median for 35 OECD counties are classified as low (high) regulation counties. The World Bank Regulatory Quality Index as of 2006 measures "the ability of the government to formulate and implement sound policies and regulations" (Kaufmann et al., 2009). The World Economic Forum (WEF) Strength of Investor Protection index as of 2006 captures a country's level of legal protection of investors. The Anti-Self-Dealing Index is a 'measure of legal protection of minority shareholders against expropriation by corporate insiders' (Djankov et al., 2008; p. 430). The WEF Trustworthiness and Confidence Index as of 2006 capture the efficiency, stability and trustworthiness of the financial system. All continuous variables except for LnGDPPerCAP are winsorised at the 1st and 99th percentile. All the controls used in table 4.3 are included here but not reported for brevity. Standard errors are clustered at the firm level and are robust to heteroscedasticity, cross- and serial- correlation. I report the p-values from Wald tests assessing the significance of differences in the coefficients. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively (two-tailed).

Table 4.7 The effect of MiFID on liquidity when prior regulation differs

Panel A: EU Countries only

	Regulatory Quality	Investor Protection	Anti-self-dealing index	Trustworthiness & confidence
EUR_MiFID*				
-LowReg	-0.096***	-0.087***	-0.075***	-0.106***
	[-4.93]	[-4.23]	[-3.91]	[-5.43]
-HighReg	-0.085***	-0.098***	-0.132***	-0.076***
	[-4.35]	[-5.15]	[-6.58]	[-3.91]
Number of observations	50,469	49,671	49,522	50,469
Adj. R-squared (%)	88.0	87.9	88.0	88.0
Wald tests for differences across coefficients (p-value):				
Low/High	0.3268	0.3471	0.0000	0.0142
Panel B: Matched sample	**(Matched sample)**			
EUR_MiFID*				
-LowReg	-0.028***	-0.018*	-0.010	-0.034***
	[-2.83]	[-1.80]	[-1.02]	[-3.29]
-HighReg	-0.045***	-0.057***	-0.059***	-0.042***
	[-4.50]	[-5.28]	[-5.59]	[-4.25]
Number of observations	59,289	58,936	58,857	59,289
Adj. R-squared (%)	89.3	89.2	89.2	89.3
Wald tests for differences across coefficients (p-value):				
Low/High	0.1282	0.0007	0.0001	0.4512
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Qtr-year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

This table reports the effect of MiFID on liquidity conditional on prior regulatory quality. The dependent variable LqFac1 is the first factor obtained from PCA with the five liquidity proxies and represents the aggregate liquidity measure. Countries with index scores lower (higher) than the median for 35 OECD counties are classified as low (high) regulation counties. The World Bank Regulatory Quality Index as of 2006 measures "the ability of the government to formulate and implement sound policies and regulations" (Kaufmann et al., 2009). The World Economic Forum (WEF) Strength of Investor Protection index as of 2006 captures a country's level of legal protection of investors. The Anti-Self-Dealing Index is a "measure of legal protection of minority shareholders against expropriation by corporate insiders" (Djankov et al., 2008; p. 430). The WEF Trustworthiness and Confidence Index as of 2006 capture the efficiency, stability and trustworthiness of the financial system. All continuous variables except for LnGDPPerCAP are winsorised at the 1st and 99th percentile. All the controls used in table 4.3 are included here but not reported for brevity. Standard errors are clustered at the firm level and are robust to heteroscedasticity, cross- and serial- correlation. I report the p-values from Wald tests assessing the significance of differences in the coefficients. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively (two-tailed).

Paper 4

5 Stock price reactions to 2016 UK referendum: restricting EU labour movement, regulation, and trade

Abstract

This paper examines the impact of the surprising decision of the British people to leave the membership of the European Union, known as Brexit, on stock prices, along key three arguments made by proponents. Using CAPM-adjusted returns and Market-adjusted returns, I document that restricting EU labour movement decreased market value by 9.64 percent over a 10-day event window. The result suggests that losses were especially severe for firms that are more labour intensive. Shareholders in Basic Resources, Chemicals, Health Care, Oil and Gas companies, and Utilities sectors gained, while shareholders in banks, real estates, and retail sectors suffered losses as a result of expected EU labour restriction. Further, I find evidence that highly regulated sectors benefit more from expected deregulation of EU laws except for the financial institutions. A price variance analysis shows that above 50% of new information was impounded on Day-3 and above 75% on Day-7 over the ten days trading considered, suggesting slow incorporation of information in stock prices. This finding is consistent with limited investor's attention which indicates that limitation on investor's time and energy lowers their learning process regarding new information. In sum, my evidence shows that expectations about labour restrictions, streamlining regulation and trade policies have a significant influence on market values.

Keywords: Brexit, Stock returns, event study, regulation, trade policy, price contribution analysis

JEL Classification: G12, G14, H18, O24

5.1 Introduction

On 23 June 2016, the British people voted in a historic referendum to leave the membership of the European Union (EU) (commonly referred to as "Brexit") after 43 years of membership,[54] (the outcome announced the following day). In the days following the unprecedented event, there was substantial price movement recorded across the financial markets, (including equity (e.g., Figure 5.1), foreign exchange and bonds markets). Also, in the currency markets, the impact substantially weakened the Sterling. Interestingly, other global financial markets also reacted nervously to the outcome of the referendum (see Figure 5.2).

[INSERT Figure 5.1]

[INSERT Figure 5.2]

Interestingly, despite the strong downward movement of UK's stock market returns surrounding the day of the referendum announcement, the market recovered and stabilised in a matter of days. Broader equity price indices such as the FTSE100 recovered within few days following the referendum result and went back where it was on June 23. A plausible interpretation is that though, the fall in the British pounds have marked down the country's economic prospects, it has provided investors' good opportunities to continue to add to existing holdings at attractive valuations, and has helped to promote exports by making UK firms more competitive. For example, Figure 5.3 shows the effect of currency depreciation on FTSE100 index returns on the event date; while the returns in local currency declined by 3.9%, the returns in dollar currency dropped by 10.9%.

[INSERT Figure 5.3]

In this paper, I explore stock prices reaction to Brexit and provide evidence of the differential effect of BREXIT across different sectors of the stock market. The study has three distinctive features. First, the event is an unprecedented event reshaping the business history of the UK, EU and global economy, and altering their future relationship. Hence, analysing market reactions to the news offer eclectic views of the effects of Brexit. Second, the UK is one of the

[54] The United Kingdom (UK) joined the then European Economic Community (EEC) in 1973 under Prime Minister Edward Heath.

leading global financial centres, and with the largest capital market in the EU.[55] The decision to leave the EU would have significant consequences on trade policy, regulation and immigration activities, relevant to investment decisions. The study would provide a greater understanding of how these fundamental factors influenced stock market's response to the event. Third, because the unanticipated outcome of 24 June 2016 was not only an event driven by the decision of the British people but also the first in the EU since its formation in 1957, it is an exogenous shock not related to the financial markets. Thus, the setting provides a unique opportunity to conduct a natural experiment that allows me to assess the economic effects of Brexit on asset prices while overcoming the endogeneity concerns.

The Brexit debates have remained divisive especially in the weeks leading up to the referendum, among the arguments marshalled by the opponents and proponents; I examine three key elements. First, on the issue of immigration, Brexit proponents repeatedly promoted ending free labour movement because it would: (i) increase employment opportunities and wages for natives; (ii) alleviate the shortage of housing, reduce the pressure on social services such as the educational services, and the National Health Service (NHS); and (iii) help UK to achieve its immigration reduction policy goal. Thus, this begs the question; what would the effect of restrictions on free labour movement be on UK businesses? Although, the aim to restrict EU immigration is to boost employment opportunities for native population; this would create labour shortages, which could be detrimental to labour intensive firms which rely on the skilled and unskilled EU workforce. The latter interpretation is consistent with previous literature that shows a positive association between immigration and total factor productivity (e.g., Peri, 2012). As such, a differential impact of Brexit on firms is to be expected.

Second, it is the issue is related to the EU laws. Making their case for leaving the EU, the proponents of BREXIT argue that the EU has become an intrusive and imposes excessive regulatory burdens on businesses. Further, they argue that the EU regulatory costs on firms have eroded the attendant benefits gained as a member of the EU. Hence, leaving the EU would enable the government to streamline the EU rules to reduce the regulatory costs on firms. Intuitively, while deregulation would be beneficial to some sectors, the government is unlikely

[55] Sharon Donnery, Deputy Governor (Central Banking) of the Central Bank of Ireland recent remark at a meeting in Chatham House, London. Bank of International Settlements, Sharon Donnery: Brexit and global capital markets, March 23, 2017.

to repeal the EU-derived regulations for other sectors, such as the real estate and the financial services sector. Banking, in particular, has to comply with the increasingly strong global standards of regulation (e.g., Basel regulatory framework). Therefore, differential stock market reactions to Brexit is to be expected.

Third, the debates about the issue of trade remain divisive. The opponents of BREXIT stress the benefits derived as a member of the EU single market and custom union, noting that exit from the union would Jeopardise UK businesses because trade with other EU member states accounts for 53 percent of UK's imports and 45 percent of exports (Office for National Statistics, 2015). On the contrary, the proponents argue that (1) withdrawal would provide the UK freedom to set its agenda, and sign better trade deals with other countries; and (2) UK is an important market to the EU, and thus the country has the incentive to negotiate better trade deals with the EU. Indeed, the issue of trade is a concern to investors. While Brexit could adversely affect businesses that trade heavily with the EU due to higher trade tariffs, dwindling customer base, and greater regulations, businesses that trade more with countries outside Europe could benefit because Brexit does not affect them. The benefits from the depreciation in Sterling could further increase their competitiveness in the international markets. These arguments suggest that stock market's reaction to would differ across the industry.

Based on the above, I address three specific research questions. First, is stock market's response to Brexit influenced by the three elements discussed above, second, does the impact of Brexit vary with the type of sectors in the economy, and third, is the speed of price adjustment similar for the different variables considered? I analyse the differential impact of Brexit across firms along to a number of measures and over various short-term windows around that day to ascertain the factors that influenced the relative winners and losers among specific sectors of the economy. The paper sheds new light on the factors that drive short-term stock price movement and influence winners and losers stocks. More specifically, my results highlight the effect of investors' expectations about the likely impact of lack of future EU workforce, EU regulations and the EU trade. Next, I examine the speed of price adjustment to Brexit. As expected, the evidence shows that stock market reactions to Brexit vary considerably among the different variables of the three elements considered.

To assess the impact of Brexit, I conduct an event study using a sample of FTSE All-Share index constituents as at 31 May 2016. I estimate the cumulative abnormal returns (CAR) using

the Capital Asset Pricing Model (CAPM) adjusted model and the Market-adjusted model. I use the CAR of various event windows (up to 10 trading days) because market reaction time to shocks may be slower (e.g., Chan, 2003), coupled with time-varying changes in market expectations.

In the results that follow, I show that investors' expectation of EU labour restriction adversely affected the cross-section of stock returns. Specifically, as expected, investors downgrade firms with higher demands of EU labour. Based on Market-adjusted model returns, I find that, on average, prospective restriction to EU labour movement, proxy by labour productivity (LnSPEM) decreased market value by 24.25% over the shortest event window (Day 0), by 12.63% over the shorter event window (Day 0 to 2), and by 9.64% over a 10-day period. More interestingly, I find that the market expects that limiting free labour movement would benefit sectors such as Basic Resources, Chemicals, and Oil and Gas companies, while it could harm sectors like the financial institutions.

More interestingly, I find that some sectors that have majority of their business operations outside the EU (e.g., Basic Resources, Chemicals, and Oil and Gas companies) are expected to benefit from the labour regulation because of their access to the global labour market. In contrast, the results suggest that investor expects that strict labour reforms could negatively affect the financial institutions, real estates and retail sector's growth potential. Also, I find strong evidence that investors perceive firms in the highly regulated sectors seem to benefit more from the removal of EU laws. However, I observe no such pattern for some sectors like the financial institutions, perhaps reflecting the concern that not having to comply with EU regulations could lead to loss of credibility of the UK financial institutions. This could also lead to business moving to other financial centres globally. Further, empirical results demonstrate that investors downgrade domestic market focused firms, suggesting investors' worry about firm's growth prospect reflected in increasing importation costs and declining markets. By contrast, Brexit benefits internationally focused firms. Finally, I document evidence of significant differences in the speeds of information across the different explanatory variables considered. I also find evidence of slow incorporation of information into stock prices, consistent with the literature on delayed price responses to public information (e.g., Chan, 2003; Wagner et al., 2017).

My study contributes to the scholarly literature about stock prices response to Brexit event. I find intriguing evidence that the cross-section of stock prices reflect UK market expectation of imposing immigration barriers on EU nationality, streamlining and removing burdensome EU regulations, and limiting trade with the Union. Specifically, my results demonstrate that, in the eyes of the investors, heavily regulated industries benefited substantially due to expectations of a reduction in regulatory burden than the less regulated industries. I also find that market react positively to firms with significant foreign exposure but downgrade firms with domestic exposure. Furthermore, my study shows that stock price reactions to Brexit are asymmetric, that is, the reactions depend on investors' perception of how the industries are principally affected by the anticipated changes in policy.

My study also contributes to the growing literature on price discovery. I analyse the speed of price adjustments in the first ten days post-Brexit and estimate how much of the price change due to the different explanatory variables are incorporated into stock prices on each day. I document differential speed of price adjustments across the different explanatory variables. My study highlights the gradual incorporation of Brexit news into stock prices over the ten trading days, consistent with slower price adjustment due to investor inattention.

The rest of this paper is organised as follows. Section 5.2 presents the developments leading to Brexit, theoretical analysis and hypothesis development. Section 5.3 presents the methodology and data. Section 5.4 presents the empirical analysis of the impact of policy uncertainty on asset prices. Section 5.5 concludes.

5.2 The institutional setting, literature review and hypothesis development

This section discusses the institutional background, literature review and formulates three hypotheses with different predictions on the impact of the Brexit surprise.

5.2.1 Developments leading to Brexit

The European Economic Community (EEC) was setup in 1957 by six member states (Belgium, Germany, France, Italy, Luxembourg, and the Netherlands) in the aftermath of the Second World War to foster stability and tranquillity among European nations. The EEC has grown bigger and now has 28 member states. The EEC was renamed the European Union (EU) in the

1992 Maastricht Treaty, amending the 1957 Rome Treaty establishing the EEC. The EU was created to promote the European identity and facilitate economic, political and single market integration between the signatory states (Damro, 2012; Berglof et al., 2008).

The Single European Act in 1986 and the subsequent creation of the EU Single Market Programme on 31 December 1992 further paved the way for a full single market by getting rid of several trade barriers among member states (Butler et al., 2016). The single market enshrines free movement of goods, Labour, capital, and services within the member states. Barrell and Pain (1997) highlight that the single market integration has helped the EU to increase its international trade, improve investment patterns, and attract foreign investments to the region. Indeed, due to the increasing economic capacity of the single market, it has helped the EU to become one of the world's biggest markets, (Baldwin and Lopez-Gonzalez, 2015), and positioning the bloc as an international actor in global governance and developments (e.g., European Commission, 2003).

The UK joined the EEC in January 1973 under Prime Minister Edward Heath of the Conservative Party. This stirs discontent among members the House of Commons and Lords (MPs) about Britain's economic prospects of being a member of the institution. The agitation led to the first referendum on Britain's continued membership in the union on 5 June 1975. The British electorate expressed significant support for UK's continued membership of the EEC, with about 67% voting in favour to stay in the bloc.

Nevertheless, in recent years, the challenge to UK's membership of the EU resurfaced. The agitation of elite Politicians for the UK to leave the union has intensified, and most especially with the surge of UK Independence Party (UKIP) that is less sanguine about the EU, gaining popularity as a 'Eurosceptic political party' and became the third largest party regarding vote at the 2015 election. The widely held view was that Britain has become isolated in the EU decision-making process and thus has markedly diminished power and influence in the European Parliament.

In addition to the surge in political elites' backlash against UK's diminishing influence in the EU, the concern of unrestrained freedom of movement of people especially from other European countries that leads to lopsided immigration, straining infrastructure and putting public services under huge pressure. These reasons led discontent politicians to clamour for

Britain to 'take back control' of its borders. Thus, to pacify the Eurosceptic Members of Parliament (MPs) of his party, and manage the rise of the UKIP – a major advocate of a Brexit from the EU – on January 2013, the British Prime Minister David Cameron pledged to do two things should the Conservative Party win the 2015 election.[56] First, the government would renegotiate with the EU for a 'better deal' for Britain. Second, to put UK membership to the EU to a referendum before the end of 2017. The announcement set the stage for the 2016 referendum to determine whether the UK will exit the EU.

The Conservative Party won the 2015 general election with an overall majority. Not surprisingly, on 28 May 2015, the government introduced the European Union Referendum Act 2015 that kick-start the process of holding a referendum in the UK. The act received royal assent on 17 December 2015 and on 20 February 2016, the government announced that the referendum on EU membership would take place on 23 June 2016. Finally, the process of withdrawing from the EU commenced with the UK Prime Minister triggering article 50 on 29 March 2017. In sum, Brexit is expected to have far-reaching consequences on the UK capital market and would have significant effect on stock prices.

5.2.2 Theoretical motivation

One of the primary focus of stock markets research has been the relation between the arrival new information and security prices (e.g., Fama, 1970). The efficient market hypothesis suggests that, given rationality in the marketplace, changes in stock prices at time are driven by the amount of all available information transmitted via the trading activities of different market participants (Grossman and Stiglitz, 1980; Fama, 1991). In essence, stock prices fully and quickly respond only to all relevant information that is not already expected by the market. Thus, a careful analysis of changes in stock prices around Brexit announcement should reveal market expectations regarding the net cost or benefit of the referendum outcome. Schwert (1981) notes that since changes in asset prices capture current market expectations, it represents an unbiased net present value of future cash flows of the asset and therefore it is unnecessary

[56] See David Cameron's speech at the London headquarters of Bloomberg of his plans for a referendum on British membership of the European Union on 23 January 2013. https://www.theguardian.com/politics/2013/jan/23/david-cameron-eu-speech-referendum (accessed 14 October 2017).

to generate all payoff streams and their discount rates separately. In other words, if stock price instantaneously adjusts to the outcome of the EU referendum, then the change in price of any individual security is driven by the difference between the net present values of the possible outcomes: 'remain' or 'leave' the EU, times the *ex-ante* probability of occurrence.

The following simple model by Wagner et al. (2017) is used to illustrate the relationship between changes in stock prices and the referendum outcome

$$R = \frac{P_L - P}{P} = \frac{(P_L - P_R)(1 - \pi_L)}{P} \quad \textbf{(5-1)}$$

where *R* denotes the return on stock price after the referendum, *P* is the pre-event security price, P_R and P_L denote the perceived stock prices based on 'remain' or 'leave' the EU, π_R denotes the probability that an investor desires that UK vote to remain in the EU, and $\pi_L = 1 - \pi_R$ denotes the Brexit probability that an investor desires that UK leave the EU. Presumably, to the extent that the market knows with certainty *ex-ante* about the election outcome to 'leave' the EU, then the effect on the event date would be minimal, perhaps eliminated because the information should have rapidly been impounded into stock prices. Intuitively, investors' uncertainty implies that asset prices will respond *ex-post* to the 'leave' outcome. Further, while the impact is same for all stocks because they are equally exposed to the vote, individual securities will react differently, depending on investor's perception of the upside and downside potential impact on the firm. Condition (1) assumes that if the individual stock would profit from the UK leaving the EU, then $P_L > P_R$, and if the individual stock would profit from UK remaining a member of the EU, then $P_R > P_L$. From the preceding, considering the cross-section of expected returns, I infer that stock prices incorporate information about investors' expectation of the impact of Brexit, and that the impact is like to vary considerably across stocks in the economy.

5.2.3 Hypothesis development

The growing concerns about EU policy response on immigration especially the migration consequences of open labour markets and the inability of Britain to impose limits is one of the major factors to the Brexit surprise. The mass immigration from eastern European new member states (Danzer and Dietz, 2014), and the recent economic turmoil (Brucker et al., 2014) further

fuelled the immigration concerns. EU labour immigration was a defining issue on Brexit outcome. As Sands et al. (2017) note, immigration is the most important factor that underpinned the Brexit vote. The leave supporters assert that immigrants have strained public services, harmed natives employment through increased competition for jobs; which has potentially led to a reduction in wages, and conclude that Brexit would allow the government to control the flow of immigrants from the EU.

More generally, immigration provides abundant human capital resource for firms. Human capital is regarded as key driver of firm's value (Coff, 1997), a lever for competitive advantage (Pfeffer, 1994), and a key determinant of firms' investment decisions (e.g., Madhavan and Iriyama, 2009; Blonigen et al., 2014). Docquier and Lodigiani (2010) empirically document that skilled labour movements influence inward foreign direct investments (FDI). This finding is consistent with Grossman and Razin (1984), who show in a theoretical model that labour size is one of the key factors influencing the direction of capital movements, suggesting that an increase in a country's labour size increases capital flow to the country.

Regarding UK secession from the EU and the impact on free labour movement, extant literature provide evidence suggesting that immigration barriers or labour regulation do appear to increase firms' cost of capital (Alimov, 2015), lower investment and productivity (Besley and Burgess, 2004), impair firm performance (Bird and Knopf, 2009), and hurt the entrepreneurship spirit (Cumming et al., 2010). It also follows that limiting labour movement is costly to firms because it increases resources to search for labour replacement if workers separate from their employers, and stifle UK firms' ability to attract and retain talent. This prediction is consistent with Kuehn et al. (2017) who show theoretically and empirically that firms with low loading on labour vacancies measured as ratio of vacant positions to unemployed workers outperform firms with high loading on labour vacancies, suggesting that increasing labour search reduces firm performance. Given this evidence, I thus argue that imposing labour regulation could create shortage of skilled labour, leading to disappointment in firm's earnings, lower productivity, profitability, and firm value. Based on our argument, I hypothesise in the alternate form:

H1: Brexit will adversely affect firms' with higher labour requirements

Further, as Sands et al. (2017) note, one of the advantages put forward by proponents of Brexit is that businesses would become free from the heavy burden of EU regulations. In short, over 19,000 EU regulations are currently in force in the UK and additional 1,260 EU regulations are expected embedded into UK law by the formal exit date of March 2019 (Thompson, 2017). The secession from the EU would provide the UK with the option to streamline or remove poorly designed or burdensome regulations as well as dismantle trade barriers loathed by firms. For example, Brexit Secretary David Davis, in a statement to MPs notes that UK parliament would repeal, amend and improve regulations after the leaving the bloc.[57] Given the role of regulation to reducing entrepreneurship (e.g., Djankov et al., 2002; Klapper et al., 2006), determining location and investment decisions and most especially in some regulated sectors (e.g., Brennan and Schwartz, 1982), and the practical reality of the overly large EU regulations I expect regulated firms would benefit more from streamlined regulatory policy post-Brexit. Accordingly, I hypothesise:

H2: Investors reaction to Brexit will be positive for firms in the regulated sectors than firms in less regulated sectors.

Also, one of the most important economic developments in the EU over the past two decades is the single market integration that led to removal or reduction in barriers to international trade, providing businesses frictionless access to trade and significantly contributed to its export boom to other EU countries. One of the reservations surrounding Brexit is how UK businesses can have access to the EU market after the secession. There is uncertainty whether the UK could secure a replacement free trade deal before the exit date. Since the EU's market constitutes about 45% of UK's businesses export, an end to access to the single market and not securing a good trade deals post-Brexit would jeopardise business activities, most especially domestic firms that imports a significant proportion of their goods from the EU (53% of UK's imports). Further, Brexit would increase importation and production costs for local firms - lowering performance; and slow down foreign interests on UK firms - reducing investments. Also, domestic focused businesses (e.g., real estate, travel and tourism, hotels, telecommunications) could be adversely affected from the weakening market reflected in decline in sales to EU nationals that are leaving the country or not migrating to the UK.

[57] http://www.bbc.co.uk/news/uk-politics-39439554 (accessed 30 October 2017).

However, the leave vote could benefit some domestically oriented firms because their businesses activities are relatively insulated from the negative impact, they are not on a pan-European market, and expected government protectionist tendencies through higher tariffs.

Considering firms with larger foreign presence in the EU market, Brexit could limit their unfettered access to the bloc. For these businesses, the potential impact of custom controls, tariffs and non-tariff barriers could increase export costs, reducing the competitiveness of their products in international market and thus lower profitability. Contrary to this view, firms with established business operations in EU could benefit from reparation of income through the depreciation of the pound. The falling Sterling could benefit these firms by making their products more competitive in the EU market, and thus compensate the costs of imposed trade tariffs from the EU. Additionally, since the UK is an important market to the EU and key ally of the bloc, the country has better incentive to negotiate better trade deals with the EU that is suited to UK's interests or similar in scope to the agreement with Switzerland.[58] Further, since UK's export to the EU is less than 50 percent, increasing export to other countries could compensate for the loss arising from Brexit.

Next, corporations with business activities outside the EU could benefit from Brexit because they are shielded from the effect of losing access to the single market. These firms could also profit from the depreciation of the British pounds, through the increase of revenue repatriated.

In summary. Brexit would lead to a polarised response in the stock market because it is multifaceted. On the one hand, Brexit would benefit the multinational firms with income outside the EU, and on the other hand, it would adversely affect domestic oriented firms, while the impact on EU oriented businesses is ambiguous. Thus, I hypothesize:

H3a: Brexit will adversely affect domestically oriented firms.

H3b: Brexit will adversely (positively) affect EU oriented firms.

H3c: Brexit will positively affect internationally focused firms.

[58] Switzerland have access to the single market through bilateral trade agreements with the EU.

5.3 Data and Methodology

5.3.1 Sample selection

The first part of my analysis investigates the abnormal returns of listed firms around the Brexit events. My initial sample consists of 638 firms in the FTSE All-Share index constituents as at 31 May 2016 in DataStream. The index constituents represent about 98% of the UK total market capitalization. I delete observations with DataStream's equity/non-equity investment instruments Industrial Classification Benchmark (ICB) indices.[59] Also, I exclude firms that do not have at least 100 return observations during the estimation window (May 31, 2015), with missing accounting data such as total assets and revenue, and my final sample relates to a total of 429 financial and non-financial firms used to evaluate the consequences of Brexit.

5.3.2 Empirical methodology

I use a standard event study method discussed in Brown and Warner (1985) to analyse market reactions to Brexit. The event study methodology is an appropriate framework that captures the net effect of the unexpected Brexit news. It is less subject to the effects of omitted variables because of it short time intervals. I identify June 24, 2016 as Day 0 for my event study because it was the day of announcement of the referendum result, and on which the market could react to news. Following Liu et al. (2017), I calculate my abnormal returns using non-missing data for each firm with a minimum of 100 days returns during the pre-event period (May 31, 2016), over the one year estimation period (June 1, 2015 to May 31, 2016). To conduct the event study, I follow prior literature (e.g., Wagner et al., 2017) and estimate my regression with respect to the Capital Asset Pricing Model (CAPM) as follows:

$$R_{it} - R_f = \alpha_i + \beta_i * (R_{mt} - R_f) + \varepsilon_{it} \quad \textbf{(5-2)}$$

where R_{it} refers to normal return for stock i on day t, β_i refers to the regression coefficient of stock i, R_{mt} is a value-weighted return of market index on day t obtained from DataStream,

[59] I obtain indices from DataStream's ICB sector level 2, which sorts manufacturing firms into twenty supersectors.

and R_f denotes the risk-free rate.[60] The risk-free rate is the UK's one-month treasury-bill rate. Next, using the estimated coefficient in Equation (2), I compute the abnormal return, which indicates the net effects of an unanticipated event as follows:

$$AR_{it} = (R_{it} - R_f) - \hat{\beta}_i * (R_{mt} - R_f) \quad \textbf{(5-3)}$$

where AR_{it} denotes abnormal returns, it is the excess return on for stock i on day t less the product of beta ($\hat{\beta}_i$) and FTSE All-Share excess return, and where $\hat{\beta}_i$ is the ordinary least squares (OLS) parameter estimate obtained from the CAPM model in Equation (2). Subsequently, since, investors may react slowly to fundamental information (e.g., Chan, 2003), I consider different multi-day abnormal returns by aggregating each firm's abnormal returns centring on the selected event days. This provides a better picture of the overall impact of the event and the speed of their reaction. Thus, CAR is a measure of market reaction to news and is calculated as follows:

$$CAR[j,k]_i = \sum_{j}^{k} AR_{it} \quad \textbf{(5-4)}$$

in which $CAR[j,k]_i$ is the cumulative abnormal returns for stock i surrounding the event days starting from day j through k, j is the beginning date of selection and k is the last date of selection. Additionally, for robustness checks, I follow Brown and Warner (1985), and Liu et al. (2017) and use market-adjusted model that involves no estimation to measure abnormal return. It is the difference between the actual daily return for stock i and the market return.

Further, to examine the impact of Brexit further, I test my hypotheses by relating how cross-sectional variation in the CARs affects my variables of interest. To test the hypothesis, I run the following regression:

$$CAR_i = \beta_0 + \beta X_i + \emptyset Z_i + \varphi_j + \varepsilon_i \quad \textbf{(5-5)}$$

60 I use the FTSE All-Share index return as the market return. The FTSE All-Share index is the most comprehensive stock market index in the UK.

where X_i is the measure of the variable of interests for firm i used to test Hypotheses 1 to 3; and Z_i denotes a set of variables included to control for firm-level heterogeneity characteristics that could confound the results (e.g., Acemoglu et al., 2016; Wagner et al., 2017). I control for size effects (LnMVE), profitability (ROA), growth opportunities (Percent sales growth), and different aspects of firms' financial conditions (Leverage) (Table 5.1 reports the details of the computations). Last, I include industry dummies (φ_j) to control for time-invariant differences in my dependent variables at the industry level. Following Huang (2015), I base the industry fixed effects on two-digits ICB sector indices available at DataStream.

Data for all explanatory variables are from DataStream at the end December 31, 2015. However, there are 101 firms with March 31, 2016 data included as their financial year ended in other months. To test Hypothesis 1 that focuses on labour restriction, I use two alternative measures in the regressions. Labour immigration increases labour market supply and significantly influences the productive efficiency of firms (Ark et al., 2008). To the extent that labour is an important asset to production, lack of free labour movement post-BREXIT could adversely impact firm's productivity (e.g., Kuehn et al., 2017). Hence, I follow Lins et al. (2017) and use logarithm of sales per employee (LnSPEM) to proxy for labour productivity. Further, labour market regulation could adversely affect firm's hiring decisions. Thus, I use EMPHire as a measure for labour hiring decisions proposed by Belo and Lin (2014). EMPHire rate is computed as ((employee number$_t$ - employee number$_{t-1}$) / (0.5*(employee number$_t$ + employee number$_{t-1}$))*100). Due to the skewed distributions of EMPHire, I use the cube root in my analysis. In addition, the labour restriction would hinder firms' adversely affecting labour intensive firm's growth opportunities because of the inability to engage new employees. Accordingly, for robustness, I use the logarithm of number of employees (LnEMP) as proxy for labour intensive firms.

To address Hypothesis 2, I follow Coates (2012) and Werner (2017) and create a dummy variable equal to one for companies in the regulated (HIGH REGULATED) sectors and zero for the less regulated firms. Coates (2012) and Werner (2017) define regulated industry as: alcohol, tobacco, drugs, aircraft, guns, gold, oil, utilities, telecom, transportation, banks, insurance, and finance. In alternative specification, following Coates (2012) and Werner (2017) approach, I use a subset of industries that regulation is particularly comprehensive and are operating in the UK as a proxy for heavily regulated sectors (HIGH REGULATED2), namely:

alcohol, tobacco, drugs, aircraft, guns, utilities, telecom, transportation, banks, insurance, and finance. Further, for robustness checks, I follow Iliev (2010) approach and use the logarithm of total compliance costs (audit fees and non-audit fees) scaled by total assets as proxy for compliance costs. Next, to test my hypothesis 3, I use the percent of UK sales to total sales to proxy for domestic focused firms; EU sales to total sales to proxy for EU focused firms; and sales to other countries to total sales to proxy for internationally focused firms.

5.4 Empirical results

This section examines the cross-sectional stock market reactions to Brexit surprise both immediately (the outcome announcement date) and over various event windows (medium run) after the referendum result. Though there are no established criteria in the literature for choosing the length of the event window, I follow Acemoglu et al. (2016) and consider shorter-run return windows (Day 0 to Day 10) because of the time-varying changes in stock market expectations caused by the variability in Brexit implementation. I report results for shorter event windows (CAR[0, 0] and CAR[0, 2]), and longer windows (CAR[0, 10]). The subsections establish the factors that significantly explain stock prices reaction.

5.4.1 *Descriptive Statistics*

Table 5.1 presents the descriptive statistics for the variables used in the paper. Panel A provides summary statistics for the number of firms, and firm size (MVE) by industry. The panel shows a strong variation in firm size within industries, ranging from Real Estate with a mean market value of £668 million to Basic Resources with a mean market value of over £35 billion, and with industry average of £7,099 million, implying that my sample is representative of all firms. Panel B shows short-window cumulative abnormal returns (CAR) and market-adjusted returns (MADJCAR) used after Brexit event to measure the differential market response with varying number of days after the event. The cross-sectional zero-day abnormal return is negative with mean (median) value of -3.73% (-2.87%), variation ranges from -29.21% to 18.67% and standard deviation of 6.79%, suggesting that market reactions are more strongly negative (losers = -29.21%) than positive (winners = 18.67%). As is apparent, although the market reaction is negative at the beginning, it showed a considerable decline on Day[0, 2] (CAR= -

7.65%), while the 10-day event window is negative with a mean (median) CAR of 8.12% (7.00%), respectively, suggesting that investors are taking time to form their expectations.

Panel C shows the control variables used in the regression. The panel shows that the mean (median) firm size (MVE) is £7,099 (1,098) million before logarithmic transformation, suggesting a large variation in size. The mean (median) of ROA is 7.13% (5.71%), the cross-sectional variation ranges from -91.40% to 314.73%, and with a standard deviation of 18.86%. My sample of FTSE All-Share firms has a low percent sales growth (Mean = 7.19%), and relatively high debt to total assets ratio as suggested by a mean Leverage of 22.28% and median of 20.58%. Panel D reports the variables of interest used to test my hypotheses. Panel E reports the Spearman and Pearson correlation coefficients for the explanatory variables. Firm size (LnMVE) is highly correlated with LnEMP (Pearson=0.59). This suggests that the cross-sectional variation in firm size largely reflects variation in number of employees. Interestingly, there is a negative correlation (-0.40) between compliance costs (LnComplCost) and firm size, suggesting an inverse relationship, that is, compliance cost decreases as firm gets bigger. To moderate the influence of possible outliers, I winsorize all variables (except for dummy variables) at the 1st and 99th percentiles. All regressions include industry fixed effects. Indeed, the industry fixed effects control for unobserved but fixed heterogeneity among firms.

[INSERT Table 5.1]

5.4.1 Stock price responses to restriction on free labour movement

The first set of empirical tests examines the cross-section of stock market reactions to Brexit surprise over the short-run. It seeks to investigate the relevance of cross-border labour restrictions for stock returns, both immediately (the day of announcement) and over various event windows after the referendum outcome. In Table 5.2, I present the ordinary least squares estimates, first using the CAPM-adjusted returns (columns 1 to 3), then using the market-adjusted returns (columns 4 to 6), of each firm abnormal returns on the labour restriction proxies with controls variables, and also including industry fixed effects for Day 0 as well as the (0,2), and (0,10) event windows. In Column (1), using the CAPM-adjusted returns, it can be seen that the impact of restricting labour movement is negative for firms, using LnSPEM as proxy, suggesting the consequences of imposing labour regulation adversely affects the market.

To put the result in context, one-standard-deviation increase in labour restriction (LnSPEM) is associated with a 0.65 percentage point (-0.992*1.05 =$e^{-1.04}$-1) reduction in the CAPM-adjusted returns on the day of the announcement of the referendum outcome.

Columns (2) and (3) show a statistically significant association at 5% level or better between LnSPEM and the CAPM-adjusted cumulative abnormal returns (CAR) for up to Day 10 after the event. Contrasting the coefficients of LnSPEM in columns (1) to (3), I observe patterns of under-reaction to Brexit, which is strongest on Day 0, indicating limited investors' attention to the announcement on the first day. This is consistent with Hirshleifer and Teoh (2003), and Peng (2005), who show in theoretical models that limited investor attention can lead to market's underreaction to public information.

Columns (4) to (6) show similar results to those in columns (1) to (3). The coefficients on LnSPEM are both negative and significant at the 5% level or better. The magnitude of the coefficient in column (1) indicates that LnSPEM is associated with a reduction in abnormal returns of 0.61% ($e^{-0.936}$-1). Exploring price responses to the prospective labour rules, a one-standard-deviation increase in LnSPEM decreases MADJCAR on Day 0 by 0.63% (-0.936*1.05=$e^{-0.983}$-1), which is economically significant. To fully capture the expected labour regulation effects on returns, since MADJCAR measures the abnormal change in market value, on average, the market lost 24.25% (0.63/2.58) in value on Day 0, 12.63% (0.798/6.32) over Days (0 to 2), and by 9.64% over a longer window (Day 0 to 10). Using CAR, the market lost 17.35%, 10.64%, and 10.35% on Day 0, Days (0 to 2), and Day (0 to 10), respectively. The disproportionate fall in market values allows the initial uncertainty of the details of the probable change in new labour rule to be resolved and the impact fully incorporated into stock prices.

In Panel B, using the Market-adjusted returns, the results show that the coefficient of the variable of interest (EMPHire) is negative and statistically significant at the 10% levels or better in five of the six regressions for the three event windows, suggesting that the stock market expects firms to underperform following the introduction of labour regulation. A possible reason for the adverse response is probably that labour restriction could lead to a rise in the cost of hiring and firing workers, indicating reduction in firms' hiring decisions. The sharp negative response of the market is consistent with Belo and Lin (2014) who show that a decline in firms' hiring decisions would lead to a fall in stock returns. Overall, taken together,

the evidence in this section supports my hypothesis 1 that restricting free labour movement would adversely affect firms.

Looking at the control variables, the results in Table 5.2 show that stock of larger firms (measured by market value of equity) performed better after the referendum. The findings can be attributable to the investors' preference for more quality and liquidity stocks to minimise their exposure to the riskier assets during uncertainty (e.g., see Beber et al., 2009). Profitability (ROA) explains abnormal returns at 10% level only in column (1). Further, faster-growing firms (Percent sales growth) react less positively to Brexit, suggesting that the market is concerned economic and political uncertainty might affect their business operations.

Finally, turning to the industry dummies, Panels C and D of Table 5.2 present the winner and loser sectors. In columns (1) of Panel C, I consider the CAPM-adjusted model. The results show that several industries such as banks, personal and household goods, real estate, retail, and travel and leisure were among the losers while basic resources tend to be a winner. Interestingly, some of the loser sectors quickly reversed on Day[0, 2] (column 2) and Day[0, 10] (column 3) to winner sectors (e.g., Industrial Goods & Services), or statistically insignificant (e.g., Construction & Materials, Media), suggesting that stock prices reaction are likely to be driven by limited investor attention across sectors ascribable to the inadequate processing of newly arriving news signals. Similar to the CAPM-adjusted model, using the Market-adjusted model in columns (4) to (6) provide qualitative similar results. Again, Panel D results are similar to those documented in Panel C. Due to space constraints, I only present summary of winner and loser sectors in Panel D.[61] In sum, the results in Panels C and D taken together, suggest that investors expect some sectors (e.g., Basic Resources, Chemicals, and Oil and Gas companies) to benefit from labour regulation because majority of their business operations are located outside the EU, coupled with their underlying strength to access the global labour market. Another plausible reason is that these sectors require higher-skilled workforce, which can be supplied by post-study immigrants. Contrariwise, I find that the market perceive labour regulation could harm sectors such as the financial institutions (banks, financial services and insurance), real estates and retail sectors because they are in a precarious

[61] Further details are available on request.

position of losing their employees through emigration, and the decreasing supply of labour from the EU would strain productivity, impacting on their performance and growth potentials.

[INSERT Table 5.2]

5.4.1.1 Robustness tests

My results in Table 5.2 so far provide evidence of the effect of restricting free labour movement from the EU, proxies by labour productivity (LnSPEM) and firms hiring decisions (EMPHire), and support my hypothesis that investors consider labour restriction to have negative consequences on firms. Regulating labour movement could hamper firms with the larger workforce to replace employees, and ultimately reducing firms' performance regarding total factor productivity. Thus, to check for the robustness of the results obtained in the baseline regression, I rerun the analyses of returns on labour regulation, as measured by LnEMP, firm characteristics, and finally including industry fixed effects. Table 5.3 reports the regressions result from Equation (5). The table reveals that the coefficients on LnEMP are negative and significantly different from zero at the 10% level or better in four of the six regressions and qualitatively similar to Table 5.2, with slight variations in the significance levels. The estimates are still supportive of a negative market reaction to Brexit for firms related to market expectations of labour restrictions. Overall, the results in Table 5.3 lend credence to hypothesis 1 that market participants perceive that the introduction of labour regulation would be disadvantageous to firms.

[INSERT Table 5.3]

5.4.2 Stock price responses to changes in regulation

In this subsection, I examine the effect of Brexit on asset prices related to market participants' expectations of changes in regulation reflected in the government streamlining the EU-derived regulation to reduce the regulatory burden on firms. If future EU regulations are simplified and improved, the present value of the regulatory burden on firms will fall, and market value would rise. Table 5.4 presents the regression results. Panel A reports the results of the regression of each firm cumulative abnormal returns on the highly regulated sectors measures with firm characteristics, and also including industry fixed effects over three different event windows Day[0, 0], Day[0,2], and Day[0,10]. In columns (1) of Table 5.4, using CAPM-adjusted returns,

I find that the coefficient of the indicator variable for reforms of EU-derived rules, as measured by HIGH REGULATED, for Day[0,0] is positive and statistically significant at the 1% level (β=2.13, t-statistic=3.31). Similarly, the coefficients of interests (HIGH REGULATED) in columns (2) and (3) are positive and statistically different from zero at the 1% level. The evidence suggests that market considers the expected changes to the EU-derived laws beneficial to firms. The regression results are consistent with the prediction of hypothesis 2, market reactions to EU-derived deregulation are significantly more positive to firms in the regulated sectors relative to firms in less regulated sectors. To examine this relationship further, I repeat the analysis using market-adjusted cumulative abnormal returns as the dependent variables. Columns (4) to (6) show similar results. The coefficients of the indicator variable are positive and statistically significant at the 5% level or higher.

[INSERT Table 5.4]

To provide corroborating evidence on the impact of Brexit on stock prices related to expected deregulation of EU-derived laws, I rerun the analysis using HIGH REGULATED2 as the indicator variable. In Panel B of Table 5.4, I present the regression estimates, using the CAPM-adjusted returns (columns 1 to 3) and the market-adjusted returns (columns 4 to 6), of each firm abnormal returns on deregulation of EU-derived laws, as proxied by more restrictive regulatory sectors (HIGH REGULATED2). I report that Panel B results are qualitatively similar to Panel A, I find positive and statistically significant coefficients on the indicator variable. For example, using the CAPM-adjusted model, the coefficient on HIGH REGULATED2 is significantly positive at the 1% level (β=2.06, t-statistic=2.80) in column (1). To put this result in context, a change in the EU laws embedded into UK law is associated with an increase in abnormal returns or market value by 55.23% (2.06/3.73) on the announcement day (Day 0) and by 58.74% (4.77/8.12) over a longer event window (Day 0 to 10). The results suggest that market participants regard deregulation of EU laws beneficial as value increases for the regulated sectors.

Next, I turn to the other firm characteristics; I observe that the estimates for firm size (LnMVE) are positive and statistically significant at the 1% level in 10 of the 12 regressions in Panels A and B of Table 5.4. The evidence suggests that stocks of larger firms are associated with higher abnormal returns during the period of uncertainty. This can be attributable to investors' flight-to-quality and flight-to-liquidity during times of heightened uncertainty (e.g., see Beber et al.,

2009) and not a result of a change in expected policies. Again, similar to Table 5.2, firm growth opportunities proxy (as measured by Percent sales growth) is negative and significantly different from zero at the 10% level or higher in 11 of the 12 regressions in Table 5.4. The evidence suggests that investors are concerned about the prospects of growth stocks following the less predictable macroeconomic, fiscal policies, and regulatory uncertainty. Besides, I find that in general, profitability (ROA) do not predict stock price reactions. I observe similar pattern to that in Table 5.2. These results provide support for Wagner et al. (2017).

Finally, examining the industry dummies, summary results in Panels C and D show the winners and losers sectors. For example, the banks and the real estates' sectors are among the losers. Regarding the banking sector, the results are consistent with the idea that regulation deters risk-taking. Thus, investors' are concern that a reduction might induce banks' to increase their risk-taking, offsetting the advantage of reduced regulation. Alternatively, expectations regarding the critical role of the banking sector to the stability of the financial system would have informed the market trepidations that the government would not reduce the regulatory burden of the banking sector. Examining the real estates' sector, investors may be particularly concerned that the UK's real estate law varies widely from other EU member states and would not benefit from regulatory change; and instead, could be subject to additional regulation such as the land value tax canvassed by the labour party, that if imposed, can cause house prices to plummet.

5.4.2.1 Additional tests

So far, I have provided empirical evidence of the impact of Brexit on stock prices relating to deregulation. To examine the effect of EU regulation on changes in returns reported in Table 5.4 further, I adopt Iliev (2010) approach and use total compliance costs as a measure of regulatory costs. Panel A and B of Table 5.5 reports the regressions estimates that relate stock price responses to Brexit event on changes in EU-derived laws and firm characteristics (equation 5.5). The effects of a reduction in regulatory burden (proxy by LnComplCost) is statistically significant at the 1% level for all regressions, and the results are qualitatively similar to Table 5.4. The results suggest that firms paying higher compliance costs should have performed better once the government review and streamline the EU-derived laws. For example, the coefficient estimate of 1.69 (t-statistic=4.66) in column (1) of Panel A indicates

the market responds strongly to the heterogeneity across firms on the first day of Brexit outcome. Overall, the results reported in Table 5.5 suggests that investors arguably perceived that firms would benefit from a reduction in regulatory burden because of Brexit and that those firms heavily regulated would benefit more. This evidence provides further support for my hypothesis 2 that reduction in regulatory burden would be advantageous and that heavily regulated firm would benefit more.

[INSERT Table 5.5]

5.4.3 Stock price responses to trade

This subsection examines the cross-section of market reactions to Brexit outcome on stock prices related to domestic oriented trading firms, EU oriented trading firms and International oriented trading firms, proxied by Percent UK Sales, Percent EU Sales, and Percent Sales to other countries, respectively. In Table 5.6, Panel A shows the results of the cross-sectional regression of returns on domestic sales and firm controls. I find that the coefficients for the variable of interest (Percent UK Sales) are negative in all six regressions and statistically significant at the 1% level. For instance, in column (1) of Panel A, the effect is economically large because market value declines by 1.77% (0.066/3.73). Similarly, on average, the market lost 1.22% (0.093/7.65) in value over Days (0 to 2) in columns (2), and 1.35% (0.110/8.12) over a longer window (Day 0 to 10) in columns (3). The results suggest that investors are concerned that migration of EU nationals to other EU countries would affect the domestic market performance such as the UK housing and retail market. Additionally, market participants perceive that trade tariffs and the weak pound would increase importation costs and thus lower profitability. Another plausible interpretation is that market expects the less predictable macroeconomic and fiscal policies to impact on domestic focused firm's productivity and performance negatively.

Next, I investigated the impact of Brexit on stock prices related to businesses that focus on EU markets for trade. Table 5.6, Panel B reports the regression estimates of abnormal returns on Percent EU sales and firm controls. I find that the estimates of the indicator variable (Percent EU Sales) are significantly positive at the 5% level or higher. I interpret my results as evidence that market perceives UK government will pull through a bespoke and favourable trade

agreement with the EU might influence their positive expectations firms with focused trading activities in the EU markets would benefit. Further, another plausible reason is that the market perceives that Sterling depreciation following Brexit would act as a powerful export stimulus to the EU market, resulting in increased products competitiveness and profitability, which will likely offset the costs of tariffs imposed. In sum, I find evidence that market did not consider Brexit impact on firms reliant on the EU markets as disadvantageous. However, I caution that my finding only examines UK firms' exports to the EU, I could not consider UK's import from the EU because of data limitation on the firm level.

Finally, Panel C of Table 5.6 presents the regression results for the regression of returns on sales outside EU countries and firm characteristics. I find that the coefficients of the indicator variable (Percent Sales to other countries) are positive in all six regressions and statistically significant at the 1% level. A plausible interpretation is that investors expect that UK would sign favourable trade agreements with countries outside the EU because of their international influence, reflecting a better sales prospect for these firms. Additionally, the decline in exchange rates may have benefited firms involved in export sales. Meanwhile, it is also important to note that it is difficult to analyse all possible explanations for the poor (better) performance of the domestic (EU and non-EU countries) focused trading activities.

[INSERT Table 5.6]

5.4.3.1 Robustness checks

To check the robustness of my results, I construct three dummy variables. The first takes the value of '1' if percentage domestic sales is greater than 50% and '0' otherwise. The second dummy takes value of '1' if percentage sales to EU member states is greater than 50% and '0' otherwise. The third dummy takes value of '1' if percentage sales to other countries is greater than 50% and '0' otherwise. I then repeat the main tests using these dummy variables as my measure for domestic oriented trading firms, EU oriented trading firms, and International oriented trading firms. Table 5.7 presents regression estimates of cumulative abnormal returns on the dummy variables and controls, and including industry fixed effects. The results, presented in panel A show a negative and statistically significant effect (1% level) of Brexit on the stock market valuation of domestic focused firms, consistent with my previous results in panel A of Table 5.6. Overall, my results provide compelling evidence supporting the notion that investors' expectations of trade issues lower market values of national oriented firms.

Taken together, the evidence supports my hypothesis 3a that Brexit will adversely affect domestic focused firms.

In panel B of Table 5.7, the dummy for EU focused firms (Percent EU SalesD) is positive and marginally statistically significant in specifications (2) and (5) of the six specifications, suggesting that there is no strong evidence to show that market participants' expectation about trade issues precipitated by Brexit surprise affected stock prices of EU focused firms. This evidence is in contrast to the results in panel B of Table 5.6, suggesting the results are fairly inconsistent. Taken as a whole, the evidence of the impact of the Brexit on the stock market valuations of EU focused firms is not conclusive.

Panel C of Table 5.7 presents the regression results for the regression of returns on the dummy variable for sales internationally oriented trading firms, firm characteristics, and industry fixed effects. I find that the coefficients of the explanatory variable (Percent Sales to other countriesD) are positive in all six specifications and statistically significant at the 1% level. The results are qualitatively similar to that of panel C in Table 5.6. Overall, the cross-sectional analyses document strong evidence that indicates that the market expects internationally focused firms to benefit from Brexit. In summary, my findings support my hypothesis 3c that Brexit will positively affect internationally focused firms.

[INSERT Table 5.7]

5.4.4 Price contribution analysis

In the prior analyses, I examine stock price reactions to Brexit news revealed by market returns. I find evidence that the each of the different explanatory variable substantially affected stock returns post-Brexit. To provide insights on the speed of price adjustment to Brexit news for the three key elements (labour restriction, regulation and trade) discussed earlier, I analyse how much of new information from the different explanatory variables i is impounded into stock prices around the Brexit event up to day t. To assess the impact of price adjustment, I follow the price contribution (PC) approach of Barclay and Hendershott (2003) as extended by Wagner et al. (2017) in the analysis. Specifically, I calculate the market return cumulative price contribution measure, $PC_{t,T}^{M}$, using the formula:

$$PC_{t,T}^{M} = \frac{R_{0,t}}{R_{0,T}} \quad \textbf{(5-6)}$$

where $R_{0,t}$ is the cumulative market return from the Brexit announcement to trading day t, and $R_{0,T}$ is the cumulative market returns from Brexit event to a given end point T days in total. In addition, following Wagner et al. (2017), I estimate the cumulative price contribution corresponding to each variable i and on each trading day t, using the regression coefficients as:

$$PC_{t,T}^{i} = \frac{\beta_{0,t}^{i}}{\beta_{0,T}^{i}} \quad \textbf{(5-7)}$$

where $\beta_{0,t}^{i}$ represents the regression estimates of the different explanatory variables i from the Brexit announcement day to each trading day t, and $\beta_{0,T}^{i}$ represents the regression estimates relating from the event day to a given end point T days in total. If, by construction, $PC_{0,T}^{i}$ takes the value of zero, and $PC_{T,T}^{i}$ takes the value of one for all i, then $PC_{t,T}^{i}$ reveals the price adjustments in the cross-section of stock returns that has taken place by day t for each explanatory variable i toward the selected end point T days.

Similarly, to assess the speed that stock prices respond to each factor over the first T days after Brexit, I follow Wagner et al. (2017) and compute the cumulative variance contribution. The cumulative variance contribution for the market measures the speed of price adjustment up to day t, it is computed using the regression coefficients as:

$$VC_{t,T}^{M} = \frac{\sum_{s=1}^{t} (R_{0,t} - R_{0,t-1})^2}{\sum_{s=1}^{T} (R_{0,t} - R_{0,t-1})^2} \quad \textbf{(5-8)}$$

where by construction, $R_{0,0} = 0$, and substituting $R\ with\ \beta^{i}$ gives the corresponding measure for variable $i, VC_{t,T}^{i}$. Also, by construction $VC_{0,T}^{i} = 0$ and $VC_{T,T}^{i}$ for all explanatory variables i.

Using the first ten days after Brexit event and CAPM-adjusted abnormal returns, Panel A of Table 5.8 shows the cumulative price contributions. As the figure indicates, except for LnEMP, the first-day after the event contribute an average of 0.85 on returns of their ten-day effect, suggesting that substantial private and public information gathered overnight of the Brexit

event was already impounded into stock prices in the first trade of the ten trading days. Further, the results also show that price adjustment substantially differs among variables, implying that more time is required to digest information. For example, Percent Sales to other countries with a contribution of 0.99 on returns has the strongest impact on stock prices, EMPHire has the least impact with a value of 0.69 on returns, while the estimates of number of employees (LnEMP) is not statistically different from zero in Day-0 and Day[0, 2] of the ten trading days. This is consistent with the Barclay and Warner (1993) stealth trading hypothesis that suggests that price contribution would be disproportionate.

[INSERT Table 5.8]

Interestingly, the result shows that some variables were greater than one as stock prices respond to Brexit event along multiple dimensions. For instance, HIGH REGULATED has a PC of 1.07 on returns on Day (4), peaked on seventh-day (1.22) and reversed to 1.11 on returns on the ninth-day. Besides, the PC for the different explanatory variables for the ten trading days is stronger than the overall market except for LnEMP (Day 1 and 2) and EMPhire (on Day 5). In Panel B of Table 5.8, I report the PC using the market-adjusted returns. The results are qualitatively similar to Panel A. Perhaps the most noteworthy difference is that while the price contribution of LnEMP is not significantly different from zero on Day-1 and Day-2 in Panel A, it is insignificant only on Day (1) in Panel B. To more clearly visualize the adjustment dynamics of stock prices to Brexit event, I plot the PC over a 10-day trading period after Brexit. Figure 5.4 shows the results using CAPM-adjusted returns, and Figure 5.5 shows the results using Market-adjusted returns.

[INSERT figure 5.4]

[INSERT figure 5.5]

Figure 5.6 shows the cumulative variance contribution using the CAPM-adjusted returns. The evidence shows that about 50% of the variability in the highly regulated sector (HIGH REGULATED, HIGH REGULATED2 and LnComplCost) coefficients took place on the first day of the ten trading days, while none of the variability associated with LnEMP occurred on the first day. Looking at other days, the variability associated with all explanatory variables are above 50% reflected in prices on the third day. Further, the variability of all the variables but one (EMPHire) had essentially taken place by the seventh day, with cumulative variance

contribution of 75% or more, while it took EMPHire the eighth day to get 100% reflected in prices. Figure 5.7 shows similar results using Market-adjusted models. A remarkable difference is that the impact of LmEMP on Day-1 is negligible for CAPM-adjusted returns, but is somewhat smaller for Market adjusted returns.

[INSERT figure 5.6]

[INSERT figure 5.7]

In sum, the price variance contribution of the different explanatory variables discussed up to this point suggest that stock prices have incorporated about half of the effect of Brexit event on the first-day of the ten-day trading. The finding also reveals that gradual incorporation of public information, suggesting limited investor's attention. This is consistent with Hirshleifer and Teoh (2003), and Peng (2005) who show that limited investor attention can lead to investors' underreaction and slow price adjustments. In addition, the different variables contribute disproportionately to the discovery process. Further, the speed of price adjustment of the market is relatively lower on Day-1 and Day-2 compared to the different explanatory variables.

5.5 Conclusions

The outcome of the historic referendum on the UK's membership of the European Union (EU) surprised the nation and the financial markets. Expectations of limiting EU labour mobility, regulatory simplification and trade-related issues affected stock prices. This study examines stock price reactions to Brexit event from the announcement day to 10 days after the referendum. The study finds strong evidence that the stock returns reflects expectation of labour restrictions, change in regulation and geographical trading activities of firms.

In this paper, I find strong evidence that stock price reaction to Brexit surprise is negatively associated with expected labour regulation. According to my estimates, the effect lowers market value by 9.64% to 10.35% over a ten-day trading window. Specifically, investors likely downgrade labour intensive firms in anticipation that the UK will restrict free movement of labour while the non-labour intensive firms benefitted substantially.

I also find evidence that highly regulated sectors benefited substantially due to expectations of a reduction in regulatory burden. However, this expectation did not favour some sectors such as banking because the market is concerned that a reduction in regulation would increase their risk-taking activities. Alternatively, investors are also concerned that because of the role of the financial sector in the economy, the sector would not benefit from the reduction in regulatory burden.

I present evidence that investors downgrade firms that focus their trading activities in the domestic markets. Inventors are concerned that the domestic market would suffer from the impact of Brexit because (1) Sterling depreciation impact on the cost of importation, (2) imposition of tariffs to increase cost of sales, and (3) migration of EU nationals and businesses to other countries would impact on market size, adversely affecting firm performance. Next, I investigate how Brexit affects stock prices related to firms that focus EU markets for trade. Taken as a whole, my evidence is inconclusive and warrants further investigation. Further, I examine the effect of Brexit on stock prices of firms with focus on export to more distant markets outside the EU. My empirical analysis demonstrates that Brexit favoured internationally oriented stocks. Conceivably, investors expect that depreciation of the Sterling would increase the competitiveness of products in the international markets - enhancing revenue and margins. Additionally, market participants also suppose that the UK would reach a better trade deals with other countries.

I analyse the speed of price adjustment in the first ten days after Brexit and estimate how much of the price change due to the different explanatory variables are incorporated into stock prices on each day. I document differential speed of price adjustments across the different explanatory variables. Additionally, my study highlights the gradual incorporation of Brexit news into stock prices over the ten trading days. This likely to be attributable to investor inattention (e.g., Peng, 2005). Illiquidity can be another probable reason that contributes to the gradual impounding of information. This is evident by the positive coefficients of the size factor (LnMVE), suggesting investors' preference for more liquid assets because of uncertainty (e.g., see Beber et al., 2009).

It is worth stressing that my findings provide insights of the stock market reactions to anticipated policy changes following Brexit and not policy changes themselves. The process of the UK separation from the EU is laden with much uncertainty. The unfolding of substantial new information might revert investors' perception and stock prices.

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Table 5.1 Descriptive statistics

Panel A shows the number of firms per industry and firm size (MVE) at the end of March 2016 Panel B summarises the abnormal returns surrounding event days using the CAPM-adjusted returns and Market-adjusted returns for all days from June 24, 2016 to December 31, 2016. The parameter is calculated as the daily excess return on the stock minus the product of beta and FTSE All-Share excess return, where beta is estimated on daily excess returns from June 1, 2015 to May 31, 2016. 1-month T-bill rate is the risk-free rate. The market model-adjusted return is the raw return less the market return. AR indicates abnormal return, CAR indicates cumulative abnormal return and MADJCAR indicates market-adjusted cumulative abnormal return. Panel C summarises the control variables used in the regression. The CAR and MADJCAR are reported in percentage point throughout the paper. Firm size (MVE) is the market value (in millions of pounds) at the end of March 2016. Percent sales growth ((Revenue-$Revenue_{t-1}$/$Revenue_{t-1}$)*100), ROA (operating income/total assets*100), Leverage (total debt/total assets*100). Panel D summarises the primary variables of interest. HIGH REGULATED, HIGH REGULATED2, are dummy variables equals one if the industry is highly regulated industry. LnSPEM (log (sales/no. of employees)), LnEMP (log (no. of employees), EMPHire rate is computed as the cube root of (((employee $number_t$ - employee $number_{t-1}$) / (0.5*(employee $number_t$ + employee $number_{t-1}$))*100), Percent Foreign Assets (foreign assets/assets*100), Percent Foreign Op. Income (foreign operating income/operating income*100). Percent UK Sales (UK sales/sales*100), Percent EU Sales (EU sales/sales*100) and Percent Sales to other countries (sales to countries outside EU/sales*100) as of 2015 (31 December 2015 – 327 firms, 31 March 2016 – 101 firms). I hand-collect percent UK Sales, EU Sales and Sales to other countries data from their annual report. Panel E reports the correlation coefficients between the explanatory variables.

Panel A: Industry	# Firms	Min	Mean	Median	Max
Automobiles & Parts	1	5,687	5,687	5,687	5,687
Banks	10	681	26,732	11,837	130,502
Basic Resources	20	152	35,108	2,936	275,571
Chemicals	7	84	1,947	1,300	5,311
Construction & Materials	14	101	2,750	595	27,442
Financial Services	30	80	2,570	2,002	10,208
Food & Beverage	16	136	10,043	967	69,006
Health Care	21	126	12,053	1,354	76,696
Industrial Goods & Services	105	49	1,929	814	18,783
Insurance	19	143	6,585	2,906	42,007
Media	22	14	4,788	1,391	29,599
Oil & Gas	16	171	20,403	704	211,657
Personal & Household Goods	24	161	12,691	1,243	93,497
Real Estate	18	107	668	459	2,514
Retail	39	100	2,342	1,222	14,992
Technology	19	104	1,819	607	14,281
Telecommunications	6	555	18,263	2,831	58,748
Travel & Leisure	35	138	3,837	1,495	29,359
Utilities	7	1,537	11,604	6,294	36,970
Total	429	14	7,099	1,098	275,571

Panel B: Investors reaction measures								
	Obs.	**Min**	**P25**	**Mean**	**Median**	**P75**	**Max**	**Std. Dev.**
CAR[0, 0]	429	-29.21	-6.80	-3.73	-2.87	0.81	18.67	6.79
CAR[0, 2]	429	-62.96	-12.64	-7.65	-6.09	0.00	25.17	11.40
CAR[0, 10]	429	-78.41	-17.05	-8.12	-7.00	1.20	66.06	16.15
MADJCAR[0, 0]	429	-28.22	-5.40	-2.58	-1.36	1.70	20.78	6.75
MADJCAR[0, 2]	429	-60.77	-11.26	-6.32	-4.50	0.63	27.61	11.22
MADJCAR[0, 10]	429	-79.01	-17.65	-8.78	-7.60	0.73	63.89	16.24
Panel C: Control variables								
MVE (£'M)	429	14	431	7,099	1,098	3,638	275,571	24,093
Percent Sales Growth	429	-85.59	-1.84	7.19	3.91	12.49	474.54	33.34
ROA	429	-91.40	1.77	7.13	5.71	10.71	314.73	18.86
Leverage	429	0.00	6.37	22.28	20.58	32.82	166.61	19.90
Panel D: Primary variable of interests								
LnSPEM	416	1.80	4.76	5.38	5.22	5.93	9.75	1.05
EMPHire	414	-5.85	-1.21	0.91	1.69	2.26	5.85	2.11
LnEMP	416	2.56	7.22	8.37	8.35	9.59	13.32	1.79
HIGH REGULATED	429	0.00	0.00	0.30	0.00	1.00	1.00	0.46
HIGH REGULATED2	429	0.00	0.00	0.24	0.00	0.00	1.00	0.43
LnComplCost	349	-12.09	-7.98	-7.40	-7.23	-6.65	-4.17	1.15
Percent UK Sales	429	0.00	15.02	56.61	54.69	100.00	100.00	39.49
Percent EU Sales	429	0.00	0.00	13.02	4.31	20.58	100.00	18.37
Percent Sales to other countries	429	0.00	0.00	30.37	15.48	59.88	100.00	32.96

Panel E: Correlation Matrix (Spearman correlation coefficients are shown above the diagonal and Pearson below)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. HIGH REGULATED	**1**	0.84	-0.25	-0.15	0.32	-0.02	-0.04	-0.13	0.07	0.20	-0.18	-0.23	-0.13
2. HIGH REGULATED2	0.85	**1**	-0.21	-0.14	0.27	0.04	0.08	-0.11	-0.05	0.20	-0.05	-0.12	-0.17
3. LnComplCost	-0.27	-0.23	**1**	-0.20	-0.29	-0.02	-0.26	0.26	0.24	-0.36	0.03	0.16	-0.01
4. LnEMP	-0.10	-0.12	-0.17	**1**	-0.40	-0.20	-0.18	0.16	0.19	0.53	-0.18	-0.14	0.24
5. LnSPEM	0.30	0.25	-0.34	-0.41	**1**	0.10	0.13	-0.18	-0.10	0.24	0.05	0.06	-0.18
6. EMPHire	-0.04	0.02	0.00	-0.15	0.04	**1**	0.17	-0.04	-0.19	-0.02	0.54	0.11	-0.11
7. Percent UK Sales	-0.05	0.05	-0.25	-0.19	0.08	0.19	**1**	-0.66	-0.91	-0.19	0.20	0.09	-0.16
8. Percent EU Sales	-0.11	-0.08	0.18	0.10	-0.15	-0.04	-0.56	**1**	0.39	0.10	-0.07	0.03	0.08
9. Percent Sales to other countries	0.12	-0.02	0.20	0.18	-0.01	-0.21	-0.89	0.11	**1**	0.23	-0.20	-0.12	0.16
10. LnMVE	0.25	0.18	-0.40	0.59	0.24	-0.06	-0.25	0.03	0.29	**1**	-0.05	0.08	0.06
11. Percent Sales Growth	-0.03	0.05	0.07	-0.14	0.01	0.35	0.10	-0.02	-0.10	-0.09	**1**	0.22	-0.12
12. ROA	-0.13	-0.04	0.11	-0.12	0.11	0.04	0.09	-0.02	-0.10	0.05	0.00	**1**	-0.17
13. Leverage	-0.06	-0.12	0.00	0.16	-0.06	-0.06	-0.06	-0.02	0.08	0.10	-0.07	-0.14	**1**

Table 5.2 Restricting free labour movement

This table shows cumulative abnormal returns from CAPM-adjusted and market-adjusted model OLS regressions. Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. Panel A is the OLS regression of CAR on LnSPEM, firm characteristics and ICB level 2 industry fixed effects. Panel B is the OLS regression of CAR on EMPHire, firm characteristics and ICB level 2 industry fixed effects. The CAR is the cumulative abnormal returns for the different event windows around Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016. T-statistics shown in parentheses based on robust standard errors. Asterisks denote significance levels (*** p<0.01, ** p<0.05, * p<0.1).

Panel A	**CAPM-adjusted returns**			**Market-adjusted returns**		
	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
LnSPEM	-0.992***	-1.602***	-1.746**	-0.936***	-1.524***	-1.784**
	[-3.00]	[-3.11]	[-2.19]	[-2.62]	[-2.80]	[-2.27]
LnMVE	1.031***	2.241***	2.365***	0.489**	1.631***	2.684***
	[5.33]	[7.21]	[5.08]	[2.40]	[5.07]	[5.82]
Percent sales growth	-0.039***	-0.079***	-0.058	-0.036**	-0.075***	-0.06
	[-2.62]	[-3.36]	[-1.56]	[-2.32]	[-3.10]	[-1.63]
ROA	-0.050*	-0.04	-0.038	-0.027	-0.014	-0.051
	[-1.78]	[-0.82]	[-0.47]	[-0.97]	[-0.28]	[-0.64]
Leverage	0.007	0.011	-0.027	0.008	0.009	-0.027
	[0.44]	[0.42]	[-0.63]	[0.45]	[0.32]	[-0.62]
Constant	-2.176	-15.523***	-18.839***	1.160	-11.951***	-20.720***
	[-1.03]	[-4.62]	[-3.51]	[0.46]	[-3.33]	[-3.91]
Observations	416	416	416	416	416	416
R-squared	0.355	0.404	0.332	0.280	0.344	0.352
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Panel B	**CAPM-adjusted returns**			**Market-adjusted returns**		
EMPHire	-0.304*	-0.632**	-0.995**	-0.247	-0.559**	-1.033***
	[-1.94]	[-2.57]	[-2.60]	[-1.54]	[-2.21]	[-2.72]
LnMVE	0.95***	2.132***	2.221***	0.411**	1.525***	2.538***
	[5.11]	[7.17]	[4.86]	[2.10]	[4.93]	[5.61]
Percent sales growth	-0.032*	-0.06**	-0.024	-0.031*	-0.058**	-0.025
	[-1.8]	[-2.22]	[-0.60]	[-1.71]	[-2.13]	[-0.63]
ROA	-0.073***	-0.082*	-0.082	-0.049*	-0.053	-0.096
	[-2.90]	[-1.90]	[-1.06]	[-1.90]	[-1.22]	[-1.23]
Leverage	0.012	0.017	-0.02	0.014	0.016	-0.020
	[0.74]	[0.62]	[-0.47]	[0.77]	[0.55]	[-0.47]
Constant	-6.02***	-21.669***	-24.902***	-2.629	-17.868***	-26.887***
	[-3.73]	[-8.41]	[-6.46]	[-1.54]	[-6.64]	[-7.05]
Observations	413	413	413	413	413	413
R-squared	0.363	0.414	0.346	0.288	0.354	0.367
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5.2 ***(cont.)***
Supersector (ICB 2) winners and losers

This table presents the ICB 2 supersector winners and losers for labour productivity (LnSPEM). Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. The CAR is the cumulative abnormal returns for the different event windows around Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016. T-statistics shown in parentheses based on robust standard errors. Asterisks denote significance levels (*** p<0.01, ** p<0.05, * p<0.1).

Panel C: LnSPEM	**CAPM-adjusted returns**			**Market-adjusted returns**		
	(1)	(2)	(3)	(4)	(5)	(6)
ICB SUPRSECTOR NAME	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
Automobiles & Parts						
Banks	-12.130***	-16.420***	-17.630***	-11.275***	-15.489***	-18.197***
	[-4.67]	[-3.72]	[-3.24]	[-4.52]	[-3.57]	[-3.30]
Basic Resources	3.192***	10.576***	22.693***	2.834*	10.800***	22.68***
	[2.67]	[5.84]	[5.30]	[1.95]	[4.60]	[5.55]
Chemicals	0.718	7.400***	10.553***	1.454	8.257***	10.107***
	[0.50]	[4.70]	[3.95]	[1.13]	[5.92]	[3.72]
Construction & Materials	-5.353***	-4.154	-3.324	-3.678**	-2.194	-4.336
	[-3.03]	[-1.59]	[-0.72]	[-2.11]	[-0.85]	[-0.94]
Financial Services	-5.969***	-2.909	0.143	-5.423***	-2.318	-0.183
	[-6.14]	[-1.59]	[0.06]	[-5.36]	[-1.27]	[-0.08]
Food & Beverage	-0.581	5.344***	14.643***	1.528**	7.816***	13.365***
	[-0.80]	[3.83]	[6.52]	[1.98]	[5.64]	[5.92]
Health Care	0.806	9.730***	15.422***	2.749***	11.992***	14.256***
	[0.84]	[6.81]	[8.11]	[2.77]	[8.20]	[7.51]
Industrial Goods & Services	-2.284***	2.099*	5.311***	-0.932	3.705***	4.476***
	[-3.50]	[1.93]	[3.29]	[-1.40]	[3.34]	[2.79]
Insurance	-4.521***	-0.726	1.805	-3.05**	0.94	0.935
	[-3.24]	[-0.40]	[0.64]	[-2.04]	[0.49]	[0.34]
Media	-3.216**	1.546	6.13	-1.617	3.421	5.236
	[-2.28]	[0.69]	[1.54]	[-1.12]	[1.54]	[1.30]
Oil & Gas	1.178	7.983***	6.287*	0.229	6.953***	6.826*
	[1.15]	[5.48]	[1.78]	[0.21]	[4.56]	[1.95]
Personal & Household Goods	-6.861***	-6.472**	-2.57	-5.277**	-4.669	-3.492
	[-3.32]	[-2.14]	[-0.70]	[-2.46]	[-1.49]	[-0.97]
Real Estate	-8.231***	-6.073*	-7.823*	-6.490***	-4.016	-8.884**
	[-3.93]	[-1.82]	[-1.78]	[-2.86]	[-1.14]	[-2.06]
Retail	-5.769***	-2.458*	-2.724	-4.178***	-0.603	-3.682*
	[-6.99]	[-1.74]	[-1.38]	[-4.84]	[-0.42]	[-1.88]
Technology	-0.771	2.403	9.709**	0.777	4.028	8.814**
	[-0.71]	[0.95]	[2.26]	[0.75]	[1.58]	[2.04]
Telecommunications	-2.447	3.992*	8.677**	-0.869	5.845**	7.718**
	[-1.06]	[1.71]	[2.33]	[-0.38]	[2.58]	[2.04]
Travel & Leisure	-5.334***	-3.386**	0.129	-3.546***	-1.274	-0.959
	[-5.17]	[-2.23]	[0.06]	[-3.29]	[-0.81]	[-0.45]
Utilities	-1.282	7.642***	15.381***	0.518	9.780***	14.278***
	[-1.09]	[3.92]	[6.85]	[0.38]	[4.74]	[6.31]

Table 5.2 ***(cont.)***
Supersector (ICB 2) winners and losers
This table presents the ICB 2 supersector winners and losers for labour hiring decisions (EMPHire). Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. The CAR is the cumulative abnormal returns for the different event windows surrounding Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016.

Panel D: EMPHire	**CAPM-adjusted returns**			**Market-adjusted returns**		
	(1)	(2)	(3)	(4)	(5)	(6)
ICB SUPRSECTOR NAME	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
Automobiles & Parts						
Banks	Loser	Loser	Loser	Loser	Loser	Loser
Basic Resources	Winner	Winner	Winner	Winner	Winner	Winner
Chemicals		Winner	Winner		Winner	Winner
Construction & Materials	Loser	Loser		Loser		
Financial Services	Loser	Loser	Loser	Loser		
Food & Beverage		Winner	Winner	Winner	Winner	Winner
Health Care		Winner	Winner	Winner	Winner	Winner
Industrial Goods & Services	Loser		Winner		Winner	Winner
Insurance	Loser	Loser		Loser		
Media	Loser					
Oil & Gas		Winner			Winner	Winner
Personal & Household Goods	Loser	Loser	Loser	Loser		
Real Estate	Loser	Loser	Loser	Loser		Loser
Retail	Loser	Loser	Loser	Loser		Loser
Technology			Winner			Winner
Telecommunications	Loser				Winner	Winner
Travel & Leisure	Loser	Loser		Loser		
Utilities	Loser	Winner	Winner		Winner	Winner

Table 5.3 Restricting free labour movement

This Table presents the coefficient estimates of OLS regression of individual cumulative abnormal returns on LnEMP, firm characteristics and ICB level 2 industry fixed effects. Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. The CAR is the cumulative abnormal returns for the different event windows around Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016. T-statistics shown in parentheses based on robust standard errors. Asterisks denote significance levels (*** p<0.01, ** p<0.05, * p<0.1).

Panel A	**CAPM-adjusted returns**			**Market-adjusted returns**		
	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
LnEMP	-0.275	-0.561	-1.700***	-0.376*	-0.702*	-1.630***
	[-1.23]	[-1.60]	[-2.76]	[-1.66]	[-1.94]	[-2.66]
LnMVE	1.115***	2.460***	3.371***	0.650**	1.957***	3.636***
	[4.60]	[6.30]	[5.00]	[2.54]	[4.81]	[5.43]
Percent sales growth	-0.046***	-0.091***	-0.082**	-0.043***	-0.088***	-0.083**
	[-3.02]	[-3.84]	[-2.19]	[-2.79]	[-3.66]	[-2.24]
ROA	-0.067**	-0.071	-0.098	-0.047*	-0.047	-0.110
	[-2.45]	[-1.47]	[-1.18]	[-1.70]	[-0.98]	[-1.31]
Leverage	0.010	0.016	-0.018	0.011	0.015	-0.018
	[0.61]	[0.61]	[-0.43]	[0.62]	[0.51]	[-0.42]
Constant	-4.909**	-19.386***	-17.925***	-0.973	-14.833***	-20.288***
	[-2.48]	[-6.20]	[-3.94]	[-0.47]	[-4.62]	[-4.49]
Observations	416	416	416	416	416	416
R-squared	0.342	0.393	0.337	0.270	0.336	0.356
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5.4 High regulated industry

This Table shows cumulative abnormal returns from CAPM-adjusted and market-adjusted model OLS regressions. Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. Panel A is the OLS regression of CAR on HIGH REGULATED, firm characteristics and ICB level 2 industry fixed effects. Panel B is the OLS regression of CAR on HIGH REGULATED2, firm characteristics and ICB level 2 fixed effects. The CAR is the cumulative abnormal returns for the different event windows around Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016. T-statistics shown in parentheses based on robust standard errors. Asterisks denote significance levels (*** p<0.01, ** p<0.05, * p<0.1).

Panel A	**CAPM-adjusted returns**			**Market-adjusted returns**		
	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
HIGH REGULATED	2.132***	3.808***	5.515***	2.224***	3.952***	5.480***
	[3.31]	[3.94]	[3.15]	[3.24]	[3.85]	[3.19]
LnMVE	0.804***	1.845***	1.917***	0.229	1.194***	2.216***
	[4.21]	[5.99]	[4.23]	[1.12]	[3.69]	[4.90]
Percent sales growth	-0.037**	-0.068**	-0.057	-0.032**	-0.061**	-0.060*
	[-2.53]	[-2.87]	[-1.61]	[-2.09]	[-2.52]	[-1.71]
ROA	-0.062**	-0.066	-0.051	-0.038	-0.038	-0.066
	[-2.32]	[-1.41]	[-0.66]	[-1.43]	[-0.8]	[-0.84]
Leverage	0.017	0.028	-0.004	0.02	0.028	-0.002
	[1.07]	[1.02]	[-0.09]	[1.11]	[0.96]	[-0.06]
Constant	-5.327***	-20.373***	-24.054***	-1.561	-16.099***	-25.963***
	[-3.27]	[-7.76]	[-6.32]	[-0.89]	[-5.82]	[-6.84]
Observations	429	429	429	429	429	429
R-squared	0.334	0.379	0.316	0.249	0.312	0.336
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Panel B	**CAPM-adjusted returns**			**Market-adjusted returns**		
HIGH REGULATED2	2.055***	4.162***	4.765**	2.182***	4.287***	4.725**
	[2.80]	[3.52]	[2.52]	[2.93]	[3.52]	[2.53]
LnMVE	0.821***	1.872***	1.966***	0.247	1.222***	2.266***
	[4.32]	[6.11]	[4.32]	[1.21]	[3.78]	[4.99]
Percent sales growth	-0.038***	-0.07***	-0.06*	-0.033**	-0.064***	-0.064*
	[-2.64]	[-2.98]	[-1.71]	[-2.20]	[-2.62]	[-1.81]
ROA	-0.064**	-0.070	-0.058	-0.041	-0.042	-0.072
	[-2.40]	[-1.49]	[-0.74]	[-1.52]	[-0.89]	[-0.92]
Leverage	0.016	0.026	-0.008	0.018	0.026	-0.007
	[0.97]	[0.95]	[-0.19]	[1.01]	[0.88]	[-0.17]
Constant	-5.444***	-20.557***	-24.386***	-1.681	-16.291***	-26.293***
	[-3.35]	[-7.85]	[-6.38]	[-0.96]	[-5.9]	[-6.91]
Observations	429	429	429	429	429	429
R-squared	0.331	0.378	0.312	0.247	0.311	0.333
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 4 *(cont.)*

Supersector (ICB 2) winners and losers (High regulated industry)

This table presents the ICB 2 supersector winners and losers. Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. Panel A is the sector dummies of OLS regression of CAR on HIGH REGULATED, firm characteristics and ICB level 2 industry fixed effects. The CAR is the cumulative abnormal returns for the different event windows around Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016. T-statistics shown in parentheses based on robust standard errors. Asterisks denote significance levels (*** p<0.01, ** p<0.05, * p<0.1).

Panel C: HIGH REGULATED	**CAPM-adjusted returns**			**Market-adjusted returns**		
	(1)	(2)	(3)	(4)	(5)	(6)
ICB SUPRSECTOR NAME	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
Automobiles & Parts						
Banks	-14.623***	-20.825***	-23.766***	-13.837***	-20.005***	-24.309***
	[-5.17]	[-4.34]	[-3.99]	[-5.06]	[-4.22]	[-4.03]
Basic Resources	0.514	5.970***	16.024***	-0.158	5.772**	16.149***
	[0.43]	[3.34]	[3.93]	[-0.11]	[2.54]	[4.15]
Chemicals	-0.408	5.591***	8.382***	0.300	6.42***	7.878***
	[-0.3]	[3.57]	[3.24]	[0.24]	[4.4]	[3.01]
Construction & Materials	-6.041***	-5.331**	-4.670	-4.432*	-3.450	-5.726
	[-3.48]	[-2.05]	[-0.99]	[-2.58]	[-1.35]	[-1.22]
Financial Services	-8.970***	-8.056***	-6.954**	-8.184***	-7.194***	-7.039**
	[-7.64]	[-4.05]	[-2.49]	[-6.35]	[-3.41]	[-2.50]
Food & Beverage	-1.433**	3.956***	12.753***	0.628	6.364***	11.439***
	[-2.01]	[3.13]	[6.14]	[0.82]	[5.05]	[5.49]
Health Care	-0.817	7.224***	11.221***	1.005	9.314***	10.065***
	[-0.81]	[4.59]	[5.08]	[0.91]	[5.47]	[4.66]
Industrial Goods & Services	-3.051***	0.86	3.584**	-1.774**	2.364**	2.707
	[-4.42]	[0.75]	[2.16]	[-2.51]	[2.01]	[1.64]
Insurance	-7.877***	-6.329***	-5.470*	-6.378***	-4.643**	-6.399**
	[-5.09]	[-3.12]	[-1.73]	[-3.88]	[-2.20]	[-2.07]
Media	-3.993***	0.262	4.56	-2.456	2.061	3.628
	[-2.73]	[0.12]	[1.16]	[-1.63]	[0.93]	[0.92]
Oil & Gas	-1.405	3.676**	0.613	-2.381**	2.604*	1.079
	[-1.42]	[2.53]	[0.17]	[-2.32]	[1.71]	[0.31]
Personal & Household Goods	-7.846***	-8.098**	-4.405	-6.266***	-6.295*	-5.360
	[-3.61]	[-2.51]	[-1.17]	[-2.78]	[-1.89]	[-1.45]
Real Estate	-8.907***	-6.828***	-7.540**	-6.973***	-4.536	-8.839**
	[-5.57]	[-2.61]	[-1.99]	[-3.96]	[-1.62]	[-2.39]
Retail	-6.087***	-3.030**	-3.416*	-4.571***	-1.270	-4.394**
	[-7.49]	[-2.14]	[-1.74]	[-5.35]	[-0.87]	[-2.27]
Technology	-0.973	1.908	9.273**	0.467	3.397	8.370*
	[-0.87]	[0.73]	[2.10]	[0.43]	[1.29]	[1.87]
Telecommunications	-5.698**	-1.585	1.019	-4.199*	0.145	0.05
	[-2.45]	[-0.66]	[0.27]	[-1.81]	[0.06]	[0.01]
Travel & Leisure	-5.572***	-3.808**	-0.480	-3.872***	-1.807	-1.585
	[-5.16]	[-2.45]	[-0.22]	[-3.44]	[-1.12]	[-0.73]
Utilities	-5.028***	1.255	6.863**	-3.273**	3.318	5.729**
	[-3.54]	[0.54]	[2.45]	[-2.02]	[1.34]	[2.08]

Table 4 (*cont.*)
Supersector (ICB 2) winners and losers (Highly regulated sector)
This table presents a summary of ICB 2 supersector winners and losers sector dummies of HIGH REGULATED2. Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. The CAR is the cumulative abnormal returns for the different event windows around Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016.

	CAPM-adjusted returns			**Market-adjusted returns**		
Panel D: HIGH REGULATED2	(1)	(2)	(3)	(4)	(5)	(6)
ICB SUPRSECTOR NAME	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
Automobiles & Parts						
Banks	Loser	Loser	Loser	Loser	Loser	Loser
Basic Resources	Winner	Winner	Winner		Winner	Winner
Chemicals		Winner	Winner		Winner	Winner
Construction & Materials	Loser	Loser		Loser		
Financial Services	Loser	Loser	Loser	Loser	Loser	Loser
Food & Beverage	Loser	Winner	Loser		Winner	Winner
Health Care		Winner	Winner		Winner	Winner
Industrial Goods & Services	Loser		Winner	Loser	Winner	Winner
Insurance	Loser	Loser		Loser	Loser	Loser
Media	Loser					
Oil & Gas		Winner			Winner	
Personal & Household Goods	Loser	Loser		Loser	Loser	
Real Estate	Loser	Loser	Loser	Loser		Loser
Retail	Loser	Loser	Loser	Loser		Loser
Technology			Winner			Winner
Telecommunications	Loser			Loser		
Travel & Leisure	Loser	Loser		Loser		
Utilities	Loser		Winner	Loser		Winner

Table 5.5 Regulatory compliance costs

This table shows cumulative abnormal returns from CAPM-adjusted and market-adjusted model OLS regressions. Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. Panel A is the OLS regression of CAR on compliance costs (LnComplCost), firm characteristics and ICB level 2 industry fixed effects. The CAR is the cumulative abnormal returns for the different event windows around Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016. T-statistics shown in parentheses based on robust standard errors. Asterisks denote significance levels (*** p<0.01, ** p<0.05, * p<0.1).

Panel A	**CAPM-adjusted returns**			**Market-adjusted returns**		
	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
LnComplCost	1.694***	2.452***	3.093***	1.688***	2.414***	3.102***
	[4.66]	[4.16]	[3.95]	[4.38]	[3.95]	[4.01]
LnMVE	1.668***	3.229***	3.731***	1.178***	2.678***	4.025***
	[7.37]	[8.88]	[7.35]	[4.94]	[7.11]	[8.02]
Percent sales growth	-0.027*	-0.058**	-0.011	-0.023	-0.052**	-0.014
	[-1.80]	[-2.41]	[-0.30]	[-1.44]	[-2.10]	[-0.37]
ROA	-0.092***	-0.115**	-0.083	-0.067***	-0.084*	-0.098
	[-3.11]	[-2.4]	[-1.25]	[-2.20]	[-1.74]	[-1.47]
Leverage	0.026	0.045	0.037	0.026**	0.042	0.038
	[1.48]	[1.61]	[0.86]	[1.38]	[1.40]	[0.90]
Constant	-0.959	-15.251***	-18.651***	2.054	-12.067***	-20.439***
	[-0.36]	[-3.57]	[-3.07]	[0.73]	[-2.68]	[-3.4]
Observations	349	349	349	349	349	349
R-squared	0.437	0.476	0.439	0.363	0.419	0.460
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5.6 Firm geographical trading segments

This table shows cumulative abnormal returns from CAPM-adjusted and market-adjusted model OLS regressions. Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. Panel A is the OLS regression of CAR on Percent UK Sales, firm characteristics and ICB level 2 industry fixed effects. Panel B is the OLS regression of CAR on Percent EU Sales, firm characteristics and ICB level 2 fixed effects. Panel C is the OLS regression of CAR on Percent Sales to other countries, firm characteristics and ICB level 2 fixed effects. The CAR is the cumulative abnormal returns for the different event windows around Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016. T-statistics shown in parentheses based on robust standard errors. Asterisks denote significance levels (*** p<0.01, ** p<0.05, * p<0.1).

Panel A	**CAPM-adjusted returns**			**Market-adjusted returns**		
	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
Percent UK Sales	-0.066***	-0.093***	-0.110***	-0.062***	-0.087***	-0.113***
	[-7.78]	[-7.10]	[-5.30]	[-6.87]	[-6.19]	[-5.52]
LnMVE	0.346*	1.216***	1.187**	-0.196	0.614*	1.467***
	[1.81]	[4.06]	[2.52]	[-0.94]	[1.90]	[3.15]
Percent sales growth	-0.027*	-0.054**	-0.041	-0.022	-0.049**	-0.044
	[-1.88]	[-2.33]	[-1.19]	[-1.49]	[-2.01]	[-1.29]
ROA	-0.052*	-0.053	-0.038	-0.029	-0.026	-0.052
	[-1.94]	[-1.15]	[-0.49]	[-1.1]	[-0.57]	[-0.66]
Leverage	0.012	0.019	-0.017	0.014	0.019	-0.015
	[0.78]	[0.72]	[-0.40]	[0.83]	[0.66]	[-0.38]
Constant	-0.477	-13.658***	-16.199***	2.961	-9.88***	-17.902***
	[-0.29]	[-5.31]	[-4.08]	[1.63]	[-3.55]	[-4.57]
Observations	429	429	429	429	429	429
R-squared	0.430	0.444	0.360	0.335	0.369	0.382
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Panel B						
Percent EU Sales	0.047***	0.071***	0.105***	0.041**	0.064***	0.108***
	[3.02]	[3.14]	[3.01]	[2.55]	[2.70]	[3.11]
LnMVE	0.792***	1.835***	1.900**	0.224	1.194***	2.197***
	[4.20]	[6.07]	[4.21]	[1.10]	[3.73]	[4.89]
Percent sales growth	-0.037**	-0.068***	-0.057*	-0.032**	-0.062**	-0.061*
	[-2.59]	[-2.94]	[-1.66]	[-2.14]	[-2.57]	[-1.76]
ROA	-0.063**	-0.069	-0.055	-0.04	-0.041	-0.070
	[-2.34]	[-1.46]	[-0.71]	[-1.48]	[-0.87]	[-0.89]
Leverage	0.015	0.024	-0.010	0.017	0.023	-0.009
	[0.93]	[0.86]	[-0.24]	[0.96]	[0.78]	[-0.21]
Constant	-5.74***	-21.062***	-25.061***	-1.963	-16.772***	-26.975***
	[-3.59]	[-8.14]	[-6.62]	[-1.13]	[-6.11]	[-7.16]
Observations	429	429	429	429	429	429
R-squared	0.340	0.382	0.320	0.252	0.313	0.341
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel C	CAPM-adjusted returns			Market-adjusted returns		
	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
Percent Sales to other countries	0.076***	0.105***	0.116***	0.072***	0.099***	0.119***
	[8.05]	[7.03]	[4.81]	[7.25]	[6.21]	[5.02]
LnMVE	0.339*	1.220***	1.245**	-0.209	0.612*	1.525***
	[1.72]	[3.94]	[2.58]	[-0.98]	[1.84]	[3.19]
Percent sales growth	-0.028*	-0.056**	-0.044	-0.023	-0.050**	-0.047
	[-1.92]	[-2.36]	[-1.26]	[-1.54]	[-2.06]	[-1.35]
ROA	-0.053**	-0.055	-0.042	-0.031	-0.028	-0.055
	[-2.05]	[-1.21]	[-0.54]	[-1.17]	[-0.62]	[-0.71]
Leverage	0.008	0.014	-0.022	0.011	0.014	-0.021
	[0.55]	[0.54]	[-0.53]	[0.64]	[0.50]	[-0.51]
Constant	-6.948***	-22.690***	-26.759***	-3.120*	-18.319***	-28.716***
	[-4.55]	[-9.12]	[-7.06]	[-1.88]	[-6.92]	[-7.61]
Observations	429	429	429	429	429	429
R-squared	0.423	0.436	0.348	0.331	0.363	0.370
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5.7 Firm geographical trading segments

This table shows cumulative abnormal returns from CAPM-adjusted and market-adjusted model OLS regressions. Columns (1) to (3) use CAPM-adjusted returns and columns (4) to (6) use market-adjusted returns. Panel A is the OLS regression of CAR on Percent UK Sales, firm characteristics and ICB level 2 industry fixed effects. Panel B is the OLS regression of CAR on Percent EU Sales, firm characteristics and ICB level 2 fixed effects. Panel C is the OLS regression of CAR on Percent Sales to other countries, firm characteristics and ICB level 2 fixed effects. The CAR is the cumulative abnormal returns for the different event windows around Brexit outcome of June 24, 2016 (Day 0) and up to July 11, 2016 (Day 10), as indicated. The sample includes FTSE All-Share index constituents as at May 31, 2016. T-statistics shown in parentheses based on robust standard errors. Asterisks denote significance levels (*** p<0.01, ** p<0.05, * p<0.1).

Panel A	**CAPM-adjusted returns**			**Market-adjusted returns**		
	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
Percent UK SalesD	-4.357***	-6.174***	-7.543***	-4.103***	-5.797***	-7.708***
	[-6.97]	[-6.30]	[-4.84]	[-6.25]	[-5.64]	[-5.01]
LnMVE	0.456**	1.364***	1.343***	-0.095	0.748**	1.628***
	[2.41]	[4.56]	[2.87]	[-0.46]	[2.34]	[3.51]
Percent sales growth	-0.028**	-0.056**	-0.043	-0.024	-0.050**	-0.046
	[-2.01]	[-2.45]	[-1.25]	[-1.59]	[-2.11]	[-1.35]
ROA	-0.057**	-0.06	-0.045	-0.034	-0.032	-0.059
	[-2.14]	[-1.29]	[-0.58]	[-1.28]	[-0.70]	[-0.75]
Leverage	0.014	0.022	-0.013	0.016	0.022	-0.011
	[0.91]	[0.83]	[-0.30]	[0.94]	[0.76]	[-0.27]
Constant	-2.315	-16.189***	-19.033***	1.252	-12.210***	-20.815***
	[-1.44]	[-6.43]	[-4.93]	[0.72]	[-4.52]	[-5.44]
Observations	429	429	429	429	429	429
R-squared	0.404	0.426	0.350	0.312	0.354	0.372
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Panel B						
Percent EU SalesD	1.369	2.762*	4.200	1.344	2.749*	4.126
	[1.49]	[1.89]	[1.58]	[1.42]	[1.85]	[1.55]
LnMVE	0.855***	1.939***	2.056***	0.281	1.29***	2.354***
	[4.51]	[6.32]	[4.53]	[1.38]	[4]	[5.21]
Percent sales growth	-0.038***	-0.069***	-0.059*	-0.033**	-0.063***	-0.062*
	[-2.65]	[-3]	[-1.69]	[-2.2]	[-2.63]	[-1.8]
ROA	-0.064**	-0.07	-0.057	-0.041	-0.042	-0.071
	[-2.39]	[-1.49]	[-0.73]	[-1.52]	[-0.89]	[-0.91]
Leverage	0.014	0.022	-0.012	0.016	0.022	-0.011
	[0.86]	[0.81]	[-0.29]	[0.9]	[0.75]	[-0.27]
Constant	-5.706***	-21.087***	-25.111***	-1.947	-16.826***	-27.008***
	[-3.52]	[-8.04]	[-6.59]	[-1.12]	[-6.08]	[-7.11]
Observations	429	429	429	429	429	429
R-squared	0.329	0.375	0.312	0.244	0.307	0.332
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel C	CAPM-adjusted returns			Market-adjusted returns		
	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[0, 0]	[0, 2]	[0, 10]	[0, 0]	[0, 2]	[0, 10]
Percent Sales to other countriesD	4.550***	6.442***	7.886***	4.303***	6.054***	8.093***
	[7.43]	[6.50]	[5.08]	[6.75]	[5.82]	[5.29]
LnMVE	0.454**	1.361***	1.338***	-0.099	0.745**	1.620***
	[2.32]	[4.37]	[2.83]	[-0.47]	[2.24]	[3.45]
Percent sales growth	-0.032**	-0.062**	-0.050	-0.028*	-0.056**	-0.053
	[-2.20]	[-2.59]	[-1.44]	[-1.81]	[-2.27]	[-1.54]
ROA	-0.058**	-0.061	-0.046	-0.035	-0.033	-0.060
	[-2.28]	[-1.36]	[-0.62]	[-1.36]	[-0.75]	[-0.79]
Leverage	0.010	0.017	-0.020	0.013	0.017	-0.018
	[0.65]	[0.62]	[-0.46]	[0.72]	[0.57]	[-0.44]
Constant	-6.773***	-22.505***	-26.754***	-2.951*	-18.141***	-28.714***
	[-4.45]	[-9.05]	[-7.14]	[-1.78]	[-6.86]	[-7.70]
Observations	429	429	429	429	429	429
R-squared	0.403	0.425	0.349	0.311	0.353	0.371
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5.8 Cumulative price contributions

Cumulative price contribution using CAPM-adjusted returns and Market-adjusted returns. This figure shows the cumulative price contributions of the different variables of interests and of the market return during the ten trading days after the Brexit outcome

	HIGH REGULATED	HIGH REGULATED2	LnComplCost	LnEMP	LnSPEM	EMPHire	Percent UK Sales	Percent EU Sales	Percent Sales to other countries	Market Return
CAPM-Adjusted model										
Day, 0-1	0.75	0.97	0.83		0.93	0.69	0.92	0.74	0.99	-3.11
Day, 0-2	0.69	0.87	0.79		0.92	0.63	0.84	0.68	0.90	-1.92
Day, 0-3	0.92	1.14	0.75	0.56	0.86	0.53	0.78	0.50	0.88	-0.40
Day, 0-4	1.07	1.38	0.81	0.69	0.91	0.58	0.82	0.60	0.90	0.55
Day, 0-5	1.14	1.39	0.82	0.85	0.70	0.53	0.79	0.63	0.86	1.04
Day, 0-6	1.15	1.36	0.91	0.87	0.72	0.67	0.95	0.83	0.99	0.59
Day, 0-7	1.22	1.32	1.10	0.90	0.81	0.74	1.09	0.95	1.14	0.54
Day, 0-8	1.16	1.19	1.16	1.03	1.06	1.03	1.12	0.95	1.18	0.06
Day, 0-9	1.11	1.24	1.17	1.00	1.05	1.03	1.08	1.03	1.09	0.57
Day, 0-10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Market-adjusted model										
Day, 0-1	0.79	1.02	0.82		0.84	0.54	0.82	0.63	0.88	-3.11
Day, 0-2	0.72	0.91	0.78	0.43	0.85	0.53	0.77	0.59	0.83	-1.92
Day, 0-3	0.93	1.16	0.74	0.60	0.84	0.49	0.75	0.47	0.85	-0.40
Day, 0-4	1.08	1.39	0.81	0.70	0.90	0.57	0.81	0.60	0.89	0.55
Day, 0-5	1.14	1.40	0.82	0.84	0.71	0.55	0.80	0.64	0.86	1.04
Day, 0-6	1.16	1.37	0.92	0.88	0.72	0.67	0.94	0.83	0.98	0.59
Day, 0-7	1.23	1.33	1.10	0.92	0.81	0.73	1.08	0.94	1.12	0.54
Day, 0-8	1.17	1.20	1.16	1.08	1.04	1.00	1.09	0.93	1.15	0.06
Day, 0-9	1.11	1.25	1.17	1.02	1.04	1.01	1.06	1.02	1.08	0.57
Day, 0-10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

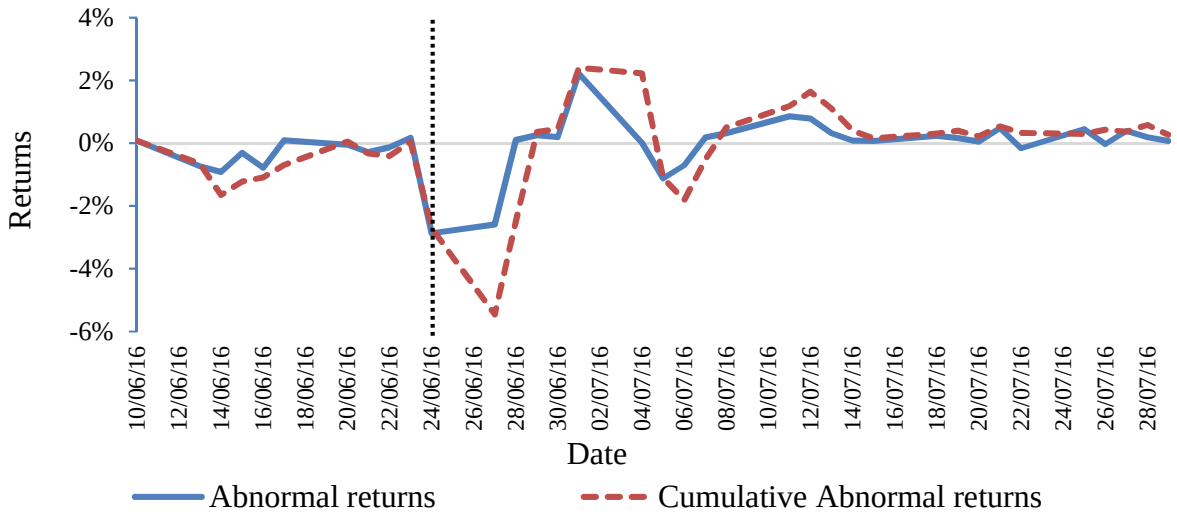

Figure 5.1 Abnormal returns and cumulative abnormal returns in the election week and beyond.
This figure shows the abnormal returns and the cumulative abnormal returns from June 10, 2016 to July 29, 2016 (days -10 to +25 around the June 24 announcement). Computation of abnormal returns discussed in session 3.2 and estimated from June 01, 2015 to May 31, 2016.

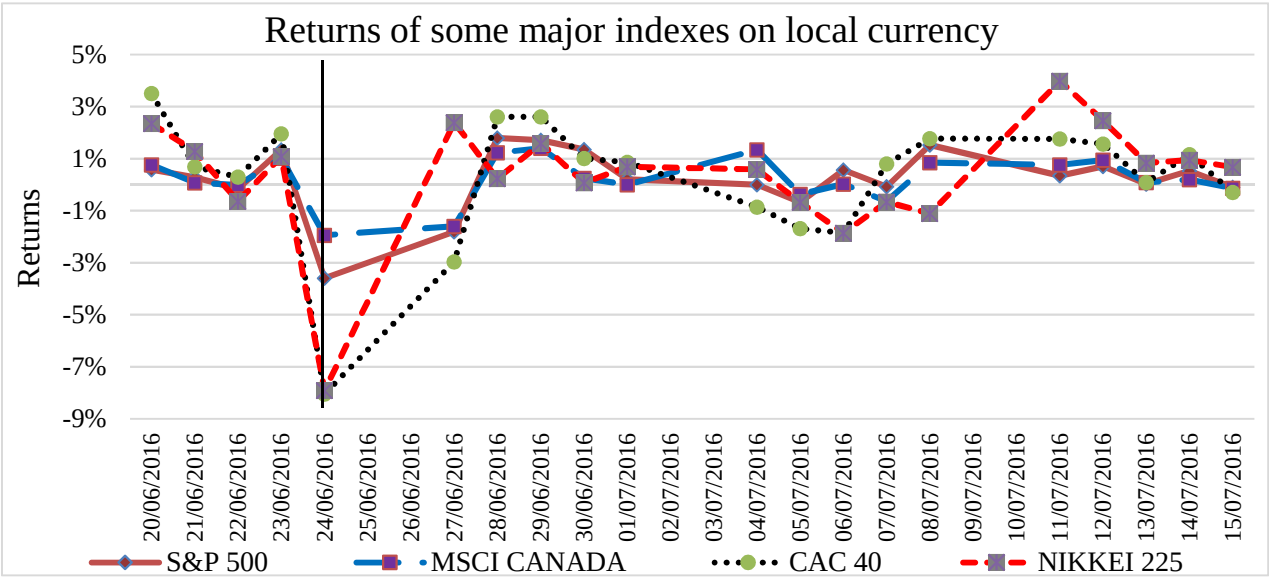

Figure 5.2 Returns of some indexes in local currency.
This figure shows the returns in each of the four days prior to the referendum as well as returns up to July 15, 2016.

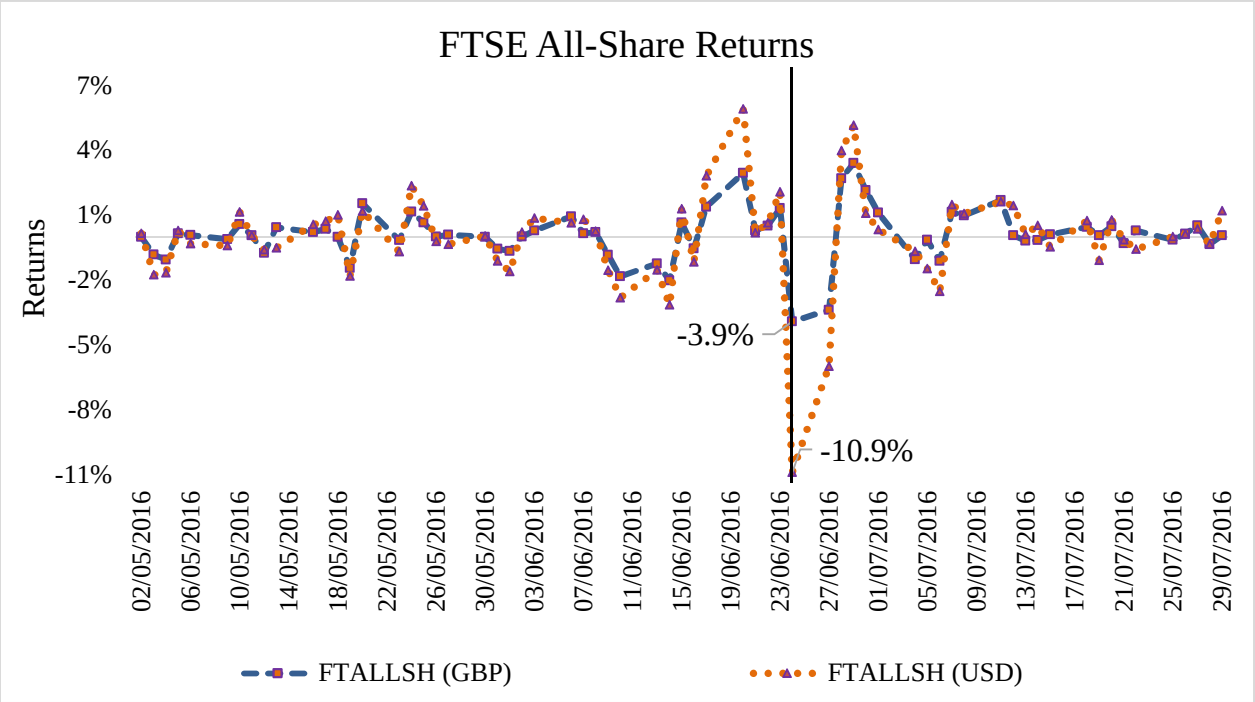

Figure 5.3 FTSE All-share returns around the Brexit referendum.
This figure shows the returns in the prior month to the referendum to July 29, 2016 and post-Brexit month.

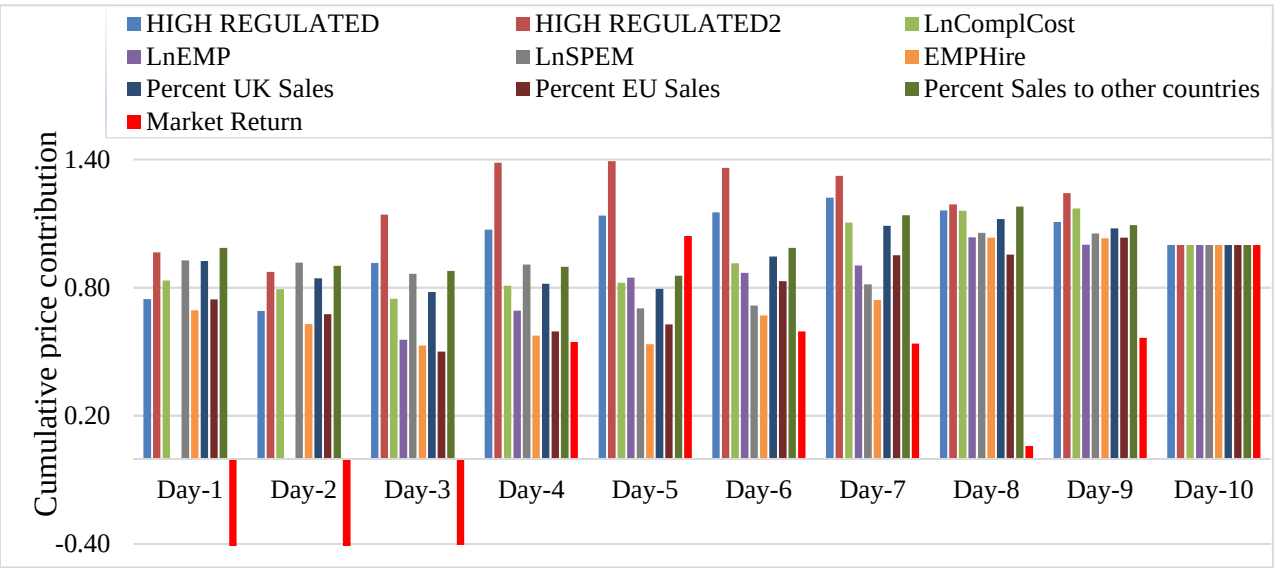

Figure 5.4 Cumulative price contribution (CPC) using CAPM-adjusted returns.
This figure shows the cumulative price contributions of the different variables of interests and of the market return during the ten trading days after the Brexit outcome. The cumulative price contribution measures the proportion of price adjustment that has accumulated by the close of day t.

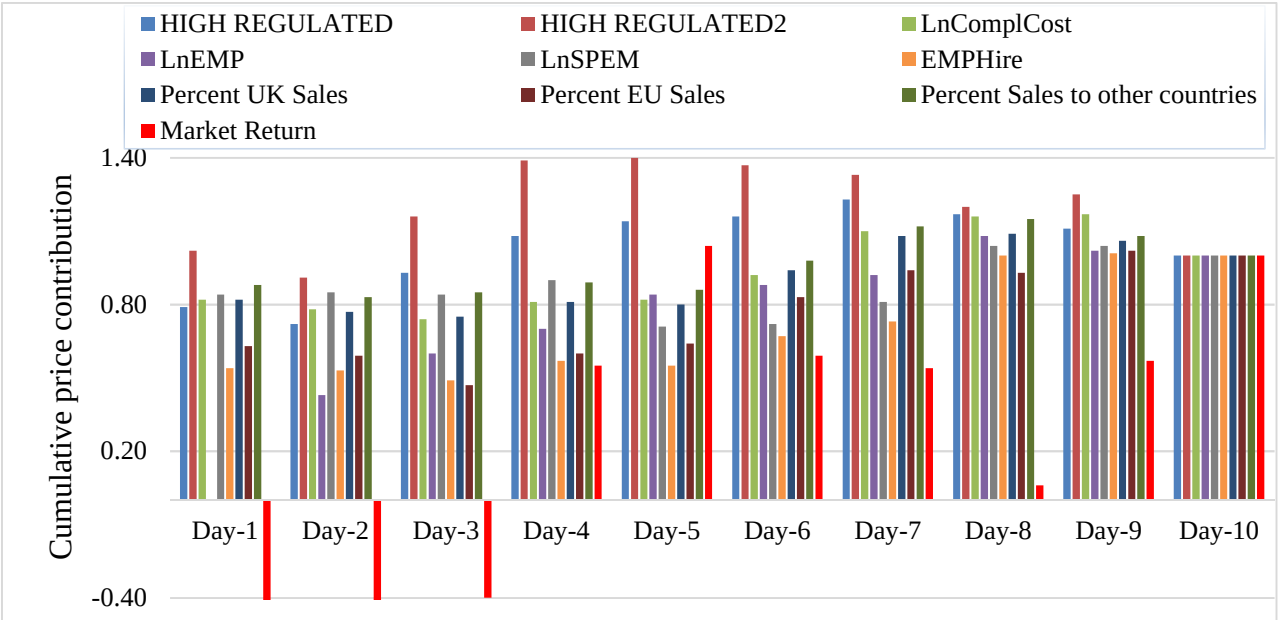

Figure 5.5 Cumulative price contribution using Market-adjusted returns.
This figure shows the cumulative price contributions of the different variables of interests and of the market return during the ten trading days after the Brexit outcome. The cumulative price contribution measures the proportion of price adjustment that has accumulated by the close of day t.

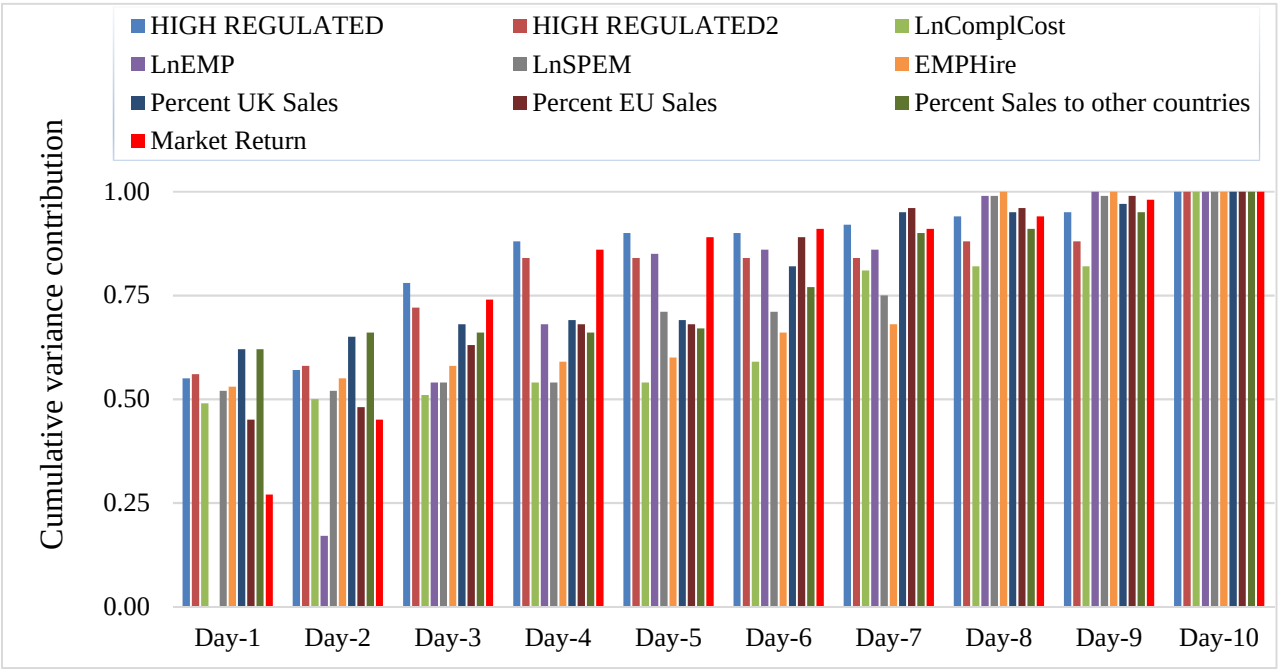

Figure 5.6 Cumulative variance contribution using CAPM-adjusted returns.
This figure shows the cumulative variance contributions of the different explanatory variables and of the market return during the ten trading days after the Brexit outcome. The cumulative variance contribution measures the speed public information is impounded into stock prices related to each of the explanatory variables that is determined by day t.

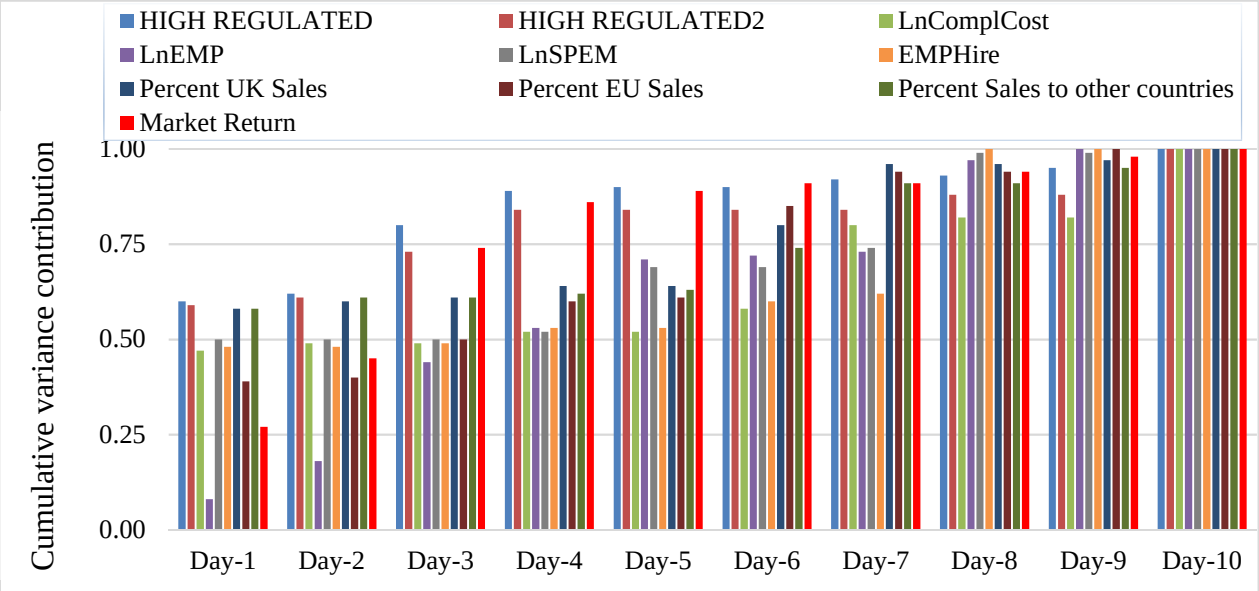

Figure 5.7 Cumulative variance contribution using Market-adjusted returns.

This figure shows the cumulative variance contributions of the different explanatory variables and of the market return during the ten trading days after the Brexit outcome. The cumulative variance contribution measures the speed public information is impounded into stock prices related to each of the explanatory variables that is determined by day t.

6 Overall Conclusions

The past three decades have witnessed a significant growth of sophisticated and complex investment products and services which has led to the creation of an opaque system of risks distribution. This has posed important challenges to the regulators who have been trying to keep pace with these rapid developments. Despite their best efforts, it has proven extremely difficult to develop regulations which are capable of insulating markets from risks arising from the indiscriminate behaviour of key participants as reflected in the 2007 financial crisis. In the aftermath of the crisis, there have been calls for stricter financial regulation to ensure greater transparency, integrity, and stability of the financial sector These developments offer interesting research opportunities to further our understanding of the economic consequences of the financial regulation. Is the EU-wide regulation effective in all member countries or does its effect vary depending on the prior quality of regulation in member states? Is regulation beneficial in terms of improving transparency and reducing risks? Do the benefits of regulation outweigh the costs? Does greater regulation enhance pricing efficiency and improve the liquidity of the stock markets? This study aimed to contribute to the extant literature on regulation by providing empirical evidence of the impact on the financial sector. The primary objectives for this thesis are to examine the consequences (costs and benefits) of financial regulation to the financial sector with a view to increasing understanding, measuring and providing evidence of the effects, and contributing to the discussion for improved regulation and financial development. This section brings the findings from the four papers into one context.

6.1 Contributions to the existing literature

6.1.1 Paper 1: Literature Review

In the first paper, I survey the empirical literature on financial regulation relating to the financial sector, classifying the literature into three main categories, namely: costs, benefits and strategic response to regulation. In the first category of the literature, I survey research findings on the costs of financial regulation to the financial services industry. The second category reviews empirical literature on benefits of regulation to the financial sector. In the third category, I review the empirical literature on the strategic responses of

firms to financial regulation. The major conclusions that came to light from the review are as follows:

First, the empirical literature gives more attention to the impact of financial regulation in the United States. The economic consequences of many other important regulations such as the Markets in Financial Instruments Directive (MiFID) and the Transparency Directive, among others are under-researched.

Second, the empirical literature exhibits a general paucity of evidence of the costs of new regulations relating to the financial sector. Empirical literature excludes the financial sector when measuring costs of regulation. Since the financial services is one of the highly regulated sectors, measuring the costs of regulation is essential to the economic justification of the regulation and thus deserves more attention.

Third, causal evidence on capital market effects from Markets in Financial Instruments Directive (MiFID) is still rare, which is essential to the economic justification of the financial markets regulation. This warrants further studies.

In sum, the empirical literature shows inconclusive evidence of costs and benefits of financial regulation, warranting further studies. That said, the literature review helped to delimit the existing research on financial regulation and identify some future research issues for researchers to address. Some of these gaps identified are discussed in preceding papers.

6.1.2 Paper 2: Statutory Audit and Corporate Reporting Directives, Compliance Costs, Risk-taking, and the Reporting Quality of the EU Banks

In paper 2, I investigate the effects of Statutory Audit Directive and Corporate Reporting Directive (SACORD) regulations for the EU banks in terms of compliance costs, risk-taking, and the quality of reporting. This is necessary because extant research does not offer conclusive evidence of the costs and benefits of regulations and whether more regulations improve transparency and moderate risk taking.

The paper makes significant contributions to the extant literature on the cost implications and effectiveness of regulations in reducing risk by improving quality of financial

reporting including risk disclosures. First, a key contribution of this paper is to show that there is a significant increase in compliance costs after the implementation of SACORD. My study is important in that I provide empirical evidence that shows that the imposition of SACORD regulations can have a substantial regulatory burden for banks. My study estimates the costs implications of implementing the two EU directives using both the staggered and propensity score matching methods on almost the entire population of listed banks across the EU. In doing so, my study adds to the budding literature that focuses on the costs of financial regulation on the banking sector.

Second, my findings contribute to the growing literature on banks' risk-taking. The results in the paper provide empirical evidence that the implementation of SACORD does not achieve the goal of lowering banks' risk-taking activities reflected in the regulations demand for credible financial reporting processes and greater disclosure requirements.

My third contribution is that the study adds significantly to the debates on the impact of stricter regulations on financial reporting quality. I find evidence suggesting the SACORD regulations have been ineffective in improving the quality of reporting by the EU banks.

In sum, my findings have several key implications. First, financial regulation is burdensome for banks. Second, stricter regulations have a significant positive influence on EU banks' risk-taking. Finally, the implementation of the regulations appears to be ineffective in terms of improved corporate disclosure and reporting. Thus, policymakers and regulators should be cognizant of these negative effects and should inform their decisions on the implementation of new regulatory reforms or changes to current ones. Additionally, if the quality of financial reporting is meant to influence investors' decision making, then investors understanding the level of banks compliance with the regulations is fundamental to their informed decision making.

6.1.3 Paper 3: Market in Financial Instruments Directive (MiFID), stock price informativeness and liquidity

In paper 3, I examine the effects of adopting new securities market regulation (MiFID) for a broad cross-section of firms in the EU. My paper contributes to the budding literature

in three ways. First, and foremost, it contributes to the stream of research on the role of disclosure regulation in the capital markets. My study is the first to examine the impact of the MiFID regulation on stock price informativeness. Specifically, my study estimates the informational efficiency benefits of the disclosure regulations and provide evidence to show that the enforcement of the MiFID led to a substantial increase in the information content of stock prices.

Second, my paper contributes to the debates on the effect of stricter securities regulation in the capital market. Additionally, it complements a small number of related studies on the MiFID's impact on stock liquidity. The paper provides an estimate of the liquidity benefits of the MiFID. My findings also indicate that stricter securities regulation improves liquidity and reduces trading costs in the capital market.

A third significant contribution of my paper is the evidence of the differential impact of the MiFID across EU countries. I find that, in general, the increase in price informativeness is significantly higher for countries that have superior quality of regulation in the past. The finding highlights that the disparate initial conditions in different countries could prevent same regulation from achieving identical effects.

Overall, my findings have important implications for regulators, investors and policymakers. First, disclosure regulations can help improve the informational contents of stock prices. Second, stricter market regulations can help lower trading costs and improve stock liquidity. Finally, the benefits of stock market regulation can differ across countries due to prior regulatory quality. This finding provides insights to policymakers on how to address issues of regulatory divergence in the EU.

6.1.4 In Paper 4: Stock price reactions to 2016 UK referendum: restricting EU labour movement, regulation, and trade

The surprising decision of the British people to leave the EU led to substantial reactions on the stock market. This paper studies the relationship between Brexit surprise and the response on stock prices along key three arguments made by proponents. My paper makes several key contributions to the existing literature on stock price reactions. First, I find strong evidence that investors are likely to downgrade labour-intensive firms in anticipation of the UK restricting the free movement of labour while the non-labour intensive firms benefited substantially. My results also demonstrate that highly regulated sectors benefited substantially due to expectations of a reduction in regulatory burden than the less regulated sectors. Additionally, I find that investors favour internationally oriented stocks but downgrade firms that focus their trading activities on domestic markets. Furthermore, my study shows that stock price reactions to Brexit are asymmetric, that is, the reactions depend on investors' perception of how the sectors are principally affected by the anticipated changes in policy.

My study also contributes to the growing literature on price discovery. I analyse the speed of price adjustments in the first ten days post-Brexit and estimate how much of the price change due to the different explanatory variables are incorporated into stock prices on each day. I document differential speed of price adjustments across the different explanatory variables. My study highlights the gradual incorporation of Brexit news into stock prices over the ten trading days, consistent with slower price adjustment due to investor inattention.

In sum, my paper has broad implications. My results highlight how quickly stock prices respond to new information. Additionally, my results tell us that prices react more slowly and asymmetrically to news across all explanatory variables. My results are relevant to regulators faced with the need to design policies that would enhance the accuracy of stock prices and also not favour some sectors over others.

6.2 Limitations and future research

This study extends the current state of understanding regarding the impact of regulation on the financial services industry. However, like any other piece of research, this work too is not without limitations.

The first limitation of paper 2 is that the study examines financial regulation utilising only quantitative disclosures in annual reports and stock market data, whereas there exist other channels that can be considered timely sources of information in assessing the quality of financial reporting. Future research is suggested using qualitative analysis of narrative disclosures, conference calls, press releases and strategic reports to contribute to the literature on the impact of regulation and quality of reporting.

Further, in paper 2, I must acknowledge that the empirical results I draw are limited in terms of their representativeness, that is, I use only listed banks in the EU. It is unclear if my results would remain qualitatively similar if private banks are included in my sample. Future research could explore the effect of the regulation on all banks (private and public) in the EU.

A key limitation I face in paper 3 is the identification challenge, that is, I could only ascertain very limited unaffected control groups from within the EU. To bolster my results, I also use control groups from countries with similar underlying economics and regulation, and applying the propensity score matching to minimise selection bias (discussed in paper 3). It would be thought-provoking for future research to examine the impact of securities regulation using larger unaffected control groups within the EU that would provide better identification of the causal effect of regulation.

In paper 4, I analyse EU trade-related issues using Percent EU sales as a proxy. Since the EU's market constitutes about 45% of UK's export and 53% of UK's businesses imports, future research should explore in greater depth market perception of the impact of Brexit using both export and import data. Also, I assess stock market reactions to Brexit surprise over the short-run. There is the potential to explore the effects of longer-run.

Finance research is positivist by nature. The research approach believes that single objective reality can be achieved through puzzle-solving considerations using statistics

and mathematics. Indeed, we know that mathematical sequences can be used to explain natural phenomena, but not all human events can be modelled in mathematics. Of course, human values are difficult to model, and its use problematic in finance research. Thus, finance scholars are unwilling to integrate human traits into financial theory. However, taking a social-constructionist approach might help finance researchers develop models and measures that could help regulators make rules that will, for example, strengthen the capital markets, mitigate risk-taking, increase price efficiency, improve reporting quality and reduce regulatory costs.