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Economic Implications of the Payment Services Directive 2: Empirical Evidence from the Capital Markets

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Abstract

This study is the first, to our knowledge, to analyze the effect of the Payment Services Directive 2 on the European banks' stock returns. The financial market data is analyzed using the event study methodology. Our findings show that the PSD 2 has had a statistically significant positive impact on the stock returns of the European banks. Specifically, the overall effect is estimated to be a 2.78% - 6.89% increase in stock returns for an average EU bank.

Moreover, the interpretation of the findings provides important implications for various stakeholders on the digital payment services market. In addition, this study offers an early evaluation of the regulation's performance in terms of achieving its intended results. The conclusions drawn in this study suggest that the positive valuation of the PSD 2-related events by investors may serve as a necessary incentive for the banks to become compliant with the directive's requirements. Consequently, it may contribute to the PSD 2's ability to fulfill its goal in creating more secure and innovative digital payment services. However, further examination is warranted regarding the regulation's potential of improving the competitive situation on the market.

Keywords: event study, Payment Service Directive 2, PSD 2, regulation

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1. Introduction

This chapter offers relevant background information on the Payment Services Directive 2. Furthermore, this chapter provides a discussion of the identified problems and states the purpose of this study together with its limitations.

1.1 Background Information

The events of the 2008 global financial crisis influenced a sharp need in a regulatory overhaul of the financial system, which has led to a number of new international regulations aiming to improve the global financial stability (Schäfer et al. 2016). However, this has not been the sole purpose of the regulatory activities across the world.

For instance, the European Union (EU) during the past 19 years has also been preoccupied with attempts to establish international integration of the financial markets via a long-term initiative called "Single Euro Payments Area", or shortly SEPA (Bolkenstein 2000). SEPA is defined as the area in which companies and customers will be able to make and receive payments in euro both within and across national borders regardless of their location, and under the same basic conditions, such as rights and obligations (European Central Bank (ECB) 2013; European Commission (EC) 2018a).

SEPA's first key milestone is associated with the implementation of the Payment Services Directive 1 (PSD 1) in 2007, which provided the necessary legal framework for the EU's initiative (ECB 2013). In addition, the PSD 1 set important information requirements, according to which the payment services providers were obligated to provide important information about e.g. fees to their customers (2007/64/EC). Briefly, the directive's purpose was to achieve easier, safer and more efficient payment services for consumers.

However, the EC's later review of the PSD 1 states that the directive has encouraged innovations in the payments services market but might not have had the desired overall effect. This is due to the fact that the digital payment services market and the card, internet, and mobile payments segments, in particular, have still remained fragmented along the national borders (2015/2366/EU). Ultimately, the insufficiency of the PSD 1 forced the EC to revise the directive.

As a result, the European Commission has adopted a new legislation, the Payment Services Directive 2, or shortly the PSD 2 (2015/2366/EU). The revised directive still provides the necessary legal framework for SEPA, but in addition, the PSD 2 has other important intended implications for the digital payment services market. Specifically, the directive's two main intentions are the following: raising the competition on the digital payment services market and improving the quality of the provided services in terms of enhanced security and lower transaction costs (2015/2366/EU).

Moreover, Evry (2017) predicted 2018 to become a "game-changing year" for retail banking due to the PSD 2 requirements that abolish the banks' monopoly on payment services provision and possession of their customers' account information. Although it may sound like a subtle change to some, the opportunity for other companies to access the banks' customer data and operate payment services on the customers' behalf can cause major implications for the European market as a whole. According to Evry's (2017) analysis, the European payment services market is expected to leave its status quo state, with traditional banks dominating the market, and successively transform into an open European market with both banks and non-banks supplying the digital payment services.

Nevertheless, it is also worth commenting on the current status of the PSD 2. While the directive itself has already entered into force, the deadlines of the national transposition laws are set for September 2019 (EC 2017). Meanwhile, according to a survey carried out by Capgemini and BNP Paribas (2018), only 21.4% of the surveyed European banks confirmed to be fully compliant with the directive's requirements as of June 2018. Thus, given the low compliance rate and the limited time before meeting the deadlines, a question arises whether the PSD 2 will succeed at fulfilling the EC's ambitions.

1.2 Identified Problems and Discussion

Given the inability of SEPA to meet its internal deadlines on multiple occasions (Brace 2012; Popovici 2014) and the insufficiency of the PSD 1 that has led to the implementation of the PSD 2 in the first place, the question regarding the PSD 2's performance becomes more important. After all, any further deviations from the regulation's intended course may diminish the trust in the EC's authority as a regulatory unit.

Besides, there are already several identifiable risks of the PSD 2 potentially not fulfilling the outlined intentions. Firstly, the banks have been demonstrating a defensive reaction towards threats to their competitive position on the market, such as the emergence of third parties, e.g. FinTechs – defined as companies offering technologies for various financial services (Accenture 2015). For instance, as of

2015 only 20% of banks worldwide were partnering up with FinTechs. Meanwhile, the majority's reaction constituted of measures that involve obtaining a degree of ownership, such as providing FinTechs with funding or direct acquisition (Statista 2018). In other words, the banks set an effective entry barrier, which potentially hinders achieving the intended level of competition on the digital payment services market.

Secondly, the European banks exhibit mixed attitudes and degrees of compliance towards the PSD 2. To demonstrate that, Deloitte (2018) presented a survey of 90 different banks in Europe. The company has identified two categories among Central and Eastern European (CEE) banks, based on the undertaken and planned PSD 2-related measures that reflect varying views on the directive's impact. The first category of banks, dubbed "CEE PSD 2 Challengers", mostly exhibit a cooperative approach, using the directive to drive new business strategy and seeking new cooperation opportunities. Whereas the second group – "CEE PSD 2 Minimalists" – generally demonstrates a passive attitude towards the directive, with the majority of banks having yet to decide on a concrete strategic approach. Moreover, Western European banks have been assigned to a separate category, as they were considered significantly more advanced than the CEE banks in their compliance preparations (Deloitte 2018).

In addition, further confirmation of the existing discrepancy in the banks' degree of compliance is provided by Gemalto, which is a world leading IT-company offering enhanced digital security services around the globe (Gemalto 2018). Gemalto possesses practical knowledge on the subject matter that is accumulated through years of experience of working with different actors on the digital payment services market in particular. Some of that knowledge was shared with us during a telephone conversation with the company's representative (Arta Sylejmani 2018, personal communication, 5 November), who has also expressed interest in a study that will shed more light on the PSD 2.

All in all, the differences in the banks' degrees of compliance and attitudes towards the directive constitute the risk of the PSD 2 not fulfilling its intention to improve the quality of the services offered by the banks.

In fact, there are several possible reasons for the abovementioned discrepancy among the banks. On one hand, the insufficiencies of the preceding regulation may have convinced the banks of the unlikeliness of any significant impact from the revised directive. On the contrary, a higher degree of compliance can be observed among those banks that had long been prepared for the PSD 2's requirements due to the technological development in the market (Arta Sylejmani 2018, personal communication, 5 November).

However, the most important reason for the inconsistencies in compliance behaviors is probably the lack of understanding of the regulation's economic impact, which results from the absence of a clear econometric basis for the PSD 2. In other words, European banks may not perceive a comprehensible incentive to meet the regulation's requirements without knowing how it would affect their financial performance. Even so, it is obvious that obtaining such knowledge is challenging due to the fact that the regulation is relatively new and is yet to be fully implemented (EC 2017). Hence, the task of obtaining insight into the quantitative impact of the directive presents a challenge for researchers as well.

Although, the theoretical field of finance offers a suitable methodology to evaluate a regulation's impact on the affected firms' financial performance in the form of an event study. The general purpose of event studies is to measure the impact of a specific event (e.g. a regulation) on the value of a firm using financial market data. Furthermore, the proponents of the event study methodology argue that security prices reflect all available information (Fama 1991). Hence, future regulatory changes should affect the security prices as soon as the information about the regulation becomes available. In addition, the interpretation of the observed returns on the securities may be utilized for early evaluations of the performance of regulations in terms of comparing the actual outcomes with the intended effects (Schwert 1981).

All things considered, the event study methodology is applied in this study in an attempt to estimate the overall effect of the PSD 2 on the stock returns of the European banks. Furthermore, this study, to our knowledge, is the first to provide some sort of evaluation of the directive's performance based on the interpretation of the evidence from the financial markets. Finally, the findings in this study are expected to be helpful to banks, third parties, such as Gemalto, and regulators in achieving a better understanding of the regulation's economic implications.

1.3 Study's Aim and Limitations

The aim of this study is twofold. Firstly, this study aims to provide an estimation of the overall effect of the PSD 2 on the stock returns of the directly affected banks, which also allows for an early evaluation of the regulation's performance in terms of realization of its intended effects. Secondly, it thoroughly demonstrates an application of the event study methodology to a regulatory event in a multi-country setting, utilizing recent methodological developments.

Correspondingly, the research questions addressed in this study are the following:

- What is the overall effect of the PSD 2 on the stock returns of EU's banks?
- What are the possible implications of the quantitative results for the affected stakeholders: banks, third parties and consumers?

From the stated research questions it follows that the estimation of the quantitative effect of the PSD 2 in this study is limited to the stakeholder group of banks. Meanwhile, a similar analysis for companies constituting other stakeholder groups, such as third parties and FinTechs, is omitted due to the restrictions in time and data availability. In addition, while it is possible that the PSD 2 could have affected companies outside of the EU (Yap 2017), this study investigates the directive's effect for EU-based banks only.

Furthermore, the event study methodology can be applied to analyze the event-related changes in the systematic risk of the affected companies. However, the scope of this study includes the analysis of stock returns only.

Finally, the potential effect of other events that take place during the same period as the PSD 2 is accounted for only on the industry-wide level. In other words, corporate events, such as mergers and acquisitions are not taken into consideration.

1.4 Report's Structure

The report is organized as follows. Chapter 2 provides a critical overview of the relevant literature. A thorough description of the methodology applied in this study is provided in Chapter 3. The results are presented and analyzed in Chapter 4. Chapter 5 provides a critical evaluation of the study's reliability, an interpretation of the quantitative results and suggestions for further research. Chapter 6 concludes.

2. Theoretical Framework

The aim of this chapter is twofold. Firstly, it establishes a conceptual understanding of the PSD 2 in terms of its economic costs and benefits. Secondly, the theoretical framework of the event study methodology is delineated together with the challenges of its application to regulatory events. Finally, the ways to address the identified challenges are discussed in order to establish a baseline design for our study.

2.1 Introductory Theory

2.1.1 Motives for Regulatory Compliance

Available research in the fields of policymaking offers a fundamental understanding of the motives that drive businesses to comply with regulations. In general, researchers identify three major types of motives for regulatory compliance: economic motives, which reflect the commitment of firms and managers to maximize their economic utility (e.g. Frey 1997); social motives, which reflect the commitment to earn the respect and approval from the society (e.g. Winter and May 2001); and normative motives, which simply adhere to the need of “doing the morally right thing” by obeying the laws (e.g. Scholz and Pinney 1995). Furthermore, the focus of the latest research on regulatory compliance has been on studying possible interactions between the abovementioned motives, developing theoretical models with plural motives (e.g. Etienne 2011; Nielsen and Parker 2012), and identifying non-motivational explanatory factors, such as complexity of regulations (e.g. Mendoza et al. 2016).

Nevertheless, the recognition of the importance of firms’ economic motives in the context of regulatory compliance has led to the development of analytical tools that help to express the intentions of regulations in economic terms, such as the event study methodology and the cost-benefit analysis. Despite the latter arguably being more applicable as a decision-making tool for policymakers (Mishan and Quah 2007), translating the effects of regulation in terms of economic costs and benefits can aid the interpretation of the results of event studies (e.g. Feinberg and Harper 1999; Schäfer et al. 2016).

As such, the following segment provides a brief review of the relationship between a company’s economic costs and benefits, and its stock prices and returns, which constitute the subject of analysis in the event study methodology.

2.1.2 Financial Market Data and Economic Implications

Stock or equity issuance is one of the ways to externally raise capital for a company, via which the company essentially sells a share of ownership of its assets and earnings (Berk and DeMarzo 2017). Despite the variety of methods for stock valuation and the exogenous determinants of stock prices studied in the field of finance (e.g. Fernández 2002; Spilioti 2014), the fundamental notion about equity prices is that they reflect, to some extent, the present values of the expected future cash flows generated by the firm's assets (Berk and DeMarzo 2017).

Furthermore, the stock prices of publicly traded equities are subject to the existing stock market dynamics, meaning that there are fluctuations in equity prices created by the supply and demand forces of the market's participants (Johnson and Lambert 1965). On one hand, this fact implies that the equity prices arguably reflect the stock trade participants' aggregated knowledge and expectations regarding the future changes in a company's cash flows, which justifies the use of financial market data for the purposes of economic analysis of events (Malkiel and Fama 1970). On the other hand, the fact that the stock prices are not only endogenously dependent on company-specific information is emphasized. Thus, the ability of the stock markets to act as a "neutral referee" when assessing the economic implications of events, such as regulations, is open to criticism (Beigi and Budzinski 2013).

Nevertheless, the fundamental relationship between the changes in a company's cash flows and the changes in its stock price is direct. In other words, expected economic costs should affect the stock price negatively, thus resulting in negative stock returns, whereas economic benefits should create positive stock returns. Conversely, the price movements observed on the stock markets may be interpreted in terms of economic implications of the subject events that cause reactions among investors (MacKinlay 1997; Schwert 1981).

With a coherent relationship between the financial market data and the economic costs and benefits in place, it is necessary to establish a conceptual understanding of the PSD 2. Therefore, the following segment offers a review of the existing, yet scarce, information about the economic costs and benefits attributable to the directive.

2.1.3 Conceptual Understanding of the Payment Services Directive 2

While the law details provided by the EC (2015/2366/EU) still constitute the main source of comprehensive and accurate information about the PSD 2, there are some articles offering complementary expert insight, published in the International Financial Law Review which is a peer-reviewed publication covering financial regulations.

As mentioned earlier, the directive's two main intentions are the following: improving the competition between digital payment services providers, i.e. banks and FinTechs, and stimulating the development of more innovative, price-worthy and secure payment services for the benefit of the consumers (2015/2366/EU). These intentions are sought to be fulfilled by establishing new types of payment services provider licenses: the account information service provider license (AISP) and the payment initiation service provider license (PISP), both being sometimes collectively referred to as third-party providers (TPPs). The AISP licensed companies are allowed to acquire and manage the banks' customer data, whereas the PISPs can initiate payments on behalf of the banks' customers (Jackson 2018a).

In other words, the banks lose their monopoly right of ownership of the customer data, while the customers are no longer restricted to choosing payment services only among those that are provided by the banks. Instead, the customers are expected to encounter a broad range of service offerings that are built by the TPPs on top of the data obtained from the banks at no charge (Lovells et al. 2017). However, the augmented customer data sharing raises some legitimate concerns about potential data breaches (Jackson 2018a; Jackson 2018b), which is why the PSD 2 sets regulatory technical standards (RTS) for payment services providers to ensure consumer protection (EC 2017).

Although the interpretations of the directive, offered in the literature (Jackson 2018a; Lovells et al. 2017) are generally coherent with the information provided above, there are differences in the expectations of the PSD 2's potential impact on the affected stakeholder groups. For instance, the article by Lovells et al. (2017) highlights the opportunities to lead the innovative change on the financial services markets that are being provided to the TPPs by the recent "FinTech regulations", such as the PSD 2. Furthermore, the context of the article suggests that the recent regulatory changes are expected to improve the competitive position of the FinTechs due to the emphasis on innovation, in contrast to the traditionally strict focus of policymakers on consumer protection assurance.

On the other hand, Jackson (2018a) presents a contrasting view in his article, which questions the ability of the FinTechs to "challenge traditional banking giants". The author argues that there are persisting market entry barriers in terms of economic costs of obtaining a license, developing technologies and hiring legal staff, which altogether could be unaffordable for the majority of the FinTech startups across Europe. Although Jackson (2018a) acknowledges the banks' potential revenue loss due to the emerging competition, the author emphasizes that the PSD 2 does not prevent the banks from acquiring the same new types of licenses. Thus, the opportunity to establish new revenue streams from the new types of services is equally presented to the EU banks.

Furthermore, Jackson (2018a) raises awareness of the threat of higher exposure to the data breaching risks due to the augmented data sharing enforced by the PSD 2. In addition, the responsibility for secure customer data management is magnified by another recently implemented regulation – the General Data Protection Regulation (GDPR), which imposes greater fines in case of improper data management (Jackson 2018a; Jackson 2018b). Yet, these potential costs should affect all AISPs equally, regardless of whether the service provider is a bank or a FinTech, which equalizes the negative impact for these two stakeholder groups.

Overall, the knowledge accumulated from the law details (2015/2366/EU) and the peer-reviewed articles (Jackson 2018a; Jackson 2018b and Lovells et al. 2017) allows to establish a conceptual understanding of the expected economic impact of the PSD 2 in terms of costs and benefits for the three major stakeholder groups: consumers, banks and third parties (see Figure 1).

To be fair, the established framework cannot provide a comprehensive view of the values of the identified costs and benefits, even in relative terms, due to the scarcity of available research on the PSD 2. Nevertheless, the framework, together with the understanding of the effects of economic costs and benefits on stock prices and returns, is sufficient to assist the interpretation of the directive's impact on the stock returns of the EU banks.

Finally, the remainder of the chapter is dedicated to familiarizing the reader with the theoretical framework of the event study methodology, which constitutes the main analytical instrument for this thesis.

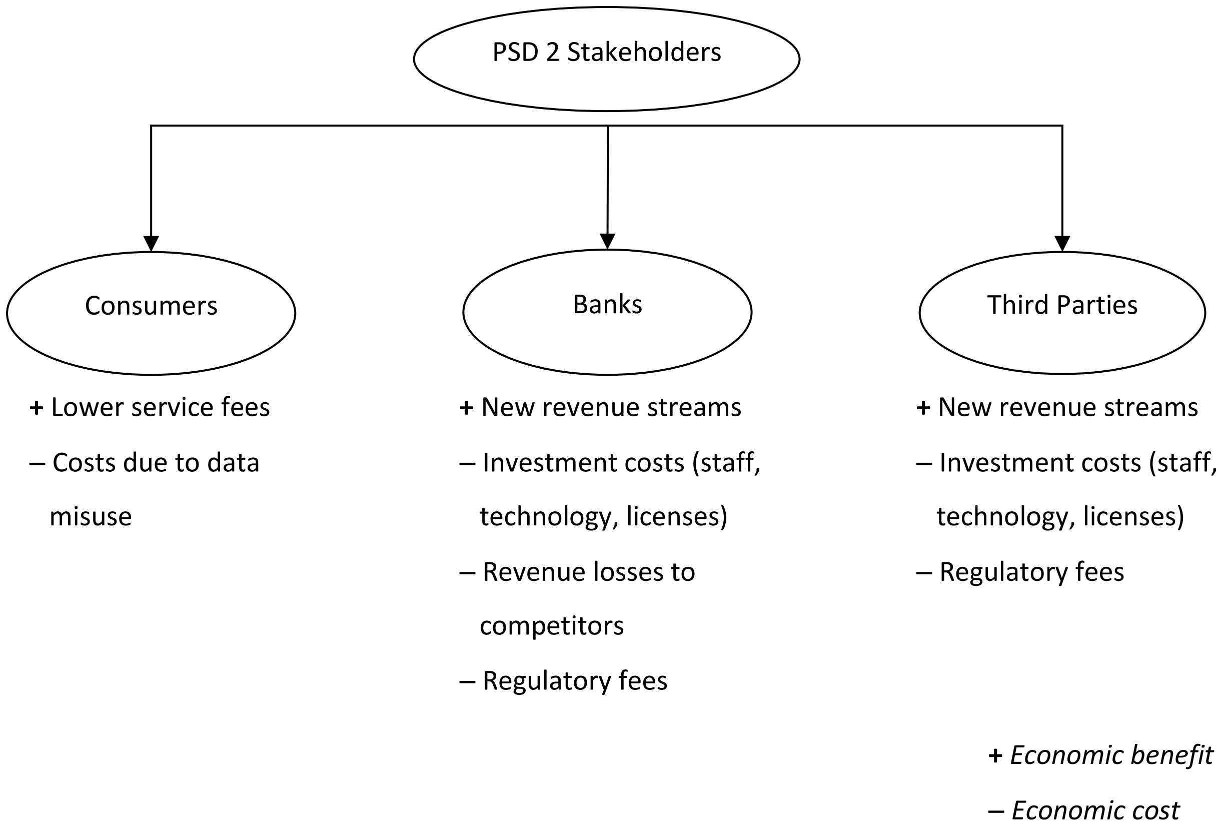

Figure 1: A conceptual understanding of the PSD 2-related economic costs and benefits for the affected stakeholders.

2.2 Event Studies in General

2.2.1 Event Studies' Purpose and the Efficient-Market Hypothesis

Event studies provide a statistical framework for measuring the impact of a specific event on the value of a firm using financial market data. The measure of an event's economic impact is usually constructed using security prices observed over a certain time period. Since the introduction of the foundational methodology by Ball and Brown (1968) and Fama et al. (1969), the event studies have found its applications in many research areas, including studies of effects of regulatory changes (e.g. Schwert 1981).

What allows researchers to analyze the effects of various events based on security prices is the efficient-market hypothesis (EMH), introduced by Malkiel and Fama (1970). EMH suggests that the efficiency of capital markets causes the stock prices to reflect all available information at any given time. Specifically, EMH at its strongest form posits that the security prices reflect both public and private information and therefore investors cannot consistently earn excess returns (Fama 1991).

However, as suggested by Fama (1991), event studies represent semi-strong-form tests and aim to address the question of how quickly security prices reflect public information announcements. In other words, the efficient-market hypothesis constitutes the theoretical basis for the event studies. And conversely, the event study methodology can be used to test the capital markets for efficiency.

Finally, it is worth mentioning that the validity of the efficient-market hypothesis is a highly debatable topic in the field of finance and the discussion on this subject is outside of the scope of this thesis. Although, we still encourage readers to get familiar with the available criticism of EMH (e.g. Shiller 2003) as well as the arguments for market efficiency (e.g. Fama 1991).

2.2.2 Event Studies' General Procedure and Important Study Design Decisions

While there is no unique structure for event studies, a general analytical procedure can still be outlined with an emphasis on important study design decisions.

One of the first important decisions for researchers conducting an event study is determining the period over which the security prices of the firms affected by the chosen event will be examined, i.e. the event window. In practice, the event window used for analysis of a single-day event is often expanded to multiple days, including at least the day of the announcement and the day after the announcement (MacKinlay 1997).

Secondly, it is necessary to determine the sample selection criteria, i.e. the factors that determine the inclusion of a given firm in the study. Such criteria are often constituted by data availability restrictions such as listings on stock exchanges, firm size restrictions, and membership in a specific industry. Provision of descriptive statistics is further suggested in order to summarize the sample characteristics and to identify any potential biases that may have originated from the sample selection (MacKinlay 1997).

After having decided on the event window and the sample selection criteria, a measure of abnormal return is constructed. The abnormal return is defined as the difference between the actual ex-post return of the security over the event window and the normal return of the firm's security over the event window. Meanwhile, the normal return is the expected return without conditioning on the event taking place (MacKinlay 1997).

Thus, the abnormal return for firm i and event date τ is defined as follows:

$$AR_{i\tau} = R_{i\tau} - E(R_{i\tau}|\, X_\tau), \tag{1}$$

where $AR_{i\tau}$, $R_{i\tau}$ and $E(R_{i\tau}|\, X_\tau)$ are the abnormal, actual and normal returns respectively for time period τ. Furthermore, the normal returns over the event period are obtained through conditioning of the actual returns on the chosen estimation model for normal returns. More specifically, one of the most popular normal return estimation models is the market model, where X_τ is in fact a proxy for the market return (MacKinlay 1997).

The market model assumes a stable linear relation between the market return and the security return, according to which the estimated actual return on security i is:

$$R_{i\tau} = \alpha_i + \beta_i R_{m\tau} + \varepsilon_{i\tau}, \tag{2}$$

where R_{it} and R_{mt} are the period-τ returns on security i and the market portfolio respectively. The zero mean disturbance term is given by ε_{it}, while α_i and β_i are the parameters of the market model. Moreover, the parameters' specification is dependent on the choice of regression estimators, which is discussed in the statistics segment of this chapter.

Additionally, researchers utilize various broad-based stock indexes as proxies for the market portfolio. These indexes are either constructed with globally aggregated equities, e.g. the STOXX Global Total Markets Index (Schäfer et al. 2016), or constituted of major stock markets' indexes, e.g. the S&P 500 Index (Campbell et al. 2010).

Also, apart from the market model the normal return estimation models used by researchers include the following: the constant mean return model (Brown and Warner 1985), various single-factor and multifactor models (e.g. Fama and French 1996) and economic models, such as the Capital Asset Pricing Model (Sharpe 1964; Litner 1965) and the Arbitrage Pricing Theory (Ross 1976). Nevertheless, the use of the market model (Eq. 2) is widely argued for due to the relative simplicity of implementation and the sufficiency in terms of quality of the estimations (MacKinlay 1997; Campbell et al. 2010). Although, readers that are interested in learning more about other estimation models are referred to Binder (1998), who provides an overview of the development in the event study methodology since 1969.

After choosing the appropriate normal return estimation model, the estimation period has to be decided upon, i.e. the period over which the predictors of the future normal returns are estimated. The length of the estimation window varies among different event studies and is primarily dependent on the choice of frequency of observations, i.e. whether the analysis will be based on daily, weekly, monthly or annual data (Lamdin 2001).

A representation of the event study timeline is shown in figure 2, in which the normal return estimation period is shown between timepoints $T_0 - T_1$. The event window, during which the abnormal returns are calculated, is shown between timepoints $T_1 - T_2$ and the post-event window, which is used for the analysis of capital markets' behavior after the event, is shown between timepoints $T_2 - T_3$.

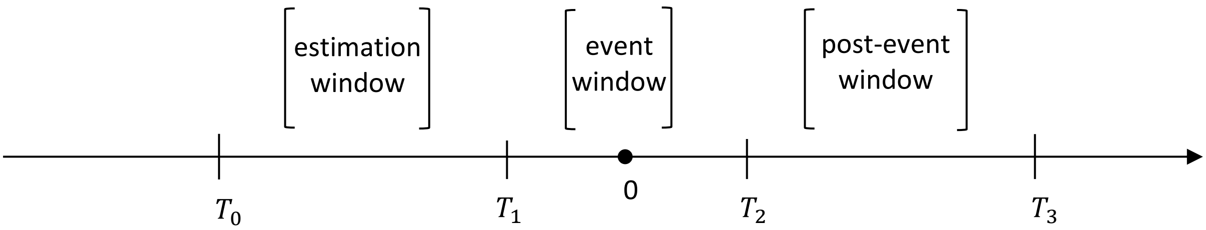

Figure 2: The event study timeline.

After calculating the abnormal returns, their values are analyzed via aggregation that results in the so-called cumulative abnormal returns (CAR), which is simply the sum of abnormal returns across the event window (see Eq. 3).

$$CAR_i = \sum_{\tau=T_1}^{T_2} AR_{i\tau} \tag{3}$$

Furthermore, the cumulative abnormal returns are averaged across securities to obtain the cumulative average abnormal returns (CAAR), which show the overall average effect on the stock returns for the total of I securities (see Eq. 4) (MacKinlay 1997).

$$CAAR = \frac{1}{I}\sum_{i=1}^{I} CAR_i \tag{4}$$

In summary, the general event study methodology consists of three major procedures: the normal return estimation using an appropriate estimation model, the calculation of abnormal returns and the analysis of the aggregated results. Albeit the variety of study design decisions, the outlined procedures are common among the majority of event studies.

2.2.3 Application of Statistics

The analytical procedures in the event study methodology employ a variety of statistical tools to such extent that it feels indispensable to provide a brief overview of the relevant statistical concepts.

Furthermore, the familiarity with the key concepts is required to obtain a complete understanding of the methodology employed in this particular study.

The implementation of statistical concepts in the event study methodology appears as early as the beginning of the event study design. Specifically, the sampling procedure is suggested to be complemented with the identification of potential biases, i.e. the criteria that may lead to overrepresentation or underrepresentation of the members that share a common characteristic in the sample (Heckman 1979; MacKinlay 1997).

Moreover, the statistical method of linear regression analysis is actively employed during the normal return estimation procedures. For instance, the market model assumes a linear relationship between a company's stock returns and the returns of the market portfolio (see Eq. 2), which makes the linear regression analysis a suitable statistical modeling tool. In fact, linear regression allows estimating the values of the α_i and β_i parameters that are used for calculation of normal returns in Eq. 2 (MacKinlay 1997). In addition, several normal return estimation procedures implement dummy variables in the linear regression models. Dummy variables are used to control for the presence of some categorical effect that is expected to affect the outcome (e.g. Lamdin 2001).

Furthermore, linear regression analysis in the event study methodology employs a variety of parameter estimators, the most popular ones being the ordinary least squares (OLS) estimators. However, other parameter estimation methods can also be implemented as robustness measures, i.e. measures that improve the reliability of the results (Sorokina et al. 2013). The different types of parameter estimators exhibit unique properties and unique underlying assumptions, a detailed discussion of which are omitted in this report.

Finally, statistical hypothesis testing is used as a method of statistical inference. In applications to the event study methodology, the null hypotheses often assume the values of the cumulative average abnormal returns equal to zero. The hypotheses are then tested for significance using an appropriate testing method, the most common one being the so-called Student's t-test (MacKinlay 1997).

2.3 Regulatory Event Studies' Specifics

2.3.1 Defining the Event Window

For corporate events such as acquisitions or stock split announcements, which are often analyzed using event studies (e.g. Mitchell and Stafford 2000), the event window is usually short, as it corresponds to a single identifiable event. On the contrary, regulatory events can take several years before actual implementation. Thus, it is possible to break down regulatory events into multiple subevent periods that are constituted of the collective announcements affecting the probability of the regulation's enactment.

However, the process of identifying key subevents that should constitute the entire regulatory event window is not straightforward. Moreover, researchers argue that the coverage of the real-time developments of regulations in various news sources can cause price movements on the stock markets prior to the actual enactment of the regulations (Binder 1985, MacKinlay 1997). As such, the study of regulatory changes presents a so-called "event period uncertainty" challenge (Lamdin 2001). Firstly, the event period uncertainty challenge implies that it is difficult to define the event window. Secondly, the challenge entails that it is still possible to omit the observations of abnormal returns despite the correct specification of the event date.

Unfortunately, there are no universal guidelines to address the complexity of the event window specification other than fulfilling the prerequisite of close examination of the subject regulation's development history. However, a common procedure among researchers is to search for event-related news among first pages of highly circulating business newspapers, such as The Wall Street Journal or Financial Times (e.g. O'Hara and Shaw 1990).

Finally, when it comes to addressing the event period uncertainty challenge, researchers implement various event window lengths (Lamdin 2001). In particular, expanding the event window increases the chance of capturing the omitted reactions of the stock markets to the event-related news and announcement. However, this measure leads to a higher risk of the obtained abnormal returns being affected by unrelated market noise or confounding events. In other words, adjusting the event window length implies a trade-off between the ability to capture the event-related effects and the vulnerability of the results towards potentially non-related effects (MacKinlay 1997).

2.3.2 Specific Normal Return Estimation Models

The presence of multiple event windows in regulatory event studies has led to the development of specific normal return estimation models that employ dummy variables as an alternative to the general multi-step procedure, which includes the aggregation of abnormal returns (Lamdin 2001; Sorokina et al. 2013; Schäfer et al. 2016).

For instance, Lamdin (2001) introduces the so-called parameterized normal return estimation model (see Eq. 5) in his research on the implementation and interpretation of regulatory event studies. In essence, the parameterized model is a variation of the ordinary market model that includes a dummy variable D_a for each of the A total amount of events that constitute the regulation's event period:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \sum_{a=1}^{A} \gamma_a D_a + \varepsilon_{it} \qquad (5)$$

Since the event-specific dummy variable assumes the value of 1 only during the respective subevent window and 0 otherwise, the obtained event-specific estimator γ_a in Eq. 5 conveys the value of the event-specific abnormal return. Thus, the summation of the estimator's values across all events results is similar to the concept of cumulative abnormal returns from Eq. 3.

In fact, Lamdin (2001) himself mentions that the parameterized model does not necessarily constitute a different empirical approach. As such, the general multi-step event study methodology with the implementation of analysis of aggregated abnormal returns (MacKinlay 1997) can be seen as an equivalently suitable alternative for the purposes of a regulatory event study.

2.4 Robustness Techniques

2.4.1 Baseline Robustness Techniques

Researchers utilize a variety of robustness techniques to improve the quality of the analysis in terms of the reliability of the obtained results (Sorokina et al. 2013).

Firstly, the robustness techniques applied in regulatory event studies consist of changing the lengths of the event windows, as mentioned previously (Lamdin 2001). In addition, the length of the estimation period is also subject to change, as it may result in a more accurate estimation of the normal returns (MacKinlay 1997).

Secondly, robustness can be demonstrated via alterations in the sample, which is useful in the presence of potential sampling biases (Heckman 1979). Moreover, the use of different samples can be necessary for the analysis of controlled effects (e.g. Schäfer et al. 2016).

Additionally, the implementation of various normal return estimation models in a single study can increase the reliability of the obtained abnormal returns, if the significance of the values persists through the model changes. The performance of the normal return estimation models can be compared using the coefficient of determination, also known as the R^2, which shows the proportion of the variance in the dependent variable that is predictable from the independent variable (e.g. Kleinow et al. 2014).

Finally, more advanced robustness techniques involve implementing regression estimators that are different from the standardly used OLS-estimators. The motivation for the use of other estimators, despite the popularity of OLS in financial research, is that they can significantly improve the reliability of the results by providing proper treatment of various potential biases (Sorokina et al. 2013). As such, the following section describes the implementation of the suggested type of estimators.

2.4.2 Advanced Robustness Techniques

In a methodological study of robust methods in event studies, Sorokina et al. (2013) provide a critical overview of a variety of robustness methods with a focus on the treatment of outliers and leverage points. The researchers emphasize the importance of a proper treatment, which is often omitted in event studies, despite the high risk of exposure to a potential outlier bias, due to non-normality of the daily stock returns (Brown and Warner 1985).

Moreover, Sorokina et al. (2013) criticize the most common ways of handling outliers and leverage points, as the common methods either ignore those completely or treat them in ways that alter the values of the actual stock returns. The former is problematic, as it leads to a distorted valuation of the events' effects, whereas the latter can lead to a loss of valuable information.

An alternate solution is suggested, consisting of the use of a specific type of regression estimators, the first being the Huber's (1973) M-estimators. The regression procedure with the M-estimators assigns a weight-based value to the outliers in an iterative algorithm until the results of the regression improve. Another suggestion is to employ Rousseeuw and Yohai's (1983) MM-estimators that represent an improved version of the M-estimators. Despite being closely related to each other, the main advantage of the MM-estimators is that their use guarantees robustness to both outliers and leverage points, whereas the M-estimators take care of the outliers only (Sorokina et al. 2013).

Finally, Sorokina et al. (2013) provide evidence that the use of the abovementioned robust estimators does not only improve the reliability of the obtained results but can also help in determining a statistically significant effect. On that point, we conclude the theoretical chapter of this report and move on to describe the methodology of our study.

3. Methodology

This chapter describes the essential steps undertaken in our event study of the PSD 2's impact on the stock performance of European banks. The methodology applied in this specific event study is decided upon with respect to the theoretical framework outlined in the previous chapter.

3.1 General Research Approach

This study employs a mixed research approach with an emphasis on the application of quantitative research methods (Creswell 2009). The quantitative methods are mainly imposed by the theoretical framework of the event studies and thus include the procedures of numerical data collection, statistical analysis and statistical interpretation. Furthermore, the decision to implement the prevalently quantitative approach is motivated by the extant analytical research on policymaking (e.g. Schwert 1981).

In addition, the results of the quantitative analysis are interpreted qualitatively through a theoretical lens of the available conceptual understanding of the PSD 2. Combining the two research approaches not only allows to answer the research questions stated in this study but also improves the overall strength of the study (Creswell 2009).

3.2 Event Study Design

3.2.1 Defining the Event Period for the PSD 2

Prior to sample selection and data collection, it is necessary to define the timeframe of our study. Therefore, we identify the key events, also referred to as subevents, that constitute the development and enactment of the PSD 2 by searching the European Commission's database (EC 2018b) for official press releases involving the directive. In addition, several subevents are identified in accordance with the official law details, including the release, enforcement and implementation dates (2015/2366/EU).

In total, we identify nine key events dating from July 24, 2013, to January 13, 2018. A comprehensive overview of the events is presented in Table A.1 in Appendix A.

3.2.2 Data Frequency, Estimation and Event Windows' Lengths

As mentioned in the theoretical framework section, the event study methodology applied to regulatory events presents the inherent event period uncertainty challenge (Lamdin 2001). Therefore, there is no consensus among researchers on the optimal choice of the data frequency and the lengths of the estimation and event windows.

Nevertheless, we choose daily stock returns for our analysis, based on our ability to set exact dates for the subevents constituting the entire event period for the PSD 2. The advantage of using daily data is the ability to establish short event windows, hence, reducing the potential impact of confounding events and market noise. On the other hand, the use of daily data increases the potential risk of misplacing the events or looking for capital markets' reactions to the events on the wrong dates (Lamdin 2001).

In respect to decisions on the windows' lengths, we follow the example of Schäfer et al. (2016), who conducted an event study on the effects of financial sector reforms in several countries. The researchers used two different lengths for both event and estimation windows. Thus, the event windows in our study contain either three or five trading days, encompassing the subevent dates. The enlarged five days event windows address the potential risk of misplacing the events but increase the exposure to effects of potential confounding events. Meanwhile, the estimation windows are either 80 or 140 trading days long. The enlarged 140 days estimation windows may provide a better estimate for the normal returns by including more of the historical market fluctuations.

In addition, we ensure that there is no overlapping between the event windows and the estimation periods by excluding the event days from the overlapping estimation periods. The estimation window is also expanded for the respective amount of removed days so that the length of the estimation windows is constant. Such treatment of the overlapping reduces the risk of normal return mismeasurement due to the regulatory events' effect on the stock returns during the estimation process (Schäfer et al. 2016).

3.2.3 The Normal Return Estimation Model

According to MacKinlay (1997) and Campbell et al. (2010), the local-currency market model using national market indexes provides a suitable estimator of the predicted stock returns for the purposes of a multi-country event study. Therefore, the suggested market model is used as the baseline normal return estimation model in our study. However, other variations of the market model are used for robustness purposes, which are discussed in more detail in section 3.4.

To conclude the description of the event study design, a summary of the key design decisions is presented in Figure 3. While the figure shows the 80 days estimation period based on the three-day event window and the 140 days estimation period based on the five-day event window, this study implements all possible combinations of the estimation and event windows.

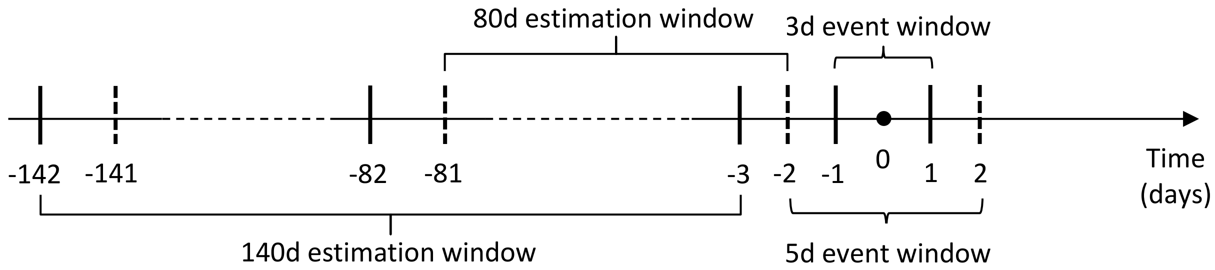

Figure 3: Graphic representation of the event study design. The subevent dates correspond to T = 0.

3.3 Sample Selection and Data Collection

Following MacKinlay's guidelines (1997), the European banks are sampled based on the geographic criterion and the availability of the daily stock return data in Bloomberg Terminal (BT). BT is a computer software that provides a wide range of historical and real-time financial market data as well as analytical tools.

Our initial sample included equities of 127 European banks that had an active trading status on November 2, 2012, and on November 22, 2018. The first screening date is chosen based on a 180 business days margin, which ensures the inclusion of the 140 days estimation period prior to the first subevent date – July 24, 2013. The final screening date is simply the day when we carried out the data collection.

Upon close examination of the initial sample, we noticed that the daily stock return data for several banks were not available for lengthy time periods. This may be the case of a regulatory suspension given to a bank or solvency issues, which make the company's equity unavailable for trading. For example, Monte dei Paschi di Siena's equity from the initial sample was suspended for almost 10 months in 2017 due to the bank's solvency issues (Ewing, Pianigiani and Bray 2017).

The issue with data availability prompted a second screening procedure involving average quarterly trading volume as a sample selection criterion. The volumes were obtained using a simple moving average tool (SMAVG) in BT with 24 quarters, which covers the entire timeframe. Equities with a SMAVG trading volume value of less than 100,000 were excluded. Furthermore, to avoid the overrepresentation of thickly traded stocks the procedure was complemented with a thorough examination of the number of missing observations for each company in the initial sample, in accordance with Campbell et al.'s (2010) suggestions.

Finally, the data was exported from BT to Stata and processed by excluding observations on country-specific holidays for each equity. Stata is a statistical analysis software, widely used for research in the fields of economics and finance.

3.4 Event Study Procedures

3.4.1 Procedures in Stata

Upon obtaining the required data, the event study is conducted in Stata following the guidelines provided by the Princeton University Library (2008). Princeton's algorithm adheres to the general multi-step event study methodology, as outlined in the theoretical framework chapter.

3.4.2 Regression Models' Specification and Variables

The baseline normal return estimation procedure consists of OLS regressions of the companies' daily stock returns adjusted for stock splits and dividends on the daily returns of the respective local benchmark indices:

$$R_{i\tau} = \alpha_i + \beta_i R_{l\tau} + \varepsilon_{i\tau} \tag{6}$$

$R_{i\tau}$ in Eq. 6 is the adjusted stock return for company i on day τ; $R_{l\tau}$ is the return of the local benchmark index l; α_i and β_i are the company-specific OLS estimators and $\varepsilon_{i\tau}$ is the error term. The local benchmark index is chosen as the major stock exchange index of the respective country. A complete list of indices used in our study is presented in Table A.2 (Appendix A).

The predicted returns ($E[R_{i\tau}|\, R_{l\tau}]$) are calculated for each company over the event windows, using the estimators (α_i, β_i) obtained from regressions in Eq. 6. The abnormal returns ($AR_{i\tau}$) are then calculated and summed up to obtain the event- and company-specific cumulative abnormal returns (CAR_{in}).

Finally, the event-specific cumulative average abnormal returns ($CAAR_n$) are calculated for the industry from the intercept-only OLS regressions of the CAR variable:

$$CAAR_n = \alpha_n + \varepsilon_n, \quad (7)$$

where a_n is the constant showing the cumulative average abnormal return for the whole sample during subevent n; and ε_n is the error term. Table 1 provides a summary of the variables used for analysis, showing the variables' definitions, descriptions and the sources of obtainment.

Table 1: Summary of variables used for analysis. This table shows the variables' name, definition, description and the source of obtainment. The obtained values of stock returns are expressed in percentage points, which is indicated by multiplication by 100 in the raw data variables' definitions.

Variable	Definition	Description	Source
Adjusted daily stock return	$R_{i\tau} = \frac{P^*_{i,\tau+1} - P^*_{i\tau}}{P^*_{i\tau}} * 100$	A company's adjusted stock return is the daily change in the stock's prices over the initial price of the stock. The prices are adjusted for stock splits and dividends.	Bloomberg Terminal (Raw data)
Daily index return	$R_{l\tau} = \frac{P_{l,\tau+1} - P_{l\tau}}{P_{l\tau}} * 100$	An index's return is the daily change in the index's prices over the initial price of the index.	Bloomberg Terminal (Raw data)
Predicted normal stock return	$E[R_{i\tau}\|\, R_{l\tau}] = \alpha_i + \beta_i R_{i\tau}$	The predicted normal returns are obtained using the company's daily stock returns and the estimators obtained from the OLS regressions.	Stata

(continued)

Table 1 Continued

Variable	Definition	Description	Source
Abnormal stock return	$AR_{i\tau} = R_{i\tau} - E[R_{i\tau} \| R_{l\tau}]$	A company's abnormal stock return is the difference between the actual stock return and the predicted normal stock return.	Stata
Cumulative abnormal stock return	$CAR_{in} = \sum_{\tau=-x}^{x} AR_{i\tau}$	The event-specific cumulative abnormal stock return for a company is obtained by summing up the abnormal returns of the company over the event window.	Stata
Cumulative average abnormal stock return	$CAAR_n = \frac{1}{I}\sum_{i=1}^{I} CAR_{in}$	The event-specific cumulative average abnormal return is obtained from the intercept-only OLS regression of the event-specific CARs for all companies.	Stata

3.4.3 Hypotheses Tests

To answer the research question "What is the overall impact of PSD 2 on the stock returns of the European banks?", each of the event-specific CAARs is tested for being significantly different from zero, based on the following null hypotheses:

$$H_{o1}: \overline{CAR_1} = CAAR_1 = 0 \quad H_{o6}: \overline{CAR_6} = CAAR_6 = 0$$
$$H_{o2}: \overline{CAR_2} = CAAR_2 = 0 \quad H_{o7}: \overline{CAR_7} = CAAR_7 = 0$$
$$H_{o3}: \overline{CAR_3} = CAAR_3 = 0 \quad H_{o8}: \overline{CAR_8} = CAAR_8 = 0$$
$$H_{o4}: \overline{CAR_4} = CAAR_4 = 0 \quad H_{o9}: \overline{CAR_9} = CAAR_9 = 0$$
$$H_{o5}: \overline{CAR_5} = CAAR_5 = 0$$

Note that a test for significance is not performed for all event-specific CAARs simultaneously, due to the different estimation periods being used in the normal market return estimation procedures for each event. Hence, a test for significance of the overall effect is not straightforward (Schäfer et al. 2016).

3.5 Robustness Methods

3.5.1 Different Estimation and Event Periods

One of the initial robustness tests implemented in this study is the use of different estimation and event periods, as mentioned previously in the event study's design section.

The baseline analysis is conducted with an 80 days estimation period and a three days event window. However, a 140 days estimation period is implemented to analyze the CAARs obtained from more accurate predictions of the normal returns (MacKinlay 1997). In addition, the expanded event window of 5 days is used to improve the capability of capturing the stock markets' reaction to the announcements of the subevents. However, the employment of the expanded event window warrants the examination for potential confounding events due to the trade-off between increasing the probability of detecting abnormal returns and exposing the results to the market noise and other events (Lamdin 2001).

3.5.2 Different Samples

Further robustness testing involves the comparison of results of the baseline analysis among different samples in an attempt to identify potential sampling biases. Although, the application of this particular robustness method is limited due to the restrictions on data availability and due to the study's limitation in regards to controlling for fixed effects.

3.5.3 Different Normal Return Estimation Models

The market model with local indexes' returns (Eq. 6) is used as the baseline estimation model for the predicted returns. However, for robustness purposes, the estimation procedures are repeated using a market model with a global market index and a two-factor market model with both a global and the local market indexes, following the example of Schäfer et al. (2016).

3.5.4 Application of the Robust Estimators

Based on the suggestions of Sorokina et al. (2013), this study implements the robust M- and MM-estimators in additional regression tests. This is done for the purposes of increasing the reliability of the results due to the proper treatment of potential contamination of the sample with outliers and leverage points.

Finally, the differences in the CAAR values obtained with the outlined robustness methods are analyzed in comparison to each other, together with the t-tests in order to reject the stated null hypotheses with more confidence.

4. Results and Analysis

This chapter provides descriptive statistics for the obtained data and the quantitative results obtained from the event study procedures. Furthermore, the results are analyzed using robustness tests, as outlined in the previous chapter. Finally, an interpretation of the quantitative results is provided using the extant knowledge about the PSD 2.

4.1 Descriptive Statistics

The screening procedures, which are outlined in the sample selection methods, resulted in two final samples: a sample of 67 banks remaining after a hard screening procedure with high sensitivity to the number of missing observations, and a sample of 72 banks remaining after a semi-hard screening procedure with lower sensitivity to the number of missing observations. A summary of the collected data is presented in Table 2, which shows the number of companies per country.

As observed in Table 2, the portion of companies from less compliant countries in the sample is higher than that of companies from PSD 2-compliant countries. Thus, the overrepresentation of less compliant companies in the sample creates a potential downward bias, based on the conceptual understanding of the directive's impact on stock returns. In other words, the negative effect on the stock returns is expected to be more prominent, due to the investment costs implied by the directive.

However, the classification of the compliant and less compliant countries varies among sources. For instance, the classification presented in Table 2 is based on the information obtained from Gemalto (Arta Sylejmani 2018, personal communication, 5 November). On the other hand, following Deloitte's classification (2018) leads to a sample that instead overrepresents companies from the PSD 2-compliant countries. Besides, an evaluation of banks' compliance on a national level does not directly imply compliance or non-compliance on an individual level. Therefore, the presence of an overrepresentation bias is uncertain.

Table 2: Summary of the obtained data in the hard-screened and semi-hard-screened samples. The classification of compliant and less compliant countries is confirmed with Gemalto (Arta Sylejmani, 2018, personal communication, 5 November).

Country	No. of Companies	Country	No. of Companies
PSD 2-compliant countries		*Less compliant countries*	
Belgium	2	Austria	2 (3)
Denmark	7 (8)	Czech Republic	1
Finland	1	France	5
Ireland	2	Germany	3
Malta	1	Hungary	1
Netherlands	1	Italy	12 (13)
Sweden	4	Lithuania	1
United Kingdom	6 (8)	Poland	9
Group's totals:	**24 (27)**	Portugal	1
		Romania	2
		Spain	6
		Group's totals:	**43 (45)**
		Entire sample's totals:	**67 (72)**

No. in parentheses refers to the semi-hard-screened sample

4.2 Results of the Baseline Estimations

The results of the baseline market model estimations vary among companies and subevents in terms of values of the coefficient of determination (R^2), which shows how well the indexes' returns predict the companies' stock returns. The obtained values of R^2 together with the values of the OLS estimators for each company from both samples are presented in Tables B.1-B.3 in Appendix B.

On the individual company level, the values of R^2 vary drastically, ranging from 0% to 95.3% among all events. These results imply that the major stock exchange indexes' do not always perform well as predictors of the banks' stock returns. In addition, the average R^2 of only 2.8% is observed for the five companies that are exclusive to the semi-hard screened sample. Thus, we argue for the use of the hard-screened sample for further analysis, since the inclusion of the abovementioned five companies would impair the reliability of the predicted returns.

On the subevent level, the lowest observed mean value of R^2 is 24.5% with a median value of 19.1%, which reflects the average coefficient of determination for all companies' stock returns' estimations prior to the PSD 2's implementation date (Event 9). At the same time, the highest observed mean value of R^2 is 59.7% with a median value of 62.2%, which corresponds to the estimations prior to the adoption of the PSD 2 proposal by the European Parliament (Event 5). Thus, the abnormal returns observed during these two events are respectively the least and the most reliable ones in terms of not resulting from misestimation.

Finally, it is worth mentioning that authors of peer-reviewed event studies often omit to provide detailed results of the estimation procedures, which makes it difficult to evaluate the overall reliability of the baseline estimations in our study. However, the estimations from an event study of the financial sector in the USA conducted by Kleinow et al. (2014) shows average R^2 values ranging from 34.5% to 43.4% on the subevent level. Therefore, we deem the reliability of the estimations in our study to be comparably acceptable.

4.3 Resulting Cumulative Average Abnormal Returns

The cumulative average abnormal returns resulting from the intercept-only OLS regressions of the event-specific CARs are shown in Table 3 (see Table C.1 for a more detailed version). For each subevent, the table displays the event-specific CAARs for the estimation windows of 80 and 140 days and the event windows of three and five days. Lastly, the sum of returns over all subevents is presented in the summation line, regardless of the individual significance of the CAARs.

Looking first at the summation line, the overall effect of the PSD 2 is an increase in the banks' stock prices, based on the CAARs. However, before providing any interpretation to these results, they ought to be examined more closely and tested for robustness.

The values of the cumulative average abnormal returns vary with the estimation parameters in the following manner: the increase of the estimation period from 80 to 140 days leads to a slight drop in abnormal returns, while the expansion of the event window from three to five days leads to an increase in the abnormal returns. This pattern is in line with our expectations established upon studying the theoretical framework. In this case, the extended estimation window does provide a more accurate prediction of the normal return and hence the decrease in abnormal returns. Meanwhile, the expanded event window captures more of the differences between the actual and expected returns, both PSD 2-related and not, which leads to larger abnormal returns. As such, the overall effect of the directive is estimated to be a 2.78%-6,89% increase in an average EU bank's stock return.

Considering individual events, the strongest effect is observed on the announcement date (Event 1) with the CAAR value between 1.14% and 1.40% that is statistically significant at a 1% level. This particular outcome is reasonable in the light of the efficient-market hypothesis (Fama 1991). In other words, if the PSD 2 is to have a significant effect on the banks' performance then the efficient capital markets adjust the stock prices to reflect the future changes, as soon as the information about them became available, i.e. on the announcement date.

However, the initial announcement of the PSD 2, as with almost any European directive, did not convey complete information about the eventual changes. Instead, the initial proposal by the European Commission was negotiated and altered, which prompted more reactions on the stock markets. For instance, the agreement reached on December 5, 2014 (Event 3), brought more certainty about the implementation of the PSD 2 (EC 2018b) and more positive reactions from the stock markets with CAAR values between 0.42% and 1.04%. These values are also statistically significant at a 10% level with a three-day event window and at a 1% level with a five-day event window.

Similar results are observed in relation to the adoption of the regulatory technical standards on November 27, 2017 (Event 8), with CAAR values ranging between 0.53% and 1.37%, at 5% and 1% levels of significance. However, it is unclear why would the announcement of regulatory standards affect the stocks positively, as the rules imply additional investment costs for banks (European Banking Authority (EBA) 2017). Furthermore, the baseline estimations of the normal returns during the announcement have a mean R^2 of 27.2% (see Table B.2), which also impairs the reliability of the resulting CAARs.

In addition, the adoption of the PSD 2 proposal by the European Parliament (Event 5) and the day of entry into force (Event 7) show CAAR values that are significant at 10% and 5% levels, respectively. However, these values are no longer significant with the expansion of the event window to five days, i.e. the first robustness tests. On the other hand, the R^2 values for the estimations of normal returns are above average for these events (see Table B.2), which warrants further examination with more robustness tests and discussion of potential confounding events.

Furthermore, two events (Event 2 and Event 4) do not show statistically significant CAARs with the baseline estimation parameters, but CAAR values that are significant at 5% and 1% levels are found with the expanded event window. This may be an indication of a very early or, more likely, a delayed positive reaction to the news that increased the probability of the PSD 2 eventually passing through unless the results are caused by confounding events.

To sum up, five of nine subevents demonstrate CAAR values that are statistically significant at least at the 10% level, using baseline estimation parameters: a three days event window and an 80 days estimation period. However, two of the five subevents that are statistically significant with the baseline estimators lose significance during the initial robustness tests. In addition, we identify two events that are statistically significant only when using the expanded event window. As such, all events, excluding events 6 and 9 due to baseline non-significance, require close attention during further robustness tests and examination of potential confounding events.

Table 3: The cumulative average abnormal returns from the baseline analysis. The values in the brackets state the estimation and event window lengths, respectively.

Event	CAAR [80, 3]	CAAR [140, 3]	CAAR [80, 5]	CAAR [140, 5]
(1) PSD 2 adoption announced	1.136***	1.177***	1.372***	1.396***
(2) European Parliament votes on proposal	-0.278	-0.269	1.052**	1.028**
(3) General approach agreement in Council	0.475*	0.421*	1.037***	1.022***
(4) Trilogue negotiations lead to agreement	-0.034	0.220	0.881**	1.123***
(5) EP adopts EC's PSD 2 proposal	0.780*	0.771*	0.684	0.694
(6) PSD 2 adopted by EC and EP	-0.250	-0.379*	0.009	-0.245
(7) PSD 2 enters into force	0.737**	0.528	0.366	0.271
(8) EC adopts rules on RTS	0.525**	0.351	1.366***	1.124***
(9) Transposition deadlines	0.027	-0.040	0.126	-0.003
Summation	**3.119**	**2.780**	**6.894**	**6.409**

** - significant at 10%, ** - significant at 5%, *** - significant at 1%.*

4.4 Further Robustness Tests and Examination of Confounding Events

In order to improve the reliability of the results obtained from the baseline analysis, the final analytical procedure includes an examination of potential confounding events and additional robustness tests consisting of the following measures: changing the sample, changing the normal returns estimation model and applying the robust M and MM-estimators.

The CAARs obtained from the baseline estimations on the semi-hard sample are similar to the ones obtained from the hard-screened sample, both in terms of the values and the statistical significance. In fact, the summation of the CAAR values ranges between 2.52% and 6.56% (see Table C.2 in Appendix C), which is only a couple of tenths of a percent lower than the ones obtained from the hard-screened sample. However, the similarity of the results from the two samples is not surprising since the hard-screened sample is essentially a subset of the semi-hard sample with only five companies constituting the difference.

On the other hand, the change of the normal returns estimation model leads to different results, especially when observing the market model that uses the STOXX Global Total Markets Index as the benchmark (see Table C.3). Firstly, the summation of the CAAR values ranges from 7.95% to 11.86%, which implies that the PSD 2 has had an almost twice as large overall impact on the banks' stock returns in comparison to the baseline analysis. Secondly, the CAARs obtained during events 5 and 8 lose statistical significance with the baseline estimation parameters of the three days event window and the 80 days estimation period. Instead, the cumulative average abnormal returns obtained during the transposition deadline (Event 9) emerge as a statistically significant result, which is at odds with the fact that the deadlines were set several years in advance and thus should not present themselves as a shock for the capital markets. In fact, the latter observation together with the quantitatively inflated abnormal returns serves as an indication that the global index has not performed well as a predictor of normal returns. Hence, the CAARs obtained with the global index model are not as reliable as the ones obtained from the baseline model.

Contrarily, the last alternate normal return estimation model, which is a two-factor model including both local and global indexes as benchmarks, provides results that are also similar to the baseline CAARs, both in terms of values and statistical significance (see Table C.4). The summation of the CAAR values ranges from 2.51% to 6.54%, which is in fact almost identical to the values obtained from the baseline model analysis of the semi-hard sample. Furthermore, these results provide proof of the explanatory power of the major local indexes being higher than that of the global index, when it comes to the estimation of normal returns in our study. In addition, the event-specific CAARs that are significant at least at the 10% level are associated with the same five events that demonstrate significant results with the baseline analysis (see Table 3).

Interestingly, significant CAARs are discovered during the same events even with the robust M and MM-estimators (see Tables C.5-C.6). These results are especially important since the analysis using these estimators provides proper treatment of outliers and leverage points (Sorokina et al. 2013). Hence, we are able to reject the null hypotheses for the respective event-specific CAARs with higher reliability, provided that the results are not subjected to an outlier bias. In quantitative terms, the overall effect of the PSD 2 on the banks' stock returns is estimated to be between 3.53% and 7.90% with the M-estimators and in the range from 4.43% to 9.13% with the MM-estimators.

During the examination of potential major confounding events, we have identified two events that may have had an industry-wide impact on the stock returns. The first event is the Greek debt crisis that led to a shutdown of the Greek stock market and a banking bailout in the summer of 2015 (Udland 2015). And the second event being Brexit, the development of which has been regularly covered on the front pages of Financial Times during the entire period of 2013-2018. However, neither does any of the two events receive an announcement during the PSD 2's subevent windows nor could they theoretically have led to the emergence of positive abnormal returns. Therefore, we are unable to find evidence of a bias in the resulting CAARs due to industry-wide confounding events. As such, we achieve a higher degree of reliability for the resulting values that are significant with the baseline parameters. Also, we are able to conclude that the significance, which is found only with the expanded event window, implies a delayed reaction of the stock markets rather than a biased result.

In summary, the examination of confounding events and the comparison of results from additional robustness tests (see Table 4) allows us to more confidently reject the null hypotheses for seven out of nine subevents. More specifically, the cumulative average abnormal returns are significantly non-zero for the following PSD 2-related subevents: the announcement of the PSD 2's adoption (Event 1); the European Parliament's voting on the proposal (Event 2); reaching the general approach agreement (Event 3); the trilogue negotiations leading to an agreement (Event 4); the EP's adoption of the proposal (Event 5); the PSD 2 entering into force (Event 7) and the adoption of the regulatory technical standards (Event 8), despite our inability to provide explanation for the positive effect of the latter.

Table 4: The results of comparing the significance of the event-specific CAARs from various changes in the study design. The events in the second and the third columns are marked with an X if the respective CAARs are significant at least at the 10% levels. Other columns indicate whether the significance persists through the robustness tests.

Subevent No.	Baseline significance	Expanded event window	Sample change	Model changes	Estimator changes
1	X	X	X	X	X
2	-	X	-	-	-
3	X	X	X	X	X
4	-	X	-	-	-
5	X	-	X	-	X
6	-	-	-	-	-
7	X	-	X	X	X
8	X	X	X	-	X
9	-	-	-	-	-

4.5 Qualitative Interpretation of the Findings

Provided the relationship between the investors' stock valuation and their awareness of the future economic costs and benefits (Berk and Demarzo 2017; Malkiel and Fama 1970), the observed positive CAARs lead to important implications. Specifically, the empirical evidence suggests that the expected PSD 2-related economic benefits outweigh the costs, from the investors' point of view.

The investors may be expecting the EU banks to act more decisively on the opportunity to establish new revenue streams from the provision of the new types of services despite the associated investment costs and the potential risks of penalized data breaches. Therefore, our findings support the concern that the potential threat of the emerging third-party competitors to the European banks may, in fact, be overstated, as suggested by Jackson (2018a).

However, our quantitative analysis is limited to the banks' stock returns only, while the event study methodology does not allow to evaluate the magnitude of the conceptually defined PSD 2 costs separately. Hence, it is fair to conclude that our findings do not provide any definitive evidence regarding the competitive position of the European FinTechs, and the optimistic expectations on that matter, such as those of Lovells et al. (2017), should not be completely disregarded. Yet, the market entry barriers still present a relatively greater challenge for the FinTechs, as pointed out by

Jackson (2018a). Therefore, all things considered, the PSD 2's intention to improve the competitive position of the FinTechs warrants further examination and should be closely assessed by the EU policymakers to avoid failure.

Moreover, the positive interpretation of the PSD 2-related events by the banks' shareholders should act as a form of an economic incentive for the European banks, which is an important motivational factor of regulatory compliance, as suggested by the research in the policymaking fields (e.g. Frey 1997). Thus, based on our findings, we expect an increase in the degree of compliance to the PSD 2's requirements and a rise in interest for the new opportunities with AISP and PISP licenses, at least among banks. However, these potential outcomes are feasible on condition that the banks are well aware of the economic incentives and the opportunities presented by the PSD 2.

Finally, regardless of whether the majority of firms providing the new types of services will consist of banks or FinTechs, the main beneficiary of the PSD 2 regulation should be the consumer who will be able to enjoy the enhanced digital payment services at lower fees. Although, the necessary prerequisite for that to happen is the service providers' ability to mitigate the threat of data breaches, which requires a responsible amount of investments in secure data management technologies on the firms' part (Jackson 2018a). Therefore, the PSD 2 also has a positive potential implication for suppliers of this type of solutions, i.e. IT companies, such as Gemalto, that will benefit from increased demand in their services.

5. Discussion

The obtained results show that the PSD 2 has had a statistically significant impact on the stock returns of the European banks over the course of the directive's development and implementation. However, we are only able to confidently state the fragmented measurements of the event-specific cumulative average abnormal returns due to the limitations of the event study methodology's application to regulatory events (Lamdin 2001, Schäfer et al. 2016). Nevertheless, the directive's overall effect is estimated to be a 2.78%-6.89% increase in stock returns for an average EU bank, according to our baseline analysis.

Although the reliability of the overall effect is not absolute, we have employed several measures to improve the quality of our study. These measures include a thorough event identification procedure, examination of potential sampling biases, application of various robustness techniques and implementation of modern advancements in the event study methodology, such as the use of the M and MM-estimators (Sorokina et al. 2013).

As such, we view the achieved results being valuable to the academics since our event study serves as a case of successful implementation of the event study methodology to a regulatory event. Besides, the regulatory event under discussion has been materializing over several years and has been affecting companies on a large scale. Therefore, the obtained results are important, as researchers consider the application of the methodology to such events particularly problematic (Schwert 1981, Lamdin 2001, Park 2004). In other words, adopting a variety of key study design decisions and considering similar quality improvement measures may serve as helpful guidelines to researchers in the future.

On the other hand, the limitations of our study make room for potential improvements and further findings on the effects of the PSD 2. As for improvements, we can suggest attempting to increase the reliability of the obtained results by implementing more advanced normal return estimation models, such as the world market model, which is developed by Park (2004) for analyzing events in a multi-country setting. Another suggestion is to eliminate more potential biases by controlling for fixed characteristics of the sampled companies, e.g. firm size, and by looking for major confounding events on the company level.

When it comes to further research on the effects of the PSD 2, we propose to investigate whether there are differences in the directive's impact on the stock returns among the different compliance groups, as it may convey important information for practitioners about the value of being PSD 2-compliant. In addition, defining the impact of the directive for other stakeholder groups may provide supplementary insights on and raise awareness around the PSD 2 among e.g. FinTechs and consumers. The positive returns also create room for finding a potential downside, which may be present among other actors of the financial payment services. More importantly, such insights can contribute to the evaluation of the regulation's performance in terms of its intended effect versus its actual effect. Moreover, we encourage the application of analytical methodologies other than the event study framework in the light of the available critique, which suggests that event studies should not replace thorough economic analysis to evaluate the quality of policies and regulations (Beigi and Budzinski 2013).

Apart from constituting a starting point for quantitative academic research on the PSD 2, the findings in this study also have important practical implications. Firstly, the positive abnormal returns on the banks' equities convey that investors expect an increase in the companies' future net cash flows due to the directive's implementation. In other words, the valuation of the long-term benefits associated with the PSD 2 is higher than the short-term investment costs and the potential regulatory fees. Obtaining this knowledge can cause a positive shift in the banks' attitude towards the PSD 2 and can act as an incentive for companies to become compliant with the regulation's requirements.

Secondly, a stronger willingness among banks to become PSD 2-compliant should raise the demand for services offered by third parties that aid to meet the regulatory requirements. The increased demand for such services is particularly beneficial for companies that provide IT security services, such as Gemalto, and for FinTechs that provide innovative solutions on the digital payment services market.

Finally, the potential rise of interest towards the directive entails good news for the regulators, since the PSD 2 under these circumstances is more likely to fulfill the intention of providing the consumers with more secure, innovative and price-worthy digital payment services (2015/2366/EU). On the other hand, this study shows no evidence of a positive impact on the FinTechs' competitive position due to the PSD 2. Therefore, the directive's intention to improve the competition on the digital payment services market, which is currently in the favor of banks (Jackson 2018a), warrants close assessment.

6. Conclusion

In conclusion, this study uses financial market data to estimate the overall effect of the Payment Services Directive 2 on the EU's banking sector. The results are obtained from the application of the event study methodology and show that the directive has had a statistically significant positive overall impact on the stock returns of the European banks. Furthermore, these findings have important implications for the actors on the digital payment services market and allow for an early evaluation of the regulation's performance in terms of achieving its intended results. More specifically, our interpretation of the findings suggests that the PSD 2 is likely to fulfill its goal to create more secure and innovative digital payment services. However, we find no evidence of potential improvement of the competitive situation on the market, which should be alarming for the regulators.

In addition, this study to our knowledge is the first quantitative academic research on the PSD 2, which implies that there are major opportunities and demand for more knowledge about the directive's impact. Further research is encouraged to contribute with a better understanding on the matter by establishing a proper econometric basis for the directive, which could be achieved via further applications of more advanced event study methods complemented by thorough economic analysis.

7. References

Accenture (2015). *The Future of Fintech and Banking: Digitally Disrupted or Reimagined?.* Available at: https://www.accenture.com/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_11/Accenture-Future-Fintech-Banking.pdf#zoom=50 [2019-01-11]

Ball, R. and Brown, P. (1968). An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research*, 6(2), pp.159–178.

Beigi, M. and Budzinski, H. (2013). Reservations on the Use of Event Studies to Evaluate Economic Policy*. Intereconomics*, 48(3), pp.174–179.

Berk, J. and DeMarzo, P. (2017). *Corporate Finance.* 4th ed. Boston MA, USA: Pearson

Binder, J. (1985). Measuring the Effects of Regulations with Stock Price Data. *The Rand Journal of Economics,* 16(2), pp.167-183.

Binder, J. (1998). The Event Study Methodology Since 1969. *Review of Quantitative Finance and Accounting,* 11(2), pp.111-137.

Bolkenstein, F. (2000). Establishing a Single Payment Area. In: European Commission (EC) (2018). *SPEECH/00/424*. Brussels. Available at: http://europa.eu/rapid/press-release_SPEECH-00-424_en.htm?locale=en [2018-12-15]

Capgemini and BNP Paribas (2018). *World Payments Report 2018.* Available at: https://worldpaymentsreport.com/ [2018-11-09]

Brace, R. (2012). SEPA's Tight Deadline: Migrating to the Single Payments Area in Two Years Poses a Real Challenge. (GLOBAL REGULATIONS) (Single Euro Payments Area). *Treasury & Risk*, p.28.

Brown, S.J. and Warner, J.B. (1985). Using Daily Stock Returns: The Case of Event Studies. *Journal of Financial Economics,* 14(3), pp.3-31.

Campbell, C.J., Cowan, A.R. and Salotti, V. (2010). Multi-Country Event-Study Methods. *Journal of Banking and Finance,* 34(12), pp.3078–3090.

Creswell, J.W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* 3rd ed. Thousand Oaks CA, USA: Sage Publications.

Deloitte (2018). *European PSD2 Survey. Voice of the Banks. January 2018.* Available at: https://www2.deloitte.com/ce/en/pages/financial-services/articles/deloitte-european-psd2-surveys.html [2018-11-09]

Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market. *Official Journal of the European Union* L319/1, 5.12.2007.

Directive 2015/2366/EU of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market. *Official Journal of the European Union* L337/35, 23.12.2015, pp.35-127.

Etienne, J. (2011). Compliance Theory: A Goal Framing Approach. *Law & Policy*, 33(3), pp.305–333.

European Banking Authority (EBA) (2017). *Technical Standards on the EBA Register Under PSD2.* Available at: https://eba.europa.eu/regulation-and-policy/payment-services-and-electronic-money/technical-standards-on-the-eba-register-under-psd2 [2018-12-15]

European Central Bank (ECB) (2013). *The Single Euro Payments Area (SEPA). An integrated retail payments market.* Frankfurt am Main: European Central Bank. Available at: https://www.ecb.europa.eu/paym/retpaym/shared/pdf/SEPA_e-brochure_2013.pdf [2018-11-09]

European Commission (EC) (2017). *Payment Services Directive (PSD2): Regulatory Technical Standards (RTS) Enabling Consumers to Benefit from Safer and More Innovative Electronic Payments* [Press Release]. 27 November. Brussels: European Commission. Available at: http://europa.eu/rapid/press-release_MEMO-17-4961_en.htm [2018-11-09]

European Commission (EC) (2018a). *The European Single Market*. Available at: https://ec.europa.eu/growth/single-market_en [2018-12-15]

European Commission (EC) (2018b). *Press Releases Database. Search.* Available at: http://europa.eu/rapid/search.htm [2018-12-15]

Evry (2017). *PSD2, the Directive That Will Change Banking as We Know It.* Available at: https://www.evry.com/en/news/articles/psd2-the-directive-that-will-change-banking-as-we-know-it/ [2018-11-09]

Ewing, J., Pianigiani, G. and Bray, C. (2017). Why Troubles at a Midsize Italian Bank Worry the E.U. *The New York Times,* June 1. Available at: https://www.nytimes.com/2017/06/01/business/dealbook/italy-bank-mps-debt.html [2018-12-17]

Fama, E.F. (1991). Efficient Capital Markets: II. *Journal of Finance,* 46(5), pp.1575–1617.

Fama, E.F., Fisher, L., Jensen, M. and Roll, R. (1969). The Adjustment of Stock Prices to New Information. *International Economic Review*, 10, p.1.

Fama, E.F. and French, K.R. (1996). Multifactor Explanations of Asset Pricing Anomalies. *Journal of Finance*, 51(1), pp.55–84.

Feinberg, R. and Harper, M. (1999). Regime Effects of EU Market Integration Policies on the UK Financial Sector. *Review of Industrial Organization*, 15(4), pp.357–365.

Fernández, P. (2002). *Valuation Methods and Shareholder Value Creation.* San Diego, CA, USA: Academic Press.

Frey, B.S. (1997). *Not Just for the Money: An Economic Theory of Personal Motivation.* Cheltenham, UK: Edward Elgar Publishing.

Gemalto (2018). *About Us.* Available at: https://www.gemalto.com/companyinfo [2018-12-15]

Heckman, J.J. (1979). Sample Selection Bias as a Specification Error. *Econometrica,* 47(1), pp.153-161.

Huber, P. J. (1973). Robust Regression: Asymptotics, Conjectures and Monte Carlo. *Annals of Statistics*, 1, pp.799-821.

Jackson, O. (2018a). PSD2 Gives Banks Chance to Evolve. *International Financial Law Review,* February 12, p.4.

Jackson, O. (2018b). Many Small Firms Are Still Unprepared For GDPR. *International Financial Law Review,* March 19, p.1.

Johnson, H.L. and Lambert, E.W. (1965). Supply and Demand Forces in the Equities Market: Fact and Fantasy. *Economic Inquiry*, 4(1), pp.15–27.

Kleinow, J., Nell, T., Rogler, S. and Horsch, A. (2014). The Value of Being Systemically Important: Event Study on Regulatory Announcements for Banks. *Applied Financial Economics*, 24(24), pp.1585–1604.

Lamdin, D.J. (2001). Implementing and Interpreting Event Studies of Regulatory Changes. *Journal of Economics and Business*, 53(2), pp.171–183.

Litner, J. (1965). The Valuation of Risky Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics,* 47(1), p.13

Lovells, H., Salmon, J., Parsons, M. and Thew, S. (2017). Fintech Regulation Unbalances Financial Services Market. *International Financial Law Review,* April 17, p.4.

MacKinlay, A.C. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, 35(1), pp.13–39.

Malkiel, B.G. and Fama, E.F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, 25(2), pp.383–417.

Mendoza, J.P., Dekker, H.C. and Wielhouwer, J.L. (2016). Firms' Compliance with Complex Regulations. *Law and Human Behavior,* 40(6), pp.721-723.

Mishan, E.J. and Quah, E. (2007). *Cost-Benefit Analysis.* 5th ed., London, UK: Routledge.

Mitchell, M.L. and Stafford, E. (2000). Managerial Decisions and Long-Term Stock Price Performance. *Journal of Business*, 73(3), pp.287–329.

Nielsen, V. and Parker, C. (2012). Mixed Motives: Economic, Social, and Normative Motivations in Business Compliance. *Law & Policy,* 34(4), 428-462.

O'Hara, M. and Shaw, W. (1990). Deposit Insurance and Wealth Effects: The Value of Being 'Too Big to Fail', *Journal of Finance,* 45(5), pp.1587-1600.

Park, N.K., (2004). A Guide to Using Event Study Methods in Multi-Country Settings. *Strategic Management Journal,* 25(7), pp.655-668.

Popovici, M.C. (2014). The Implications of Single Euro Payments Area (SEPA) on Banking Efficiency. *CES Working Papers*, 6(3), pp.68–75.

Princeton University Library (2008). *Event Studies with Stata.* Available at: https://dss.princeton.edu/online_help/stats_packages/stata/eventstudy.html [2018-12-21]

Ross, S.A. (1976). The Arbitrage Theory of Capital Asset Pricing. *Journal of Economic Theory,* 13(3), pp.341-360.

Rousseeuw, P., and Yohai, V. (1984). Robust Regression by Means of S-Estimators. *Springer Lecture Notes in Statistics*, 26, pp.256-272.

Scholz, J. and Pinney, N. (1995). Duty, Fear, and Tax Compliance: The Heuristic Basis of Citizenship Behavior. *American Journal of Political Science*, 39(2), pp.490–512.

Schwert, G.W. (1981). Using Financial Data to Measure Effects of Regulation. *The Journal of Law and Economics*, 24(1), pp.121–158.

Schäfer, A., Schnabel, I. and Weder di Mauro, B. (2016). Financial Sector Reform After the Subprime Crisis: Has Anything Happened?. *Review of Finance*, 20(1), pp.77–125.

Sharpe, W.F. (1964). Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk, *Journal of Finance,* 19(3), pp.425-442.

Shiller, R.J. (2003). From Efficient Markets Theory to Behavioral Finance. *Journal of Economic Perspectives,* 17(1), pp.83–104.

Sorokina, N., Booth, D.E. and Thornton Jr., J.H. (2013). Robust Methods in Event Studies: Empirical Evidence and Theoretical Implications. *Journal of Data Science,* 11, pp.575-606.

Spilioti, S. (2014). Predicted vs. Real Stock Prices Can the Difference Be Explained by Key Macroeconomic Factors? *Investment Management and Financial Innovations*, 11(4), pp.107–116.

Statista (2018). *Reaction of Banks to Development of Fintech Companies Worldwide as of February 2015.* Available at: https://www-statista-com.ezproxy.ub.gu.se/statistics/379497/reaction-of-banks-to-fintech-companies/ [2018-11-09]

Udland, M. (2015). REPORT: Greece's Stock Market Will Be Closed for at Least a Week. *Business Insider,* June 28. Available at: https://www.businessinsider.com/kathimerini-reports-greek-stock-market-will-be-closed-for-a-week-2015-6?r=US&IR=T&IR=T [2018-12-21]

Winter, S.C. and May, P.J. (2001). Motivation for Compliance with Environmental Regulations. *Journal of Policy Analysis and Management*, 20(4), pp.675–698.

Yap, B. (2017). New EU Payment Services Rules Spur New Regulation in Japan. *International Financial Law Review*, February 17, p.7.

Appendixes

Appendix A – Supplementary Material

Table A.1: List of key events (subevents) constituting the PSD 2's development and enactment. The table shows all PSD 2-related subevents according to the European Commission's official press releases and law details. The last column provides the titles of the corresponding press releases or laws to simplify search queries for reference purposes.

Subevent name	Subevent date	Press release/law title
Adoption of a revised Payment Services Directive (PSD 2) is announced	July 24, 2013	"New rules on Payment Services for the benefit of consumers and retailers"
European Parliament votes on PSD 2	April 3, 2014	"Commissioner Jonathan Hill welcomes the General Approach agreement reached in Council on the revised Payment Services Directive"
General Approach agreement reached in Council on PSD 2	December 5, 2014	"Commissioner Jonathan Hill welcomes the General Approach agreement reached in Council on the revised Payment Services Directive"
Trilogue negotiations between EC, EP and Council of Ministers lead to agreement on PSD 2	May 5, 2015	"Commissioner Hill welcomes agreement on the revised Payment Services Directive"
European Parliament adopts European Commission's proposal of PSD 2	October 8, 2015	"European Parliament adopts European Commission proposal to create safer and more innovative European payments"
PSD 2 released	November 25, 2015	Directive 2015/2366/EU of the European Parliament and of the Council of 25 November 2015
PSD 2 enters into force	January 12, 2016	Directive 2015/2366/EU of the European Parliament and of the Council of 25 November 2015

(continued)

Table A.1 Continued

Subevent name	Subevent date	Press release/law title
EC adopts rules on regulatory technical standards (RTS)	November 27, 2017	"Payment services: Consumers to bene-fit from safer and more innovative electronic payments"
Deadline for national transposition laws	January 13, 2018	Directive 2015/2366/EU of the Europe-an Parliament and of the Council of 25 November 2015

Table A.2 List of indices used as proxies for market returns in the market model estimations of the normal returns.

Country	Stock exchange	Index
Austria	Vienna Stock Exchange	ATX
Belgium	Brussels Stock Exchange	BEL 20
Czech Republic	Prague Stock Exchange	PX Index
Denmark	Copenhagen Stock Exchange	OMXC20
Finland	Helsinki Stock Exchange	OMXH25
France	Euronext Paris	CAC 40
Germany	Frankfurt Stock Exchange	DAX
Hungary	Budapest Stock Exchange	BUX
Ireland	Euronext Dublin	ISEQ 20
Italy	Borsa Italiana	FTSE MIB
Lithuania	Vilnius Stock Exchange	OMX Vilnius
Malta	Malta Stock Exchange	MALTEX
Netherlands	Euronext Amsterdam	AEX
Poland	Warsaw Stock Exchange	WIG 20
Portugal	Euronext Lisbon	PSI-20
Romania	Bucharest Stock Exchange	BET
Spain	Bolsa de Madrid	IBEX 35
Sweden	Stockholm Stock Exchange	OMXS30
United Kingdom	London Stock Exchange	FTSE 100
Global	-	STOXX Global Total Markets Index

Appendix B – Results of the Baseline Estimation

Table B.1: OLS regression parameters (α_i, β_i) and the coefficients of determination (R^2) of the baseline market model with 80 days estimation periods, using major local stock exchange indexes, for events 1-4. All values are shown in absolute terms. Additional banks from the semi-hard sample are marked with *.

		Event (1) July 24, 2013			Event (2) April 3, 2014			Event (3) December 5, 2014			Event (4) May 5, 2015		
i	Bank	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2
1	Aktia Bank	0.046	0.608	0.180	0.205	0.456	0.189	0.001	0.433	0.185	0.160	0.269	0.055
2	Arbuthnot Banking Group PLC*	0.059	0.067	0.008	-0.111	0.354	0.007	0.316	0.201	0.003	0.123	0.486	0.036
3	Banca Carige S.p.A.	-0.187	0.619	0.135	0.335	0.807	0.086	-0.630	0.912	0.185	0.220	0.128	0.003
4	Banca Generali S.p.A.	0.233	0.601	0.239	0.029	0.767	0.173	0.091	0.727	0.502	0.202	0.505	0.205
5	Banca Popolare di Sondrio S.C.p.A.	-0.065	1.234	0.446	0.129	0.954	0.310	-0.052	1.050	0.665	0.124	0.975	0.280
6	Banca Transilvania S.A.	-0.003	1.399	0.388	0.181	1.413	0.631	-0.028	0.730	0.277	0.152	1.754	0.474
7	Banco Bilbao Vizcaya Argentaria, S.A.	-0.066	1.190	0.859	-0.101	1.428	0.874	-0.107	1.176	0.286	0.040	1.122	0.731
8	Banco BPI S.A.	-0.024	1.669	0.743	0.303	1.448	0.513	0.336	1.342	0.521	0.169	1.321	0.154
9	Banco BPM S.p.A.	-0.120	1.641	0.557	0.175	1.821	0.302	-0.039	1.427	0.612	0.136	1.350	0.417
10	Banco de Sabadell S.A.	0.062	1.057	0.330	0.160	1.208	0.461	-0.070	1.561	0.795	0.013	1.281	0.392
11	Banco di Desio e Brianza S.p.A.	0.032	0.191	0.023	0.358	0.807	0.116	-0.195	0.433	0.214	0.314	0.587	0.184
12	Banco di Sardegna S.p.A.*	-0.215	0.010	0.000	0.167	0.146	0.016	-0.081	0.139	0.055	0.098	0.148	0.033
13	Banco Santander S.A.	-0.033	1.305	0.863	0.012	1.163	0.916	-0.057	1.172	0.937	-0.229	1.681	0.749
14	Bank Handlowy w Warszawie S.A.	0.143	0.889	0.281	0.039	1.146	0.323	-0.106	0.878	0.209	0.020	0.657	0.219
15	Bank Millenium S.A.	0.227	0.743	0.193	0.311	0.874	0.193	-0.018	1.296	0.210	-0.270	1.529	0.299
16	Bank Ochrony Srodowiska S.A.	0.121	0.754	0.243	0.034	1.070	0.304	-0.243	0.734	0.108	-0.173	0.358	0.074
17	Bank of Ireland Group PLC	0.008	1.749	0.461	-0.036	1.780	0.317	0.077	1.600	0.576	-0.149	1.450	0.328
18	Bank of Valletta PLC	-0.014	0.948	0.184	-0.076	0.270	0.053	0.122	1.065	0.338	-0.188	2.035	0.581
19	Bank Polska Kasa Opieki S.A.	0.118	0.923	0.490	0.135	1.141	0.614	0.054	1.122	0.363	-0.013	0.859	0.343
20	Bankia S.A.	0.208	0.387	0.000	0.450	1.598	0.494	-0.082	1.219	0.731	-0.137	0.960	0.294
21	Bankinter S.A.	0.279	1.456	0.539	0.232	1.246	0.561	0.126	1.102	0.625	-0.098	0.968	0.395
22	Barclays PLC	0.081	1.471	0.624	-0.147	1.102	0.285	0.118	1.369	0.415	-0.004	1.223	0.428
23	BNP Paribas S.A.	0.077	1.372	0.821	0.000	1.333	0.655	-0.010	1.177	0.778	-0.031	1.099	0.443
24	BPER Banca S.p.A.	-0.261	1.753	0.616	0.068	1.662	0.482	-0.069	1.609	0.733	0.101	1.284	0.387
25	BRD – Groupe Société Générale	-0.161	0.775	0.268	-0.057	1.112	0.343	-0.055	0.709	0.167	0.162	0.871	0.224

(continued)

Table B.1 Continued

		Event (1) July 24, 2013			Event (2) April 3, 2014			Event (3) December 5, 2014			Event (4) May 5, 2015		
i	Bank	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2
26	CaixaBank S.A.	0.009	1.053	0.488	0.218	1.347	0.584	-0.002	1.268	0.696	-0.092	1.026	0.389
27	Close Brothers Group PLC	-0.052	1.023	0.407	0.095	1.092	0.301	0.240	0.838	0.364	-0.027	0.759	0.411
28	Comdirect Bank AG	-0.051	0.210	0.037	0.034	0.289	0.058	0.032	0.298	0.170	0.072	0.370	0.186
29	Commerzbank AG	-0.345	0.802	0.081	0.318	1.151	0.282	0.042	1.005	0.318	-0.011	0.681	0.230
30	Crédit Agricole Nord de France	0.050	0.167	0.045	0.189	0.242	0.042	-0.078	0.224	0.061	0.286	-0.029	0.001
31	Crédit Agricole S.A.	0.047	1.447	0.649	0.257	1.181	0.426	0.025	1.216	0.535	0.116	1.041	0.314
32	Credito Emiliano S.p.A.	0.023	0.861	0.435	0.191	0.912	0.252	-0.007	0.851	0.468	0.100	0.385	0.095
33	Credito Valtellinese S.p.A.	0.045	0.803	0.263	-0.064	1.177	0.210	0.027	1.301	0.497	0.091	1.310	0.317
34	Danske Andelskassers Bank A/S	-0.200	0.252	0.008	0.200	1.067	0.048	-0.602	0.084	0.001	0.524	0.027	0.000
35	Danske Bank A/S	-0.025	1.000	0.256	0.104	0.877	0.463	0.020	1.051	0.675	-0.035	0.716	0.393
36	Deutsche Bank AG	0.143	1.021	0.412	-0.093	1.007	0.452	-0.020	0.966	0.484	0.064	0.703	0.252
37	Erste Group Bank AG	-0.004	1.740	0.750	0.067	1.664	0.660	0.190	1.540	0.710	-0.030	1.562	0.559
38	Getin Holding S.A.	0.249	1.118	0.228	-0.182	1.944	0.364	-0.280	1.775	0.383	0.037	1.248	0.160
39	HSBC Holdings PLC	0.006	1.230	0.737	-0.097	0.892	0.434	0.000	1.058	0.594	0.037	0.821	0.329
40	ING Bank Slaski S.A.	0.113	0.596	0.162	0.200	1.167	0.406	0.135	0.550	0.139	0.080	0.204	0.017
41	ING Groep	0.210	1.686	0.594	0.071	1.706	0.642	0.025	1.527	0.636	0.059	1.304	0.630
42	Intesa Sanpaolo S.p.A.	0.140	1.475	0.829	0.208	1.271	0.648	0.125	1.351	0.905	-0.044	1.343	0.777
43	Jyske Bank A/S	0.221	0.850	0.270	-0.158	1.230	0.392	-0.076	0.854	0.416	-0.075	0.402	0.105
44	KBC Ancora	0.083	1.699	0.625	-0.120	1.314	0.475	0.049	1.441	0.608	0.179	0.790	0.307
45	KBC Group	0.100	1.694	0.622	-0.118	1.959	0.662	-0.020	1.428	0.602	0.179	0.865	0.376
46	Komercni banka	0.032	0.827	0.263	0.074	1.151	0.461	0.027	0.924	0.406	0.135	1.073	0.353
47	Lloyds Banking Group PLC	0.416	1.054	0.385	-0.054	0.877	0.179	0.080	0.952	0.396	-0.002	0.702	0.463
48	mBank S.A.	0.212	0.947	0.399	0.020	1.014	0.446	0.079	1.146	0.339	-0.189	1.236	0.327
49	Medio Banca di Credito Finanziario S.p.A.	0.054	1.258	0.426	0.171	1.107	0.480	0.218	1.156	0.750	0.039	1.135	0.607
50	Natixis S.A.	0.200	0.912	0.465	0.360	0.987	0.308	0.086	1.346	0.671	0.101	1.149	0.534
51	Nordea Bank Abp	0.057	1.229	0.640	0.090	1.131	0.673	-0.077	1.374	0.750	0.083	1.169	0.552
52	Oberbank AG*	0.002	-0.008	0.030	0.035	0.011	0.007	0.005	0.003	0.001	0.031	-0.002	0.001

(continued)

Table B.1 Continued

		Event (1) July 24, 2013			Event (2) April 3, 2014			Event (3) December 5, 2014			Event (4) May 5, 2015		
i	Bank	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2
53	OTP Bank Nyrt	-0.063	1.709	0.765	0.055	1.290	0.657	0.044	1.442	0.715	0.065	1.350	0.709
54	Park Group PLC*	-0.117	0.224	0.022	0.124	-0.1809	0.004	0.100	0.019	0.000	0.017	-0.132	0.003
55	Permanent TSB Group Holdings PLC	-0.335	0.685	0.013	1.252	0.430	0.004	-0.123	0.078	0.000	-0.249	0.650	0.020
56	Powszechna Kasa Oszczednosci Ban S.A.	0.121	0.802	0.436	0.089	0.918	0.647	-0.026	1.154	0.564	-0.128	1.319	0.493
57	Raiffeisen Bank International AG	-0.179	0.978	0.392	0.049	1.504	0.464	-0.217	2.313	0.587	-0.228	2.394	0.376
58	Ringkjoebing Landbobank A/S	0.180	0.267	0.093	0.054	0.253	0.083	0.009	0.360	0.218	0.303	0.074	0.007
59	Royal Bank of Scotland Group PLC	0.139	1.531	0.312	-0.099	1.375	0.282	0.149	1.298	0.410	-0.228	0.983	0.271
60	Santander Bank Polska S.A.	0.268	0.501	0.166	0.100	0.962	0.512	0.019	0.951	0.334	-0.108	1.261	0.355
61	Siauliu Bankas AB	-0.007	0.123	0.003	-0.051	1.387	0.502	-0.088	0.833	0.126	0.150	0.843	0.081
62	Skandinaviska Enskilda Banken AB	0.009	1.241	0.718	0.121	0.986	0.541	0.023	1.174	0.697	0.017	0.776	0.436
63	Skjern Bank*	0.133	0.567	0.065	-0.046	0.396	0.048	-0.115	0.902	0.239	-0.070	0.035	0.000
64	Société Générale S.A.	0.062	1.507	0.659	0.066	1.424	0.561	0.017	1.474	0.735	0.095	1.046	0.424
65	Spar Nord Bank A/S	0.203	0.838	0.227	0.168	0.706	0.252	-0.094	0.786	0.278	0.249	0.201	0.026
66	Standard Chartered PLC	-0.209	1.226	0.531	-0.061	1.018	0.381	-0.302	0.654	0.097	0.040	1.408	0.281
67	Svenska Handelsbanken AB	0.005	1.088	0.599	0.071	0.985	0.602	0.047	0.949	0.672	-0.019	0.857	0.472
68	Swedbank AB	-0.027	1.365	0.609	0.044	0.970	0.502	0.054	0.965	0.718	-0.066	0.806	0.554
69	Sydbank A/S	0.033	0.670	0.240	-0.277	0.851	0.290	0.228	1.085	0.367	0.125	0.667	0.227
70	UniCredit S.p.A.	0.118	1.481	0.809	-0.003	1.529	0.688	0.010	1.403	0.859	-0.080	1.352	0.720
71	Unione di Banche Italiane S.p.A.	0.011	1.569	0.630	0.229	1.274	0.426	0.075	1.513	0.752	-0.075	1.357	0.549
72	Vestjysk Bank A/S	0.234	0.066	0.000	-0.344	0.836	0.057	-0.475	0.420	0.023	0.004	0.174	0.009
			Mean R^2:	**0.405**			**0.403**			**0.465**			**0.334**
			Median R^2:	**0.407**			**0.426**			**0.484**			**0.329**

Table B.2: OLS regression parameters (α_i, β_i) and the coefficients of determination (R^2) of the baseline market model with 80 days estimation periods, using major local stock exchange indexes, for events 5-8. All values are shown in absolute terms. Additional banks from the semi-hard sample are marked with *.

		Event (5) October 8, 2015			Event (6) November 25, 2015			Event (7) January 12, 2016			Event (8) November 27, 2017		
i	Bank	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2
1	Aktia Bank	0.028	0.730	0.455	-0.110	0.560	0.233	-0.081	0.287	0.073	0.003	0.291	0.090
2	Arbuthnot Banking Group PLC*	0.018	0.331	0.047	-0.066	0.420	0.162	0.050	-0.007	0.000	-0.013	0.082	0.002
3	Banca Carige S.p.A.	0.005	1.029	0.561	-0.099	0.863	0.471	-0.052	1.019	0.381	-0.617	1.251	0.012
4	Banca Generali S.p.A.	-0.152	0.860	0.585	-0.016	0.886	0.630	0.122	0.730	0.466	-0.063	1.118	0.432
5	Banca Popolare di Sondrio S.C.p.A.	-0.008	0.877	0.730	-0.068	0.814	0.637	-0.080	0.790	0.485	-0.219	0.728	0.156
6	Banca Transilvania S.A.	0.159	1.243	0.655	0.179	1.260	0.634	0.085	1.653	0.644	-0.032	1.717	0.648
7	Banco Bilbao Vizcaya Argentaria, S.A.	-0.072	1.058	0.911	-0.138	1.008	0.812	-0.152	1.075	0.767	-0.036	1.299	0.804
8	Banco BPI S.A.	-0.170	1.352	0.485	0.190	1.189	0.428	0.158	1.215	0.271	0.058	0.384	0.039
9	Banco BPM S.p.A.	-0.068	1.208	0.825	-0.171	1.126	0.685	-0.287	1.189	0.650	-0.270	1.800	0.318
10	Banco de Sabadell S.A.	-0.179	1.038	0.622	-0.205	1.044	0.501	-0.102	0.922	0.377	-0.057	1.996	0.685
11	Banco di Desio e Brianza S.p.A.	-0.017	0.323	0.125	-0.190	0.236	0.055	-0.278	0.113	0.009	-0.171	0.718	0.112
12	Banco di Sardegna S.p.A.*	-0.065	0.118	0.031	-0.038	0.120	0.025	-0.318	0.026	0.001	0.004	0.113	0.014
13	Banco Santander S.A.	-0.144	1.291	0.953	-0.147	1.296	0.895	-0.188	1.386	0.875	0.033	1.347	0.793
14	Bank Handlowy w Warszawie S.A.	-0.048	1.067	0.409	-0.105	1.034	0.274	-0.121	0.943	0.214	0.047	0.400	0.081
15	Bank Millenium S.A.	0.113	1.281	0.395	-0.217	1.279	0.365	0.141	0.803	0.205	0.099	0.459	0.091
16	Bank Ochrony Srodowiska S.A.	-0.304	0.408	0.033	-0.088	0.916	0.192	-0.120	0.643	0.110	-0.178	0.673	0.086
17	Bank of Ireland Group PLC	0.023	1.067	0.595	-0.123	1.023	0.549	-0.156	0.946	0.396	-0.118	0.891	0.256
18	Bank of Valletta PLC	-0.026	0.675	0.116	-0.041	0.557	0.079	0.103	0.627	0.120	0.020	2.800	0.507
19	Bank Polska Kasa Opieki S.A.	-0.024	1.001	0.501	0.000	0.940	0.461	0.043	1.006	0.486	-0.008	0.770	0.276
20	Bankia S.A.	0.203	0.894	0.485	0.104	0.835	0.355	0.008	0.825	0.291	-0.066	1.140	0.609
21	Bankinter S.A.	0.142	0.944	0.772	0.052	0.784	0.551	0.004	0.679	0.462	-0.018	1.018	0.638
22	Barclays PLC	0.035	1.180	0.840	-0.232	1.135	0.663	-0.223	1.159	0.572	-0.119	0.647	0.060
23	BNP Paribas S.A.	0.061	1.099	0.872	0.030	0.986	0.774	-0.092	0.995	0.745	-0.155	1.232	0.413
24	BPER Banca S.p.A.	0.028	1.207	0.804	-0.115	1.018	0.681	-0.111	1.050	0.655	-0.196	1.334	0.168
25	BRD – Groupe Société Générale	0.069	1.061	0.539	0.151	1.030	0.536	0.137	1.428	0.512	-0.038	1.288	0.552

(continued)

Table B.2 Continued

		Event (5) October 8, 2015			Event (6) November 25, 2015			Event (7) January 12, 2016			Event (8) November 27, 2017		
i	Bank	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2
26	CaixaBank S.A.	-0.086	0.866	0.689	-0.167	0.871	0.526	-0.170	0.904	0.390	-0.046	1.550	0.670
27	Close Brothers Group PLC	0.020	0.687	0.500	0.092	0.591	0.428	-0.027	0.449	0.287	-0.130	1.094	0.164
28	Comdirect Bank AG	0.198	0.339	0.190	0.132	0.274	0.109	0.145	0.215	0.044	0.038	0.470	0.076
29	Commerzbank AG	-0.077	0.870	0.614	-0.143	0.815	0.473	-0.126	0.720	0.387	0.028	1.006	0.123
30	Crédit Agricole Nord de France	-0.059	0.322	0.343	-0.042	0.242	0.186	-0.071	0.163	0.098	-0.008	0.314	0.036
31	Crédit Agricole S.A.	-0.167	0.947	0.594	-0.278	0.813	0.366	-0.163	0.806	0.391	-0.136	1.018	0.239
32	Credito Emiliano S.p.A.	-0.116	0.758	0.593	-0.170	0.597	0.380	-0.092	0.651	0.299	-0.049	0.756	0.155
33	Credito Valtellinese S.p.A.	0.027	0.945	0.687	-0.136	0.785	0.506	-0.142	0.787	0.372	-1.173	3.633	0.098
34	Danske Andelskassers Bank A/S	-0.295	0.211	0.027	-0.557	0.308	0.024	-0.846	0.139	0.001	-0.111	0.333	0.016
35	Danske Bank A/S	0.068	0.931	0.776	-0.124	0.899	0.600	-0.187	0.842	0.438	-0.101	0.276	0.049
36	Deutsche Bank AG	0.025	1.007	0.628	-0.289	0.900	0.489	-0.255	0.901	0.468	-0.005	0.909	0.117
37	Erste Group Bank AG	0.119	1.203	0.810	0.093	1.189	0.665	0.141	1.110	0.576	-0.001	1.136	0.382
38	Getin Holding S.A.	-0.118	1.174	0.313	-0.007	1.126	0.247	0.081	1.136	0.155	0.170	0.630	0.084
39	HSBC Holdings PLC	-0.087	1.158	0.864	-0.022	1.156	0.808	0.050	1.103	0.738	-0.049	1.035	0.431
40	ING Bank Slaski S.A.	-0.033	0.714	0.231	0.056	0.662	0.227	0.088	0.709	0.246	0.015	0.171	0.025
41	ING Groep	0.024	1.222	0.829	-0.077	1.124	0.767	-0.044	0.978	0.733	-0.059	0.815	0.309
42	Intesa Sanpaolo S.p.A.	0.052	1.179	0.915	-0.022	1.060	0.835	0.020	0.950	0.787	-0.076	0.743	0.504
43	Jyske Bank A/S	0.167	0.825	0.628	-0.032	0.801	0.547	-0.299	0.690	0.390	-0.183	0.501	0.081
44	KBC Ancora	0.004	1.155	0.726	0.002	1.063	0.601	0.053	0.687	0.345	0.124	0.978	0.269
45	KBC Group	0.049	1.119	0.790	-0.116	1.010	0.531	-0.063	0.835	0.347	-0.034	0.941	0.338
46	Komercni banka	0.066	0.929	0.467	-0.035	0.888	0.462	-0.009	0.881	0.321	-0.100	1.018	0.400
47	Lloyds Banking Group PLC	-0.087	0.731	0.583	-0.168	0.719	0.464	-0.072	0.813	0.467	0.018	0.400	0.045
48	mBank S.A.	-0.067	1.221	0.513	-0.041	1.178	0.468	0.015	1.080	0.381	-0.006	0.934	0.207
49	Medio Banca di Credito Finanziario S.p.A.	0.093	1.014	0.821	0.066	0.928	0.758	0.004	0.836	0.682	0.092	0.747	0.304
50	Natixis S.A.	-0.181	1.064	0.657	-0.271	1.023	0.556	-0.242	1.065	0.517	-0.046	1.342	0.283
51	Nordea Bank Abp	0.023	1.050	0.826	-0.020	1.059	0.741	-0.008	1.044	0.708	-0.100	0.721	0.146
52	Oberbank AG*	-0.018	0.003	0.001	0.013	0.014	0.025	0.055	-0.005	0.002	0.055	-0.022	0.022

(continued)

Table B.2 Continued

		Event (5) October 8, 2015			Event (6) November 25, 2015			Event (7) January 12, 2016			Event (8) November 27, 2017		
i	Bank	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2	α_i	β_i	R^2
53	OTP Bank Nyrt	0.037	1.238	0.743	-0.009	1.303	0.779	-0.075	1.391	0.713	-0.062	1.178	0.537
54	Park Group PLC*	0.339	0.353	0.056	0.404	0.369	0.055	0.057	0.243	0.010	0.185	-0.034	0.000
55	Permanent TSB Group Holdings PLC	0.067	0.830	0.292	-0.317	0.726	0.241	-0.163	0.629	0.120	0.137	0.335	0.026
56	Powszechna Kasa Oszczednosci Ban S.A.	0.079	1.304	0.700	0.048	1.207	0.595	0.086	1.100	0.565	0.095	1.011	0.363
57	Raiffeisen Bank International AG	0.159	1.554	0.622	0.170	1.355	0.513	0.037	1.355	0.580	0.143	1.577	0.513
58	Ringkjoebing Landbobank A/S	0.033	0.497	0.348	0.022	0.499	0.402	-0.051	0.273	0.142	-0.117	0.192	0.036
59	Royal Bank of Scotland Group PLC	-0.010	0.968	0.675	-0.146	0.918	0.607	-0.097	0.957	0.574	0.081	0.654	0.093
60	Santander Bank Polska S.A.	0.085	1.340	0.550	0.054	1.307	0.605	0.111	1.203	0.497	-0.001	0.999	0.258
61	Siauliu Bankas AB	0.014	0.848	0.353	0.042	0.822	0.136	0.064	0.506	0.026	-0.024	1.606	0.391
62	Skandinaviska Enskilda Banken AB	-0.060	0.992	0.787	-0.099	1.005	0.736	-0.062	1.108	0.734	-0.107	0.913	0.483
63	Skjern Bank*	0.101	0.368	0.061	0.072	0.319	0.053	0.028	0.424	0.069	-0.028	0.049	0.001
64	Société Générale S.A.	0.041	1.190	0.827	0.034	1.150	0.727	-0.050	1.003	0.675	-0.237	1.319	0.342
65	Spar Nord Bank A/S	0.176	0.822	0.405	-0.226	0.754	0.270	-0.347	0.567	0.117	-0.241	0.339	0.048
66	Standard Chartered PLC	-0.362	1.298	0.662	-0.647	1.368	0.582	-0.326	1.441	0.436	-0.115	1.313	0.214
67	Svenska Handelsbanken AB	0.119	1.013	0.773	-0.063	1.018	0.673	-0.101	0.991	0.622	-0.126	0.749	0.232
68	Swedbank AB	0.089	0.988	0.887	-0.005	0.964	0.851	0.036	0.992	0.801	-0.151	0.941	0.373
69	Sydbank A/S	0.017	0.974	0.616	-0.040	0.855	0.420	-0.252	0.671	0.266	-0.083	0.560	0.113
70	UniCredit S.p.A.	-0.037	1.180	0.870	-0.046	1.105	0.789	-0.105	1.068	0.758	-0.054	0.150	0.391
71	Unione di Banche Italiane S.p.A.	-0.066	1.163	0.832	-0.125	1.031	0.742	-0.179	1.042	0.669	-0.146	1.831	0.429
72	Vestjysk Bank A/S	-0.137	0.562	0.176	-0.212	0.441	0.101	-0.228	0.105	0.005	0.381	-1.130	0.007
			Mean R^2:	**0.597**			**0.507**			**0.427**			**0.272**
			Median R^2:	**0.622**			**0.531**			**0.436**			**0.239**

Table B.3: OLS regression parameters (α_i, β_i) and the coefficients of determination (R^2) of the baseline market model with 80 days estimation periods, using major local stock exchange indexes, for event 9. All values are shown in absolute terms. Additional banks from the semi-hard sample are marked with *.

		Event (9) January 13, 2018					Event (9) January 13, 2018		
i	Bank	α_i	β_i	R^2	i	Bank	α_i	β_i	R^2
1	Aktia Bank	0.033	0.270	0.064	26	CaixaBank S.A.	-0.008	1.710	0.666
2	Arbuthnot Banking Group PLC*	0.025	0.114	0.005	27	Close Brothers Group PLC	-0.012	0.505	0.027
3	Banca Carige S.p.A.	-0.873	0.997	0.009	28	Comdirect Bank AG	0.054	0.361	0.047
4	Banca Generali S.p.A.	-0.015	1.003	0.392	29	Commerzbank AG	0.282	0.329	0.018
5	Banca Popolare di Sondrio S.C.p.A.	-0.211	1.164	0.320	30	Crédit Agricole Nord de France	0.148	0.200	0.013
6	Banca Transilvania S.A.	-0.079	1.498	0.619	31	Crédit Agricole S.A.	-0.073	0.886	0.164
7	Banco Bilbao Vizcaya Argentaria, S.A.	-0.020	1.264	0.784	32	Credito Emiliano S.p.A.	-0.004	0.518	0.084
8	Banco BPI S.A.	0.166	0.737	0.076	33	Credito Valtellinese S.p.A.	-1.405	2.433	0.048
9	Banco BPM S.p.A.	-0.287	1.562	0.246	34	Danske Andelskassers Bank A/S	-0.220	0.214	0.007
10	Banco de Sabadell S.A.	0.075	2.149	0.701	35	Danske Bank A/S	0.027	0.376	0.058
11	Banco di Desio e Brianza S.p.A.	-0.081	0.607	0.088	36	Deutsche Bank AG	0.148	0.381	0.019
12	Banco di Sardegna S.p.A.*	-0.005	0.130	0.020	37	Erste Group Bank AG	-0.006	1.083	0.383
13	Banco Santander S.A.	0.052	1.317	0.737	38	Getin Holding S.A.	-0.180	0.595	0.063
14	Bank Handlowy w Warszawie S.A.	0.238	0.446	0.090	39	HSBC Holdings PLC	0.027	1.075	0.329
15	Bank Millenium S.A.	0.390	0.845	0.147	40	ING Bank Slaski S.A.	0.083	0.414	0.110
16	Bank Ochrony Srodowiska S.A.	0.025	1.270	0.178	41	ING Groep	0.065	0.535	0.099
17	Bank of Ireland Group PLC	0.107	1.008	0.168	42	Intesa Sanpaolo S.p.A.	-0.010	0.934	0.457
18	Bank of Valletta PLC	-0.120	2.506	0.422	43	Jyske Bank A/S	-0.009	0.432	0.056
19	Bank Polska Kasa Opieki S.A.	-0.014	0.734	0.253	44	KBC Ancora	0.120	0.904	0.221
20	Bankia S.A.	0.083	1.125	0.491	45	KBC Group	0.023	1.138	0.325
21	Bankinter S.A.	0.059	0.992	0.595	46	Komercni banka	-0.131	0.996	0.358
22	Barclays PLC	0.024	0.365	0.016	47	Lloyds Banking Group PLC	0.080	0.486	0.048
23	BNP Paribas S.A.	-0.060	0.990	0.278	48	mBank S.A.	0.184	1.271	0.332
24	BPER Banca S.p.A.	-0.180	1.332	0.159	49	Medio Banca di Credito Finanziario S.p.A.	0.161	0.472	0.173
25	BRD – Groupe Société Générale	0.056	1.198	0.491	50	Natixis S.A.	0.039	1.286	0.229

(continued)

Table B.3 Continued

		Event (9) January 13, 2018		
i	Bank	α_i	β_i	R^2
51	Nordea Bank Abp	-0.060	0.837	0.195
52	Oberbank AG*	0.056	-0.007	0.003
53	OTP Bank Nyrt	0.008	1.136	0.525
54	Park Group PLC*	0.199	-0.322	0.023
55	Permanent TSB Group Holdings PLC	0.413	0.076	0.001
56	Powszechna Kasa Oszczednosci Ban S.A.	0.287	0.856	0.287
57	Raiffeisen Bank International AG	0.017	1.282	0.498
58	Ringkjoebing Landbobank A/S	0.065	0.185	0.027
59	Royal Bank of Scotland Group PLC	0.188	0.411	0.030
60	Santander Bank Polska S.A.	0.182	1.167	0.284
61	Siauliu Bankas AB	0.013	1.590	0.367
62	Skandinaviska Enskilda Banken AB	-0.052	1.078	0.528
63	Skjern Bank*	-0.030	0.127	0.006
64	Société Générale S.A.	-0.114	0.945	0.191
65	Spar Nord Bank A/S	-0.090	0.206	0.015
66	Standard Chartered PLC	0.037	1.150	0.154
67	Svenska Handelsbanken AB	-0.076	1.079	0.346
68	Swedbank AB	-0.133	1.017	0.377
69	Sydbank A/S	0.042	0.418	0.081
70	UniCredit S.p.A.	-0.134	1.367	0.422
71	Unione di Banche Italiane S.p.A.	-0.124	1.657	0.398
72	Vestjysk Bank A/S	-0.681	-0.486	0.011
			Mean R^2:	**0.245**
			Median R^2:	**0.191**

Appendix C – Resulting Cumulative Average Abnormal Returns

Table C.1: Results of the intercept-only OLS regressions of the event-specific CARs. The CARs are obtained from the baseline market model estimations. The third column shows the average stock returns for all companies on the event date $T = 0$. The numbers in the square brackets indicate the estimation parameters: the estimation window length and the event window length, respectively. The significance of the t-tests for the CAARs not being equal to zero is shown at three levels: ***, significant at 1%, **, significant at 5% and *, significant at 10%. The values in parentheses are the standard errors for the obtained CAARs. The last line incorporates the sum of all coefficients, regardless of significance. All values apart from the standard errors are shown in percentage points.

		Stock returns: major local benchmark indexes (baseline)				
Payment Services Directive II	Date	Average actual return	Cumulative average abnormal return [80, 3]	Cumulative average abnormal return [140, 3]	Cumulative average abnormal return [80, 5]	Cumulative average abnormal return [140, 5]
Adoption of PSD 2 announced	July 24 2013	1.563	1.136***	1.177***	1.372***	1.396***
			(0.294)	(0.276)	(0.359)	(0.341)
European Parliament votes on the proposal	April 3 2014	0.664	-0.278	-0.269	1.052**	1.028**
			(0.280)	(0.265)	(0.430)	(0.412)
General approach agreement in Council	December 5 2014	2.099	0.475*	0.421*	1.037***	1.022***
			(0.240)	(0.238)	(0.292)	(0.295)
Trilogue negotiations lead to agreement	May 5 2015	-1.311	-0.034	0.220	0.881**	1.123***
			(0.316)	(0.309)	(0.418)	(0.402)
EP adopts EC's proposal for PSD 2	October 8 2015	0.135	0.780*	0.771*	0.684	0.694
			(0.425)	(0.418)	(0.499)	(0.492)
PSD 2 adopted by EC and EP	November 25 2015	0.215	-0.250	-0.379*	0.009	-0.245
			(0.213)	(0.206)	(0.334)	(0.316)
PSD 2 enters into force	January 12 2016	1.364	0.737**	0.528	0.366	0.271
			(0.345)	(0.353)	(0.418)	(0.416)
EC adopts rules on RTS	November 27 2017	-0.490	0.525**	0.351	1.366***	1.124***
			(0.223)	(0.215)	(0.319)	(0.317)
Transposition deadlines for PSD 2	January 13 2018	0.173	0.027	-0.040	0.126	-0.003
			(0.295)	(0.285)	(0.372)	(0.339)
Summation		**4.412**	**3.119**	**2.780**	**6.894**	**6.409**
Total number of observations: 603 (67 per event)						

Table C.2: Results of the intercept-only OLS regressions of the event-specific CARs from the semi-hard sample. The CARs are obtained from the baseline market model estimations. The third column shows the average stock returns for all companies on the event date $T = 0$. The numbers in the square brackets indicate the estimation parameters: the estimation window length and the event window length, respectively. The significance of the t-tests for the CAARs not being equal to zero is shown at three levels: ***, significant at 1%, **, significant at 5% and *, significant at 10%. The values in parentheses are the standard errors for the obtained CAARs. The last line incorporates the sum of all coefficients, regardless of significance. All values apart from the standard errors are shown in percentage points.

		Stock returns: major local benchmark indexes				
Payment Services Directive II	Date	Average actual return	Cumulative average abnormal return [80, 3]	Cumulative average abnormal return [140, 3]	Cumulative average abnormal return [80, 5]	Cumulative average abnormal return [140, 5]
Adoption of PSD 2 announced	July 24, 2013	1.461	1.104***	1.152***	1.309***	1.335***
			(0.277)	(0.261)	(0.336)	(0.320)
European Parliament votes on the proposal	April 3, 2014	0.631	-0.100	-0.108	1.171***	1.123***
			(0.309)	(0.300)	(0.430)	(0.417)
General approach agreement in Council	December 5, 2014	1.954	0.399*	0.353	0.910***	0.908***
			(0.235)	(0.234)	(0.280)	(0.284)
Trilogue negotiations lead to agreement	May 5, 2015	-1.258	-0.170	0.078	0.739*	0.967**
			(0.308)	(0.302)	(0.406)	(0.391)
EP adopts EC's proposal for PSD 2	October 8, 2015	0.160	0.767*	0.763*	0.726	0.749
			(0.397)	(0.391)	(0.467)	(0.462)
PSD 2 adopted by EC and EP	November 25, 2015	0.204	-0.298	-0.413**	-0.031	-0.270
			(0.210)	(0.202)	(0.315)	(0.298)
PSD 2 enters into force	January 12, 2016	1.256	0.700**	0.493	0.365	0.263
			(0.330)	(0.339)	(0.398)	(0.398)
EC adopts rules on RTS	November 27, 2017	-0.483	0.382*	0.225	1.240***	1.023***
			(0.222)	(0.212)	(0.303)	(0.300)
Transposition deadlines for PSD 2	January 13, 2018	0.168	0.036	-0.026	0.132	0.015
			(0.275)	(0.266)	(0.346)	(0.316)
Summation		**4.093**	**2.820**	**2.516**	**6.561**	**6.115**
Total number of observations: 648 (72 per event)						

Table C.3: Results of the intercept-only OLS regressions of the event-specific CARs from the hard-screened sample. The CARs are obtained from the market model estimations using STOXX Global Total Markets Index. The third column shows the average stock returns for all companies on the event date $T = 0$. The numbers in the square brackets indicate the estimation parameters: the estimation window length and the event window length, respectively. The significance of the t-tests for the CAARs not being equal to zero is shown at three levels: ***, significant at 1%, **, significant at 5% and *, significant at 10%. The values in parentheses are the standard errors for the obtained CAARs. The last line incorporates the sum of all coefficients, regardless of significance. All values apart from the standard errors are shown in percentage points.

		Stock returns: STOXX Global Total Markets Index benchmark				
Payment Services Directive II	Date	Average actual return	Cumulative average abnormal return [80, 3]	Cumulative average abnormal return [140, 3]	Cumulative average abnormal return [80, 5]	Cumulative average abnormal return [140, 5]
Adoption of PSD 2 announced	July 24, 2013	1.563	2.560***	2.650***	2.998***	3.088***
			(0.391)	(0.394)	(0.503)	(0.514)
European Parliament votes on the proposal	April 3, 2014	0.664	0.044	0.093	1.952***	1.928***
			(0.294)	(0.279)	(0.433)	(0.415)
General approach agreement in Council	December 5, 2014	2.099	1.172***	1.253***	0.754**	0.922***
			(0.276)	(0.278)	(0.318)	(0.317)
Trilogue negotiations lead to agreement	May 5, 2015	-1.311	-0.076	0.832**	1.727***	2.920***
			(0.334)	(0.335)	(0.451)	(0.474)
EP adopts EC's proposal for PSD 2	October 8, 2015	0.135	0.705	0.757	1.038*	1.065*
			(0.486)	(0.478)	(0.580)	(0.570)
PSD 2 adopted by EC and EP	November 25, 2015	0.215	0.160	0.013	-0.067	-0.386
			(0.260)	(0.250)	(0.443)	(0.415)
PSD 2 enters into force	January 12, 2016	1.364	2.177***	2.030***	0.747	0.457
			(0.408)	(0.414)	(0.512)	(0.519)
EC adopts rules on RTS	November 27, 2017	-0.490	0.301	0.094	1.445***	1.096***
			(0.226)	(0.222)	(0.363)	(0.359)
Transposition deadlines for PSD 2	January 13, 2018	0.173	0.907**	0.851***	0.997**	0.766**
			(0.348)	(0.304)	(0.414)	(0.374)
Summation		**4.412**	**7.948**	**8.574**	**11.590**	**11.856**
Total number of observations: 603 (67 per event)						

Table C.4: Results of the intercept-only OLS regressions of the event-specific CARs from the hard-screened sample. The CARs obtained from the two-factor market model estimations using both local benchmark indexes and the STOXX Global Total Markets Index. The third column shows the average stock returns for all companies on the event date $T = 0$. The numbers in the square brackets indicate the estimation parameters: the estimation window length and the event window length, respectively. The significance of the t-tests for the CAARs not being equal to zero is shown at three levels: ***, significant at 1%, **, significant at 5% and *, significant at 10%. The values in parentheses are the standard errors for the obtained CAARs. The last line incorporates the sum of all coefficients, regardless of significance. All values apart from the standard errors are shown in percentage points.

		Stock returns: two-factor estimation model using both global and local indices				
Payment Services Directive II	Date	Average actual return	Cumulative average abnormal return [80, 3]	Cumulative average abnormal return [140, 3]	Cumulative average abnormal return [80, 5]	Cumulative average abnormal return [140, 5]
Adoption of PSD 2 announced	July 24, 2013	1.563	1.239***	1.164***	1.501***	1.354***
			(0.339)	(0.295)	(0.425)	(0.362)
European Parliament votes on the proposal	April 3, 2014	0.664	-0.289	-0.287	1.059**	1.007**
			(0.281)	(0.265)	(0.439)	(0.428)
General approach agreement in Council	December 5, 2014	2.099	0.512**	0.471**	1.019***	1.007***
			(0.234)	(0.233)	(0.286)	(0.288)
Trilogue negotiations lead to agreement	May 5, 2015	-1.311	-0.204	0.100	0.559	0.866**
			(0.298)	(0.299)	(0.390)	(0.379)
EP adopts EC's proposal for PSD 2	October 8, 2015	0.135	0.829*	0.829*	0.758	0.756
			(0.421)	(0.417)	(0.497)	(0.492)
PSD 2 adopted by EC and EP	November 25, 2015	0.215	-0.259	-0.390*	-0.027	-0.273
			(0.213)	(0.204)	(0.328)	(0.313)
PSD 2 enters into force	January 12, 2016	1.364	0.677*	0.513	0.389	0.326
			(0.345)	(0.362)	(0.417)	(0.425)
EC adopts rules on RTS	November 27, 2017	-0.490	0.554**	0.408*	1.335***	1.104***
			(0.241)	(0.228)	(0.320)	(0.322)
Transposition deadlines for PSD 2	January 13, 2018	0.173	-0.236	-0.296	-0.054	-0.128**
			(0.357)	(0.308)	(0.414)	(0.349)
Summation		**4.412**	**2.822**	**2.512**	**6.539**	**6.019**
Total number of observations: 603 (67 per event)						

Table C.5: Results of the intercept-only OLS regressions of the event-specific CARs from the hard-screened sample. The CARs are obtained from the baseline market model estimations using the robust M-estimators. The third column shows the average stock returns for all companies on the event date $T = 0$. The numbers in the square brackets indicate the estimation parameters: the estimation window length and the event window length, respectively. The significance of the t-tests for the CAARs not being equal to zero is shown at three levels: ***, significant at 1%, **, significant at 5% and *, significant at 10%. The values in parentheses are the standard errors for the obtained CAARs. The last line incorporates the sum of all coefficients, regardless of significance. All values apart from the standard errors are shown in percentage points.

		Stock returns: major local benchmark indexes with M-estimators				
Payment Services Directive II	Date	Average actual return	Cumulative average abnormal return [80, 3]	Cumulative average abnormal return [140, 3]	Cumulative average abnormal return [80, 5]	Cumulative average abnormal return [140, 5]
Adoption of PSD 2 announced	July 24, 2013	1.563	1.348***	1.357***	1.703***	1.679***
			(0.337)	(0.307)	(0.420)	(0.385)
European Parliament votes on the proposal	April 3, 2014	0.664	-0.112	-0.128	1.252***	1.210***
			(0.276)	(0.262)	(0.439)	(0.420)
General approach agreement in Council	December 5, 2014	2.099	0.486**	0.476**	1.054***	1.113***
			(0.240)	(0.238)	(0.293)	(0.294)
Trilogue negotiations lead to agreement	May 5, 2015	-1.311	0.026	0.277	1.011**	1.217***
			(0.312)	(0.302)	(0.411)	(0.395)
EP adopts EC's proposal for PSD 2	October 8, 2015	0.135	0.832*	0.845**	0.761	0.791
			(0.428)	(0.429)	(0.506)	(0.499)
PSD 2 adopted by EC and EP	November 25, 2015	0.215	-0.218	-0.352*	0.013	-0.231
			(0.211)	(0.206)	(0.339)	(0.316)
PSD 2 enters into force	January 12, 2016	1.364	0.768**	0.565	0.404	0.297
			(0.356)	(0.359)	(0.424)	(0.422)
EC adopts rules on RTS	November 27, 2017	-0.490	0.550**	0.407*	1.439***	1.245***
			(0.220)	(0.216)	(0.310)	(0.307)
Transposition deadlines for PSD 2	January 13, 2018	0.173	0.133	0.079	0.264	0.188
			(0.294)	(0.291)	(0.362)	(0.340)
Summation		**4.412**	**3.813**	**3.526**	**7.901**	**7.509**
Total number of observations: 603 (67 per event)						

Table C.6: Results of the intercept-only OLS regressions of the event-specific CARs from the hard-screened sample. The CARs are obtained from the baseline market model estimations using the robust MM-estimators. The third column shows the average stock returns for all companies on the event date $T = 0$. The numbers in the square brackets indicate the estimation parameters: the estimation window length and the event window length, respectively. The significance of the t-tests for the CAARs not being equal to zero is shown at three levels: ***, significant at 1%, **, significant at 5% and *, significant at 10%. The values in parentheses are the standard errors for the obtained CAARs. The last line incorporates the sum of all coefficients, regardless of significance. All values apart from the standard errors are shown in percentage points.

		Stock returns: major local benchmark indexes with M-estimators				
Payment Services Directive II	Date	Average actual return	Cumulative average abnormal return [80, 3]	Cumulative average abnormal return [140, 3]	Cumulative average abnormal return [80, 5]	Cumulative average abnormal return [140, 5]
Adoption of PSD 2 announced	July 24, 2013	1.563	1.538***	1.511***	1.976***	1.919***
			(0.328)	(0.302)	(0.407)	(0.372)
European Parliament votes on the proposal	April 3, 2014	0.664	0.121	0.078	1.560***	1.490***
			(0.276)	(0.260)	(0.445)	(0.423)
General approach agreement in Council	December 5, 2014	2.099	0.503**	0.531**	1.075***	1.197***
			(0.242)	(0.240)	(0.295)	(0.297)
Trilogue negotiations lead to agreement	May 5, 2015	-1.311	0.118	0.359	1.171***	1.330***
			(0.311)	(0.299)	(0.411)	(0.396)
EP adopts EC's proposal for PSD 2	October 8, 2015	0.135	0.901**	0.955**	0.884*	0.947*
			(0.436)	(0.431)	(0.521)	(0.509)
PSD 2 adopted by EC and EP	November 25, 2015	0.215	-0.140	-0.306	0.085	-0.221
			(0.214)	(0.209)	(0.352)	(0.328)
PSD 2 enters into force	January 12, 2016	1.364	0.812**	0.642*	0.446	0.353
			(0.374)	(0.371)	(0.444)	(0.437)
EC adopts rules on RTS	November 27, 2017	-0.490	0.537**	0.460**	1.462***	1.360***
			(0.236)	(0.226)	(0.319)	(0.310)
Transposition deadlines for PSD 2	January 13, 2018	0.173	0.268	0.202	0.465	0.386
			(0.285)	(0.290)	(0.346)	(0.339)
Summation		**4.412**	**4.658**	**4.432**	**9.127**	**8.761**
Total number of observations: 603 (67 per event)						