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Banking regulation and disclosure in M&A

An application of the event study methodology

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Summary

After a decade of deregulation, the recent financial crisis has directed legislators' and public attention back to the benefits of, and need for, regulation. As a result, a considerable range of new regulation has been introduced in recent years and current political discussion centers around additional regulatory measures, especially in the financial sector.

Despite the current intensive discussions, however, it is not always clear if regulation is the appropriate and most cost effective means to cope with failures in financial markets, be they crisis-related or otherwise. This thesis explores two different cases of regulation, and draws conclusions on the effectiveness of existing and the need for additional regulatory measures. The first is a case of banking regulation introduced in Germany and the UK in the aftermath of the financial crisis. The second treats information disclosure in mergers, where management takes the decision whether or not to publish additional data, in this case synergy estimates, in order to better inform investors.

The first part of this thesis studies the effectiveness of the German Bank Restructuring Act and the UK Banking Act 2009, regulations that introduce processes to handle banks in financial distress and reduce implicit government bail-out guarantees. To assess effectiveness, effects on security prices and thus investor wealth are studied, and in particular the effects on CDS spreads as a measure of credit risk, and on share prices as a measure of business risk.

Results reveal that the two regulatory measures have, at best, had limited impact on financial markets, as effects on security prices have been weak. Statistically and economically significant effects are only measured in an increase of CDS spreads for German financial institutions, and thus increased credit risk, a fact that is expected as the regulation aims at withdrawing implicit bail-out guarantees. In case of the UK Banking Act, no significant results are obtained either on credit or on equity valuations. In a nutshell, the introduction of bankruptcy regulation had limited effect on the German and British banking landscape, respectively, and investors' reactions are only measurable for German bank credit holders.

In the second part of this thesis the need for enhanced regulation on information disclosure in mergers is studied on the example of synergy forecasts. Mergers and acquisitions are among the largest investments companies perform, and require a striking rationale in order to convince investors. Investor communication thus plays an important role, and it has repeatedly been shown in the literature that the amount and quality of information provided to investors is a determining factor for the capital market reaction to a merger announcement. Synergy announcements are found to be made in approximately one third of large mergers. Results of this study suggest that managers voluntarily disclose enhanced information during merger announcements in order to reduce information asymmetry between management and investors and thus reduce investor uncertainty. The disclosure of synergy forecasts leads to significantly higher announcement window returns than in the case of non-disclosure. Conversely, positive post-announcement window returns, which occur due to the reduction of uncertainty in the period after the merger announcement, are reduced as investor uncertainty is smaller in case of disclosure. Synergy announcements are thus shown to be informative to investors and decrease investor uncertainty.

In spite of this informativeness and the positive effects for disclosing companies' stock prices found in this study, current information supply cannot be determined to be suboptimal for individual companies or the general public. Thus, no failure in the information market can be detected which would warrant additional regulation. In light of this, instead of regulating synergy disclosure, the amount of information disclosed in a merger situation should, in the future as today, be determined by the capital market through managers diligently weighing costs against benefits.

Regulating financial markets is not an easy task and in view of the costs of regulation is only warranted were it is the least costly possibility and generates the most public welfare. Studies on regulation such as the one in hand can help decision makers to gain a better understanding of the complex nature of regulatory actions and hopefully lead the way to further improved decision making.

Short Table of Contents

Contents

List of Tables

List of Tables

1 Introduction

After a decade of deregulation, the financial crisis of 2007–2009 has redirected legislators' and public attention back to the benefits of, and need for, regulation. As a result, a considerable range of new regulation has been introduced in recent years and current political discussion centers around additional regulatory measures, especially in the financial sector. As Schäfer, Schnabel & di Mauro (2012) state, ...

> "... [f]ollowing the breakdown of Lehman Brothers, the near-collapse of large parts of the financial system and unprecedented support measures from the public sector and central banks, the leaders of the G20 agreed on the need for a radical overhaul of the financial system. Since the London summit in March 2009 and the creation of the Financial Stability Board, the supervisory community has been extremely busy proposing, negotiating and enacting a wide range of new regulations both at the national and international level."[1]

In face of the recent crisis the financial sector, and especially the banking sector, have been a special focus of regulation. A few prominent examples for recent regulatory measures in the EU and US are (Schäfer et al., 2012):

- *Bank bankruptcy and restructuring legislation (2008–2010):* Introduction of restructuring legislation in the US[2], Germany[3] and the UK[4], accompanied by bank taxes to finance restructuring or liquidation of failed banks

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[1]Schäfer et al. (2012, p. 1)
[2]Dodd-Frank Act, passed in 2010
[3]German Bank Restructuring Act, passed in 2010
[4]UK Banking Act 2009, passed in 2008

- *Volcker Rule (2010):* Commercial banks banned from proprietary trading in the US

- *Vickers Reform (2010):* Legal separation of deposit-taking consumer business and investment banking in the UK

- *Basel III (2010):* Modification of the Basel accords imposing tighter bank capital and liquidity requirements on an international level

The above regulations had strong influence on the banking sector both globally and in individual countries, and Schäfer et al. (2012) show significant market reactions to structural reforms in banking regulation.

Apart from banking regulation, numerous other areas of regulation exist in financial markets. An important field that will be studied in this work is disclosure regulation, even if recently this topic has not enjoyed as much attention as directly crisis-related financial regulation. Disclosure regulation sets rules for corporations as to what information has to be disclosed to financial markets, depending on the respective legal form and jurisdiction. Important recent pieces of disclosure regulation are (e.g., Hutton, 2004):

- *Regulation Fair Disclosure (2000):* Frequently referred to as Reg FD, the regulation provides a "level playing field" to investors, prohibiting selective information disclosure to individual market participants

- *Sarbanes-Oxley Act (2002):* Motivated by accounting scandals such as Enron and Worldcom, the Sarbanes-Oxley Act, among other things[5], regulates increased management accountability for published company data and enhances mandatory financial disclosure

While there is a wide range of motives and justifications for regulation, it is often not clear to what extent regulation reaches the goals set by regulators, and to what extent a certain piece of regulation best serves the public interest. As

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[5]Most importantly the introduction of the Public Company Accounting Oversight Board (PCAOB) and standards for external auditor independence

regulation always comes at a cost to society, merely showing that regulation has a positive effect on public welfare is a first step, but not sufficient to prove a need for regulation. It is also to be shown that regulation is the most cost effective measure to reach this goal. This may especially be the case when failures in the information market prevent market participants from finding the optimal level of information production.

As a first part of this thesis I analyze the effectiveness of bank bankruptcy legislation recently introduced in Germany and the UK. In the aftermath of the financial crisis, states had to repeatedly rescue financial institutions from insolvency, especially banks that where dubbed "too big to fail", i.e., where a bank failure was perceived to have major impact on the economy. This usually led to the transfer of considerable financial risks and losses to the tax payer. In order to avoid this situation in the future, bank bankruptcy legislation defines a restructuring process for banks in financial distress, granting financial supervisory authorities additional rights towards creditors and equity holders. In this part of my work I will review the process of the legislation in Germany and the UK and will examine if the introduction of the legislation has been effective. Effectiveness in this context is translated into the question if the introduction has had a financial impact on bank security holders. As the main goal of the regulator is to eliminate or at least reduce implicit state guarantees for large financial institutions, negative wealth effects on security holders, and especially debt holders who most profit from implicit guarantees, are to be expected. For Germany I find relatively weak effects which are, as expected, stronger for debt holders than for equity holders. In the case of the UK, I do not find any significant effects of bankruptcy regulation, but must acknowledge that measurement is difficult due to the general effects of the financial crisis which induce high volatility in bank securities and thus may drown the effects in noise. I conclude that bank bankruptcy regulation has been, at best, marginally effective.

In a second part I focus on a possible example for disclosure regulation. I observe information disclosure in the case of M&A transactions, and especially the announcement of synergy forecasts by management. M&A transactions are

by far the largest and most important transactions management has to decide on. A common justification for mergers is the creation of synergies between the merging companies, and thus the argumentation that the resulting company is more than the sum of its parts. This "more" constitutes of the value creation through M&A. While a rich body of literature shows that the "more" is likely to be a "less", meaning that mergers in the majority of cases are value destroying instead of value creating, a discussion is still ongoing as to what the determinants are that distinguish between the two. Recent literature shows that investor communication, and thus corporate disclosure, plays an important role as a determinant of value creation. While the depth of information disclosure in an M&A process can be measured in different ways, the disclosure of synergy estimates seems to be a relevant indicator. This study shows that the disclosure of synergy estimates is an important means to reduce information asymmetry between investors and management, and that, in spite of only partial credibility of published synergy estimates, mergers featuring a disclosure still perform significantly better than mergers without published synergy estimates. I also find a significant post-announcement stock price drift that can be attributed to the reduction of investor uncertainty as investors keep learning about a merger. This reaction is weaker when more information about a transaction is given at announcement, as investors then learn directly at the time of deal announcement and hence post-announcement uncertainty reduction is less important. I conclude that, while information disclosure is important in the case of M&A, there is not necessarily a need for additional regulation. As management weighs the benefits of disclosure against the cost, it is unclear if additional regulation, e.g., in form of a general requirement of synergy disclosure, would produce a more favorable amount of information.

This work is structured as follows. Chapter 2 gives a general introduction into the theory of regulation as a basis for this work. Chapter 3 reviews event study methodology in general terms, while the specific methodology for the two following studies is laid out in more detail later. Chapter 4 presents the study on bank bankruptcy regulation, and Chapter 5 presents the study on synergy disclosure in the context of M&A transactions. Chapter 6 concludes.

2 Regulation

Regulation in the recent past has been a field of intensive scientific and public debate (Baldwin, Cave & Lodge, 2011). After a decade of deregulation, discussion has especially gained in momentum in the wake of the financial crisis of 2007–2009, when a demand for more rigorous regulation, especially in the financial markets, became obvious to legislators in Europe, the US and around the world.

While ongoing discussions are mainly centered around the regulation of financial institutions such as banks and insurance companies, regulation is of vital importance in a wider range of industries. An important area of intense political debate and regulatory intervention is, e.g., the environmental sector, where fixed feed-in tariffs and a CO_2 trade regime are only two examples of recent developments.

This work conducts an exemplary study of two areas where financial regulation is playing or should potentially play a more important role. I therefore begin this work reviewing important aspects of regulatory theory. This chapter is oriented along the lines of Baldwin et al. (2011) and some of the literature given there.

2.1 Purpose and definition of regulation

A range of different definitions of regulation have been proposed in the literature, focusing either on (a) the goals and purpose of regulation or (b) the means available to regulatory agents. As a representative of (a), Brunnermeier, Goodhart, Persaud, Crockett & Shin (2009) identify three main purposes of regulation from traditional economic theory:

"Traditional economic theory suggests that there are three main purposes [of regulation].

1. to constrain the use of monopoly power and the prevention of serious distortions to competition and the maintenance of market integrity;

2. to protect the essential needs of ordinary people in cases where information is hard or costly to obtain, and mistakes could devastate welfare; and

3. where there are sufficient externalities that the social, and overall, costs of market failure exceed both the private costs of failure *and* the extra costs of regulation.

[The first] has been a main rationale for the regulation of private utilities, but, until recently, has only entered the financial scene in a few rare cases, e.g. where the network economies of having a single market procedure, e.g. a clearing house, are so great that those who control access to the network could potentially extort huge rents from those trying to join."[1]

In contrast to this purpose-driven definition, and as a representative of (b), Posner (1974) defines economic regulation along regulatory instruments as

"... taxes and subsidies of all sorts as well as [...] explicit legislative and administrative controls over rates, entry, and other facets of economic activity."[2]

Following the same line of thought, and referring to, e.g., Black (2002), Baldwin et al. (2011) conceptualize regulation in somewhat more detail as

- "*[S]pecific set of commands*—where regulation involves the promulgation of a binding set of rules to be applied by a body devoted to this purpose."

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[1]Brunnermeier et al. (2009, p. 2)
[2]Posner (1974, p. 1)

- "*[D]eliberate state influence*—where regulation has a more broad sense and covers all state actions that are designed to influence business or social behavior. Thus, command-based regimes would come within this usage, based on the use of economic incentives [...]; contractual powers; deployment of resources; franchises; the supply of information, or other techniques."

- "*[A]ll forms of social or economic influence*—where all mechanisms affecting behavior—whether these be state-based or from other sources (e.g. markets)—are deemed regulatory. One of the great contributions of the theory of 'smart regulation' has been to point out that regulation may be carried out not merely by state institutions but by a host of other bodies, including corporations, self-regulators, professional or trade bodies, and voluntary organizations. [...]"[3]

Baldwin et al. (2011) conclude with the remark that regulation is often perceived as restricting behavior undesirable to society, while on the other hand regulation may equally be facilitative, thus enabling market participants to act in certain ways favorable to society. They state the example of the airwaves regulation, allowing orderly broadcasting operations and preventing chaos.

Two main assumptions have ruled the thinking about regulation in the early years of regulatory theory from the late 19th until the mid 20th century (Posner, 1974). First, markets are assumed to be "extremely fragile and apt to operate very inefficiently (or inequitably) if left alone"[4], introducing a general need for regulation to free markets. Secondly, regulation is assumed to be virtually costless, meaning transaction cost to be zero. Transaction cost is meant in its most general meaning, including information cost, bargaining cost within and between interest groups and political and regulatory agents and the cost of the enforcement of regulation. We will see below that these assumptions are restrictive and only required in particular regulatory strands. For other theories, such as the

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[3]Baldwin et al. (2011, p. 3)
[4]Posner (1974, p. 2)

economic theory of regulation, these assumptions can be relaxed. In practice the assumptions do not seem to hold. Posner (1974) argues that ...

> "... [w]ith these assumptions, it was very easy to argue that the principal government interventions in the economy [...] were simply responses of government to public demands for the rectification of palpable, and remediable, inefficiencies and inequities in the operation of the free market. [...] Were this theory of regulation correct, we would find regulation imposed mainly in highly concentrated industries (where the danger of monopoly is greatest) and in industries that generate substantial external costs or benefits. We do not."[4]

Although the author directly refers to monopolies as justification for regulation, this is by far not the only possible reason. The next section will review some possible market failures that serve as a technical justification for regulation (Baldwin et al., 2011). Thereafter more general theories of regulation will be discussed.

2.2 Technical justifications for regulation

As laid out above, regulation is mainly justified by the notion of "market failures", i.e., the idea that the marketplace, without control, will not properly function to the best of the public interest. In other sectors, e.g., the environmental sector, markets may be outright absent without regulation.[5] According to Baldwin et al. (2011), market failures can occur through different rationales, the most important of which are explained in the following.

Monopolies: Monopolies occur where a single seller supplies the entire market. The market in this case is not efficient as competition does no exist and pricing is at the discretion of the monopoly firm. In the absence of competition and in

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[5]An example is the trading of CO_2 emission rights, a piece of regulation imposing cost on the consumption of environment

search of profit maximization, the monopoly firm will set prices above marginal cost, thereby reducing output and not optimally supplying the market.

Excess profits: Excess or windfall profits are present, e.g., where a single firm finds a source of supply at a considerably lower cost than in the market, or possesses an asset that drastically gains in value. In these cases a transfer of wealth from the private company to the state or taxpayer may be desirable to share benefits with the public.

Externalities: The notion of externalities is that the monetary production cost of a good does not fully reflect the cost to the public. In this case price and production volume are non-optimal for society and the production process is wasteful. Frequently this is a reason for environmental and labor regulation, imposing rules and additional cost on the consumption of production factors. Later in this work I will analyze an example for this case. Financial institutions, especially those deemed to be "too big to fail", exposed themselves to excessive risk before the financial crises. In the improbable case of a systemic failure as in the financial crisis 2007–2009 these risks had to be borne by society. I study the effectiveness of bank bankruptcy legislation in the wake of the financial crisis, with the aim to withdraw implicit state guarantees for banks in case of failure.

Information inadequacies: When the acquisition of information is costly or information is private and thus not known to the public to evaluate a product, information externalities occur. In this case it is the goal of regulation to make information more broadly available to the marketplace, e.g., in the case of disclosure regulation. We analyze a particular example for possible information inadequacy later in this work where I study the case of synergy information in M&A deals. The information on synergies is potentially important to investors as the value of synergies determines the value of a company resulting from a merger. This work poses the question if regulation on synergy disclosures in M&A is required.

Continuity and availability of service: Under certain circumstances it may not be rational for companies to supply a service at all times and to all customers. This may occur under circumstances where demand is cyclical or infrastructure

is costly to deploy in remote areas. In these cases regulation may be appropriate to avoid waste and ensure socially agreeable levels of service. A case for cyclical demand may be public transportation where demand is high in commuting periods and low at night time. Regulators may mitigate this situation granting exclusive service licenses for a certain period of time to one company, together with the obligation to provide a certain service schedule at all times. Further cases of costly and from a company's point of view partly economically unprofitable provision of infrastructure may be basic services such as mail and telephone services.

Anti-competitive behavior and predatory pricing: Even in the presence of competitors markets may be incomplete when companies are able to behave in a way to suppress competition. This may be the case when a company cuts prices below cost and is able to outlast competition and may occur, e.g., when vertically integrated companies and non-integrated companies are present in one market. Vertically integrated companies may be able to set external prices in such a way that they can outlast competition in one step of the value chain by covering losses through profitable operations on another step of the value chain. An example are oil producing companies with own distribution network parallel to independent gas distributors.

Baldwin et al. (2011) list and explain several other rationales for regulation which are of minor importance for this work. Table I presents a complete overview of the technical motivations for regulation.

The basis for the rationales presented above is reaching a socially desirable outcome in a market environment when markets do not reach this outcome if left alone. As we will see in the next section, the above motivations may not always be the real motives for regulation, as different stakeholders in the regulatory process have different interests and influence to reach their goals.

Table I: Rationales for regulating

Rationale	Main aims of regulation	Example
Monopolies and natural monopolies	Counter tendency to raise prices and lower output. Harness benefits to scale economies.	Utilities.
Windfall profits	Transfer benefits of windfalls from firms to consumers or taxpayers.	Firm discovers unusually cheap source of supply.
Externalities	Compel producer or consumer to bear full costs of production, rather than pass on to third parties or society.	Pollution of river by factory.
Information inadequacies	Inform consumers to allow market to operate.	Pharmaceuticals. Food and drinks labeling.
Continuity and availability of service	Ensure socially desired (or protect minimal) level of "essential" service.	Transport service to remote region.
Anti-competitive and predatory pricing	Prevent anti-competitive behavior.	Below-cost pricing in transport.
Public goods and moral hazard	Share costs where benefits of activity are shared but free-rider problems exist.	Defense and security services. Health Services.
Unequal bargaining power	Protect vulnerable interests where market fails to do so.	Health and Safety at Work.
Scarcity and rationing	Public interest allocation of scarce commodities.	Petrol shortage.
Rationalization and coordination	Secure efficient production where transaction costs prevent market from obtaining network gains or efficiencies of scale.	Disparate production in agriculture and fisheries.
Planning	Protect interests of future generations. Coordinate altruistic intentions.	Environment.
Human rights	Protection of weaker citizens.	Discrimination. Embryology.
Social protection	Social solidarity.	Broadcasting.

Source: Baldwin et al. (2011, p. 24)

2.3 Motives for regulation

The above rationales for regulation are technical justifications that can be used by regulatory agencies and stakeholders to determine the need for regulation. They generally aim at reaching socially desirable outcomes that markets would not produce otherwise. Nonetheless, regulation is set in a political process involving a wide range of stakeholders such as regulatory authorities, special interest groups, industry and the general public. Decisions on regulation take place within this wide range of interests, which are not necessarily identical with the achievement of socially desirable outcomes.

Apart from the above justifications for regulation, therefore, there are different theories as to the motives and development process of regulation. According to Baldwin et al. (2011), these can be categorized into four main strands: *Public Interest Theories* which suggest that regulation is based on reaching objectives in the interest of the broader public, *Interest Group Theories*, such as the economic theory of regulation, that take regulation to be based on the goals of specific interest groups, *Power of Ideas Explanations*, grounding regulation in the importance of general attitudes towards regulation and free markets, and *Institutional Theories*, which are based on the notion that the environment and self-interest of regulatory institutions largely affects the outcome of the regulatory process. This section will briefly discuss the four different theoretical foundations along the lines of reasoning of the authors.

Public Interest Theories

The Public Interest Theory of regulation "explains, in general terms, that regulation seeks the protection and benefit of the public at large"[6]. This means that Public Interest Theories are based on the premise that those who enact regulation do so pursuing welfare for the general public. Public Interest Theories were first proposed by Richard Posner[7], building on the two ideas common in regulatory theory that (a) markets left to themselves tend to fail and (b) regulation causes

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[6]Hantke-Domas (2003, p. 165)
[7]Posner (1974)

zero transaction cost, i.e., is free of cost (Hantke-Domas, 2003). The purpose of regulation, consequently, is the achievement of certain publicly desirable results, and specifically so in circumstances where the markets, left to themselves, would fail to produce these.

Regulatory agents, therefore, have to act in the public interest, being trustworthy, free of self-interest and having expert knowledge within the regulated industries, while the functioning of the political process is benevolent and effective. Knowledge and expertise among regulators are a prerequisite to determine market failures and act accordingly. Freedom of self-interest means that regulatory agencies act to the best of society and do not, e.g., intend to increase their respective area of influence. Effectiveness of the political process implies that politics is not influenced by potentially small but well-organized interest groups.[8]

These preconditions are substantial, and, unsurprisingly, a number of problems arises with their fulfillment. As to the expertise and independent view of regulators, public good is not easily determined as it exists only in an environment of opposite interests and views. It is therefore a challenging task for regulators to determine an "objective truth" of public good. Doubts may also arise on the uninterestedness and expert nature of regulatory agencies. Regulatory agencies are complex eco-systems influenced by political actors, and are thus not always certain to be uninterested. Furthermore, experts may pursue personal interests, e.g., depending on their political views or through political influence by strong interest groups.[9]

As stated above, it is empirically shown that regulation frequently does not seem to deliver results in line with public interest (e.g., Posner, 1974). This may have different reasons. For once, regulation possibly has not been set up in a way to serve public interest from the beginning, e.g., when the political decision making process was influenced by strong interest groups, and therefore due to the "unsoundness in the basic goals or nature of the process"[10]. On the other hand, a well set up regulatory regime may be mismanaged over time and has possibly

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[8]See Landis (1974), Barry (1990), Francis (1993)

[9]See Stigler (1971), Landis (1974)

[10]Posner (1974, pp. 3-4)

run out of political oversight (ibid.). We will look at circumstances that lead to the deviation of regulation from serving public interest in the next subsections.

Interest Group Theories

In contrast to Public Interest Theories, Interest Group Theories do not suggest that regulation necessarily benefits the general public, but that regulation is frequently designed to the benefit of specific interest groups. It draws on the notion that supply and demand for regulation are met in a marketplace and therefore can be influenced, or acquired, by strong and well organized interest groups.

Interest Group Theories have been first introduced by Stigler (1971), then also known as the Chicago Theory or Economic Theory of Regulation (Hantke-Domas, 2003). The Economic Theory of Regulation was subsequently formalized and extended by Peltzman (1976).

In Interest Group Theories such as the Economic Theory of Regulation, the development of regulation is not driven by public interest but by particularistic interest groups. According to the Economic Theory of Regulation all actors are solely interested in the maximization of their own utility, i.e., are entirely self-interested. The Economic Theory of Regulation therefore is sometimes called capture theory. As Public Interest Theories, the Economic Theory assumes zero transaction costs for regulation (Peltzman, 1976), but unlike those assumes a market for regulation (Stigler, 1971). In the context of a monopoly, e.g., where the regulator is able to capture monopoly rents, the monopolistic firm has the incentive and the means to influence the regulator. Similarly, other interest groups such as consumers have their own interest and means of influence. Both, and all other, interest groups will therefore try to capture the regulator and to influence regulation to their advantage as far as possible.

As with other processes of collective organization, highly concentrated interest groups such as industry organizations, will tend to win the "capture game" against possibly larger, but more diffuse and more weakly organized interest groups, which will have difficulties to mobilize forces. The most important good that is

traded in the regulatory market is re-election. Regulatory and political agents are interested in re-election, and will act accordingly by granting support to the interest groups that can contribute the most to this goal. An example for a contribution to the goal of re-election by an interest group is the increase of industrial campaign donations in order to preserve monopolistic rents.

Despite some criticism and skepticism towards the Economic Theory of Regulation, many examples for regulation and deregulation make a better case for the Economic Theory than for the Public Interest Theory (Peltzman, 1976). Regulation, e.g., cannot only be found in cases of natural monopolies, where a normative rationale can be constructed, but also in many other cases of economic activities in the form of, e.g., price fixing and entry control (Dal Bó, 2006). Nonetheless, Interest Group Theories leave some important questions unanswered and are exposed to their own set of criticisms (Hood, 1994). The main strand of criticism on Interest Group Theories grounds in the important notion of a market for political choice. Doubts arise as to the existence of a political auction where many bidders try to purchase a favorable political outcome (Peltzman, 1976), as other interests of political and regulatory actors, such as altruism or career planning might play a role (Posner, 1974). The idea of a purely self-serving behavior of regulatory agencies, thus, may not be correct. In an attempt to reconcile this criticism, and in contrast to the pure Chicago Theory which draws on the notion of mere wealth maximization by legislators and regulators, the theory of the Virginian school of political economy builds on the idea of regulators and legislators maximizing a utility function that does not only include pure wealth maximization but also takes into account preferences on political votes, ideology and special interests (Dal Bó, 2006). The drawback of this more general theory is the loss of predictive power and some methodological difficulties.

Apart from these two main strands of regulatory theory, additional theories have been proposed in the literature, focusing on societal and organizational dynamics. They are briefly reviewed in the following.

Power of Ideas Explanations

Power of Ideas Explanations draw on the notion that ideologies, beliefs and the zeitgeist, i.e., the intellectual climate in political and public discussions, strongly influence legislatory and regulatory actions. Ideas, therefore, and not so much private interest groups or an objective public good rule the regulatory process. Limits to this approach are set by the constraints of political realism.

Drawing, e.g., on Hood (1994), Baldwin et al. (2011) give the example of deregulation during the Reagan and Thatcher administrations, which where not so much forced by private interest groups than by a general free-market ideology. They elaborate on three different facets of the power of ideas explanations, which they call the "ideas matter" strain, based on the general intellectual climate and economic conviction, a second strain that "concentrates more on the implicit theories inherent in particular regulatory approaches"[11], and based on worldviews in two dimensions, existence of binding rules for individual behavior and the extent to which individuals understand themselves as part of a group.[12] Lastly, a third strain "emphasizes the importance of deliberation and conversation"[11].

Nonetheless, ideas cannot always be clearly separated from particularistic interests and are often reflected in political interest of decision-makers.

Institutional Theories

Institutional Theories are focused less on the individual, and more on the institutional background in which individuals act. In this sense they are opposed to rational actor models, as, e.g., the Economic Theory of Regulation. Baldwin et al. (2011), drawing on March & Olsen (1984) among others, state that ...

> "... [i]nstitutionalist theorists center on the notion that institutional structure and arrangements, as well as social process, significantly

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[11]Baldwin et al. (2011, pp. 50-51)

[12]The result of this distinction are four different worldviews called fatalism, individualism, hierarchy, egalitarianism; they describe the way society thinks about human behavior

> shape regulation—that there is more driving regulatory develop-
> ments than mere aggregation of individuals' preferences."[13]

In Institutional Theories, actors such as regulatory agents are seen less as "ratio-
nal choice maximizers"[13], but as living and acting within institutions with their
respective principles, rules and norms. This does not mean that individuals are
not as such acting rationally, but they do so by the rules of their institutions.
Therefore, regulatory choice is less influenced by public or particularistic inter-
ests, but by arrangements within and between regulatory bodies. Institutional
theories pay special attention to the principal-agent conflict that arises for elected
representatives of the general public acting as regulatory agents.

The above major approaches to explain regulation exist in parallel, and, un-
fortunately, no integrated theory or explanation has been developed today. The
parallel existence of the different theories and absence of a universal model implies
that predictive power is still limited. The applicability of the theories, therefore,
depends on the context of the specific regulation that is to be studied, and none
of the theories carries more truth than the other. It is a task of theoretical as
well as empirical work to further refine our understanding of the prerequisites and
applicability of different theories to different cases on our way to a more general
approach which features higher predictive power (Baldwin et al., 2011).

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[13]Baldwin et al. (2011, p. 53)

3 Event Study Methodology

The findings in this work are based on event studies in financial markets, predominantly stock markets. Although the specific methodologies used for the two empirical studies in this work are quite different, the broad topic of event studies merits a brief and general review in this chapter. The specifics of the respective methodologies for the two studies in this work are laid out in more detail later.

Event studies have since their first occurrence become one of the most important standard methods in finance and accounting research as well as in various other fields of research. It has provided a vast amount of evidence on the economic consequences of a broad range of events on the value of firms and securities. This section starts by looking at the goal and purpose of event studies, then provides a brief historical literature overview and finally lays out the general procedure to follow when conducting an event study.

3.1 Purpose

One of the most common research questions in economics and finance is to measure the impact of certain discretionary events on companies and their management and investors (MacKinlay, 1997). In doing so, the impact on financial variables is measured, most commonly the stock price of a company, in certain cases also credit or credit default swap spreads, and therefore the impact on investor wealth.

According to Binder (1998), event study methodology has mainly been used for two reasons.

1. "[T]o test the null hypothesis that the market efficiently incorporates information, and

2. [U]nder the maintained hypothesis of market efficiency, at least with respect to publicly available information, to examine the impact of some event on the wealth of the firm's security holders."[1]

The first of the two implies that at the arrival of new information investors react by adjusting their expectations of future earnings and therefore the stock price of the company. Conversely, when no new information arrives investor expectations, and hence security prices, should not change. The null hypothesis of efficient information processing thus predicts that at the arrival of new information, e.g., the announcement of a stock split, security prices react, while in the period following the information disclosure, and absent any other new information, no security price reaction should be observable.[2]

The second reason for event studies, the evaluation of wealth effects, builds on the underlying assumption that financial markets are efficient, and thus security prices reflect all information available to the market. New information available to investors is incorporated into security prices immediately at its arrival through buying and selling transactions of financial market agents (Fama, 1970). Therefore, unanticipated information entering the market, e.g., on regulatory changes, leads to an immediate update of the value of future cashflows and therefore to an update of security prices reflecting these changes. The immediate change in security prices then reflects the total wealth effect on investors.

There is a wide range of research questions that can be addressed through event studies in accounting and finance. Examples can be found in the area of M&A, earnings announcements, the issuance of debt or equity, stock splits, and other corporate actions (MacKinlay, 1997). Further applications exist in the regulatory context where regulation has a direct impact on future firm cashflows and

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[1]Binder (1998, p. 111)

[2]Another popular example for studies on information processing can be found in the post-earnings announcement drift literature

therefore on security valuations (e.g., Schwert, 1981; Binder, 1985a).

The next section provides a brief literature overview together with some history on event study methodology.

3.2 Literature review

The event study methodology is broadly introduced by Fama, Fisher, Jensen & Roll (1969) for the purpose of measuring stock price adjustments to stock splits. The very first event studies were conducted considerably before 1969[3], although their methodology somewhat deviated from today's standard. Following their introduction in these early years the methodology has been refined, including the correction for general stock price movements and the separation of confounding events (MacKinlay, 1997). Since the seminal papers by Ball & Brown (1968) and Fama et al. (1969), the basic methodology of event studies has been largely the same that is still used today and has, according to Binder (1998), since then "become the standard method of measuring security price reaction to some announcement or event"[1]. Nonetheless, further enhancements of study methodology have been made since these early studies. Most importantly, variations have been developed in order to deal with deviations from initial statistical assumptions in order to make the methodology more flexible and powerful (MacKinlay, 1997). As by today a vast number of event studies[4] has been published in different fields and event studies are ubiquitous in capital market research (Corrado, 2011).

In the following I will briefly reference some of the important literature on event studies, with a special focus on methodological work. As a number of excellent literature reviews exist both on methodology and application of event studies I will not make the attempt to produce yet another review. Instead, some of these reviews on specific topics will be pointed out for further reading.

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[3]According to MacKinlay (1997), the presumably first event study, on the effects of common stock splits, was conducted by Dolley (1933)

[4]Kothari & Warner (2007) report the number of event study to be 565 for the years 1974 through 2000 as a lower bound

In his instructive paper, MacKinlay (1997) presents an overview of the different steps of an event study, paying special attention to different market models that can be used as a reference and to the statistical properties of abnormal returns under different conditions such as event clustering. He presents a step-by-step example of an event study on quarterly earnings announcements and the informativeness of accounting information. Kothari & Warner (2007) present a full methodological overview of event studies, focusing especially on the statistical design and properties and the interpretation of event studies. They elaborate on the power of short- and long-horizon event studies and the respective simulation methods, and review in detail the methods used for long-horizon event studies. This will be important in Chapter 5 when I study long-term effects of synergy disclosures in M&A situations. The authors provide a tabulated overview of event studies published in important journals in the time period from 1974 to 2000 and provide a large number of literature references on the topic. Corrado (2011) provides a recent and comprehensive overview of short-term event study methodology and applications, including an extensive bibliography. He presents a discussion of the different steps to be performed in an event study, of test specifications and performance in event studies, and, as a methodological focus, reviews the topic of event-induced variance and solutions to this problem. He provides a comprehensive list of literature references on event study methodology.

Binder (1998) provides an overview of the evolution of event study methods since 1969. He discusses standard techniques where returns are estimated as residuals of benchmark normal returns and issues related to hypothesis testing and alternative benchmarks. He especially focuses on the multivariate regression model (MVRM), where abnormal returns are modeled as regression coefficients on dummy variables. The MVRM is especially useful in the case of calender time clustering of events, frequently present in the regulatory context where changes in the economic environment take place for a sample of firms at the same time in calender time. Additional work of special importance for this study are Binder (1985b) and Binder (1985a) which focus on the application of event studies in the regulatory context, where event clustering is ubiquitous. He elaborates on the multivariate regression model (MVRM) as a framework to cope with several difficulties that occur in the regulatory context, such as differing abnormal re-

turns across firms, differing variance of abnormal returns across firms and event clustering, e.g., within an industry. He compares the statistical power of different hypothesis tests within the MVRM using monthly and daily stock price data. He finds that, although the variance of daily returns is 20 times smaller than that of monthly returns, statistical power of event studies with daily data is not necessarily higher due to difficulties of correct event window placement. Lamdin (2001) presents an overview of event study methodology on regulatory actions, especially pointing out the issues of correct placing of event windows and reference periods. He uses the event study methodology to test the Economic Theory of Regulation studying the 1971 radio and television cigarette advertising ban.

Apart from the literature given in this short overview, much more has been written on the topic of event studies, both in terms of methodology and application. The literature reviews and bibliographies of the summarized literature give a comprehensive overview of the topic.

3.3 General event study procedure

We draw on MacKinlay (1997) to give a brief overview of the general steps that are carried out in an event study before diving into more methodological details in Sections 4.5 and 5.5. The general steps are:

- Identification of event window

- Determination of sample

- Selection of market model and calculation of abnormal returns

- Hypothesis testing

The individual steps are briefly discussed in the following.

Identification of event window

The first step of any event study is the identification of the event window in calender time. The time period when the event occurred, or more precisely the period when the market learned of the occurrence of the event, has to be determined. This may be a relatively easy task where a clear-cut event date can be determined, e.g., in the case of a stock split or merger announcement, and harder when, as in the case of regulation, public discussion leads to a gradual adaption of market expectations over a longer period of time or a larger number of sub-events. The choice of the event window is also dependent on the availability of data, e.g., daily, weekly or monthly data.

The event window should include the event date and one or several days before and after the event date. In the literature several days before the event date are frequently included in order to capture information leakage, and at least one day after the event date is included in order to capture possible counter-reactions. The length of the event date has direct influence on the statistical power of the event study, with longer event windows leading to reduced statistical power.

Determination of sample

The next step is the definition of selection criteria for the identification of the relevant sample firms. The sample firms are the companies directly influenced by the event. The sample may be subject to constraints of security data availability through listing or industry constraints. Possible biases in the sample, e.g., through a higher share of listed firms within large firms as opposed to small firms have to be documented and controlled for.

Market model and abnormal returns

Abnormal returns are the returns of the sample firms during the event period after accounting for expected returns through a market model. To measure abnormal returns in security valuations one has to establish an expected security return, e.g., the expected return of company i's stock price at time t, $E(R_{it})$, for the

event period. This task is performed by the use of a market model. The abnormal
returns can then be calculated as

$$AR_{it} = R_{it} - E(R_{it}).$$

A range of different market models has been developed over time. According to
Binder (1998) abnormal returns "have been measured as

(1) mean-adjusted returns,

(2) market-adjusted returns,

(3) deviations (prediction errors) from the market model,

(4) deviations from the one factor Sharpe (1964)–Lintner (1965)
Capital Asset Pricing Model (CAPM) or the Black (1972) CAPM
or

(5) deviations from a multifactor model, such as the Arbitrage Pric-
ing Theory (APT) (see Ross, 1976)."[5]

The most common approaches are (1) and (2), the constant mean return model
and the market model (MacKinlay, 1997).

In the constant mean return model (1), the expected return for the event window
is the average return of the security and is constant over time. The model does
not account for the stock's risk profile and the market return during the event
window (Binder, 1998). It only accounts for the expected drift during the event
window. In short-term event studies with event windows of only a few days, the
expected drift usually is very small.

In the market model (2), parameters for the security of company i, α_i and β_i, are
estimated during a pre-event period by ordinary least squares regression relative
to an adequate market index. It is thus a relatively easy method to control for
a company's risk and drift compared to the market. General market movements
induced, e.g., by confounding events or general changes in investor sentiment, do
not influence abnormal returns when using the market model. As Binder (1998)

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[5]Binder (1998, p. 117)

remarks, problems with parameter estimation can arise when β_i is changed by the event. This can be accounted for using a post-event estimation window for the estimation of β_i. As an estimation period for the market model with daily data a period of, e.g., 120 days before the event, not including the event window can be chosen (MacKinlay, 1997).

The correction for general market movements during the event window, be it drift or reactions to other events, is important to not pick up noise for a signal in the event study. The exact choice of the market model, however, seems to be of minor importance. According to Brown & Warner (1980, 1985) event studies usually are not very sensitive to the choice of the normal return model as variance reduction is usually limited. I therefore forgo a more detailed explanation of the remaining models for expected returns above and turn back to the modeling of expected returns in more detail in the individual model sections later. For a more detailed review see Binder (1998).

Hypothesis testing

Once the expected returns are calculated, abnormal returns can be obtained and hypotheses on abnormal returns can be tested. In the test design the statistical properties of the abnormal returns have to be taken into account and abnormal returns have to be aggregated over sample companies and time. Problems can arise, e.g., from non-random event distribution in the sample. Binder (1998) gives an overview of the different methodologies used in event studies, especially pointing out issues of test specification and statistical efficiency.

This section gives only a very rough overview of the event study methodology. The determination of the appropriate detailed event study method depends on the statistical properties of the returns such as clustering of events in calender time as in the regulatory context (Binder, 1998). Details on the model selection are discussed in Sections 4.5 and 5.5.

4 Bank bankruptcy regulation: Evaluation of effectiveness

4.1 Introduction

In the aftermath of the recent financial crisis, the worldwide banking sector has come under great pressure. Banks in all regions of the world suffered from massive write-downs on bad loans and repeatedly government action had to be taken to rescue so called system-relevant banks from default and limit further negative impact on the economy. In the course of these events policymakers increasingly saw the necessity for stricter bank regulation. In particular, processes had to be established to deal with defaulting financial institutions without passing on the consequences of excessive risk taking to the taxpayer.

Special bankruptcy legislation for financial institutions is desirable as banks are in many aspects different from non-financial companies (Marinc & Vlahu, 2011). Particularly, in the case of system-relevant banks, implicit and explicit state guarantees can create incentives for excessive risk taking in the case of financial distress. The cost for government guarantees are then borne by the taxpayer. Respective legislation has, during and in the aftermath of the financial crisis, been introduced in a limited number of countries, the UK and Germany being among the most important. This work will analyze the effects, if any, bank bankruptcy legislation had on security valuations, specifically on bank share prices and CDS spreads. To do so I analyze the two examples of the German Bank Restructuring Act introduced during 2010 and the UK Banking Act 2009 introduced throughout 2008 and early 2009, in the midst of the financial crisis.

German Bank Restructuring Act

The German government, in a cabinet meeting on August 25th, 2010 has approved the German Bank Restructuring Act[1], which is a step towards stricter financial regulation based on learnings from the recent financial crisis. The Restructuring Act features two main constituents, a new and special restructuring regime for financial institutions[2], as well as the formation of a Restructuring Fund for banks[3], which bears the direct cost of future crises related restructuring activities. The law has come into effect on January 1st, 2011.

As stated above, the first constituent of the Restructuring Act is a new two stage restructuring and reorganization regime for system-relevant financial institutions. The first level of the process is targeted towards reaching a bargaining solution in an early stage of financial distress, prior to a potential insolvency, and is launched by the bank. In case the first level fails, the financial supervisory authority[4] can invoke the second step, a restructuring process, which grants additional rights towards (a) creditors, e.g., the conversion of debt into equity, and (b) equity holders, e.g., raising additional equity, ensuring their constructive participation in the process. One option in the restructuring process is the transfer of system-relevant parts of the financial institution to a bridge bank, therefore better targeting rescue measures towards these parts. The non-system-relevant rest of the bank can then enter a liquidation process.

Through the second major constituent of the Restructuring Act, the Restructuring Funds Act, a restructuring fund under administration of the SoFFin[5] is set up. The purpose of this fund is to finance all measures taken under the Restructuring Act. All financial institutions are obliged to contribute to the fund through annual and special payments of the newly introduced bank levy. The contribution of any individual bank to the bank levy is based primarily on its liabilities, which is used to approximate the systemic risk induced by a financial

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[1]Gesetz zur Restrukturierung und geordneten Abwicklung von Kreditinstituten, zur Errichtung eines Restrukturierungsfonds für Kreditinstitute und zur Verlängerung der Verjährungsfrist der aktienrechtlichen Organhaftung; short: Restrukturierungsgesetz

[2]KredReorgG: Gesetz zur Reorganisation für Kreditinstitute

[3]RStrukFG: Gesetz zur Errichtung eines Restrukturierungsfonds für Kreditinstitute

[4]BaFin: Bundesanstalt für Finanzdienstleistungsaufsicht

[5]SoFFin: Sonderfonds Finanzmarktstabilisierung

institution. The determination of the bank levy, however, does not discriminate between business models. This results in the fact that banks with rather conservative business models in terms of systemic risk, e.g., German Sparkassen, are treated equally to banks with a much higher contribution to systemic risk. The bank levy has a progressive form and amounts to between 0.02% and 0.04% of adjusted bank liabilities.[6] At no time the bank levy will exceed 15% of bank net profits. Therefore, in a highly volatile market environment it is possible that banks with a stable business model, which typically add little systemic risk, bear a considerable share of the bank levy. The overall amount is estimated by Kaserer (2010a) to around EUR $1.0-1.3$bn. For a more detailed discussion of the German Bank Restructuring Act refer to Kaserer (2010a).

UK Banking Act 2009

The measures defined in the UK Banking Act 2009 point in much the same direction as the German Bank Restructuring Act, setting rules for the case of bank bankruptcy. The main difference is that the Banking Act does not include a bank levy as in Germany.

The most important part of the Banking Act is the first-time establishment of a permanent Special Resolution Regime for Banks (SRR), which gives British authorities[7] tools to deal with banks in financial distress, protecting bank depositors and preserving financial stability. The SRR specifically provides three options for an early intervention (pre-insolvency) for failing banks: the transfer to a private purchaser, transfer to a bridge bank and temporary public ownership while continuing important bank services. The first two options are to be executed by the BoE, while transfer into public ownership is exercised by the Treasury. Furthermore, the Banking Act establishes a new bank administration and a bank insolvency procedure. The UK Banking Act 2009 also contains a framework for stronger regulatory supervisory of financial institutions, strengthens and formalizes the role of the Bank of England in the oversight of inter-bank

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[6]Adjustments include the subtraction of equity and participation rights from total liabilities

[7]Relevant authorities are the Bank of England (BoE), the Financial Services Authority (FSA) and the Treasury

payment systems, provides the Treasury with the powers to set regulation to deal with Investment Bank insolvency and increases deposit insurance limits. For a more detailed discussion of the UK Banking Act 2009 refer to Singh (2011).

Hypotheses on the following three questions around the introduction of bank bankruptcy regulation are developed.

(1) *Bank credit risk:* Credit risk is increasing as creditors no longer profit from implicit bail-out guarantees

(2) *Market value:* Market value of banks is reduced as equity holders bear the threat of potential bankruptcy

(3) *Market risk:* Market risk is reduced as regulation stabilizes the banking sector as a whole

Concerning (1) an abnormal increase in CDS spreads for German banks of around 14bp against an unpolluted CDS index is measured, depending on the exact choice of dates, both statistically and economically significant. The abnormal increase on the most important individual event date is 7.3bp. Schäfer et al. (2012) report an increase of approximately 15bp on the most important event date and do not report a consolidated figure for all event dates. For the UK sample I measure an insignificant increase of 2.5bp. In the event study on (2) I do not find statistically significant effects on share prices, neither for the overall period nor on important individual days. This leads to the conclusion that the German Bank Restructuring Act has not influenced share holders in a significant way. Schäfer et al. (2012) report a significant decline on a single important event date[8], while significance levels are generally lower than in the case of CDS. Lower significance levels in this case are in line with the notion that effects on shareholders are weaker than on debt holders. Market risk in hypothesis (3) is significantly reduced after the introduction compared to before new legislation on bank bankruptcy was introduced. Nonetheless, one has to be cautious with the interpretation of this fact as it may be due to changes in the general market environment during the financial crisis.

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[8]Differences in results may stem from the use of different reference indices

A remarkable fact is that similar legislation has been passed in Germany and the UK as individual countries, while most other regulatory actions are discussed on a European or worldwide level. The fact that similar regulatory actions were implemented in only very few other European countries[9], and not at the same time, provides with a good basis for comparison to other European financial institutions in the event study analysis.

The remainder of this chapter is structured as follows: Section 4.2 reviews available literature on banking regulation, Section 4.3 derives the hypotheses tested in this work, Section 4.4 displays in some detail the introduction process identifying important event dates, Section 4.5 lays out the event study methodology employed, Section 4.6 presents the findings and Section 4.7 concludes.

4.2 Literature review

Available literature on the German Bank Restructuring Act and the UK Banking Act 2009 is reviewed briefly in this section.

4.2.1 German Bank Restructuring Act

As to my knowledge, literature on the effects of the German Bank Restructuring Act is still quite scarce. This is in part due to the fact that it is a relatively new regulatory measure, come into effect on January 1st, 2011, which still has not left much time to study its effects.

The to my knowledge first detailed quantitative study on the effects of the Restructuring Act using capital market data has been conducted by Schäfer et al. (2012), in the form of an event study on the introduction on the Restructuring

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[9]E.g., Sweden, Austria, and Hungary

Act[10]. Their results indicate limited effects of the Restructuring Act on capital markets. They find significant effects of the Restructuring Act on individual event dates, which reach approximately 15bp on the most important event date, the date of the final approval of the tax by the German Bundesrat (Nov 26th, 2010). They find insignificant effects on share prices, and explain the insignificance of results as follows.

> "The progressive tax rate is not drastic enough to fulfill the purpose of a Pigouvian tax. The burden on banks is also relatively small. These results support the opinion expressed in the Annual Report of the German Council of Economics Experts [...], which argued that the bank tax is a step in the right direction without being powerful enough to truly fulfill its objectives."[11]

As conclusions from the insignificance of their results, they state that ...

> "... a reform that diminishes bail-out expectations should increase CDS spreads, but if the same reform makes banks safer, this should decrease CDS spreads. [...] The final explanation of insignificance is the most worrying of all. It may simply mean that the major financial reforms announced and enacted over the past two years have been just that—insignificant."[12]

In comparison with this paper they consider a narrower and somewhat differing range of event dates.

On a more general level Marinc & Vlahu (2011) argue that special bankruptcy legislation for financial institutions is desirable as financial institutions feature specific characteristics which distinguish them from other corporations. They give an overview of bankruptcy legislation in different countries and compare the U.S., UK and German bankruptcy frameworks. They argue that during the financial crisis and due to the lack of banking-specific bankruptcy laws, financial

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[10]Schäfer et al. (2012) analyze a wide range of regulatory measures in addition to the German Bank Restructuring Act, including the introduction of the Dodd-Frank Act and the Volcker Rule in the USA, the Vickers Reform and bank tax in the UK and the international Basel III legislation

[11]Schäfer et al. (2012, p. 25)

[12]Schäfer et al. (2012, p. 32)

authorities did not have appropriate measures at hand to adequately react to the crisis.

Kaserer (2010a) presents a detailed overview of the features of the German Bank Restructuring Act and an assessment of the most important policy implications. He argues that the Restructuring Act is pointing into the right direction, still suffering from some important flaws[13]. He also presents an estimation of the economic consequences on bank profits and the expected tax revenues from the bank levy. Kaserer (2010b) provides an extensive overview of the Solvency III and Basel II regulatory regimes. He especially concentrates on the consequences of regulatory measures with respect to corporate financing. With respect to the Restructuring Act he finds that financial institutions' credit risk has increased due to the new restructuring legislation, which especially can be seen in financial institutions' CDS spread data. Additionally, he points out a considerable valuation effect on bank shares as a consequence of the Restructuring Act. This work will review and deepen some of the analyses carried out in Kaserer (2010b).

4.2.2 UK Banking Act 2009

To my knowledge no study on the UK Banking Act 2009 exists measuring its effects on security markets. As to the available literature, Avgouleas (2009) provides an extensive review of the UK Banking Act 2009 and the events that led to its introduction. He argues that the introduction of the Banking Act was a significant improvement over the previous regulatory regime, but for its full effectiveness requires a structural reform of UK banking supervisory institutions. Therefore, the SRR as in place today might seriously lack effectiveness. Singh (2011) provides some history on the introduction and a detailed description of the UK Banking Act 2009, with special focus on the implications for practical implementation. He compares the discretion-based design of the British SRR, where the FSA decides on the execution of the SRR, to rule-based approaches such as the US or Canadian model, where a resolution regime is executed on

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[13]Especially the imprecise definition of systemic relevance, a lack of systemic risk steering effects, and the unsolved issue of international restructuring

pre-defined triggers, and highlights the difficulties connected with such decisions in the Banking Act.

While quite some literature exists as to the legal consequences of the Banking Act, the consequences on bank corporate risk management and corporate governance, to my knowledge, no quantitative studies on the financial market effects of the UK Banking Act 2009 have yet been published.

4.3   Hypotheses creation

In this thesis I will study the market reactions to the introduction of the banking regulations described in Section 4.1. In particular, three hypotheses will be studied as laid out in the following.

4.3.1   Credit risk and CDS spreads

Even in times of increasing equity requirements for banks, debt is still the most important source of bank financing. Bank creditors are thus heavily exposed to the financial situation of the respective financial institutions they provide financing to and thus are sensitive to financial institutions' credit risk. Credit risk is the risk that a borrower fails to make the payments he is obliged to make by means of the credit contract and thus defaults on a credit. The default risk of a certain credit generally finds its expression through credit spreads. Creditors demand compensation for higher credit risk by demanding higher returns and thus higher credit spreads.

Apart from the direct credit spread, credit derivatives are frequently used to express credit risk. A credit derivative allows to increase or reduce one's exposure to specific credit risks. The most important class of credit derivatives are credit default swaps (CDS). A CDS is a contract between two parties to pass along the risk of a specific credit for a specific issuer from one counter-party to the other. The issuer of a credit default swap sells protection to credit risk. If the borrower defaults on the credit a credit default swap is issued for, the seller of

protection has to compensate the buyer of a credit default swap for his losses. He is compensated for the credit risk he is bearing by a regular payment from the protection buyer. The price of protection is denoted as the CDS spread and depicts the risk part of a credit spread that can be approximated by the credit spread minus the risk free rate. The CDS spread thus is a measure of credit risk.

I put forward the following hypothesis.

Hypothesis 1: Increased bank credit risk and rising CDS spreads

The introduction of bank bankruptcy regulation reduces implicit bail-out guarantees in case of financial distress. As bank credit holders can no longer count on being rescued in case of insolvency, credit risk and thus CDS spreads increase

I expect to see an increase in financial institutions' credit risk premia as system-relevant financial institutions can no longer count with an implicit state guarantee to be rescued. As long as creditors of financial institutions are secured by an implicit state guarantee against bank failure, credit risk is limited. The implicit guarantee is replaced by a formal restructuring process for banks in financial distress, which places some of the burden of a bank bankruptcy on the debt holders. This effect should be observable especially for larger financial institutions as they have a higher probability to be perceived as system-relevant. As a side effect, declining bank profits (see Section 4.3.2) lead to a reduced distance-to-default for financial institutions, and hence increased credit risk and rising CDS spreads.

4.3.2 Equity valuations and market risk

Apart from credit holders, bank bankruptcy regulation also affects equity holders. Effects on equity holders are expected through two channels. First, in anticipation of additional risk of default, a direct influence on share prices is expected. Secondly, regulation is intended to stabilize the financial sector as a whole, which is why long term company risk should be reduced.

I put forward the following hypotheses.

Hypothesis 2a: Decreasing share price

The introduction of bank insolvency regulation reduces implicit bail-out guarantees in case of financial distress. Bank equity holders can no longer count on being rescued with public funds. This opens the possibility of a loss of all equity value. As a reaction to this increased risk shareholders demand higher expected returns and share prices drop

The introduction of explicit procedures to deal with banks in financial distress and insolvent banks reduce implicit bail-out guarantees by the state. This reduction of government guarantees should lead to abnormal negative stock returns through a direct and an indirect effect. Directly, an increased threat of losing all equity value in the course of an insolvency is imposed on stock holders. Indirectly, higher credit risk implied by discontinuation of a bail-out guarantees leads to higher refinancing cost (see Section 4.3.1). Rising credit rates lead to reduced free cashflow, and hence lower valuations.

In addition, in case of the German Bank Restructuring Act, the bank levy will put pressure on banks' free cashflow. The size of this effect is subject to the extent to which the additional cost from the bank levy can be passed on to customers. Kaserer (2010a) estimates the effect on banks' RoE from the bank levy to around 30bp, with larger effects possible due to business model specifics. Linearity in valuation methods suggests an effect on company equity valuations, and thus share prices, of similar size.

As bank bankruptcy regulation seems to affect debt holders more than equity holders, a stronger effect in CDS spreads is expected than in share prices. This expectation is backed by the fact that financial bail-out packages, such as country rescue packages or the creation of the EFSF, mainly benefited creditors instead of owners (King, 2009; Horvath & Huizinga, 2011). Therefore, in turn, a reduction in bail-out guarantees should mainly affect debt holders.

For the sake of completeness I state that there may be a positive effect on security valuations through the increased stability induced in the financial system, which

is the ultimate goal of enhanced regulation. Nonetheless, due to the fact that the insolvency schemes studied in this work have been introduced only in few individual countries and in view of the interconnectedness of the global banking system, this effect is estimated to be smaller than the above-mentioned.

Hypothesis 2b: Decreasing market β

Regulation is intended to stabilize the financial sector as incentives for excessive risk taking are reduced. Sector risk relative to the general market, and thus financial sector β, is expected to be reduced

Banking regulation is generally designed to reduce risks in the banking sector. As argued by Marinc & Vlahu (2011), a carefully designed bank bankruptcy law reduces the moral hazard to take excessive risks, as created by implicit state guarantees. Additionally, the German bank levy increases the cost of risky business models and may lead towards business risk reduction. Another view on risk reduction is brought forward by Lamdin (2001), who argues that regulation reduces systematic (and idiosyncratic) risk by reducing the variability of cashflows.

A reduction of systematic risk and therefore banks' market β through bank bankruptcy regulation is therefore expected.

4.4 Identification of event dates

The first important step in any event study is the identification of relevant events, i.e., points in time when new information is released to the market. Especially for regulatory measures where there is only a limited number of news events, correct identification of events is critical for the success of an event study. In order to identify events, an extensive press search was conducted, especially taking into account German and British business press and news tickers.[14]

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[14]Reference for the German press search were Financial Times Deutschland, Börsen-Zeitung, dapd Nachrichtenagentur (ddp news services) and dpa-AFX Wirtschaftsnachrichten, for the UK press search AFP, AP, Thomson Financial News, Press Association Newsfile and Citywire

This section will document in detail the events that lead to the introduction of bank bankruptcy legislation in Germany and the UK. I try to identify and document not only official events, but also points in time where information is first leaked into the market. In order to increase the power of the event study, I follow an approach by Schipper & Thompson (1983b), especially identifying events that changed expectations of market participants as to the contents or the likelihood of introduction of new regulation as these are the most likely to influence security prices. These expectation changing events are marked in the following with an "∗".

An overview of events is given in Figure 4.1 for the German Bank Restructuring Act and in Figure 4.2 for the UK Banking Act 2009.

4.4.1 German Bank Restructuring Act

Nov/Dec 2009 - First rumors on bank levy: During Nov and Dec 2009 first rumors on a bank levy appear. At this time the discussion is limited to a bank levy, still without plans of an insolvency regime. On Nov 13th the German Council of Economic Advisors[15] recommends that all system-relevant banks should pay a bank levy in the form of a Pigouvian tax into an European stability fund based on the level of bank risk taking, primarily in order to reduce risk taking incentives. On Nov 16th Josef Ackermann, CEO of Deutsche Bank and managing director of the German banking association[16] proposes a rescue fund which is co-funded by the state and banks. On Dec 30th the CSU as first governing party in Germany demands a risk adjusted bank levy and the setup of a rescue fund without participation of the state. Following these first discussions on a bank levy, and following the announcement of a US bank tax by Barack Obama on Jan 12th, 2010, there are more discussions on a bank levy, also with first mentioning of a reformation of the German bank insolvency regime in Jan and Feb 2010.

At this point in time no decisions of any kind are taken and many different models are possible. Therefore, taking into consideration the rather long timeframe of

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[15]Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung
[16]Bundesverband deutscher Banken

Figure 4.1: Overview of German Bank Restructuring Act event dates
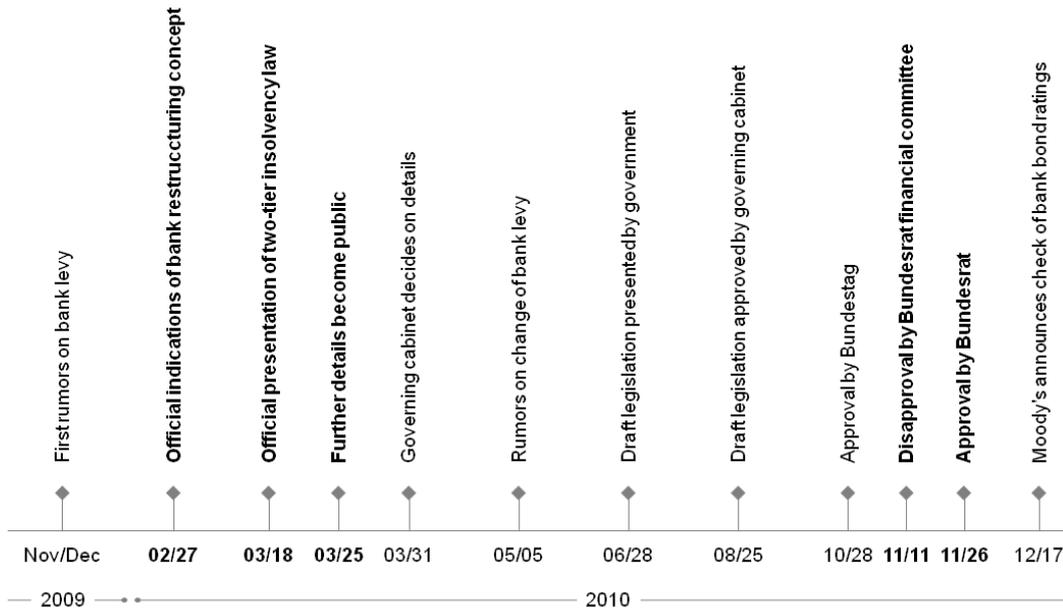
these discussions, and although most of this was new information, measurable effects on security prices during this period are not expected.

∗**Feb 27th, 2010 - Official indications of bank restructuring concept:** The German minister of justice, Sabine Leutheusser-Schnarrenberger, mentions very first details on the new restructuring legislation, indicating a two-step reorganization plan, at an event at a Hamburg law firm.

At the same time, confoundingly, rumors on the preparation of a Greek rescue package have significant positive influence on stock markets.

∗**Mar 18th, 2010 - Official presentation of two-tier insolvency law:** The German minister of justice for the first time presents official government plans

on the restructuring of financial institutions at the German Lawyer's Society[17].
Key points of the concept are projected to be ready for discussion in the federal
cabinet in Apr 2010. At this time the insolvency regime is announced to be
applied to all, not only system-relevant, banks. Still unclear are the details of
the new legislation, e.g., the exact funding distribution of the bank levy.

Contemporaneously, on Mar 21st, the coalition member FDP, who up to that
point had been against the bank levy, is reported to have a concept rather similar
to the one presented. On Sunday, Mar 21st, the member parties of the governing
coalition agree on the introduction of a bank levy. Still, the day of introduction,
the funding distribution and the duration of the bank levy are unclear. The total
volume, according to first estimates, is reported to amount to around EUR 1.2bn
per year, and is to be paid by all German banks. The events of that weekend
understandably are followed by at least a week of intense discussions, while the
whole process is parallel to debates on a financial transaction tax.

∗**Mar 25th, 2010 - Further details become public:** As becomes public
from informed sources within the governing coalition, within the Restructuring
Act instruments to limit shareholder rights are planned, so that a promising
reorganization plan cannot be impeded by shareholders. On Mar 27th, an increase
of the limitation period for bank management[18] from the then effective five years
to ten years is agreed on.

Mar 31st, 2010 - Governing cabinet decides on details: On Mar 31st, the
German governing cabinet debates and decides on the details of the Restructuring
Act and determines that the legislation should be prepared until Jul 2010. On
Mar 29th more details on the distribution of the contributions to the bank levy
are leaked.

Both of these events do not really constitute new or surprising information, so
that no measurable effects on financial markets are expected.

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[17]Arbeitsgemeinschaft Insolvenzrecht und Sanierung at the Deutsche Anwaltsverein
(DAV)

[18]Verjährungsfrist für Pflichtverletzungen bei der Geschäftsführung (§ 93 AktG)

May 5th, 2010 - Rumors on change of bank levy: On May 5th, rumors on a change of the bank levy arise. According to these rumors, the bank levy should take into account managerial bonus payments. On May 26th, plans on a European bank levy are proposed by the European commission, including a European restructuring and liquidation fund for banks. Both propositions are ultimately not pursued further and are not considered to have significant effects on financial markets.

As a confounding event, during the period of May 4th to May 6th, German financial institutions agree to contribute substantially to a rescue package for Greece. At the same time, worries come up as to what extent the Greek and Spanish debt crisis would reach the rest of the European economies.

Jun 28th, 2010 - Draft legislation presented by Government: The German government presents draft legislation on the Restructuring Act. The draft legislation includes the two-step restructuring process and a limitation of shareholder rights. Apart from this, the voluntary participation of creditors through shortening of debt or debt-equity swaps in case of system-relevant banks is included. As all of the contents were intensively discussed before, no new or surprising information is revealed.

Parallel to the events of Jun 28th, no agreement on a European bank levy or financial transaction tax is achieved on the G20 summit. In the US, a bank tax is surprisingly announced, which shortly after is discarded due to narrow majorities in the US congress.

Aug 25th, 2010 - Draft legislation approved by governing cabinet: Foreseeably, the draft legislation on the Restructuring Act is approved by the governing cabinet, a result that is covered by the press already before the actual event.

Oct 28th, 2010 - Approval by Bundestag: After the approval of the legislation by the Bundestag financial committee[19] on Oct 26th, the Restructuring

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[19]Finanzausschuss des Bundestages

Act is foreseeably approved by the Bundestag on Oct 28th.

∗**Nov 11th, 2010 - Disapproval by Bundesrat financial committee:** The Bundesrat financial committee[20] recommends passing the Restructuring Act to the arbitration committee[21] of Bundestag and Bundesrat. The criticism refers to the fact that federal banks with a very limited risk profile, German Sparkassen and Genossenschaftsbanken, are obliged to contribute to the bank levy. Discussions on this fact started beginning of Nov and culminate on Nov 11th.

∗**Nov 26th, 2010: Approval by Bundesrat:** In spite of the recommendation of the Bundesrat financial committee to send the Restructuring Act to the arbitration committee, the act is surprisingly passed by the Bundesrat.

Due to the surprising nature of the events on Nov 11th and in particular of Nov 26th, considerable market reactions on these dates are expected.

∗**Dec 17th, 2010: Moody's announces check of bank bond ratings:** Due to the possible participation of creditors in case of a bank restructuring event, Moody's announces the check of ratings of subordinated bonds.

Some additional regulatory measures were put in place during the same timeframe, one being increased equity requirements for banks. Nonetheless, banking regulation implemented during 2010 was mostly determined beforehand by EU legislation and therefore foreseeable. No substantial impact on security prices from these events is expected. Parallel discussions on a European financial transaction tax did not materialize in actual legislatory action and did not constitute confounding events on the above-mentioned event dates. Parallel in 2010 the European debt crisis continued, with considerable discussions on the financial situation and bail-out of Greece and Ireland. These discussions are likely to have provoked market reactions during 2010. Nonetheless, most of the Greece-related discussions took place in Apr and May, Ireland-related discussions from Nov on.

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[20]Finanzausschuss des Bundesrates

[21]Vermittlungsausschuss

Figure 4.2: Overview of UK Banking Act 2009 event dates
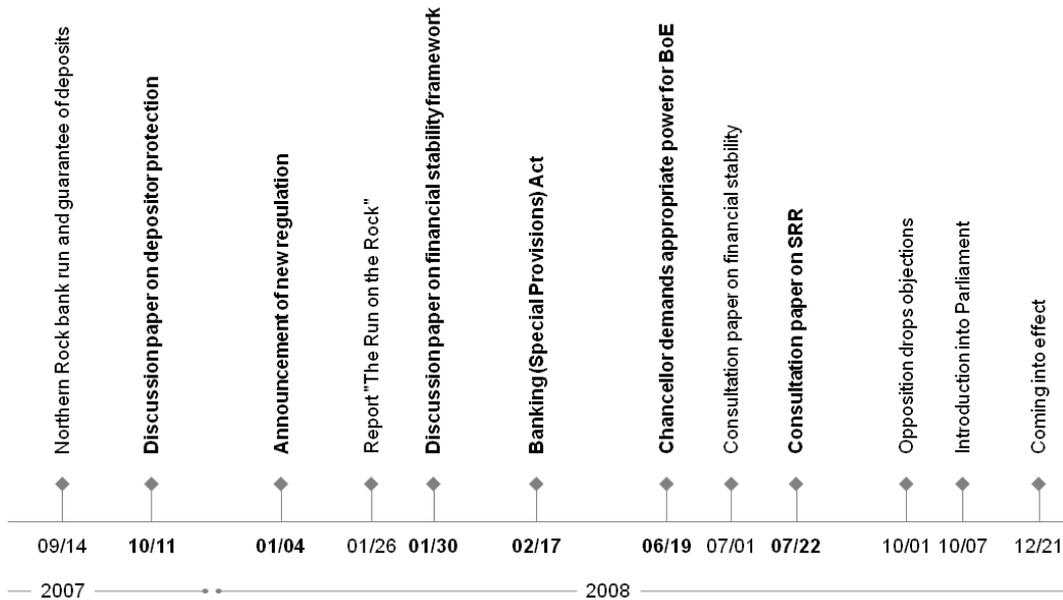
Fortunately, not many event windows lie there, which were checked to be free of debt-crisis related confounding events.

4.4.2 UK Banking Act 2009

The introduction of the UK Banking Act 2009 is an ultimate response to the collapse and nationalization of the UK mortgage bank Northern Rock and the liquidity problems thereafter. In this sense, the Banking Act formalizes the temporary provisions taken in the course of the Northern Rock rescue. In the timeline of events I therefore start with the collapse of Northern Rock.

Sep 14th, 2007 - Northern Rock bank run and guarantee of deposits:
As a result of serious and publicly known liquidity troubles, UK mortgage lender
Northern Rock experiences a bank run during the days from Sep 14th to 17th.
In order to preserve the stability of the UK financial system, British Chancel-
lor Alistair Darling on Sep 17th announces emergency liquidity assistance. The
British government guarantees all customer savings without limit[22]. Following
the deposit guarantees, on Oct 1st deposit coverage is increased to GBP 35k at
a level of 100% of incurred losses.

As no relevant long-term policy decisions were made at this time, I do not take
this date into account for the event study.

∗**Oct 11th, 2007 - Discussion paper on depositor protection:** As a first
step to a more comprehensive regulatory framework for banks in distress, the
British Chancellor announces the publication of the discussion paper "Banking
Reform: Protecting Depositors" by BoE, FSA and HM Treasury. The paper
particularly raises the questions if (a) the depositor compensation system should
be reformed and (b) how a failing bank's critical banking functions can be pre-
served, and aims at creating greater certainty and faster payout of compensation
for bank customers. An additional proposition says that a new administration
system should be set up for insolvent banks, permitting the appointment of an
administrator under special rules to deal with the problems of distressed banks
more quickly. The discussion paper is agreed to be followed up in early 2008.

∗**Jan 4th, 2008 - Announcement of new regulation:** The British chan-
cellor announces that UK regulators will be given more powers in monitoring
and intervening in troubled banks. British government plans to grant the FSA
and central bank additional power to intensify bank surveillance and to force a
restructuring on defined triggers. The measures would also provide the FSA with
the power to secure depositors' cash at troubled banks to prevent bank runs.
Legislation was supposed to be proposed in May by the Treasury.

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[22]Usual state protection at that time amounts to GBP 33k per saver

Jan 26th, 2008 - Report "The Run on the Rock": The report "The Run on the Rock" is published by the House of Commons Treasury Committee, reviewing the events and policy measures taken through the Northern Rock rescue. The creation of a single authority for the handling of banks in trouble is recommended.

At the time of its publication, the report does not contain surprising or new information.

∗**Jan 30th, 2008 - Discussion paper on financial stability framework:** The British chancellor launches a further discussion paper, containing more detailed proposals to enhance the current financial stability and depositor framework. A set of new measures is proposed, including the improvement of the framework for liquidity assistance by the BoE[23] and the introduction of the Special Resolution Regime for Banks (SRR) that would lead to more organized recoveries and quicker transfer of remaining healthy business to a publicly owned bridge bank. The process would be lead by a restructuring officer. According to the discussion paper, banks might be obliged to pay billions of pounds into a fund used to pay for the bail-out measures taken on troubled banks. The decision on the application of the SRR on a specific bank in trouble would lie with the FSA. As a further measure, depositors' insurance could be increased to amounts in a range from GBP 50k up GBP 100k.

∗**Feb 17-19th, 2008 - Banking (Special Provisions) Act:** On Feb 17th, the British chancellor announces the temporary nationalization of Northern Rock after the rejection of two private takeover bids by the government. The legislation allowing the nationalization is passed during the subsequent days as the Banking (Special Provisions) Act. The Banking (Special Provisions) Bill is introduced into the House of Commons on Feb 19th, receives Royal Assent and enters into force on Feb 21st. It enables the UK government to nationalize banks under emergency circumstances. The legislation is then applied to Northern Rock and, seven month later, with announcement on Sep 29th, to Bradford & Bingley's.

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[23]Including the right for the BoE to secretly grant emergency loans to banks in distress

The Banking (Special Provision) Act will be in place until replaced by the UK Banking Act 2009.

As the legislation of the Banking (Special Provision) Act anticipates some of the measures of the Banking Act, this is an important event for this study.

∗**Jun 19th, 2008 - Chancellor demands appropriate power for BoE:** With a letter to the Treasury Committee, the British Chancellor confirms his efforts to new and effective banking regulation. The Chancellor argues that, in order for the BoE to effectively preserve financial stability, it needs appropriate tools and powers. These power should include an improved liquidity provision framework, and most importantly, a leading role in the implementation and execution of the planned Special Resolution Regime for Banks.

As a side note, on Jun 18th Charles Bean is approved as Deputy Governor of the Bank of England for Monetary Stability, starting on Jul 1st, 2008, and following Sir John Gieve.

Jul 1st, 2008 - Consultation paper on financial stability: A further consultation document on financial stability and depositor protection is launched, including feedback on the Jan 30th-paper and further clarifications and confirming plans to raise deposit insurance to GBP 50 k.

The new consultation paper seems to provide only limited new information to the market with respect to the Jan 30th-paper.

∗**Jul 22nd, 2008 - Consultation paper on the SRR:** Yet another consultation paper is launched, dealing with the new SRR legislation. The rather technical consultation document provides details on the specifics of the SRR. The deadline for comments on both consultation papers is Sep 15th, 2008.

Oct 1st, 2008 - Opposition drops objections: Opposition Conservative Party leader David Cameron announces in his speech at the Conservative Party conference to drop objections to the planned banking reforms and help to pass the new legislation in Parliament.

Parallel, on Sep 30th, British PM Gordon Brown confirms that deposit protection will be raised to GBP 50k, which by then is already expected by the market.

As a parallel confounding event, the British government on Sep 29th takes over the control of Bradford & Bingley's, the eighth largest UK bank, selling the savings operations and branches to Spanish Banco Santander. The European Commission on Oct 1st approves the rescue according to EU state aid rules. Because of these strong confounding events and limited news character of the events on Oct 1st, I exclude this date from the analysis.

Oct 7th, 2008 - Introduction into Parliament: The UK Banking Act 2009 is introduced into Parliament by the British Government.

Parallel to this event, on Oct 6th, Iceland is threatened with "national bankruptcy" by the credit crisis, as warned by Iceland's prime minister. On Oct 7th, Iceland nationalizes its second-biggest bank, Landsbanki. On Oct 9th, the Icelandic FSA puts the biggest Icelandic bank, Kaupthing Bank, under its administration, while the same had already happened to Glitnir.

Again parallel to the Icelandic events, Britain on Oct 8th announces a GBP 50bn part-nationalization of Britain's main banks, which is part of a bail-out package of the size of hundreds of billions of pounds. The funds are used to buy preferential shares in banks in order to prevent a collapse of the banking system. Furthermore, the package makes available GBP 200bn in short-term loans and GBP 250bn to guarantee interbank loans[24]. As a third measure, BoE cuts lending rates to 4.5%.

Due to the little news importance of the introduction into Parliament and the strong confounding events, this event is excluded from the analysis.

Dec 17th, 2008 - Banking Bill passes House of Commons: The UK Banking Act 2009 passes the House of Commons with the support of the main opposition parties.

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[24]The banks covered by the package are HSBC, Barclays, Royal Bank of Scotland, Lloyds TSB, Standard Chartered, HBOS, Abbey and Nationwide Building Society

On the same day a cut in US interest rates by the Federal Reserve and fears of UK bank stock holders of additional bank rights issues strongly influence share prices.

This event does not constitute new or surprising information for the Banking Act.

Feb 21st, 2009 - Coming into effect: The UK Banking Act 2009 comes into effect on Feb 21st as planned, and replaces the Banking (Special Provisions) Act 2008, which expires on Feb 20th. Secondary legislation on the Special Resolution Regime for Banks is presented to parliament on Feb 20th.

Parallel to the coming into effect of the Banking Act, from Feb 20th through 24th, European and worldwide stock markets sharply fall on renewed fears of a global recession from weak US industrial production data combined with worries over the future of the financial sector.

Due to the limited news content of the events on Feb 21st with respect to the Banking Act and the strong confounding event, the event is excluded from the analysis.

During the event period of late 2007 and 2008, the financial crisis, being at its peak, created a range of confounding events which have to be considered. The first important event is the crash of Lehman Brothers on Sep 15th, 2008, which lead to considerable uncertainty in the markets and a sharp drop in asset prices. Fortunately for this study, there are no important events very close to the collapse of Lehman, so that this does not require further treatment. The second important event in 2008 is the above-mentioned near-bankruptcy of Iceland and the subsequent nationalization of Icelandic banks around Oct 7th, which also lead to increased market uncertainty, especially in the UK. Fortunately once again, no important events are very close to this date, not considering the introduction of the Banking Act into Parliament which did not provide new information to the market and can be left out of the analysis.

4.5 Methodology

An event study approach is used to examine the effects of bank bankruptcy regulation on financial institutions' share prices and CDS spreads. The different steps of the implementation are described in this section.

4.5.1 Event windows

Having identified the event dates in Section 4.4, the important question of adequately applying event windows arises. This is especially critical in the regulatory context (Lamdin, 2001). For the placing of the event windows I pursue two different approaches used in the literature. First, all event windows relevant for the respective legislatory process are taken into account.[25] As a second approach, in order to enhance the statistical power of the event study, and following Schipper & Thompson (1983b), only those events are considered where expectations of market participants as to the contents or the likelihood of introduction of new regulation where changed as these should have the strongest effect on security prices.

The correct length of the event windows is less clear. According to the efficient market hypothesis (Fama, 1965; 1970) capital market reactions to new information should be immediate. MacKinlay (1997) argues for multiple day event windows, including at least the day of the announcement and the day after, in case the announcement took place after closing of the markets. According to Binder (1985a), regulatory effects are often anticipated by the market, and therefore some days before the event should be included into the event window as otherwise the effect might not be measurable. However, he also points out that, assuming correct identification of the event date, shorter event windows increase the statistical power of the event study.

Following these lines of argumentation, in order to fully capture the market reaction as well as possible effects from preliminary information leakage and counter

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[25]Dates with especially strong confounding events as marked in Section 4.4 are excluded

reactions, I allow for an event window of the exact event date and the following day ([0,1]), and check results including up to six days prior to the event (Binder, 1985a). The choice of relatively short event windows reduces the risk of polluting events and increases the statistical power of the event study. In case the event date is not a trading day, the event date is shifted to the next trading day.

4.5.2 Data and sample creation

As the Restructuring Act and Banking Act are restricted to Germany and the UK respectively, the samples for the different parts of the study are German and British bank samples. However, as information availability for financial institutions differs across securities[26], samples for the studies on share prices and CDS spreads differ.

Daily return data is used in order to gain statistical power (MacKinlay, 1997). The power of the event study then depends highly on the correct identification of events.

CDS spreads

CDS spreads are used in order to estimate wealth effects on bank creditors as CDS spreads offer some advantages over bond spreads. In particular, according to King (2009), CDS are more liquid than the underlying bonds and are not sensitive to the choice of the underlying risk-free benchmark rate, thus reflecting only credit risk effects.[27] Also, according to Ejsing & Lemke (2011), as CDS in contrast to bonds do not need upfront funding, they have been less influenced by the dry-up of financial markets through the crisis.

As basis for the CDS sample creation I use five year senior unsecured CDS from German and UK financial institutions, as these are usually the most liquid.[28]

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[26]CDS spreads are not available for all exchange listed financial institutions and vice versa

[27]CDS spreads nonetheless bear counter-party risk

[28]According to Norden & Weber (2004), five years is the benchmark maturity in CDS market

Table I: Constituents list of German sample for CDS spread study

No.	Company	Name
1	Bayerische Landesbank	Bayerische Landesbk SNR MM 5Y
2	Commerzbank AG	Commerzbank AG SNR MM 5Y
3	Deutsche Bank AG	Deutsche Bank AG SNR MM 5Y
4	HSH Nordbank AG	HSH Nordbank AG SNR MM 5Y
5	IKB Deutsche Industriebank	IKB Dt Industriebk AG SNR MM 5Y
6	Landsbank Badenwürttemberg	LBBW SNR MM 5Y
7	Westdeutsche Landesbank AG	WestLB AG SNR MM 5Y

Notes: Sample includes German banks' CDS with less than 25% zero daily returns during 2010

Table II: Constituents list of UK sample for CDS spread study

No.	Company	Name
1	Barclays PLC	Barclays Bank PLC SEN 5YR
2	Santander UK PLC	SANTANDER UK PLC SEN 5YR
3	Standard Chartered PLC	Standard Chartered Bank SEN 5YR
4	Royal Bank of Scotland Grp. PLC	Royal Bank Of Scotland Group PLC SEN 5YR
5	Lloyds Banking Grp. PLC	Lloyds TSB BANK PLC SEN 5YR
6	HBOS PLC	HBOS PLC SEN 5YR
7	HSBC Holding PLC	HSBC BANK PLC SEN 5YR

Notes: Sample includes UK banks' CDS with less than 25% zero daily returns during 2008

Following Jorion & Zhang (2007) the sample is restricted to CDS with a modified restructuring (MM) clause. I exclude securities with very low liquidity from the sample[29] and end up with a sample of seven German and seven UK CDS time series.

As a reference index for the CDS spread study broad European banking indices, the DS EU Banking 5Y CDS Index and the DS Itraxx SEN Financials 5Y CDS Index, respectively, are chosen according to their availability. Nonetheless, as Jorion & Zhang (2007) state, the widely used difference in difference method biases findings towards zero, as the security studied usually constitutes a part of

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[29]SNR MM CDS with more than 25% of zero daily returns during 2010 and 2008, respectively, are excluded

Table III: Constituents list of German sample for share price study

No.	Name	Total mkt cap.	Free float mkt cap.
1	AAREAL Bank	696.2	423.7
2	Comdirect Bank	1,013.9	578.2
3	Commerzbank	7,270.7	4,580.6
4	Deutsche Bank	32,928.6	32,393.3
5	DVB Bank	1,139.3	57.0
6	HSBC Trinkaus & Burkhard	2,800.6	112.8
7	IKB Deutsche Industriebank	440.2	70.4

Notes: German financial institutions listed throughout 2010, with average free float market capitalization of over EUR 50m; market capitalization in EUR m, avg. 2010

the index. As this effect is greater the more specific a reference index is, results are tested on the DS Itraxx Europe 5Y as a much wider, non-industry specific index.[30] The constituents of the CDS securities sample are displayed in Table I for Germany and Table II for the UK.

Share prices

In order to study the effects on share prices, samples of German and British financial institutions are used that slightly differ from the samples above. German banks had to be listed in the CDAX throughout the year 2010, represented by the sector specific CDAX Banks index, UK banks in the FTSE 350 throughout the year 2008, represented by the FTSE 350 Banks index. In order to minimize potential effects from low trading volumes, only financial institutions with a free-float market capitalization of over EUR 50m are taken into consideration. In case of the UK sample I extend the sample by two additional UK banks to increase sample size. The constituents of the German bank sample can be seen in Table III, those of the UK sample in Table IV.

As described in Section 4.5.3, following the methodology in MacKinlay (1997) and Binder (1985b), a model for normal returns is employed for the study of share prices. Following MacKinlay (1997), there are four possible models for

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[30]According to Ejsing & Lemke (2011), the Itraxx index of non-financial CDS premia has very high explanatory power for bank credit risk premia

Table IV: Constituents list of UK sample for share price study

No.	Name	Total mkt cap.	Free float mkt cap.
1	Barclays PLC	$24,896.8$	$22,353.3$
2	BCB Holdings LTD	139.5	36.0
3	HSBC Holdings PLC	$95,756.6$	$95,756.5$
4	Lloyds Banking Grp PLC	$18,641.1$	$18,641.1$
5	NatWest Bank PLC	−	−
6	Royal Bank of Scotland Grp PLC	$31,703.7$	$29,901.3$
7	Standard Chartered PLC	$20,675.4$	$20,071.6$

Notes: UK financial institutions listed throughout 2008; market capitalization in EUR m, avg. 2008

normal returns: constant mean return, market model, multifactor models[31] and economic models[32]. According to MacKinlay (1997), the gain of multifactor or economic models over an easy-to-implement market model is very limited, which may explain the widespread use of market models.[33]

Using a market model for modeling normal returns one is left with the choice between different market indices, e.g., bank specific indices as the STOXX Europe 600 Banks or broader indices as the German CDAX and UK FTSE 350. As variance reduction is greatest with highest R^2 between market model and event study securities (Brown & Warner, 1980; 1985), I use the STOXX Europe 600 Banks index. In a robustness check I use the German CDAX and UK FTSE 350 indices instead of European banks. This is an important check as European bank share prices might be influenced by decisions on German and UK banking regulation and therefore be polluted as reference indices.

For the estimation time series starting in Jul 2009 through Dec 2010 for the German Bank Restructuring Act and Jul 2007 through Dec 2008 for the UK Banking Act 2009 are used, including approximately six months of additional estimation period before the first event. Results are robust against the use of longer or shorter timeframes.

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[31]E.g., models which in addition to a market index include further industry indices

[32]E.g., CAPM (Capital Asset Pricing Model) or APT (Arbitrage Pricing Theory)

[33]According to Brown & Warner (1980, 1985), event studies usually are not very sensitive to the choice of the normal return model as variance reduction is usually limited

4.5.3 Model

The methodology used in this event study is a Multivariate Regression Model (MVRM) methodology as was first laid out by Gibbons (1980). Binder (1998) and Binder (1985b) give a very good overview of the methodology, together with a comprehensive literature overview.

Model selection

As laid out in Binder (1998) there are two different methodological strands, which are most widely used in event study literature. I will briefly review the different methodologies and motivate the use of the MVRM in this work. Corrado (2011), to this end, provides a recent and comprehensive overview of short-term event study methodology, including an extensive bibliography on the topic.

Residual Analysis (FFJR) Technique: First used by Fama, Fisher, Jensen and Roll in 1969[34], this technique, as described in detail, e.g., in Binder (1998) and MacKinlay (1997), uses the model

$$R_{it} = \alpha_i + \beta_i R_t^M + u_{it},$$

where R_{it} is the security return to be analyzed and R_t^M is the market return of a reference index. The residuals from the OLS estimation are used as an estimator for the abnormal returns (AR). Abnormal returns are then aggregated across securities and event dates for hypothesis testing.

The use of the FFJR method is appropriate especially in the non-regulatory context. King (2009) states that under the conditions of the regulatory context—clustering, overlapping events, increased variance—traditional test statistics requiring abnormal returns are invalidated. In view of this fact he states that in the FFJR approach it cannot be reliably tested if results obtained are statistically different from zero. Binder (1998) and MacKinlay (1997) discuss in more detail the statistical issues arising in this technique. Most importantly in the context of this study, the FFJR methodology for the aggregation of events assumes events

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[34]Fama (1969)

to be not clustered, i.e., assumes zero covariances between abnormal returns of different securities, which is clearly not the case in the regulatory context.[35] According to MacKinlay (1997) there are two ways to deal with these nonzero covariances: (a) the aggregation of securities into an index[36] and (b) the use of a MVRM framework as discussed in the next paragraph.

Regression Coefficients Analysis: The second methodological strand measures event window abnormal returns as regression coefficients as laid out in Binder (1998). Binder (1985b) gives an introduction on the MVRM and compares it to other event study methodologies. He evaluates the performance of different test statistics within the MVRM framework. It employs dummy variables in an equation system of the form

$$R_{it} = \alpha_i + \beta_i R_t^M + \sum_{a=1}^{A} \gamma_{ia} D_{at} + u_{it},$$

which take the value $D_{at} = 1$ during the event window a and zero otherwise. The parameters of the above-mentioned equation are discussed in more detail below.

This approach can either be applied to a single equation using indices on portfolios, or in a Multivariate Regression Model (MVRM), featuring one equation per security. Especially interesting in the setting of this study is the use of the MVRM, as initially described by Binder (1998) and Binder (1985b) and carried out in several econometric studies in the regulatory context, such as Binder (1985a) and Schipper & Thompson (1983b) among others.[37] In the above-mentioned literature the MVRM is estimated by a seemingly unrelated regressions (SUR) approach based on Zellner (1962). Binder (1985a) gives an introduction on the use of the MVRM in the context of regulatory events and compares the statistical power of different hypothesis tests within the MVRM using monthly and daily stock price data. He finds that, although the variance of daily returns

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[35] Other statistical issues arise, e.g., from heteroscedasticity across securities

[36] The aggregation into an index does not allow to identify reactions of different assets in different directions

[37] More recent studies using the MVRM approach are, e.g., Kabir & Hassan (2005), Tanuwidjaja (2007) and Whalen (2008)

is 20 times smaller than that of monthly returns, statistical power of event studies with daily data is not necessarily higher due to difficulties of correct event window placement.

The MVRM approach solves several statistical problems with respect to the FFJR approach. Most importantly, especially in the regulatory context, heteroscedasticity and contemporaneous correlation across securities is allowed, while non-contemporaneous correlations are still assumed zero. The usual assumptions in the MVRM framework restrict the abnormal returns to be from the same calendar time period for all securities, i.e., the event windows are contemporaneous (Binder, 1998), which is why the MVRM has primarily been used in the regulatory context. However, the MVRM does not allow for a distinction between estimation and event window, thus assuming that the distribution of the AR on the event day is the same as during the rest of the sampling period.

Malatesta (1986) presents another approach using dummy variables. The Joint Generalized Least Squares (JGLS) approach extends the SUR framework described above to the case of non-contemporaneous events. While this can be very relevant in the case of (non-contemporaneous, but not necessarily independently distributed) firm events, it is not necessary in the context of this work. In any case, Malatesta (1986) reports JGLS estimators to not have greater precision than simpler techniques.

Following the above argumentation, I use the MVRM methodology to estimate abnormal returns in this work. The MVRM also seems to be the approach most widely applied for event studies in the regulatory context. I do not apply nonparametric tests such as the sign and the rank test described by MacKinlay (1997), as these require the assumption of independent distribution of abnormal returns across securities.

Figure 4.3: Event study timeline
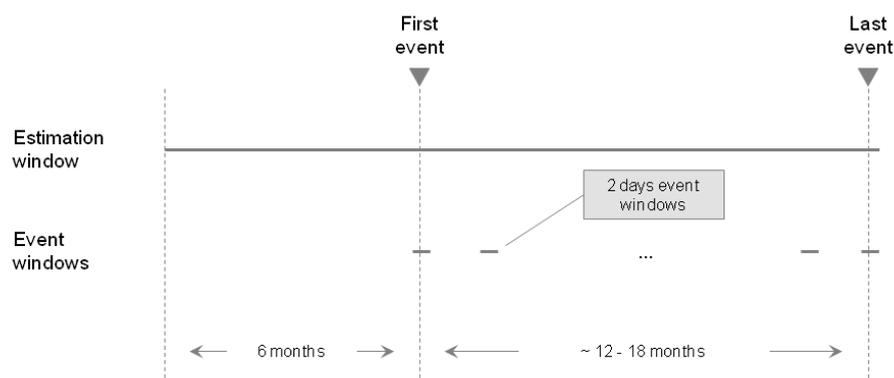
CDS spreads

As argued above the MVRM methodology on is applied on CDS spreads.[38] In contrast to the topic of event studies on share prices, little has been written on the much younger topic of event studies on CDS spreads (Jacobs, 2010), especially in the regulatory context.

I follow the approach by King (2009), who gives two results for the CDS event study, with market adjustment and, in order to check sensitivity of the results to the market model, without market adjustment. Market adjustment is done by estimating with a difference in difference method[39], using dummy variables along

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[38]Most other event studies use Residual Analysis Technique as described by MacKinlay (1997), while King (2009) admits that under the conditions in a regulatory context traditional test statistics requiring abnormal returns are invalidated. Jacobs (2010) reports to use MVRM on CDS spreads to test results from an FFJR ansatz but does not explicitly report results

[39]E.g., Hull, Predescu & White (2004), Norden & Weber (2004) and Jacobs (2010) for recent application in the non-regulatory, King (2009) and Horvath & Huizinga (2011) in the regulatory context

the following model:

$$\Delta\text{CDS Spread}_{it} = \alpha_i + \Delta\text{CDS Spread}_t^M + \sum_{a=1}^{A} \gamma_{ia} D_{at} + u_{it}, \tag{4.1}$$

with i being the index of the securities 1 to I. $\Delta\text{CDS Spread}_{it}$ is the daily change in the spread of security i at time t and $\Delta\text{CDS Spread}_t^M$ is the daily change in the spread of the reference CDS market index at time t. D_{at} are dummy variables for the A event windows, taking the value one during the event window a and zero otherwise. Therefore, the γ_{ia} measure the abnormal daily return of the i-th security during the a-th event window. Finally, u_{it} denotes stochastic disturbances from the model estimation.

In comparison to (4.2) first differences are used instead of percentage changes and $\beta_i = 1$ is set for all equations i. In the approach without market adjustment, the second term on the right side of (4.1) is left out.

Share prices

For an evaluation of share prices in the MVRM, abnormal returns are measured against a reference market model,

$$R_{it} = \alpha_i + \beta_i R_t^M + \sum_{a=1}^{A} \gamma_{ia} D_{at} + u_{it}, \tag{4.2}$$

where R_{it} is the return of security i at time t, R_t^M is the market return at time t and β_i is the regression coefficient between the market returns and the returns of the individual security (market β). The interpretation of the other indices is the same as in (4.1).

The MVRM has frequently been used to examine regulatory changes. It allows effects on different firms in different ways depending on firm characteristics, unlike approaches where an index of the portfolio companies is created and tested against a market model. It then allows for joint hypotheses testing of individual event windows or firms as described below.

Each of the equation systems (4.1) and (4.2) can be estimated within the framework of seemingly unrelated regressions (SUR). This produces no efficiency gain for the estimation of the individual equations as each of the equations separately yields an unbiased estimate, but allows for joint hypotheses testing automatically taking into account the contemporaneous correlation of the disturbances due to the clustering of event dates across securities (i.e., $E(u_{it}u_{jt}) \neq 0 \quad \forall \quad i,j$). The approach also automatically controls for heteroscedasticity across securities. Nonetheless, one must assume non-contemporaneous correlations of the disturbances to be equal to zero (i.e., $E(u_{it_1}u_{jt_2}) = 0 \quad \forall \quad t_1 \neq t_2$).

Market β

In order to measure the effects on market β, I follow Lamdin (2001) in the use of the model

$$R_t = \alpha + \beta R_t^M + \delta_1 D_1 R_t^M + \delta_2 D_2 R_t^M + u_t, \tag{4.3}$$

with R_t being the return at time t of an equal weighted portfolio of the I securities used in (4.2) and R_t^M the market return as above. The dummy variables D_1 and D_2 take the value 1 during the event period and afterward respectively and zero otherwise. Therefore, δ_1 measures the change in market β during the event period, and more interestingly, δ_2 measures the change in β after the end of the event period. Thus, $\beta_{after} = \beta + \delta_2$ is the market β after the regulatory change is fully implemented. Following Lamdin (2001), one year of data is used to estimate β and δ_2, six months before and six months after the event period.

Hypothesis testing

Binder (1985a) gives a set of three hypotheses tests (HT) that can be carried out with daily data in the MVRM framework and which will, complemented by a fourth test, be taken as a basis for this work.

HT 1: $\gamma_{ia} = 0 \quad \forall \quad i,a$, testing the joint hypothesis that abnormal returns for all securities are zero at all event dates.

HT 2: $\gamma_{ia} = 0 \quad \forall \quad i$, testing the joint hypothesis that abnormal returns for all securities are zero during a specific event window a.

HT 3: $\frac{1}{I \cdot A} \sum_{i,a} \gamma_{ia} = 0$, testing the hypothesis that the average abnormal return is zero during all event windows.

HT 4: $\frac{1}{I} \sum_i \gamma_{ia} = 0$, testing the hypothesis that the average abnormal return is zero during event window a.

As test statistics for the MVRM are only asymptotically known (Binder, 1985b) and therefore some ambiguity exists as to what statistical distribution should be used for hypothesis testing, results are reviewed with different test statistics. I primarily use a Wald F statistic.

As a concluding remark in this section, as discussed, e.g., in MacKinlay (1997), due to the limited number of securities available for this analysis, event study methodology has limited power for detecting abnormal returns. I try to, in part, remedy this by choosing very short event windows in order to reach sufficient power of the test. Nonetheless, not finding statistically significant effects on security prices does not necessarily mean that regulation has been ineffective, but may also mean that an event study approach is not able to detect these effects.

4.6 Results

This section will present the results of the event study, testing the hypotheses developed in Section 4.3 by the tests HT 1 to HT 4 specified at the end of Section 4.5.3. For CDS spreads and share prices I list results for individual days, jointly for all event dates and jointly for the event dates considered as expectation-changing, market with an "$*$". The reader can therefore retrace from which event date strong joint effects are triggered.

As an overall result it can be stated that significance levels for the effects from both the German Bank Restructuring Act and the UK Banking Act 2009 are relatively low. There are two possible explanations for this fact. First, it cannot be ruled out that existing strong effects could not be identified by the event study approach employed. This may be due to general difficulties to identify effects of regulation with event studies (Binder, 1985a), difficult identification of relevant events and the exceptional market conditions during the financial crisis. On the other hand it may be that, especially through the market turmoil of the financial crisis, the regulatory measures studied were not perceived as especially important by market participants.

4.6.1 German Bank Restructuring Act

Results on the German Bank Restructuring Act are presented first, before turning to the UK Banking Act 2009 in the next subsection.

Hypothesis 1: Increased bank credit risk and rising CDS spreads

The hypothesis of rising credit risk, and hence rising interest rates, is tested on CDS spread data. In case credit risk for banks has risen since the implicit bail-out guarantee by the state is no longer credible, bank CDS spreads should have risen significantly.

As already laid out in Section 4.5.2, some ambiguity exists in the literature as to the use of market models in CDS spread event studies. While some authors use a difference-in-difference approach against a CDS index (e.g., Norden & Weber, 2004; King, 2009), other authors entirely forgo the use of a market index (e.g., Schäfer et al., 2012; Horvath & Huizinga, 2011). CDS market indices generally are duration-weighted. Thus, while broad standard CDS indices are frequently polluted by the instruments studied, a duration-weighted market index excluding the relevant instruments cannot easily be reconstructed due to data constraints.[40]

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[40]To calculate the risky duration of a CDS, assumptions on the recovery rate of individual CDS are needed which are not available, e.g., on Datastream

In light of this ambiguity I establish results against an own, asset-weighted, un-polluted reference index in the next paragraph and check them twofold, using a standard industry reference index including German financial institutions, and without a reference index.

Results against an unpolluted, asset-weighted index

I use an asset-weighted, unpolluted market index for senior unsecured CDS with a modified restructuring clause for European financial institutions. German banks are excluded from the index as their inclusion would bias results towards zero (Jorion & Zhang, 2007).

The overall effect on CDS spreads during the introduction period of the German Bank Restructuring Act is pronounced, with a rise of 14.18bp. The effect is of roughly equal size regarding all event dates or only the important ones marked with an "∗", but only including important dates yields higher statistical power, showing statistical significance to the 10%-level (HT 3).

HT 1 can be rejected with a confidence level of $< 1\%$, indicating strong reactions of CDS spreads on some of the event days. Strong effects on May 5th, in different directions for different financial institutions (HT 2), seem to arise from the discussions around contributions to a Greek rescue package. HT 2 can be rejected for two further expectation-changing event dates. On Nov 26th the German Bundesrat approved the Restructuring Act. During the days before it was believed that the Restructuring Act would be sent to the German mediation committee, meaning further delay and changes to the new law. On Dec 17th, finally, Moody's announces to check and potentially downgrade bank bond ratings. Results are summarized in Table V.

Among German banks, *Commerzbank AG*, *HSH Nordbank* and *IKB Deutsche Industriebank* where the financial institutions suffering from the strongest effects, with rises in CDS spreads of more than 10bp. All four institutes had received explicit guarantees from the Soffin in 2008. Effects on subordinated CDS are pointing in the same direction and are still more pronounced. Nonetheless, results are not reported in detail as subordinated CDS are available for only a very

Table V: Impact of Restructuring Act on CDS spreads

	Event Day	AR [bp]	CAAR [bp]	HT 1/2		HT 3/4	
				F-value	Pr(>F)	F-value	Pr(>F)
*	02/27/10	0.96	1.92	0.47	0.86	0.39	0.53
*	03/18/10	−0.44	−0.89	0.16	0.99	0.16	0.68
*	03/25/10	−0.01	−0.03	0.18	0.99	0.00	0.99
	03/31/10	−0.73	−1.46	0.91	0.50	0.22	0.64
	05/05/10	−0.34	−0.69	6.52	< 0.01***	0.05	0.82
	06/28/10	0.99	1.98	0.50	0.83	0.41	0.52
	08/25/10	−0.90	−1.80	0.50	0.84	0.34	0.56
	10/28/10	1.42	2.83	0.41	0.89	0.84	0.36
*	11/11/10	0.16	0.32	0.21	0.98	0.01	0.92
*	11/26/10	3.67	7.35	8.95	< 0.01***	5.65	0.02**
*	12/17/10	2.32	4.65	4.39	< 0.01***	2.26	0.13
	Total	0.64	14.18	2.11	< 0.01***	1.89	0.17
*	Total	1.11	13.32	2.40	< 0.01***	3.28	0.07*

Notes: Expectation changing dates as identified in Section 4.4, and their sum, are marked with an "∗" in the first column

limited number of German financial institutions and may suffer from liquidity constraints.

Results against other/no indices

Tables VI and VII in this section summarize results obtained with the DS EU Banking 5Y CDS Index in (4.1) and without the inclusion of a reference index, respectively. These approaches, while differing in details, confirm the conclusions, and show somewhat stronger results.

Duration weighted market index incl. German banks: The first test of the results is against the broad European banking index DS EU Banking 5Y CDS Index for 5 year senior CDS. The index is a duration weighted index of a broad range of CDS for European financial institutions. Table VI shows that results in general are consistent with the base case approach in Section 4.6.2. Due to the different index weights of individual CDS, results are not weaker as would be expected when just adding German financial institutions to the asset-weighted index.

While the measured cumulative effect over all event days with 27.68bp is considerably stronger than in in Section 4.6.2, the effect measured on only the important event dates of 14.40bp is in the same range. One can also observe that the distribution of effects over event dates is similar, with especially strong effects on May 5th, Nov 26th and Dec 17th.

No reference index: The second test of the results is a test without the inclusion of a reference index. This means that the second term on the right side of (4.1) is left out and no market adjustment is made. Results without market adjustment are expected to be stronger, especially if the debate about the German Bank Restructuring Act has influenced CDS of non-German financial institutions in the same way as German financial institutions.

Table VII shows the regression results. Again results are in line with the base case in Section 4.6.2, but results are considerably stronger. The overall effect on important event dates with 27.34bp is double the size as in the base case, results over all event dates are even stronger. Also, significance levels of all results are stronger. The distribution of effects of event dates is identical to the base case, with significant effects on May 5th, Nov 26th and Dec 17th.

In a nutshell results from the two test cases of a broad market index and without the use of an index are in line with the base case results above. The discussion on the German Bank Restructuring Act lead to significant reactions in CDS spreads both summarized over all event dates and on important individual event dates.

Hypothesis 2a: Decreasing share price

This section describes the event study results on share prices for the German Bank Restructuring Act. Using the model as described in Section 4.5.3 abnormal returns are estimated.

As can be seen in Table VIII, the abnormal returns for the German Bank Restructuring Act have a negative sign on most event dates as expected by theory, indicating a negative effect on share prices. Especially, five of the six event dates

Table VI: Impact of Restructuring Act on CDS spreads - *Duration weighted market index incl. German banks*

	Event Day	AR [bp]	CAAR [bp]	HT 1/2 F-value	HT 1/2 Pr(>F)	HT 3/4 F-value	HT 3/4 Pr(>F)
∗	02/27/10	−0.05	−0.09	0.33	0.94	0.00	0.98
∗	03/18/10	−0.02	−0.03	0.14	1.00	0.00	0.99
∗	03/25/10	0.51	1.02	0.19	0.99	0.08	0.77
	03/31/10	−0.36	−0.72	0.80	0.59	0.04	0.84
	05/05/10	2.09	4.18	6.55	$< 0.01^{***}$	1.40	0.24
	06/28/10	−0.47	−0.94	0.47	0.86	0.07	0.79
	08/25/10	4.11	8.22	1.25	0.27	5.44	0.02**
	10/28/10	1.27	2.54	0.35	0.93	0.52	0.47
∗	11/11/10	0.78	1.55	0.22	0.98	0.19	0.66
∗	11/26/10	3.44	6.89	8.07	$< 0.01^{***}$	3.81	0.05*
∗	12/17/10	2.53	5.05	4.48	$< 0.01^{***}$	2.05	0.15
	Total	1.26	27.68	2.07	$< 0.01^{***}$	5.55	0.02**
∗	Total	1.20	14.40	2.24	$< 0.01^{***}$	2.94	0.09*

Notes: Reference index DS EU Banking 5Y CDS including German bank CDS; expectation changing dates as identified in Section 4.4, and their sum, are marked with an "∗" in the first column

Table VII: Impact of Restructuring Act on CDS spreads - *No reference index*

	Event Day	AR [bp]	CAAR [bp]	HT 1/2 F-value	HT 1/2 Pr(>F)	HT 3/4 F-value	HT 3/4 Pr(>F)
∗	02/27/10	−2.06	−4.12	0.35	0.93	0.78	0.38
∗	03/18/10	0.58	1.16	0.15	0.99	0.12	0.72
∗	03/25/10	0.53	1.06	0.17	0.99	0.05	0.82
	03/31/10	−0.21	−0.41	0.77	0.61	0.01	0.93
	05/05/10	10.86	21.73	7.42	$< 0.01^{***}$	21.69	$< 0.01^{***}$
	06/28/10	0.99	1.98	0.77	0.61	0.18	0.67
	08/25/10	0.59	1.17	0.33	0.94	0.06	0.80
	10/28/10	1.75	3.51	0.59	0.76	0.57	0.45
∗	11/11/10	1.10	2.19	0.19	0.99	0.22	0.64
∗	11/26/10	7.58	15.17	13.52	$< 0.01^{***}$	10.57	$< 0.01^{***}$
∗	12/17/10	5.94	11.88	4.85	$< 0.01^{***}$	6.48	0.01**
	Total	2.51	55.32	2.64	$< 0.01^{***}$	12.68	$< 0.01^{***}$
∗	Total	2.28	27.34	3.21	$< 0.01^{***}$	6.06	0.01**

Notes: No reference index included; expectation changing dates as identified in Section 4.4, and their sum, are marked with an "∗" in the first column

Table VIII: Impact of Restructuring Act on share prices

	Event Day	AR [%]	CAAR [%]	HT 1/2 F-value	HT 1/2 Pr(>F)	HT 3/4 F-value	HT 3/4 Pr(>F)
*	02/27/10	0.32	0.64	0.35	0.93	0.23	0.63
*	03/18/10	−0.23	−0.46	0.16	0.99	0.24	0.63
*	03/25/10	−0.01	−0.02	0.37	0.92	0.00	0.99
	03/31/10	−0.19	−0.38	0.14	1.00	0.08	0.77
	05/05/10	−0.19	−0.38	0.33	0.94	0.08	0.78
	06/28/10	0.40	0.80	0.29	0.96	0.35	0.56
	08/25/10	−0.49	−0.98	0.16	0.99	0.53	0.47
	10/28/10	0.31	0.62	0.25	0.97	0.21	0.64
*	11/11/10	−0.22	−0.44	0.25	0.97	0.10	0.75
*	11/26/10	−0.43	−0.86	0.24	0.98	0.40	0.53
*	12/17/10	−0.08	−0.16	0.10	1.00	0.02	0.90
	Total	−0.07	−1.62	0.24	1.00	0.13	0.72
*	Total	−0.11	−1.28	0.25	1.00	0.16	0.69

Notes: Expectation changing dates as identified in Section 4.4, and their sum, are marked with an "∗" in the first column

rated as important have a negative effect, with the first date probably being influenced by changing expectations on a Greek rescue package. The total cumulative abnormal return during all eleven event windows (HT 3) amounts to −1.62%, with a total of −1.28% on event dates rated important. This effect is somewhat higher than the 30bp drop in RoE estimated by Kaserer (2010a) as a result of the bank levy only.

Nonetheless, the effects found are not statistically significant, neither on individual event dates nor jointly. HT 1 of all abnormal returns being zero obtains an *F*-value of 0.24 and thus cannot be rejected at any significance level. Similarly, HT 2 and 4 for returns being zero on individual event dates cannot be rejected.

Table VIII shows that significance levels on HT 1 and 2 are almost always smaller than on HT 3 and 4, meaning that the effects on share prices are usually in the same direction across banks. The results reported here, as in this whole section, are robust against the use of other indices[41], and different choices of event window length.

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[41]Especially STOXX Europe 600 Banks including Germany and German CDAX

Table IX: Impact of Restructuring Act on bank market risk (β)

Timeframe	Index	β	$\Delta\beta$ (vs. 2009)[1]	t-value	Pr(>|t|)
2009 (2nd half)	STOXX	1.12			
	CDAX	1.41			
2010	STOXX	0.75	-0.37	-5.1	< 0.01***
	CDAX	1.14	-0.28	-2.3	0.02**
2011 (1st half)	STOXX	0.73	-0.39	-3.9	< 0.01***
	CDAX	0.86	-0.55	-4.3	< 0.01***

[1] $\Delta\beta$ equals δ_1 and $\delta_1 + \delta_2$ in (4.3) for 2010 and 2011 respectively

Notes: Change of β for an index of German banks vs. STOXX Europe 600 Banks ex. Germany and German CDAX index

Significance levels in the above analyses are higher in the case of CDS spreads than for share prices, indicating a stronger effect on debt holders than on equity holders.

Hypothesis 2b: Decreasing market β

In this section the effect on company market risk is evaluated, measured by the parameter β in the market model. A decline in market risk is generally predicted by the economic theory of regulation.[42] It also reflects the fact that one of the goals of banking regulation is to impose higher cost on risky business models, thus creating an incentive for reducing financial institutions' business risk. Nonetheless, due to the extended period used for the measurement of β, considerable pollution by other events during the financial crisis cannot be excluded.

A significant decline of $\Delta\beta = -0.39$ is found for an equal weighted index of German financial institutions[43] during the regulatory period, which is statistically significant to the 1%-level. Similar results can be obtained using the German CDAX index as a market reference. Table IX shows the variation of the β coefficient over time.

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[42] For a brief discussion on the economic theory of regulation see Lamdin (2001)

[43] Measured against a portfolio of European banks ex. Germany

From the evolution of the financial crisis I suppose that the effect on β is not due to the respective restructuring legislation. It is well imaginable that the decrease between 2009 and 2011 is due to the improving economic situation especially in Germany and for the banking sector throughout 2010 with respect to many other European countries. Effects on market β due to singular regulatory events are supposedly not measurable in times of economic crises.

4.6.2 UK Banking Act 2009

I now turn to the discussion of the effects of the UK Banking Act 2009 on UK bank CDS spreads and share prices.

Hypothesis 1: Increased bank credit risk and rising CDS spreads

The hypothesis of rising credit risk, and hence rising interest rates, is once again tested on CDS spread data. As above, in case credit risks for banks have risen since the implicit bail-out guarantee by the state is no longer credible, bank CDS spreads should have risen significantly. Again an unpolluted, asset-weighted CDS reference index excluding UK financial institutions is considered first, and subsequently test results using a standard industry reference index including UK financial institutions, and no reference index are presented.

Results against an unpolluted, asset-weighted index

In case of the UK Banking Act 2009 results are less clear than for the German Bank Restructuring Act. Summarized over all event dates an increase in CDS spreads of 2.52bp is found, albeit statistically insignificant. On expectation-changing dates, the spread change amounts to a slightly higher, but still insignificant, 5.34bp. HT 3 and 4 can therefore not be rejected for the Banking Act, as measured effects are too small, and none of the event dates features significant results. HT 1 and 2 cannot be rejected either. I conclude that the Banking Act did not have a major effect on the UK banking system. Once again, nonetheless, the absence of results may possibly also be attributed to extreme noise in the returns of UK financial institutions during the years of the financial crisis, making

Table X: Impact of Banking Act on CDS spreads

	Event Day	AR [bp]	CAAR [bp]	HT 1/2 F-value	HT 1/2 Pr(>F)	HT 3/4 F-value	HT 3/4 Pr(>F)
*	10/11/07	−0.23	−0.46	0.01	1.00	0.01	0.92
*	01/04/08	1.43	2.68	0.36	0.92	0.41	0.52
	01/26/08	−0.23	−0.46	0.08	1.00	0.01	0.92
*	01/30/08	0.91	1.82	0.21	0.98	0.16	0.69
*	02/17/08	1.69	3.38	0.95	0.47	0.84	0.36
*	06/19/08	0.71	1.42	0.14	0.99	0.10	0.75
	07/01/08	−0.91	−1.82	0.36	0.93	0.16	0.68
*	07/22/08	−0.93	−1.86	0.33	0.94	0.17	0.68
	12/17/08	−1.18	−2.36	0.92	0.49	0.27	0.60
	Total	0.14	2.52	0.37	1.00	0.03	0.85
*	Total	0.45	5.34	0.33	1.00	0.44	0.51

Notes: Expectation changing dates as identified in Section 4.4, and their sum, are marked with an "∗" in the first column

relatively small shifts in bank valuations due to the Banking Act indetectable. Results for the UK Banking Act 2009 are given in Table X.

As above results are checked against other possible market models.

Results against other/no indices

Tables XI and XII show similar results obtained with the DS EU Banking 5Y CDS Index in (4.1) and without a market index.

Duration weighted market index incl. UK banks: Results against a duration weighted market index including UK financial institutions broadly confirms the above results. Over all event dates a considerably larger increase in CDS spreads of 19.60bp is found, albeit still statistically insignificant. On expectation-changing dates, the spread change amounts to insignificant −0.88bp. HT 3 can therefore not be rejected for the Banking Act, as measured effects are too small, HT 4 can only be rejected for the last event date.

The bulk of the total increase on CDS spreads stems from the last event date, Dec 17th. HT 1 and 2 therefore cannot be rejected either, except for the case of Dec 17th. I tend to attribute this, however, to general fears among UK banks

during the financial crisis rather than effects from newly introduced regulation. Results for the regression on the duration weighted market index are given in Table XI.

No reference index: The second test, once again, is performed without the use of a reference index and displayed in Table XII. While the result for the sum of all event dates is quite similar to the result using a duration weighted market index including UK banks, results for the most important event dates are quite different to the results with either of the two reference indices. Differences between regressions with and without reference indices show that the effects stem from the reference index rather than from the sample companies. It still is a valid result as it means that the sample companies suffered an effect that compensated for the move in the market index. Large differences occur on the two event dates Feb 17th and Dec 17th, driven by large shifts in the broad European index. Within the noisy data, on the last event date, Dec 17th, the index sharply drops for two consecutive days by a total of 32bp. Overall, no significant results are found in this analysis.

In a nutshell results from the two test cases of a broad market index and without the use of an index are in line with the base case results. The discussion on the German Bank Restructuring Act lead to largely insignificant reactions in CDS spreads both summarized over all event dates and on important individual event dates. As can be observed in the market index, CDS spreads were extreme volatile during the study period due to financial crisis, complicating the identification of significant CDS spread reactions.

Hypothesis 2a: Decreasing share price

A similar picture can be seen in the case of share prices with results given in Table XIII. Most of the tests HT 1 to HT 4 cannot be rejected at any reasonable significance level. An exception make HT 2 and 4 on event day Dec 17th, being highly statistically significant. This is due to strong effects on different banks' stocks on this date. As in case of CDS spreads, however, this effect can likely not

Table XI: Impact of Banking Act on CDS spreads - *Duration weighted market index incl. UK banks*

	Event Day	AR [bp]	CAAR [bp]	HT 1/2 F-value	HT 1/2 Pr(>F)	HT 3/4 F-value	HT 3/4 Pr(>F)
*	10/11/07	−0.22	−0.43	0.01	1.00	0.00	0.96
*	01/04/08	1.27	2.53	0.22	0.98	0.11	0.75
	01/26/08	−3.61	−7.22	0.22	0.98	0.86	0.35
*	01/30/08	2.29	4.59	0.26	0.97	0.35	0.56
*	02/17/08	−0.49	−0.99	0.86	0.54	0.02	0.88
*	06/19/08	−0.38	−0.76	0.17	0.99	0.1	0.92
	07/01/08	0.40	0.80	0.13	1.00	0.01	0.92
*	07/22/08	−3.31	−6.63	0.31	0.95	0.72	0.40
	12/17/08	13.85	27.70	3.45	< 0.01***	12.61	< 0.01***
	Total	1.09	19.60	0.63	0.99	0.70	0.40
*	Total	−0.06	−0.88	0.31	1.00	0.01	0.93

Notes: Reference index DS EU Banking 5Y CDS Index including UK bank CDS; expectation changing dates as identified in Section 4.4, and their sum, are marked with an "∗" in the first column

Table XII: Impact of Banking Act on CDS spreads - *No reference index*

	Event Day	AR [bp]	CAAR [bp]	HT 1/2 F-value	HT 1/2 Pr(>F)	HT 3/4 F-value	HT 3/4 Pr(>F)
*	10/11/07	−0.82	−1.63	0.02	1.00	0.02	0.88
*	01/04/08	2.96	5.93	0.30	0.96	0.30	0.58
	01/26/07	−1.14	−2.27	0.08	1.00	0.04	0.83
*	01/30/07	3.61	7.21	0.33	0.94	0.45	0.50
*	02/17/07	6.70	13.40	1.46	0.18	2.32	0.13
*	06/19/08	4.71	9.43	0.24	0.98	0.77	0.38
	07/01/08	1.57	3.14	0.14	1.00	0.09	0.77
*	07/22/08	−4.92	−9.84	0.34	0.94	0.84	0.36
	12/17/08	−2.28	−4.56	0.91	0.50	0.18	0.67
	Total	1.16	20.80	0.42	1.00	0.41	0.52
*	Total	1.97	27.63	0.45	1.00	0.89	0.35

Notes: No reference index included; expectation changing dates as identified in Section 4.4, and their sum, are marked with an "∗" in the first column

Table XIII: Impact of Banking Act on share prices

	Event Day	AR [%]	CAAR [%]	HT 1/2 F-value	HT 1/2 Pr(>F)	HT 3/4 F-value	HT 3/4 Pr(>F)
*	10/11/07	−0.28	−0.57	0.04	1.00	0.06	0.80
*	01/04/08	−0.02	−0.05	0.29	0.96	0.00	0.98
	01/26/08	−0.46	−0.92	0.14	0.99	0.17	0.68
*	01/30/08	−0.06	−0.12	0.35	0.93	0.00	0.96
*	02/17/08	0.98	1.97	1.25	0.27	1.16	0.28
*	06/19/08	0.09	0.17	0.13	1.00	0.01	0.94
	07/01/08	−0.53	−1.06	0.19	0.99	0.22	0.64
*	07/22/08	1.54	3.08	0.42	0.89	1.88	0.17
	12/17/08	−3.79	−7.57	10.81	< 0.01***	11.42	< 0.01***
	Total	−0.28	−5.07	1.52	< 0.01***	0.57	0.45
*	Total	0.37	4.48	0.42	1.00	0.69	0.41

Notes: Expectation changing dates as identified in Section 4.4, and their sum, are marked with an "∗" in the first column

be attributed to the Banking Act, as no relevant new information is disclosed on this day and fears among UK banks during the financial crisis strongly influenced share prices.

In case of the Banking Act, the overall result is negative on all event dates with a decrease of −5.07%, and slightly positive on important event dates with an increase of 4.48% (HT 3). Nonetheless, this effect is not statistically significant and may well be due to other crisis-related effects.

The results reported here, as in this whole section, are robust against the use of other indices[44], and different choices of event window length.

Hypothesis 2b: Decreasing market β

For the UK Banking Act 2009 an increase in market risk by $\Delta\beta = +0.35$ is found as shown in Table XIV. This effect cannot be explained by the economic theory of regulation. Nonetheless, it is imaginable that an increase in market β from 2007 to 2009 might be driven by generally adverse market conditions that especially

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[44]Especially German CDAX and British FTSE

Table XIV: Impact of Banking Act on bank market risk (β)

Timeframe	β	$\Delta\beta$ (vs. 2007)	t-value	Pr($>$|t|)
2007 (2nd half)	0.96			
2008	1.00	0.04	0.6	0.55
2009 (1st half)	1.35	0.35	2.5	0.01**

Notes: Change of β for an index of British banks vs. STOXX Europe 600 Banks index

affected financial institutions.

From the evolution of the financial crisis I suppose that none of the two effects on β is due to the respective restructuring legislation. It is well imaginable that the increase in the UK between 2007 and 2009 is due to the intensifying disturbances of the financial markets, with strongest effects especially in the UK, while the decrease in Germany between 2009 and 2011 is due to the improving economic situation especially in Germany throughout 2010 with respect to many other European countries. Effects on market β due to singular regulatory events are supposedly not measurable in times of economic crises.

4.7 Conclusions: Effective banking regulation?

The effects of the German Bank Restructuring Act and the UK Banking Act 2009 on investor wealth are examined in this study. CDS spreads and share prices are studied using a Multivariate Regression Model which is estimated with a SUR methodology. Samples are built from German and UK financial institutions' securities.

Main results are:

- A statistically significant and robust increase in CDS spreads over the event period can be found in case of the German Bank Restructuring Act, result-

ing from the withdrawal of implicit state guarantees against bank failure through the definition of a restructuring process.

- Effects on share prices from the Restructuring Act point in the expected direction, but are not statistically significant.

- The fact that stronger effects can be measured in the case of CDS spreads than on share prices indicates larger effects on debt than on equity holders. This is primarily due to the additional rights regulatory authorities obtain towards bank creditors and in line with prior literature.

- For the Banking Act no significant effect can be found, while volatility in both CDS spreads and share prices is large due to the financial crisis. This may mean that possible effects are drowned in noise.

- The evaluation of market risk does not yield meaningful results as general crisis-related effects seem to dominate effects from the introduction of single regulation.

In a nutshell, the German Bank Restructuring Act as well as the UK Banking Act 2009 had limited effect on the German and British banking landscape. As far as these effects are due to a reduction of the implicit bail-out guarantees, they are a desirable outcome from regulation.

I also conclude that the use of event study methodology lacks strength in detecting market reactions in times of financial crises. This is especially due to high volatility and a high number of confounding events. The wide absence of strong and statistically significant results may be due to this lack of power.

5 Synergy disclosure in M&A: Evaluation of regulation need

5.1 Introduction

Managerial information disclosure affects investors' perception of a company's value and thus has the potential to influence stock prices. Assuming that a manager is concerned about his company's stock price, he will make the decision on the disclosure of private information dependent on the stock price impact he expects. This chapter investigates the managerial decision on the disclosure of private synergy information in an M&A deal.[1] In particular it studies the drivers for managers to publicly release information on expected synergies, investors' perception of the credibility of this information and the effect on investor uncertainty regarding the value of the merged company. Based on these results the necessity for additional disclosure regulation in the case of M&A is discussed.

Mergers and acquisitions are, under normal conditions, by far the largest investments companies perform and have been a subject of extensive research. Nonetheless, and in spite of their size, it is still not entirely clear if and under what conditions mergers are value creating or value destroying. While generally low but significantly positive combined abnormal returns are reported for M&A (e.g., Betton, Eckbo & Thorburn, 2008), estimates for value destroying deals reach from 30% (Bruner, 2002; 2005) up to 70% (Jansen, 2002). A rich body of literature has emerged on the question of stock price reactions to mergers, typically divided into short-run effects around the announcement date and long-run

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[1]The terms "Mergers and acquisitions" ("M&A"), "mergers" and "deals" will be used synonymously in this work

effects following the announcement date. In this literature the results for the short-term announcement event window cumulative abnormal returns (CARs) seem to be quite well established. There is a broad consensus that short-run CARs for acquisition targets are significantly positive, a fact that is not surprising regarding the considerable premiums typically paid to target shareholders in an M&A transaction (e.g., Agrawal & Jaffe, 2001). Returns for acquirers have been reported to be statistically indistinguishable from zero (e.g., Roll, 1986) or even significantly negative (e.g., Betton et al., 2008).[2] On the other hand, results for long-run post-announcement returns are not so clear (e.g., Dutta & Jog, 2009), with ongoing discussion on the robustness of results and results depending on the method of measurement (e.g., Loughran & Ritter, 2000).

The most common argument for the execution of an M&A deal is the creation of value for the acquiring company's shareholders (Tuch & O'Sullivan, 2007). While there are different possible sources of value creation, synergies of different kinds, e.g., cost synergies or market share synergies, frequently play an important role. Having identified potential synergies in the acquisition process, acquirer management has to take the decision whether or not to disclose this synergy information to shareholders and capital markets, signaling a sound deal rationale and positive effect on company value to the different stakeholders in the merger. While market evidence suggests that synergy announcements become increasingly important, or at least frequent, in M&A (e.g., Dutordoir, Roosenboom & Vasconcelos, 2010), little is still known about the drivers for and the impact of such announcements.

An ample body of literature exists around the topic of corporate information disclosure, both non-voluntary and voluntary. Non-voluntary information disclosure is present primarily in the accounting context with the obligation to follow certain information disclosure standards. Voluntary disclosure is frequently found in connection with forward-looking statements, i.e., statements concerning future

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[2]See, e.g., Betton et al. (2008), Meglio & Risberg (2011) and Hutzschenreuter, Kleindienst & Schmitt (2012) for an overview of recent literature. Betton et al. (2008) provide a review of recent, large sample studies that explicitly provide estimates of abnormal returns. They reach the conclusion that average target CARs are positive and significant, while largest CARs appear in all-cash offers amounting to 28%. Combined CARs are on average positive and significant at a level of 1.06%, while bidder CARs are around 0.73% with negative and significant z-statistic and a negative median

earnings. Synergy disclosure in the case of M&A is an example for voluntary information disclosure.

I develop hypotheses on the following three sets of research questions around the announcement of synergies in this work.

(1) *Drivers for the disclosure decision:* The driving forces in a merger that lead management to disclose additional information in the form of synergy forecasts

(2) *Investor credibility and announcement window returns:* The credibility of synergy announcements to investors and financial intermediaries, and the connected short term stock price reaction to the additional information provided by management

(3) *Investor uncertainty and post-announcement returns:* The uncertainty of investors as to the value of the combined company and the connected post-announcement medium-term stock price reaction

Concerning (1) we put forward the hypothesis that larger information asymmetry increases the inclination of a manager to disclose (Verrecchia, 2001). Larger information asymmetry between management and investors makes the information known to the manager more important. Thus, investors, absent disclosure assuming the worst possible outcome, will pose larger discounts on the company's stock price. We further predict that the inclination of managers to disclose synergy information is greater when the information is favorable than when it is unfavorable. Under (2) we develop the hypothesis that the information is at least partly credible to investors, and therefore expect a positive stock price effect in case of information disclosure, while non-disclosure negatively influences stock price. With regards to (3) I propose that investor uncertainty as to the value of the combined entity after the merger leads to increased stock returns expected by investors, and to positive abnormal returns in the medium run after the announcement as uncertainty is gradually decreasing. The disclosure of additional information at the time of the merger leads to reduced medium-term stock price reactions. Variables that are positively connected to investor uncertainty lead to increased expected returns.

The hypotheses on (1) and (2) are based on disclosure models by Dye (1985) and Verrecchia (1983).[3] Contrary to the disclosure principle[4] these models predict that managers confronted with the decision to disclose private information that influences company value will disclose information that is favorable for the stock price and will withhold information that is unfavorable to the stock price. The models predict that if the firm value implied in the information is above the current firm value as represented by stock prices, the manager will disclose, otherwise he will withhold the information.[5] Hypotheses on (3) are based on the uncertain information hypothesis developed by Brown, Harlow & Tinic (1988). We interpret the post-announcement stock price pattern as a rebound of the acquirer stock price drop during the announcement window. Information on a merger entering the market increases investor uncertainty regarding the valuation of the acquiring company. This increased risk can be observed in increased values of acquirer β in the post-announcement period. Investors revise downward acquirer stock prices during the announcement window and subsequently demand higher expected returns for acquirer company stocks. The price pattern superficially looks like a negative overreaction to the merger announcement. Unlike in the underreaction case, however, post-announcement returns to positive news, i.e., positive announcement window CARs, are also positive. The hypotheses are derived in more detail in Section 5.4.

To test the above hypotheses I analyze an international sample of large M&A deals that do or do not comprise a synergy forecast on or around the day of deal announcement. The dataset contains hand-collected information about the existence and the size of a synergy announcement, e.g., in a press release or analyst conference. The existence of a synergy announcement is studied in connection with important deal characteristics, short-term announcement window returns and medium-term post-announcement returns for acquirer stock prices,

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[3]For a more comprehensive review of disclosure literature see Verrecchia (2001) and Dye (2001)

[4]The disclosure principle states that, given that investors know about the existence of new information, a manager will always disclose even if the information is unfavorable to the stock price as otherwise investors will discount assets to a point where it becomes favorable for the manager to disclose; these models are called "full-disclosure models"

[5]The current stock price thus constitutes a threshold for information disclosure, which is why these models are frequently referred to as "threshold models"

i.e., acquirer stock price movements in a period of 3 up to 6 months after the merger announcement beginning 4 days after the announcement.[6] To my knowledge, medium-term post-announcement returns have not been studied intensively in the M&A literature, and no medium-term stock price effect has been documented.

I am able to show that the probability for a synergy disclosure is higher in more complex deals, where information asymmetry between managers and investors is higher. It is also shown that the inclination to disclose synergy information is higher in settings where higher synergy values are expected. Thirdly, a strong and positive stock price reaction of 5.6% on the combined cumulative abnormal return and 4.7% on the acquirer abnormal return is measured in case of disclosure relative to the non-disclosure case, suggesting that the release of positive information is credible to investors. Nonetheless, credibility is not entirely given as an USD 1 increase in the present value of announced synergies is only reflected by a company value reaction of less than USD 1. I further document that additional information disclosure, measured in the form of the voluntary announcement of quantifiable synergy estimates for the merger, reduces the "negative overreaction" or rebound effect. For the subsample that exhibits synergy disclosures, the post-announcement stock price reaction is insignificant. This is compatible with studies by, e.g., Dutordoir et al. (2010) and Kimbrough & Louis (2011), who document a significant positive stock price reaction to the disclosure of additional synergy information during the announcement window. An effect in line with these studies is also found in this paper. As a further result I document that variables that are connected to information availability and investor uncertainty, such as stock price volatility prior to the merger announcement, the number of analysts following the acquirer stock and the economic importance of the deal to acquirer shareholders, influence the size of the "negative overreaction" and subsequent rebound. One observes that values in these parameters indicating towards higher investor uncertainty lead to larger stock price rebounds than in the case of reduced investor uncertainty. While in the sample for this study acquirer announcement window returns are significantly negative, I document statistically and economically significant positive acquirer stock price reactions in a period

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[6]Longer periods of up to 36 months are considered, but are not the primary focus

of 3 to 6 months after the merger announcement beginning 4 days after the announcement. The effect is especially pronounced for deals that are perceived negatively by investors and therefore earn negative announcement window cumulative abnormal returns. While potentially irrational investor behavior has been documented in cases of corporate events such as share repurchases, initial public offerings (IPOs) and seasoned equity offerings (SEOs), among others (Kadiyala & Rau, 2004), medium-term reactions to M&A announcements have not been a focus of attention in this literature up to now. In the context of the uncertain information hypothesis the stock price rebound after a merger is not interpreted as being irrational.

As a conclusion of this chapter, further regulation on disclosure does not seem to be advisable. While stock price reactions show that synergy announcements are informative to investors, management decides on synergy disclosure weighing the connected costs and benefits. There is no indication that regulation would produce an amount of information more favorable to the general public including security investors.

The remainder of this chapter is structured as follows: Section 5.2 sheds some light on disclosure and disclosure regulation and Section 5.3 presents current literature on value creation in M&A, especially in connection with synergy disclosure. Section 5.4 derives the hypotheses in the context of relevant literature. Section 5.5 lays out the methodology employed for the measurement of M&A performance and the calculation of present values for synergy forecasts. In Section 5.6 results are presented, and Section 5.7 concludes.

5.2 Disclosure and disclosure regulation

This section is largely directed along reviews of the corporate disclosure literature by Healy & Palepu (2001) and Leuz & Wysocki (2008). Corporate disclosure is the main means to provide company information to capital markets, and is,

according to Healy & Palepu (2001), "critical for the functioning of an efficient capital market"[7]. It is mainly directed towards investors and focused on financial disclosure.

Financial reporting needs are created by "information asymmetry and agency conflicts between managers and outside investors"[7], which will be reviewed in somewhat more detail later. As we will see, a company has a self-interest to disclose value relevant information to investors as investors will otherwise impose a discount on stock prices in order to secure themselves against unknown negative information. In this process, the credibility of disclosures can be enhanced by different agents. These are regulatory agencies, who provide minimum standards for disclosure and the necessary legal framework to pursue misreporting, standard setters, especially in new fields where no legal frameworks exist, auditors and other capital market agents (ibid).

Corporate disclosure comes in different forms. Healy & Palepu (2001) summarize that ...

> "... firms provide disclosure through regulated financial reports, including the financial statements, footnotes, management discussion and analysis, and other regulatory filings. In addition, some firms engage in voluntary communication, such as management forecasts, analysts' presentations and conference calls, press releases, internet sites, and other corporate reports. Finally, there are disclosures about firms by information intermediaries, such as financial analysts, industry experts, and the financial press."[7]

At the top level, corporate disclosure can be divided into mandatory disclosure required by regulation and voluntary disclosures which is at managers' discretion. Mandatory disclosure differs between countries and includes, e.g., quarterly reports for listed companies. In the US, standard setting and monitoring of mandatory disclosure is performed by the SEC. Voluntary disclosure depends on managerial decisions to disclose and can vary across companies. It is well documented that voluntary disclosure is "associated with stock performance, bid-ask

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[7]Healy & Palepu (2001, pp. 405-405)

spreads, cost of capital, analyst coverage and institutional ownership"[8], and includes, as a prominent example, forecasts on earnings per shares (EPS). Although there exists only very limited regulation as to the contents of voluntary disclosure[9], research suggests that it is seen as informative by investors. I will review mandatory and voluntary disclosure in more detail below.

5.2.1   Corporate disclosure and the capital market

Efficient capital allocation is at the heart of any capitalistic society. Methods and means that make capital allocation more effective or mitigate capital allocation problems increase the wealth of society. There are two problems in the capital allocation relationship between investors and entrepreneurs that are mitigated by corporate disclosure: the information problem and the agency problem.

Information problem

To properly allocate capital it is important for the investor to distinguish "good" from "bad" companies. A priori an investor has very limited information about a company. Managers of bad companies, seeking for funds, will claim to perform as good as the good companies. Investors, absent corporate disclosure, cannot decide on the value of a company or business idea and are forced to value all ideas equally. This leads to misvaluation of both good and bad business models and therefore inadequate capital allocation. Regulated corporate disclosure can, at least in part, mitigate this information asymmetry problem. There may be, however, additional private information managers are not obliged to disclose. This residual private information can then lead to, at least temporary, misvaluation.[10] According to Grossman & Hart (1980), Grossman (1981), Milgrom (1981), and absent disclosure cost, this should lead to full disclosure as investors rationally

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[8]Healy & Palepu (2001, pp. 407)

[9]E.g., that information has to be provided to all market participants at the same time in order to ensure a "level playing field" (RegFD)

[10]We will see an example of this in the study on synergy disclosure in M&A together with the question if this information should be required by regulators

infer from non-disclosure that stock valuation is above real firm value and prices are corrected downward.

Agency problem

Once investors' capital is invested in a company, self-interested managers are incentivized and potentially have the means to redirect capital to alternative uses, e.g., to increase personal wealth through excessive compensation. Investors typically are not able to control corporate actions sufficiently to be able to prevent management from doing so. Disclosure can limit or eliminate the agency problem as investors and financial intermediaries gain additional insight on corporate actions and are able to more closely monitor if management has managed funds in line with investors' interests.

5.2.2 Mandatory disclosure and regulation

As seen above, disclosure is important for the proper functioning of financial markets. Disclosure regulation sets minimum standards for corporate disclosure that are monitored by the regulator, e.g., the SEC in the US.

There is an ongoing discussion on the motivation for, the need for and effectiveness of regulation. Voluntary disclosure has been shown in the literature to be beneficial to disclosing firms. This, however, is not per se an argument for disclosure regulation as firms, provided functioning markets and rationally trading off costs and benefits of disclosure, should come to the decision to disclose in case benefits outweigh costs (e.g., Ross, 1979). From this argument it is therefore unclear if, and to what extent, regulation is needed (Leuz & Wysocki, 2008). As this is based on properly functioning markets, researchers have concentrated on market imperfections as justification for disclosure regulation.

Apart from company-specific effects there are market-wide effects of corporate disclosure. These effects may provide a rationale for regulation as benefits for society are not taken into account in a company's decision making on disclosure. One possible market imperfection stems from the fact that, while all actual and

potential investors profit from a company's financial reporting, only current investors implicitly bear the cost attached (e.g., Leftwich, 1980). In this case firms, who only regard private benefits, may come to a decision suboptimal for society, leading to underproduction of information.

According to the above-mentioned models of full disclosure, stating that companies in equilibrium should disclose available information as, absent disclosure, investors will correct downward stock prices, and absent market externalities, disclosure regulation should not be necessary. According to Leuz & Wysocki (2008), ...

> "... an economic justification of mandatory disclosure has to show that a market solution is unlikely to produce a socially desirable level of disclosure, ..."[11]

... which through regulation can be produced. Merely showing that the absence of regulation produces sub-optimal results, without the qualification that these results can be produced by regulation, does not, however, imply any need for regulation. According to the authors there are different reasons that are frequently brought forward in the literature as a justification for regulation, which are ...

> "... the existence of externalities, market-wide cost savings from regulation, strict sanctions that are difficult to produce privately and dead-weight costs from fraud and agency conflicts that could be mitigated by disclosure."[11]

These justifications are briefly reviewed along Leuz & Wysocki (2008). The externalities argument states that corporate disclosure produces different externalities leading to potential over- or underproduction of corporate information. To mitigate this misallocation of resources a regulator can step in to assure the production of the socially optimal value of corporate disclosure. It is, however, not clear a priori and thus a matter of empirical research, if regulation better than market forces succeeds in doing so. It seems very difficult for regulators to determine the optimal level of disclosure given that corporate disclosure produces positive and negative externalities of different kinds. Market externalities include information

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[11]Leuz & Wysocki (2008, pp. 15-16)

sharing effects between industries (not necessarily competitors), e.g., concerning market trends and best practices. One practical example is the common practice of benchmarking to assess operational performance relative to other companies. The size of these effects seems to be mostly unmeasured. A further example of positive externalities is that investors, through disclosure of one company, may learn about the value of other companies, e.g., by inferring cash-flow patterns and risk.

Market-wide cost savings can be generated as disclosure regulation is a relatively low-cost device to ensure future information supply. Leuz & Wysocki (2008) present the example of an IPO where it is initially rational for the issuing company to promise future information disclosure in order to avoid investors' discounts on stock prices. Once the security is issued, however, it may be rational for the company to not adhere to the promise and thus forgo full disclosure. Regulation can ensure that a minimum standard of disclosure is met at all times and therefore the disclosure promise is credible. Nonetheless, the sole existence of this mechanism is not sufficient as an argument in favor of regulation as companies could provide credibility to their disclosure promise by other means. It has to be shown that regulation is the most cost-efficient means.

Strict sanctions from a regulatory regime can be desirable to reduce agency conflicts between managers and owners of a company. Although investors may be interested in full information disclosure, managers may not be. This may be the case, e.g., where personal careers may be influenced by certain information becoming public. A variety of other examples for a potential agency conflict can be created (ibid.). Legal sanctions in cases of misreporting of information may help mitigate agency conflicts through penalties that may not be available in private contracts.

In a nutshell, the potential positive aspects discussed here are not automatically a justification for regulation. Regulation is difficult to implement, e.g., through capture by incumbent firms, and imposes substantial cost, and it is not a priori clear that the social benefits outweigh the costs or that regulation achieves the goals set. I will come back to these arguments when evaluating synergy disclosure in mergers as a potential case for regulation.

5.2.3 Voluntary disclosure

This section will discuss the economic consequences of voluntary disclosure which is at the discretion of managers. It generally seems to be beneficial to company valuations. There are three important types of economic consequences of voluntary disclosure identified in the literature which will briefly be reviewed along Leuz & Wysocki (2008).

Increased liquidity

Information disclosed voluntarily by companies is subsequently and rapidly reflected in stock price. Investors can thus act on the premise that trading of securities takes place at a fair value. This leads to increased liquidity as investors are more willing to buy and sell company securities. In particular, liquidity increases as less informed investors, in the absence of information, lower the price they are willing to pay for a security reacting to the possibility of trading with a more informed counter-party who is exploiting the information advantage. The decreased willingness to pay leads to increased bid-ask-spreads, and therefore decreased liquidity. The effect works likewise for a less informed selling party. Corporate disclosure in this setting increases liquidity through two effects (ibid.): an increased supply of public information makes it more costly for market agents to acquire additional, incremental information, and thus reduces the risk for an uninformed trader to trade with an informed counter-party. Secondly, increased information supply lowers the uncertainty of company valuations, reducing the advantage of informed traders.

Healy & Palepu (2001) cite ample empirical evidence for this hypothesis, including stock price rises associated with the expansion of voluntary disclosure, similar to what is found in this work.

Reduced cost of capital

Voluntary disclosure reduces information asymmetry. As investors face higher idiosyncratic risk when information asymmetry is higher, i.e., no voluntary disclosure is made, they will demand higher risk premiums on company securities (e.g., Barry & Brown, 1984). This amounts to higher cost of capital. Additionally,

reduced liquidity and higher bid-ask spreads in the non-disclosure case increase capital cost as they increase trading cost for investors. In order to be redeemed for this increased cost investors will demand higher returns on securities (Leuz & Wysocki, 2008). Thirdly, the prospect of increased trading costs may influence prices directly at an initial security offering, thus reducing investors' willingness to pay for the offered security and directly increasing a company's financing cost (e.g., Verrecchia, 2001).

A formal model for this effect is developed by Merton (1987), showing that, if investors do not know about some companies on the market, these companies will be underheld, and therefore require increased returns, directly increasing the cost of capital. Corporate disclosure may be a means to make investors aware of a company, thus increasing the investor base and increasing security prices or lowering required returns respectively. Additional links between disclosure and capital cost, such as estimation risk or the reduction of managerial appropriation, are reviewed by Leuz & Wysocki (2008).

According to Healy & Palepu (2001), there is some empirical evidence showing the extent of voluntary disclosure to be negatively correlated to cost of capital.

Increased information intermediation

Voluntary disclosure reduces information acquisition cost for analysts and therefore increases analyst following and the supply of analyst services. On the other hand, the existence of additional information for investors can make analyst coverage less relevant, reducing demand for analyst services.

Empirical evidence seems to be mixed, with no clear tendency towards one of the two hypotheses.

A more detailed theoretical framework and research hypotheses for the case of synergy disclosure are presented in Section 5.4. A common limitation of studies on voluntary disclosure is imposed by the endogeneity of the disclosure decision and the resulting self-selection bias (Healy & Palepu, 2001). It is frequently difficult to answer the question whether voluntary disclosure leads to certain measurable financial outcomes or if these same financial properties lead to voluntary

disclosure. Therefore one has to carefully control for the self-selection, a task that becomes even more cumbersome through the absence of a clear model for the relationship between disclosure and company performance (ibid.). We will see further details on this issue later in this work.

Cost of disclosure

After having discussed potential benefits of corporate disclosure, I shortly discuss the cost attached along Leuz & Wysocki (2008). The discussion of disclosure cost applies to mandatory and voluntary disclosure alike.

Corporate disclosure always comes at a cost. This cost of disclosure can, at the top level, be divided into direct and indirect cost. Direct cost of disclosure is reflected, e.g., by the external financial expenses of the disclosing company and the opportunity costs of employees involved in the disclosure process. Costs are especially attached to the preparation and distribution of reports, and expenses to financial intermediaries to certify the accuracy and completeness of reports.

Indirect cost of disclosure arises from multiple possible sources. First, information can be used by third parties such as "competitors, labor unions, regulators, tax authorities, etc."[12]. As an example, competitors may be able to deduce details on a company's operations from detailed cost and profitability disclosure. A second source of disclosure cost are potential litigation costs (Healy & Palepu, 2001). These can be present in cases of misreporting of historical figures or in case forward looking statements prove themselves wrong.

Having discussed the benefits and costs of corporate information disclosure, the next section presents relevant literature, especially in the case of voluntary disclosures in response to company events.

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[12]Leuz & Wysocki (2008, p. 10)

5.3 Literature review

In this section recent contributions to the literature of value creation in M&A in general will be reviewed very briefly. Secondly, and more importantly, literature that has been produced on the effects of additional information disclosure in M&A will be summarized.

5.3.1 Value creation in M&A

Much has been written on the topic of M&A and value creation over the past 30 years. Studies typically are divided into short-run effects during an event window of several days around the announcement date and long-run effects during three to five years following the merger announcement date. Apart from a large number of contributions on different individual topics, a wide range of excellent literature reviews exists. I will thus not go into too much detail here and refer to these reviews. To my knowledge, among the most recent literature reviews are Hutzschenreuter et al. (2012) and Meglio & Risberg (2011). The first give a very recent and comprehensive overview, featuring also a structured overview of M&A literature reviews since 1990, including a useful list of explanatory variables for M&A performance used in different review papers. Meglio & Risberg (2011) provide a very recent and structured literature review, especially discussing the meaning of M&A performance. In this literature, the results for the short-term announcement event window CAR seem to be quite well established. There is a broad consensus that short-term abnormal returns for acquisition targets are significantly positive, a fact that is not surprising regarding the considerable premiums typically paid in an M&A transaction (e.g., Agrawal & Jaffe, 2001). Returns for acquirers have been reported to be statistically indistinguishable from zero (e.g., Roll, 1986) or even significantly negative (e.g., Betton et al., 2008). Betton et al. (2008) provide a review of recent, large sample studies that explicitly provide estimates of abnormal returns. They reach the conclusion that average target CARs are positive and significant, while largest CARs appear in all-cash offers amounting to 28%. Combined CARs are on average positive and

significant at a level of 1.06%, while bidder CARs are around 0.73% with negative and significant z-statistic and a negative median.

On the other hand, results for long-run post-announcement returns are not so clear. According to the efficient market hypothesis, post-announcement abnormal returns measured against an adequate reference index should be zero on a risk adjusted basis. Empirical results on this question have evolved over time as have the techniques employed. In a literature review, Agrawal & Jaffe (2001) conclude that "long-run performance is negative following mergers, though performance is non-negative (and perhaps even positive) following tender offers"[13]. Conversely, Fama (1998) finds that overreaction and underreaction to information are roughly equally frequent and results on post-event stock price drifts both positive and negative can be attributed to chance and the use of inadequate methodology, consistent with the efficient market hypothesis. Dutta & Jog (2009) conduct a recent study on long-run abnormal returns and present a comprehensive and recent literature overview. They report insignificant negative long-run returns for acquirers in the post-acquisition period for a sample of Canadian acquiring firms. Martynova & Renneboog (2008) in their recent review article state that the measurement of long-run abnormal returns depends on the method of measurement. They report that more recent articles employing matching firm techniques, measuring the returns against a dynamic benchmark of firms matched by size and book-to-market, exhibit insignificant long-term abnormal returns for cross-sectional samples of acquirer companies. Once the transactions are divided into subsamples along payment method, bid status and type of target firm, however, significant long-run effects can be measured.

5.3.2   Information disclosure in M&A

While a rich body of literature has emerged on the topic of voluntary disclosure in general, relatively little has been written on voluntary information disclosure in the specific case of M&A announcements. Additionally, despite the many contributions on M&A value creation, to my best knowledge, not many studies

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[13]Agrawal & Jaffe (2001, p. 1)

exist that take announced synergies into account as an explanatory variable for abnormal returns. The following sums up what I believe to be the most relevant publications on the topic.

Information disclosure in general is a topic of increasing importance both in the scientific literature as in corporate practice. It has been repeatedly shown in the literature that the voluntary disclosure of information reduces the cost of capital for companies (e.g., Diamond & Verrecchia, 1991; Easley & O'hara, 2004; Lambert, Leuz & Verrecchia, 2007; Francis, Nanda & Olsson, 2008). Specifically for the case of mergers and acquisitions, Sirower & Lipin (2003) point out the importance of voluntary corporate information disclosure stating that ...

> "... well-conceived M&A communications during due diligence can serve as a litmus test for the prospective acquirer in thinking through whether the transaction is a good idea in the first place, and whether it will give investors more reasons to buy than to sell. Second, investors performing their own due diligence use the information contained in press releases, investor presentations, conference calls, and interviews to reach buy and sell decisions in the fast-moving equity markets. Additionally, employees, customers, vendors, and other vital constituencies scrutinize communications materials for signals on how the deal will affect them."[14]

The authors emphasize that merger communications should reduce uncertainty as to what the merger rationale and integration strategy is and has to give direction to employees and the organization. This is especially important as investor initial reactions are highly dependent on investors' confidence in the deal, and occur at the time of the deal announcement where no track record for the merger can still be proven. Sirower & Lipin (2003) point out that in recent studies, ...

> "... [t]hese initial reactions [...] were highly indicative of future returns. In the year following announcement, acquirers whose deals were met initially with a negative investor reaction, and continued to be perceived negatively, posted an average return of minus 25%,

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[14]Sirower & Lipin (2003)

> whereas acquirers whose deals initially received, and continued to re-
> ceive, a favorable response, returned an average of 33%—a difference
> of 58 percentage points!"[15]

Information disclosure at the time of a merger announcement can be performed in different forms. This work focuses on the release of quantifiable synergy estimates by management. The release of synergy estimates usually comes with a more detailed explanation of the deal, together with a more specific breakdown of synergies into different cost and revenue sources. The existence of public synergy estimates can thus be seen as a pars pro toto for enhanced investor information. In the following I review empirical studies on the effects of synergy announcements in merger situations.

Houston, James & Ryngaert (2001) analyze value creation in bank M&A between 1985 and 1996. For a set of 41 banks they collect management projections on estimated merger synergies in terms of revenue gains and cost savings. They find that "recent mergers appear to result in positive revaluations of the combined value of bidder and target stocks. Although not as large as the present value of management's estimates, with the bulk of the revaluation being attributable to estimated cost savings rather than projected revenue enhancements"[16]. In more detail, the authors report that "management's projected merger gains explain roughly 60% of the cross-sectional variation in the combined bidder and target stock returns"[17]. They further find that, while gains from cost savings projections are typically valued positively by the market, projected revenue gains are negatively related to abnormal stock returns, cost savings thus being the primary source of M&A value creation and having significantly higher capital market credibility than revenue enhancements. They acknowledge difficulties in the measurement of total abnormal returns versus announced synergies due to anticipation errors and the present day valuation of future earnings, and report it being "difficult to assess whether the market is fully valuing managerial claims

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[15]Sirower & Lipin (2003)
[16]Houston et al. (2001, p. 285)
[17]Houston et al. (2001, p. 293)

or is heavily discounting them as overoptimistic"[18].

In his working paper, Bernile (2004) conducts the first large sample study on managerial synergy forecasts. He analyzes a sample of $1,510$ M&A deals involving publicly traded companies with US bidders between 1990 and 1999, with a sample of 324 deals with public synergy forecasts. He finds that the stock market significantly discounts managerial synergy forecasts, "consistent with the notion that bidder insiders have incentives to appear optimistic"[19]. He reports that on average 40% of forecast synergies are capitalized into stock prices and further states significant differences between industries, with no discounts on forecasts in regulated utilities, while in other industries only 35% of synergy forecasts are incurred in stock prices. He also finds that "costly signaling enhances the credibility of voluntary disclosures"[19], shown by additional gains for bidders and seller in all-cash offers. Also, managerial equity stakes in the bidder company enhance credibility of insiders' synergy projections. He reports that managerial synergy estimates on average amount to 6.18% of combined equity.

Dutordoir et al. (2010) seem to have conducted the most recent large sample study on managerial synergy forecasts in M&A. They analyze a sample of $2,794$ M&A deals between US publicly held companies, 474 or 17% of which feature voluntary synergy announcements. They report managerial synergy estimates to amount to 11.68% of combined equity on average, with a median of 6.91%, and high discounts in what the market capitalizes of these estimates. They find deal complexity to be a main driver in the decision to disclose synergy forecasts, and higher proprietary costs for synergy disclosure to have negative impact on the decision. They also find a dependency on bidding firms' industry disclosure practice. Furthermore, they report a significant positive impact of 3.6% to 5.1% in stock price abnormal returns through managerial synergy disclosures after correcting for the self-selection bias in the decision of synergy disclosure.

Devos, Kadapakkam & Krishnamurthy (2009) use Value Line synergy forecasts, but not managerial forecasts, on a sample of 264 large mergers during 1980 - 2004. They report synergies to be estimated to 10.03% of combined equity value. They

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[18]Houston et al. (2001, p. 288)
[19]Bernile (2004, p. 1)

identify and separate three possible sources for merger gains, operating synergies, financial synergies (e.g., from tax shields) and market power gains. They report operating synergies as the main driver of merger gains, mainly through cutbacks in investments. Increased market power does not seem to be a relevant factor. They report synergy forecasts to be higher for focusing mergers, and for bidders with higher book-to-market value of equity.

Another means of information disclosure is through the holding of conference calls at the time of deal announcement. During these calls, additional information is typically disclosed in an investor presentation and an interactive Q&A session.

Kimbrough & Louis (2011) analyze the determinants and consequences of conference calls held at the day of deal announcement on investors' reaction to the merger. They state that ...

> "... bidders that hold conference calls at the time of their merger announcements provide a greater volume of disclosure and emphasize forward-looking details to a greater degree than bidders that rely solely on merger announcement press releases."[20]

As a consequence they find that ...

> "... (1) acquirers provide substantial amounts of forward-looking information during merger-related conference calls, (2) acquirers that hold conference calls experience superior announcement returns, and (3) there is no evidence that the superior returns subsequently reverse."[20]

The authors analyze factors that influence managerial inclination to the holding of conference calls, and find that conference calls are more likely in stock-for-stock mergers, for larger deals, larger acquirers and higher analyst following. They state that managers are more inclined to announce additional information through conference calls "at merger announcements [...] for large and complex mergers where management's intent is more likely to be unclear to investors"[21].

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[20]Kimbrough & Louis (2011, p. 640)
[21]Kimbrough & Louis (2011, pp. 638-639)

They measure announcement window returns for acquirers to be significantly higher, once corrected for the self-selection bias, in cases where conference calls are held. All else equal, acquirers holding a conference call earn a 6.5% increased announcement window return than acquirers that do not hold a conference call. They conclude that ...

> "... [o]verall, the evidence suggests that managers use conference calls around merger announcements to credibly convey genuine favorable private information to the market as opposed to hyping their stock prices."[21]

Leone, Rock & Willenborg (2007) study the effect of information disclosure on the intended use of IPO proceeds, and more specifically "the relation between the extent of dollar detail that an IPO issuer provides regarding their intended use of proceeds and first-day underpricing".[22] They document ...

> "... a significant negative association between the use of proceeds specificity and IPO underpricing. This relation stems from disclosure regarding plans to use the IPO cash for financing and investing activities such as deleveraging, capital expenditures and research and development as opposed to other operating activities [...]. In addition, [they] find that the extent of voluntary disclosure that an IPO issuer provides is related to proxies for agency costs and that its relation with IPO underpricing is robust to accommodating the endogenous choice to disclose."[23]

They document that more details on the use of IPO proceeds are, amongst others, provided in case of larger companies (pre-IPO asset value) and higher leverage, and less ex-ante risk and less ownership retention. Also, expert intermediaries, such as high-profile investment banks, reduce the inclination to provide additional details as they exercise additional scrutiny in the IPO process and thus reduce investor risk. The conclude that ...

> "... [f]ollowing Rock (1986) and Beatty & Ritter (1986), this implies that detailed use of proceeds disclosure reduces the ex ante

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[22]Leone et al. (2007, p. 1)
[23]Leone et al. (2007, pp. 21-22)

uncertainty associated with the IPO shares and also implies that '... disclosure choices can have a first-order economic effect by reducing information asymmetry and lowering firms' equity discount rates.' (Core, 2001)"[23]

Several other studies use proxies for synergies in their analyses, at least as control variables in cross-sectional regressions. Proxy variables usually refer to some kind of similarity measure such as geographical overlap or business model similarities. As only forecast synergies are treated in this work I will not explore this any further.

5.4 Hypothesis creation

In this section the specific hypotheses are developed and relevant theoretical literature is discussed. Hypotheses are divided into three different sections,

(1) Drivers for the disclosure decision,

(2) Investor credibility and announcement window returns,

(3) Investor uncertainty and post-announcement returns,

and are discussed in this order. The different hypotheses are based on different strands of theory, and the theoretical background is discussed in the respective section. Relevant are models of voluntary disclosure for (1) and (2), and investor uncertainty for (3).

This study observes the disclosure of synergy forecasts in an M&A situation and the resulting effect in stock prices. Following Schipper & Thompson (1983a), investors update their beliefs regarding the company value of the acquirer and target company at the time of the merger announcement, where only the surprising part of the news relative to the expectations is incorporated at this time. At the announcement of a merger, details about the deal are given, usually in the form of a press release or analyst conference. The most common argument for the execution of an M&A deal is the creation of value for the acquiring company's shareholders (Tuch & O'Sullivan, 2007). While there are different possible

sources for value creation, synergies of different kinds, e.g., cost synergies or market share synergies, frequently play an important role. Therefore, the information at the announcement of a merger frequently includes forecasts about the synergies management forecasts to be associated with the deal. I observe, among other deal characteristics, the existence of such synergy announcements along with the size of the synergies announced. I also observe the stock price reaction around the date of announcement. The predictions of the full disclosure models clearly do not hold in M&A situations as studied in this work, as only in about 30% of all mergers synergy values are disclosed.[24] The existence of synergies in an M&A deal is assumed to be value creating, and therefore be good news, while the absence of a synergy announcement is assumed to be bad news for two possible reasons. First, it is possible that a synergy valuation has been made for the deal, but the outcome is unfavorable for the stock price. Or, secondly, a company might have totally foregone synergy evaluation. I suppose this also to be bad news for investors as this might indicate a lack in preparation or insufficient deal rationale. Apart from the fact that the decision to voluntarily disclose expected synergies in a merger is taken by acquirer management, the topic is especially interesting to acquirer shareholders. As reported by Chi, Sun & Young (2011), target shareholders "earn abnormal returns regardless of the motivation of M&A"[25], while the case is not equally clear for acquirer shareholders. Acquirer shareholders' value creation seems to especially depend on deal rationale and characteristics.

5.4.1 Drivers for the disclosure decision

In this first section hypotheses are established on the factors that lead management to disclose additional information in the case of a merger. The hypotheses are based on literature on voluntary disclosure and existing literature on synergy disclosure in M&A situations as presented in Section 5.3.

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[24] Full disclosure models predict that information is disclosed by management regardless of their content; see discussion below

[25] Chi et al. (2011, p. 153)

The basic premise of disclosure literature is that managers have access to information about the company they represent that is not available to investors. The main foundations of the literature on voluntary disclosure is based on the work of Grossman & Hart (1980), Grossman (1981) and Milgrom (1981). These models, called "full disclosure models", predict that managers will always disclose private information, even if it is unfavorable for the company value, as in the opposite case investors, knowing about the existence of the information, will assume the worst possible outcome and revise downward their expectations of the company value to a point where it is favorable for the manager to release the information. It is a common view in disclosure literature and a premise to the models discussed in this paper that managerial voluntary information disclosure is motivated by the wish to inflate the company's stock price (Einhorn, 2007). While there are certain situations in which this might not hold[26], I assume this premise to be fulfilled in this work. Verrecchia (1983) and Dye (1985) add elements to the above theories which impede the manager from disclosing information. These elements are the uncertainty of investors as to the existence of new information (Dye, 1985), and an additional cost associated with information disclosure (Verrecchia, 1983). Thus, there are situations for firms in which the manager is inclined not to disclose information. In the case of uncertainty of investors as to the existence of new information, the firms that do not disclose are not only firms with low-value information, but also those where no new information is known to management. A manager who receives a low-value signal will hide behind the companies that have not received new information, establishing a disclosure threshold. If new information is not available or does not exceed this threshold, no information will be disclosed. Investors at the same time cannot distinguish between the two reasons for non-disclosure. The second case is the case of significant disclosure cost. Disclosure of proprietary information almost always comes at a cost (e.g., Dye, 2001), be it the disclosure of data to competing market participants (Verrecchia, 2001) or potential legal responsibility for forecasts made public (Healy & Palepu, 2001). Additionally, there is a potential threat of litigation cost in case forward-looking statements prove themselves wrong. In both cases, information uncertainty and cost to disclosure, the manager will only disclose information above a certain

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[26]Managers might, e.g., have an incentive to lower stock value shortly before stock option compensation packages are negotiated

threshold. The threshold in both cases is the current stock price.

Previous empirical literature establishes the hypothesis that managerial information disclosure is driven by at least two factors, the favorability of the information to the firm value and the possible reduction of information asymmetry.[27]

I put forward the following hypotheses.

Hypothesis 1a: Information asymmetry drives disclosure decision

Larger information asymmetry between managers and investors increases the inclination of management to disclose information about an M&A deal. The information asymmetry between the manager and the investor is highest when the deal is complex. Larger and more diversified targets, a relatively larger deal size and long times to deal completion are indicators for high complexity and thus information asymmetry. Higher proprietary cost to disclosure reduces the inclination to disclose synergy information.

In the event of a capital market transaction, managers will be inclined to reduce information asymmetry.[28] Decreasing information asymmetry is generally perceived as desirable as it leads to higher liquidity (Diamond & Verrecchia, 1991) and reduced cost of capital (Leuz & Verrecchia, 2000). If information asymmetry cannot be reduced this will be costly to investors through a decline in company valuations. As investors hold managers accountable for the stock price, managers seek to avoid negative stock returns and thus are inclined to reduce information asymmetry leading to possible devaluations. Specifically in an M&A situation, the short-term success or failure of a deal is frequently assessed by the stock price reaction at announcement. By credibly disclosing information on the expected value creation, i.e., synergies, of an M&A deal managers can reduce the information asymmetry. The more important the information a manager possesses, the larger the effect on the share price will be and the higher his inclination to disclose. Importance of synergy information is highest when a deal is opaque, meaning that investors do not have a proper outside view on the deal.

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[27]See, e.g., Verrecchia (2001) and Dye (2001) for extensive literature reviews regarding the incentive to voluntarily disclose private information

[28]See, e.g., Healy & Palepu (1993), Healy & Palepu (1995) and Healy & Palepu (2001)

Assuming that the information asymmetry is more severe in more complex M&A transactions, means are needed to measure deal complexity. According to Chari, Jagannathan & Ofer (1988) company size and deal value are measures for complexity and therefore proxy variables for information asymmetry. Grinstein & Hribar (2004) use deal size and time-to-completion and da Silva Rosa, Lee, Skott & Walter (2004), stating that "credible, standard, independently verifiable measures of deal complexity and risk are unavailable"[29], use deal time-to-completion as a complexity measure. They also propose the number of target SIC-codes, i.e., target diversification, as a proxy variable for the complexity of the integration, as it seems to be generally harder to integrate highly diversified companies.

I use target size, relative deal size and deal time-to-completion, i.e., the time from the deal announcement to actual deal completion, as measures for deal complexity. Time-to-completion, unlike the other variables, is an ex-post measure which I assume to be influenced by a complex structure of the deal. These same variables are also used by Dutordoir et al. (2010). Results are tested including the target diversification measure of the number of target SIC-codes divided by target market cap. The division by market cap is made to avoid collinearity between target size and number of SIC-codes as it seems natural that larger targets operate in a higher number of industries. Additionally, I assume that the number of analysts following the acquirer company as a consequence of investors' information need determines managerial inclination to disclose additional information. The more information investors need, leading to higher analyst following, the more frequent I expect to see synergy disclosure. Conversely, I expect that higher proprietary cost of information disclosure, measured, i.e., through the acquirer industry's competitiveness[30] and the acquirer's litigation risk, leads to lower disclosure rates.

Existing evidence for this hypothesis can be found in Dutordoir et al. (2010). In what seems to be the most recent large sample study on managerial synergy forecasts in M&A, they analyze a sample of $2,794$ M&A deals between US publicly held companies, 474 or 17% of which feature voluntary synergy announcements. They find deal complexity to be a main driver in the decision to disclose synergy

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[29]da Silva Rosa et al. (2004, p. 65)
[30]Industry competitiveness is measured by the industry Herfindahl Index

forecasts, and higher proprietary costs for synergy disclosure to have negative impact on the decision. They also find a dependency on bidding firms' industry disclosure practice.

Additional evidence is provided by Kimbrough & Louis (2011). They analyze the effect of conference calls on announcement returns. Conference calls are frequently held at the time of the deal announcement and are, similar to synergy announcements, an indicator for additional information voluntarily released by managers. They report that in a sample of $1,228$ mergers 62% exhibit a conference call at the day of deal announcement. They find significant positive effects of, among others, relative deal value, acquirer size and the number of analysts following on the probability to hold a conference call.

Hypothesis 1b: Favorable information is disclosed more frequently

Managers have a higher inclination to disclose synergy forecasts when the information is more favorable to the value of the company. The larger the predicted synergy value in an M&A deal, and thus the more favorable the information to the acquirers' stock price, the higher the probability that these values are disclosed.

According to the threshold models laid out above, a self-selection for synergy disclosure is expected towards deals with higher forecast synergies. As managers are held responsible for stock price movements, especially in view of decisions as far-reaching as a merger, managers are inclined to positively influence the stock price. I therefore expect that acquirer management will more frequently decide to disclose synergy information in case this information is beneficial for them, i.e., favorable to the stock price. The outcome of a supposedly performed synergy analysis thus influences the decision to publish synergy forecasts. In cases where the takeover analysis shows higher synergies, a public release should be more likely than in cases where the result from a synergy analysis is not as favorable.

Related results have frequently been shown in the literature. Early empirical tests on the hypothesis of higher inclination of managers to release favorable

information are performed, e.g., by Penman (1980) and Lev & Penman (1990). They find that...

> "... on average, firms with good news do voluntarily disclose forecasts
> in order to distinguish themselves from firms with worse news."[31]

Miller (2002) finds that managers more often disclose earnings forecast information in periods with higher earnings and end to do so once the period of higher earnings is coming to an end. More recently, Sletten (2012) finds a stock price impact on the probability of disclosure, showing that when stock prices decline and therefore news that once were unfavorable to the company's stock price become favorable, managerial inclination to disclose information increases. Kothari, Shu & Wysocki (2008) find that managers delay the release of bad news while immediately releasing good news when becoming aware of the information. They find that investors' reactions to bad news are larger than reactions to good news, as managers accumulate bad news up to a certain threshold. Very recently, Roychowdhury & Sletten (2012) find that earnings forecast informativeness is less in good news quarters and higher in bad news quarters when managers do not voluntarily disclose information, thus suggesting that managers are holding back part of the unfavorable information. Hutton, Miller & Skinner (2003), studying managerial decisions to voluntarily supplement earnings forecasts with additional information, find that ...

> "... managers provide soft talk disclosures with similar frequency for
> good and bad news forecasts but are more likely to supplement good
> news forecasts with verifiable forward-looking statements."[32]

Managers seem to provide additional quantifiable information primarily in the case of good news while in the case of bad news they do not. This work focuses on quantifiable synergy forecasts. Statements which do not provide the possibility of quantification in form of a DCF valuation of total synergies as specified in Section 5.5.4 are not regarded as informative and thus are not counted in this study. Thus, a higher inclination to disclosure is expected in case of good news.

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[31]Lev & Penman (1990, p. 50)
[32]Hutton et al. (2003, p. 867)

I am not aware of any contributions to the literature showing these results in case of a merger decision. The hypothesis is tested calculating hypothetical expected synergy values for deals which do not have a synergy disclosure, and it is shown that the disclosure probability is strongly correlated with the size of the expected synergies.

5.4.2 Investor credibility and announcement window returns

The second subset of hypotheses refers to the credibility of synergy announcements in the merger situation. As discussed above, managers are inclined to inflate the stock price of their company, and especially so as the positive or negative reception of a merger is a good indicator of future performance in connection with the merger (e.g., Sirower & Lipin, 2003), or, as they put it, ...

> "... many companies have discovered [that] it's hard to put the genie back in the bottle once a deal gets a bad reception."[33]

Therefore, knowing about this inclination to stock price inflation, investors may doubt the credibility of managerial synergy forecasts. On the other hand, Hutton et al. (2003), studying investors' response to the provision of additional information in case of earnings forecasts, find that ...

> "... good news forecasts are informative only when supplemented by verifiable forward-looking statements, supporting our argument that these statements bolster the credibility of good news forecasts."[32]

The quantifiable synergy forecasts we observe in this work may thus be able to gain investor credibility.

I put forward the following hypotheses.

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[33]Sirower & Lipin (2003)

Hypothesis 2a: Information disclosure is credible to investors

Managers have an incentive to disclose information to investors only in case this information is perceived to be at least in part credible. Provided that the information disclosed is positive, the disclosure of good news should lead to a positive stock market reaction compared to the non-disclosure case.

The mitigation of information asymmetry depends on the credibility of managerial disclosure. If the information disclosed to investors is perceived as not credible, there will be no different effect on stock prices than in the non-disclosure case. Much evidence exists in the literature that voluntary managerial disclosure can usually be viewed truthful.[34] Empirically, studies conducted in the 1970s and 1980s demonstrate stock price reactions on management earnings forecasts (e.g. Patell, 1976; Penman, 1980). Ajinkya & Gift (1984) and Waymire (1984) show that investors react positively to good news forecasts and negatively to bad news forecasts, suggesting that investors view managerial forecasts as being informative. In an experimental setting Stocken (2000) finds that in a repeated game managers almost always are truthful about the information they release. Hutton et al. (2003) state that ...

> "... [a] longstanding literature documents that management earnings forecasts are informative and that the information content of these forecasts varies with forecast horizon, the sign of the earnings news, forecast form, forecast venue, and management credibility. Previous research also documents that forecasts are often accompanied by other information."[32]

Rogers & Stocken (2005) report that disclosure of favorable information is generally followed by positive stock price reactions, albeit less positive the more the predicted optimism in the forecasts.

Two sources increasing the credibility of managerial disclosures have been identified in the literature: (a) third-party intermediaries and (b) the ex-post valuation

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[34]See Healy & Palepu (2001) for a literature review

of the credibility of prior disclosures.[35] In an M&A setting, both of these credibility adding factors may exist, in the form of external third parties accompanying the deal, e.g., investment banks, and the concern of a manager about his future credibility. As a third factor potential litigation cost in case of inaccuracy of forward looking statements might add to the truthfulness of managerial disclosures. Synergy disclosure is therefore expected to be at least partly informative and the mere existence of a synergy announcement, assuming it is good news, is expected to have a positive valuation effect. I further expect the positive valuation effect to mainly accrue to the acquirer as the one taking the disclosure decision. A possible positive valuation effect for the seller may stem from an enhanced negotiation position towards the acquirer having additional transparency on the business rationale behind the deal.

Empirically, Dutordoir et al. (2010) show for a US sample that the announcement of synergies has a positive signaling effect and leads to positive incremental combined cumulative abnormal returns. They report a significant positive impact of 3.6% to 5.1% in stock price abnormal returns through managerial synergy disclosures after correcting for the self-selection bias in the decision of synergy disclosure. Kimbrough & Louis (2011) show positive and significant incremental cumulative abnormal returns of 6.5% for the case of information release through conference calls in connection with a merger announcement. Acquirers who voluntarily release additional information through a conference call at the time of deal announcement experience significantly higher short-term returns than acquirers who decide not to release additional information.

The effect is measured by the regression of a dummy variable indicating disclosure or non-disclosure on stock returns around the announcement date. This setting has to carefully be controlled for self-selection.

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[35]See Healy & Palepu (2001) for a more detailed discussion

Hypothesis 2b: Investor credibility of synergy disclosure is less than complete

Managers have an incentive to communicate the most favorable information possible to the market. Therefore, acquirer management will not be viewed as completely neutral by investors. Investors will take this bias into account when reviewing company valuations and discount on managerial disclosure.

While having a strong incentive not to actively misrepresent information, managers do have an incentive to be overoptimistic in their disclosure. Thus, they might communicate forward looking values that are likely to be achieved only in an optimistic case. Referring to the cheap talk literature[36], Bernile (2004) states a number of reasons why managerial synergy releases may not be fully informative, including "the necessity to obtain shareholders' approval"[37], bargaining considerations and the possible emergence of competing bidders. Investor skepticism may be even higher as synergy forecasts frequently lack the details to be fully verified and therefore stay intrinsically vague (ibid.). Rogers & Stocken (2005), regarding stock price responses to forecasts, find that "the market varies its response with the predictable bias in the forecast"[38], filtering out the bias and discounting forecasts if necessary. I therefore expect market participants to discount managerial synergy announcements to a certain point.

There is already quite some empirical evidence in the literature on this hypothesis, and particularly so in settings around M&A deals. Houston et al. (2001) analyze value creation in bank M&A between 1985 and 1996 for a set of 41 US banks. They report that "management's projected merger gains explain roughly 60% of the cross-sectional variation in the combined bidder and target stock returns"[39]. They further find that, while gains from cost savings projections are typically valued positively by the market, projected revenue gains are negatively related to abnormal stock returns, cost savings thus being the primary source of M&A value creation, having significantly higher capital market credibility than revenue

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[36]E.g., Crawford & Sobel (1982)

[37]Bernile (2004, p. 3)

[38]Rogers & Stocken (2005, p. 1233)

[39]Houston et al. (2001, p. 287)

enhancements[40]. In his working paper, Bernile (2004) conducts the first large sample study on managerial synergy forecasts. He analyzes a sample of $1,510$ M&A deals involving publicly traded companies with US bidders between 1990 and 1999, with a sample of 324 deals with public synergy forecasts. He finds that the stock market significantly discounts managerial synergy forecasts, "consistent with the notion that bidder insiders have incentives to appear optimistic"[41]. He reports that on average 40% of forecast synergies are capitalized into stock prices. He further states significant differences between industries, with no discounts on forecasts in regulated utilities, while in other industries only 35% of synergy forecasts are incurred in stock prices. He finds that "costly signaling enhances the credibility of voluntary disclosures"[41], shown by additional gains for bidders and seller in all-cash offers. Also, managerial equity stakes in the bidder company enhance credibility of insiders' synergy projections. Dutordoir et al. (2010) seem to have conducted the most recent study that measures high discounts in what the market capitalizes of managerial synergy forecasts.

The discounts on managerial synergy forecasts are measured by regressing the present value of announced synergy values on combined CAR, identifying to what extent an additional dollar of announced synergy value is incorporated in the company value.

In summary, clear predictions on hypothesis sets (1) and (2) are provided by the threshold theories by Verrecchia (1983) and Dye (1985) laid out above. The short-term stock price effects stemming from the disclosure decision, however, have to be separated from the stock price effects that usually appear around an M&A event. M&A provides a very clear company event, where investors expect, but do not exactly know about, the arrival of new information regarding synergies. Also, there is a cost associated with disclosure. This represents the assumptions for the models by Verrecchia (1983) and Dye (1985) and provides a good test for

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[40]Houston et al. (2001) acknowledge difficulties in the measurement of total abnormal returns versus announced synergies due to anticipation errors and the present day valuation of future earnings, and report it being "difficult to assess whether the market is fully valuing managerial claims or is heavily discounting them as overoptimistic" (Houston et al., 2001, p. 288)

[41]Bernile (2004, p. 1)

them against the null hypothesis of the full disclosure models, where, even if not every deal reports expected synergy values, the disclosure should be independent of the fact if it is favorable or not.

5.4.3 Investor uncertainty and post-announcement returns

The hypotheses in this section refer to investor uncertainty and post-announcement medium-run returns and are based on theories on uncertain information. The stock price reactions that are observed at first sight seem similar to classical over- or underreaction patterns. In order to distinguish these patterns from over- or underreaction frequently observed in connection with corporate events, I will briefly review important contributions to this ample literature. Subsequently, hypotheses based primarily on the uncertain information hypothesis by Brown et al. (1988) are developed.

Significant long-run abnormal stock returns have been observed in a variety of different corporate events, such as "share repurchases, initial public offerings (IPOs), seasoned equity offerings (SEOs)"[42] and earnings announcements (PEAD)[43]. Post-announcement period under- or outperformance in the literature has frequently been associated with investor over- or underreaction. Due to the evidence on long-term post-event abnormal stock returns, which seem to be in violation to the predictions from the efficient market hypothesis, theories of investor over- and underreaction to news events have been created in behavioral investor models. I will shortly review available literature on reactions to corporate news events in connection with investor over- and underreaction to corporate events. We will then see that the patterns observed in the case of M&A do not fit to classical over- or underreaction patterns and hypotheses will be derived.

An important strand of literature interprets long-run abnormal returns following corporate news events as signs of irrational investor behavior. Kadiyala &

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[42]Kadiyala & Rau (2004, p. 359)
[43]E.g., Ng, Tuna & Verdi (2006)

Rau (2004) give an overview of the behavioral finance literature regarding investor over- and underreaction. The models proposed are partly contradictory in that they predict either under- or overreaction to new information. The authors summarize the two important models. The first predicts investor overreaction to corporate news events, leading to a long term reversal of stock prices and negative correlations of the initial short-run and the long-run post-event stock price movements, a pattern observed, e.g., in seasoned equity offerings (SEO). The second model predicts investor underreaction, leading to long-term post-event stock price movements in the same direction as the initial short-run reaction, and hence positive correlations. Underreaction is observed, e.g., in share repurchases and cash-financed tender offers. According to Kadiyala & Rau (2004), the difficulty with investor behavioral models is their limited ex-ante predictive power, as it is unclear why investors overreact to corporate news events in one case and underreact in other cases.[44] Barberis, Shleifer & Vishny (1998) observe that underreaction to news generally appears in the shorter post-event horizon of one to 12 months, while overreaction evidence is generally found over the longer periods of three to five years. They present a model of investor sentiment which is consistent with both views, predicting both underreaction and overreaction during different periods. Their model is based on psychological evidence, especially the behavioral patterns of representativeness and conservatism. Representativeness is described as "the tendency of experimental subjects to view events as typical or representative of some specific class and to ignore the laws of probability in the process"[45]. This pattern might lead investors to classify stocks into categories consistent with the earnings history of the stock and only slowly updating this believe as new information arrives, which leads to momentum and overreaction to a series of good news. Conservatism describes the observed pattern that individuals only slowly update their believes when confronted with new information, leading to underreaction to news in the shorter term. Daniel, Hirshleifer & Subrahmanyam (1998) present a theory of investor over- and underreaction based on two different psychological patterns, investor overconfidence and biased self-attribution. They

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[44]The limited predictive power is a point already made by Fama (1998) in that studies on abnormal long-run returns "rarely test a specific alternative to market efficiency" (Fama, 1998, p. 284) other than market inefficiency, and therefore do not present a "specific model of price formation, itself potentially rejectable by empirical tests" [ibid.]

[45]Barberis et al. (1998, p. 308)

predict that "stock prices overreact to private information signals and underreact to public signals"[46]. Investor overconfidence describes the fact that investors are overconfident regarding the precision and informative value of their private information. They show that investor overconfidence leads to negative long-run autocorrelation as overconfident and informed investors overweight the information contained in their private signal and undervalue public information, causing stock prices to overreact. During subsequent periods the overreaction is corrected leading to positive long-run stock price autocorrelation when the arrival of public information gradually reduces the overreaction. Overconfidence is stronger in cases where private information is highly uncertain. Biased self-attribution describes the psychological pattern that investors, having private information which is subsequently confirmed by public information increase the confidence in their private information more than confidence would be decreased in the case of subsequent negative public information. Biased self-attribution therefore leads to positive short-run autocorrelations, but long-run correction of this trend and therefore long-run negative autocorrelation. The theory thus predicts short-run underreaction, and short-run momentum, and long-run overreaction. The authors also state that "investors overreact to private information and underreact to public information, but public information can stimulate additional overreaction to private information"[47]. Hong & Stein (1999) find that the empirical findings largely...

> "... can be thought of as belonging to one of two broad categories of phenomena. On the one hand, returns appear to exhibit continuation, or momentum, in the short to medium run. On the other hand, there is also a tendency toward reversals, or fundamental reversion, in the long run."[48]

Not surprisingly, as the above models are designed to explain the empirical findings, this is what they broadly predict.

As stated above, the empirical findings regarding over- and underreaction are largely based on corporate events such as share repurchases, initial public offer-

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[46]Daniel et al. (1998, p. 1841)
[47]Daniel et al. (1998, p. 1865)
[48]Hong & Stein (1999, p. 2143)

ings (IPOs), seasoned equity offerings (SEOs) and earnings announcements. In M&A none of these effects have been documented without doubt. M&A also differs from these corporate events in an important way. While none of the above corporate events have significant operational impact on the company releasing the information, a merger of two companies generally leads to considerable operational changes. This means that the complexity and the information content disclosed or not disclosed is significantly larger.

In this part of the study post-event stock price movements in an M&A situation and the influence of synergy forecasts on this reaction are observed. I will focus on effects within periods of 3 to 6 months after the event, which are identical to those studied in the post-earnings announcement drift literature (e.g., Liang, 2003; Francis, Lafond, Olsson & Schipper, 2007). Additionally longer timeframes of up to 36 months will be anayzed as common in studies on long-term merger effects.[49] The patterns observed differ from the stock-price behavior due to investor under- or overreaction. In the following, hypotheses are developed based on the uncertain information hypothesis by Brown et al. (1988).

Hypothesis 3a: Short-term stock price rebound after M&A announcements

Short-term stock price rebounds in acquirer stocks occur after M&A announcements. The positive stock price reaction is especially present in the case when investors perceive a merger as unfavorable for acquirer shareholders, and is due to the gradual reduction of investor uncertainty in the period after a merger

Mergers are among the most important investment decisions acquirer management can take, and typically are complex corporate actions. The literature has intensively studied and recently tends toward ruling out long-run underperformance of acquiring firms (e.g., Martynova & Renneboog, 2008). Nonetheless, to my knowledge, medium-term returns after merger announcements have not been studied intensively in the literature.

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[49]I do not study timeframes of up to 60 months as these strongly reduce sample size

Due to the complex nature of a merger, information release during the announcement window must necessarily remain incomplete. This is due to two reasons. First, although management might be willing to release all necessary information connected to a merger, because of the complexity of the corporate event full information release might not be possible within the short announcement period. Secondly, it is not clear that management is always willing to release full information concerning a merger. One indication for this is given by the fact that, while mergers are frequently claimed to create value due to synergies between the acquirer and target company, in only a fraction of all mergers synergy estimates are actually publicly released.[50]

The hypothesis of a price rebound in the case of M&A is based on the rebound effect detected by Brown et al. (1988) after large capital market events. They observe a reversal phenomenon in security prices, where the reactions of rational investors to bad news superficially looks like an overreaction pattern, hence a negative overreaction which is subsequently corrected, and develop a theory, the uncertain information hypothesis (UIH), to explain the price reversal. In case of good news they show a pattern resembling underreaction, which means that the initial price jump and the after-reaction are positively correlated. The UIH predicts that price changes following good or bad news should be positive, as increased risk after events that induce large stock price changes increases expected returns. As risk is subsequently reduced, expected returns decrease and stock prices rise. The authors measure a cumulative price reversal on unfavorable information of 0.532% during the first 60 trading days after the event. An unfavorable event is identified by a one-day stock price shift of -2.5% or more, and thus the price reversal is in the order of magnitude of 20% of the initial reaction.

The basis for the UIH is that new information is incurred into security prices instantaneously. However, Brown et al. (1988) state that, ...

> "... even when an event clearly conveys good or bad news about
> a firm's or the market's prospects, the full extent of its eventual

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[50]In the sample used for this study, approx. 30% of all mergers contain synergy estimates, other studies find fractions as low as 17% (Dutordoir et al., 2010)

impact on stock prices may be uncertain. Thus, with incomplete information, the best that investors may be able to do is to estimate the parameters of a conditional probability distribution summarizing the various potential outcomes."[51]

The uncertain information hypothesis is based on the assumptions that

- investors are rationally maximizing expected utility[52],

- investors are risk-averse,

- new information is quickly incorporated into security prices, and

- the nature of an event, being good or bad, can be quickly identified by investors, while the full extent stays unclear for a certain period of time.

These assumptions are assumed to be fulfilled in the case of M&A announcements. In particular the fourth assumption that the full extent of the merger announcement stays unclear for a certain period of time seems very relevant considering the potentially far-reaching impact of a merger on company valuations. I assume this to be even more important in cases where only limited additional information (e.g., no synergy estimates) is released together with the merger announcement. This point will be further discussed in Hypothesis 3b.

Based on the above assumptions the UIH predicts that ...

"... in the aftermath of new information, both the risk and the expected return of the affected companies increase in a systematic fashion. More precisely, [the authors] demonstrate that in addition to increasing measurable risk, a noisy piece of favorable or unfavorable news immediately causes a market comprising risk-averse investors to set stock prices significantly below their conditional expected values. As the uncertainty over the eventual outcome is resolved, subsequent price changes tend to be positive on average, regardless of the nature of the catalyzing event. Further, if investors' preferences exhibit

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[51]Brown et al. (1988, p. 356)
[52]Investors act as rational agents in the von Neumann-Morgenstern sense

decreasing absolute risk aversion the UIH predicts that the average price change will be larger following bad news than good."[51]

Empirically, and in accordance with Brown et al. (1988), Bremer & Sweeney (1991) report positive abnormal returns after large drops in stock price. They find that "[e]xtremely large negative 10-day rates of returns are followed on average by larger-than-expected positive rates of return over following days"[53]. After a 10% fall in stock price they measure a rebound of 1.773% after one day and cumulative 2.215% after two days. They do not measure a significant rebound for winners. They consider these short-term price reversals for large negative price jumps to be "inconsistent with the notion that market prices fully and quickly reflect relevant information"[53] due to the long recovery period of several days. In related analyses, Bondt & Thaler (1985) and Bondt & Thaler (1987) find that stocks with large positive abnormal returns ("past winners") underperform and stocks with large negative abnormal returns ("past losers") outperform the market in the period following an event, and find this to be in line with the hypothesis of investor overreaction. Howe (1986) analyzes stock price performance during a holding period of one week subsequent to large stock price changes. Using a large sample of good and bad news events, defined by a price move of at least $\pm 50\%$, he finds "evidence [...] strongly consistent with the overreaction hypothesis"[54]. He shows that stocks experiencing a large positive one-day return subsequently underperform over a 50-week period after the event, with the effect being spread out over nearly one year. On the contrary, bad-news stocks rebounded in a short period after the event, with the effect declining later and turning negative forty weeks after the event. He finds weak evidence that events that lead to large, and especially negative, price shifts also lead to a change in company β. Atkins & Dyl (1990) find that drops in security prices of at least 10% are followed by price reversals, studying stock price behavior after trading days with large stock price changes. They "find evidence that the stock market appears to have overreacted, especially in the case of price declines"[55]. They find this result, however, to be consistent with the notion of efficient markets after taking into

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[53]Bremer & Sweeney (1991, p. 747)
[54]Howe (1986, p. 76)
[55]Atkins & Dyl (1990, p. 535)

account transaction cost. Cox & Peterson (1994) report that stock price reversals following large stock price drops of at least 10% diminish over time. They find negative cumulative returns following these events over 4 to 20 trading days after the events. Larson & Madura (2003) analyze daily returns in stock prices above a threshold of 10%, and analyze the stock performance of these samples following the event. They investigate if under- and overreaction to events is determined by whether an event is what they call an "informed event", i.e., "the underlying reason for the extreme stock price change is cited in the Wall Street Journal"[56], or an "uninformed event" where no reason is given there. They state that "the release of public information reduces uncertainty, as uninformed winners experience overreaction and informed winners do not"[56].

Following this discussion, and in accordance with the models of Verrecchia (2001) and Dye (2001), I assume that the disclosure of incomplete information, while investors assume the existence of additional information, leads to a pattern that superficially resembles negative overreaction. I expect this negative overreaction to be present especially in the case where investors perceive the merger to be unfavorable and therefore negative information. Stock prices are expected to rebound during a post-announcement period, leading to positive abnormal returns in acquirer stock prices, and negative correlations of these post-announcement returns with announcement window returns, especially in the case where the merger information was initially perceived as negative.

The additional hypotheses refer to the factors which influence the amount of post-announcement stock-price rebound. I generally expect that factors which increase the trust in management and credibility of announcements should increase investor confidence and mitigate or at least reduce the positive post-announcement effect. Conversely, factors that add additional uncertainty for investors should lead to an increased reaction to perceived bad news.

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[56]Larson & Madura (2003, p. 114)

Hypothesis 3b: Additional information release reduces post-announcement price rebound

The release of additional information in the course of an M&A announcement decreases the amount of investor uncertainty and thus post-announcement price rebounds. Especially, the release of quantifiable synergy forecasts reduces negative reactions on merger announcements and subsequent positive counter-reactions in the case of mergers perceived as bad news.

It is shown in the literature that acquirer announcement window stock returns are more favorable when, along with the merger announcement, additional information is provided. Dutordoir et al. (2010) show that, once the self-selection effect for voluntary synergy announcements is taken into account, the quantifiable announcement of synergies in a merger leads to 3.6% to 5.1% higher short-run announcement abnormal returns compared to non-disclosure deals. Kimbrough & Louis (2011) show that the release of additional information through conference calls leads to more positive, or less negative, reaction of acquirer share prices to merger announcements during the announcement window. They also state that the use of a conference call is positively correlated with factors that lead to negative acquirer performance in M&A deals, a fact that suggests that management makes conference calls in order to reduce investor uncertainty and avoid negative overreaction at announcement. Kimbrough (2005) shows that the voluntary release of additional information through conference calls connected with earnings announcements significantly reduces analyst uncertainty and influences post-announcement drift.

Above I point out that the pattern of increased returns, especially after bad news events, stems from investor uncertainty regarding the value of a risky asset. Easley, Hvidkjaer & O'hara (2002) show that stocks that have a higher probability of being traded on private information require higher returns. Easley & O'hara (2004) present a rational expectations equilibrium model for stocks carrying a different amount of private information. They develop the argument that ...

> "... differences in the composition of information between public and private information affect the cost of capital, with investors demand-

> ing a higher return to hold stocks with greater private, and correspondingly less public, information. This higher return reflects the fact that private information increases the risk to uninformed investors of holding the stock because informed investors are better able to shift their portfolio weights to incorporate new information. [...] Private information thus induces a new form of systematic risk, and in equilibrium investors require compensation for this risk."[57]

Through the disclosure of additional information regarding a deal, e.g., synergy estimates, private information is converted into public information. According to the above argument, "public information reduces the risk to uninformed traders of holding the asset"[58]. The model thus predicts that when two otherwise identical stocks are compared, the one with a higher share of private information features higher expected returns.

Following the above evidence a significant reduction in the pattern of event-window negative reaction is expected and therefore a reduction in post-event positive stock-price drift for acquirers voluntarily releasing synergy forecasts. This also means that the effect of significantly higher event window short-run abnormal returns in the case of synergy disclosure as shown in Hypothesis 2a is not the sign of additional long-term value creation, but decreased investor uncertainty, as the mere release of information is not per se long-term value creating.

Lastly factors are investigated which, apart from the release of additional information, influence investors' short-run negative reaction to merger announcements and a subsequent stock price rebound. These factors are closely connected to investor uncertainty towards the favorability of the merger for the acquirer market value. The post earnings announcement drift literature suggests a number of factors that increase or decrease investor uncertainty.

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[57]Easley & O'hara (2004, p. 3)

[58]Easley & O'hara (2004, pp. 5-6)

Hypothesis 3c: Investor uncertainty increases post-announcement stock-price rebound

Increased investor uncertainty regarding future earnings of the combined company leads to larger negative stock-price reactions during the announcement window. Subsequently, post-announcement price rebounds are larger, especially if the merger is perceived as being unfavorable for acquirer shareholders.

Higher investor uncertainty increases negative reaction to news considered unfavorable by investors. The post-earnings announcement literature has identified several factors that influence investor uncertainty and hence influence investor reactions to corporate events. Generally, the more uncertainty remains the more difficult it is for investors to create an unbiased reaction to the announcements of an event. The additional uncertainty leads to larger event-window price drops, and subsequent stock price rebounds when the uncertainty is reduced.

Francis et al. (2007) show in an earnings announcement setting that higher investor uncertainty increases the amount of underreaction to positive announcements, an effect they refer to as "rational learning". Following this line of reasoning I expect that high uncertainty means less valuable information to investors. Investors therefore, according to the models of Verrecchia (2001) and Dye (2001), put a larger discount on security prices until the uncertainty is reduced and the information content of the announcement is increased. Likewise, when information uncertainty is reduced, investors impose a smaller discount on security prices during the announcement window and thus there is less negative reaction. The discounts vanish in the post-announcement period as uncertainty is gradually reduced, leading to a counter-reaction in stock prices.

Specific variables connected to investor uncertainty are identified in Section 5.6.4.

5.5 Data and methodology

Bruner (2002) summarizes four approaches to measure value creation in M&A, event studies, accounting studies, surveys of executives and clinical case studies,

and analyzes the specific strengths and weaknesses of these approaches. In this work announcement effects are measured using the event study methodology, especially testing for effects from announced synergies. Corrado (2011) gives a recent and comprehensive overview of short-term event study methodology, including an extensive bibliography on the topic. Houston et al. (2001), in their study on announced synergies in M&A, present a methodology for the valuation of expected merger gains which I will broadly follow in this work. Details of the methodology used in this work are laid out in the following.[59]

5.5.1 Data and sample selection

A worldwide sample of mergers between publicly listed companies which are announced between 2000 and 2011 is compiled for this paper. The sample is restricted to this period in order to ensure maximum data availability on announced synergies. I further restrict the sample to mergers with a transaction value of at least USD 300m as investor interest, media coverage and therefore incentives for synergy disclosure increase with size. Deal data is obtained from Thompson One Banker and company market data from Datastream/Worldscope, excluding deals with insufficient Datastream coverage for either acquirer or target. After the selection process the sample contains 1,172 deals and will be referred to as "full sample".

The database is completed by a manual search for synergy disclosures near the announcement date. In line with Dutordoir et al. (2010) synergy disclosures are found on or very close to the announcement date. I[60] manually search investor relations publications on company websites, which are the most important source for synergy disclosure data. Additionally, a press search is conducted on Lexis-Nexis around the announcement date to check for publications. In order to not accidentally miss any synergy disclosures the search process is completed by a general "Google" search. Documentation and coverage is found on all but a very small number of deals, with only a fraction actually including synergy forecasts.

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[59]A good overview of econometric difficulties encountered in short term event studies on M&A is presented in Betton et al. (2008)

[60]I thank Claudia Bek for extensive research assistance

I proceed in this way to ensure not to accidentally miss any synergy disclosures where they were available at the time of deal announcement. In the search process it is verified that synergy data is released by acquirer management and does not consist of third party or outsider information (e.g., from analysts). Synergy forecasts have to be quantified.[61] Most quantified and usable synergy data refers to cost synergies. Revenue synergies are only included if forecast net of additional sales cost, which is rarely the case.[62]

I will call the sample with synergy disclosures the "disclosure sample", featuring 365 deals. Disclosure rate over the entire period is 31%. The disclosure rate is significantly higher than reported by Dutordoir et al. (2010), while the rest of the sample characteristics such as transaction value and average synergy value seem largely similar. Table II in Section 5.6 shows a slightly positive trend in disclosure rates from 2000 to 2011, albeit significantly weaker than reported by Dutordoir et al. (2010) during the same period.

For industry specific analyses I use the Fama-French 12 industry classification in this work.

5.5.2 Calculation of announcement window cumulative abnormal returns

In the calculation of abnormal returns I follow the commonly used methodology as laid out, e.g., in Fama et al. (1969), Brown & Warner (1985) and Strong (1992). Returns are calculated along

$$log(AR_{it}) = log(R_{it}) - log(E(R_{it})),$$

where $log(R_{it})$ is the logarithmic return of security i on day t and $log(E(R_{it}))$ is the logarithmic expected return for the same security and day.

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[61]Hutton et al. (2003) distinguish between "qualitative soft talk disclosures and verifiable forward-looking statements" (Hutton et al., 2003, p. 888). To be included in the former category, the statement must be specific enough to be compared with subsequent realizations. Quantifiable synergy forecasts qualify as such

[62]In all but four cases the announcement of revenue synergies is accompanied by the announcement of cost synergies

The market model $E(R_{it})$ is modeled by an OLS regression on the returns of the individual security i against a wider market index during a pre-event estimation period. In order to sufficiently separate the estimation period from the event period, a grace period is included and the estimation period is separated from the event date by one month[63]. With an event window beginning three days before the event, the 180 days estimation window lasts from day -200 to day -21, where day zero is the day of the merger announcement. $E(R_{it})$ then is defined by

$$E(R_{it}) = \alpha_i + \beta_i R_t^M + u_{it},$$

where R_t^M is the return of a market reference index. I choose the worldwide DS sector indices for each company in the respective sector as these are industry sector specific and available during a large timeframe. The factors α_i and β_i are then used to calculate abnormal returns along

$$log(AR_{it}) = log(R_{it}) - log(\alpha_i + \beta_i R_t^M).$$

As a last step, abnormal returns are summed up during the event window to obtain cumulative abnormal returns (CAR) for each company i:

$$CAR_i = exp(\sum_{t=Start}^{End} log(AR_{it})) - 1.$$

Average cumulative abnormal returns (ACAR) for the N companies are calculated by

$$ACAR = \frac{1}{N} \sum_{i=1}^{N} CAR_i.$$

I determine abnormal returns for two different event window lengths. As a standard for the later analyses an event window beginning three days prior to the announcement is used. Alternatively, following Betton et al. (2008), I use an event window starting 43 days before the announcement date to account for a possible run-up effect prior to the merger announcement[64]. In any case, the

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[63]20 trading days

[64]Schwert (1996) indicates that more than half of the cumulative run-up returns are obtained during the approximately 40 trading days prior to the M&A announcement.

event window ends three trading days after the announcement to capture possible counter-movements. If an event day is not a trading day, it is pushed backwards to the last trading day. In each case the estimation period features 180 trading days, separated from the event window by a grace period as laid out above. Results do not differ relative to using discrete, non-logarithmic returns.

Although MacKinlay (1997) points out that ...

> "... the gains from employing multifactor models for event studies are limited. The reason for the limited gains is the empirical fact that the marginal explanatory power of additional factors the market factor is small, and hence, there is little reduction in the variance of the abnormal return, ..."[65]

... a Fama-French three factor model will be employed to conduct a robustness check of results and ensure that results are not driven by size or value effects. Multifactor models take into account additional risk factors relative to the simple market or a CAPM model.

Fama & French (1992) confirm size and value effect and Fama & French (1993) extend the CAPM to a three-factor model

$$E(R_{it}) = R_t^f + \beta_i(R_t^M - R_t^f) + s_i R_t^{SMB} + h_i R_t^{HML} + u_{it},$$

where R_t^f is the risk free rate, R_t^M represents the market return, and SMB ("small minus big") and HML ("high minus low") are the returns of portfolios built of companies with small market cap minus the return of a portfolio of companies with large market cap and portfolios with high market-to-book value minus low market-to-book value respectively. I thus control in the return generating process for the size and value factor. Market and factor returns are obtained from Kenneth French's website. One empirical drawback is that daily market and factor returns are only available for a US sample. As a large part of the research sample is constituted of US companies, this is considered to be a minor drawback for this robustness check. Additionally, in contrast to the above methodology,

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Once again a grace period is included and the estimation window runs from day -240 to day -61

[65]MacKinlay (1997, p. 18)

returns cannot be obtained for industry sectors, but only for the US market as a whole.

In order to calculate dollar revaluation values or combined bidder and target abnormal returns, the abnormal return of each company is multiplied by its market value 21 and 61 days prior to the announcement date for the 7 and 47 days event windows respectively.

5.5.3 Calculation of post-announcement abnormal returns

Following Betton et al. (2008) I apply two independent methods to calculate post-announcement abnormal returns, (1) the calculation of buy-and-hold abnormal returns relative to control firms matched by industry, size and book-to-market ratio and (2) abnormal returns estimated from Fama-French factor regressions. The methodologies are described in detail in the following.

Buy-and-hold abnormal returns

Post-announcement buy-and-hold abnormal returns are calculated through a matching firm approach according to the methodology laid out in Betton et al. (2008). The matching of firms is performed on a worldwide dataset of publicly listed companies, compiled following the procedure of Ince & Porter (2006) and Schmidt, Von Arx, Schrimpf, Wagner & Ziegler (2011). Following Betton et al. (2008), I[66] match companies on industry, market value and book-to-market ratio. In order to ensure the match between acquirer company and matching firm, a four step matching procedure is employed, where a matching firm is required to be within the SIC code and market value ranges and have the best fit in book-to-market value. I start with three-digit SIC codes and a market value range of $\pm 30\%$. For acquirer companies that do not obtain three matching firms in the first step, I relax the requirements to a market value range of $\pm 50\%$ and

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[66]I thank Felix Sehardt for extensive programming assistance

further to two-digit SIC codes and $\pm 30\%$ and $\pm 50\%$ market value ranges respectively. Three matching firms are determined for each acquirer company, which are ranked according to their fit[67] and are subsequently used once a matching firm ceases to exist. If the acquirer company ceases to exist, acquirer returns are replaced by the matching firm's returns. Sufficient matching firms are found for 1,058 out of 1,172 companies or approximately 90%.

The buy-and-hold abnormal return for company i and period T is calculated according to

$$BHAR_{i,T} = R_{i,T}^{\text{acquirer}} - R_{i,T}^{\text{matched firm}}$$

with

$$R_{i,T} = [\prod_{t=1}^{T}(1 + r_i)] - 1$$

and r_i being the respective raw returns. Buy-and-hold abnormal returns are calculated over different periods from one month to three years in order to confirm that results are in accordance with current literature. Following Ng et al. (2006) in the main analysis I will focus on windows of three and six months length after the announcement.

Fama-French factor regressions

In addition to the buy-and-hold returns described in the previous section, abnormal returns are calculated using a Fama-French factor model. For short term event studies with event windows of several days, MacKinlay (1997) points out that "the gains from employing multifactor models for event studies are limited"[65]. To correctly calculate returns in the longer run after an event, however, returns have to be carefully adjusted for risk factors such as size, book-to-market ratio and optionally momentum.

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[67]Within each step of the matching procedure, the matching company with the best fit is the one nearest in book-to-market ratio

I employ a Fama-French 3-factor model to account for additional risk factors relative to the simple market or a CAPM model, along the regression

$$R_{it} - R_t^f = \alpha_i + \beta_i(R_t^M - R_t^f) + s_i R_t^{SMB} + h_i R_t^{HML} + u_{it},$$

where, as above, R_t^f is the risk free rate, R_t^M represents the market return, and SMB ("small minus big") and HML ("high minus low") are the returns of portfolios built of companies with small market cap minus the return of a portfolio of companies with large market cap and portfolios with high market-to-book value minus low market-to-book value respectively. The parameter of interest is the intercept α_i. α_i indicates the abnormal return of company i relative to the market portfolio return R_t^M, while controlling for market risk, size and book-to-market factors (e.g., Barber & Lyon, 1997). I additionally test results employing a Fama-French 4-factor model, including the WML ("winner minus loser") momentum factor into the above factor regression. Once again, market and factor returns are obtained from Kenneth French's website.

Post-announcement medium-term factor regressions are performed with daily returns for the medium run of up to 12 months, and monthly returns for the long run of up to 36 months. An empirical drawback is that daily market and factor returns are only available for a US sample, monthly factor returns are available for different world regions.[68] Once again, as a large part of the research sample is constituted of US companies, this is considered to be a minor drawback. Additionally, in contrast to the above methodology for buy-and-hold returns, returns cannot be obtained for industry sectors, but only for the US market as a whole.

The results from the second calculation method deviate from buy-and-hold returns for two reasons. First, the resulting abnormal returns from the α_i are adjusted for market risk. In the above calculation of buy-and-hold abnormal returns companies involved in a merger are compared to industry, size and book-to-market matched firms that did not experience a merger. Thus, if a merger

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[68]Factors are available for North America, Europe, japan, Asia Pacific ex. Japan, and globally for the rest of world

event systematically changes company market risk, and therefore changes expected returns, there is a systematic upward bias in abnormal returns for merger companies.

Secondly, some statistical issues with abnormal returns from factor regressions have been identified. Barber & Lyon (1997) document that "test statistics based on abnormal returns calculated using a reference portfolio [...] are misspecified (empirical rejection rates exceed theoretical rejection rates) and identify three reasons for this misspecification"[69].

> "[T]hese three biases include:
>
> - new listing bias, which arises because in event studies of long-run abnormal returns, sampled firms generally have a long post-event history of returns, while firms that constitute the index (or reference portfolio) typically include new firms that begin trading subsequent to the event month,
>
> - rebalancing bias, which arises because the compound returns of a reference portfolio, such as an equally weighted market index, are typically calculated assuming periodic (generally monthly) rebalancing, while the returns of sample firms are compounded without rebalancing, and
>
> - skewness bias, which arises because long-run abnormal returns are positively skewed."[70]

Lyon, Barber & Tsai (1999) state that in the long run, abnormal returns based on reference portfolios potentially suffer from the above misspecifications in statistical tests. They present methods for the careful construction of reference portfolios in order to avoid these misspecifications and provide evidence that reference portfolios constructed along these methods reduce misspecification. Lyon et al. (1999) report that the first approach in this work, a method using control firms matched by size and book-to-market, together with the use of a conventional t-statistic yields a well-specified statistical test in random samples.

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[69]Barber & Lyon (1997, p. 341)
[70]Barber & Lyon (1997, pp. 342-343)

Kothari & Warner (1997) state that "conclusions from long-horizon studies require extreme caution"[71] due to possible misspecifications. In more detail they report their main result being ...

> "... that long-horizon tests are misspecified. For example, in samples of 200 securities, procedures based on the Fama-French 3-factor model show abnormal performance over a 36-month horizon for 34.8% of the samples [...]. The results are similar using other procedures and the general conclusions are not sensitive to the specific performance benchmarks. Further, the tests can show both positive and negative abnormal performance too often. Moreover, the abnormal performance persists throughout the horizon following a simulated event."[72]

They recommend the use of nonparametric or bootstrap procedures as in Ikenberry, Lakonishok & Vermaelen (1995). This bootstrap procedure is exactly the matching procedure from above, also recommended as well-specified in Lyon et al. (1999).

Due to the difficulties with the measurement of long-term abnormal returns, abnormal returns are calculated in the two independent ways described above.[73] As statistical issues become more severe in the longer run, I especially focus on medium-run abnormal returns in timeframes from three to six months after the event. I use buy-and-hold returns as described in Section 5.5.3 as the standard for this work and test results with abnormal returns from a Fama-French factor regression.

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[71]Kothari & Warner (1997, p. 301)

[72]Kothari & Warner (1997, p. 302)

[73]Loughran & Ritter (2000) state that "magnitude, and sometimes even the sign, of the abnormal returns are sensitive to alternative measurement methodologies" (Loughran & Ritter, 2000, p. 1)

5.5.4 Valuation of merger benefits

In the valuation of merger benefits a procedure similar to those used by Houston et al. (2001), Gilson, Hotchkiss & Ruback (2000) and Kaplan & Ruback (1995) is used. As merger gains I define the present value (PV) of announced merger synergies minus merger cost after tax. Merger synergies are specified as cost savings or revenue gains as a consequence of the merger. To calculate discounted cashflow values I use management cashflow projections for the years following the merger. Cost savings directly constitute incremental free cashflows, revenue gains have to be net of additional cost, which is rarely the case in management projections. If revenue gains are not net of additional cost, I do not regard them as a quantifiable synergy announcement. Contrary to Houston et al. (2001), cashflows are not projected into eternity by the respective long-term (10-year) inflation forecasts as I consider this too strong an assumption. Nonetheless, results are checked with inflated forecasts and no major deviances are found. In those rare cases where a lower and an upper bound was given for synergies I take the lower bound as the base case.

In most cases managerial synergy announcements only include cost savings or revenue enhancements in the "final state" after the merger. To account for this fact, and in order to treat all mergers equally, only final state data is used in the analysis. I calculate ramp-up merger gains for the first four years after the merger as 0 in the first year and 1 in the fourth year and after, with a 100% yearly ramp-up growth rate, yielding a time series of 0, 0.25, 0.5 and 1 in years one to four.[74] Similar to Houston et al. (2001) the present value of the synergy announcement of company i, PV_i, is calculated along

$$PV_i = \sum_{y=1}^{5} \frac{C_y + R_y}{(1+r)^a} + \frac{C_5 + R_5}{(r-I)(1+r)^A} - RC,$$

where C_y and R_y are the year y after-tax cost savings and revenue gains for year y respectively, r is the discount rate and I is the inflation rate, set to zero in the base case. In year five the final state is reached. RC is the lump sum of merger costs.

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[74]This methodology roughly follows Bernile (2004)

Merger costs

Merger costs are frequently not given in management synergy estimates. To produce consistent results in spite of poor data quality I adopt the assumption frequently made by practitioners of merger costs being one year of total synergies in the final state. As merger costs are incurred at the time of or shortly after the merger, no discounting is necessary.

Discount rates

To produce an estimate for the present value of merger synergies at announcement, future cashflows have to be discounted to the date of the merger announcement. In measuring stock returns a cashflow-to-equity view is adopted. Therefore, and in contrast to Houston et al. (2001) and Bernile (2004), I use yearly industry ICCs, and hence implicit cost of equity, as discount rates. Following the GLS methodology by Gebhardt, Lee & Swaminathan (2001), ICCs are measured on a data set for the G-7 countries, in a period between July 1990 and December 2011, conditional on Datastream data availability and, especially, the availability of I/B/E/S forecasts.[75] As a robustness check, and following Houston et al. (2001), equity discount rates for individual firms are calculated using a CAPM for the acquirer. The capital beta is calculated using weekly data over a timeframe of two years, as suggested in Bartholdy & Peare (2005). As risk-free rate I choose the ten-year US Treasury bond yield on the announcement date, for calculation of the discount rate a market risk premium of 7% is assumed.

In case a perpetuation of incremental merger cashflows is done (see Scenarios), it is performed with the long-term inflation rate estimates obtained from the Philadelphia Federal Reserve Bank.

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[75]Additional information on ICC methodologies can be found in Hail & Leuz (2009), I thank Christoph Jäckel and Katja Mühlhäuser for providing the actual ICC data from their research on Jäckel & Mühlhäuser (2011)

Tax adjustments

Dollar estimates for synergies in M&A are usually given before tax. In order to ensure comparability of stock value effects with the present value of future cashflows, the PV has to be calculated after tax. I use federal corporate tax rates for the acquirer's home country to calculate after-tax cost savings and revenue gains from the pre-tax figures.[76] I obtain corporate marginal tax rates by country published by KPMG through Damodaran Online.

Scenarios

I study three different scenarios for the valuation of merger benefits. As stated above the basic assumption is the case of perpetual merger benefits which do not grow with the inflation rate:

SV1: Perpetual merger benefits in constant nominal terms, i.e., not growing with inflation

In this basic scenario merger benefits are slowly decaying in real value over time. Additionally I provide two scenarios with perpetual and growing benefits and decaying benefits respectively:

SV2: Perpetual merger benefits in constant real terms, i.e., growing with long-term expected inflation

SV3: Linearly decaying merger benefits after year five to year ten

The last scenario, *SV3*, represents the assumption that synergy effects vanish through competition as they have to be passed on to clients. When industries undergo a consolidation wave, and more companies are able to realize synergies from mergers, competition will lead to the incorporation of the cost savings into product prices. The savings are then no longer available as cashflows to the merged companies. A second effect may be that savings efforts that are made in

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[76]Houston et al. (2001) use a tax rate that is three percentage points above the federal corporate tax rate to reflect the application of state taxes. I skip this assumption because I consider its influence on the results to be minor

conjunction with a merger may materialize at first and then slowly vanish in daily business. This study seems to be the first study on merger benefits to regard such a scenario.

5.5.5   Cross-sectional analyses

Most of the results in Section 5.6 are obtained through cross-sectional regressions on the abnormal returns and synergy announcements of individual mergers. The respective detailed model for each hypothesis is given there.

In this subsection I briefly define the set of deal control variables which will be used in the regressions. Additional acquirer specific control variables are given below. Selection of deal control variables is based on Bruner (2002), Moeller, Schlingemann & Stulz (2004) and Aybar & Ficici (2009), who in detail review the influence of control variables on M&A abnormal returns, and Dutordoir et al. (2010), leaving out some variables with no or minor explanatory power according to the above-mentioned publications. $DealContVar$ is defined as a vector of deal control variables in Table I.

In addition to the deal specific control variables in $DealContVar$ I control for acquirer characteristics which are identified in the literature to influence investor reaction to corporate news events. I briefly summarize these variables in the following.

The first two acquirer specific variables are the log number of analysts following the acquirer company, $Analysts$, and the standard deviation of daily acquirer returns prior to the merger announcement, $ReturnsStDev$. The first is an indicator for the amount of information demanded by and available to investors, e.g., through analyst reports, the second depicts acquirer volatility and is an indicator for investor uncertainty regarding the standalone value of the company.

$AcquirerMomentum$ is the 12-months cumulative raw return ending in the month before the month of the forecast. Together with the $AcquirerBeta$, and size and book-to-market variables in the deal specific variable set, the momentum variable

Table I: Deal control variables constituting the vector *DealContVar* for cross-sectional regressions

AcquirerMV	—	Acquirer market value 21 days before announcement (logarithmic)
TargetMV	—	Target market value 21 days before announcement (logarithmic)
TransactionValue	—	Transaction value of the M&A deal (logarithmic)
TimeToCompletion	—	Time delay between announcement and completion of deal in days
TargetMV/AcquirerMV	—	Relative size of the target company
AcquirerTobinsQ	—	Tobin's Q value of acquirer company, as measure of company overvaluation
CrossCountry	—	Cross-country dummy variable, 0 for same-country acquisition, 1 otherwise
CrossIndustry	—	Cross-industry dummy variable, 0 for same-industry acquisition, 1 otherwise[1]
DealAttitude	—	Deal attitude dummy, 0 for friendly, 1 otherwise
ConsiderationStructure	—	Consideration structure dummy, 0 for all but cash-only, 1 for cash-only
MultipleBidders	—	Multiple-bidders dummy, 0 for single bidder, 1 otherwise
AntidirectorRightsIndex	—	Antidirector Rights Index as measure for shareholder protection in acquirer's country[2]
ICC	—	Implied cost of capital for acquirer in merger year

[1] Same-industry defined by identical first two digits of 4-digit SIC codes
[2] Revisited values for the Antidirector Rights Index are obtained from Spamann (2010)

controls for a relation between the size of the of the post-announcement abnormal buy-and-hold returns and market and factor risks (Ng et al., 2006).

The variable *R&D* is defined as a company's yearly R&D spending divided by its total assets. Through the announcement of a merger, and more so if it includes synergy forecasts, competitors learn about the failure and success of company projects. This information disclosure in a competitive environment constitutes a cost to the company which is higher the more research and development a company undertakes (Wang, 2007). The R&D intensity of each company is measured during the last fiscal year prior to the transaction announcement.

As another measure for the proprietary cost of information disclosure the acquirer industry's Herfindahl Index is included (Gigler, 1994). The proprietary cost of information disclosure is higher the more competitive the industry a company is operating in (lower Herfindahl Index value), as competitors are more likely to exploit the information given in the announcement. The variable $HerfindahlIndex$ is calculated through the formula $\sum_i^n MS_i^2$, where MS_i is the market share of the ith company and n is the number of companies within a given 2-digit SIC code. A lower Herfindahl Index value means lower industry concentration and thus increased competition. The index is based on the calendar year prior to the transaction announcement.

The variable $TimeToFYEnd$ represents the time between the announcement and the end of the fiscal year. The variable is included as studies on voluntary disclosure (e.g., Johnson, Kasznik & Nelson, 2002) show that forecast errors diminish with shorter time lags to the fiscal year end. In this case, as management has to issue annual reports at the fiscal year end, assumptions that are stated as basis for the merger can be controlled by investors through year end reports, which for shorter time lags gives less room for overly optimistic assumptions.

I include litigation risk into the measures of proprietary cost as it constitutes a potential cost to the company. Companies that are more likely to be sued should exhibit a smaller amount of potential misrepresentation and therefore reduced investor uncertainty. Litigation risk is calculated through a model based on Rogers & Stocken (2005).[77]

A dummy variable $PredictLoss$ is included to indicate if I/B/E/S one-year analyst forecasts on earnings per share are negative, i.e., a loss for the upcoming year is predicted. The variable is included as losses are shown to make forecasts more difficult, and therefore increase uncertainty (Stocken, 2000).

As an additional control variable I compute the analyst forecast dispersion for acquirers' I/B/E/S forecasts. $ForecastDisp$ depicts the EPS forecast uncertainty or lack of consensus among analysts one month before deal announcement (e.g.,

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[77]The model by Rogers & Stocken (2005) additionally includes the term $0.012 \times Beta$ where $Beta$ is measured against the CRSP equal-weighted index. As in this study Datastream data is used on a worldwide data sample, the term is left out

Stocken, 2000). It is calculated from I/B/E/S as the standard deviation of analyst forecasts divided by its mean. I use forecasts on earnings per shares as they are the most widely available on I/B/E/S and pose the least restrictions on the sample. Similar to *ReturnStDev*, higher standard deviation in analyst forecasts suggests higher uncertainty in stock price valuations. The variable is included into the regression only for robustness testing as due to availability constraints a considerable amount of observations is deleted on the requirement of *ForecastDisp* being available. Results are not changed by including the variable into the regressions.

Another variable included for robustness testing is the percentage of shares in free-float, *SharesFF*. This variable controls for institutional ownership. It seems possible that institutional owners take influence on the managerial decision to disclose synergies in a merger. The variable is only included in robustness tests as limited data availability reduces sample size. Furthermore, institutional ownership has already been proven insignificant for the disclosure decision and disclosure short-term value creation by Dutordoir et al. (2010).

Testing results on Hypothesis 1, I include target diversification, *TargetDiv*, the number of target SIC-codes divided by target market cap into the regression. The division by market cap is made in order to avoid collinearity between target size and number of SIC-codes as it seems natural that larger targets operate in a higher number of industries.

The control variables in *DealContVar* together with the acquirer specific control variables form the vector of control variables *ContVar*. The respective vector of coefficients for the control variables will be denoted as γ in Section 5.6. I additionally control for industry affiliation using industry, and merger year using year dummy variables.

5.6 Empirical results

In Section 5.6.1, some descriptive statistics and analyses on important sample characteristics are laid out. Thereafter I discuss empirical results along the hypotheses developed in Section 5.4.

5.6.1 Descriptive statistics and sample characteristics

I analyze a sample of 1,172 M&A transactions during the period from 2000 to 2011. Table II shows an overview of the sample split along different years. In 31% of the mergers in the sample synergy estimates were provided by management. We observe that, while the disclosure fraction is increasing only insignificantly over the years, the number of deals shows the pattern of the M&A cycle, with relatively many mergers in the pre-crisis years from 2005 to 2007 and relatively few mergers in the period from 2001 to 2004 and 2008 to 2011. Disclosure rates increase at a rate of 0.4%-points per year, from 27% in 2000 to 39% in 2011, but the increase is not statistically significant. The right hand side of Table II shows the sample excluding financials and utilities, as is frequently the practice in studies on M&A and especially on synergy disclosure. Observations do not differ significantly. The effect of increasing disclosure rates, which is reported to be stronger by other authors, may in part be due to data availability being worse for older deals. In this work a significantly higher fraction of deals with synergy disclosure is reported than in the recent study by Dutordoir et al. (2010).[78]

Table III shows a breakdown along industries for the full sample. We observe that the industries with the highest number of mergers are Finance, Business Equipment and Healthcare. Highest disclosure rates above 40% can be observed in Chemicals and Manufacturing, lowest rates below 20% in Business Equipment. This may be due to the fact that the first two are process industries where cost savings play an important role in mergers, while the latter is less process

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[78]31% of deals have a synergy disclosure for the period 2000–2011 while Dutordoir et al. (2010) report a share of 17% for the period 1995–2008

Table II: Full sample, yearly breakdown

Year	Incl. fins and utils			Excl. fins and utils		
	Total	Discl.	Fraction	Total	Discl.	Fraction
2000	151	41	27%	99	31	31%
2001	95	31	33%	50	17	34%
2002	47	14	30%	29	10	34%
2003	84	28	33%	57	20	35%
2004	99	34	34%	54	23	43%
2005	124	42	34%	87	27	31%
2006	158	52	33%	97	28	29%
2007	169	42	25%	109	29	27%
2008	60	17	28%	41	13	32%
2009	58	19	33%	38	15	39%
2010	86	29	34%	60	19	32%
2011	41	16	39%	23	8	35%
Total	1,172	365	31%	744	240	32%

driven, and mergers might be more strategic and less cost focused. I will further investigate this in Section 5.6.2, controlling for different factors that drive the disclosure decision apart from industry affiliation. All regressions include controls for merger year and industry affiliation.

Table IV shows basic characteristics of short-run abnormal returns during the announcement window and post-announcement medium- and long-run buy-and-hold abnormal returns. In line with prior studies[79], negative acquirer CARs of -1.79% are found on the full sample, statistically significant at the 1%-level, positive target CARs of 17.03%, statistically significant at the 1%-level and slightly positive combined CARs of 1.39%, statistically significant at the 1%-level. Combined CARs amount to USD 40.1m. CAR values seem to be quite similar for deals with and without synergy disclosure, suggesting no impact of the disclosure decision on run-up returns. This, however, will be reviewed below taking into

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[79]See, e.g., Betton et al. (2008), Meglio & Risberg (2011) and Hutzschenreuter et al. (2012) for an overview of recent literature. Betton et al. (2008) provide a review of recent, large sample studies that explicitly provide estimates of abnormal returns. They reach the conclusion that average target CARs are positive and significant, while largest CARs appear in all-cash offers amounting to 28%. Combined CARs are on average positive and significant at a level of 1.06%, while bidder CARs are around 0.73% with negative and significant z-statistic and a negative median

Table III: Full sample, industry breakdown

Industry	No. of deals			Market cap.	
	Total	Discl.	Fraction	Non-discl.	Discl.
Business Equipment	211	40	19%	32.58	2.02
Chemicals	25	15	60%	30.37	3.74
Consumer Durables	14	4	29%	18.39	1.01
Consumer Non-Durables	63	25	40%	11.31	2.38
Healthcare	123	36	29%	37.80	4.06
Manufacturing	97	46	47%	18.45	1.62
Wholesale. Retail	49	18	37%	12.54	1.56
Other	162	56	35%	7.57	1.55
Finance	261	70	27%	23.42	3.13
Oil. Gas. and Coal	86	23	27%	21.46	3.31
Telecommunication	51	20	39%	34.76	4.69
Utilities	30	12	40%	15.66	4.04
Total	1,172	365	31%	23.11	2.67

account the self-selection bias in the disclosure decision, showing a significant effect on CARs from voluntary synergy disclosure.

We observe that within the sample of 1,172 M&A transactions during the period from 2000 to 2011, post-announcement buy-and-hold returns are significantly positive in the medium-run 3- and 6-months period and subsequently turn negative for the longer 12-months and 36-months timeframe.[80] In the first three months after the merger, acquirers on average gain statistically significant abnormal buy-and-hold returns of 1.38% relative to industry, size and book-to-market matched control firms, with a significantly positive median of 0.81%[81]. Within the full sample, non-disclosure firms on average earn positive and significant post-merger abnormal returns of 1.67%, compared to insignificant 0.73% in the disclosure sample. These results are confirmed using a Fama-French 3-factor regression as described in Section 5.5.3. In the longer 12-months period results lose statistical significance, and turn significantly negative for buy-and-hold returns in the 36-months period. The Fama-French 3-factor regression shows positive, but insignificant results for the 36-months period. The discrepancy between long-run

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[80]I do not report results for 60-months timeframes in this work as sample size is strongly reduced

[81]Statistical significance calculated with a non-parametric Wilcoxon test

buy-and-hold abnormal returns and abnormal returns from a factor regression shows the dependency of results on the methodology of measurement as, e.g., observed by Kothari & Warner (1997).

In addition to the observation of significantly positive short-run 3- and 6-months abnormal returns it seems that this result is driven primarily by deals in the non-disclosure sample, i.e., mergers that do not exhibit a voluntary disclosure of a managerial synergy estimate. I will discuss this fact further in the discussion of hypotheses later. Results in Table IV do not seem to be driven by outliers, as results are stable against the use of Winsorized abnormal returns (not reported). Long-run post-merger returns have intensively been studied in the literature, and the results on long-run abnormal returns are in line with literature. While the issue of whether long-term post-merger stock performance is negative and significant is still not entirely resolved, estimates involving different methods range from a statistically significant negative BHAR of -16% (Moeller, Schlingemann & Stulz, 2003) to the absence of statistically significant risk-adjusted abnormal performance (e.g., Dube & Glascock, 2006).[82] However, as laid out in Section 5.4, this study focuses on short-run rather than long-run returns.

As can be seen in Table V, the average and median transaction value, target market value[83] and relative size of equity are significantly larger for deals with synergy disclosure than without synergy disclosure, suggesting absolute and relative deal size to be important drivers in the disclosure decision. Interestingly, acquirer market values on average are smaller in the disclosure sample than in the full sample, albeit contributing to an additional increase in relative deal size.

Present values of synergy announcements on average amount to 7.8% (median 4.4%) of combined market value, using the valuation methodology without perpetuation of merger gains (*SV1* in Section 5.5.4). A valuation methodology with perpetuation as in Dutordoir et al. (2010) (*SV2*) leads to an average of 11.7% of combined market value (median 6.59%), under the assumption of a decay of merger benefits over time (*SV3*) total benefits amount to 3.4% (median 1.9%)

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[82]Dutta & Jog (2009) provide an overview of long-term performance studies on M&A transactions

[83]Market values reported here are measured one month (21 days) before deal announcement

Table IV: Sample characteristics and abnormal returns

Variable	Full sample		Non-discl. sample	Discl. sample	Difference in mean
	Mean	Median[1]	Mean	Mean	t-value[2]
Cumulative abnormal returns during the announcement window:					
Combined CAR	1.39%***	0.99%	2.42%***	0.92%***	−3.27***
Combined CAR (USDm)	40.1	43.6	43.2	38.7	
Acquirer CAR	−1.79%***	−1.46%	−2.05%***	−1.68%***	0.78
Target CAR	17.03%***	15.33%	16.85%***	17.12%***	0.27
Acquirer buy-and-hold returns beginning 4 days after the announcement window:					
BHAR (3-months)	1.38%**	0.81%**	1.67%**	0.73%	−0.74
BHAR (6-months)	1.96%**	1.38%**	2.15%*	1.50%	−0.31
BHAR (12-months)	−0.53%	−0.65%	−1.59%	1.89%	1.23
BHAR (36-months)	−12.66%***	−5.82%***	−11.74%***	−14.82%***	−0.51
Acquirer factor regression returns beginning 4 days after the announcement window:					
BHAR (3-months, daily)	1.95%***	1.45%***	2.06%***	1.70%**	−0.35
BHAR (6-months, daily)	3.27%***	2.79%***	3.39%***	2.99%*	−0.25
BHAR (12-months, daily)	3.48%***	3.94%***	2.42%*	5.90%***	1.50
BHAR (12-months, monthly)	1.88%	2.31%**	1.37%	3.02%	0.63
BHAR (36-months, monthly)	13.04%	8.85%***	17.47%	2.64%	−0.79

[1] Statistical significance calculated by a non-parametric Wilcoxon test

[2] Difference between synergy sample and sample without synergy announcements

Table V: Sample characteristics and abnormal returns (*continued*)

| Variable | Full sample | | Non-discl. sample | Discl. sample | Difference in mean |
	Mean	Median[1]	Mean	Mean	t-value[2]
Acquirer buy-and-hold including the announcement window:					
BHAR (3-months)	−0.48%	−1.11%	−1.56%	−0.01%	1.15
BHAR (12-months)	−2.48%*	−1.81%	−0.43%	−3.37%**	−1.02
BHAR (36-months)	−11.05%***	−8.64%***	−8.61%**	−16.85%***	−1.24
Deal characteristics:					
Transaction value (USDb)	3.82	1.22	7.24	2.61	−8.98***
Acquirer market cap (USDb)	23.11	5.88	20.12	5.90	−1.57
Target market cap (USDb)	2.67	0.83	5.05	1.69	−9.00***
Relative size of equity	0.35	0.20	0.46	0.34	−5.33***
Announced synergies (SV1):[3]					
PV Synergy/Comb. MV			7.8% (4.4%)		
PV Synergy (USDb)			1.14 (0.38)		
N[4]	1,172		807	365	

[1] Statistical significance calculated by a non-parametric Wilcoxon test

[2] Difference between synergy sample and sample without synergy announcements   [3] Scenario *SV1* in Section 5.5.4, median values displayed in brackets   [4] Sample sizes for BHARs slightly differ from full sample: 3-months, 6-months, 12-months - 1058/736/322, 36-months - 914/641/273

Table VI: Sample characteristics, further variables

	Non-discl. sample		Discl. sample		Diff. in mean
Variable	Mean	Median	Mean	Median	t-value[1]
TimeToCompletion	122.3	96.0	167.0	143.0	7.49***
AcquirerTobinsQ	1.61	1.35	1.46	1.26	−1.80*
CrossCountry	0.26	0.00	0.28	0.00	0.52
CrossIndustry	0.33	0.00	0.29	0.00	−1.32
DealAttitude	0.01	0.00	0.02	0.00	1.96*
ConsiderationStructure	0.40	0.00	0.28	0.00	−3.66***
MultipleBidders	0.05	0.00	0.09	0.00	2.42**
AntidirectorRightsIndex	3.32	3.00	3.24	3.00	−1.28
ICC	0.096	0.098	0.097	0.098	0.13
N	807		365		

[1] Difference between synergy sample and sample without synergy announcements

of combined market value. These results are closely in line with results reported in Dutordoir et al. (2010) of 11.68% of combined equity on average (median of 6.91%). Bernile (2004) report managerial synergy estimates to, on average, amount to 6.18% of combined equity.

Statistical significances are marked as follows: * for 10%, ** for 5% and *** for 1% confidence level.

5.6.2 Drivers for the disclosure decision

In this subsection I analyze the factors that drive the managerial decision to publish synergy forecasts. In Section 5.4 the hypotheses that information asymmetry increases the inclination to disclose (Hypothesis 1a) and favorable information is disclosed more frequently (Hypothesis 1b) were established. These hypotheses will be tested in the following.

Hypothesis 1a: Information asymmetry drives disclosure decision

According to the argumentation in Section 5.4, information asymmetry and thus deal complexity is a driver for the disclosure of synergy estimates in an M&A

situation. It was already stated that, following Chari et al. (1988), Grinstein & Hribar (2004), da Silva Rosa et al. (2004) and Dutordoir et al. (2010), information asymmetry would be measured by target size, relative deal size, i.e., the proportion of target to acquirer market value, deal time-to-disclosure, i.e., the time from deal announcement to deal completion, and the number of analysts following the acquirer. Results are tested including a measure for the diversification of the target based on the number of target SIC-codes. On the other hand, higher proprietary cost, measured through variables for the R&D intensity, industry competitiveness and the acquirer's litigation risk is expected to decrease managerial inclination to disclose synergy forecasts.

Research design

I run a probit regression along the model

$$Probit(SynergyAnnouncement) = \gamma \cdot ContVar + \epsilon, \tag{5.1}$$

where $SynergyAnnouncement$ is a dummy variable, taking the value 0 if no synergies are announced and 1 for deals with synergy announcement, and $ContVar$ is the set of control variables explained in detail in Section 5.5.5. The regression results are displayed in Table VII. Variables are briefly discussed in the following.

$SynergyAnnouncement$**:** The variable $SynergyAnnouncement$ is a dummy variable indicating if a synergy announcement has been made during the announcement event window.[84] It takes the value 1 if a synergy announcement is made and 0 otherwise. To be taken into account in this variable, synergy announcements have to be quantifiable. This means management has to at least provide estimates of the expected additional annual cash-flow generated through synergies, predominantly in the form of cost savings. Cash-flow estimates are frequently given summarized over the first few[85] years after the merger or as an estimate for the "final state" after the merger is completed. Similarly to the assumption in

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[84]In all but very few cases the synergy announcement is made on the exact date of deal announcement

[85]In most cases estimates are given as a sum over the first three years after merger completion

Kimbrough & Louis (2011) regarding the existence of conference calls, I expect the announcement of quantifiable synergies, besides its own informative value, to be an indicator for the amount of information provided at the announcement of a merger. I expect that companies which provide a synergy estimate also provide more detailed additional information regarding the deal, which makes it easier for investors to fully understand and believe in the deal rationale at the time of announcement.

$ControlVariables$**:**   In this regression and the following, I include the full set of control variables from Section 5.5.5 which can be split into the three categories: (a) acquirer specific variables, (b) deal specific variables and (c) industry and year dummy variables which later also used as instruments for endogeneity correction.

Results

Table VII shows that synergy announcements are primarily driven by the three variables $TargetMV$, $TimeToCompletion$ and $TargetMV/AcquirerMV$ which represent the target value, the deal time-to-completion and the relative size of the target. All of these three variables can be viewed as deal complexity measures: the larger a target is, in absolute and relative terms and the longer the time until deal completion, the more complex a deal will be on average. Regression (III) in Table VII includes all three variables and shows positive coefficients with 1% significance levels on all three. Regressions (I) and (II) confirm these results. In these regressions, the acquirer market value is included. In regression (I) we observe that higher acquirer market value negatively influences the inclination to disclose, regression (II) shows that this effect is only relevant in so far, as lower acquirer market value increases the relative deal value $TargetMV/AcquirerMV$. In order to check that these results are not only driven by size, but complexity, I include the degree of target diversification, $TargetDiv$, into regression (I) (unreported). $TargetDiv$ then obtains a positive coefficient, significant to the level of 10%, showing that higher target diversification, and thus integration complexity, increases the inclination to disclose. This further strengthens the confidence that results are not only driven by size, but that size measures are a proxy for deal

Table VII: Probit regression: Drivers for synergy announcement

Variable	Expected Sign	Synergy Announcement		
		(I)	(II)	(III)
$AcquirerMV$		−0.2798***	0.0552	
		(0.0494)	(0.043)	
$TargetMV$	+	0.5064***		0.3153***
		(0.0525)		(0.0452)
$TimeToCompletion$	+	0.0017***	0.0023***	0.0019***
		(0.0005)	(0.0005)	(0.0005)
$TargetMV/AcquirerMV$	+		0.7746***	0.3943***
			(0.1481)	(0.1425)
$AcquirerTobinsQ$		−0.0489	−0.0534	−0.0585
$CrossCountry$		0.0232	0.0651	0.0114
$CrossIndustry$		−0.0562	−0.1463	−0.1208
$Dealattitude$		−0.2384	0.0605	−0.1746
$ConsiderationStructure$		0.1128	−0.1939*	−0.0446
$MultipleBidders$		0.1920	0.2287	0.1447
$AntidirectorRightsIndex$		−0.1141*	−0.1061*	−0.0941
ICC		0.8826	−1.3462	1.4958
$Analysts$	+	0.2528***	0.2548***	0.1009
		(0.0814)	(0.0793)	(0.0734)
$R\&D$	−	0.9049	0.7179	0.7796
$HerfindahlIndex$	+	1.3801	1.6743*	1.4073
$LitigationRisk$	−	−2.3367	−1.9492	−3.6425**
$ReturnStDev$		−0.1706	−0.0686	−0.0370
$AcquirerMomentum$		−0.0233	−0.0143	−0.0310
$AcquirerBeta$		−0.0457	−0.0673	−0.0613
$TimeToFYEnd$		0.0004	0.0003	0.0004
$PredictLoss$		0.2493	0.1592	0.2632
$Intercept$		−4.0391***	−2.3368**	−5.5236***
		(1.0278)	(0.9712)	(0.9751)
$IndustryDummies$		yes	yes	yes
$YearDummies$		yes	yes	yes
R-squared[1]		0.37	0.32	0.35
VIF max[2]		6.0	5.9	6.0

[1] Maximum likelihood pseudo r-squared

[2] Maximum variance inflation factor of regression, occurring on ICC

Notes: Standard errors displayed in brackets in case of statistical significance

complexity. A significant positive coefficient is also obtained when the number of target SIC-codes is included while leaving out $TargetMV$ in the regression. Along the hypothesis derived in Section 5.4 I assume that more complex deals need additional explanation due to larger information asymmetry between acquirer management and shareholders and also need additional justification due to the additional risks connected with these deals. Additionally, a higher number of analysts following the acquirer significantly increases the managerial inclination to disclose synergy forecasts. As already stated in Section 5.4, I interpret this as a further indication that information asymmetry is the driving force behind voluntary synergy disclosure.

We observe that the proprietary cost variables in Table VII largely have the expected signs, although they mostly do not exhibit statistical significance. A higher Herfindahl Index, indicating higher industry concentration and less competition, leads to an increased probability of disclosure. Higher litigation risk for the acquirer company leads to decreased probability of voluntary disclosure.

There are two additional observations to be made in Table VII. First, we see that the sum of all control variables included in the regressions only explains around 35% of the total variation in the decision to disclose. This suggests the existence of important additional unmeasured factors that influence the decision for information disclosure in this setting. Dutordoir et al. (2010), in a similar regression, report explanatory powers of 29% to 42% depending on specification, and are therefore in a very similar range. Second, we observe additional factors that influence the disclosure decision. Higher acquirer Tobin's Q seems to have an adverse effect on the probability of synergy forecast disclosure, although not statistically significant. According to Doukas (1995) and Dong, Hirshleifer, Richardson & Teoh (2006), lower Tobin's Q in the announcement sample relative to the full sample shows that M&A deals that feature a synergy disclosure seem to be less driven by acquirer overvaluation and more driven by real synergies. I suppose that companies with a higher market value compared to book value (and therefore higher Tobin's Q), indicating a higher probability of overvaluation, more frequently conduct M&A transactions to acquire value with their inflated stock price instead of a clear synergy rationale. As Tobin's Q is an industry specific measure it is important to account for industry affiliation. Fur-

144

thermore, we observe strong industry effects on the probability of disclosure (not reported in Table VII). This suggests that there are industries in which synergy disclosure is more important or more common than in others, driving the management to themselves disclose synergy information. Table VIII shows differences in disclosure probabilities between industries. One observation is that, all else equal, process industries with lower R&D spending and higher possible process synergies such as "Chemicals", "Manufacturing" and "Wholesale, Retail" have significantly higher disclosure rates than industries with higher R&D spending such as "Healthcare" and "Business Equipment". This is in line with the notion that information disclosure always comes at a cost, and even more so the more knowledge intense an industry is.[86] Also, in process industries the rationale and quantification of synergies, especially on the cost side, is clearer and more credible to investors, while synergies in R&D intense industries might well have other than purely cost focus. Making this observation at this point, I will use industry and year controls as instruments for 2SLS and Heckman regressions below. Including an industry disclosure index as in Dutordoir et al. (2010) instead of industry dummies in (5.1) produces largely identical results, with a significant effect of the disclosure index on the probability to disclose.

Overall, we find Hypothesis 1a confirmed. Information asymmetry, as predicted by theory, is a strong driver for information disclosure in the M&A setting. The findings reported in this section are in line with Dutordoir et al. (2010). They find that the decision to disclose is driven by information asymmetry stemming from deal complexity. Largely independent from the number of control variables included they find highly significant positive coefficients on both absolute and relative deal size. They also find synergy disclosures to be significantly more likely for same-industry deals, a result that I confirm in direction, but without statistical significance. The authors find a similar effect on the market-to-book value as I do on Tobin's Q, with a statistically significant negative coefficient. The results are also in line with Kimbrough & Louis (2011), who find significant

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[86]E.g., Wang (2007) shows that companies with high R&D expenditures as a percentage of total assets are less likely to publish earnings announcements because of the additional proprietary cost attached in this case. Conversely, Ajinkya, Bhojraj & Sengupta (2005), using other proxies, find no effect between a company's proprietary cost and the inclination to publish forecasts

Table VIII: Probit regression: Influence of industry affiliation on disclosure probability

Industries	BE	CH	CD	CN	HC	MF	WR	FI	TC	OG	UT	OT
Business Equipment (BE)		1.19***	0.39	0.44.	0.23	0.76***	0.51*	0.13	0.54*	−0.21	0.3	0.27
		(−0.33)	(−0.44)	(−0.24)	(−0.2)	(−0.2)	(−0.26)	(−0.19)	(−0.25)	(−0.28)	(−0.3)	(−0.2)
Chemicals (CH)			−0.8	−0.74*	−0.96**	−0.42	−0.68.	−1.05**	−0.64.	−1.4***	−0.89*	−0.91**
			(−0.53)	(−0.37)	(−0.35)	(−0.35)	(−0.38)	(−0.34)	(−0.38)	(−0.41)	(−0.41)	(−0.35)
Consumer Durables (CD)				0.06	−0.16	0.37	0.12	−0.26	0.16	−0.6	−0.09	−0.12
				(−0.46)	(−0.44)	(−0.43)	(−0.45)	(−0.43)	(−0.48)	(−0.46)	(−0.51)	(−0.43)
Consumer Non-Dur. (CN)					−0.22	0.32	0.06	−0.31	0.1	−0.65*	−0.15	−0.17
					(−0.25)	(−0.25)	(−0.28)	(−0.23)	(−0.31)	(−0.29)	(−0.34)	(−0.23)
Healthcare (HC)						0.53*	0.28	−0.1	0.32	−0.44.	0.07	0.04
						(−0.21)	(−0.26)	(−0.2)	(−0.28)	(−0.26)	(−0.32)	(−0.2)
Manufacturing (MF)							−0.26	−0.63**	−0.22	−0.97***	−0.46	−0.49*
							(−0.26)	(−0.2)	(−0.28)	(−0.27)	(−0.32)	(−0.2)
Wholesale. Retail (WR)								−0.37	0.04	−0.72*	−0.21	−0.23
								(−0.24)	(−0.32)	(−0.3)	(−0.36)	(−0.24)
Finance (FI)									0.41	−0.34	0.17	0.14
									(−0.26)	(−0.24)	(−0.3)	(−0.17)
Telecommunication (TC)										−0.75*	−0.25	−0.27
										(−0.34)	(−0.35)	(−0.27)
Oil. Gas and Coal (OG)											0.51	0.48*
											(−0.38)	(−0.24)
Utilities (UT)												−0.03
												(−0.32)
Other (OT)												

Notes: Regression incl. $ContVar$; standard errors displayed in brackets; read table from left to right: disclosure rate CH significantly higher than BE

positive effects on the probability to hold a conference call and therefore on the probability of additional information disclosure of, among others, the relative deal value and the number of analysts following.

Hypothesis 1b: Favorable information is disclosed more frequently

In this section the hypothesis that higher expected value of synergies, and thus more favorable information, leads to higher probability of synergy disclosure is tested.

Research design

In a first step I analyze the factors that drive expected synergy values on the subsample where synergy values are reported. Having identified these factors, in a second step I calculate hypothetical synergy values for those M&A deals in the full sample that are not in the synergy sample. I thus assume that for deals where no disclosure has been made, synergy values are driven by the same factors as in the rest of the sample, i.e., if synergy values had been made they would have, on average, been as calculated in this second step. In a third step the correlation between synergy value and disclosure probability is analyzed.

Step 1: I analyze which factors influence the value of synergies as percentage of combined market value in the synergy sample ($ExpectedSynergies_{SynSample}$) through the regression

$$ExpectedSynergies_{SynSample} = \alpha + \gamma \cdot ContVar + \epsilon, \tag{5.2}$$

where $ExpectedSynergies_{SynSample}$ is the present value of announced synergies as a percentage of the combined company market value. The present value of synergies is calculated according to the procedure in Section 5.5. $ContVar$ once again is the full set of control variables. The regression includes industry and year dummy variables.

The estimation procedure in (5.2) has to be corrected for possible selection bias. As we can only observe the value of synergies in case synergies have been disclosed, a natural selection bias for synergy values has to be assumed. The reason for this bias is the possible existence of additional factors that influence the size of the synergies and at the same time the inclination to disclose synergy information. This case of sample selection is an example for incidental truncation, where all explanatory variables are observed in all cases, but dependent variable $ExpectedSynergies_{SynSample}$ can only be observed on a subset of the full sample. This omitted variable bias can be corrected using a Heckman (Heckman, 1976; 1979) two-step procedure following Aktas, De Bodt & Cousin (2011) and Prabhala & Li (2007).

In the Heckman two-step procedure, an explicit selection equation is included into the model, additional to the outcome equation of interest. The selection equation explains the observability of the dependent variable, in this case the decision to disclose a synergy announcement, by the explanatory variables of the outcome equation and potentially additional variables.[87] The selection equation is estimated using a probit model in a regression of a disclosure dummy variable on the set of explanatory variables. Subsequently, the inverse Mill's ratio is calculated for every observation and included into the regression of the outcome equation. In the estimation of (5.2) a value for the inverse Mill's ratio λ of 0.06 is obtained, with a t-value of 0.9, indicating only a weak self-selection bias for the synergy disclosure decision. The regression reveals good explanatory power of the control variables on the synergy size with multiple R-squared equal to 0.27.

Step 2: I use the coefficients from (5.2) to create expected synergy values for

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[87]For the Heckman procedure to produce proper results, and especially useful standard errors, one is advised to include an exclusion restriction. An exclusion restriction means that the selection equation contains additional explanatory variables compared to the outcome equation. Without an exclusion restriction there are usually concerns about multicollinearity between the inverse Mill's ratio and the explanatory variables in the second step of the estimation procedure, leading to inflated standard errors (Lennox, Francis & Wang, 2011). Nonetheless, as we are only interested in the estimates of the parameters in $ContVar$ and not in the standard errors of these estimates, and secondly the setting does not suggest a natural exclusion restriction, I forgo an exclusion restriction in this case

Table IX: Probit regression: Effect of synergy value on probability of synergy disclosure

| | | Synergy Announcement | |
Variable	Expected Sign	(I)	(II)
ExpectedSynergies	+	7.7867***	0.7804***
		(0.7589)	(0.0896)
Intercept		−0.7807***	−0.9813***
		(0.0539)	(0.0719)
R-squared[1]		0.30	0.26

[1] Maximum likelihood pseudo r-squared
Notes: Standard errors displayed in brackets

each transaction in the full sample, thus transferring the regression results from the synergy sample to the full sample.

Step 3: A probit regression of the decision to disclose on the value of the expected synergies is estimated along the model

$$Probit(SynergyAnnouncement_{FullSample}) =$$
$$\alpha + \beta \cdot ExpectedSynergies_{FullSample} + \epsilon. \quad (5.3)$$

In case the synergy value has a strong influence on the willingness to disclose in an M&A setting, a strong correlation between the left and the right hand side of (5.3) is expected, i.e., β is expected to be positive and significant.

Results

Results from (5.3) are displayed in Table IX, where column (I) shows the direct regression results from (5.3), and column (II) shows results where the values in $ExpectedSynergies_{FullSample}$ are divided into two fractions, above- and below-average synergies, by use of a dummy variable. The results in Table IX show that synergies are significantly more likely to be announced if the expected synergies are higher as judged from the control variables in *ContVar*. The coefficient for the probit regression (5.3) in both cases is positive, and different from zero at

the 1% significance level. The above results are robust against the use of an OLS regression instead of a Heckman two-step procedure.

The results obtained here show that managers are significantly more likely to disclose information that is favorable than information that is unfavorable and thus confirm Hypothesis 1b.

5.6.3 Investor credibility and announcement window returns

Market credibility along Hypotheses 2a and 2b is tested in two different ways. First, I test the market valuation effect of the mere announcement of synergies, i.e., the question if the announcement as such, independently of the size of synergies, has any valuation effect and therefore any credibility. Secondly, I test the size of the valuation effect against the present value of the announced synergies, i.e., the question if the credibility is complete.

Hypothesis 2a: Information disclosure is credible to investors

I test the question whether or not the announcement of synergies, independently of the size of the announcement, has an impact on the run up abnormal returns around a synergy announcement. The answer to this question is of special practical relevance as it could directly drive a company's decision with respect to synergy disclosure. Hypothesis 2a in Section 5.4 states that the mere announcement of synergies, and therefore of good news, to the market should have a positive effect on stock price valuation.

Research design

In order to test this hypothesis one has to be careful about the above-mentioned self-selection bias in synergy announcements: as shown above, companies with higher expected synergies are significantly more likely to announce synergies than

companies with lower expected synergies. I test the hypothesis along the model

$$CAR = \alpha + \beta \cdot SynergyAnnouncement + \gamma \cdot ContVar + \epsilon. \qquad (5.4)$$

The estimation of (5.4) by conventional OLS suffers from an endogeneity induced by self-selection. Variables on the right side of (5.4), especially the *Synergy Announcement* variable, are not exogenous. The endogeneity exists as the primary regressor, the variable *SynergyAnnouncement*, is a choice variable. This endogeneity is induced by self-selection, meaning that unobserved factors that are part of the error ϵ apart from the abnormal run-up returns CAR also have an influence on the managerial decision to disclose, and therefore

$$cov(SynergyAnnouncement, \epsilon) \neq 0.$$

The estimators of an OLS estimation are then biased and inconsistent. This is especially likely as we have seen in Table VII that the control variables in *ContVar* explain only about 35% of the variation in the decision to disclose. Before I begin the treatment of the self-selection bias I try to get an assessment of the direction in which the error will bias results if untreated. Above I have shown that more positive information, i.e., higher CARs, increase the manager's inclination to disclose, and thus I suppose that variables in ϵ that drive the CARs upwards also increase the managerial inclination to disclose. I therefore expect the results from OLS to be upward biased towards higher impact of disclosure on CARs by the unobserved variables in (5.4).

As the endogeneity stems from self-selection, and therefore simultaneous-equation bias, it is treated with a two-step least squares (2SLS) procedure.[88] While Larcker

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[88]Instrumental variables approaches as 2SLS provide a general solution to the problem of endogenous explanatory variables (Wang, 2010), while the case of an omitted variable bias (see above) is generally treated with a Heckman two-step procedure (Bascle, 2008). While problems of self-selection can generally also be treated with a Heckman two-step procedure instead of 2SLS, Moffitt (1999) points out that, without the use of an exclusion restriction, Heckman selection models frequently suffer from low efficiency. Collinearity of $\lambda(Z\delta)$ with explanatory variables in the second stage equation leads to large standard errors in the β coefficients. When using an exclusion restriction, one is generally left with the same question of finding a suitable instrument as in the case of IV methods, with 2SLS being "less restrictive, more robust, and freer in functional form than selection bias methods". In a survey of econometric methods, Moffitt (1999) observes a declining use

& Rusticus (2010) state that 2SLS is commonly used in accounting research, among others research on voluntary disclosure, when the regressor variables are endogenous, its appropriateness is not obvious and has to be checked thoroughly. As a first step it has to be tested if endogeneity in (5.4) is strong enough to justify the use of a 2SLS method. I perform a Hausman (1978) test for endogeneity, comparing OLS and 2SLS estimates.[89] As can be seen in Table X, endogeneity must be assumed for regressions on combined CARs and acquirer CARs, while the regression on target CARs seems to be free of endogeneity. The use of 2SLS is therefore appropriate in case of the first two equations and OLS in the third.

The use of a 2SLS procedure requires the identification of a suitable instrumental variable Z that satisfies the two conditions that it has to be (a) relevant, i.e., $cov(Z, SynergyAnnouncement) \neq 0$ and (b) exogenous, i.e., $cov(Z, \epsilon) = 0$. I follow the procedure laid out in Wooldridge (2002) and Wooldridge (2008) in order to identify the average treatment effect (ATE) of the synergy disclosure, i.e., the coefficient on $SynergyAnnouncement$. As a first step a probit regression is performed to explain $SynergyAnnouncement$ by the set control variables, including the year and industry dummies as instrumental variables. In the second step, the 2SLS estimation is performed, including the predictions of the first step probit regression on $SynergyAnnouncement$ as an instrumental variable. This method enhances the efficiency of the procedure relative to directly including the full set of instrumental variables into the 2SLS regression.

Results

The model (5.4) is estimated separately for combined, acquirer and target CARs, and results are displayed in Table XI. Results show that the mere announcement of synergies has a significant positive effect on run-up returns, especially for combined CARs and for acquirer CARs. The coefficient on $SynergyAnnouncement$ shows that the announcement of synergies ceteris paribus increases the combined CARs by 5.6%, statistically significant at the 1%-level, and acquirer CARs by

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of Heckman and increasing use of IV methods among others

[89]In the first step of the test, a regression of $SynergyAnnouncement$ on all exogenous variables is performed. In a second step the residuals of the OLS regression are included in the structural equation. If the coefficients on the residuals are significantly different from zero, endogeneity has to be assumed

Table X: Hausman (1978) test for endogeneity of the disclosure decision

Variable	Reg 1	Reg 2 Combined	Reg 2 Acquirer	Reg 2 Target
$SynergyAnnouncement$		0.0529**	0.0687***	−0.0248
		(0.0231)	(0.0245)	(0.0498
$AcquirerMV$	−0.0814***	−0.0036	0.0101***	0.0083
	(0.0169)	(0.0033)	(0.0035)	(0.0071)
$TargetMV$	−0.0421	−0.0045	0.0080	−0.1413***
$TransactionValue$	0.2144***	−0.0007	−0.0276***	0.1329***
$TargetMV/AcquirerMV$	−0.0203	0.0235***	0.0081	−0.032*
$AcquirerTobinsQ$	−0.0101	−0.0041**	−0.0021	−0.0068**
$CrossCountry$	0.0030	−0.0020	−0.0033	0.0015
$CrossIndustry$	−0.0166	−0.0020	−0.0027	0.0002
$DealAttitude$	−0.0415	0.0185	0.0140	−0.0181
$ConsiderationStructure$	0.0015	0.0287***	0.0278***	0.0432***
$MultipleBidders$	0.0521	−0.0144	−0.0144	−0.0526***
$AntidirectorRightsIndex$	−0.0320*	−0.0001	0.0030	−0.0046
ICC	0.6346	0.1205	0.0668	0.7204**
$ReturnStDev$	−0.0725	−0.0088	0.0003	0.0026
$R\&D$	0.3690	0.0757	−0.0172	0.1862
$HerfindahlIndex$	0.3037	−0.0221	0.0081	−0.1349
$AcquirerBeta$	−0.0170	−0.0018	−0.0033	0.0067
$TimeToFYEnd$	0.0001	0.0000	0.0000	0.0000
$AcquirerMomentum$	−0.0043	−0.0013	−0.0014	−0.001
$LitigationRisk$	−360.20	48.24	76.79	−79.58
$PredictLoss$	0.0707	−0.0314***	−0.0379***	−0.0022
$Analysts$	0.0635***	−0.0069*	−0.0134***	0.0225***
$Intercept$	0.1783	0.0053	−0.0370	0.0117
	(0.2299)	(0.0236)	(0.0251)	(0.051)
Residuals Reg 1		−0.0425*	−0.0662***	0.0423
		(0.0236)	(0.0251)	(0.0510)

Notes: Standard errors displayed in brackets

Table XI: Influence of synergy announcement on event window CARs

Variable	Expected Sign	Combined CAR	Acquirer CAR	Target CAR[1]
SynergyAnnouncement	+	0.0564***	0.0468**	0.0319***
		(0.0215)	(0.0225)	(0.011)
AcquirerMV		−0.0036	0.0081***	0.0121**
TargetMV		−0.0050	−0.0140***	−0.0221***
TimeToCompletion		0.0000	0.0000	−0.0002***
TargetMV/AcquirerMV		0.0236*	0.0088	−0.0399**
AcquirerTobinsQ		−0.0040**	−0.0024	−0.0061*
CrossCountry		−0.0020	−0.0026	−0.0009
CrossIndustry		−0.0025	−0.0026	−0.0040
DealAttitude		0.0225	0.0096	0.0283
ConsiderationStructure		0.0274***	0.0277***	0.0365***
MultipleBidders		−0.0144*	−0.0133	−0.0512**
AntidirectorRightsIndex		−0.0003	0.0024	−0.0058
ICC		0.1073	0.0354	0.7879**
ReturnStDev		−0.0094	−0.0036	0.0131
R&D		0.0707	−0.0205	0.1767
HerfindahlIndex		−0.0220	0.0086	−0.1387
AcquirerBeta		−0.0016	−0.0037	0.0093
TimeToFYEnd		0.0000	0.0000	0.0000
AcquirerMomentum		−0.0013***	−0.0017***	−0.0003
LitigationRisk		56.277	71.586	−47.670
PredictLoss		−0.0326*	−0.0369**	−0.0087
Analysts		−0.0074*	−0.0130***	0.0222***
Intercept		0.0723***	0.0138	0.1190**

[1] OLS regression   **Notes:** Standard errors displayed in brackets

4.7%, statistically significant at the 5%-level. Target CARs are increased by 3.2%, significant at the 1% level. We also observe that statistical significances on the target column overall are considerably larger than on the other two columns. This is not surprising as the use of the 2SLS procedure is costly in terms of efficiency. As expected in Hypothesis 2a, synergy disclosures have a positive effect on stock valuation. This shows that synergy disclosure has at least partial credibility in the market. We still do not know how much of the synergy value announced the market believes, but we know that investors believe part of the announced value to be true. Thus Hypothesis 2a is confirmed.

Dutordoir et al. (2010) show similar, albeit somewhat smaller, results in their large sample study on US merger between 1995 and 2008. They show, that "the disclosure decision results in 3.6% to 5.1% higher announcement returns"[90], which are significantly different from zero. Due to different sample characteristics the results are not directly comparable, shown, among other things, by the fact that in this work a considerably higher disclosure rate of 31% vs. 17% is measured. Nonetheless, the results of both studies yield the same conclusion with respect to the credibility of synergy disclosures. Kimbrough & Louis (2011) show a positive stock price effect on the existence of conference calls in connection with a merger announcement. The statistically significant stock price effect amounts to 6.5% in their large-sample study. Similar to the release of synergy information, the existence of conference calls is a proxy for the existence of enhanced information disclosure to investors at the announcement of a merger.

As a practical takeaway from this section, provided a sound deal rationale, it seems favorable for the acquirer in an M&A situation to release synergy forecasts as run-up returns for the acquirer are significantly more positive. On the other hand, also the target run-up returns show a significant positive effect from synergy disclosure, albeit smaller. This means that the target becomes more expensive for the acquirer.

Hypothesis 2b: Investor credibility of synergy disclosure is less than complete

As a second step I test Hypothesis 2b, the claim that the credibility of managerial synergy announcements is only partial and investor revaluations in an M&A situation do not account for the total present value of a synergy forecast. I do so by showing that, ceteris paribus, an increase of the announced synergies by USD 1 leads to a revaluation of company value by USD $\beta \cdot 1$, with the factor β being smaller than 1.

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[90]Dutordoir et al. (2010, p. 34)

Research design

The test is performed along the simple model

$$CAR = \alpha + \beta \cdot \frac{PV(Synergies)}{EquityMarketValue} + \epsilon, \tag{5.5}$$

where CAR is the cumulative abnormal return during the event window, and the right hand side represents the total present value of synergies as a percentage of the company equity market value. Thus, the coefficient β measures the extent to which an additional dollar in synergies is incorporated in the run-up returns. The regression is performed on combined CARs, separately for all and only cost synergy announcements, to estimate the market credibility of managerial synergy forecasts.

Results

Results from the estimation of (5.5) are displayed in Table XII. I begin the discussion of the results with a caveat on the meaning of β. The coefficient β measures the extent to which an *additional* dollar value of synergies is implied in the stock price revaluation, conditional on the fact that a synergy announcement has been made. As shown above, the mere announcement of synergies, being "good news", already yields a stock price revaluation. Therefore, the β-coefficient cannot be interpreted as *"the market believes β of the total synergies announced"*. Rather, a value of $\beta < 1$ means that additional announced synergies do not possess full credibility.

Having said this, we observe in Table XII that the credibility for an additional dollar amount of synergies is far below 1. For the scenario of perpetual merger benefits that are not inflated over time ($SV1$), 12% of additional synergies in the case of all synergies and 16% in the case of only cost synergies are incorporated into the company value by investors. Both values are significant to the level of 1%. The values are larger when longer event windows are taken into account, reaching up to almost 30% for cost synergies in an event window from -43 to $+3$ days around the announcement date. As mentioned, the above results require that synergies have been announced. They do not deliver information on the effect of a synergy announcement per se, but on the credibility of an additional

Table XII: Effect of present value of announced synergies on event window
CARs

		CAR	
Variable	Expected Sign	All	Cost
SV1 — Perpetual benefits, constant in nominal terms:			
$\frac{PV(Synergies)}{EquityMarketValue}$	+	0.1245***	0.1615***
		(0.0386)	(0.0544)
Intercept		0.0145***	0.0178***
		(0.0049)	(0.0044)
SV2 — Perpetual benefits, constant in real terms:			
$\frac{PV(Synergies)}{EquityMarketValue}$	+	0.0850***	0.1097***
		(0.0257)	(0.0359)
Intercept		0.0143***	0.0177***
		(0.0048)	(0.0044)
SV3 — Decaying benefits:			
$\frac{PV(Synergies)}{EquityMarketValue}$	+	0.2732***	0.3566***
		(0.0908)	(0.1296)
Intercept		0.0151***	0.0182***
		(0.0049)	(0.0044)
R-squared[1]		$0.02 - 0.03$	$0.02 - 0.03$

[1] Multiple r-squared   **Notes:** Standard errors displayed in brackets

dollar value in announced synergies. Table XII shows that credibility of cost
synergies is higher in all cases *SV1* to *SV3*. This result may be due to the
fact that cost synergies typically have a better rationale and are therefore more
credible to investors than revenue synergies. As expected, the scenarios *SV2*
and *SV3* show similar values. For perpetual benefits which are inflated with
the expected long-term inflation rate (constant real terms, *SV2*), and therefore
higher calculated present value of synergies, we observe a decreased credibility of
around 10% of an additional dollar value of synergies. In case of decaying merger
benefits (*SV3*) credibility, not surprisingly, seems to be higher and around 30%.
The results in this section suggest that synergy announcements do not enjoy full
credibility with investors. While a positive announcement effect is measured, and
higher announced synergy values lead to higher stock revaluations ($\beta > 0$), the

credibility of an additional dollar value of announced synergies is far from 1, thus confirming Hypothesis 2b.

As discussed in Section 5.4, similar results have already been found in previous studies. Houston et al. (2001) state that "management's projected merger gains explain roughly 60% of the cross-sectional variation in the combined bidder and target stock returns"[91]. They further find that cost synergies are significantly more credible than revenue synergies. Bernile (2004) finds that the stock market significantly discounts managerial synergy forecasts. He reports that on average 40% of forecast synergies are capitalized into stock prices. Finally, Dutordoir et al. (2010) measure high discounts in what the market capitalizes of managerial synergy forecasts.

Results on Hypotheses 2a and 2b are tested against the use of abnormal returns calculated in a multifactor model as described in Section 5.5.2 (unreported). Results are not changed in this case which confirms the claim by MacKinlay (1997) that the use of multifactor models in event studies shows positive but limited effects.

5.6.4 Investor uncertainty and post-announcement returns

While up to this point the focus was on announcement window returns and their connection to the credibility of synergy announcement, from now on I analyze post-announcement window returns. As laid out in Section 5.4, post-event returns are frequently interpreted as a sign of investor over- or underreaction to a news event. In the evaluation on Hypothesis 3a I establish the existence of significant post-event returns and try to distinguish between a pattern of over- or underreaction to a merger announcement and a stock price pattern according to the uncertain information hypothesis. In Hypotheses 3b and 3c I analyze factors that drive post-announcement returns and thus influence investor uncertainty.

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[91]Houston et al. (2001, p. 287)

Hypothesis 3a: Short-term stock price rebound after M&A announcements

Analogously to the post-earnings announcement drift literature, post-announcement buy-and-hold returns are measured during a correction period after the event.[92] I use different observation periods from one to 36 months. Overreaction to an M&A announcement is defined to be a reaction that is so strong in a positive or negative direction that following the initial announcement window it is corrected by investors. In the case of overreaction, therefore, broadly speaking a positive signal is followed by a negative signal and conversely a negative signal is followed by a positive signal. The case of underreaction is identified by a positive signal being followed by another positive signal and similarly for a negative signal.

The first hint towards the distinction of stock price patterns in the case of M&A announcements can be observed in Table IV. The significant negative reaction of -1.79% in acquirer CARs during the announcement window is followed by an almost equally strong and significant positive reaction of 1.38% in the acquirer BHAR during the first three months and 1.96% in the first six months after the deal announcement respectively.[93] Similar effects can be observed when splitting the sample into subsamples with and without synergy disclosure, and provide first, albeit weak, evidence that investors partly correct a negative valuation during the announcement window in the post-announcement period.

The results displayed in Table XIII help us to explore in more detail the positive BHARs after the deal announcement. The upper part of Table XIII contains post-announcement buy-and-hold returns for different periods after the event, the middle part contains correlations of post-announcement buy-and-hold returns with event window abnormal returns and the lower part contains values of acquirer β for pre- and post-announcement periods. If the hypothesis of overreaction and subsequent correction is correct, one should expect negative correlation coefficients for the relevant post-announcement correction periods on positive and negative CARs. In case of a pattern induced by uncertain information accord-

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[92]E.g., Liang (2003), Francis et al. (2007)

[93]In line with prior research, acquirer BHARs in the longer timeframe of 12 and 36 months turn significantly negative

Table XIII: Post-announcement returns and correlations with announcement window returns

Timeframe	All CARs (I)	Pos. CARs (II)	Neg. CARs (III)	First quintile (IV)	Last quintile (V)
Buy-and-hold returns beginning 4 days after the announcement window:					
1-month	0.21%	0.29%	0.18%	0.24%	0.48%
2-months	0.43%	0.25%	0.55%	−0.21%	1.77%
3-months	1.38%**	0.93%	1.67%**	1.24%	3.99%***
6-months	1.96%**	0.95%	2.69%**	0.26%	6.26%***
12-months	−0.54%	−1.79%	0.33%	−1.84%	3.03%
36-months	−11.05%***	−12.90%***	−9.81%**	−9.62%	−11.42%
Correlations of post-announcement BHARs with announcement window CARs:					
1-month	−0.03	−0.01	−0.07*	−0.03	−0.15**
2-months	−0.07**	−0.08	−0.10**	−0.11	−0.10
3-months	−0.09***	−0.04	−0.15***	−0.10	−0.19***
6-months	−0.09***	−0.09*	−0.11***	−0.14**	−0.12*
12-months	−0.06*	−0.05	−0.06	−0.08	−0.02
36-months	−0.01	0.01	−0.01	−0.04	−0.01
Acquirer β:[1]					
before ann.	0.93	0.92	0.94	0.92	1.03
after ann.	1.02***	1.01***	1.03***	1.03***	1.17***
3-months aft.	1.00***	0.99***	1.02***	1.03***	1.12**
6-months aft.	1.02***	1.00***	1.02***	1.02***	1.10*
12-months aft.	1.05***	1.05***	1.06***	1.06***	1.11*

[1] Statistical significances indicate significance of difference to β before announcement; measurement of β during 3-months period directly and several months after the announcement as indicated

ing to the UIH by Brown et al. (1988), we should see strong and significantly positive post-announcement BHARs on negative CARs and positive but weaker post-announcement BHARs on positive CARs, in connection with increased values for acquirer β in the post-announcement periods. The latter is exactly what is observed in Table XIII.

The upper part of Table XIII exhibits positive post-announcement buy-and-hold returns for the periods of up to six months. Results are significant especially in the 3- and 6-months periods. They are large and statistically significant for all CARs (column I) and for negative and last quintile CARs (columns III and V), i.e., in cases where deals are perceived as negative. They are positive but

weaker in the case of positively perceived deals, i.e., deals with positive and first quintile CARs (columns II and IV). As already stated above, they turn negative in the longer run. In accordance with these results, in the middle part of Table XIII we observe a negative sign on all significant correlation coefficients for different post-announcement periods. The coefficients on the most relevant 3-months and 6-months periods are negative and highly statistically significant. Additionally, we observe that strong and significantly positive buy-and-hold returns and negative correlation coefficients, apart from column (I) for the entire sample, are mostly present in columns (III) and (V) of Table XIII which represent negative CARs and the last quintile of CARs respectively. This shows that negative reaction and subsequent correction are present predominantly in cases where the merger is initially perceived as unfavorable by investors, therefore earning negative and last-quintile event window CARs respectively. In cases where the merger is initially perceived favorable (columns II and IV), the same patterns are present, but mostly not significant at any conventional level. In the lower part of Table XIII, we observe significantly increased values for acquirer β[94] for all periods and CARs, in line with the notion of the UIH that increased systematic risk leads to higher expected returns in the post-announcement period. Overall, I interpret this pattern in a way that is in accordance with the uncertain information hypothesis by Brown et al. (1988). M&A announcements significantly increase the risk of acquirer stocks in the medium run, and investors subsequently demand higher expected returns. In line with the UIH the effect is stronger in cases where investors initially perceive the merger as unfavorable for acquirer shareholders. Results from a robustness check using abnormal returns from a Fama-French 3-factor regression lead to the same conclusions. They are displayed in Table XIV.

Overall, the above results show that risk and return significantly increase after a merger. This is in line with the uncertain information hypothesis by Brown et al. (1988). Investors receive incomplete and uncertain information about a company event. Subsequently, due to increased valuation risk, investors demand

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[94]Acquirer β is measured during a 3-months period directly, three months, six months and one year after the announcement, respectively. Statistical significances in the lower part of Table XIII indicate significance of difference to pre-announcement β

Table XIV: Post-announcement returns and correlations with announcement window returns - *Fama French 3-factor returns*

Timeframe	All CARs (I)	Pos. CARs (II)	Neg. CARs (III)	First quintile (IV)	Last quintile (V)
Fama-French (FF) abnormal returns beginning 4 days after the ann. window:					
1-months	0.33%	0.08%	0.50%	−0.29%	1.56%*
2-months	1.04%***	1.20%*	0.94%*	0.99%	2.81%***
3-months	1.95%***	1.34%*	2.36%***	1.38%	5.03%***
6-months	3.27%***	2.41%**	3.95%***	1.95%	6.47%***
12-mo. (dly)	3.48%***	2.88%*	3.91%***	2.91%	8.69%***
12-mo. (mly)	1.88%	1.77%	2.01%	0.93%	5.87%*
36-months	13.04%	29.71%	2.63%	50.42%	6.84%
Correlations of post-ann. FF abnormal returns with ann. window CARs:					
1-months	−0.08***	−0.04	−0.13***	−0.03	−0.16**
2-months	−0.06**	−0.05	−0.14***	−0.06	−0.12*
3-months	−0.11***	−0.05	−0.16***	−0.09	−0.14**
6-months	−0.08**	−0.04	−0.10**	−0.04	−0.12*
12-mo. (dly)	−0.08**	−0.08*	−0.10**	−0.12*	−0.08
12-mo. (mly)	−0.05	−0.10**	−0.04	−0.14**	0.05
36-months	0.03	−0.02	−0.01	−0.08	0.06

Notes: 12-months abnormal returns generated with daily (dly) and monthly (mly) returns data, shorter timeframes use only daily, longer only monthly return data

higher expected returns and revise downward security valuations. The UIH is also in line with findings in the literature on M&A value creation that acquirers generally experience negative announcement window returns. We see, especially in the price rebound, that effects are stronger for events that are perceived as being unfavorable.

In the following analyses I will focus on returns during the medium-run 3-months post-announcement period, while results are largely identical for the longer 6-months period.

Hypothesis 3b: Additional information release reduces post-announcement price rebound

We get a first hint on a reduction of negative overreaction effect in Table IV from the considerable differences in post-event BHARs in the disclosure and non-disclosure sample. The non-disclosure sample, where management does not disclose synergy estimates for the merger, exhibits a statistically significant 1.67% BHAR during the 3-months post-announcement period, while in the disclosure sample the difference is not statistically different from zero. It therefore seems that a significant part of the overall positive post-announcement BHAR of 1.38% is driven by the non-disclosure sample, while in the disclosure sample no post-announcement reaction is measurable. Nonetheless, we have to be careful with the direct interpretation of these results as information disclosure in M&A, and especially synergy disclosure, has been shown to suffer from significant selection bias.[95] In the following I will therefore correct for this endogeneity.

Research design

To examine the effect of a synergy announcement on the post-announcement buy-and-hold abnormal returns I estimate the model

$$BHAR_3 = \quad \alpha + \beta_1 SynergyAnnouncement + ControlVariables + \epsilon \quad (5.6)$$

through the use of a cross-sectional 2SLS regression to correct for the endogeneity of the disclosure decision. In this subsection I will shortly discuss the methodology and regression variables and their relevance in the current setting.

The estimation of (5.6) by conventional OLS suffers from an endogeneity induced by self-selection as determined by a Hausman test for endogeneity. Variables on the right side of the equation, especially the $SynergyAnnouncement$ variable, are not exogenous. The endogeneity exists as the primary regressor, the variable $SynergyAnnouncement$, is a choice variable. This endogeneity is induced by self-selection, meaning that unobserved factors that are part of the error ϵ apart from the buy-and-hold abnormal returns $BHAR_3$ also have an influence on the

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[95]E.g., Dutordoir et al. (2010) for the case of synergy announcements, Kimbrough & Louis (2011) for additional information release during conference calls

managerial decision to disclose, and therefore $cov(SynergyAnnouncement, \epsilon) \neq$ 0. This makes the estimators of an OLS estimation biased and inconsistent.

As in Section 5.6.3, the endogeneity stems from self-selection, and therefore simultaneous equation bias. It is treated with a two-step least squares (2SLS) procedure. Once again I follow the procedure laid out in Wooldridge (2002) and Wooldridge (2008) in order to identify the average treatment effect (ATE) of the synergy disclosure, i.e., the coefficient on $SynergyAnnouncement$. In doing so, as a first step I perform a probit regression to explain $SynergyAnnouncement$ by the set control variables, including the year and industry dummies as instrumental variables. In the second step, the 2SLS estimation is performed, including the predictions of the first step probit regression on $SynergyAnnouncement$ as an instrumental variable. This method enhances the efficiency of the procedure relative to directly including the full set of instrumental variables into the 2SLS regression.

Hypothesis 1 states that the specification of synergies and additional information given to investors through the merger announcement reduces information asymmetry and therefore reduces negative reaction during the announcement window. I therefore expect a negative sign on the $SynergyAnnouncement$ variable in (5.6), indicating a more positive reaction during the announcement event window and a less positive post-announcement reaction during the correction period.

I include the full set of control variables from Section 5.5.5 into the above regression. The two most important acquirer specific variables are the standard deviation of daily acquirer returns prior to the merger announcement, $ReturnsStDev$, and the log number of analysts following the acquirer company, $Analysts$. The first depicts acquirer volatility and is an indicator for investor uncertainty regarding the value of a company, the second is an indicator for the amount of information available to investors, e.g., through analyst reports. Both variables are considered in more detail in Hypothesis 3c. Results on the acquirer specific variables are presented in Table XV. Results on deal specific variables are not reported in the regression tables below. Coefficients are widely insignificant.

Results

Regression results are obtained through a regression on the full sample, and separately for positive and negative CAR subsamples along the (5.6). Table XV displays results from the estimation of (5.6) for a 3-months period after the announcement respectively. Results effectively stay the same when a 6-months period is used.

The coefficient on *SynergyAnnouncement* in the full-sample regression (I) is negative and significant as expected. The positive reaction in post-announcement BHARs can be interpreted as a counter-reaction to an initial negative reaction to uncertainty. Both reactions are reduced when a synergy announcement is made. In regressions (II) and (III) in Table XV we additionally observe that the positive reaction in BHARs is driven by the reaction within the subsample with negative CARs in column (II), while the reaction within the sample with positive CARs in column (III) is not statistically different from zero. I interpret this as a sign that the voluntary disclosure of additional information reduces the negative reaction to mergers that are perceived negative by the market.

Theory suggests that in the absence of sufficient information investor uncertainty as to the value of a company will be highest and investors will assume the worst possible outcome (see Section 5.4). The disclosure of additional information thus leads to less negative reaction during the announcement window as observed in the right column of Table XV. In the case of mergers that are initially perceived as favorable by investors, exhibiting positive announcement window CARs, no significant effect of the disclosure of additional information can be measured. This seems reasonable in light of the results on Hypothesis 3a, where, in line with the UIH, the positive post-announcement stock price movement is measured to be negligible. The latter fact fits into the observation made by Kimbrough & Louis (2011) that the probability of information disclosure, there measured through the existence of analyst calls in connection with the merger announcement press release, is connected to more unfavorable deal characteristics. It therefore seems that managers disclose additional information specifically to mitigate the effects of negative event-window reaction to negative merger news. The result is also in line with Dutordoir et al. (2010) who report a positive effect of synergy disclosure

Table XV: Influence of synergy announcement on the post-announcement BHAR

		Full sample	Neg./pos. CAR		Full sample
Variable	Expected Sign	(I)	(II)	(III)	(CAR)
Synergy−	−	−0.1492**	−0.1890***	−0.0101	0.0564***
Announcement		(0.0613)	(0.0705)	(0.0976)	(0.0215)
ReturnStDev		0.0523*	0.0833**	0.0125	−0.0094
Analysts		−0.0159	−0.0181	−0.0127	−0.0074*
AcquirerMomentum		−0.0017	−0.0026**	−0.0271	−0.0013***
R&D		−0.0621	−0.0525	−0.0405	0.0707
HerfindahlIndex		−0.1523	−0.0672	−0.1983	−0.0220
AcquirerBeta		−0.0204*	−0.0182	−0.0257	−0.0016
TimeToFYEnd		0.0001	0.0001	0.0000	0.0000
LitigationRisk		−5.4150	−129.32	215.57	56.227
PredictLoss		−0.0545	−0.1148**	0.1037	−0.0326*
Intercept		0.0202	0.0780	0.2008*	0.0723***
DealVariables		— yes, see Table I —			
IndustryDummies		— yes, as instruments in first step probit regression —			
YearDummies		— yes, as instruments in first step probit regression —			

Notes: Heteroscedasticity robust standard errors displayed in brackets

on event window CARs. As a synergy disclosure, corrected for the endogeneity of the decision, is not per se value creating, the effect likely has to be reverted in the post-announcement correction period. This is what we observe.

In (5.6) I distinguish between positive and negative CARs by splitting the sample along this line. In an alternative, unreported setting I make the distinction through adding a dummy variable taking the value 1 for positive and 0 for negative CARs, crossed with the variable *SynergyAnnouncement*. The results are similar in size and direction, but do not exhibit statistical significance on the interaction term. This may be due to insufficient statistical power in the 2SLS setting. In order to determine if results are driven by outliers I use 1% and 3% winsorized versions of $BHAR_3$. Results are identical while somewhat smaller in size (unreported). Results obtained using abnormal returns from a Fama-French 3-factor model are largely identical for the 3- and 6-months periods. Longer periods than six months do not exhibit statistically significant results.

As a side remark, confidence in the uncertain information hypothesis is further strengthened by the fact that higher relative deal value (one of the deal control variables not reported in Table XV) has a positive and highly significant effect on post-announcement BHARs, meaning that the reaction is stronger within relatively larger deals where investor uncertainty is expected to be higher due to the higher impact of the merger. I will further discuss this observation in Hypothesis 3c.

Hypothesis 3c: Investor uncertainty increases post-announcement stock-price rebound

In this subsection I will explore which factors influence investors reaction to M&A announcements, and thus which factor influence the post-announcement stock price rebound. In the literature multiple different factors have been determined that influence under- and overreaction to company events (e.g., Ng et al., 2006) and the reaction to M&A announcements (e.g., Dutordoir et al., 2010; Kimbrough & Louis, 2011). I will build on this literature in the following analysis.

Research design

To examine the effect of the forecast environment variables on the post-announcement buy-and-hold abnormal returns I estimate the model

$$BHAR_3 = \alpha + \beta_1 \cdot ReturnStDev + \beta_2 \cdot Analysts +$$
$$\beta_3 \cdot RelativeDealSize + ContVar + \epsilon \quad (5.7)$$

using a cross-sectional OLS regression on the full sample, and a 2SLS regression as in Section 5.6.3 for the subsamples with and without a synergy announcement.[96] As above, regression (5.7) will be carried out to measure the overall effect of the variables. Additionally, I split the sample for positive and negative acquirer CARs. As an unreported robustness test, I further split the sample into the top-30%, mid-40% and bottom-30% of acquirer CARs to measure the effect of the variables on BHARs for different deal performances during the announcement window and obtain similar results. I will shortly discuss the model variables and their relevance in the current setting.

ReturnStDev: The variable *ReturnStDev* measures acquirer annualized stock price volatility in the form of standard deviations of stock price returns for one year prior to the announcement of the M&A transaction. Higher return volatility suggests higher investor uncertainty regarding the acquirer stock price and higher forecast difficulty (e.g., Rogers & Stocken, 2005). Hypothesis 3c states, in accordance with the UIH, that increased investor uncertainty leads to increased negative announcement window reaction, and higher post-announcement stock price rebound, especially in the case of bad news. Specifically, if the deal announcement is bad news and therefore carries a negative CAR I expect a positive effect in the BHARs as sign of increased expected returns by investors in a period where uncertainty is gradually reduced.

Analysts: The variable *Analysts* represents the number of analysts following the acquirer stock. It is determined as the log number of analyst estimates for the

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[96]As I am not interested in the average treatment effect, i.e., the coefficient on *SynergyAnnouncement* and the sample is split along this variable, *SynergyAnnouncement* is left out in this regression

acquirer stock's earnings per share on I/B/E/S one month before the announcement date. I use the number of analysts following as a proxy for the amount of information investors obtain. The more information an investor can base his decision on, the less uncertainty remains, and the more accurate investor reaction is expected to be during the announcement window. I therefore expect post-announcement uncertainty to be smaller and thus reduced post-announcement buy-and-hold returns. Prior research has established that the number of analysts following a stock is positively correlated with the amount of information released by management. Kimbrough & Louis (2011), e.g., observe that in an M&A situation management is more likely to hold a conference call in connection to the merger announcement when more analysts are following the acquirer stock. For a higher number of analysts following I therefore expect reduced effects according to the UIH, and a negative sign on the variable in the BHAR regression.

*RelativeDealSize***:**   This variable is determined as the market value of the target relative to the market value of the acquirer. Market values are measured one month before the announcement date to avoid contamination by the merger announcement and possible run-up effects. Higher relative deal value means that a merger is economically more important for acquirer investors, and the risks from uncertainty are higher in the case of high relative deal value than in case of low relative deal value. I therefore expect investor negative reaction to be stronger in case of high relative deal value, as the downside risks are higher. Thus, a positive sign on the variable *RelativeDealSize* is expected, especially in the case of negative CARs.

The additional control variables are the same that are already discussed in Section 5.5. Apart from the variables explicitly stated in Table XVI, the above mentioned deal specific variables and instrumental variables are included as controls. As above I additionally include the I/B/E/S analyst forecast dispersion one month before the deal announcement and the percentage of shares in free-float in separate, unreported tests. Results remain unchanged.

Table XVI: Influence of variables related to investor uncertainty on post-announcement returns

Variable	CAR sign	Expected Sign	Full sample					Disc./non-disc. sample	
			(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
ReturnStDev	All	+	0.0681** (0.0280)			0.0647** (0.0301)		0.1266** (0.0528)	0.0533 (0.0378)
	+	+					0.0537 (0.0510)		
	−	+					0.0684** (0.0333)		
Analysts	All	−		−0.0269*** (0.0088)		−0.0285*** (0.0089)		−0.0094 (0.0183)	−0.0356*** (0.0104)
	+	−					−0.0266*** (0.0010)		
	−	−					−0.0302*** (0.0099)		
RelativeDealSize	All	+			0.0458** (0.0210)	0.0356* (0.0224)		0.0664 (0.0421)	0.0277 (0.0281)
	+	+					−0.0198 (0.0286)		
	−	+					0.0457* (0.0251)		
AcquirerMomentum			−0.0015	−0.0018*	−0.0012	−0.0026**	−0.0029**	−0.0007	−0.0030**
R&D			−0.1861	−0.1910	−0.1920	−0.2060	−0.2088	−0.4070*	−0.1388
HerfindahlIndex			0.0432	0.0011	0.030	0.0019	0.0009	0.1073	−0.0729
AcquirerBeta			−0.0129	−0.0092	−0.0048	−0.0151	−0.0151	−0.0033	−0.0214
TimeToFYEnd			0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001
LitigationRisk			−29.159	−37.891	−35.347	−61.721	−52.994	262.680	−322.440
PredictLoss			−0.0666*	−0.0607	−0.0660*	−0.0711*	−0.0691*	−0.0644	−0.0749*
Intercept			0.2632**	0.2786**	0.2222*	0.1879	0.1892	0.3120	0.1676
DealVariables			— yes, see Table I —						
IndustryDummies			— yes —						
YearDummies			— yes —						

Notes: Heteroscedasticity robust standard errors displayed in brackets

Results

Regression results are obtained on the entire sample and on subsamples with positive and negative CARs as laid out above. Results are displayed in Table XVI. Regressions (I) to (III) in Table XVI separately include the uncertainty variables, regressions (IV) and (V) include all uncertainty variables, directly and multiplied by acquirer CARs sign dummy variables respectively. Regressions (VI) and (VII) reproduce the results from regression (IV) for the disclosure and non-disclosure sample respectively.

In regressions (I) to (III) in Table XVI we observe the expected signs on the variables *ReturnStDev*, *Analysts* and *RelativeDealSize*, with effects being statistically significant at least to the 5%-level. Regression (IV) shows that the results hold in the case of the simultaneous inclusion of all three variables. This result supports the hypothesis that investor uncertainty regarding the value of a stock leads to a negative reaction in the case of significant new information entering the market in the form of an M&A announcement as investor uncertainty rises, and subsequently to a correction of the negative reaction when uncertainty is gradually reduced in the months following the announcement when investors keep learning about and adapting to the new reality. Higher uncertainty, represented by higher pre-announcement return volatility, less analyst coverage and higher stakes through higher relative deal size, increases the negative reaction during the announcement window and the positive post-announcement stock price rebound. Regression (V) in Table XVI shows that the reaction is generally stronger and more significant in the case of bad news, i.e., negative announcement window CARs. Regressions (VI) and (VII) on the subsamples with and without synergy disclosure present weak evidence for differences in the reactions among the two subsamples. An especially strong effect is observed on the number of analysts in that the BHARs within the non-disclosure sample depend more strongly on the number of analysts following the acquirer stock. This seems intuitive as, while less information is provided by management in the non-disclosure sample, investors have to rely more on analyst expertise.

Among the generally insignificant control variables we find weak evidence that higher *AcquirerMomentum*, representing a positive pre-announcement track

record, leads to a lower announcement window negative reaction and therefore reduced post-announcement BHARs. As stated above, including analyst forecast dispersion or the percentage of share in free-float as additional control variables does not alter result, but deletes a considerable number of observations.

Once again, results are stable against the use of abnormal returns from a Fama-French 3-factor model and winsorized versions of $BHAR_3$. Longer periods than six months do not exhibit statistically significant results.

5.7   Conclusions: A case for regulation?

It is the goal of this paper to test hypotheses derived from threshold disclosure models by Dye (1985) and Verrecchia (1983) and the uncertain information hypothesis by Brown et al. (1988). I analyze the factors that influence a manager's decision to disclose private synergy information in the setting of an M&A deal, and the effects of disclosure on the short-term event window returns and medium-term post-announcement returns. Based on the evaluation of these effects, I will discuss the necessity for enhanced disclosure regulation. For this paper, a sample of 1,172 corporate mergers during the period from 2000 to 2011 was compiled and analyzed.

Capital market effects of synergy disclosures

Main results are:

- The decision to disclose synergies is influenced by the degree of information asymmetry between managers and investors. Information asymmetry is represented by deal size and complexity, measured through the variables absolute and relative deal size, time-to-completion and target diversification. Information need by investors is represented by the number of analysts following the acquirer company, with a higher number of analysts leading to an increased probability to disclose. Managers react to

investors' increased need for information in complex M&A situations by disclosing additional information.

- A manager's inclination to information disclosure is influenced by the nature of the information itself. "Good news", being information that is favorable to the stock price, is released significantly more frequently than "bad news", i.e., information that is unfavorable to the stock price.

- Managerial synergy disclosure is credible to investors. The mere announcement of synergies, which is assumed to be "good news", significantly increases acquirer and combined CARs, leading to a 5.6% increase in combined CARs and a 4.7% increase in acquirer CARs. Target CARs experience a weaker, but significantly positive incremental run-up return of 3.2%. This means that investors believe synergy disclosures to be at least partly informative and react accordingly.

- Managerial synergy disclosures are not totally credible to investors. In stock price revaluations investors place a discount on the announced synergy value. Once a synergy announcement is made, investors monetize 12% (total) and 16% (cost only) of an additional dollar value of synergies.

- Large scale mergers exhibit significant and positive post-announcement stock price reactions in line with the prediction from the uncertain information hypothesis that investors negatively react to increased uncertainty at the announcement of a merger demanding higher expected returns. As the uncertainty is gradually reduced, expected returns fall and stock prices rebound. This fact might add to the still unsolved question of value creation in M&A for acquirer shareholders.

- The negative reaction and subsequent rebound is especially present in the case where only a limited amount of information is provided to investors during the merger announcement, and specifically no managerial synergy forecasts are released. In the subsample of mergers where synergy forecasts are disclosed, uncertainty seems to be limited and post-announcement stock-price rebounds reduced. This result holds when accounted for the self-selection bias of the voluntary disclosure decision.

- The negative investor reaction is stronger in cases where higher investor uncertainty is present. Investor uncertainty, represented by variables of pre-announcement acquirer stock price volatility, number of analysts following and economic significance of the deal (relative deal size), leads to stronger negative reactions during the announcement window with larger post-announcement stock price rebounds.

This paper differs from previous studies, especially Dutordoir et al. (2010), in that to my knowledge the first international large sample study on synergy announcements in M&A is conducted. Through a time-consuming manual press and internet search I report a significantly higher percentage of synergy disclosures than previous studies. Results are largely in line with those from previous studies, especially Bernile (2004) and Dutordoir et al. (2010). The results also provide incremental evidence on the uncertain information hypothesis in the case of merger announcements. Medium-term post-merger announcement stock price reactions have not been a topic of focus in the literature. I am not aware that this pattern has been documented in the literature up to now.

In a nutshell, results confirm the hypotheses derived from threshold models and the uncertain information hypothesis in Section 5.4 for corporate disclosure. Results indicate that in an M&A situation, and provided a sound deal rationale, an acquirer is well advised to publicly announce synergy forecasts as this will lead to a positive revaluation of stock prices during the announcement window. To what extent this positive revaluation reflects the true value of the information, and connected therewith the question to what extent markets can effectively assess ad-hoc information of synergy values in an M&A situation, is not considered in this study. Nonetheless, there is evidence in the literature of undervaluation of favorable news influencing stock prices. To verify this in the M&A setting is a topic for further research. Additional information disclosure during the announcement of a merger is expected to lead to reduced investor uncertainty and hence more favorable stock price reaction to a merger. Also, when drawing conclusions on M&A value creation for acquirer management, it seems important to take into account a post-announcement period instead of only focusing on the announcement window, as economically significant stock price reactions seem to

be present in this period.

Synergy disclosure: A case for regulation?

Current disclosure regulation especially focuses on backward looking accounting measures such as income statements and balance sheets. In view of increasing information needs and quickly evolving technological possibilities, disclosure regulation thus seems somewhat outdated, or as Barr (1999) puts it, ...

> "... [...] an extraordinary mismatch exists between the market's demands for financial information and the ability of today's Depression-era financial-reporting system to deliver it.
>
> On the one hand, the insatiable information thirst of analysts and investors is slaked by an increasing array of instantaneous media services, ranging from Bloomberg terminals to Internet Web sites and chat rooms to various pager and phone products. On the other hand, the SEC oversees a process of quarterly and annual reporting that was developed in the 1930s, when carbon paper was a technological innovation."[97]

Forward-looking measures are required as GAAP income statements and balance sheets do not transport enough information to accurately and sufficiently assess a company's value of future earnings. Management thus has to voluntarily disclose supplementary information in addition to mandatory reports in order to enable analysts and investors to properly assess the value a company. A focus of voluntary disclosure should be on the value drivers of the business and corporate actions (Hutton, 2004). In the case of M&A these are predominantly the synergies arising from the merger.

Having established the need for supplementary information in addition to mandatory disclosure, the level of disclosure regulation has to be determined. While disclosure regulation typically does not mandate forward looking information such as EPS forecasts, they are nonetheless touched by regulation. The SEC's mission

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[97]Barr (1999, p. 2)

to provide all market participants with a "level playing field", i.e., to provide all investors with relevant information at the same time, led to the passage of the Regulation Fair Disclosure (RegFD) in 2000 by the SEC (e.g., Hutton, 2004). The RegFD is predominantly aiming at ending disclosure that is selective to individual market participants and requires the disclosure of material information at the same time and in a way accessible to all investors.

As argued in Chapter 2, for disclosure regulation to be justified it has to not only be a possible, but the most effective means of providing the appropriate amount of information to capital markets. There are a number of reasons in favor of and against possible regulation of synergy disclosure in M&A situations. As discussed on page 9 in Chapter 2, information inadequacies are one of the main justifications for regulation. Information inadequacies occur when the acquisition of information is costly or information is private and not known to the public. According to this definition, the case of the valuation of a merger seems like a classical example of information inadequacies. It is shown above that information conveyed by synergy disclosures in merger situations is material and important to investors. Economically and statistically significant effects on stock prices have been measured during and after the announcement window. Especially, synergy disclosure mitigates investor insecurity connected with the success of a merger. Furthermore, due to the complexity of the transaction and the operational impact, the outcome of a merger cannot totally be assessed by outsiders, which means that investors are worse informed than management.

On the other hand, regulation may not be the right means to close this informational gap. Hutton (2004) states that ...

> "... [m]ost U.S. regulators, corporate executives, and thought leaders agree that enhanced disclosure should not be accomplished by more regulation because 'much of the information that is now missing is industry and company specific [and] the most relevant data changes constantly, given the rapid changes in the economy and in business models.'[98] In other words, the relevant information does not lend

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[98]Yale School of Management (2001)

itself to standardization."[99]

This difficulty for standardization makes it challenging for regulators to provide guidance to the market as to what a possible mandatory disclosure should look like.

Apart from the difficulty to design such a regulatory framework, and as discussed in Chapter 2, one further prerequisite for regulation is the detection of a market failure that leads to a suboptimal amount of disclosure. In the case of M&A, management decides on the disclosure of synergies based on perceived costs and benefits of the disclosure. Both are discussed in this work, with benefits for management being more positive initial stock price reactions and reduced investor uncertainty, and cost being adverse effects of the disclosure of private information to market participants and possible litigation costs in case forward-looking statements prove themselves wrong. An additional cost to synergy disclosure may be that, as discussed as the "earnings guidance game"[100] in Hutton (2004) in the case of EPS forecasts, management may be inclined to meet the targets set for synergy realization, even at the cost of stretching accounting rules and taking long-term value destroying decisions.

As a conclusion of the above argumentation, I do not think that regulation for synergy disclosure in M&A situations is required. In spite of the positive effects for disclosing companies' stock price found in this study, information supply cannot be determined to be suboptimal for individual companies or the general public. Thus, no market failure in the market for information can be detected. Instead of regulating synergy disclosure, the amount of information disclosed in a merger situation should, in the future as today, be determined by the capital market through managers diligently weighing costs against benefits. In this process, studies such as the one at hand can help decision-makers to better understand these costs and benefits and lead to enhanced decision making.

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[99]Hutton (2004, p. 9)

[100]Hutton (2004) states that after having provided earnings guidance to analysts, companies may manage their earnings in order to match analyst forecasts, and in this attempt may take "shortsighted, value-reducing, and even unethical steps."(Hutton, 2004, p. 11)

6 Conclusions

This thesis explores two different cases of regulation in financial markets, and draws conclusions on the effectiveness of existing and the need for additional regulatory measures. The first is a case of banking regulation introduced in Germany and the UK in the aftermath of the financial crisis. The second treats voluntary synergy disclosure in mergers, where management takes the decision whether or not to publish a synergy estimate in order to provide enhanced information to investors.

Bank bankruptcy regulation: Evaluation of effectiveness

In the aftermath of the financial crisis, and after repeated government intervention to rescue banks in financial distress, individual countries introduced legislation explicitly directed at dealing with failing financial institutions. Such bankruptcy legislation typically provides financial authorities with additional rights towards equity and debt holders, and defines processes for bank restructuring and liquidation.

In this thesis, the effectiveness of the German Bank Restructuring Act, introduced in 2010, and the UK Banking Act 2009, introduced in 2008, are examined in an event study. To assess effectiveness I study effects on investor wealth. In particular, the effects on CDS spreads as a measure of credit risk, and on share prices as a measure of investor risk, are studied using a Multivariate Regression Model which is estimated with a SUR methodology. Samples are built from German and UK financial institutions' securities.

Effects on security prices from bank bankruptcy regulation in Germany and the UK overall are weak. Statistically and economically significant effects are only

measured in an increase of CDS spreads for German financial institutions, a fact that is expected as the regulation aims at withdrawing implicit bail-out guarantees. Absent these implicit guarantees, debt holders bear the credit risk in case of bank insolvency. Effects on share prices are not significantly different from zero.

In case of the UK Banking Act 2009 no significant results are obtained either on credit or on equity valuations. This may be due to increased volatility in security prices and a large number of confounding events during the peak of the financial crisis in 2008, which may drown effects from bankruptcy regulation in noise. A more detailed review of results is given in Section 4.7.

In a nutshell, the German Bank Restructuring Act as well as the UK Banking Act 2009 had limited effect on the German and British banking landscape, and investors' reactions are only measurable for German bank credit holders. As far as these effects are due to a reduction of the implicit bail-out guarantees, they are a desirable outcome from regulation.

This study contributes to the literature in that it is one of very view quantitative studies on the German Bank Restructuring Act[1], and the first on the UK Banking Act 2009. General conclusions concerning the limited effectiveness of the Restructuring Act are in line with Schäfer et al. (2012).

Synergy disclosure in M&A: Evaluation of regulation need

Mergers and acquisitions are among the largest investments companies perform, and require a striking rationale in order to convince investors. Investor communication thus plays an important role, and it has repeatedly been shown in the literature that the amount and quality of information provided to investors is a determining factor for the capital market reaction to a merger announcement. It is one of most frequent justifications for M&A, and an important piece of information for shareholders of the acquiring company, if and to what extent the

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[1]To my knowledge the only other quantitative study on the German Bank Restructuring Act is Schäfer et al. (2012)

combination of two companies is value creating due to synergies that arise between the two individual firms. And it is at managements' discretion whether or not to disclose estimates as to the amount of these synergies.

I analyze the factors that influence a manager's decision to disclose private synergy information in the setting of an M&A deal, and the effects of disclosure on the short-term event window returns and medium-term post-announcement returns. Based on the evaluation of these effects, I discuss the necessity for enhanced disclosure regulation. For this paper, a sample of 1,172 corporate mergers during the period from 2000 to 2011 was compiled and analyzed.

In short, managers disclose synergy information in mergers in order to reduce information asymmetry between management and investors. Deals where information asymmetry is highest significantly more often feature a synergy disclosure than deals with low information asymmetry. The disclosure of synergy estimates leads to significantly higher announcement window returns compared to deals without synergy disclosure, showing that investors positively value the additional information. This result is true accounting for the self-selection bias in the disclosure decision. In the post-announcement period positive abnormal returns are measured when uncertainty as to the value of the combined entity is reduced. As a synergy disclosure reduces investor uncertainty in the first place and therefore reduces negative reactions during the announcement window, positive post-announcement run-up returns are also reduced. A more detailed review and discussion of results is given in Section 5.7.

To my knowledge this is the first international large sample study on synergy disclosures in M&A. The findings documented are in line with comparable studies on differing samples, e.g., by Dutordoir et al. (2010), Bernile (2004) and Houston et al. (2001) on factors determining disclosure and announcement window returns. This seems to be the first study to detect post-announcement window abnormal returns in line with the uncertain information hypothesis developed by Brown et al. (1988).

It is the goal of this study to determine if additional disclosure regulation is required for the case of M&A. In spite of the positive effects for disclosing companies' stock prices found in this study, information supply cannot be determined

to be suboptimal for individual companies or the general public. Thus, no market failure in the market for information can be detected. In light of this, instead of regulating synergy disclosure, the amount of information disclosed in a merger situation should, in the future as today, be determined by the capital market through managers diligently weighing costs against benefits.

After a decade of deregulation, political intervention in capital markets, and thus regulation, has come back into the focus of political decision makers and the public discussion. Nonetheless, regulating financial markets is not an easy task and in view of the costs of regulation is only warranted were it is the least costly possibility and generates the most public welfare. Regulation thus is especially warranted where market failures otherwise lead to undesirable outcomes, such as, e.g., in the case of banking regulation in this paper, where an implicit state guarantee in case of bankruptcy of system-relevant banks, led to excessive risk taking visible in the recent financial crisis. Studies on regulation such as the one in hand can help decision makers to gain a better understanding of the complex nature of regulatory actions and hopefully lead to further improved decision making in the future

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