Regulating rating agencies: A conservative behavioural change

Jones, Laurence; Alsakka, Rasha; ap Gwilym, Owain; Mantovan, Noemi

Journal of Financial Stability

DOI:
10.1016/j.jfs.2022.100999

Published: 01/06/2022

Peer reviewed version

Regulating rating agencies: A conservative behavioural change

Laurence Jones[a], Rasha Alsakka[a,] *, Owain ap Gwilym[a], Noemi Mantovan[a]

[a] Bangor Business School, Bangor University, Bangor, LL57 2DG, UK

This version: 15th November 2021

Abstract

We investigate whether the European regulatory reforms of the credit rating industry have been successful in improving the quality of financial institutions' credit ratings. A shift to more conservative rating behaviour rather than rating quality improvement is identified, which is attributable to increased regulatory scrutiny. This change leads to a reduction in rating inflation and an increase in the number of unwarranted downgrades and false rating warnings in the post-regulatory period. A significant decrease (increase) in the informativeness of rating downgrades (upgrades) is evident. Our findings contrast with prior evidence for US corporates where reputational effects dominated.

JEL classification: G15; G21; G24.

Keywords: EU regulation of rating agencies; Rating quality; Rating conservatism, Disciplining hypothesis; Reputation hypothesis.

---

* Rasha Alsakka is the corresponding author.

E-mail addresses: l.j.jones@bangor.ac.uk (Laurence Jones), r.alsakka@bangor.ac.uk (Rasha Alsakka), owain.apgwilym@bangor.ac.uk (Owain ap Gwilym), n.mantovan@bangor.ac.uk (Noemi Mantovan).

Acknowledgments: The paper has benefited from constructive comments received from the reviewers and editor. We are grateful for suggestions received from participants at the British Accounting & Finance Association Northern Group 2017 conference, the 2018 International Accounting & Finance Symposium and the 6th International Conference on Credit Analysis and Risk Management 2019.

1. Introduction

The US sub-prime crisis led to increased public and regulatory scrutiny of the quality of ratings issued by credit rating agencies (CRAs) (e.g. Bae et al., 2015, Flynn and Ghent, 2018). High quality ratings are vital for the proper functioning of the financial system, given that credit ratings are heavily used by regulators, debt issuers, investors and financial institutions (Becker and Milbourn 2011; EC 2016; Jackowicz et al. 2020). In response to the sub-prime crisis, the EU acted promptly to establish new regulations for CRAs operating in Europe. The key aim of this study is to investigate the impact of the EU regulatory reforms on the quality of ratings. We focus on two dimensions of rating quality: (i) the ability of ratings to classify risk, and (ii) the ability of ratings to transfer information to market participants. Ratings that can correctly classify the future probability of defaults and are closely correlated with current market prices fulfil their expected functions. Inflated ratings (overstatements of creditworthiness) mislead the market about the true financial condition of a debt issuer. It is now evident that inflated ratings (especially in structured finance products) were prevalent prior to the global financial crisis, with the most notable example being Lehman Brothers' AAA rating months before its financial collapse. Steps to discourage rating inflation could therefore potentially enhance ratings quality. However, the increased regulatory scrutiny, liability and penalties could induce more conservative rating behaviour (Bannier et al., 2010).

The initial stage of EU CRA regulation was established in September 2009 (No 1060/2009, known as CRA I) and sought to address conflicts of interest in the rating process by requiring comprehensive disclosures by CRAs of their rating models, historical performance and annual transparency reports. In July 2011, the newly created European Securities and Markets Authority (ESMA) assumed responsibility for supervising and certifying CRAs operating in the EU (CRA II). ESMA sought to mitigate mechanistic reliance on credit ratings by market participants, and thereby reduce the potential for market overreactions to rating actions (EC,

2014). These regulatory reforms mark a shift from the pre-crisis scenario of CRA self-regulation and towards stringent regulation enforced by ESMA. Prior to this, the scope for legal and regulatory fines on CRAs was much more limited and no entity had direct responsibility to ensure that the regulation was implemented. This is the most significant factor that should contribute to a decrease in rating inflation. The May 2013 regulatory update (CRA III) strengthened the regulation with the instigation of a new civil liability regime and expansion of the transparency and monitoring requirements. Overall, the key aims of the regulation are to increase the quality of ratings by reducing rating inflation, to increase the informativeness of rating upgrades, and to reduce mechanistic market reactions to rating downgrades.

This paper contributes to knowledge in many respects. Firstly, while previous related studies have focused on the impact of US regulatory reforms on corporate ratings and structured finance ratings (see Section 2), this paper fills a significant void in the literature regarding both the impact of the regulatory changes on the financial institution (FI) rating segment and in the European setting. Secondly, this study furthers the debate surrounding the most appropriate mechanisms for regulating CRAs in the future. Third, our paper investigates whether the EU regulatory reforms have achieved their stated objectives. Fourth, it sheds light on the question, initially raised by Baghai et al. (2014), of why CRAs have become increasingly conservative. Finally, our paper reveals how FI ratings have been affected in recent years, given their pivotal role before and during the global financial crisis. FIs are somewhat opaque and subject to a range of different risks, which make them more difficult to rate by CRAs compared with firms in other industries (Flannery et al., 2013; Morgan, 2002).[1] This study provides evidence on FI ratings behaviour in response to changes in CRA regulation, an aspect which is neglected in the earlier literature. Our sample includes ratings from the largest three CRAs

[1] Also, FI ratings affect the cost of borrowing and they are key determinants of the quality of FIs' portfolios, the quality of collateral to obtain liquidity from central banks, and capital adequacy requirements.

(Moody's, S&P and Fitch) for 758 FIs across 27 European countries during the period January 2006 to June 2016.

Three hypotheses on the impact of the regulatory change on credit ratings are tested, namely the *disciplining*, *rating conservatism* and *reputation* hypotheses (see Section 2). We test three key indicators: rating levels, the number of false warnings and the informational content of rating signals. The precise testable predictions arising from each hypothesis are detailed in Section 4.

The *disciplining hypothesis* proposes that the regulation motivates CRAs to invest in improvements to their methodologies, due diligence and performance monitoring (Bae et al., 2015; Dimitrov et al., 2015). The regulation also promotes enhanced disclosure of conflicts of interest within the rating process, strengthening of CRAs' internal control structures and increased methodological transparency. These improvements in CRAs rating practices can enhance rating quality and accuracy (Hirth, 2014; Cornaggia et al., 2018).

Rating conservatism implies that CRAs will lower their ratings (under-rate) to avoid incurring fines, penalties and scrutiny introduced by the more stringent new regulations. A rating that is too generous is more likely to incur scrutiny and criticism than a rating that is too low, and thus CRAs may choose to err on the side of caution. Further, we argue that conservatism is more likely to be observed in FI ratings, since FIs have greater information opacity/asymmetry than firms in other industries (Flannery et al., 2013; Morgan, 2002). Bannier et al. (2010) find that the strength of the conservatism increases when the issuers' creditworthiness is more uncertain (i.e. more opaque). Atilgan et al. (2015) also show that information asymmetry is a key reason for increases in conservative rating bias.

The *reputation hypothesis* stems from the notion of "reputational capital" (Flynn and Ghent, 2017), whereby CRAs may enhance their reputation by rating accurately, so that they can benefit in the future from opportunities to inflate their ratings to increase their market share

and hence their revenues. Reputational shocks deplete CRAs' reputational capital and trigger a subsequent period of reputation building which is characterised by conservative ratings with less informational impact in financial markets (Bedendo et al., 2018). Crucially, the effect of the *reputation hypothesis* is expected to be stronger in regions where CRAs are more concerned about preserving their reputational capital (Becker and Milbourn, 2011; Dimitrov et al., 2015).

The results reveal that EU regulatory actions have largely been successful in reducing rating inflation and have led to a significant decrease in rating levels, as predicted by the regulators surveyed in EC (2016).[2] However, the increased regulatory scrutiny has changed CRA behaviour whereby ratings are increasingly conservative (in line with the *rating conservatism* hypothesis).[3] This leads to an increase in unwarranted downgrades or false warnings, which in turn contribute to an observed decrease in the market reactions to negative credit signals (less informative negative rating actions). There is some evidence that rating upgrades are more informative in the post-regulatory period, particularly those by S&P and Fitch. This is a consistent outcome of increased rating conservatism because CRAs expend greater effort to ensure that each upgrade is warranted. The findings also show that the EU regulatory update in May 2013 acted to strengthen the existing impact of the prior regulation.

Our results contrast with those reported by Dimitrov et al. (2015) for the US corporate rating market following the Dodd-Frank Act (DFA). They study the impact of the DFA on US corporate ratings (excluding FIs) and find no evidence of increased *disciplining* or *rating conservatism*, but that CRAs become more protective of their reputation (i.e. consistent with the *reputation hypothesis*). Our findings imply that there are unique effects in the EU context. The EU and US CRA regulations have some similar objectives, but they differ in the details

[2] Both CRAs and issuers surveyed in EC (2016) were much more sceptical about the potential impact of the regulation than were the regulators.

[3] This is not the first instance of CRA regulation producing unintended consequences (see Behr et al., 2018).

and the execution.[4] ESMA has been more active in taking enforcement actions under its new regulatory regime than has the US Security and Exchange Commission (SEC) during the same period. ESMA has issued several fines to CRAs for breaches of the new regulation, while the SEC has appeared to be more reluctant.[5] Our results are robust to consideration of the DFA timing, and there is a clear incremental effect of the additional EU regulation when CRA II and CRA III are implemented in July 2011 and May 2013 respectively.

The remainder of the paper is organised as follows. Section 2 reviews prior research on the impact of regulation on CRAs and discusses the development of hypotheses. Section 3 describes the data sample and Section 4 discusses the methodology and the testable predictions based on the hypotheses. Section 5 analyses the empirical results and Section 6 concludes the paper.

2. Literature review and development of hypotheses

The business model adopted by CRAs is predominantly the "issuer pays" approach, whereby the issuer is charged for receiving a rating on a debt issuance. Issuers can be assumed to prefer favourable over truthful ratings and, since it is the issuer who pays fees to the CRA, there exists an inherent conflict of interest. This could be even more problematic in a context of competition for rating business, as discussed later in this section. CRAs argue that the main incentive for them to provide honest and accurate ratings is their concern for their reputation (Bar-Isaac and Shapiro 2013). Some researchers propose that CRAs possess "reputational

[4] In particular, the EU is enacting a more stringent civil liability regime than the US.

[5] DBRS was fined €30,000 on 29th June 2015 for failing to comply with corporate governance, compliance and record-keeping requirements. Fitch was fined €1.38 million on 21st July 2016 for negligence, transmitting information about upcoming rating actions and internal control failures. Moody's was fined €1.24 million on 1st June 2017 for negligence regarding their public announcements of ratings and public disclosure of methodologies. Fitch was fined €5,132,500 on 28th March 2019 for breaches of conflict of interest requirements. On 4th June 2020, ESMA fined Scope Ratings GmbH (Scope) €640,000 for failings in covered bonds ratings.

capital" (Flynn and Ghent, 2017), whereby CRAs may enhance their reputation by rating accurately, so that they can subsequently benefit from future opportunities to inflate ratings to increase revenues. Bedendo et al. (2018) argue that reputational shocks, such as the sub-prime crisis and the lawsuit against S&P,[6] cause the depletion of CRAs' reputational capital and thus trigger a period of reputation building which is characterised by more conservative ratings with less informational impact in financial markets. Baghai and Becker (2020) also confirm that CRAs which suffer reputational damage can (re)gain market share by issuing optimistic ratings. Therefore, the *reputation hypothesis* argues that CRAs lower their ratings to rebuild their depleted "reputational capital" following a reputational shock. Previous studies (e.g. Becker and Milbourn, 2011; Dimitrov et al., 2015) show that the effect of the *reputation hypothesis* is crucially stronger in markets where CRAs are more concerned with preserving their reputational capital, particularly in markets where CRAs are less concerned about competition.

Competition in the rating industry could potentially impact upon the quality of ratings issued. This proposition is tested by Becker and Milbourn (2011) who examine the entry of a third CRA (Fitch) into the US corporate bond rating market. They find that increased competition from Fitch coincides with lower quality ratings from incumbents (Moody's and S&P), which is attributed to inflated corporate rating levels. In addition, Dimitrov et al. (2015) empirically analyse the impact of the DFA on corporate bond ratings, using Fitch market share across industries as a proxy for reputational concerns (drawing from Becker and Milbourn (2011)). They find that CRAs issue lower, less accurate and less informative ratings following the DFA, especially in circumstances where their reputational costs are greater, which is consistent with the *reputation hypothesis*.

[6] This refers to the 2013 civil lawsuit by the US Government's Department of Justice and District of Columbia against S&P for defrauding investors in structured financial products, by issuing inflated ratings that misrepresented the true risks of the securities (Bedendo et al. 2018). The US government entered into a $1.375 billion settlement agreement with S&P in 2015.

Similar findings are reported for structured finance ratings. Cohen and Manuszak (2013) investigate the competition effects on AAA-rated tranches of over 300 commercial mortgage-backed securities. With similar findings to Becker and Milbourn (2011), they provide evidence that competitive pressure from a third market entrant (Fitch) results in more lenient ratings assigned by the incumbents (Moody's and S&P). Such effects of competition were more pronounced when Fitch's market share was low, but disappeared after Fitch became more established. Flynn and Ghent (2017) analyse the entry of new CRAs into the structured finance rating market and find evidence to support Becker and Milbourn (2011). The evidence points to the fact that CRAs are more concerned about preserving their market share, by assigning more inflated ratings, than maintaining their reputational capital when competition is fierce. Crucially, the strength of their desire to protect their 'reputational capital' will vary with their concern for their reputation, i.e. inversely proportional to the competition.

The *disciplining hypothesis* argues that the increased rating discipline promoted by the regulation leads to improved rating quality. The EU regulatory reforms contain many clauses to motivate CRAs to invest in improving their methodologies and having a strong framework for due diligence and performance monitoring. They also require CRAs to fully disclose any conflicts of interest, strengthen their internal control structures, and increase transparency of rating processes and performance. Hirth (2014) finds that the implementation of performance monitoring by a regulator rather than by investors can lead CRAs to become more honest. Cornaggia et al. (2018) argue that improved rating processes and increased rating transparency can enhance rating quality, leading CRAs to increasingly assign ratings free from inflation.

The *rating conservatism* hypothesis stems from Bannier et al. (2010) who show that CRAs are exposed to more severe scrutiny and penalties by over-rating (being less conservative), rather than by under-rating (being more conservative). The global financial crisis highlighted the detrimental role of rating inflation, which then became a focus of increased

regulatory scrutiny (Baghai et al., 2014). Although the regulation discourages optimistic ratings bias, it does not equally punish pessimistic rating bias. As a result, increased regulatory stringency, fines and liability can cause a shift to more conservative rating behaviour. Opp et al. (2013) develop a theoretical framework which predicts that the DFA would result in a systematic downward shift in the distribution of ratings from CRAs, caused by lower regulatory advantages for higher ratings. In addition, Baghai et al. (2014) show that CRAs became more conservative from 1985 to 2009, with average rating levels dropping three notches over the period, which is at odds with declining default rates during their sample period. Their evidence suggests that capital markets do not perceive the corresponding increase in conservatism to be warranted. Atilgan et al. (2015) also highlight that CRAs are more likely to be conservative when the cost for over rating is high. Therefore, the *rating conservatism* hypothesis states that in an attempt to avoid incurring such fines, penalties and scrutiny, CRAs will lower their ratings, i.e. rate more conservatively. [7]

Overall, our three hypotheses are summarised as follows:

Summary of hypotheses

Hypothesis	Summary
Disciplining	Improvements in rating process and methodology, stimulated by the regulation, lead to better quality ratings.
Rating conservatism	CRAs rate more conservatively to avoid incurring regulatory fines, scrutiny and penalties.
Reputation	Following a reputational shock, CRAs enter a period of reputation building where they rate more conservatively, and the effect is stronger in markets where CRAs care more about their reputation.

[7] Based on a survey of CRAs, investors and regulators, EC (2016) analyses the key points of the EU CRA regulation and assesses its impact. The study argues that the requirement for CRAs to publish historical performance and rating information may increase reputational costs for CRAs and provide investors with the information necessary to evaluate rating quality. However, the study also suggests that evaluating the historical performance is a complex task that only sophisticated investors can undertake.

Each hypothesis makes distinct testable predictions on the way in which the regulation will impact three key areas: (i) rating levels, (ii) false warnings and (iii) the informational content of credit rating signals. These will be discussed in Section 4.

3. Data

The sample consists of 758 rated FIs in 27 EU countries,[8] of which 378 are rated by S&P, 468 by Moody's and 494 by Fitch, during the period from 1st January 2006 to 1st June 2016. FI ratings and accounting variables are obtained from BankScope.[9] A panel dataset is constructed at monthly frequency (as in Caporale et al. (2012); Chen et al. (2016) and others). Table 1 presents the descriptions and summary statistics for the variables, which are selected following the literature on the determinants of FI ratings (e.g. Huang and Shen (2015)).[10]

The credit ratings are mapped to a 52-point comprehensive credit rating (CCR) scale: AAA/Aaa = 52, AA+/Aa1 = 49, AA/Aa2 = 46 …, CCC+/Caa1, CCC/Caa2, CCC-/Caa3 = 4, C/SD/CC/D = 1.[11, 12] Then, for positive (negative) watch we add +2 (-2) and for positive (negative) outlook we add +1 (-1). There are 1108 negative rating, outlook and watch events and 430 positive events (Table 4). S&P issues more downgrades during the sample period

[8] FIs' ratings are suitable for investigating our research questions because they were not the driving factor behind many of the regulatory changes. The earlier regulatory changes in the EU were typically aimed at structured finance products (although the changes also apply to other rating segments) which played a large role in the 2007-2008 sub-prime crisis. The later regulatory changes in the EU are driven by conflicts and issues that arose in the EU sovereign debt crisis, primarily caused by concerns relating to sovereign ratings. As such, potential endogeneity concerns regarding the impact of the regulation and the driving factors behind it are eliminated.

[9] Additional rating information is sourced from CRA publications.

[10] Annual financial variables are used in order to maximise data coverage in the sample. Only FIs that are rated and have financial characteristics available during the sample period are included. FIs may enter or exit the sample throughout the sample period. The data is trimmed at 1% to remove outliers. The correlation matrix (available on request) demonstrates an absence of strong correlation among the control variables.

[11] Unlike S&P and Moody's, Fitch does not differentiate between ratings at the CCC/Caa level since 2006.

[12] Eq. (1) to (4), Eq. (6) and Eq. (7) produced equivalent results when using the 18-notch rating scale (which excludes outlook and watch signals) as used by Becker and Milbourn (2011) and Dimitrov et al. (2015). Those results are available upon request.

(398), than Moody's (379) and Fitch (331). Moody's issues the most upgrades (191), compared to S&P (142) and Fitch (97).

3.1. S&P market share

To distinguish between markets with greater and lesser reputational concerns, it is necessary to utilize a proxy. A suitable proxy is derived from Becker and Milbourn (2011) and Dimitrov et al. (2015) but is adapted to the European FI context. Two CRAs with a dominant market share will consider a strengthening presence of a third CRA with a smaller pre-existing market share as a competitive threat. Consequently, they will behave increasingly competitively (caring less about their reputation and being more likely to inflate ratings) in seeking to stave off continued incursion into the market by the competitor.

Becker and Milbourn (2011) and Dimitrov et al. (2015) chose Fitch market share as a proxy for reputational concerns in the US corporate rating market, because Fitch has a relatively weaker presence in that market. This study's sample consists of European FI ratings, where the three large CRAs have substantially varying market shares across countries. Fitch is a relatively stronger participant in Europe than in the US and stronger in the FI sector than in corporate bond ratings. The long-established strength of Fitch in the European FI rating sector is influenced by: (i) having their global headquarters in London during the relevant time period; (ii) historical acquisitions of IBCA Limited (thereby achieving a strong European presence) and Thomson Financial BankWatch (thereby strengthening their position in FI ratings). Calculated at the issuer level, S&P has the lowest market share in the European FI rating market and thus its market share serves as a better proxy for reputational concerns. Further, S&P has the lowest rate of growth in market share in FI ratings during the sample period, while Fitch has the fastest rate (see Fig. 1).[13]

[13] Also, when Fitch market share is used in Eq. (A1) (see Appendix A), there is no positive correlation with European FI rating levels (those results are available upon request). Hence, Fitch market share would not act as a

Bae et al. (2015) argue that there are two problems with the measure used by Becker and Milbourn (2011) and Dimitrov et al. (2015). First, that the results are driven by an endogeneity problem caused by unobservable industry effects and second, that the positive relation between credit ratings and Fitch market share does not hold when only firms in non-regulated industries are included in the analysis. We address the first issue by limiting our sample to a single industry and calculating market share variation on the country level, while controlling for country level variation using country*year fixed effects as well as FI characteristics. The second issue is addressed by considering a single industry, whereby the regulation is therefore applied homogenously across the sample (as all countries are affected equally and simultaneously by the regulation).

S&P market share **(*S&PMS*)** is calculated by dividing the number of S&P issuer ratings (assigned to FIs) in country *j* in year *t* by the total number of FI issuer ratings assigned by the big three CRAs in country *j* in year *t* (the resulting market share is lagged by 1 year in estimated models). Fig. 2 shows that the average S&P market share varies substantially across all countries in the sample and across time. S&P market share in the sample ranges from an average of 21.4% in 2005 to 24.1% in 2016. S&P market share also varies across countries with Estonia having no S&P FI ratings and Luxembourg having an average S&P market share of 40.1%.[14]

good proxy for reputation as there is no positive relationship with rating levels and therefore competition. CRAs have increased reputational concerns in markets where there is less competition (Becker and Milbourn, 2011). As S&P has the smallest market share, its increased presence in the market triggers increased competitive behaviour from the other two incumbent CRAs. Because Fitch has a more established presence, an increment in its market share does not trigger more competitive behaviour from the other two CRAs. We further check, using Eq. (A1) (see Appendix A), that S&P market share has a positive relation to rating levels both before and after the regulation, in addition to the entire sample (those results are available upon request).

[14] In Appendix A, we illustrate how S&P market share **(*S&PMS*)** can be used as a proxy for reputational concerns. The inference is that Moody's and Fitch assign higher ratings in countries with higher S&P market share.

4. Methodology and testable predictions

4.1. Rating levels

A key aim of the EU regulation is to reduce rating inflation. All three hypotheses (see Section 2) predict that rating levels decrease in the post regulatory period. The *disciplining hypothesis* argues that the improvements in CRA methodology and rating process lead to a reduction in rating inflation. *Rating conservatism* argues that CRAs tend to under-rate issuers to reduce their susceptibility to fines, scrutiny, and liability. The *reputation hypothesis* suggests that CRAs assign lower ratings to safeguard their reputation. To examine whether rating levels decreased in the post regulatory period, the following ordered logit[15] model is estimated:

$$CR_{i,j,k,t} = \beta_1 Post_t + \beta_2 BANK_{i,j,k,t-1} + \beta_3 Moody's_t + \beta_4 Fitch_t + \lambda CF * YF + \varepsilon_{i,j,k,t} \quad (1)$$

$\boldsymbol{CR_{i,j,k,t}}$ is the credit rating of a FI *i* in country *j* assigned by CRA *k* at time *t* based on a 52-point CCR scale (see Section 3). ***Post*** is a dummy variable that takes the value of one after the new regulation and zero before. Eq. (1) is first estimated using July 2011, when the regulation became more strongly enforced by the newly established ESMA, as the start of the post-regulatory period.[16] Eq. (1) is then estimated using two separate post-regulatory dummies. ***Post1*** takes the value one during the period July 2011 to May 2013, and zero otherwise. ***Post2*** takes the value of one after May 2013 and zero otherwise to capture the latter regulatory update that increased the stringency of the rules and introduced a new liability regime. ***BANK*** is a set of variables that control for FI-specific characteristics (see Table 1). ***Moody's*** and ***Fitch*** are dummy variables that distinguish between ratings assigned by Moody's, Fitch and S&P (both dummies are zero in the latter case). ***CF *YF*** is a full set of interacted country and year dummy

[15] The estimation results of Eq. (1) to Eq. (4) are also robust to using either ordered probit or OLS estimations (available on request).

[16] The inferences from Eq. (1) to Eq. (4), Eq. (6) and Eq. (7) are similar when using September 2009 as a key date when the first regulatory reforms were introduced. Results are available on request.

variables. In line with Acharya et al. (2013) and Philippon and Reshef (2013), we use country and time fixed effects, along with a dummy variable for regulatory change.[17]

Crucially, the *reputation hypothesis* makes a different prediction to the other two hypotheses, namely that the effect should be stronger in countries where CRAs care more about their reputation. To detect the presence of reputational effects, the model is expanded to consider whether the FI is in a country with stronger or weaker reputational concerns. We use S&P market share as a proxy for reputational concerns (see Section 3.1). In countries with a greater presence of the third CRA, the other two CRAs care less about their reputation due to the stronger competition (Becker and Milbourn, 2011; Dimitrov et al. 2015). Conversely, countries with a lower S&P market share are characterised by greater reputational concerns for Moody's and Fitch, therefore reputational effects should be stronger. If a stronger decrease in rating levels is observed in countries with greater reputational concerns, this indicates the presence of reputational effects. If no difference between countries with differing reputational concerns is observed, this implies that either the *disciplining hypothesis* or *rating conservatism* is potentially more relevant to explain any decrease in rating levels. The following ordered logit model is estimated:

$$CR_{i,j,k,t} = \beta_1 Post_t + \beta_2 S\&PMS_{j,t-1} + \beta_3 Post * S\&PMS_{i,j,t} + \beta_4 BANK_{i,j,k,t-1} + \beta_5 Moody's_t + \lambda CF * YF + \varepsilon_{i,j,k,t} \quad (2)$$

The sample is split into two sub-groups, the lower quartile of ***S&PMS*** and the upper three quartiles of ***S&PMS*** (similar to Dimitrov et al. (2015)). The variable $\boldsymbol{S\&PMS_{j,t}}$ is a dummy

[17] The use of interacting fixed effects is an increasingly common practice (e.g. Jiménez et al. (2012)), as the approach allows for the control of possible omitted variable bias i.e. endogeneity issues. The interaction term takes account of any variation present across different times and countries, and controls for differences in the macroeconomic conditions of the countries. The results (available on request) of Eq. (1) to Eq. (4), Eq. (6) and Eq. (7) are robust to using to using country and year fixed effects separately, and to using country fixed effects only (without year fixed effects, as done by Dimitrov et al. (2015)).

with a value of one if in the first group and zero if in the second.[18] The addition of ***Post*S&PMS*** allows for the extraction of the effect due to variations in reputational concerns in the post-regulatory period and thus ***Post*** represents the change arising solely from the regulation.

4.2. False warnings

This section addresses the question of whether lower credit ratings in the post-regulatory period are warranted by changing FI creditworthiness. If any change in rating levels is fully justified, there will be no significant increase in false warnings. If the observed lower ratings are not fully justified, an increase in false warnings would be identified (i.e. unjustified downgrades). The following logit model of false warnings is estimated:

$$FW_{i,j,k,t} = \beta_1 Post_t + \beta_2 BANK_{i,j,k,t-1} + \beta_3 Moody's_t + \beta_4 Fitch_t + \lambda CF * YF + \varepsilon_{i,j,k,t} \quad (3)$$

$\boldsymbol{FW_{i,j,k,t}}$ is a dummy variable taking the value of one for a FI *i* rated BB+/Ba1 or lower in country *j* by CRA *k* at time *t* that does not face financial distress within one year, and zero otherwise (see Dimitrov et al. (2015)).[19] FI failures are rare in Europe and therefore defining when a FI faces distress can be challenging. Betz et al.'s (2014) method is adopted here, whereby FIs are examined for potential distress events, including: (i) default/liquidation, (ii) government intervention/support and (iii) forced merger. The incidence of false warnings in our sample is shown in Fig. 3, and there is a clear increase in false warnings from 2010 to 2014.

The three hypotheses make different predictions with regards to false warnings. The *disciplining hypothesis* predicts no increase in the number of false warnings, because the

[18] The estimation results for Eq. (2) and Eq. (4) remain consistent when using 20th, 30th and 40th percentiles of S&P market share in the $\boldsymbol{S\&PMS_{t-1}}$ dummy. These results are available on request.

[19] The estimation results of Eq. (3) and Eq. (4) are robust to using a rating of B+/B1 and below as the cut off point for a warning instead of the original cut off point of BB+/Ba1. The results are robust to changing the length of time to observe financial distress from one year to: (i) two years and (ii) three years. Results are available upon request.

regulation has acted to improve rating methodology and reduce rating inflation. *Rating conservatism* predicts an increase in the number of false warnings, as greater risk of regulatory intervention causes CRAs to under-rate, thereby inducing an increased incidence of unwarranted downgrades. The *reputation hypothesis* predicts that any increase in false warnings is more apparent in countries with stronger reputational concerns in the post-regulation period. The following model is estimated:

$$FW_{i,j,k,t} = \beta_1 Post_t + \beta_2 S\&PMS_{j,t-1} + \beta_3 Post * S\&PMS_{i,j,t} + \beta_4 BANK_{i,j,k,t-1} + \beta_5 Moody's_t + \lambda CF * YF + \varepsilon_{i,j,k,t} \quad (4)$$

A positive and significant coefficient on ***Post*** would indicate an increase in false warnings and unwarranted downgrades in the post-regulatory era. ***Post*S&PMS*** captures the difference in impact between countries with stronger and weaker reputational concerns.

4.3. Informational content of ratings

Jackowicz et al. (2020) argue that credit rating downgrades represent one of the most prolific types of economic shocks influencing both issuers and investors, given that credit ratings are inherent in regulatory requirements and internal investment policies. ESMA seeks to reduce financial markets' mechanistic reliance on credit ratings and hence to reduce market overreactions to downgrades, which should consequently reduce the market reaction to negative rating signals. Improving rating quality would increase the informational content of (hence greater market reaction to) positive rating news. We use two methods, which are commonly applied in previous ratings-related literature, to examine the information content of CRAs' bank credit signals during periods prior and subsequent to the regulatory reforms of the rating industry: (i) Event study methodology, and (ii) Fixed effects model. First, in the event study, the market reaction to a credit signal on day t is measured by the abnormal stock return,

calculated using a technique widely adopted in the literature (e.g. Correa et al., 2014; Jackowicz et al., 2020):

$$Abnormal\ Return = Stock\ Return - \alpha - \beta * Market\ Return \quad (5)$$

The FI stock return is calculated over a 2-day period (*t-1*, *t+1*). α and β are the intercept and slope coefficients, respectively, of an OLS regression of FI *i*'s stock returns on the market return. This is estimated using daily data from an event window of 230 days prior to 30 days prior [-230, -30] each rating announcement and a constant.[20]

Second, a fixed effects model of rating announcements is constructed (positive and negative credit rating events are considered separately) as follows:

$$AR_{i,j,k,t} = \beta_1 Post_t + \beta_2 Rating\ Event_{i,t} + \beta_3 Post_t * Rating\ Event_{i,t} + \beta_4 BANK_{i,j,k,t-1} + \beta_5 Moody's_t + \beta_6 Fitch_t + \lambda CF * YF + \varepsilon_{i,j,k,t} \quad (6)$$

Rating Event$_{it}$ is a dummy variable equal to 1 on a credit signal date *t* for FI *i* and zero otherwise). ***AR*** is the abnormal stock return and is calculated as in Eq. (5).

The *disciplining hypothesis* predicts that negative and positive credit signals will become more informative, because improved methodologies, reduced rating inflation and greater diligence by CRAs will result in improved rating quality. *Rating conservatism* predicts that negative credit signals will become less informative, because CRAs tend to deflate their ratings to protect themselves against increased regulatory intervention. In addition, the EU regulation aims to mitigate the mechanistic market reaction to rating downgrades, which may potentially reduce the stock price reactions to negative signals. Conversely, positive credit signals may become more informative, as over-rating exposes CRAs to greater potential penalties and liability. This incentivises CRAs to expend greater effort to ensure that each positive signal is warranted. The *reputation hypothesis* stipulates that negative credit signals

[20] Stock market data for 107 listed FIs and their respective country indices is collected from DataStream.

may become less informative, and positive credit signals may become more informative because CRAs wish to avoid the perception of biased ratings and therefore expend greater effort when issuing rating upgrades. Any effect due to the *reputation hypothesis* would differ between countries with greater and lesser reputational concerns.

We estimate Eq. (7), whereby the interaction term ***Post*Rating Event*S&PMS*** is the additional effect that credit signals have in countries in the bottom quartile of S&P market share (greater reputational concerns):

$$AR_{i,j,k,t} = \beta_1 Post_t + \beta_2 Rating\ Event_{i,t} + \beta_3 Post_t * Rating\ Event_{i,t} + \beta_4 S\&PMS_{i,t-1} + \beta_5 Rating\ Event_{i,t} * S\&PMS_{i,t-1} + \beta_6 Post_{i,t} * S\&PMS_{i,t-1} + \beta_7 Post_{i,t} * Rating\ Event_{i,t} * S\&PMS_{i,t-1} + \beta_8 BANK_{i,j,k,t-1} + \beta_9 Moody's_t + \beta_{10} Fitch_t + \lambda CF * YF + \varepsilon_{i,j,k,t} \quad (7)$$

4.4. Testable predictions

The testable predictions of our three hypotheses (see Section 2) on rating levels, false warnings and the informational content of rating upgrades and downgrades are summarized below:

Testable predictions

Hypothesis	Rating Levels	False Warnings	Upgrades	Downgrades
Disciplining	Decrease	No change	More informative	More informative
Rating conservatism	Decrease	Increase	Potentially more informative	Less informative
Reputation	Decrease – varies with reputation concerns	Increase in countries with greater reputation concerns	Potentially more informative – varies with reputation concerns	Less informative – varies with reputation concerns

5. Empirical results

5.1. Rating levels

In this sub-section, we analyse whether rating levels have changed following the introduction of the EU regulation of CRAs. To preview the findings, we show that: (i) rating levels are lower following the regulation, (ii) the effect does not differ with reputational concerns, and (iii) the May 2013 regulation update strengthens the regulatory/conservatism effect.

Eq. (1) is estimated twice using different dates for the start of the post-regulatory period, with the results reported in Table 2. Credit ratings are lower following the regulatory change. First, Eq. (1) is estimated using July 2011 (when ESMA was established) as the start of the post-regulatory period. The coefficient of the regulatory change ***Post*** is -0.304, and thus the odds that a FI is rated as non-investment grade are 1.36 ($1/e^{-0.304}$) times greater following the regulation.[21] The results are consistent with the *disciplining hypothesis*, whereby rating quality improves and there is a reduction in inflated ratings, and with *rating conservatism*, whereby CRAs are induced by greater regulatory scrutiny to issue more conservatively biased ratings. The results are also in line with the *reputation hypothesis*, whereby CRAs issue lower ratings following a reputational shock in order to protect their reputation.

Eq. (1) is then estimated using two separate post-regulatory dummies. ***Post1*** takes the value one during the period July 2011 to May 2013, and zero otherwise, to capture any effects caused by the enforcement of the initial regulation by ESMA. ***Post2*** takes the value of one after May 2013 and zero otherwise to capture the latter regulatory update. Eq. (1) produces the same inferences as reported above for the July 2011 handover of responsibilities to ESMA. The regulatory update in May 2013 then acts to strengthen this effect with a further decrease (***Post2*** coefficient is -0.413 and the odds of being rated non-investment grade are 1.51 times greater).

[21] The proportional odds ratio in ordered logit captures the proportional change in the odds that a FI is rated below a certain credit rating level, such as BBB-/Baa3, for a unit change in a predictor variable, holding other variables in the model constant (see Dimitrov et al. 2015).

Consistent with the *rating conservatism* hypothesis, this additional decrease could arise from the increased stringency of the rules introduced by the 2013 regulatory update. This primarily introduced a new liability regime (Article 35a), giving investors and issuers the right to sue for damages, and strengthening existing disclosure and transparency requirements.

To investigate the difference further, Eq. (2) is estimated to take account of differences between countries with different reputational concerns, with the results reported in Table 2. Rating signals are restricted to those of Moody's and Fitch and the estimated model includes the S&P market share variable. A strengthening of the impact of the regulation is observed in all countries following both July 2011 and May 2013, implying the strong presence of either *disciplining* effects or increased *rating conservatism*. Using the July 2011 regulatory start date, there is no variation in effect between countries with greater or lesser reputational concerns (insignificant ***Post*S&PMS***) and countries in the bottom quartile of S&P market share reveal no differences compared with countries in the top three quartiles. Second, the significant coefficients on both ***Post1*** (-0.345) and ***Post2*** (-0.427) imply lower ratings following the regulation. ***Post1 * S&PMS*** and ***Post2 * S&PMS*** coefficients are not significant, indicating that there is no difference in the impact of the regulation between countries where CRAs have stronger or weaker reputational concerns. The implication is that there are no reputational effects present and only the disciplining effect of the regulation remains. This acts through either the discipline channel or by stimulating increased rating conservatism, thus supporting the regulators' views expressed in EC (2016). This finding contrasts strongly with US evidence that reputational effects are strongly connected to the reductions in corporate ratings levels.[22]

[22] Dimitrov et al. (2015) find evidence of the presence of reputational effects causing a significant decrease in corporate rating levels in the post Dodd-Frank era in the US. This effect is stronger in industries with greater reputational effects. They find no significant decrease in industries with lesser reputational effects. They find no evidence that the Dodd-Frank legislation acts through the discipline channel.

5.2. False warnings

This sub-section aims to determine whether *rating conservatism* is driving the decrease in rating levels. To preview the findings, we show: (i) an increase in false warnings in the post regulatory period, (ii) the increase does not differ with reputational concerns, and (iii) the May 2013 regulation update strengthens the effect.

The results from Eq. (3) are reported in Table 3. After July 2011, there is a significant increase in false warnings (***Post*** coefficient is 0.383). This implies that the odds that a CRA would issue a false warning after July 2011 are 1.47 ($e^{0.383}$) times greater than before. This increase in false warnings implies that not all rating downgrades are warranted. There are two potential reasons for this. First, increased *rating conservatism* caused by CRAs' concerns about potentially greater regulatory intervention in cases of over-rating. Second, CRAs issue more downgrades to protect their reputation and build reputational capital. Eq. (3) is then estimated using two separate post-regulatory dummies. The results show a strengthening of the result from ***Post1*** to ***Post2*** (the coefficient is 0.694, which doubles the odds of a false warning). This increase in unwarranted downgrades following the strengthening of the regulation in May 2013 and the introduction of the civil liability regime is highly suggestive of an increase in *rating conservatism* by CRAs as they respond to the increased potential cost for over-rating.

To differentiate between the two possibilities, Eq. (4) is estimated (see Table 3). Following July 2011, there is an increase in the incidence of false warnings (***Post*** coefficient is 0.464). The coefficient on ***Post*S&PMS*** is negative and is not significant, implying that countries in the bottom quartile of S&P market share do not show different outcomes from those in the top three quartiles (i.e. countries with lesser reputational concerns, greater competition). This evidence supports the notion that increased *rating conservatism* induced by regulation is driving the increased incidence of false warnings, rather than CRAs protecting their reputation. In other words, CRAs are downgrading FI ratings to avoid potentially exposing

themselves to increased regulatory interventions. This is not dependent on reputational concerns because regulatory penalties would be applied to CRAs irrespective of their reputation. This result again contrasts with evidence from US corporate ratings, whereby the DFA's impact on false warnings is significantly stronger for industries where CRAs had stronger reputation concerns.

On estimating Eq. (4) with ***Post1***, ***Post2*** and ***S&PMS***, the coefficients of the interaction terms are both insignificant, i.e. there are no different effects for countries where CRAs have weaker or stronger reputational concerns. This reinforces the hypothesis that *rating conservatism* drives the rating changes rather than CRAs protecting their reputation. The May 2013 regulatory update exacerbates the effect, as we see an increase in the number of unwarranted downgrades (i.e. false warnings) and no difference between countries with different reputational concerns.

5.3. Informational content of ratings

This sub-section compares stock market reactions to rating announcements before and after the establishment of ESMA in July 2011. To preview the findings, we reveal a decrease in the informational content of rating downgrades and an increase in informational content for rating upgrades, which are both consistent with increased rating conservatism.

The event study results, reported in Table 4, show that, prior to July 2011, negative credit signals resulted in a significant stock price reduction (-0.597%, see Panel A - All signals sample). The strongest market responses are observed for watch signals (-1.206%), followed by combined rating downgrades and negative watch/outlook signals (-0.996%) and then outlook signals (-0.630%). This is consistent with previous studies' findings that outlook and watch signals have a stronger impact on financial markets because they are less anticipated by market participants, and CRAs disclose more private information to the markets via the

watch/outlook channel (e.g. Abad et al., 2018; Afonso et al., 2012). IMF (2010) also highlights that most of the informational value from CRAs' actions arises through outlook/watch procedures rather than actual rating level changes. Watch signals, in particular, reveal a much stronger statement and CRAs aim at a short-term horizon in resolving the watch status, and this explains the very strong market reaction to negative watch signals before the regulatory change (see Panel A of Table 4). In addition, we examine the market reaction to rating downgrades which were not preceded versus preceded by negative outlook/watch signals. We find that rating downgrades which were not preceded by negative watch/outlook signals lead to a significant strong negative abnormal return (-1.305%), given that they are to some extent not anticipated by the market, while the latter signals have insignificant market reaction prior to the regulatory reforms. After July 2011, there is no significant negative response to any type of negative credit signals. The t-test confirms a statistically significant decrease in the reaction to negative signals in the post-regulatory period (-0.624%, see All signals sample), indicating that negative credit signals are less informative in the post-regulatory period.

The results are also consistent when the sample is restricted to negative rating announcements by Moody's and Fitch only (results are available on request).[23] Further, the fixed effects model (Eq. (6)) produces equivalent inferences.[24] It shows that, prior to the 2011 regulatory change, rating downgrades elicit a significant stock price reduction of 0.483% (see

[23] When examining the information content of rating announcements using an event study, it is important to consider the clustering of rating announcements (Hill and Faff, 2010). An independent rating event is one where no other rating event occurs for the FI within 21 trading days (-10, +11), otherwise the event is a clustered event. There are 1654 separate rating events in the sample, of which 1263 are independent events and 391 are clustered. The results (available upon request) are consistent. Independent rating downgrades generate a much greater market reaction prior to July 2011, whereas clustered downgrades do not. Both reveal insignificant reactions after July 2011.

[24] To ensure that our results are not driven by changes in stock price or market volatility, we estimate Eq. (6) with the addition of two terms: (i) the VSTOXX European volatility index lagged at *t*-1, (ii) the rolling average daily stock return volatility (estimated with both 3- and 7-days moving averages separately). The results, available on request, are consistent with those presented in Table 5.

Table 5). However, after the regulatory change, rating downgrades no longer do so (insignificant ***Post * Rating downgrade***).

One of the intended aims of the regulation is to reduce the mechanistic market reaction to negative credit signals and it could therefore be argued that this has been successful. However, this change may be also due in part to an increase in rating conservatism induced by the new regulation's discouragement of over-optimistic ratings. Following the regulatory reforms, there is an increase in unwarranted negative signals (false warnings, see Section 5.2). It follows logically that unwarranted negative signals hold less information for the market.

The impact of the regulatory change in July 2011 on stock market reactions to positive signals is also examined. Panel A of Table 4 shows that abnormal stock returns for positive credit news are statistically insignificant before the regulatory change and remain insignificant after the regulation (see All signals sample). This is consistent with the findings of prior literature (e.g. Correa et al., 2014) that the responses to CRAs' positive credit signals are muted given that positive credit signals are usually anticipated by market participants. Prior to the regulatory change, all types of positive credit signals did not induce a significant increase in stock prices. However, following the regulation, rating upgrades which were not preceded by watch/outlook signals, and therefore less anticipated by the market participants, elicit positive and significant abnormal returns (1.650%). Examining signals by Moody's and Fitch only, unreported results (available on request) reveal that, following the regulation, rating upgrades by both Moody's and Fitch elicit positive and significant abnormal returns (0.734%).

The results of the fixed effects model (Eq. (6)) for upgrades demonstrate that, prior to the 2011 regulatory change, no significant reaction to rating upgrades is observed. Following the establishment of ESMA, a 0.445% reaction in stock prices is observed in response to rating upgrades (see Table 5). There is therefore some evidence for a limited increase in the informational content of upgrades. This is consistent with increased *rating conservatism*, in the

sense that CRAs will expend more effort to ensure that rating upgrades are justified and those rating actions will thereby typically become more informative.

Lastly, the impact of reputational concerns is also considered. The results (available upon request) of both the event study and Eq. (7) show no significant stock market reaction to FI rating downgrades in groups of countries with greater and lesser reputational concerns following the regulatory change of July 2011. This indicates that reputational effects are not driving the decrease in the informational content of rating downgrades. These results support the overall findings of the negligible relevance of the *reputation hypothesis* in the European FI rating context. In contrast, the US corporate rating market demonstrates strong evidence of reputational effects, with downgrades in industries with stronger reputational concerns exhibiting a stronger stock market reaction (Dimitrov et al. (2015)).

The impact of the May 2013 regulatory update upon the stock market reaction to negative rating signals is also examined (see Panel B of Table 4). The event study results show a clear reduction in the informational content of the negative credit signals following the regulatory update (1.146% decrease in the market reaction, see Panel B of Table 4 – All signals sample). We also find that, following the regulatory change, all types of negative credit signals did not induce negative and significant abnormal return. The results from the fixed effects model (Eq. (6)) corroborate those of the event study because once again a significant negative reaction to rating downgrades is observed (-0.483%, see Table 5) prior to July 2011. This then disappears and a positive reaction (which indicates a lack of information) is observed following the May 2013 update (Table 5). For rating upgrades, the fixed effects model shows no significant reaction to rating upgrades prior to July 2011, a significantly stronger market reaction after July 2011 and then an insignificant reaction following the May 2013 update. These results are consistent with the *rating conservatism* hypothesis.

5.4. Robustness tests

The regulation that targeted CRAs has been rolled out incrementally. The DFA was enacted in the US in July 2010, prior to the EU's implementation of reforms in July 2011 and May 2013. To identify whether the DFA was in some way driving the responses to changes in the EU regulations, Eq. (1) to Eq. (4) are estimated with the inclusion of DFA dummy variable (Table 6), that takes the value of one after 21st July 2010 and zero otherwise. Our results are robust to the inclusion of DFA. Rating levels still exhibit a clear decrease following the EU regulation (-0.304%). False warnings show a clear increase in the post-regulatory period (0.383%). The DFA's introduction appears to have an impact, but this is much smaller than the impact from the European regulation. It is clear that the EU regulation rather than the US regulation is driving the results for our sample.

It is feasible that the regulation has induced S&P, Moody's and Fitch to amend their FI rating policies in different ways, thus Eq. (1) to Eq. (4) are estimated separately for each CRA (the results are available on request). The results of Eq. (1) (decreasing rating levels) are consistent for all three CRAs, although Moody's reveals a stronger result than S&P and Fitch. The results of Eq. (3) show a significant increase in false warnings for Moody's and Fitch, while S&P exhibits a weaker insignificant result. It is possible that because S&P has a lesser presence in the EU, S&P may issue less inflated FI ratings and thus did not issue as many unwarranted downgrades following the regulatory reforms. The results of Eq. (6) show that in the post-regulatory period, none of the CRAs' rating downgrades generate a significant stock market response, while S&P and Fitch rating upgrades induce a positive stock market reaction.

Bedendo et al. (2018) argue that CRAs respond to reputational shocks by increasing rating quality to preserve their reputation. This occurs when CRAs promptly react to criticism by increasing rating quality (Bar-Isaac and Shapiro, 2013, Bedendo et al., 2018). There are arguably three major reputational shocks during our sample period: (i) the 2006-2008 financial

crisis (the collapse of Lehman Brothers in September 2008), (ii) the EU sovereign debt crisis (April 2010, the date that S&P downgraded Greece to junk status) and (iii) the S&P litigation case (February 2013). To control for the impact of reputational shocks during the sample period, Eq. (1) and (4) are estimated with an additional dummy $\boldsymbol{RepShock_{i,j,t}}$. that captures periods of reputational shock for CRAs and takes the value of one for a period of one year after the reputational shock and zero otherwise.

The results of Eq. (1) in Table 7 show a significant reduction in rating levels in the year following a shock and there also remains a significant impact from the regulation (***Post*** coefficient is -0.303, therefore the magnitude of the rating reduction due to ***Post*** has barely decreased at all compared to the previous estimation). Thus, while reputational shocks may contribute to decreased rating levels, they are not solely responsible. The results of Eq. (3) show a significant increase in false warnings following both the reputational shock and the regulation. This is attributable both to CRAs seeking to protect their reputation after any shock and to the role of regulation.

The European sovereign debt crisis was characterised by a particular concentration of rating downgrades in peripheral Euro-zone countries, namely Greece, Ireland, Italy, Portugal and Spain (GIIPS). Our sample is dominated by FIs in other (core) countries. Yet, as a robustness test, Eq. (1) to Eq. (4), Eq. (6) and Eq. (7) are estimated with a sub-sample excluding the GIIPS countries. The inferences (results available upon request) are similar to those reported earlier in the paper. This indicates that our findings are not driven by the EU sovereign debt crisis.

Dilly and Mählmann (2016) show that rating quality is counter cyclical and ratings quality should be higher in an economic downturn. We would then expect that during our sample period (economic downturn) that ratings quality should increase. This would then predict a reduction in false warnings and an increase in the informational content of ratings announcements. We find, however, that there is an increase in false warnings and a reduction

in the informational content of rating downgrades. We can conclude that our results cannot be driven by cyclical effects.

Finally, the recent EU bank bail-in regulations (starting from January 2016 but variable timing across countries) are an additional factor to consider. Because these laws shift some of the responsibility for bank resolution from the government to shareholders and creditors, they could potentially impact FI rating levels. A dummy variable is included on a country-by-country basis to take account of the period when the law is introduced in that country (based on ISDA (2016)). The results (available on request) of Eq. (1) to Eq. (4) are consistent and robust to the inclusion of this bail-in dummy. The bail-in variable is not significant in any estimated model.

6. Conclusions

This unique study investigates whether the EU regulatory reforms of the rating industry in response to the global financial crisis have been successful. Our paper is also unique in its focus on the quality of FIs' ratings following the regulatory reform. A sample of 758 financial institutions across 27 European countries rated by S&P, Moody's and Fitch during January 2006 to June 2016 is used. We examine the impact of EU regulation on rating levels, the incidence of false warnings and the responsiveness of stock markets to credit rating signals (rating informativeness).

We contribute to the literature by demonstrating that the EU regulatory reforms act to promote more conservative rating behaviour, leading to a reduction in the levels of European FI ratings. Overly generous ratings are much more likely to incur scrutiny and criticism, thus CRAs err on the side of caution. This has led to an increased incidence of unjustified downgrades (false rating warnings) and with it a corresponding decrease in the informational content of (and stock price reactions to) rating downgrades. The latter decrease in informational

content may also be driven in part by a declining reliance on CRAs by market participants, which reduces the mechanistic reactions to rating signals in financial markets (a key aim of ESMA). There is evidence of increased stock price sensitivity to rating upgrades (mainly those by S&P and Fitch) following July 2011. This is consistent with the increased presence of rating conservatism, i.e. within an environment of increased regulatory scrutiny and potential legal repercussions, CRAs spend more effort and resources to ensure that upgrades are justified. These results are robust to the inclusion of reputational shocks, the more recent EU bail-in laws and to alternative definitions of false warnings and of the rating scale.

Our results contrast with evidence from US corporate bond ratings where it appears that reputational effects have driven changes in CRA behaviour subsequent to the DFA. Becker and Milbourn (2011) and Dimitrov et al. (2015) propose that incumbent CRAs have greater reputational concerns in markets with the presence of a third CRA with a smaller market share (markets with less competition). In contrast to the US, we find no evidence of variation in effects for EU FI ratings across countries with differing reputational concerns. The EU regulatory update of May 2013 strengthens the existing impact of the regulation on *rating conservatism* by further reducing rating levels and increasing unwarranted downgrades.

Although the EU and US CRA regulatory reforms have some similarities, there are substantial differences in the details and execution. ESMA has been more active in enforcing the regulatory amendments than the US SEC. We consider the incremental effect of the EU regulation, alongside the earlier introduction of DFA to regulate CRAs in the US. The results are robust to the consideration of DFA and we find that the EU regulation has a far more significant impact, as would be anticipated.

This paper furthers the discussion on suitable mechanisms for regulating CRAs in the future. While the regulation has been successful in reducing rating inflation, the evidence indicates that this is a by-product of a behavioural shift towards increased rating conservatism,

in line with Baghai et al. (2014), rather than a direct result of increased rating quality. This has come at the cost of an increased incidence of false warnings and reduced rating downgrade informativeness, but there is evidence of reduced mechanistic market reactions to rating downgrades. This is not the first illustration of CRA regulation producing some unintended consequences (Behr et al., 2018)).

Several other policy recommendations arise. Credit ratings are an important source of information for market participants and therefore regulators should reflect on the need to alleviate both overly optimistic and conservative biases. Promoting improvements within the rating process should continue as a central tenet of the regulation in order to mitigate the conservative rating bias. Regulators should also consider the potential costs to market functioning and informational efficiency which arise from a reduced informativeness of rating downgrades. Further, regulators should more explicitly consider the structured debt-rating sector separately from the FI rating segment, given that we find evidence that increased competition among CRAs leads to more inflated FI ratings.

References

Abad, P., Alsakka, R., ap Gwilym, O. (2018). The influence of rating levels and rating convergence on the spillover effects of sovereign credit actions. Journal of International Money and Finance, 85, 40-57

Acharya, V. V., Schnabl, P., Suarez, G. (2013). Securitization without risk transfer. Journal of Financial Economics, 107, 515–536.

Afonso, A., Furceri, D., Gomes, P. (2012). Sovereign credit ratings and financial markets linkages: Application to European data. Journal of International Money and Finance, 31, 606-638.

Atilgan, Y., Ghosh, A., Zhang, J. (2015). Cross-listed bonds, information asymmetry and rating conservatism. Journal of Money, Credit, and Banking, 47, 1–45.

Bae, K.-H., Kang, J.-K., Wang, J. (2015). Does increased competition affect credit ratings? A reexamination of the effect of Fitch's market share on credit ratings in the corporate bond market. Journal of Financial and Quantitative Analysis, 50, 1011–1035.

Baghai, R., Becker, B. (2020). Reputations and credit ratings: Evidence from commercial mortgage-backed securities. Journal of Financial Economics, 135, 425–444.

Baghai, R. P., Servaes, H., Tamayo, A. (2014). Have rating agencies become more conservative? Implications for capital structure and debt pricing. Journal of Finance, 69, 1961–2005.

Bannier, C. E., Behr, P., Güttler, A. (2010). Rating opaque borrowers: Why are unsolicited ratings lower? Review of Finance, 14, 263–294.

Bar-Isaac, H., Shapiro, J. (2013). Ratings quality over the business cycle. Journal of Financial Economics, 108, 62–78.

Becker, B., Milbourn, T. (2011). How did increased competition affect credit ratings? Journal of Financial Economics, 101, 493–514.

Bedendo, M., Cathcart, L., El-Jahel, L. (2016). Reputational shocks and the information content of credit ratings. Journal of Financial Stability, 34, 44-60.

Behr, P., Kisgen, D. J., Taillard, J. P. (2018). Did government regulations lead to inflated credit ratings? Management Science, 64, 1034–1054.

Betz, F., Oprică, S., Peltonen, T. A., Sarlin, P. (2014). Predicting distress in European banks. Journal of Banking and Finance, 45, 225–241.

Caporale, G. M., Matousek, R., Stewart, C. (2012). Ratings assignments: Lessons from international banks. Journal of International Money and Finance, 31, 1593–1606.

Chen, S. S., Chen, H. Y., Chang, C. C., Yang, S. L. (2016). The relation between sovereign credit rating revisions and economic growth. Journal of Banking and Finance, 64, 90–100.

Cohen, A., Manuszak, M. (2013). Ratings competition in the CMBS market. Journal of Money, Credit and Banking, 45**,** 93-119.

Cornaggia, J., Cornaggia, K. J., Israelsen, R. D. (2018). Credit ratings and the cost of municipal financing. Review of Financial Studies, 31, 2038–2079.

Correa, R., Lee, K. H., Sapriza, H., Suarez, G. A. (2014). Sovereign credit risk, banks' government support, and bank stock returns around the world. Journal of Money, Credit and Banking, 46, 93–121.

Dilly, M., Mählmann, T. (2016). Is there a boom bias in agency ratings? Review of Finance, 20(3), 979–1011.

Dimitrov, V., Palia, D., Tang, L. (2015). Impact of the Dodd-Frank Act on credit ratings. Journal of Financial Economics, 115, 505–520.

EC. (2014). Economic review of the financial regulation agenda. Commission Staff Working Document 2014/158.

EC. (2016). Study on the state of the credit rating market. https://doi.org/10.2874/625016

Flannery, M. J., Kwan, S. H., Nimalendran, M. (2013). The 2007-2009 financial crisis and bank opaqueness. Journal of Financial Intermediation, 22, 55–84.

Flynn, S., Ghent, A. (2017). Competition and credit ratings after the fall. Management Science, 64(4), 1672–1692.

Hill, P., Faff, R. (2010). The market impact of relative agency activity in the sovereign ratings market. Journal of Business Finance and Accounting, 37, 1309–1347.

Hirth, S. (2014). Credit rating dynamics and competition. Journal of Banking and Finance, 49, 100–112.

Huang, Y. L., Shen, C. H. (2015). The sovereign effect on bank credit ratings. Journal of Financial Services Research, 47, 341–379.

Iannotta, G. (2006). Testing for opaqueness in the European banking industry: Evidence from bond credit ratings. Journal of Financial Services Research, 30, 287–309.

International Monetary Fund (IMF). 2010. Chapter 3: The uses and abuses of sovereign credit ratings. Global Stability Report.

ISDA (2016). ISDA BRRD implementation monitor (5th edition).

Jackowicz, K., Kozłowski, L. Podgórski, B, Winkler-Drews, T. (2020). Do political connections shield from negative shocks? Evidence from rating changes in advanced emerging economies. Journal of Financial Stabilty, 51, 100786.

Jiménez, G., Ongena, S., Peydró, J., Saurina, J. (2012). Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. American Economic Review, 102, 2301–2326.

Morgan, D. P. (2002). Rating banks: Risk and uncertainty in an opaque industry. American Economic Review, 92, 874–888.

Opp, C. C., Opp, M. M., Harris, M. (2013). Rating agencies in the face of regulation. Journal of Financial Economics, 108, 46–61.

Philippon, T., Reshef, A. (2013). An international look at the growth of modern finance. Journal of Economic Perspectives, 27, 73–96.

Table 1. Distribution and summary statistics for the control variables

Section	Variable	Explanation	Measure	Expected sign	Obs.	Mean	Std.	Min	Max
Main factors	***Post***	Post regulatory change, dummy variable of one for observations after the regulatory change, zero otherwise.	Regulatory change	-					
	S&PMS	S&P market share dummy (1 in the bottom quartile of S&P market share, zero otherwise).	Reputational concerns	+/-					
Rating variables	***Moody's***	Moody's rating dummy variable	Rating by Moody	+/-					
	Fitch	Fitch rating dummy variable	Rating by Fitch	+/-					
Bank specific variables (*BANK*)	***LLPNIR***	Ratio of loan-loss provisions to net interest revenues	Asset Quality	+	105,756	23.54	27.74	-75.76	160.20
	CIR	Ratio of cost to income	Efficiency	-	105,756	59.44	15.34	19.21	113.35
	ROAA	Return on average assets	Profitability	+	105,756	0.51	0.70	-3.73	3.82
	NIIGR	Non-interest income over gross revenue	Revenues	+	105,756	34.26	18.84	-14.99	93.11
	ETA	Ratio of equity to total assets	Leverage	+	105,756	7.01	3.91	1.04	35.16
	LAtoCSTF	Ratio of liquid assets to customer and short-term funding	Liquidity	+	105,756	32.64	27.66	1.53	148.44
	Ln(TA)	The natural logarithm of total assets (€)	Bank size	+	105,756	17.08	2.25	10.75	22.06
Dummy variables	***CF***	Dummy variable for each country	Geographic variation	+/-					
	YF	Dummy variable for each year	Variation over time	+/-					

The Table reports the variables used in the regression models. The sample consists of 758 rated European FIs during the period January 2006 to June 2016 in the 27 EU countries. The data of these financial variables is trimmed at the top and bottom 1% to remove outliers.

Table 2. Rating level

	Eq. (1)				Eq. (2)			
	July 2011		July 2011 and May 2013		July 2011		July 2011 and May 2013	
Variable	Coefficient	Z-stat	Coefficient	Z-stat	Coefficient	Z-stat	Coefficient	Z-stat
Post	-0.304***	-8.17			-0.345***	-7.77		
Post1			-0.304***	-8.17			-0.345***	-7.77
Post2			-0.413***	-9.38			-0.427***	-8.44
S&PMS					-1.399*	-1.76	-1.303	-1.64
Post × S&PMS					-0.061	-0.47		
Post1 × S&PMS							-0.061	-0.47
Post2 × S&PMS							-0.155	-0.84
Moody's	-0.037	-0.41	-0.037	-0.41	-0.520***	-6.25	-0.520***	-6.25
Fitch	0.416***	5.07	0.416***	5.07				
ROAA	-0.087	-0.88	-0.087	-0.88	-0.030	-0.30	-0.030	-0.30
CIR	-0.015***	-3.55	-0.015***	-3.55	-0.017***	-3.89	-0.017***	-3.89
LLPNIR	-0.010***	-4.67	-0.010***	-4.68	-0.011***	-4.46	-0.011***	-4.46
Ln(TA)	0.220***	5.52	0.220***	5.52	0.302***	7.56	0.302***	7.56
NIIGR	0.008**	2.37	0.008**	2.37	0.006*	1.69	0.006*	1.69
ETA	-0.001	-0.07	-0.002	-0.07	0.006	0.29	0.006	0.29
LAtoCSTF	-0.000	-0.02	-0.000	-0.02	0.000	0.03	0.000	0.03
Year*Country Fixed Effects	Included		Included		Included		Included	
# Observations	105,756		105,756		75,631		75,631	
Pseudo R^2	10.21%		10.21%		10.70%		10.70%	

The Table presents the results of the ordered logit regressions for the sample of European FIs during the period January 2006 to June 2016 rated by S&P, Moody's and Fitch in Eq. (1), and by Moody's and Fitch in Eq. (2). Two different regulatory start dates are included. First, July 2011 when ESMA was established and second, May 2013 when the regulatory update was released. The dependent variable is $\boldsymbol{CR_{i,j,k,t}}$: the credit rating level of FI i in country j by CRA k at time t based on a 52-point CCR rating scale. ***Post*** is a dummy variable that takes the value of 1 after July 2011 (establishment of ESMA) and zero otherwise. When both regulatory changes are considered, ***Post1*** takes the value of one between July 2011 and May 2013, zero otherwise. ***Post2*** takes the value of one after May 2013 and zero otherwise. ***S&PMS*** is a dummy variable that takes the value of 1 in countries in the bottom quartile of S&P market share and zero in the top three quartiles. ***Moody's*** and ***Fitch*** are dummy variables that take the value of 1 if the rating is issued by them and zero otherwise (if both are zero this indicates a rating by S&P). For control variables' definitions, see Table 1. Standard errors are clustered by FI and a full set of ***year*country dummies*** are included. ***, **, * represent significance at the 1%, 5% and 10% levels respectively.

Table 3. False warnings

	Eq. (3)				Eq. (4)			
	July 2011		July 2011 and May 2013		July 2011		July 2011 and May 2013	
Variable	Coefficient	Z-stat	Coefficient	Z-stat	Coefficient	Z-stat	Coefficient	Z-stat
Post	0.383***	3.57			0.464***	4.02		
Post1			0.383***	3.57			0.464***	4.02
Post2			0.694***	5.52			0.704***	5.11
S&PMS					0.542	0.40	0.542	0.40
Post × S&PMS					-0.032	-0.11		
Post1 × S&PMS							-0.032	-0.11
Post2 × S&PMS							0.052	0.15
Moody's	0.153	0.77	0.153	0.77	0.682***	2.95	0.683***	2.95
Fitch	-0.562***	-2.58	-0.562***	-2.58				
ROAA	0.061	0.43	0.061	0.43	0.048	0.29	0.048	0.29
CIR	0.001	0.18	0.001	0.18	0.006	0.82	0.006	0.81
LLPNIR	0.012***	3.32	0.012***	3.32	0.012***	2.96	0.012***	2.97
Ln(TA)	-0.436***	-6.26	-0.436***	-6.26	-0.466***	-6.11	-0.466***	-6.11
NIIGR	-0.002	-0.34	-0.002	-0.34	0.002	0.29	0.002	0.29
ETA	-0.025	-0.86	-0.025	-0.86	-0.038	-1.16	-0.038	-1.16
LAtoCSTF	0.011**	2.36	0.011**	2.36	0.010**	2.02	0.010**	2.02
Year*Country Fixed Effects	Included		Included		Included		Included	
# Observations	91,353		91,353		59,263		59,263	
Pseudo R^2	36.61%		36.64%		34.14%		34.16%	

The Table presents the results of logit regressions for the sample of rated European FIs during the period January 2006 to June 2016 rated by S&P, Moody's and Fitch in Eq. (3), and by Moody's and Fitch in Eq. (4). Two different regulatory start dates are included. First, July 2011 when ESMA was established and second, May 2013 when the regulatory update was released. The dependent variable $\boldsymbol{FW_{i,j,k,t}}$, a dummy representing false warnings, takes the value of 1 if an FI with a rating of BB+ or below does not default after one year and zero otherwise. ***Post*** is a dummy variable that takes the value of 1 after July 2011 (establishment of ESMA) and zero otherwise. When both regulatory changes are considered, ***Post1*** takes the value of one between July 2011 and May 2013, zero otherwise. ***Post2*** takes the value of one after May 2013 and zero otherwise. ***S&PMS*** is a dummy variable that takes the value of 1 in countries in the bottom quartile of S&P market share and zero in the top three quartiles. ***Moody's*** and ***Fitch*** are dummy variables that take the value of 1 if the rating is issued by them and zero otherwise (if both are zero this indicates a rating by S&P). For control variables' definitions see Table 1. Standard errors are clustered by FI and a full set of ***year*country dummies*** are included. ***, **, * represent significance at 1%, 5% and 10% levels respectively.

Table 4. Information content – Event study

Panel A: July 2011

		Variable	Post = 0	Post = 1	Difference (Before-After)	T-statistic
Negative credit signals	All	#Obs	490	618		
		Mean return (%)	-0.597***	0.027	-0.624**	-2.39
	Combined signals of rating downgrade and watch/outlook	#Obs	85	129		
		Mean return (%)	-0.996*	-0.057	-0.899	-1.27
	Rating downgrades (solo)	#Obs	213	301		
		Mean return (%)	-0.360	-0.216	-0.145	-0.40
	Watch signals (solo)	#Obs	70	80		
		Mean return (%)	-1.206*	0.721*	-1.927***	-2.64
	Outlook signals (solo)	#Obs	122	108		
		Mean return (%)	-0.630*	0.050	-0.680	-1.53
	Rating downgrades preceded by watch/outlook signals	#Obs	222	373		
		Mean return (%)	-0.232	0.090	-0.142	-0.37
	Rating downgrades not preceded by watch/ outlook signals	#Obs	76	57		
		Mean return (%)	-1.305***	-0.624	-0.624	-1.08
Positive credit signals	All	#Obs	144	286		
		Mean return (%)	-0.186	0.120	-0.307	-1.15
	Combined signals of rating upgrade and watch/outlook	#Obs	22	28		
		Mean return (%)	-0.415	0.214	-0.630	-1.22
	Rating upgrades (solo)	#Obs	66	77		
		Mean return (%)	0.282	0.655*	-0.373	-0.88
	Watch signals (solo)	#Obs	17	65		
		Mean return (%)	0.262	-0.180	0.442	0.65
	Outlook signals (solo)	#Obs	39	116		
		Mean return (%)	-1.045*	-0.089	-0.956*	-1.77
	Rating downgrades preceded by watch/outlook signals	#Obs	36	81		
		Mean return (%)	-0.140	0.261	-0.401	-1.08
	Rating upgrades not preceded by watch/outlook signals	#Obs	52	24		
		Mean return (%)	0.279	1.650*	-1.371**	-1.96

Table 4. Continued.

Panel B: May 2013

		Variable	Post = 0	Post = 1	Difference (Before-After)	T-statistic
Negative credit signals	All	#Obs	904	204		
		Mean return (%)	-0.460***	0.686**	-1.146***	-3.58
	Combined signals of rating downgrade and watch/outlook	#Obs	152	62		
		Mean return (%)	-0.946***	0.891	-1.719**	-2.17
	Rating downgrades (solo)	#Obs	447	67		
		Mean return (%)	-0.320*	0.024	-0.346	-0.66
	Watch signals (solo)	#Obs	133	17		
		Mean return (%)	-0.431	1.804*	-2.236*	-1.92
	Outlook signals (solo)	#Obs	172	58		
		Mean return (%)	-0.571**	0.460	-0.980**	-1.86
	Rating downgrades preceded by watch/outlook signals	#Obs	478	117		
		Mean return (%)	-0.293	0.467	-0.760*	-1.63
	Rating downgrades not preceded by watch/ outlook signals	#Obs	121	12		
		Mean return (%)	-1.067***	0.186	-1.254	-1.08
Positive credit signals	All	#Obs	180	250		
		Mean return (%)	0.037	0.004	0.033	0.13
	Combined signals of rating upgrade and watch/outlook	#Obs	24	26		
		Mean return (%)	-0.248	0.108	-0.357	-0.69
	Rating upgrades (solo)	#Obs	75	68		
		Mean return (%)	0.641*	0.309	0.332	-0.78
	Watch signals (solo)	#Obs	35	47		
		Mean return (%)	-0.249	-0.339	0.588	1.06
	Outlook signals (solo)	#Obs	46	109		
		Mean return (%)	-0.960*	-0.064	-0.900*	-1.75
	Rating upgrades preceded by watch/outlook signals	#Obs	38	79		
		Mean return (%)	-0.049	0.228	-0.277	-0.75
	Rating upgrades not preceded by watch/outlook signals	#Obs	61	15		
		Mean return (%)	0.770*	0.388	0.382	0.45

The Table presents the results of the event study for the stock market reaction (abnormal return calculated using Eq. (5)) to credit rating signals (including outlook and watch) for the sample of 758 rated European FIs during the period January 2006 to June 2016 in the 27 EU countries. ***Post*** is defined from July 2011 when ESMA was established, in Panel A, and from May 2013 in Panel B. Various types of signals are examined, including Rating downgrades/upgrades (solo), Combined signals of rating downgrade/upgrade and watch or outlook signals, watch signals (solo), outlook signals (solo). We also examine the market reaction to rating upgrade and downgrade (solo and combined) which were preceded versus not preceded by watch or outlook signals in the same direction. ***, **, * represent significance at 1%, 5% and 10% levels respectively.

Table 5. Information content – Fixed effects model

	July 2011				July 2011 and May 2013			
	Rating Downgrades		*Rating Upgrades*		*Rating Downgrades*		*Rating Upgrades*	
Variable	Coefficient	Z-stat	Coefficient	Z-stat	Coefficient	Z-stat	Coefficient	Z-stat
Post	-0.051*	-1.83	-0.051*	-1.81				
Post1					-0.050*	-1.81	-0.051*	-1.82
Post2					-0.068	-1.60	-0.069	-1.59
Rating Downgrade	-0.483*	-1.72			-0.483*	-1.72		
Rating Upgrade			-0.134	-1.12			-0.134	-1.12
Post × Rating Downgrade	0.299	0.98						
Post1 × Rating Downgrade					0.190	0.59		
Post2 × Rating Downgrade					0.589*	1.96		
Post × Rating Upgrade			0.445**	2.20				
Post1 × Rating Upgrade							1.625**	2.03
Post2 × Rating Upgrade							0.278	1.42
Moody's	-0.015	-1.36	-0.013	-1.19	-0.015	-1.32	-0.013	-1.17
Fitch	-0.006	-0.50	-0.004	-0.29	-0.006	-0.51	-0.005	-0.37
ROAA	0.073	0.93	0.073	0.94	0.073	0.93	0.073	0.93
CIR	0.007*	1.93	0.007*	1.93	0.007*	1.93	0.007*	1.93
LLPNIR	0.003	0.93	0.003	0.92	0.003	0.93	0.003	0.92
Ln(TA)	0.014	0.94	0.014	0.95	0.014	0.96	0.014	0.96
NIIGR	0.003	1.21	0.003	1.22	0.003	1.21	0.003	1.22
ETA	-0.008	-0.79	-0.008	-0.78	-0.008	-0.78	-0.008	-0.78
LAtoCSTF	-0.004**	-2.47	-0.004**	-2.48	-0.004**	-2.48	-0.004**	-2.49
Year*Country Fixed Effects	Included		Included		Included		Included	
# Observations	443,641		443,641		443,641		443,641	

The Table presents the results of Eq. (6). The dependent variable is AR, the abnormal stock return and is calculated as shown in Eq. (5). ***Rating upgrade*** and ***Rating downgrade*** are dummy variables with a value one for an upgrade and downgrade (respectively) and zero otherwise. Only cases with the full window [-230, -30] are considered. For 2011, ***Post*** is a dummy variable that takes the value of 1 after the regulation in July 2011 and zero otherwise. ***Post1*** takes the value of one between July 2011 and May 2013, zero otherwise and ***Post2*** takes the value of one after May 2013 and zero otherwise. ***Moody's*** and ***Fitch*** are dummy variables that take the value of 1 if the rating is issued by them and zero otherwise (if both are zero this indicates a rating by S&P). For control variables' definitions see Table 1. The Sample includes 758 rated European FIs during the period January 2006 to June 2016 in the 27 EU countries. Post, Rating downgrade and Rating upgrade, Post* Rating downgrade, Post* Rating upgrade are multiplied by 100 to give the impact on the percentage abnormal return. Standard errors are clustered by company and a full set of ***country*year dummies*** are included. ***, **, * represent significance at 1%, 5% and 10% levels respectively.

Table 6. Incremental effect of the regulation

Panel A - Rating levels

Variable	Eq. (1)	Eq. (1)	Eq. (2)	Eq. (2)
Post Dodd Frank	-0.095***	-0.095***	-0.115***	-0.115***
Post	-0.304***		-0.345***	
Post1		-0.179***		-0.345***
Post2		-0.288***		-0.427***
Post Dodd Frank * S&PMS			-0.005	-0.005
Post* S&PMS			-0.061	
Post1* S&PMS				-0.061
Post2* S&PMS				-0.155
Controls	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes
Observations	105,756	105,756	75,631	75,631
R^2	10.21%	10.20%	10.70%	10.71%

Panel B - False warnings

Variable	Eq. (3)	Eq. (3)	Eq. (4)	Eq. (4)
Post Dodd Frank	0.224**	0.224**	0.263**	0.263**
Post	0.383***		0.464***	
Post1		0.383***		0.464***
Post2		0.694***		0.704***
Post Dodd Frank * S&PMS			-0.444**	-0.444**
Post* S&PMS			-0.032	
Post1* S&PMS				-0.032
Post2* S&PMS				0.052
Controls	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes
Observations	91,353	91,242	59,263	59,263
R^2	36.62%	36.65%	34.15%	34.17%

The Table presents the results of the ordered logit regressions for the sample of European FIs during the period January 2006 to June 2016 rated by S&P, Moody's and Fitch in Eq. (1) and (3), and by Moody's and Fitch in Eq. (2) and (4). Three different regulatory start dates are included. First, July 2011 when ESMA was established, second May 2013 when the regulatory update was released and third, July 2010 when Dodd-Frank Act was implemented in the US. The dependent variable in Panel A is $\boldsymbol{CR_{i,j,k,t}}$: the credit rating level of FI *i* in country *j* by CRA *k* at time *t* based on a 52-point CCR rating scale, and in Panel B is $\boldsymbol{FW_{i,j,k,t}}$, a dummy representing false warnings, takes the value of 1 if an FI with a rating of BB+ or below does not default after one year and zero otherwise. ***Post*** is a dummy variable that takes the value of 1 after July 2011 (establishment of ESMA) and zero otherwise. When both regulatory changes are considered, ***Post1*** takes the value of one between July 2011 and May 2013, zero otherwise. ***Post2*** takes the value of one after May 2013 and zero otherwise. ***Post Dodd-Frank*** takes the value of 1 after July 2010 and zero otherwise. ***S&PMS*** is a dummy variable that takes the value of 1 in countries in the bottom quartile of S&P market share and zero in the top three quartiles. ***Moody's*** and ***Fitch*** are dummy variables that take the value of 1 if the rating is issued by them and zero otherwise (if both are zero this indicates a rating by S&P). For control variables' definitions, see Table 1. Standard errors are clustered by FI and a full set of ***year*country dummies*** are included. ***, **, * represent significance at the 1%, 5% and 10% levels respectively.

Table 7. Reputational shocks

Variables	Eq. (1)		Eq. (3)	
	Coefficient	Z-stat	Coefficient	Z-stat
Post	-0.303***	-8.07	0.405***	4.02
Reputational Shock	0.000	0.05	0.037	0.75
Post × Reputational Shock	-0.059***	-3.93	0.167**	2.55
Moody's	-0.037	-0.41	0.153	0.77
Fitch	0.416***	5.07	-0.562***	-2.58
ROAA	-0.087	-0.88	0.061	0.43
CIR	-0.015***	-3.55	0.001	0.18
LLPNIR	-0.010***	-4.67	0.012***	3.32
Ln(TA)	0.220***	5.52	-0.436***	-6.26
NIIGR	0.008**	2.37	-0.002	-0.34
ETA	-0.001	-0.07	-0.025	-0.86
LAtoCSTF	0.000	-0.02	0.011**	2.36
Year*Country Fixed Effects	Included		Included	
# Observations	105,756		91,353	
Pseudo R^2	10.21%		36.63%	

This Table shows the results of ordered logit regressions for Eq. (1) (rating levels) and Eq. (3) (false warnings) using a sample of 758 rated European FIs during the period January 2006 to June 2016 in the 27 EU countries. ***Post*** takes the value of one after 1st July 2011 and zero otherwise. ***Reputational shock*** is a dummy that takes the value of one in the year following a reputational shock and zero otherwise. Reputational shocks take place in September 2008, April 2010 and the February 2013. ***Moody's*** and ***Fitch*** are dummy variables that take the value of 1 if the rating is issued by them and zero otherwise (if both are zero this indicates a rating by S&P). For control variables' definitions, see Table 1. The standard errors are clustered by FI. ***, **, * represent significance at 1%, 5% and 10% levels respectively.

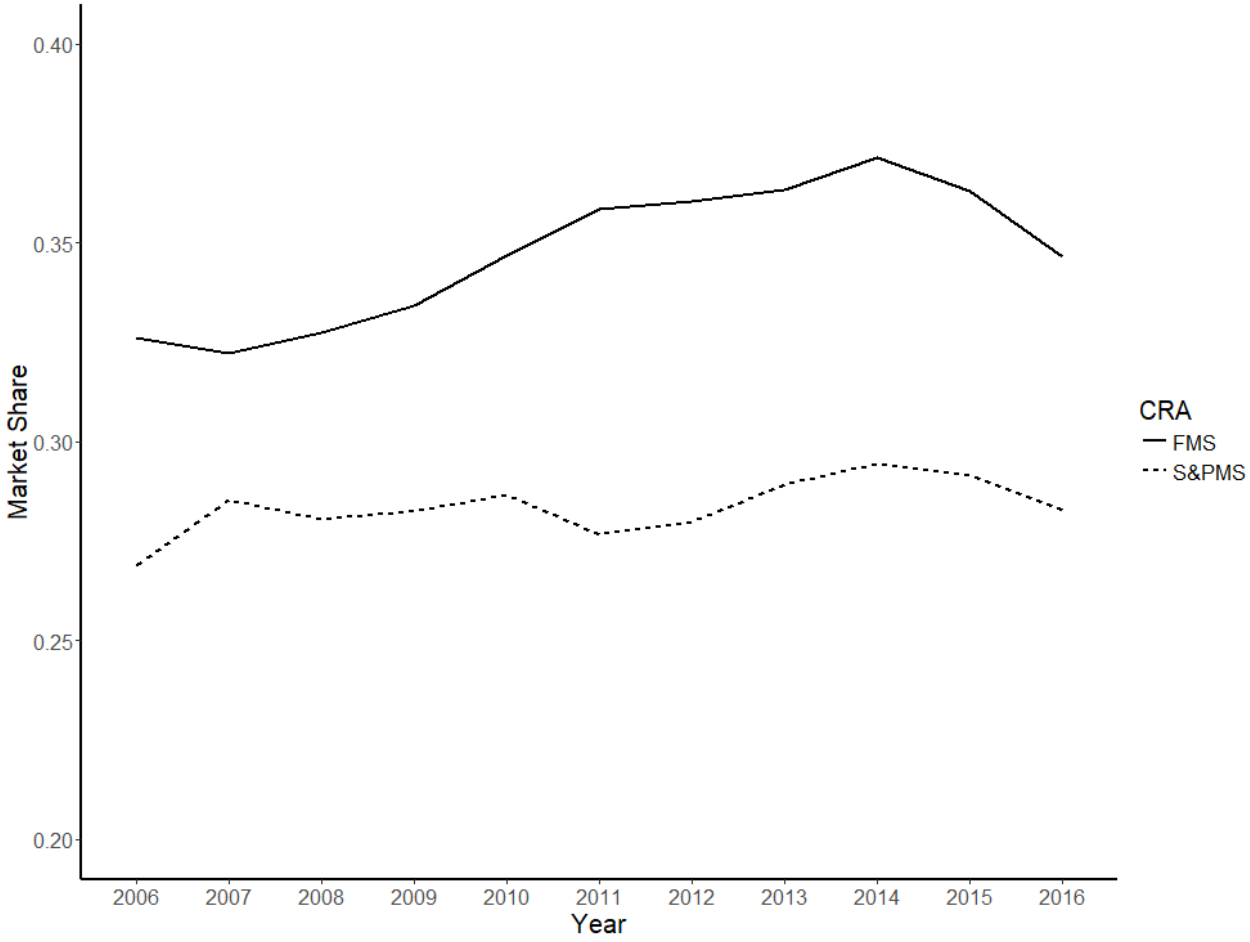

Fig. 1. S&P and Fitch market share over time. The Figure displays the variation of average S&P and Fitch market share over time in the sample of 758 rated European FIs during the period from January 2006 to June 2016 in the 27 EU countries.

Fig. 2. S&P market share distribution. Variation of S&P market share over country and year in the sample of 758 rated European FIs during the period from January 2006 to June 2016 in the 27 EU countries.

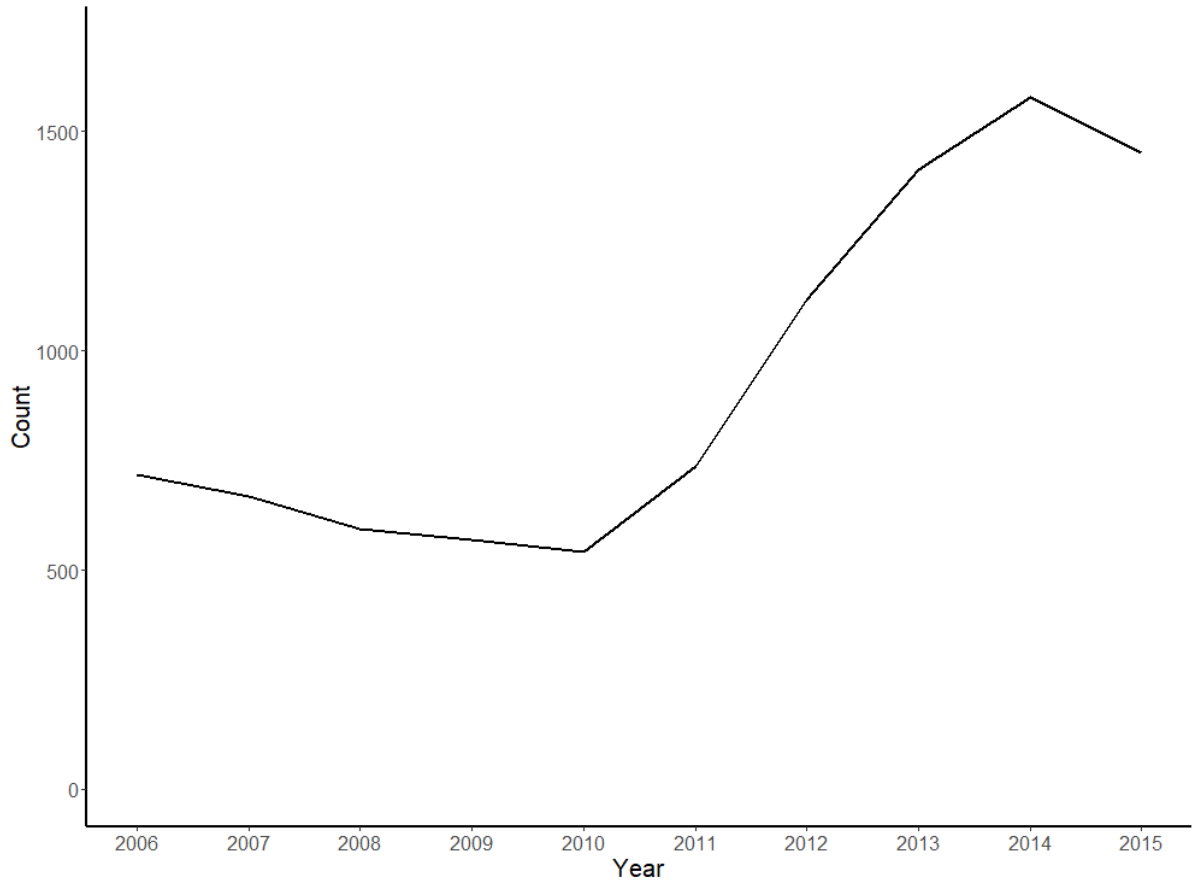

Fig. 3. Incidence of false warning. The Figure displays the count of periods in which a CRA had issued a false warning to a FI from the sample of 758 rated European FIs during the period from January 2006 to June 2016 in the 27 EU countries.

Appendix A

It is necessary to confirm that S&P market share (***S&PMS***) can be used as a proxy for reputational concerns. The inference is that Moody's and Fitch assign higher ratings in countries with higher S&P market share. The following ordered logit model[25] is estimated:

$$CR_{i,j,k,t} = \beta_1 S\&PMS_{t-1} + \beta_2 BANK_{i,j,k,t-1} + \beta_3 Moody's_t + \beta_4 Fitch_t + \lambda CF * YF + \varepsilon_{i,j,k,t} \quad \text{(A8)}$$

$\boldsymbol{CR_{i,j,k,t}}$, is the rating of FI *i* in country *j* by CRA *k* at time *t* based on the 52-point CCR scale. $\boldsymbol{S\&PMS_{t-1}}$ is S&P market share (lagged by 1 year), defined as a dummy variable with a value 1 for FIs in countries within the lower quartile of S&P market share and zero within the upper three quartiles of S&P market share.[26] ***BANK*** is a set of FI control variables, including asset quality, efficiency, profitability, revenues, leverage, liquidity and size (see Table 1), ***Moody's*** and ***Fitch*** are dummy variables that distinguish between ratings assigned by Moody's, Fitch and S&P (both dummies are zero for ratings assigned by the latter). ***CF*YF*** is a full set of interacted country (***CF***) and year (***YF***) dummy variables.

The results of Eq. (A1) are presented in Table A1 and are consistent with the expectation that Moody's and Fitch issue lower ratings in countries in the lower 25th percentile of S&P market share (with $\boldsymbol{S\&PMS_{t-1}}$ being negative and significant). In countries with higher S&P market share, Moody's and Fitch are less concerned with their reputation and thus more likely to inflate their FI ratings.

[25] The estimation results of Eq. (A1) are also robust to using either ordered probit or OLS estimations (available on request).

[26] The estimation results of Eq. (A1) are robust to using 20th, 30th and 40th percentiles of S&P market share in the $\boldsymbol{S\&PMS_{t-1}}$ dummy, and also robust to using the percentage market share in each country. These results are available on request.

Table A1. Impact of S&P market share

Variable	Moody's and Fitch		Moody's		Fitch	
	Coefficient	Z-stat	Coefficient	Z-stat	Coefficient	Z-stat
$S\&PMS_{t-1}$	-1.804***	-5.62	-1.418***	-7.98	-1.126**	-2.09
Moody's	-0.519***	-5.27				
ROAA	-0.030	-0.25	0.030	0.21	0.015	0.14
CIR	-0.017***	-3.47	-0.019***	-3.80	-0.016***	-3.01
LLPNIR	-0.011***	-3.06	-0.012***	-3.61	-0.008**	-2.14
Ln(TA)	0.302**	2.02	0.524***	7.36	0.181	1.20
NIIGR	0.006**	2.00	0.003	0.80	0.007**	2.11
ETA	0.006	0.43	0.038**	1.99	-0.026	-1.38
LAtoCSTF	0.000	0.02	0.004	0.66	-0.003	-0.74
# Observations	75,631		35,478		40,153	
Pseudo R^2	10.69%		12.80%		12.70%	

The Table reports the results of the ordered logit model - Eq. (A1). The dependent variable is the FI credit rating (based on the 52 point CCR scale). The key independent variable is ***$S\&PMS_{t-1}$***, S&P market share (lagged by 1 year), defined as a dummy variable with a value 1 for FIs in countries within the lower quartile of S&P market share and zero within the upper three quartiles of S&P market share. The sample includes 758 rated European FIs during the period January 2006 to June 2016 in the 27 EU. See Table 1 for the definitions of control variables. Standard errors are clustered by FI and a full set of ***country*year dummies*** are included. ***, **, * represent significance at the 1%, 5% and 10% levels respectively.