MULTIRATING DECISION MODEL VALIDATION: THE RELEVANCE OF THE QUALITY OF THE SECURITIZATION ISSUES

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ABSTRACT:
Rating enables the information asymmetry existing in the issuer-investor relationship to be reduced, particularly for issues with a high degree of complexity, as is the case of securitizations. However, there may be a serious conflict of interest between the issuer's choice and remuneration of the agency and the credit rating awarded, resulting in lower quality and information power of the published rating. In this paper, we propose an explicative model of the number of ratings requested, by analyzing the relevance of the number of ratings to measure the reliability, where multirating is shown to be associated to the quality, size, liquidity and the degree of information asymmetry relating to the issue. Thus, we consider that the regulatory changes that foster the widespread publication of simultaneous ratings could help to alleviate the problem of rating model arbitrage and the crisis of confidence in credit ratings in general and in the securitization issues, in particular.

KEYWORD: *Credit rating agencies (CRAs), rating, securitization, rating shopping, rating model arbitrage*

JEL: G14, G21, G28

1. INTRODUCTION[1]

Ratings seek to assess the credit quality of the economic operators and of the debt instruments that they issue. The reasons justifying the use of ratings are, on the one hand, to obtain information economies of scale and, on the other hand, to solve the problems caused by the information asymmetry between debt issuers and investors (Gonzalez *et al* (2004); ECB (2009))[2]. Thus, the role of the credit rating agencies (CRAs) will be efficiently performed if they maintain a completely independent position from investors and issuers.

If the information asymmetry is a problem to be taken into account on the debt issue markets, whether private or sovereign, this issue is crucial in the securitization issues, where the degree of complexity and opacity is greater, including the role that the CRAs have played in assessing the securitization issues (Zagaglia (2008); Blancheton *et al*. (2012)). In turn, the relaxing of investor analysis and monitoring functions during the run-up to the subprime crisis and the excessive confidence deposited by investors in the external assessment by the CRAs increased the prominence of the latter in the securitization processes (BCBS (2011)).

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[2] In this line, Cavallo *et al.* (2012) provide empirical evidence for various countries, including Spain, that the rating agencies provide relevant information, improving the assessment of the sovereign debt.

However, the sharp and widespread loss in the value of the securitizations following the subprime crisis raised a series of questions about the role of the rating agencies and the possibility that they might have been lowering their standards with respect to the risk regarding the securitization issues (Bolton *et al.* (2012). Precisely, the credit analysis and rating system raises a conflict of interest as it is the very issuer of the securities entrusted with contracting and paying the rating agencies. In addition, the rating agencies themselves can take part in the design of the issue, along with its management company. Incentives can thus be generated that encourage issuers to contract the services of the least strict rating agencies and for rating agencies to have incentives to award favorable credit ratings to debt issues by those originators. This phenomenon is known in the academic literature as rating shopping or rating model arbitrage (RMA).

As rating model arbitrage is defined as "the issuer's deliberate capitalization of information asymmetry at the investor's cost on the basis of different rating processes" (Morkötter and Westerfeld (2009, p. 21), the number of ratings published per issue is a crucial element to limit this phenomenon. Thus, it is foreseeable that the more simultaneous ratings that are offered, the lower the likelihood that there will be rating shopping as the discretional power of choosing those comparatively more advantageous ratings will be eliminated.

Therefore, the main objective of this paper is to answer the following question: is the existence of several simultaneous ratings for a securitization issue a good indicator of its quality? We will therefore analyze the relationship existing between the number of ratings published for an issue and its quality and reliability. The underlying characteristics of the issues that act as explanatory factors for multiple rating publications have been analyzed. Thus, a positive and significant relationship can be noted between the number of ratings and the quality, the size, liquidity and the reduction of the information asymmetry implicit to the issue, concluding that the legislative changes encouraging the publication of multiple ratings per issue could ease the crisis of confidence of the investments in the credit ratings in general, and in the securitization issues, in particular, which will help to reactivate this market.

We consider that this paper is justified on several reasons. First of all, the subject of study is of great not only academic, but also social and political importance. In fact, it is the subject of an intense political debate and in which a wide range of stakeholders takes part: investors, savers, credit entities, brokers, supervisors and legislators, both in the supranational and national spheres. The evidence presented, gleaned from academic studies and the very dynamics of the markets, has led to different reports, recommendations and legislative changes (IOSCO (2009); Financial Stability Board (2010); Dodd-Frank Act (2010); CNMV, (2010); Regulation (EC) 1060/2009 known as CRA1 and Regulation (EU) 513/2011 known as CRA2). However, these legislative changes have not reflected the importance of the multiple awarding of ratings as a means to make them more relevant and reliable. Our recommendations, arising from the results, are set in this context.

Second, the approach is novel as it uses the number of ratings as an indicator of the quality and reliability of the rating and, to a lesser extent, of the rating model arbitrage. Third, the Spanish securitization market, which is the subject of study for the first time in research of this type, is a major market as it has been as high as third in the world ranking. Finally, the broad period analyzed (1993-2011) has provided us with a complete time series of securitization issues in Spain, as well as taking into consideration a comprehensive economic and credit cycle, which provide the study with an added historical and qualitative relevance.

This paper is structured as follows. The related literature is first reviewed and the research hypotheses that make up the proposed model are justified and drafted. The population under study and the methodology used to confirm the model are then presented. After setting out and discussing the results found, the most important conclusions and policy implications are presented.

2. RELATED LITERATURE REVIEW

The awarding of a reliable, objective and external rating of the quality of the securitization issues is a determining factor for resource generating and risk transmission processes on the capital markets to be efficiently performed. However, the credit rating and analysis system, as we know, can clearly raise a conflict of interest (Krugman (2010)), with numerous papers providing evidence of this. Ashcraft *et al*. (2010) and Mathis *et al*. (2009) note the relaxation in the rating processes of securitization issues backed by mortgage loans in the run-up to the financial crisis. Stanton and Wallace (2010) find greater incentives for rating inflation in the commercial mortgage-backed securities (CMBS) segment due to the legislative changes that favor, comparatively, the triple-A CMBS when calculating the regulatory capital. On the other hand, Griffin and Tang (2012) and Hull and White (2010a) detected evidence of subjective opinions by the rating agencies to inflate the ratings of the collateralized debt obligations (CDO). In turn, Becker and Milbourn (2010) showed that the quality of the rating is inversely related to the number of active rating agencies, concluding that the strong competition on the rating market helps to foster the strategy of contracting the agencies that better rate the assets.

There are many papers that show evidence of the existence of significant differences in the rating awarded, depending on the agency or on the number of agencies. As far back as 1993, Cantor and Packer (1997) noted that the issues that offered a third rating (in addition to those awarded jointly by Moody's and S&P) were of better quality for the rating industry of the US corporate bonds. Jewel and Livingston (1999) observed similar results. And staying with the US corporate bonds market, Bongaerts *et al.* (2012) note that the third rating (awarded by Fitch) usually helps the issue to be included in the "investment grade" category. Yet, no indications are noted of rating shopping in the issues that are clearly catalogued (investment grade *vs*. high yield) after the two first ratings (awarded by Moody's and S&P).

In recent studies considering securitization, Skreta and Veldkamp (2009) claim that the greater the complexity of the financial securities to be rated, the more incentives and rewards the issuers find for rating shopping. In turn, the structuring in multiple tranches has influenced phenomena such as adulterating or inflating ratings. Coval *et al*. (2009) and Brennan *et al*. (2009) note that the securitization issues have significantly different credit risk profiles if they are compared with fixed yield securities with equivalent ratings. The overrating of senior bonds occurs both if the methodology used for its calculation is based on the probability of defaulting (Coval *et al*. (2009)) –as is the case of Fitch and Standard & Poor's–, and if that methodology is based on the expected loss (Brennan *et al.* (2009)) –as is the case of Moody's–. In turn, Hamerle *et al*. (2009), Krahnen and Wilde (2009) and Hull and White (2010b) find similar results in line with the overrating or rating inflation.

On the other hand, Benmelech and Dlugosz (2010), considering a worldwide CDO sample for 2005-2008, find that the tranches rated by a single agencies (particularly Standard & Poor's) were downgraded more often than those rated by more than one agency. Specifically, in the

CDO segment, Standard & Poor's was known for applying generous assumptions, which helped it to attain a dominant position in the rating business for those issues. Thus, if we only refer to the tranches assessed by a single agency, Standard & Poor's accounts for nearly 70% of the share in this segment, compared to 20% for Fitch Ratings and 10% for Moody's.

Morkötter and Westerfield (2009), for a sample 231 international debt backed securitization issues (CDO) issued between August and September 2006, find rating patterns consistent with the theoretical models developed by Fender and Kiff (2005). The latter forecast as more feasible that the senior tranches (the largest volume and less risky) were rated by Moody's – an agency that uses rating models based on expected loss-, while the equity-mezzanine (with a smaller volume and more risky) were rated by Fitch and Standard & Poor's −which use rating models based on the default probability . In turn, on the 2009 re-securitization market (Re-Remics), Kiff (2010) finds that the DBRS rating agency obtained 43% of the market share in 2009 (compared to its barely 7% in 2007)[3]. Precisely, this agency allocated the ratings on the estimated default probability, that tends to rate the mezzanine tranches comparatively better than when using other methods.

Even though the conflicts of interests between the agents involved in the securitization industry and the problems associated to the CRAs have been widely analyzed by scientific literature, the possible advantages of multi-rating have barely been studied. We therefore consider this paper to be relevant, as it provides evidence on the increased reliability in the rating achieved by increasing the number of CRAs involved in each issue.

3. DERIVATION OF HYPOTHESES: THE MODEL

The choice of the number of ratings published for each issue is associated to different points. Based on the related literature, an explicative model associated to the number of ratings of each issue is presented below and the relevant hypotheses are put forward.

First of all, given that the cost of the rating is for the issuer, the volume of the issue will influence a greater number of ratings, as the relative cost of the commissions paid to the CRAs will be diluted and reduced the larger the volume of the issue is, resulting in lower average transaction costs. This argument is consolidated from the perspective that one of the reasons why ratings are used is to obtain economies of scale in the gathering and analysis of financial information (ECB (2009)) and that the information gain will be greater the larger the volume of the issue and, therefore, the greater the number of potential issuers. We therefore propose Hypothesis H1 as follows:

H1 (Information economies of scale): There is a significant and positive relationship between the total size of the issue and the number of ratings.

Second, the rating in the securitization issues is broadly associated with the information asymmetry problems and the complexity of the assets being analyzed (Opp *et al.* (2013)). Under the regulatory certification hypothesis, regulatory and market forces can arise from a need to credibly separate bonds issues into two types: information sensitive and non-information sensitive (Brister *et al*. (1994)). The generation of bond tranches with different risk-yield characteristics, apart from completing the market and meeting the needs of a greater

[3] By means of comparison, Moody's, that had a market share of 80% in this segment in 2007, had only 5% in 2009.

range of investors (Shleifer and Vishny (1997); DeMarzo (2005)), allows the cost associated to the information asymmetries (Gorton and Pennacchi (1990); Boot and Thakor (1993); Firla-Cuchra and Jenkinson (2006); Franke and Weber (2009)). Given that those studies foresee or signal a positive relationship between the number of tranches and the resolution of the problems arising from the information asymmetries, we consider using the number of tranches where the issue is divided as a variable proxy of the degree of information asymmetry implicit in the securitization processes to be justified. Consequently, to contrast the relationship between the number of ratings published per issue and the issuer-investor information gap, we put forward the following hypothesis:

H2 (Asymmetric information): There is a significant and positive relationship between the number of tranches into which the issue is divided and the number of ratings.

The following factor that underpins the number of ratings awarded is the intention that the issuer has to place the issue effectively and competitively on the market. Under the information production hypothesis, investors are averse to uncertainty, which is reduced by adding extra ratings (Bongaerts *et al.* (2012)). Thus, we consider that the intention to perform an effective placement of the issue on primary markets is a key aspect in the awarding of one or more ratings, as it is necessary to send more reliable information to the markets to achieve the acceptance of this type of issues by the investors (Opp *et al.* (2013)). On the other hand, if the issue is carried out for the explicit purpose of being retained by the credit institution itself or to be subsequently used as collateral in operations with central banks (ECB (2011)), the information value associated to the *multirating* drops substantially, even more so if the determination of "haircuts" at the discount window of the central bank is not related to the number of ratings offered (BCBS (2000)). Precisely, the *subprime* closed the securitization markets, by forcing the self-placement by the *originators* themselves. This scenario has continued on the Spanish market to the present. Thus, taking the *subprime* crisis as a natural experiment, we use the issue period as an indicator of the effective placement of the issues, with the subsequent hypothesis (H3) resulting as follows:

H3 (Market orientation): There is a significant and positive relationship between the intention to perform an effective and competitive placement of the issue on the markets and the number of ratings.

Finally, the publication of additional ratings is associated with greater reliability and quality of the rating (Cantor and Packer (1997); Jewell and Livingston (1999); Duff and Einig (2009); Benmelech and Dlugosz (2010)), in the same way as the incentive to carry out rating shopping is lower the higher the intrinsic quality of the issue open to scrutiny. Therefore, we deem it helpful to consider the relationship existing between the quality of the issue and the number of ratings. That said, the quality of the issue depends on the quality of the asset pool transferred to the special purpose vehicle (SPV), increased by the external and internal credit enhancements awarded. Among the internal credit enhancements, special mention should be made of the multi-tranche structuring by means of which the junior bonds, subordinate to the senior ones, protect the latter. In this regard, the percentage of senior bonds (*Seniority*) with respect to the total issue can be considered as a measurement of the overall quality of the issue. The weighted average rating (*WAR*) of the issue is another key indicator of its quality. On the other hand, an endorsement from an external institution is another indicator of the quality of the issue. The number of originators needed to generate a sufficiently large and diversified asset pool is another indicator of the quality (and diversification) of the asset pool. Thus, the larger entities may, in isolation, set up a sufficiently large and diversified loan

portfolio. On the other hand, smaller entities, many of which have a limited sectoral and geographical presence, need to be clustered into groups in order to address the transaction costs and generate more diversified portfolios. Thus, once controlled for the other variables, the number of credit institutions (*Noriginators*) that take part in the operation may be considered a risk proxy (less diversification) and therefore of lower quality of the portfolio. In short, the hypothesis associated with the quality of the issue would be as follows:

H4 (Quality): There is a significant and positive relationship between the quality of the issue and the number of ratings.

That said, taking into account the quality indicators discussed above, we here put forward the following sub-hypothesis in this case:

H4.1: There is a significant and positive relationship between the *seniority* of the issue and the number of ratings.

H4.2: There is a significant and positive relationship between the *WAR* of the issue and the number of ratings.

H4.3: There is a significant and positive relationship between the guarantees of the issue and the number of ratings.

H4.4: There is a significant and negative relationship between the number of originators that take part in the issue and the number of ratings.

Moreover, in all our tests we control for other issue characteristics which may affect the number of ratings.

To summarize, the variables used in our model are as follows (Figure 1):

A) Dependent variable: number of CRAs that simultaneously rate the same issue [*Nrating*]

B) Independent variables:
   1. Specific of the size of the issue: the natural logarithm of the total volume (in millions of euros) of each issue [*Size*].
   2. Specific of the information asymmetry implicit to the issue: the natural logarithm of the number of tranches (market classes) into which the issue is divided [*Ntranches*].
   3. Specific of the effective placement intention of the issue: a dummy variable [*Market*] has been generated that takes the value 1 if the issue is prior to July 2007, and 0 if it is subsequent.
   4. Specifics of the issue quality. Four complementary variables have been proposed:
      i. [*Seniority*]: the relative weight of the senior bonds awarded the maximum rating (AAA/Aaa) with respect to the total volume of the issue.
      ii. [*WAR*]: the weighted average rating of the issue. A single numerical rating is assigned per issue, measured as the weighted average rating calculated using the credit rating awarded to each of the securitization tranches generated and their relative weight with respect to the total of the issue. The numerical scale used for each rating from 1 (without rating) to 22

(AAA/Aaa). When there are different rating entities for each tranche, the simple average of those ratings per tranche is calculated and subsequently the weighted average for the series of tranches[4].

iii. [*Guarantee*]: dummy variable that takes value 1 if the issue has a tranche endorsed by a public institution and 0 otherwise.

iv. [*Noriginators*]: natural logarithm of the number of originators taking part in the issue.

5. Controls. We use the following variables as controls:
   i. [*Year*]: dummies for the different years when the issue is carried out.
   ii. [*Collateral*]: dummies for the different types of loans as collateral for the issue: residential and commercial mortgages, business loans, SME loans, personal loans, and others.

We propose two models to check the influence of the explanatory factors of the number of ratings. The first of them [Eq.1] explains the number of ratings (1, 2 or 3) by means of a linear regression model (Ordinary Least-Square Regression, OLS). Given that the dependent variable is categorical, we likewise apply a structural equation model (SEM) with a similar structure to the regression model to confirm the results, using the maximum likelihood method to estimate the coefficients.

$$Nrating_{\,i} = \alpha_o + \alpha_1 \cdot Size_i + \alpha_2 \cdot Ntranches_{\,i} + \alpha_3 \cdot Market_{\,i} + \alpha_4 \cdot Seniority_{\,i} + \alpha_5 \cdot WAR_{\,i} + \\ + \alpha_6 \cdot Guarantee_{\,i} + \alpha_7 \cdot Noriginators_{\,i} + \sum \alpha_j \cdot Control_{\,ji} + \varepsilon_I \qquad \text{[Eq.1]}$$

The second model seeks to establish whether the issue is monorating or multirating [Eq.2]. In order to check the predictive power of the aforementioned factors in the choice of monorating or multirating issues, we choose a logistic regression model, also known as the logistic model, which is a form of regression used when the dependent variable is dichotomous (in this case, to multirating issue or not) and the independent variables are of any type It is normally employed when trying to obtain a function to predict whether an observation belongs to a particular group or when trying to analyze the influence of a series of independent variables on the dependent variable (Cardone-Riportella *et al.* (2010)).

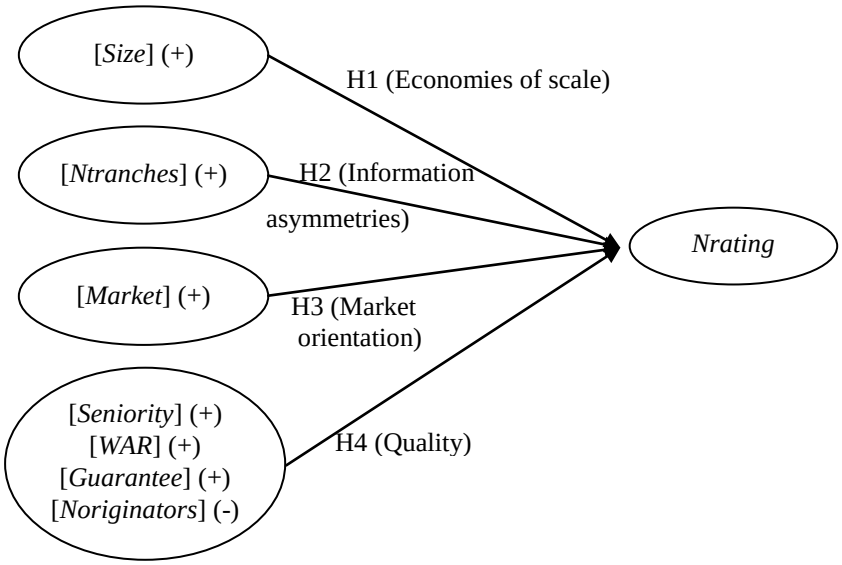
The logistic equation is as follows:

$$Z_i = \beta_o + \beta_1 \cdot Size_i + \beta_2 \cdot Ntranches_{\,i} + \beta_3 \cdot Market_{\,i} + \beta_4 \cdot Seniority_{\,i} + \beta_5 \cdot WAR_{\,i} + \beta_6 \cdot Guarantee_{\,i} + \\ + \beta_7 \cdot Noriginators_{\,i} + \sum \beta_j \cdot Control_{\,ji} + \zeta_i \qquad \text{[Eq.2]}$$

Here, Z_i is the log odds of the dependent variable for the *i*-th case, β_o is a constant and the ‘‘β” terms are the logistic regression coefficients, also called parameter estimates. To describe the relationship between Z_i and the probability of multirating (π_i) for the *i*-th case we use the following function:

[4] When there are CRAs involved Grün *et al.* (2013) generate a consensus rating model with captures systematic and idiosyncratic changes. However, as we have considered all issues in our case, we have opted for the average ratings awarded by the agency/ies.

Figure 1: Proposed model.



4. EMPIRICAL FINDINGS.

4.1. The data.

The population under study is the set of Spanish issues of and ratings for mortgage backed securities (MBS) and asset backed securities (ABS), from their origins in 1993 until 2011. The set of 503 SPV included in our analysis has issued a total of 535,672 million euros, sustained by 1,981 series or MBS/ABS tranches, during the 19 years studied. We have thus finally been able to count on 813 credit ratings. The prospectuses submitted by the issuer at the Spanish Securities Exchange Commission (Comisión Nacional del Mercado de Valores, CNMV) are the primary information source used.

4.2. Summary statistics

During the period studied, four agencies were active on the market for credit rating securitization issues in Spain: Moody's Investor Service (Moody's), rated 78% of the volume issued; Standard and Poor's Rating (SP), 48%; Fitch IBCA (Fitch), 42%; and DBRS, 9%[5]. Moody's and SP began to operate in Spain in 1993, Fitch in 1995 and DBRS in 2010. Tables 1 and 2 set out the market share, both in volume and number of issues, broken down by the number of participant agencies per issue. When there is only one awarding CRA, Moody's accounted for 61% of the market share, followed by SP, with 28% of the issued volume and 20% of the number of issues. Fitch rates 11% of the issues in volume and 19% in number. Moody's dominant position increases when there are two CRAs participating simultaneously, given that this agency is involved in 83% of the assessments and en 100% (together with SP and Fitch) when there are three CRAs involved. When two agencies are participating simultaneously, SP rates 48% of the volume issued, a very similar percentage (49%) to that of Fitch (Table 1). Taking as the benchmark the total number of rated issues from 1993 to 2011, Moody's accounted for 46% of the total, Fitch 26%, SP 25% and, finally, DBRS 3% (Table 2).

[5] Note that the sum of the four percentages comes to more than 100% given that a single issue is frequently rated by more than one agency.

It can be concluded from the above that the market structure of the credit rating industry in Spain, as in all other countries, is oligopolistic, which we believe should be remedied by eliminating the existing rigid entry barriers, based on independence and reputational aspects that are highly conditioned by the economic cycle (Carlehed and Petrov (2012); Bar-Isaac and Shapiro (2013)) and which the repeated crisis of confidence have shown to be inefficient. In fact, the reputational aspect underlies the rating inflation given that, for example, obtaining a good reputation on the corporate debt rating market by a CRA may be an incentive to inflate its ratings on the structure product market (Rablen (2013)).

As regards the distribution of the number of rating published per issue, it can be seen (Table 1) that 47% of the issues (representing 37% of the issued volume) were rated by a CRA, while 45% of the issues (50% of the volume) were rated by two CRAs, and 8% of the remaining issues (13% of the volume issued) were rated by three CRAs. In short, the series of the issues can be divided practically into two halves: monorating (47%) and multirating (53%).

Table 1. Distribution of the CRAs by number of ratings. The volume is expressed in millions of euros.

	Issues (Vol.)	**Issues (No.)**	**Share (%Vol.)**	**Share (%No.)**
1 rating	**196,191**	**235**	**37%**	**47%**
Moody's	118,832	144	61%	61%
SP	55,362	47	28%	20%
Fitch	21,997	44	11%	19%
DBRS	0	0	0%	0%
2 rating	**268,429**	**226**	**50%**	**45%**
Moody's&SP	89,874	76	33%	34%
Moody's&Fitch	94,678	90	35%	40%
Moody's&DBRS	42,523	20	16%	9%
SP&Fitch	35,679	35	13%	15%
SP&DBRS	4,275	4	2%	2%
Fitch&DBRS	1,400	1	1%	0%
3 rating	**71,052**	**42**	**13%**	**8%**
Moody's&SP&Fitch	71,052	42	100%	100%
TOTAL	**535,672**	**503**		

Table 2. Distribution of the market share and the percentage of issues rated by CRA. The volume is expressed in millions of euros.

	Issues (Vol.)	**Issues (No.)**	**Share (%Vol.)**	**Share (% No.)**	**% Issues (Vol.)**	**% Issues (No.)**
Moody's	416,959	372	44%	46%	78%	74%
SP	256,242	204	27%	25%	48%	41%
Fitch	224,806	212	24%	26%	42%	42%
DBRS	48,198	25	5%	3%	9%	5%
TOTAL	**535,672**	**503**	**100%**	**100%**	**177%**	**162%**

Table 3 summarizes the descriptive statistics of the variables used. Where the variable is a transformation (logarithmic), the statistics associated to both variables (transformed and non transformed) are presented. Table 4 sets out the correlation matrix of the variables used, where a very high correlation between *WAR* and *Seniority_*(83%) is noted, which could

generate problems of multicollinearity in the model and force one of the two variables to be eliminated.

It can be seen that the correlation matrix that the variable to be explained (*Nrating*) is strongly related, and with the expected direction, with *Size, Ntranches, Market, Seniority* and *Noriginators* On the other hand, no significant relations are noted between *Nrating* with *WAR*, or with *Guarantee*.

Table 3. Descriptive statistics.

	Cases	Min	Max	Median	Mean		Stand.
					Value	S.E.	Desv.
Nrating	503	1	3	2	1.61	0.0280	0.6360
Size (ln)	503	2.89	9.05	6.75	6.6231	0.0383	0.8589
Size (non scaled: mill. €)	503	18	8500	850	1064.95	46.050	1,032.76
Ntranches (ln)	503	1.10	2.64	1.61	1.5474	0.0141	0.3156
Ntranches (non scaled)	503	2	13	4	3.9384	0.0735	1.6490
Market	503	0	1	1	0.5686	0.0221	0.4958
Seniority	503	0.19	1.00	0.93	0.9003	0.0040	0.0899
WAR	503	13.50	22.00	21.54	21.1735	0.0486	1.0906
Guarantee	503	0	1	0	0.06	0.0100	0.2330
Noriginators (ln)	503	0.69	3.43	0.69	0.8612	0.0209	0.4691
Noriginators (non scaled)	503	1	30	1	1.84	0.1300	2.9180

Table 4. Correlation Matrix.

	Nrating	Size	Ntranches	Competitive	Seniority	WAR	Guarantee	Norigin.
Nrating	1	0.390**	0.254**	0.318**	0.128**	0.081	0.002	-0.113*
Size	0.390**	1	0.240**	-0.114*	0.023	-0.072	-0.177**	-0.066
Ntranches	0.254**	0.240**	1	0.040	-0.119**	-0.029	0.087*	0.066
Market	0.318**	-0.114*	0.040	1	0.371**	0.442**	-0.008	0.165**
Seniority	0.128**	0.023	-0.119**	0.371**	1	0.827**	-0.253**	0.028
WAR	0.081	-0.072	-0.029	0.442**	0.827**	1	-0.042	0.092*
Guarantee	0.002	-0.177**	0.087*	-0.008	-0.253**	-0.042	1	0.082
Noriginat.	-0.113*	-0.066	0.066	0.165**	0.028	0.092*	0.082	1

Note: **/* denotes that the correlation is significant to the level 0.01/0.05

4.3. Results of multivariate analysis

We have opted for complementary methodologies to test the proposed hypotheses. We first construct linear regression models (OLS, SEM) where the explicative power of each variable on the number of ratings (*Nrating*) can be seen [see Eq.1]. We subsequently use the logistic regression model [see Eq. 2] to describe the predictive power of the different factors in the choice by the issuer of one, or various, ratings. Both in the case of the logistic and linear regression models, robust analysis are performed to check the stability and reliability of the results.

Table 5 summarizes the linear regression models (OLS) tested, together with the structural equation model (last column) estimated robustly. Given the high correlation existing between the *Seniority* and *WAR* variables (see Table 4), we have opted not to include both variables simultaneously in the proposed models. In the two first models (OLS.1, with *WAR*, and OLS.2, with *Seniority*), no control variable is incorporated and a significant relationship and

with the expected sign is noted between nearly all the explicative variables and *Nrating.* Only *Seniority* (OLS:1) and *WAR* (OLS:2), even if the sign of the co-efficient is the expected one, lacks sufficient significance. However, when the control variables are included, its explicative power becomes significant.

Table 5. Explicative models of the number of ratings [*Nrating*].

OLS Reg/SEM	**[OLS.1]**	**[OLS.2]**	**[OLS.3]**	**[OLS.4]**	**[OLS.5]**	**[OLS.6]**	**[OLS.7]**	**[SEM.7*]**
Size	0.297*** [0.029]	0.297*** [0.029]	0.195*** [0.029]	0.205*** [0.029]	0.194*** [0.030]	0.202*** [0.030]	0.213*** [0.027]	0.213*** [0.025]
Ntranches	0.299*** [0.078]	0.289*** [0.077]	0.277*** [0.086]	0.239*** [0.085]	0.278*** [0.090]	0.248*** [0.090]	0.335*** [0.083]	0.332*** [0.084]
Market	0.484*** [0.052]	0.522*** [0.053]	0.488*** [0.109]	0.492*** [0.110]	0.502*** [0.111]	0.498*** [0.112]	0.506*** [0.062]	0.509*** [0.063]
Seniority	0.160 [0.292]	-	1.046*** [0.288]	-	1.001*** [0.320]	-	1.037*** [0.286]	1.030*** [0.240]
WAR	-	-0.028 [0.024]	-	0.061** [0.025]	-	0.054** [0.026]	n.e.	n.e.
Guarantee	0.227** [0.106]	0.207** [0.103]	0.325*** [0.099]	0.252** [0.098]	0.372*** [0.104]	0.307*** [0.103]	0.298*** [0.097]	0.299*** [0.110]
Noriginators	-0.224*** [0.051]	-0.223*** [0.051]	-0.177*** [0.046]	-0.18*** [0.046]	-0.163*** [0.046]	-0.167*** [0.047]	-0.179*** [0.046]	-0.179*** [0.037]
Years_Dummies	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Collateral_Dummies	No	No	No	No	Yes	Yes	n.e.	n.e.
Constant	-1.055*** [0.331]	-0.332 [0.540]	-1.486*** [0.567]	-1.828** [0.734]	-1.838*** [0.603]	-2.107*** [0.772]	-2.107*** [0.772]	-2.107*** [0.772]
No. cases	503	503	503	503	503	503	503	503
R^2 [R^2 corrected]	0.336 [0.328]	0.337 [0.329]	0.490 [0.465]	0.483 [0.457]	0.498 [0.466]	0.492 [0.468]	0.481 [0.466]	0.481
F	41.768***	42.033***	19.171***	18.612***	15.591***	15.231***	32.333***	1722***[a]

N.B.: The value included in the table for each variable represents the non-standardized coefficient of that variable. The value represented between square brackets represents the standard error. Statistic F represents the degree of global adjustment of the model. *, ** and *** denote statistical significance at the levels of 10%, 5% and 1%, respectively. "n.e." denotes variable not entry in the model (statistical significance > 10%). SEM.7 is a Structural Equation Model (where the same variables of the OLS.7 are included) where the coefficients are estimated using the maximum likelihood method and the Satorra-Bentler robust estimates, [a] Satorra-Bentler scaled Chi-Square, are expressed (between square brackets).

The adjustment enhancement of the OLS.3 and OLS.4 models is substantial compared to the OLS.1 and OLS.2 models, respectively (improvement of the R^2 of 15%), which indicates that the issue year significantly influences the number of ratings. On the other hand, the introduction of *collateral-dummies* (OLS.5 and OLS.6) barely has any significant effect. In OLS.7, the statistics program is granted freedom such that only those variables that contribute with sufficient explicative value in the model are included by successive steps, controlling the (non existence of) multi-colinearity among the explicative variables by searching for greater parsimony. The sign of the coefficients of the variables, in general, coincides with the expected one. In any event, the sign and relevance of the variables analyzed is maintained (and even increases when controls are introduced) in all models, which is proof of the robustness of the proposed model.

Given the lack of multivariate normality (Mardia's coefficient normalized estimate = 67.83) and the existence of heteroscedasticity in the majority of the explicative variables (except

WAR and *Seniority*, according to the Levene test), we have opted to perform a complementary analysis, by generating a structural equation model (SEM.7) where the same variables are included as in the OLS.7 model, but estimating the coefficients using the maximum likelihood method and using the Satorra-Bentler robust estimates. As can be observed in the last column of Table 5, the results are very similar to the previous ones, which corroborate everything previously stated.

Nonetheless, while the dependent variable (*Nrating*) only takes three possible values (1, 2 or 3), we believe it to be of interest to conduct a complementary analysis so that this metric variable (Nrating) becomes a dichotomous variable (*Multirating*) that takes the value 0 if the issue is monorating, or 1 if it is multirating. Thus, we will divide the population into two groups that are very homogenous in size (47%, monorating; 53%, multirating). Once this transformation has been performed, we design a Logit Regression model to check which factors of those considered have a greater influence on the fact that the issuer decides to public a single rating, or various [see Eq.2].

The construction of the models (LOG.1-LOG.7) presented in Table 6 follows the same logic as the one set out for Table 5. The proposed logit models show a significant relationship, and with the expected sign, between the proposed factors with respect to the existence of multi-rating issues, with the proposed hypotheses verified. . As regards the predicative capacity of the logistic model (maximum likelihood estimation model), a high certainty rate can be noted (83.3% in the LOG.7 model), that is, that out of every 100 funds, the model correctly rates 83, either when (78.4% certainty), or as multirating (87.3% certainty). Given that the certainty percentage by mere chance is 53% (probability of occurrence of the most probable fact), the certainty rate obtained by the models (between 72% and 83%) must be considered to be very high.

4.3.1. Further empirical check.

To assess the robustness of the logistic models, we analyze the outliers (observation with a standardized residual absolute value greater than two). By applying LOG. 7 to the refined sample of 480 observations, once the 23 outliers are eliminated (LOG.7*) a similar adjustment (87.7%, even greater when obtained for the full population) is observed, with the significance of the incorporated variables being maintained. These results confirm that the existence of outliers does not contribute to an abnormal power being awarded to our model, which means we can conclude that the model is robust.

In turn, to check the predictive utility of the model, a cross-validation analysis was conducted, with the sample being randomly divided into two groups: the training sample (75%) and the validation sample (25%). By applying the model obtained with the training sample to the validation model, a certainty rate of 82.4% is obtained, very close to the one presented in Table 6 associated to LOG.7. We can therefore conclude that the proposed logit model is highly useful to predict the rating policy of the securitization issuers.

Table 6. Explicative models of multirating issues.

Logit Regressions	**[LOG.1]**	**[LOG.2]**	**[LOG.3]**	**[LOG.4]**	**[LOG.5]**	**[LOG.6]**	**[LOG.7]**	**[LOG.7*]**
Size	1.216*** [0.154] (3.373)	1.224*** [0.155] (3.401)	1.072*** [0.199] (2.922)	1.097*** [0.198] (2.994)	1.074*** [0.203] (2.927)	1.088*** [0.202] (2.969)	1.191*** [0.19] (3.29)	1.982*** [0.287] (7.26)
Ntranches	0.866** [0.355] (2.376)	0.854** [0.355] (2.348)	1.325** [0.523] (3.762)	1.176** [0.511] (3.241)	1.312** [0.568] (3.714)	1.267** [0.561] (3.552)	1.928*** [0.483] (6.878)	2.845*** [0.641] (17.193)
Market	1.815*** [0.251] (6.143)	2.029*** [0.26] (7.607)	2.149*** [0.695] (8.577)	2.105*** [0.692] (8.204)	2.297*** [0.733] (9.945)	2.207*** [0.731] (9.085)	1.405*** [0.447] (4.074)	1.828*** [0.536] (6.222)
Seniority	0.001 [0.013] (1.001)	-	0.090*** [0.023] (1.095)	-	0.080*** [0.025] (1.084)	-	0.088*** [0.023] (1.092)	0.170*** [0.038] (1.186)
WAR	-	-0.205* [0.107] (0.815)	-	0.791*** [0.259] (2.205)	-	0.674*** [0.26] (1.962)	n.e.	n.e.
Guarantee	1.481*** [0.519] (4.398)	1.418*** [0.514] (4.128)	2.821*** [0.647] (16.795)	1.889*** [0.61] (6.612)	2.887*** [0.655] (17.94)	2.113*** [0.612] (8.27)	2.737*** [0.646] (15.45)	5.208*** [0.978] (182.81)
Noriginators	-0.789*** [0.233] (0.454)	-0.784*** [0.235] (0.457)	-0.685** [0.271] (0.504)	-0.698*** [0.267] (0.498)	-0.68** [0.279] (0.506)	-0.700** [0.274] (0.497)	-0.734*** [0.27] (0.48)	-1.271*** [0.362] (0.281)
Years_Dummies	No	No	Yes	Yes	Yes	Yes	Yes[a]	Yes[a]
Collateral_Dummies	No	No	No	No	Yes	Yes	n.e.	n.e.
Constant	-9.763*** [1.639] (0.000)	-5.479** [2.421] (0.004)	-37.50 [40192] (0.000)	-45.98 [40195] (0.000)	-38.044 [40190] (0.000)	-45.103 [40194] (0.000)	-17.642*** [2.692] (0.000)	-32.992*** [4.679] (0.000)
No. Cases	503	503	503	503	503	503	503	480
Log pseudo-likelyhood	-536.12	-532.37	-368.80	-377.41	-363.34	-369.51	-381.27	-234.16
Pseudo-R^2	[0.362]	[0.370]	[0.638]	[0.626]	[0.483]	[0.637]	[0.620]	[0.790]
Classific. accuracy	0.716	0.730	0.853	0.849	0.857	0.847	0.833	0.877
Chi-square	159.28***	163.03***	326.60***	317.98***	332.05***	325.88***	314.12***	429.85***

N.B.: The dependent variable equals 1 if a issue is monorating and 0 otherwise (multirating). The value included in the table for each variable represents the non-standardized coefficient of that variable. The value represented between [square brackets] and (parenthesis) represents the [standard error] and the (odds ratios), respectively. Statistic Chi-square represents the degree of global adjustment of the model. Pseudo-R^2 is Nagelkerke-R^2 (Cox and Snell-R^2 re-scaled). Accuracy of the rating is the percentage of correctly rated cases (cut-off point: 0.5). *, ** and *** denote statistical significance at the levels of 10%, 5% and 1%, respectively. "n.e." denotes variable not entry in the model (statistical significance > 10%). [a] Years included: 2000, 2006 and 2008-2011.

4.4. Main results.

Irrespective of the methodology applied (OLS Regression, SEM, Logit Regression), the same factors conditioning the request of more than one rating can be observed. On the one hand, the more voluminous issues offer more ratings, justified by the existence of information economies of scale (Gonzalez *et al.* (2004)). In turn, in line with the results found by Bongaerts *et al*. (2012), the issues with a greater problem of information asymmetry (and which therefore generate a greater number of tranches) also try to offset this fact by offering more ratings, which is compatible with the regulatory certification hypothesis and the search for differentiated securities (Gorton and Pennacchi (1990); Boot and Thakor (1993)). On the other hand, the issues that are orientated at the market, that is, that they look for the effective placement (and not the withholding of the issue by the originators themselves) they offer a greater number of ratings, by looking for their greater information power.

Finally, the quality of the securitization issues is a factor that explains the number of ratings offered, where there is a relevant and positive association between the perceived quality of the issue and the fact that it is multirating. These results are compatible with those observed by Cantor and Packer (1997), Jewell and Livingston (1999), Duff and Einig (2009) and Benmelech and Dlugosz (2010). Specifically, we have used four indicators of the perceived quality: the average quality of the issue (*WAR*), the percentage of senior bonds (*Seniority*), the public endorsement (*Guarantee*), and the number of originators involved (*Noriginators*). The four have been useful to rate the issues (monorating *vs*. multirating). Therefore, all the hypotheses proposed that make up the proposed model are confirmed; thus, on the one hand H1, H2 and H3 are confirmed, and on the other hand, H4, as the sub-hypotheses to which the latter is divided are likewise confirmed.

5. CONCLUSIONS AND POLICY IMPLICATIONS

In the aftermath of the subprime crisis, there is the widespread impression that the relative role assigned to the CRAs to reduce the information asymmetries existing between the issuer and the investors has not been satisfactorily fulfilled; practices such as rating shopping and This paper proposes and validates a predictive and explicative model of the number of ratings awarded in the securitization issues. Precisely, the number of ratings published per issue negatively and significantly influences the incidence of the rating shopping. At the same time, a larger number of ratings per issue positively influence their reliability and the information power.

An analysis of the series of the ABS/MBS Spanish Market (from 1993 to 2011, when it peaked at third in the worldwide ranking) reveals that the awarding of a second (or third) rating is strongly associated with four factors: the information economies of scale, the endeavors of the issuer to reduce the information asymmetries (by generating differentiated tranches), the market orientation and the quality of the issue. These factors explain, taken together, nearly 90% of the behavior of the issuer when deciding to publish one or various ratings per issue.

Given the results obtained, we believe that a supervisory policy aimed at encouraging the publication of independent and simultaneous ratings would foster the information quality of the issues, thus resulting in fewer problems of confidence and generating a more secure climate among investors, which is fundamental to reactive the securitization market. Without overlooking the analysis of the incurred transaction costs, we believe that contemplating the number of ratings associated to the issue in many corporate credit arrangements and investments, such as collateral requirements, haircuts (at the discount window of the central bank or at private transactions) and regulatory capital should be a measure that is generalizable and not solely applicable to the sphere of institutional investors.

In turn, the oligopolistic structure of the credit rating industry (Moody’s alone rates 78% of the volume of issues in Spain individually or together with other CRAs), should be remedied by eliminating the existing rigid entry barriers, based on independence and reputational aspects highly conditioned by the economic that the repeated crisis of confidence have shown to be inefficient.

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