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Asset-Backed Securitization and Financial Stability: The Downgrading Delay Effect

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5.1 Introduction

Asset-backed securitization (ABS) may contribute to generating instability in financial markets both through an 'inside effect' in the banking system – facilitating progressive deterioration of bank assets' quality – and through an 'outside effect' – favouring credit risk transfer from balance sheets of banks acting as originators to investors in asset-backed securities (ABS). The rating assigned to ABS has the function of indicating to the market the credit risk borne by investors. This depends on the quality of assets and of guarantees lent by originators and by any third-party guarantor, as well as on the trend of macroeconomic determinants which may compromise the capacity of principal debtors to honour their debts.

The underlying hypothesis on which this work is based is that rating models do not correctly embody the impact of macroeconomic variables on debtors' solvency, determining a lag in downgrading. In particular, it is considered that any variations in interest rates and GDP have an impact on ABS performances, but that such an impact is not picked up in a timely fashion by rating models. Essentially, in pre-crisis periods, when interest rate increases as well as decreases are recorded in growth rates of GDP, rating assessments fail to register risk increases in ABS securities, only proceeding to downgrade later, when variations in macroeconomic variables have generated negative effects on the flow of ABS funds.

We verify this hypothesis specifically with reference to ABS transactions active during the recent financial and economic crisis. We then

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proceed to test information on ABS rating, assessing it in relation to the timing of downgrading on a sample of transactions which took place between 2000 and 2009. The conclusions reached confirm the theoretical hypothesis, demonstrating that, in the pre-crisis period, when macroeconomic variables suggested the need for a downgrading judgement, agencies delayed downmarking, making the announcement only at a later stage, after the crisis had taken place and the transaction criticalities were already displayed. The chapter is related to the literature analysing relations between the financial crisis and asset-backed securitization, bringing an innovative contribution to empirical and theoretical studies, aimed at defining an interpretational model for relations between ABS and financial crises.

5.2   Objective, methodology and structure

ABS has often been mentioned as one of the financial techniques which most contributed to the creation and diffusion of the recent financial crisis. It is, in fact, considered that the low quality of securitized assets, and the use of inappropriately set-up ABS structures, resulted in the introduction into the financial market of asset-backed securities (ABS) which contained a high risk factor, not perceived by investors. Rating agencies also contributed to the process, unable as they were to accurately perceive through their assessments the implicit risk in ABS transactions and the following developments.

In this framework, the objective of this chapter is to measure the contribution of ABS to the current systemic crisis, the first signs of which emerged around 2007. With this aim, the reporting efficiency of ABS rating was assessed in relation to the timing of downgrading. At the root of this methodology is the evidence that ABS transactions, for which rating downgrading revision is considered to have occurred late compared with the display of signs of the deteriorating quality of ABS securities, contributed most to the financial crisis.

The anomaly of an ABS transaction is the necessary condition for its contribution to systemic instability. From this point of view, downgrading represents the most explicit indicator to be used to test the contribution of asset securitization to the financial crisis.

On an empirical basis, the rating assigned to ABS securities may represent a measure of the contribution of asset securitization to the economic–financial instability experienced by financial markets. ABS rating judgement should, in fact, summarize and indicate on an ongoing basis any anomalies and criticalities in the transaction.

Downgrading is an alarm signal and a leading indicator of a possible default in the transaction. From this perspective, the number of ABS transactions subjected to downgrading may be considered an indicator of the potential contribution of asset securitization to system instability.

However, reduced information efficiency in financial markets may determine a lag in downgrading, or rather postponement of ABS downgrading compared with the moment when possible determinants of deterioration are expressed. In this case, downgrading loses all or part of its predictive value, representing only ex post the increased risk associated with ABS securities; to the 'primary negative effect' of ABS on systemic stability, therefore, must be added the 'secondary derivative effect' of a missed warning to financial markets of the real risk in the transaction.
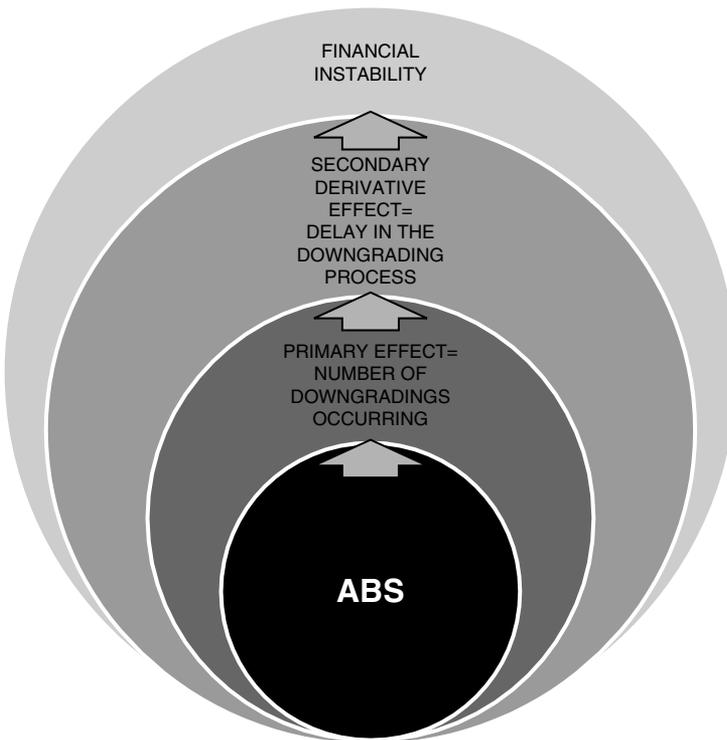
Figure 5.1   ABS and financial instability

Two logical links connect ABS with the financial crisis (Figure 5.1). The first, leading to a 'primary effect', assumes that the degree of downgrading of ABS securities – independently of the timely quality of their occurrence – represents a significant measure of the contribution made by asset securitization to the systemic crisis. The more numerous the downgradings, the greater was the contribution of ABS to financial instability. The second, which can be described as a 'secondary derivative effect', presupposes that a lack of promptness in downgrading increases the significance of ABS' contribution to the diffusion of the crisis; the more numerous the delayed downgradings compared with the expression of determinants of asset quality deterioration, the less is the capacity of the market and of ABS investors to assess and correctly manage the risk associated with their exposure.

As rating judgements are related to microeconomic and macroeconomic variables, when these are not correctly incorporated in rating models it is possible to determine a lag in downgrading. The hypothesis at the core of this chapter is that, before the diffusion of the present crisis, some variables – in particular those of a macroeconomic nature – were not correctly incorporated in rating judgements, determining a sigma effect between the 'primary effect' and the 'secondary derivative effect', increasing the negative impact of ABSs on system stability. Such a 'secondary derivative effect' – not investigated to date in the literature – may represent a highly significant variable in the contribution of ABS to financial and economic instability; particularly if it can be demonstrated that securitization deals which were active during the financial crisis and underwent downgrading, and for which downgrading came late, were numerous and significant.

It is interesting to verify whether, among recently downgraded ABS, a significant number underwent delayed markdown judgement, or, rather, if the conditions had not been met for downgrading to take place earlier. For this reason, the present chapter – after theorizing a conceptual framework explaining the link between ABS and financial stability – verifies on an empirical basis, with selected samples from ABS programmes, the number of transactions subjected to downgrading and the rating efficiency in signalling deterioration in a timely fashion. The test for timely downgrading is preceded by a descriptive analysis of the sample of ABS chosen, and in particular of those which, having undergone downgrading, were able to create negative effects on financial markets in periods of crisis, due to both a 'primary effect' and a 'secondary derivative effect'.

In particular, the analysis concentrates on a sample of securitization transactions including residential mortgages (Residential Mortgage Backed Security – RMBS) carried out in some of the major European countries (UK, Holland, Italy, Portugal and Spain). With reference to the observation period, in order also to capture pre-crisis factors, transactions were considered which were created between 2000 and 2008 and still active. For the selected samples we proceeded to:

- classify ABS for each country and building up the sample;
- identify micro and macro variables considered to explain rating judgement;
- acquire the value of selected variables;
- apply a regression model (panel data) to measure market efficiency in terms of frequency and timing of downgrading intervention.

In the second section of this chapter the contribution of our work is discussed, followed by a description of essential characteristics of an ABS programme. We then outline causal variables of ABS downgrading which can be attributed to the behaviour of both microeconomic variables (micro-determinants) and macroeconomic variables (macro-determinants). We then discuss connections between ABS and economic–financial stability, report the estimates of various models, and finally conclude.

5.3 ABS and financial crisis: the chapter's contribution to the literature

Asset securitization literature is born of a theoretical approach, focusing mainly on two aspects analysed from the originator's perspective: potential benefits, on the one hand, and potential risks and relations with financial regulations, on the other (Pavel, 1986; Greenbaum and Thakor, 1987; Hess and Smith, 1988; Rosenthal and Ocampo, 1988; Norton and Spellman, 1991; La Torre, 1995, 2004; Giannotti, 2004; Affinito and Tagliaferri, 2010).

The ABS market's progressive development has subsequently nurtured empirical investigation, which may be summarized as two trends: one verifying determinants illustrating transactions carried out (Pavel and Phillis, 1987; Donato and Shaffer, 1991) and one concentrating on microeconomic effects, in particular on risk stored in the originator's balance sheet (Loutskina and Strahan, 2006; Demyanyk and van Hemert, 2007; Dell'Ariccia *et al.*, 2008; Keys *et al.*, 2008;

Mian and Sufi, 2008) and on capital requirements (Altunbas *et al*., 2007). The financial crisis of these last few years has, in conclusion, stimulated a third investigative plan – of an empirical nature – dedicated to links between ABS and financial crisis (Fender and Mitchell, 2005; Allen and Carletti, 2006; BIS, 2008; Borio, 2008; Ibanez and Scheicher, 2009).

The main objective of empirical testing generally concerns relations between ABS and risk borne by originators. Even the link between ABS and systemic crisis is usually tested by verifying whether, and to what degree, originator banks that systematically take recourse to securitization programmes present more risky balance sheets in the middle period. In fact, even if ABS technique allows the originator to reduce the risk exposure it derives from securitized assets, in the case of principal debtors' insolvency there is always the originator bank's moral obligation, which involves for the latter an actual risk which is higher than nominal exposure.

From this perspective, empirical assessment privileges testing of determinants and effect of ABS on the originator; particular attention has been placed on leverage and on the quality of loans in the originator's portfolio following ABS transactions, as well as the overall risk in the originator's balance sheet. Moreover, the results reached are often contradictory, stressing in some cases a drop in risk for originators resorting to asset securitizations (Carey, 1998; Dionne and Harchaoui, 2003; Cebenoyan and Strahan, 2004; Jiangli and Pritsker, 2008; Keys *et al*., 2008; Mian and Sufi, 2008; Purnanandam, 2010), and in others an opposite or controversial effect (Cantor and Rouyer, 2000; Calomiris and Mason, 2004; Ambrose *et al*., 2005; Franke and Krahnen, 2005; Haensel and Krahnen, 2007; Sarkisyan *et al*., 2009). Naturally, as one would expect, the net effect on the originator of one or more ABS programmes is strongly dependent on the transactions' specific structure and, in particular, on the protection the originator itself offers on transferred assets (Casu *et al*., 2010).

The literature too date is rather limited in investigating the impact of securitization on systemic risk although there has been work investigating the increased exposure of risks to investors in ABS (Ashcraft et al, 2010) and the influence of bank credit policies on securitization activity (Madalone and Alcade, 2009).

The purpose of the present chapter is precisely the contrary: to test the contribution of asset-backed securitization to financial stability through the assessment of the risk distributed on investors in ABS, whether originators or external investors.

In the literary framework, this chapter will make an innovative contribution, both on a methodological plane and in relation to results obtained. From a methodological perspective, the study is intended to contribute to the current debate on the link between ABS and the financial crisis, carrying out an accurate analysis of mechanisms with which ABS may contribute to the creation and spreading of crises. It has been necessary, therefore, in the first place to propose an interpretation model of the link between ABS and economical–financial stability which could offer a logical map of the contribution made by asset securitization to financial and economic crises. On a methodological plane, therefore, this chapter offers an interpretation model for relations between ABS and systemic crises which has proved efficient in building a taxonomy of the variables used for empirical assessment.

On an empirical verification basis, the chapter offers innovative indications, as it measures the contribution of ABS to systemic crisis, considering the riskiness of ABS negotiated in the market rather than the risk retained by originators. Assuming that all programmes downmarked in rating judgements represent *per se* an explicit indicator of ABS' negative impact on market stability, the chapter tests the occurrence of downgrading delays. In this way, the analysis offers results which are not limited to explicating mere descriptive primary effect indicators, but also measure effects that have been defined in the context of 'secondary derivative effects', never before investigated in the literature.

5.4   ABS structure: flow of funds and investors' protection

Asset securitization is a financial technique through which firms transfer portfolios of assets present in their balance sheets to a vehicle company set up for that purpose (Special Purpose Vehicle or SPV); the peculiarity of ABS compared with traditional loan selling lies in the fact that the transferee finances assets acquisition through securities sales on the capital market for an amount corresponding to the transfer price which must be paid by the same. Thus, securitization's distinctive characteristic is the creation of a link between a firm's financial assets and third-party investors active on the capital market.

Specifically (Figure 5.2), and with reference to a banking firm, a typical securitization programme foresees the setting up on the part of the bank (originator) of a portfolio of homogeneous loans, the transfer of the portfolio to the SPV, the issuing on the part of the SPV of ABS securities and the acquisition of the latter by institutional investors. If

opportunely structured, the transaction allows the transferee bank to obtain an off-balance sheet treatment for transferred assets, which will therefore disappear from the originator's balance sheet. Normally, parties providing guarantees participate in the transaction (credit enhancers), as well as one or more rating agencies whose task it is to offer a judgement on securities issued. Securities are normally divided into three classes: senior securities, with a low degree of risk, and mezzanine and junior securities, which incorporate rising degrees of risk. It is important to note at this juncture that rating companies' judgements refer to single tranches of securities and not to transferred assets.

The cash flow of an ABS programme (Figure 5.3) allows understanding of the economic ratio underlying the transaction, as well as the key variable of its sustainability and, in the end, of the rating judgement. The securitized portfolio generates flows of funds coming from interest rates and capital reimbursed by the principal transferred debtors. Such flows, net of operational costs, represent investors' yield in ABS. So, any event interrupting or limiting the passage of flows of funds from
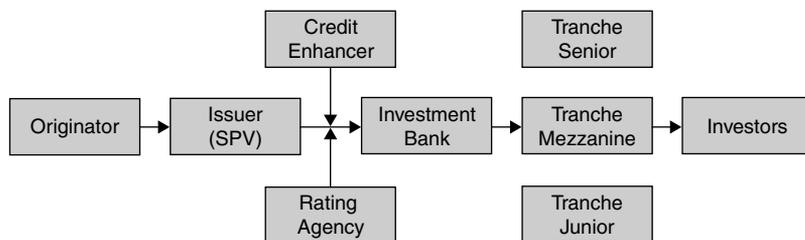

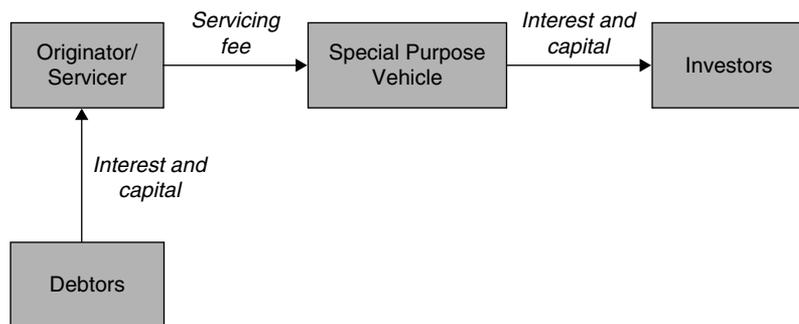*Figure 5.2*   The structure of an ABS transaction

Figure 5.3   The flow of funds of an ABS transaction

principal debtors to final investors represents a risk to the successful outcome of the transaction. Rating judgement, referring to securities and single tranches issued, precisely assesses ABS securities' capacity to ensure the yield promised to investors.

5.5   ABS rating: micro and macro determinants

ABS securities rating judgement is, therefore, related not only to transferred assets quality but also to transaction structure, in particular guarantees offered by the originator itself (internal guarantees) and by third-party guarantors (external guarantees) whose purpose is to protect ABS investors' yield in case of default. For this reason, rating judgement is not referred to the originator, nor can it be attributed only to transferred assets quality; instead, it represents a judgement on securities' capacity to provide the yield promised to external investors. Rating differs for every single tranche issued, because every single tranche, in relation to the transaction structure, withstands differing degrees of risk; for this reason separate ratings are carried out for senior, mezzanine and junior securities in a single ABS programme.

Rating adjustment during the life of an ABS programme is largely connected to specific events which explain a risk variation in ABS securities. Securitization transactions generally foresee clauses which contemplate triggers, or clauses which allow the creation of precautionary actions in the case of contractually predefined events taking place, capable of interrupting the normal transfer of funds from transferred debtors to investors in ABS securities. Such events are considered in rating adjustment of asset-backed securities through constant monitoring of specific ratios whose performances are generally described in three-quarterly reports published by issuers. Among the most used indicators, we find Default Ratio, Disequilibrium Event and Liquidity Agreement Event. ABS transactions' solvency is, in fact, threatened by delinquencies or defaults, by mismatching or commingling of cash flow, in the case of prepayments, and by originator or servicer bankruptcy.

Triggers are events which see their own determinants in microeconomic and macroeconomic variables (Table 5.1); with such prospects, ratings should incorporate elements leading to the quality of securitized assets, the standing of single parties participating in the transaction, the structure of the programme itself (micro-determinants), and also macroeconomic variables capable of impacting the regular trend of the flows of funds (macro-determinants).

Table 5.1 Micro and macro determinants in rating of ABS

Micro Determinants (specific risk)
1. Quality of portfolio (state of anomaly in loans, average duration, technical form, sector and geographical diversification)
2. Structure of ABS transaction (contracts, cash flow, guarantees, etc.)
3. Aim of the operation (transfer of credit risk, liquidity needs, capital requirements, etc.)

Macro Determinants (system risk)
4. Gross Domestic Product
5. Interest rates level (EURIBOR, LIBOR, BCE)
6. Market liquidity (EONIA volatility)
7. Inflation growth level
8. Real estate prices level on the market
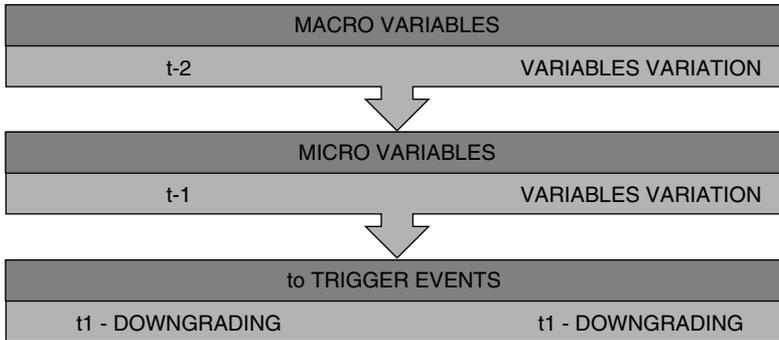9. ABS regulation

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| MACRO VARIABLES | |
| t-2 | VARIABLES VARIATION |

| MICRO VARIABLES | |
| t-1 | VARIABLES VARIATION |

| to TRIGGER EVENTS | |
| t1 - DOWNGRADING | t1 - DOWNGRADING |

Figure 5.4 The timing lag of the downgrading process

According to the hypothesis at the basis of the empirical investigation carried out in this chapter, the correlation between some macro variables and financial flows of ABS transactions incorrectly incorporated in rating judgement is what determines a delayed rating adjustment. The explanation lies in a different time link between the manifestation of trigger events and the variations in micro and macroeconomic variables that determine them (Figure 5.4).

Rating agencies participate from the start, together with the originator, in setting up the programme; for this reason, the choice of assets constituting the pool of the securitized portfolio, as well as the definition of internal and external guarantees foreseen by the ABS programme, is made according to the rating which the originator

desires to obtain on the different tranches of securities in the issuing phase. Microeconomic variables, moreover, are those most directly connected to trigger events. Ongoing variations of micro variables may determine an immediate occurrence of trigger events and a subsequent sudden rating adjustment. Essentially, the timeline reaction connecting variations in microeconomic variables to trigger events and to rating variation is relatively short. We do not, therefore, consider that microeconomic determinants justify a significant downgrading lag.

A less direct time link connects macro determinants to ABS securities' capacity to ensure promised yield to final investors, as variations in macroeconomic variables may generate effects on the regular trend of flows of ABS funds, even with large time lags. Among macro variables, particular significance must be attributed to the relation existing between principal debtors' settlement capacity, on the one side, and the trend of GDP, of the interest rate, of the market liquidity, of the rate of inflation and – particularly in case of securitizations of residential mortgages – of the level of prices on the real estate market, on the other. The increase in the cost of money, or the cost of primary consumptions, may induce a contraction in financial availability of transferred debtors, necessary to fulfil obligations deriving from loans taken up, with the consequent deterioration of the quality of the securitized portfolio. In the case of mortgages, by the way, one must also consider the presence of speculation bubbles, which cause over-assessment of estates and consequently the depreciation of the guarantee from the moment in which a realignment of prices to the real value takes place.

Finally, current ABS regulation could be a highly significant variable, as it is in a position to influence the structure of the programme through prudential ratios imposed on the originator, the guarantors and ABS investors. This chain mechanism of effects of variations in macroeconomic variables on trigger events and on flows of funds in an ABS transaction is longer than the one attributable to micro variables. ABS ratings adjustments, therefore, when justified by macro variables, may take place only with significant delay compared with the occurrence of the justifying cause.

5.6   Asset securitization and financial stability: an interpretative model

There are two transmission channels through which asset securitization may contribute to feeding systemic crises: by favouring the

concentration of the credit risk incorporated in balance sheets of single banks, and by facilitating the transfer of the credit risk on institutional investors. The two conditions, moreover, may take place at the same time.

Concerning single banks, the greatest exposure to credit risk occurs when the latter – thanks to ABS transactions – recomposes its loan portfolio, substituting good high-quality assets with riskier loans; especially when, to meet the favour of the market, ABS transactions are built selecting the highest-quality loans present in the originator bank portfolio. The effect is even more significant when, as generally happens, the originator buys part of the junior securities issued – reabsorbing in its own balance sheet the most dangerous tranche issued – or offers important guarantees on securities placed on investors. In those markets where asset securitization is widely used, this scenario may apply to a high number of originator banks. The result is an overall deterioration of bank asset quality.

Concerning investors, the mechanism is fulfilled by placing risky ABS securities on the markets, generally attributable to mezzanine and a portion of junior tranches. This can take place, in the first place, due to the explicit goal of the originating bank, via securitization, to clear its balance sheet of highly risky loans. In the second place, placement on the market of high-risk ABS securities may be the result of the abovementioned deterioration in the credits portfolio, also explained by a negative trend of the macroeconomic variables. The more numerous banks systematically resorting to securitization are on the market, the more this result is realized. In such cases, in fact, credit portfolio restructuring, together with a moral hazard attitude, results in a physiological quality deterioration of assets stored in banks' balance sheets. If these assets are destined to feed revolving portfolios of ABS transactions, or new securitization programmes, the implicit risk in single debt exposures is transferred by originators to investors in ABS securities, thus increasing systemic risk.

It is possible, therefore, to discern asset securitization's contribution to systemic risk due both to an 'inside effect' in the banking system – when ABS favours quality deterioration in bank assets present on the market, both due to the low quality of new loans issued and in relation to the quotas of junior securities held and guarantees lent – and to what can be recognized as 'outside effect' – when the loans risk present in bank balance sheets is transferred, thanks to asset securitization, to final investors in ABS and to third guarantors (Figure 5.5). Both effects may be generated by microeconomic or macroeconomic variables.
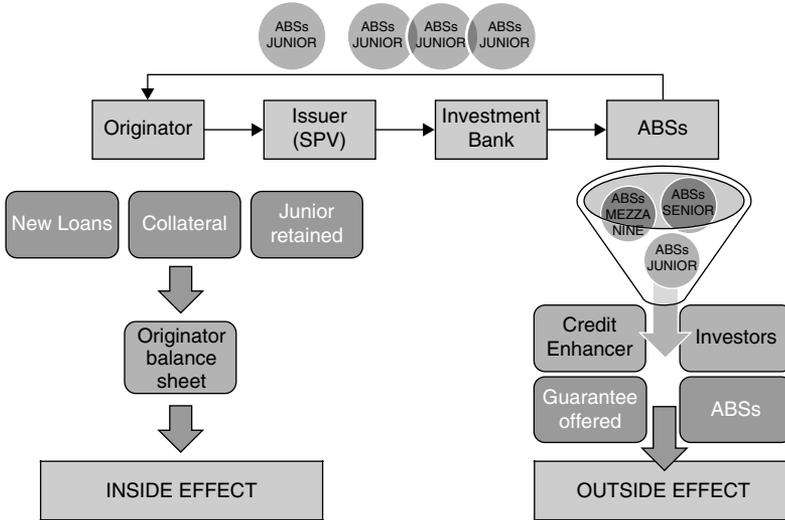
Figure 5.5 ABS and financial stability: inside and outside effect

5.6.1 ABS and systemic crisis: micro variables

In the ABS – financial crisis chain reaction, microeconomic variables which have an impact on ABS optimum performance are related to quality and typology of securitized assets. The portfolio's capacity to generate flows regularly, and not to record a high rate of prepayments, is strictly connected to the characteristics of loans selected, in terms of technical forms, of sector and geographic diversification, of average residual life, and of level of riskiness at the moment of securitization (Figure 5.6). Literature analysing relations between determinants and ABS effects has highlighted connections between the quality of securitized assets and the standing of the originator. Various studies indicate that the riskiest banks have greater incentives in resorting to securitization and transfer of risky assets to external investors. In a nutshell, it is supposed that higher-risk banks use ABS most and, thanks to this technique, improve their balance sheets, securitizing risky loans and investing the derived liquidity in less risky activities.

This mechanism would indicate, as a result, an improvement in banks' balance sheets and, at the same time, a greater diffusion on the capital market of the risk implicit in securitized assets. However, not all empirical tests reach results consistent with this hypothesis, nor do they point to a transfer from inside to outside effect.
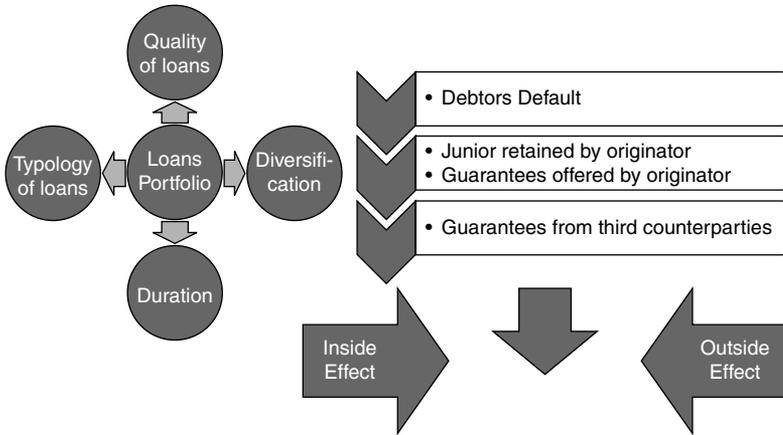
Figure 5.6 ABS and financial crisis: micro determinants

The reason for this lies in the fact that the single ABS transaction structure may determine a different final distribution of risk from securitized loans. Investors and credit enhancers find appropriate protection mechanisms in the ABS program. Originators, in fact, do not only usually repurchase relevant percentages of junior tranches issued, limiting the risk quota transmitted to investors, but also often offer other forms of internal guarantees. For the bank, restructuring its loans portfolio to operate in favour of less risky credits is juxtaposed with a withholding of part of the risk of securitized assets and an increased risk in the portfolio of securities, with a net effect on the balance sheet which is not always positive. Moreover, it must be noted that, in recession phases, the single originator finds more difficulty in substituting securitized loans with good-quality ones.

Underwriting of junior securities, and other inside guarantees provided by the originator, have precisely the purpose of protecting ABS investors and outside guarantors from the possibility of debtors' defaults being transferred; such a phenomenon has been termed in the literature the 'recourse hypothesis'. A kind of barrier against risk would therefore be created to protect final investors and, in part, third-party guarantors. The contribution of asset securitization to system crises, therefore, naturally oriented towards an 'outside effect', may find in the structure of the specific ABS operation a channelling 'inside effect' (Figure 5.7).
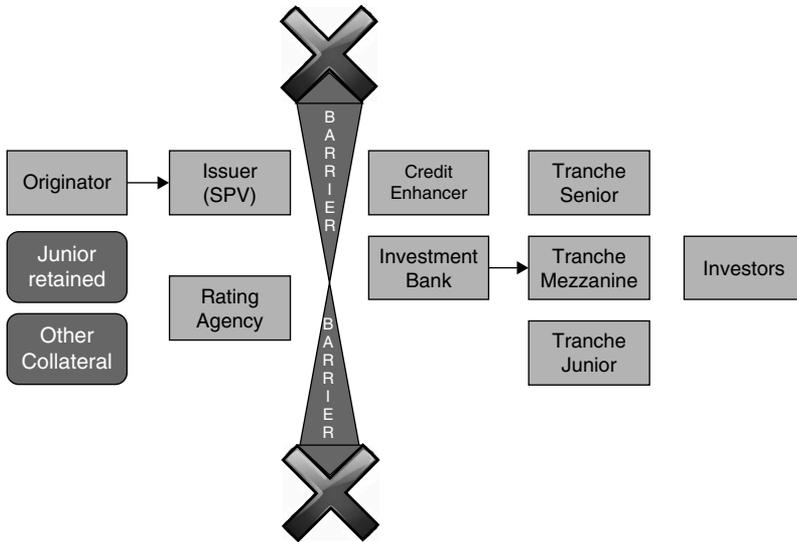
Figure 5.7   Internal recourse and barrier protection

5.6.2   ABS and systemic crisis: macro variables

The chain reaction between macro variables and securitized portfolio quality may be summed up as a logical sequence typically used in literature to explain financial instability. Expansive economic scenarios, typical of pre-crisis phases, usually show low interest rates and, importantly, sustained growth rates of the GDP; in these phases financial intermediaries and banks normally adopt pro-cyclical loan policies. The abundance of liquidity present on the market, the rise in demand for credit, and the need to compensate for decrease in margins due to low interest rates and to an increase in competition determine a general expansion in offers of credit. In this scenario, ABS becomes the perfect tool to go along with expansive credit policies: it provides additional liquidity deriving from the transfer of non-negotiable assets – and which can be used for granting new loans – and it releases the pressure on banks' profitability, both through the restructuring of flows of capital and interests, due to the substitution of old loans with new ones, and through commissions deriving from the ABS programme. Such conditions, however, may favour an attitude of moral hazard on the part of the banks and, in this way, an adverse selection of clients, ultimately causing an increase in the credit risk of the banks' loan portfolios.
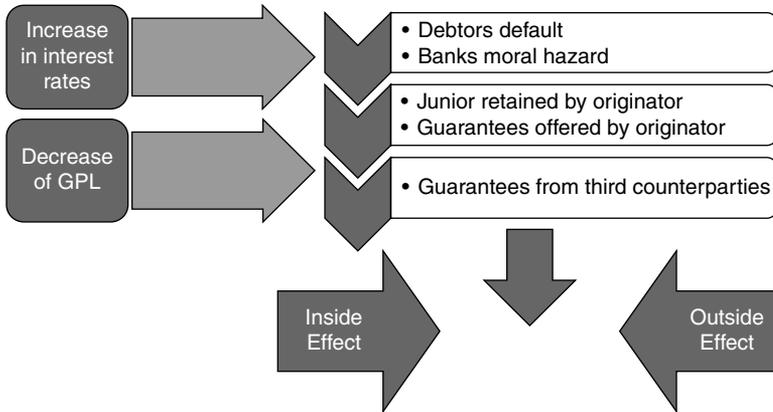
Figure 5.8 ABS and financial crisis: macro determinants

Now, when the economic cycle presents the first signs of inversion, reverting from an expanding cycle to a recessive cycle, interest rates and GDP change sign and measures; interest rates register upward trends and growth in GDP slows down. It is precisely at that point that the logical chain described, which connects ABS to the systemic crisis, brings about its effects with the utmost potency (Figure 5.8).

In the first place, interest rate increases compromise the capacity of transferred debtors to reimburse their debts to the SPV in a timely fashion, negatively impacting ABS investors' returns. In the second place, the decrease in growth rates of domestic product may expose debtors to contractions in their income and consequent difficulties in repaying debts. The negative trend of GDP, however, carries with it a lower demand for credit, stimulating moral hazard policies in those banks which – lacking an alternative – aim at keeping the same growth rhythms in their activity. Even in this case, the distribution between 'inside effect' and 'outside effect' depends on the specific structure of the transaction, and in particular on collaterals offered by the originator and by credit enhancers. There is, however, a further element to consider: criticalities are determined also by those assets which, at the moment of the securitization launch – in the expanding cycle phase – did not reveal problems, but which highlighted criticalities due to macroeconomic factors.

5.6.3 ABS and systemic crisis: downgrading delays

The hypothesis at the basis of the empirical test is that rating judgements are not adjusted in a timely fashion following macro variables;

specifically, they are late in embodying possible 'inside' and 'outside effects' dictated by variations in interest rates and GDP. It would appear that downgradings explained by macro factors do not take place until a later stage, when ABS programmes start to experience some default. Ratings, therefore, would not result in being predictive of the risk potentially affecting ABS securities due to the variation of macroeconomic variables. In a nutshell, according to the theoretical hypothesis illustrated in this chapter, because downgrading intervenes whenever a delay or default in the regular trend of the flows of the transaction takes place, and since variations in macroeconomic variables determine effects on flows in a delayed fashion, the result is that – above all in phases of economic crisis, when the weight of macro determinants is more significant in explaining default events – downgradings are significantly delayed from the appearance of the factors that cause worsening of the risk, further increasing the contribution of securitization to systemic instability.

5.7   Empirical analysis: methodology and sample selected

5.7.1   Selected variables

5.7.1.1   Micro determinants

From a microeconomic perspective, the state of health of securitization transactions may be affected by specific events which could negatively impact transfer of funds: among them the occurrence of debtors' defaults, the violation of what had been declared and guaranteed in agreements by originator and third parties participating in the programme, the originator's bankruptcy, or any other judiciary procedures which could be attributed to it.

Such events have an impact on the programme's performance and are monitored through various indicators, including the number of past due on the amount of the initial portfolio, the average number of past due over a predetermined period in time, and the number of past due beyond a period in time predetermined on the total of the first loss piece. The latter is made up of junior tranches, or from the reserve account, and it is representative of the credit enhancement level from which tranches with more seniority benefit.

Such microeconomic variables, 'captured' by trigger events, are all connected to the financial structure and participating subjects and, for the purpose of this chapter, are excluded from the empirical analysis.

This is because of the fact that, as already explained, it is considered that they are correctly incorporated in rating judgements.

5.7.1.2   *Macro determinants*

Assessment of the existence of connections between macro variables and ABS performances, and of whether they are correctly considered in the rating judgements of securitized securities, therefore forms the area of investigation of the present work.

It is maintained in the literature, and in many empirical studies, that there is a positive correlation between the increase in the cost of money, inflation, average price of real estate, low level of liquidity, and deterioration of mortgage quality ABS.

The increase in the cost of money and inflation, particularly in times of stagnation of GDP, does in fact reduce debtors' spending capacity; they find it more difficult to honour debts, with consequent repercussions on the quality of the securitized portfolio.

Deterioration of a mortgage portfolio is recorded even in the case of, as happened during the recent financial crisis, an unjustified increase in the price of real estate. In fact, the formation of speculative 'bubbles' in the real estate sector, combined with high interest rates, has the effect of amplifying the deterioration of the quality of the portfolio and reducing recovery rate deriving from estates sales.

Finally, poor liquidity, in periods of financial turmoil, reduces negotiation of credit lines given and collateral lent on the inter-bank market. In the light of these factors, the macroeconomic variables chosen for the investigation relate to:

- GDP;
- EURIBOR growth rate;[1]
- LIBOR growth rate;[2]
- average growth rate of prices in real estate for every nation;
- EONIA volatility growth rate;[3]
- inflation growth rate for every nation.

5.7.2   **Estimated model**

From the methodological perspective it has been decided to use the rating of a single primary bond issue, deriving from RMBS operations, as a dependent variable, taking this as an assessment assigned by agencies to express the capacity of a debtor to pay fully and on time the interest and reimbursement of capital on the debt; independent variables, chosen to support the hypothesis that there are macro determinants

for downgrading, have been selected from variables considered to be expressions of the level of gross product, the cost of money, liquidity and inflation rate of single countries forming the sample. The estimate model for variables chosen is represented in the following expression:

Expression 5.1   The Estimate Model

$$Rating = \beta_0 + \beta_1 PILnaz + \beta_2 EURrate + \beta_3 LIBORrate + \beta_4 BCErate \\ + \beta_5 EONIArate + \beta_6 IMMrate + \varepsilon$$

which sets a model of multiple regression, fed by panel data, referred to macro variables selected, and that allows the problem of the possible presence of disturbances from omitted variables to be overcome.

5.7.2.1   The sample

Data used for empirical analysis were related to RMBS transactions set up between 2000 and 2009, still active at the time of the analysis, quoted on the market, provided with ratings and related to five European nations:[4] the United Kingdom (UK), the Netherlands (NL), Italy (IT), Portugal (P) and Spain (E). It is a sample (Table 5.2) of 502 deals related to asset securitization of residential mortgages (66 per cent of the total of RMBS set up in the nations considered), for which the rating evolution of tranches 'A' and 'B'[5] over the period in time considered for a total of 1,004 observations. Data related to ratings has been collected by drawing on Moody's Corporation website (www.moodys.it and www.moodys.com), while data related to independent variables has been collected through the telematics platform 'Bloomber'.[6]

Table 5.2   The sample selected for the test

Nation	No. active transactions taken a census of (population)	% of active transactions (population)	No. transactions considered (sample)	No. issues considered (sample)
1 United Kingdom	245	32.5	164	328
2 Netherlands	136	18.0	90	180
3 Italy	79	10.5	52	104
4 Portugal	35	4.6	24	48
5 Spain	259	34.4	172	344
Total	754	100.0	502	1004

Table 5.3   Distribution of rating for the sample

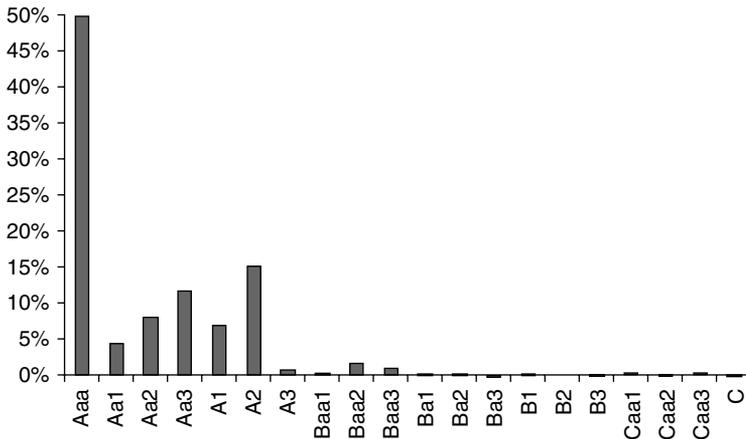| Moody's rating observed	Percentage observations	Cumulative observations (%)
Aaa	49.67	49.67
Aa1	4.26	53.93
Aa2	8.06	61.99
Aa3	11.70	73.69
A1	6.78	80.47
A2	15.11	95.58
A3	0.77	96.36
Baa1	0.19	96.55
Baa2	1.51	98.06
Baa3	0.85	98.92
Ba1	0.15	99.07
Ba2	0.19	99.26
Ba3	0.08	99.34
B1	0.19	99.54
B2	0.00	99.54
B3	0.04	99.57
Caa1	0.15	99.73
Caa2	0.04	99.77
Caa3	0.15	99.92
C	0.08	100.00

Figure 5.9   Sample rating distribution

It is noted that the sample presents an important concentration of synthetic assessments (about 50 per cent) in the highest class of the rating scale and that distribution of the rating revision appears to be concentrated in the higher classes (Table 5.3). In fact, more than 96 per cent of ratings concerning the sample, considering both downgradings and upgradings of every single issue in the period considered, are placed between 'Aaa' and 'A3' on Moody's scale.

In other words, it is a sample of issues of ABS characterized by an elevated theoretical degree of solvency (Figure 5.9) and, for this reason, capable of highlighting with greater clarity the occurrence of significant and/or concentrated downgrading/upgrading.

ABS and systemic crisis: primary effect.   The first result to highlight is that in the RMBS sample observed, on a total of 1,004 issues, 120 downgradings[7] were recorded (about 12 per cent of all issues which suffered downgrading), among which 92 (9.16 per cent of issues concerned with downgrading and 76.6 per cent of the total of downgradings) were connected only to 2009 (Table 5.7). Moreover (Table 5.8), an obvious concentration of downgradings can be seen in the three nations which have carried out ABS transactions more than the rest (Holland, Spain and the UK). It is confirmed, therefore, that asset securitization contributes to the systemic crisis in what we term a 'primary effect'.

5.8   Findings of the test

Correlations between the dependent variable and selected independent variables

In order to verify the existence of the 'secondary derivative effect', a regressive analysis was adopted. To be able to investigate the correlation between chosen independent variables (of a numeric nature) and rating (of an alphanumeric nature), it was necessary to convert Moody's scale into a numerical vector (Table 5.4). It is noticeable that the sample does not show, as it is logical to expect, a number of deals sufficient to cover the complete distribution of Moody's rates scale. In fact, the ABS transactions considered are distributed within only 20 classes of rating.

For this reason the rating scale is represented, in the statistical elaboration, by 20 whole increasing numbers at the deterioration of credit. In other words, the whole number '1' was attributed to the highest class, the whole number '2' to the second class, and so on, until arriving at number 20, attributed to the lowest class (class 'C'). This choice,

Table 5.4 Rating conversion matrix

Moody's ratings observed	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	–
Whole number assigned	1	2	3	4	5	6	7	
	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2
	8	9	10	11	12	13	14	15
	Caa1	Caa2	Caa3	C	–	–	–	–
	17	18	19	20				

Table 5.5 Correlations hypothesized by the model

Independent variable	Dependent variable (*Rating*)	Correlation between dimensions considered	Sign foreseen from angular coefficient of the regression line without distortions induced by *rating agencies*
PIL*naz*	($\uparrow^i$-$\uparrow^{ii}$); ($\downarrow$-$\downarrow$)	+	−
EUR*rate*	($\uparrow$-$\downarrow$); ($\downarrow$-$\uparrow$)	−	+
LIBOR*rate*	($\uparrow$-$\downarrow$); ($\downarrow$-$\uparrow$)	−	+
BCE*rate*	($\uparrow$-$\downarrow$); ($\downarrow$-$\uparrow$)	−	+
EONIA*rate*	($\uparrow$-$\downarrow$); ($\downarrow$-$\uparrow$)	−	+
IMM*rate*	($\uparrow$-$\downarrow$); ($\downarrow$-$\uparrow$)	−	+

Notes: [i] The arrow pointing upwards indicates an improvement in the growth rate of GDP. [ii] The arrow pointing upwards indicates an improvement in the judgement of merit.

necessary to elaborate qualitative data, will allow us to verify the hypothesis (Table 5.5), specifically whether an increase in:

- national GDP corresponds to an average improvement in the rating of ABS (positive correlation between the two dimensions and negative coefficient of the intercept);
- EURIBOR growth rate corresponds to a deterioration in the rating of ABS (negative correlation between the two dimensions and positive coefficient of the intercept) (see Figure 5.10);
- LIBOR growth rate corresponds to a deterioration of the rating of ABS (negative correlation between the two dimensions and positive coefficient of the intercept);
- BCE growth rate corresponds to a deterioration of the rating of ABS (negative correlation between the two dimensions and positive coefficient of the intercept);
- EONIA growth rate corresponds to a deterioration of the rating of ABS (negative correlation between the two dimensions and positive coefficient of the intercept);

- growth rate of the average cost of real estate corresponds to a deterioration of the rating of ABS (negative correlation between the two dimensions and positive coefficient of the intercept).

Correlation hypotheses are amply shared by literature and numerous empirical analyses and justify how, with the increase of the cost of money and in periods of recession of the economic cycle, the capacity to fulfil obligations and the quality of both the securitized portfolio and associated ratings deteriorate.

Test for possible correlations existing among the chosen independent variables

The first test carried out has been the search for any possible correlations among the chosen independent variables, with the purpose of avoiding alterations induced by possible correlations existing between the observed variables. The analysis, carried out using the 'z statistic' to verify the hypothesis, gave significant results for all variables, except between growth rate of cost of real estate and growth rate of EURIBOR and LIBOR; such a result can probably be attributed to the lack of a complete series of data on the trend of the cost of real estate in the nations chosen for the sample. In other words, an obvious degree of correlation between all the chosen independent variables has been considered (Table 5.6), which allowed three variables at most to be considered simultaneously in the successive regressions.

Secondary derivative effect

Evidence for the existence of a contribution from ABS to the systemic crisis in the form of a 'secondary derivative effect' is seen in the results

Table 5.6 Significance of relevant correlations among independent variables

Correlations	*natGDP*	EUR*rate*	LIBOR*rate*	BCE*rate*	EONIA*rate*	RE*rate*
natGDP	–	Z=62.91; P>|z|= 0.00	Z=62.92; P>|z|= 0.00	Z=49.65 P>|z|=0.00	Z=35.53 P>|z|=0.00	Z= 57.73 P>|z|=0.00
EUR*rate*		–	Z=max P>|z|=0.00	Z=772.82 P>|z|=0.00	Z=355.08 P>|z|=0.00	Z=0.41 P>|z|=0.685
LIBOR*rate*			–	Z=773.53 P>|z|=0.00	Z=355.28 P>|z|= 0.00	Z= 0.40 P>|z|= 0.687
BCE*rate*				–	Z=490.54 P>|z|=0.00	Z=7.73 P>|z|=0.00
EONIA*rate*					–	Z=19.94 P>|z|=0.00
RErate						–

Table 5.7 Downgrading occurring

Wrap-up	Sample	% compared with total of issuances
ABS issuances which underwent at least one upgrading	32	3.19
ABS issuances which underwent downgrading	120	11.95
Total downgrading for tranche A	50	4.98
Total downgrading for tranche B	70	6.97
Total ABS issuance downgraded (A and B) in 2009	92	9.16
Total ABS issuance downgraded (A and B) in 2005–8	16	1.59

Table 5.8 Downgrading occurring in each country

	Down	Down %	Up	Up %	No. issuances	No. issuances (%)
Tot. UK	52	43.3	12	37.5	328	32.6
Tot. NL	22	18.3	16	50.0	180	18.0
Tot. IT	6	5.0	0	0.0	104	10.4
Tot. P	0	0.0	0	0.0	48	4.9
Tot. E	40	33.3	4	12.5	344	34.2
Tot	120	100.0	32	100.0	1,004	100.0

of econometric analysis carried out for the independent variables considered singly (Table 5.9).

The estimated correlation of four of the independent variables with rating (EURrate, LIBORrate, EONIArate, RErate) is negative, opposite to what is expected when ratings correctly incorporate variations in macro variables (in this case the sign of the angular coefficient of the intercept of the regression rate is positive). In other words, as the starting premise is the existence of a negative correlation between variables and rating– by virtue of the choice made when converting Moody's scale – a positive angular coefficient of the regression lines is expected. As this does not happen, and angular coefficients have a negative sign, the analysis confirms the theoretical hypothesis, namely that rating judgements are invalidated by a delay in downgrading.

Test for the significance of the chosen variables

The statistical significance of the chosen independent variables was then tested. L'R2 'correct' (0.5008), which gives a synthetic measure

Table 5.9   Regression results

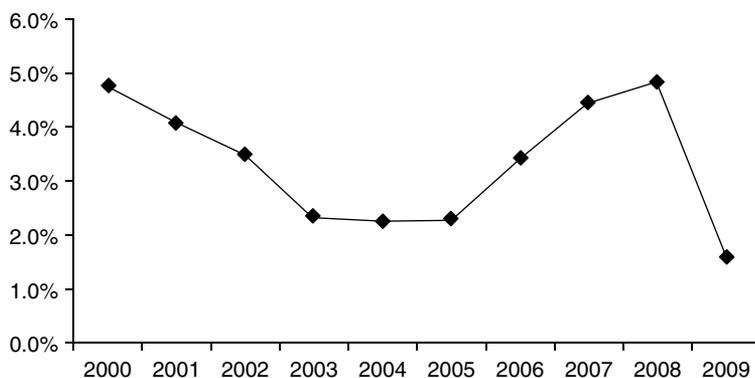| Regressor	Sign of theoretic coefficient	Estimated coefficient	Test	$\bar{R}^2$ (with fixed effects on tranches A and B, and temporal effects)
natGDP	−	−0.0395	Z=−6.21; P>|z|=0.000	0.5008
EUR*rate*	+	−0.0355	Z=−2.53; P>|z|=0.011	0.5019
LIBOR*rate*	+	−0.0355	Z=−2.53; P>|z|=0.011	0.5038
BCE*rate*	+	0.0775	Z=+2.94; P>|z|=0.003	0.4988
EONIA*rate*	+	−0.0370	Z=−2.20; P>|z|=0.028	0.4607
RErate	+	−0.0115	Z=−3.44; P>|z|=0.001	0.4280

Figure 5.10   Evolution of EURIBOR rate (2000–9)

Table 5.10   Results of regression in a 'downgrading shift scenario'

Regressor	Sign of theoretic coefficient	Estimated coefficient	Test	$\bar{R}^2$ (with fixed effects on tranches A and B, and time effects)
natGDP	−	−0.0141	Z=−2.20; P>|z|=0.027	0.5087
EUR*rate*	+	0.0497	Z=3.53; P>|z|=0.000	0.5076
LIBOR*rate*	+	0.0496	Z=3.52; P>|z|=0.000	0.5076
BCE*rate*	+	0.1538	Z=6.09; P>|z|=0.000	0.5043
EONIA*rate*	+	0.0431	Z=2.52; P>|z|=0.012	0.4653
RErate	+	−0.0119	Z=−3.63; P>|z|=0.000	0.4334

of the significance of the regression, or rather the degree to which the dependent variable is explained by independent variables, turned out to be sufficiently elevated for all variables considered singly (Table 5.9).

Double check analysis: downgradings shift

In the period of time observed, the downgradings occurred after a period of consistent interest rate increases (2005–8), in which 16 separate downgradings were recorded (Figure 5.4).

Bearing this in mind, to complete the analysis, the hypothesis was made that rating agencies had announced the downgradings occurring in 2009 at least a year earlier, or, rather, before the recent financial crisis. In this way econometric analysis should give coherent signs of correlations between variables mentioned, or rather the positivity and/or negativity of angular coefficients of regression lines, in harmony with the hypothesized theoretical correlations. From this perspective, recalibrating the panel data with the downgradings of 2009 moved back to 2008 gives results compatible with the theory expounded: angular coefficients of -0.0141 for GDP, $+0.0497$ for EURIBOR rate, $+0.0496$ for LIBOR rate, $+0.0153$ for BCE rate and $+0.0431$ for the volatility of the EONIA rate, as well as a R2 'correct' sufficiently significant for every independent variable considered individually (Table 5.10).

5.9   Conclusions

The chapter's objective has been to verify the promptness of downgrading of ABS securities in the context of the recent financial crisis, selecting a European sample of securitization programmes of residential mortgages. More specifically, we tested the hypothesis that variations in macroeconomic variables are not incorporated promptly in ratings and that this determines a downgrading lag, producing what has been defined as a 'secondary derivative effect' on the stability of the financial system. Results of the descriptive analysis indicate, in the first place, the presence of a 'primary effect', highlighting the fact that ABS contributed to the systemic crisis due to the significant number of downgradings. The regressions undertaken, moreover, also show a positive result in terms of 'derivative secondary effect', significantly confirming the theoretical hypothesis that, in pre-crisis periods, rating agencies tend to delay downgradings, announcing them only at a later stage, when the crisis is already under way.

The chapter offers an innovative contribution to the literature on relations between asset securitization and financial crises, both by proposing a theoretical framework of the connections between ABS and financial stability and by highlighting, thanks to empirical analysis, a low degree of information efficiency in ABS ratings and, therefore, a significant contribution made by ABS to the systemic crisis.

Notes

1. Euro interbank offered rate, reference rate for transactions on the inter-bank market on funds in Euros and used as an index parameter for variable rate mortgage loans, calculated daily as a simple average of info quotes received at midday on a sample of banks with an elevated credit selected periodically by the European Banking Federation.
2. London Interbank Offered Rate, reference rate for transactions on the inter-bank market, the market where banks exchange short-term funds, as an average of the eight central values provided by 16 major banks.
3. European OverNight Index Average, a parameter representing the average of overnight rates of financing applied by the main European banks and transmitted daily to the European Central Bank (BCE).
4. The choice of nations is justified by the greater number of RMBS set up compared with other European nations.
5. It has been chosen to monitor the state of health of only tranches 'A' and 'B' as, often, tranches with a greater risk are subscribed by the originator.
6. It has not been possible to consider the EONIA volatility growth rate from 2000 to 2004 and growth rate of real estate prices in Spain and Holland.
7. A single downgrading of each issue was included in the data, as annual data in the sample considered were recorded on the basis of individual downgradings, and in many cases only a single downgrading took place during the period analysed.

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