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## What do we know about Banks Securitisation? The Spanish Experience\*

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### Abstract

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The present work analyses the reasons why Spanish financial entities have carried out securitisation programs in the period 2000-2007 on such a scale that Spain has become the European country with the largest issue volumes, second only to the U.K.

The results obtained after the application of a logistic regression model to a sample of 408 observations indicate that liquidity and the search for improved performance are the decisive factors in securitisation. The hypotheses of transfer of credit risk and arbitrage in regulatory capital are not confirmed; therefore the normative development of Basel II cannot be expected to affect the volumes issued in future years.

The study is complemented with a more detailed analysis, differentiating between programs of asset and liability securitisation.

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## 1. Introduction

Securitisation is a financial technique that allows a batch of illiquid assets to be transformed into a tradable instrument that is liquid and has a known flow of income payments. This transformation is made possible by using an instrumental entity (a special purpose vehicle or SPV) that is separate under the law from the entity with ownership rights to the instrument. In consequence, the technique allows banks to transform heterogeneous assets that, in the great majority of cases, are not negotiable, into securities that are liquid, homogeneous and suitable for sale to third parties. The range of assets that can be securitised is very wide and includes not only present credit rights (interest from mortgage loans, credit card debt, consumer loans for car purchase, bonds, etc.), but also rights to future income flows (rights of authorship, property rental income, etc.).

Asset securitisation has, in recent years, become one of the more visible consequences of financial innovation. Since the year 2000, in Europe, issues of securitised assets have grown from 78.2 billion euros to 711.1 billion euros in 2008, which represents an increase in volume by a factor of ten in less than a decade<sup>2</sup>. Although the current financial crisis, in which securitisation seems to have played a notable role, produced a halt in the commissioning of new securitisation programs during the second half of 2007 and beginning of 2008, the pressing needs of financial entities for liquidity provoked a sharp change of trend after the first quarter of 2008, and the volume issued in the latest year increased by almost 60% over that of the previous year.

Over this last decade, Spain has established itself as one of the most prolific European countries, second only to the United Kingdom, in the issue of securitised banking assets, even though this financial technique is a relatively recent phenomenon in this country. In fact, although off-balance sheet securitisation appears to have been subject to regulation for the first

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<sup>2</sup> Data according to the European Securitisation Forum Data Report Q4:2008 (2009).

time in 1992<sup>3</sup>, it was not until 1998 that the securitisation of all types of assets was permitted, whether or not they had a mortgage guarantee<sup>4</sup>.

Despite this notable expansion of the market, there have been few empirical studies focusing on the specific characteristics of financial entities that lead them to undertake a program of securitisation. In this context, the work presented is intended to extend the existing scarce literature; it analyses the factors that have encouraged Spanish banks to securitise assets, in the period studied, between 2000 and 2007.

After this introduction, the article is structured as follows: Section 2 presents a review of the bibliography and identifies the principal factors indicated in the literature as determinants in the decision taken by a bank to securitise some of its assets. Next, in Section 3, the most common structures of securitisation are described, and the situation in the Spanish market is analysed. Section 4 presents the sample and methodology employed in the empirical research, and the explanatory variables are described. The results obtained are set out in Section 5, and in Section 6 the principal conclusions are presented. Finally, the bibliographical references employed are listed in Section 7.

## **2. Factors determining securitisation, according to previously published studies**

One part of the existing literature offers analyses of aspects such as the effect that securitisation produces on the risks incurred by the banks making use of this technique (Dionne and Harchaoui, 2008; Hänsel and Krahn, 2007), on the quoted prices of the shares of the entities issuing securitisation programs (Lockwood, Rutherford and Herrera, 1996; Thomas, 1999, 2001), and on the supply of bank loans (Hirtle, 2007; Loutskina and Strahan, 2006), among others. Other authors, however, have concentrated on studying the principal factors that lead a bank to securitise part of its portfolio.

Despite the undoubted growth experienced by the securitisation market, currently the specific characteristics of financial entities that lead

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<sup>3</sup> Law 19/1992, of 7 July, in respect of mortgage securitisation funds and companies, which regulates the securitisation of mortgage loans that meet the requirements stipulated in the second section of the Law 2/1981, of 25 March, for the regulation of the mortgage market.

<sup>4</sup> RD 926/1998, of 14 May, which regulates asset securitisation funds and securitisation fund management companies.

them to securitise a proportion of their assets are not clear, although previous studies seem in agreement in identifying three main (but not exclusive) groups of motivations:

- i. *Liquidity or the search for new sources of financing.* The liquidity effect of securitisation is particularly obvious in cash transactions. Here, the transfer of assets follows a true sale ("off-balance sheet") of the underlying portfolio to a special purpose vehicle (SPV). The SPV then issues notes in order to fund the assets purchased from the originating bank. Obviously, this transaction leads to an inflow of cash (funding) and hence a possible restructuring of the bank's Balance Sheet (Gorton and Pennacchi, 1995), contingent on the reallocation of cash by the originator. The need for liquidity has been stated to be the principal determinant factor of securitisation, in recent empirical studies such as that of Agostino and Mazzuca (2008).
- ii. *Transfer of credit risk.* Securitisation allows higher-risk financial institutions to originate and fund risky financial assets (e.g. mortgages, consumer loans, business loans, etc.) in a way that minimises financial distress costs (Gorton and Souleles, 2004). These institutions can use SPVs to remove loans from their balance sheet. SPVs are structured to remain "bankruptcy remote" from the originating firm, meaning that the creditors of the SPV do not have any claim against the originator's assets. Moreover, the bonds sold by the SPV are structured to make default and bankruptcy all but impossible (although there can be defaults on the underlying loans). According to this efficient contracting explanation, financial firms facing greater expected financial distress costs, for example firms with high leverage and risky assets, are more likely to be active securitisers than other firms. Among the recent studies that emphasise the importance of this factor in the decision of a bank to securitise assets are those of Minton, Sanders and Strahan (2004) and Bannier and Hänsel (2008). For these latter authors, securitisation transactions are being used mainly as a risk-transfer and funding tool that allows a more efficient risk-sharing and liquidity transformation.

However, it is appropriate to remember on this point that the originating entity usually repurchases from the SPV the tranche of worst credit quality assets (known as those of first losses, or the equity tranche), with the object of securing for the subsequent tranches of the structure a sufficient degree of credit improvement, so that these other tranches obtain a higher rating and can be placed at lower cost in the financial market. This way of proceeding would limit the effective transfer of credit risk to the final investors.

iii. *Arbitrage of regulatory capital.* In another group of studies, it is argued that credit entities have resorted to asset securitisation in order to reduce their capital requirements (Ambrose, Lacour-Little and Sanders, 2005; Calomiris and Mason, 2004; Duffie and Garleanu, 2001; Pennacchi, 1988; and Uzun and Webb, 2007, among others). This would involve exploiting the possibilities for arbitraging the regulatory capital required under the Capital Accord of 1988 (Basel I)<sup>5</sup>.

The Basle II Agreement, which entered into force in the majority of the countries of the European Union in 2008, corrects some of the weaknesses of the Basel I Agreement. Thus, the possible reduction in the capital requirements is closely associated with the quality of the underlying portfolio and with the amount of risk exposure retained by the originating entity, preventing possible arbitrage of capital<sup>6</sup>. However, while the incentives to use regulatory capital arbitrage will shrink under the new framework of Basel II that uses risk-sensitive capital ratios, arbitraging may have contributed to the increase in securitisation in the early years (Minton, Sanders and Strahan, 2004).

Bannier and Hänsel (2008) have argued against this hypothesis, that banks have been arbitraging their regulatory capital, and have even written about a significant “reverse” regulatory arbitrage effect: banks with low tier 1 capital securitise significantly less than banks with high tier 1 capital.

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<sup>5</sup> In Jones (2000), there is an analysis of the principal techniques used to perform capital arbitraging under this Accord (Basel I). Prior to Basel II, the treatment of securitisation from the point of view of the regulation of capital was unsatisfactory. Regulation differed in the different jurisdictions, since treatment specifically for securitisation had not been foreseen in Basel I and, in general, the regulations were less sensitive to risk. As the required capital was the same, the cost of holding low-risk assets is greater since the incremental capital is not economically justifiable. In order to save on regulatory capital, banks may therefore try to remove low-risk assets from their balance sheets and retain high-risk assets.

<sup>6</sup> For a more detailed analysis of the treatment of securitisation in Basel II, the Basel Committee on Banking Supervision (2004) and Catarineu and Pérez (2008) may be consulted.

Apart from the factors indicated, it has been reported that another possible cause of the increased banking securitisation is the search for improvement in the measures of performance of the entity (ROE, ROA, etc.) (Agostino and Mazzuca, 2008); however, in the previous literature, this does not appear to be considered a determinant variable, to the same extent as the factors previously indicated. It should not be forgotten that the downside aspects of securitisation include the fixed costs of setting up the SPV, as well as a potential reduction in the tax benefits flowing from keeping the assets on balance sheet and financing them with debt.

Finally, consideration must be given to a series of elements that seem to influence the decision of a financial entity to securitise some of its assets. Among these are the type of financial entity (commercial bank, savings bank, credit cooperative, investment bank, etc.) and its size. With respect to the originator type, Minton et al. (2004) state "that the efficient contracting hypothesis predicts that commercial banks and savings institutions securitize assets to a lesser degree than other institutions, because commercial banks and savings institutions do not bear the costs of financial distress (the deposit insurer does). In contrast, the regulatory arbitrage hypothesis predicts the opposite". Regarding the size of the financial entity, since setting up a securitisation program leads to significant fixed costs, we should expect only relatively large banks to securitize their loans (Bannier and Hänsel, 2008; Uzun and Webb, 2007).

With reference to the Spanish market, Martín-Oliver and Saurina (2007) conclude that the need for liquidity is the principal and only determining factor in the securitisation programs undertaken by the Spanish banks, in the period 1999-2006. The cited authors do not find any empirical evidence regarding the use of securitisation as a mechanism for the transfer of credit risk or as a way of arbitraging regulatory capital.

The study that is presented here will extend the limited literature existing on this topic, and is intended to contribute to it, being the first in which separate analyses are made of the various factors guiding Spanish financial entities in their decisions to securitise their assets, and those

leading to the securitisation of their liabilities<sup>7</sup> ; this latter is a phenomenon that has its origin in Spain but is currently also found in other countries.

### **3. Types of securitisation and the Spanish market**

A fairly extensive classification in the markets is that which distinguishes, in function of the due date or term of the securities issued, between:

- i. Programs that issue short-term securities (Asset-Backed Commercial Paper, or ABCP). Securitisations that issue short term paper are programs in which the special securitisation vehicle (SPV) issues securities that predominantly have a term of less than one year, independently of the nature and the due date of the assets securitised.
- ii. Programs that issue long-term securities. These comprise the major part of the market, and they can, in turn, be divided between:
  - ii. *Asset-Backed Securities or ABS*. These are characterised by the portfolio securitised being very fragmented, and comprised of assets with a relatively homogeneous risk rating. In the majority of the markets, mortgage loans figure prominently among the assets backing these ABS securities; this gives rise to the well-known nomenclatures for the securitised bonds issued in these programs, such as:
    - RMBS (Residential Mortgage-Backed Securities)
    - CMBS (Commercial Mortgage-Backed Securities).

Other underlying assets packaged into ABS instruments are loans to companies and to the public sector, consumer loans for the acquisition of automobiles, and the rights to credit card repayments and invoice payments; in the last decade these types of asset have increased their presence progressively.

- ii. *Collateralised Debt Obligations or CDOs*. These are a more recent type of structure, but are acquiring increasing relevance in the international market. In this case, the portfolio subject to

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<sup>7</sup> The securitisation of liabilities could be considered an inappropriate securitisation, although its structure is of the traditional type, and it functions in a very similar way to the securitisation of assets. The only notable feature is that these liabilities cannot be sold to a fund: a third entity (an investment company or similar) is required to intervene, purchasing the liabilities issued by a credit entity and selling them immediately to the SPV.

securitisation is not so fragmented, while the assets comprising it usually have more heterogeneous risk ratings than in an ABS securitisation. In terms of the types of underlying assets used, CDOs differ between:

- Collateralised Bond Obligations (CBOs), for which the underlying assets are bonds.
- Collateralised Loan Obligations (CLOs), for which the collateral is constituted by bank loans.

Moreover, the type of underlying assets may include structured products. In such cases, the CDO involves the securitisation of the structured products that are themselves derived from already-existing securitisation structures (CDOs of ABSs).

According to the purpose of the transaction, another distinction possible for CDOs is that between:

- Balance-sheet CDOs. They enable the originator to securitise assets recorded on its balance sheet allowing the originator to remove assets, free up regulatory capital, manage portfolio credit risk, diversify and reduce financing costs.
- Arbitrage CDOs. They allow the originator to take advantage of the positive spread between the average yield on the underlying portfolio and the interest rate paid on the tranches issued.

Having given an overview of the most common securitisation structures (see table 1), the situation of the Spanish market in 2007 is described next<sup>8</sup>:

- The total volume securitised by Spanish financial entities in 2007 reached 136.8 billion euros (46% more than the previous year), in contrast to barely 8 billion euros securitised in the first years of this decade.
- The securitisation of bank assets accounted for around 80% of the securitisation activity in Spain; the largest issuing sector was RMBS

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<sup>8</sup> Data according to the Report on Banking Supervision in Spain in 2007. Bank of Spain (2008).



transactions, which accounted for 46% of total issuance in 2007. The securitisation of loans to companies (14.0%) and of credits to SMEs (7.5%) were next in importance; as a novelty, in 2007, 13 billion euros of interbank loans were securitised. The other types of underlying assets, together with the programs of short-term debt securitisation (ABCP), had only a residual presence.

- For their part, securitisations of liabilities in 2007 were carried out exclusively on *mortgage certificates* ("*cédulas hipotecarias*"), the Spanish mortgage-covered bonds, representing close to 20% of the total securitised, although these grew at a slower rate than in the preceding years. Such securitisation programs are usually classified in the international market as CDOs.
- The great majority of securitisations are of the traditional type; the synthetic type of securitisation, in which the credit risk of the portfolio securitised is transferred by the contracting of credit derivatives, only represents a small minority in Spain.
- Finally, commercial banks, savings banks and credit cooperatives, accounting for 99%, continue being almost the only protagonists of securitisation in Spain.

#### **4. Methodological aspects**

##### **4.1. Sample**

The sample employed in the empirical research comprises all the Spanish commercial banks, savings banks and credit cooperatives included in the Bankscope database during the period 2000-2007 with information available for every one of the variables analysed. However, those entities that presented abnormal ratios or extreme values (outliers) were eliminated from the sample. Once this filtering had been done, the final sample was constituted by 408 observations, of which 117 correspond to commercial banks, 260 to savings banks and 31 to credit cooperatives. Table 2 gives the number of entities that comprise the sample for each of the years included in the time horizon.

The analysis has centred exclusively on those entities authorised by the Bank of Spain to capture funds from the public, with a view to homogenising the research. However, as stated in the preceding Section,

these entities account for almost all the issues in the Spanish securitisation market.

Further, the size of the time horizon considered is sufficient for performing a longitudinal analysis, but is not excessively long for significant structural changes to have take place. This period also coincides, with a substantial expansion of the securitisation activity in Spain, encouraged by a change in the regulation that, until almost the end of the 1990's, did not allow the securitisation of all types of assets. For that reason the present study is focussed on the period from 2000 to 2007 (the latest year available in Bankscope at the time the study was carried out).

Finally, the data on the securitisation activity undertaken by the entities considered, in the period of the analysis, have been obtained from the documents that the various entities issuing securitisation programs are compelled by law to deposit with the Spanish National Securities Market Commission (CNMV)<sup>9</sup>. In table 3 it can be seen that the percentage of Spanish banks that securitise has increased considerably in this decade, passing from 29.1% in the year 2000 to more than 90% in 2007. By type of entity, it is the savings banks that securitise most, as a proportion of total numbers: seven out of every ten have undertaken some program in these eight years, whereas only half of the commercial banks and credit cooperatives have made use of this financial technique.

#### **4.2. Definition of variables**

The principal objective of the present study is to determine what factors have been decisive in the development of Spanish banking securitisation in the period 2000-2007. For this, a series of specific characteristics of the financial entities (explanatory variables) have been identified, with the object of capturing the principal motivations among those referred to in the literature (see Section 2).

##### *Dependent variable*

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<sup>9</sup> Information obtained from the web page of the CNMV ([www.cnmv.es](http://www.cnmv.es)). Data on synthetic securitisation are not collected.

For each year studied it is determined whether or not a bank in our data set has securitised assets. Therefore, the dependent variable can take one of two values:

1, if the financial entity has acted as originator in at least one securitisation transaction,

0, in the contrary case, if there has been no securitisation activity.

### *Explanatory variables*

Three motivations have regularly been put forward in the previous literature as responsible for the securitisation activity of the banks: the search of new sources of financing or liquidity; the transfer of credit risk; and arbitration of regulatory capital. A fourth group has been added to these, which refers to improvement of the performance measures of the entity, and a set of control variables. All these variables are in consonance with those put forward in similar studies (see table 5). That is,

To securitise or not = f(liquidity, credit risk, regulatory capital, performance, control variables)

#### *A) Liquidity (or funding):*

Following the line established in earlier studies, in the present study three variables are considered as *proxies* of the liquidity factor:

- (1) Interbank Ratio: This is money lent to other banks divided by money borrowed from other banks (as percentage). If this ratio is greater than 100 then it indicates the bank is net placer rather than a borrower of funds in the market place, and therefore more liquid.
- (2) Net Loans/Deposits & S.T. funding: This liquidity ratio indicates the relationship between loans and deposits (as percentage). The higher this ratio the less liquid the bank will be.
- (3) Liquid Assets/Deposits & S.T. funding This is a deposit run off ratio and looks at what percentage of customer and short term funds could be met if they were withdrawn suddenly, the higher this percentage the more liquid the bank is and less vulnerable to a classic run on the bank.

In theory, one would expect a financial entity to be more predisposed to securitise part of its portfolio when the assets of the entity are less liquid. It would be precisely this lack of liquidity that would motivate the banks to seek new sources of financing in the securitisation market.

### *B) Credit risk*

The second group of variables is intended to measure the risk profile of the financial entity. This will help to test whether the Spanish banks have employed securitisation as a way of transferring part of their credit risk. If this were the case, the banks with assets of lower quality should show a greater securitisation activity.

Two variables have been chosen for this:

- (4) Loan Loss Reserve/Gross Loans: This ratio indicated how much of the total portfolio has been provided for but not charged off. It is a reserve for losses expressed as percentage of total loans. Given a similar charge-off policy the higher the ratio the poorer the quality of the loan portfolio will be.
- (5) Non-performing Loans/Gross Loans: This is a measure of the amount of total loans which are doubtful (as percentage). The lower this ratio is the better the assets quality.

### *C) Regulatory Capital Arbitrage*

In relation to the financial entity's regulatory capital, the less this is, logically the greater must be the incentive for it to securitise its assets. The variables employed to measure the relationship between securitisation and the hypothesis of arbitrage of the regulatory capital are:

- (6) Capital Adequacy Ratio: This ratio is the total capital adequacy ratio under the Basle rules. It measures Tier 1 + Tier 2 capital which includes subordinated debt, hybrid capital, loan loss reserves and the valuation reserves as a percentage of risk weighted assets and off balance sheet risks. This ratio should be at least 8%.
- (7) Equity/Total Assets: As equity is a cushion against asset malfunction, this ratio measures the amount of protection afforded to the bank by the equity they invested in it. The higher this figure the more protection there is.

#### *D) Performance*

On this point a series of relative variables have been identified to monitor the effect of efficiency improvement as a motivator of the bank in its propensity to securitise:

- (8) Return On Assets (ROA): This is perhaps the most important single ratio in comparing the efficiency and operational performance of banks as it looks at the returns generated from the assets financed by the bank.
- (9) Return On Equity (ROE): The return on equity is a measure of the return on shareholder funds. Obviously here the higher the figure the better but one should be careful in putting too much weight on this ratio as it may be at the expense of an over leveraged balance sheet.
- (10) Cost to Income Ratio (CIR): This is one of the most focused on ratios currently and measures the overheads or costs of running the bank, the major element of which is normally salaries, as percentage of income generated before provisions.

Previously published studies have not found conclusive results in respect of these variables. For Agostino and Mazzuca (2008), a negative effect on the financial entity's performance indicators would be expected (i.e. the higher its ROA and/or ROE, or the lower its CIR ratio, the lower the probability of the entity deciding to securitise loans); thus the need to improve the bank's overall financial efficiency or performance is considered to be a possible causal factor of banking securitisation. However, for Bannier and Hänsel (2008), according to the risk-appetite argument, banks with relatively superior performance should be particularly active in loan securitisation.

#### *E) Control Variables*

For control purposes, some general characteristics of the originating firm have been included in the analysis as additional regressors. First, the impact of firm size is analysed; this is measured as the log of its total assets ((11) firm size). For this variable, a positive sign is expected due to economies of scale following from the fixed costs of setting up a securitisation program.

Second, a dummy variable is included to identify commercial banks and another for savings banks ((12) bank type). With this, it can be evaluated if simply the character of the entity influences the decision to securitise assets.

Lastly, year difference effects are controlled for by the inclusion of a dummy variable for each year considered in the analysis ((13) year).

Table 5 brings together the explanatory variables considered in the present study, together with their expected sign.

### 4.3 Methodology

As first approximation, a univariate analysis of the sample was performed; this presents the principal descriptive statistics of the explanatory variables and is intended to indicate the main differences between the two groups studied. This preliminary study was followed by an analysis of the multivariate type, which enables the causal relationship, if any, between the probability of securitising and the explanatory variables to be isolated. For this analysis a logistic regression model was chosen.

Logistic regression (also known as the logistic model)<sup>10</sup> is a form of regression which is used when the dependent variable is dichotomous (in this case, to securitise or not) and the independent variables are of any type. It is normally employed when the object is to obtain a function that would serve to predict whether an observation belongs to a particular group, or else when the object is to analyse the influence of a series of independent variables on the dependent variable (in our case, the bank's characteristics that may influence its decision to securitise or not).

The logistic equation is:

$$Z_{i,t} = b_0 + b_1 \cdot \text{Interbank Ratio}_{i,t-1} + b_2 \cdot \text{Loans/D\&ST}_{i,t-1} + b_3 \cdot \text{Liquid A/D\&ST}_{i,t-1} + b_4 \cdot \text{LL Reserve/Gross L}_{i,t-1} + b_5 \cdot \text{Non-perf. L/Gross L}_{i,t-1} + b_6 \cdot \text{Capital Ratio}_{i,t-1} + b_7 \cdot \text{Equity/TA}_{i,t-1} + b_8 \cdot \text{ROA}_{i,t-1} + b_9 \cdot \text{ROE}_{i,t-1} + b_{10} \cdot \text{CIR}_{i,t-1} + b_{11} \cdot \text{Size}_{i,t-1} + b_{12} \cdot \text{Bank Type}_{i,t} + b_{13} \cdot \text{Year}_{i,t} + \varepsilon_{i,t} \quad [1]$$

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<sup>10</sup> An alternative to logistic regression analysis is probit analysis. These two analyses are very similar to one another. While logistic analysis is based on log odds, probit uses the cumulative normal probability distribution. Both produce similar results in this case. You can get the probit analysis upon request.

Where  $Z_{i,t}$  is the log odds of the dependent variable for the  $i^{th}$  case in the  $t$  period,  $b_0$  is the constant and the "b" terms are the logistic regression coefficients, also called parameter estimates.

To avoid potential problems of endogeneity, all bank specific variables enter the regression equation lagged by one period.

The relationship between  $Z_i$  and the probability of securitising ( $\pi_i$ ) for the  $i^{th}$  case is described by this link function:

$$\pi_i = \frac{1}{1 + e^{-Z_i}} \quad [2]$$

## 5. Results

### 5.1. Univariate analysis

Table 6 shows a first descriptive analysis of the sample divided into two groups: those banks that have undertaken a securitisation program during the period studied, on the one hand and on the other, those that have not done so (263 against 145).

The variables selected as indicators of liquidity, (1) Interbank Ratio, (2) Net Loans/ Deposits & Short-term funding, and (3) Liquid Assets/ Deposits & Short-term funding, move in the direction previously stated as expected. The Interbank ratio is lower in banks that securitise assets (133.05% against 136.18%); this would indicate that the financial entity resorting to securitisation is a net borrower of funds in the interbank market and is therefore seeking to improve its financial position. Also, the mean percentage of loans relative to deposits and other short term financing is 97.67% for banks that securitise compared with 75.96% for those that do not. Similarly, the mean percentage that the liquid assets represent over short-term bank financing is 14.87% for entities that securitise, against 23.84% for the others. All those variables seem to indicate that, on average, the banks that resort to securitisation present lower liquidity than those that do not securitise.

For the ratios employed to measure the bank's credit risk, (4) Loan Loss Reserve/Gross Loans, and (5) Non-performing Loans/Gross Loans, the results obtained are different. While the former is slightly higher in financial entities that securitise assets (2.00% against 1.95%), the results obtained

for the ratio of Non-performing Loans/Gross Loans do not match the expected (0.95% for banks that securitise compared with 1.04% for those that do not). Thus, one would expect that this last ratio would be higher in banks that develop securitisation programs; this would mean that securitisation is used as a way to transfer credit risk. The subsequent analyses will confirm whether this variable has statistical significance.

The univariate analysis also shows that those banks that make use of securitisation present, on average, lower capital ratios than those that do not do so (11.64% against 12.82%). However, in both cases, these are significantly higher than the minimum 8% required by the Basel capital agreements. Also the percentage that the equity represents over the total assets is, on average, lower in the entities that have chosen to securitise assets.

With respect to the variables selected to measure banking efficiency or performance, all three (ROA, ROE and CIR) present worse mean results in the group of banks that securitise. This could indicate that some financial entities have decided to resort to securitisation as a way to improve their ratios of performance.

Finally, the mean size of the banks that securitise, measured as the log of its total assets, is only slightly lower than that of those banks that do not do so (15.58 against 15.71), although, the statistical range is very high in both cases.

The next stage was to complete this preliminary analysis with a study of the variance (ANOVA), with the objective of testing whether the differences found in the mean values of the variables analysed, between those banks that securitise and those that do not, are statistically significant<sup>11</sup>.

The result from applying the analysis of variance to the sample of banks (see table 7) is that, at the univariate level, four of the variables considered show a behaviour in those financial entities that have

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<sup>11</sup> The basis of ANOVA is the partitioning of sums of squares into between-group and within-group. These calculations are used via the Fisher statistic (F) to analyse the null hypothesis. The null hypothesis states that there are no differences between means of different groups, suggesting that the variance of the within-group samples should be identical to that of the between-group samples (resulting in no between-group discrimination capability).



undertaken a securitisation program that is significantly different from those that have not done so. Those four variables are:

- (2) Net Loans/Deposits & Short-term funding
- (3) Liquid Assets/Deposits & Short-term funding
- (6) Capital Adequacy Ratio
- (10) Cost to Income Ratio (CIR)

In summary, at the univariate level, significant differences seem to exist in the mean levels of liquidity (variables (2) and (3)), regulatory capital (variable (6)) and banking efficiency (variable (10)) between the banks that securitise and those that do not. The financial entities that securitise present, on average, lower liquidity, lower capital ratios, and lower performance.

## 5.2. Multivariate analysis

Having carried out the initial univariate analysis, the next stage was to apply a logistic regression model; first, however, an analysis of multicollinearity between the independent variables previously selected was performed. A study of the matrix of correlations indicates that the coefficients of bivariate correlation are all close to zero, except for those between ratio (8) ROA and the variables (7) Equity/Total Assets and (9) ROE. This dependence was subsequently confirmed by the analysis of multicollinearity performed. The Variance Inflation Factor (VIF) of the variables indicated is close to 10 for all of them, and in the case of the ROA ratio reaches a value of 14.462<sup>12</sup>. As a result, this ratio has been eliminated from the analysis, leading to a substantial improvement of all the VIFs of the independent variables, whose values are now below 2 and, in the majority of cases, close to 1<sup>13</sup>.

Once the multicollinearity had been dealt with, the logistic model could then be determined. Table 8 reflects the results of the application of the logistic regression to the sample of banks (model 1). Of the set of variables

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<sup>12</sup> The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in a regression model. VIF shows us how much the variance of the coefficient estimate is being inflated by multicollinearity. The square root of the VIF tells you how much larger the standard error is, compared with what it would be if that variable were uncorrelated with the other X variables in the equation. A commonly given rule of thumb is that VIFs of 10 or higher (or equivalently, tolerances of .10 or less) are often regarded as indicating multicollinearity, but in weaker models values above 2.5 may be a cause for concern.

<sup>13</sup> This absence of multicollinearity was corroborated by the analysis of the Index of Condition.

considered in the study, five<sup>14</sup> (two ratios of bank's liquidity, one ratio of performance, size, and bank type) present statistical significance<sup>15</sup>:

- (1) Interbank Ratio
- (2) Net Loans/Deposits & Short-term funding
- (10) Cost to Income Ratio (CIR)
- (11) Size
- (12) Bank Type

The sign of the coefficients<sup>16</sup> confirms the expectations. Thus, one would expect a greater likelihood of securitisation by a bank, the lower is the Interbank ratio or the greater the proportion of the entity's loans that are financed with deposits and other short-term debt (less liquidity). On the other hand, a high Cost to Income ratio could motivate the bank to securitise part of its portfolio of assets with the object of improving its profitability.

The  $\text{Exp}(b)$ <sup>17</sup> of the (10) CIR variable is equal to 1.119; it can thus be stated that, when this ratio increases by one unit, the odds that a bank will opt to securitise increase by a factor of 1.119, when other variables are controlled. This leads to a new conclusion: of the three ratios with statistical significance, it is the CIR ratio that appears to exert the most influence on the probability that a bank will securitise.

On the other hand, the fact that the financial entity is a savings bank seems to have a positive influence on the probability the entity will opt to securitise assets. This is a result that would be expected from confirming that 70% of the Spanish savings banks undertook securitisation programs in the period studied, against only 50% of commercial banks and credit

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<sup>14</sup> Statistical significance was also found for the years included in the analysis as dummy variables.

<sup>15</sup> The Wald statistic is an alternative test which is commonly used to test the significance of individual logistic regression coefficients for each independent variable (that is, to test the null hypothesis in logistic regression that a particular logit (effect) coefficient is zero).

<sup>16</sup> As is well known, parameter estimates (b coefficients) associated with explanatory variables are estimators of the change in the logit caused by a unit change in the independent variable. The b coefficients vary between plus and minus infinity, with 0 indicating that the given explanatory variable does not affect the logit (that is, it makes no difference to the probability of securitising); positive or negative b coefficients indicate that the explanatory variable increases or decreases the logit of the dependent variable.

<sup>17</sup>  $\text{Exp}(b)$  is the odds ratio. The odds ratio is the natural log base, e, to the exponent, b, where b = the parameter estimate. For continuous variables, the odds ratio represents the factor by which the odds (event) change for a one-unit change in the variable. An  $\text{Exp}(b) > 1$  means the independent variable increases the logit and therefore increases odds (event). If  $\text{Exp}(b) = 1.0$ , the independent variable has no effect. If  $\text{Exp}(b)$  is less than 1.0, then the independent variable decreases the logit and decreases odds (event).

cooperatives. Also, the logistic model seems to indicate that large banks are more disposed to securitise than the smaller ones.

In relation to the use of securitisation as a mechanism for the transfer of credit risk, this factor is not relevant for the period considered. This could be because the Spanish banks have been retaining an increasingly larger share of the risks associated with securitisation (the "originate-to-hold" as opposed to the "originate-to-distribute" model of securitisation).

Finally, the hypothesis of arbitrage in regulatory capital is not confirmed by the logistic model.

### **5.3. Results according to the characteristics of the underlying portfolio**

As was reported in Section 3, most of the securitisation programs undertaken in Spain have mortgage loans as underlying assets, with the securitisation of other assets such as commercial loans or consumer credits accounting for a much smaller proportion of the total. In any case, the portfolios securitised consist of large numbers of assets of relatively low individual value, and with similar risk profiles (ABS-transactions).

However, a significant percentage of the total securitisation carried out in Spain (approximately 20% of the total) is accounted for by the securitisation of liabilities issued by credit entities. The great majority of these involve *mortgage certificates or bonds*<sup>18</sup>, although operations have also been carried out with subordinated debt and treasury bonds. In a high percentage of cases, these involve structures of the CDO type. By definition, the securitisation of liabilities cannot have the object of transmission of rights and risks associated with the assets; therefore one would expect that the transfer of credit risk would not constitute a determining motivation in this type of transaction, in contrast it could be expected for ABS-transactions.

To check the validity of this starting hypothesis, the original sample has been broken down into two non-exclusive subgroups, with object of studying if there are differences in the behaviour of the financial entities

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<sup>18</sup> These are covered bonds issued by Spanish financial institutions and collateralised by mortgage loans.

depending on the type of securitisation program undertaken (of assets versus liabilities).

The results obtained from the application of the logistic regression model to the two types of securitisation indicated are given in table 9 (models 2 and 3).

Although the objectives of greater liquidity (ratio (2) Loans/Deposits & ST debt), and improvement of performance (ratio (10) CIR) remain as confirmed determining factors when securitising assets, in the case of the securitisation of liabilities, the principal and indeed sole motivation appears to be the search for an improved liquidity (ratios (1) Interbank Ratio and (2) Loans/Deposits & ST debt).

In reality, the securitisation of liabilities constitutes an alternative way of placing these liabilities on the market. The reason for this is that securitisation, by means of the subordination of the securities issued (the tranche structure), can obtain the maximum credit rating (AAA) for almost the whole of the issue, bettering in many cases the credit rating of the originating credit entity itself.

The transfer of credit risk remains as an irrelevant factor for explaining the undertaking of securitisation programs by the Spanish banks. None of the variables used to measure the bank's credit risk show statistical significance in both types of programs. While this would be the expected result in the securitisation of liabilities by means of CDO-type structures, not necessarily have to be so in the case of securitisation of assets (ABS-transactions). This would suggest again that Spanish banks have opted for an "originate-to-hold" as opposed to the "originate-to-distribute" model of securitisation.

Besides, the hypothesis of arbitrage in the regulatory capital is not confirmed in either model, which seems to discount definitively the notion that securitisation may have been employed by the Spanish banks as a way of arbitraging regulatory capital.

Finally, the type of financial entity is shown to be relevant when a securitisation program is undertaken; the savings banks have a greater propensity than the commercial banks to opt for the securitisation of liabilities.

#### **5.4 Analyses of robustness**

Several analyses have been carried out to assess the robustness of the results obtained.

Firstly, with respect to the variables employed as regressors, the previous models (models 2 and 3) have been re-estimated with the object of testing again those hypotheses for which statistical significance has not been found. For this, the Non-performing Loans/Gross Loans ratio has been replaced by the Loan Loss Provisions/Net Interest Income ratio as proxy for the measurement of credit risk of the financial entities (models 4 and 5). This latter ratio has been employed previously by authors such as Bannier and Hänsel (2008) and measures the relationship between the provisions in the profit and loss account and the interest income over the same period. Ideally this ratio should be as low as possible, and in a well-run bank, if the lending book presents higher risk, this should be reflected by higher interest margins. In the same way, the Tier 1 ratio has been employed in place of the capital ratio as a proxy variable to analyse the possible utilisation of securitisation as a mechanism for arbitraging regulatory capital (models 6 and 7). This ratio has frequently been employed in previously published studies to measure the relationship between securitisation and the hypothesis of arbitration of regulatory capital (for example, by Agostino and Mazzuca, 2008; Bannier and Hänsel, 2008 and Calomiris and Mason, 2004, among others). This ratio is shareholder funds plus perpetual non-cumulative preference shares as a percentage of risk-weighted assets and off-balance sheet risks measured under the Basle rules, and it should be at least 4%. In both cases, the results do not differ from those obtained previously, thus again confirming the irrelevance of the two hypotheses that the transfer of credit risk and the arbitrage of regulatory capital are factors in the securitisation activity of Spanish banks (see Table 10).

Secondly, the method used to select variables has been modified, utilising a forward conditional stepwise method (models 8 and 9). The forward stepwise logistic regression method determines automatically which variables to add from the model, starting with the constant-only model and adding variables one at a time until reaching the step at which all variables not in the model have a significance, in this case, higher than 0.05. In comparison with the previous models, the most striking difference occurs in

the variables that determine the ABS-type securitisation, where the ratio (7) Equity/Total Assets appears with statistical significance, although with a sign different from that which would be expected (see model 8). According to this, the more solvent financial entities would be more inclined to securitise their assets. This "reverse" regulatory arbitrage effect has also been observed by Bannier and Hänsel (2008) in the European market.

Finally, a third test of robustness has carried been out in respect of the method of estimation used in the analysis. Since panel data are involved, the model can be estimated with fixed or random effects. Fixed effects models assume that the unobserved variables differ between banks but are constant over time for the same bank. In fact, this effect has been introduced in the analysis by establishing a set of dummy variables for time. However, it could be that certain unobserved characteristics of the financial entities differ over time and may be relevant for explaining the undertaking of securitisation programs by these financial entities. In this case, we can control for this possibility by employing random effects. Again, the results after using a random effects logistic regression model (models 10 and 11) do not differ from those obtained previously with the base models; they coincide both in the explanatory variables and in their sign, although some loss of statistical significance is noted (see Table 10).

## **6. Conclusions**

Securitisation is a financial operation by means of which a financial entity transforms a non-negotiable asset, or right to payment/income flow, into a fixed-income instrument that is homogeneous, standardised and, consequently, can be traded on organised securities markets. Since the year 2000, securitisation programs in Europe have multiplied in volume exponentially, growing from 78.2 billion euros to 711.1 billion euros in 2008. Spain is the second largest securitisation market in Europe, in terms of volumes issued.

The object of the present work is to learn more about what has motivated Spanish financial entities to carry out programs of securitisation, and thus to meet a need for empirical findings to contribute to the limited existing literature. In addition, with respect to earlier studies, this research study has explored differences between the financial entities that securitise

assets and those that securitise liabilities, which is an aspect scarcely touched in the previous literature.

The results obtained confirm the hypotheses that liquidity and the search for improvements in efficiency are the determining factors that have motivated Spanish banks to undertake securitisation programs in the period 2000-2007. The hypotheses of transfer of credit risk and arbitrage in regulatory capital are not confirmed by the logistic regression model.

A more detailed analysis, differentiating between programs of asset and liability securitisation, reveals that the objective of seeking new sources of financing is a key factor in both types of structure. In fact, Spanish banks have employed the securitisation of liabilities in the period analysed only for funding, without any of the other variables analysed having played any role in this case. The securitisation of liabilities by means of CDO-type structures is utilised, generally, by savings banks of medium size that are able to group together indirectly their credits in a common fund, and can in this way reach the minimum volumes necessary to participate in these markets.

The use of the securitisation as a mechanism in the search for liquidity and, therefore, as a source of additional financing, has been seen to increase from the beginning of the current financial crisis in August 2007, although in a way different from how it has been used up to now. Thus, it can be seen that increasingly there are more entities that underwrite their own securitisation programs in order to use them as a guarantee for obtaining resources in the auctions of the European Bank Central (ECB). Similarly, securitised bonds are being utilised by some financial entities to obtain liquidity through the Financial Assets Acquisition Fund (FAAF), created in 2008 by the Spanish government with the object of generating the liquidity necessary so that the banks might continue lending to the private residential property sector. Both practices have partially replaced the issue of debt, or the interbank market itself, as sources of finance to enable the banks to grant loans.

In relation to the use of securitisation as a mechanism for the transfer of credit risk, this factor is not relevant in the ABS programs for the period considered. This is because, unlike what is happening in other financial systems, and particularly in the USA, the Spanish banks have been retaining an increasingly larger share of the risks associated with

securitisation (the "originate-to-hold" as opposed to the "originate-to-distribute" model of securitisation). Thus, since the *Circular 4/2004* of the Bank of Spain came into force in 2005, a regulation which tightened the criteria for permitting securitised assets to be eliminated from the balance sheets of the financial entities, and which stipulated that, for this to be done, there should be a substantial transfer of all the risks and profits associated with the securitised assets, the volume of operations in which the assets have been taken off-balance sheet has been relatively small.

On the other hand, the results obtained in this study suggest that the role played by the performance improvement variables in motivating programs of asset securitisation cannot be ignored. The Spanish financial entities have sought to use asset securitisation as a means of improving their efficiency ratios.

Finally, although the normative development of Basel II in Spain, culminating with the entry into force in June 2008 of Circular 3/2008 of the Bank of Spain, imposes a much more restrictive treatment for financial entities attempting to reduce their capital requirements by using securitisation programs, it does not seem likely that this will affect the future development of the market; our study has found that this variable has not been a key factor in the past.

The results obtained for the Spanish market coincide, in general, with those reported by the previous studies. Bannier and Hänsel (2008) find that a European bank is more likely to securitise, the higher the bank's credit risk exposure, the lower its liquidity and the worse its performance measures. However, for Agostino and Mazzuca (2008) and Martin-Oliver and Saurina (2007), in the Italian and Spanish markets respectively, the only motivation found to be a determining factor in securitisation is the search for new sources of bank financing.

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**Table 1: Types of Securitisation**

<p><i>According to the term of the securities issued</i></p>	<p><i>According to the characteristics of the underlying portfolio:</i></p> <p><b>Asset-Backed Securities (ABS)</b>                  (backed by portfolios of homogenous assets comprising exposures to a large number of obligors)</p>	<p><i>Based on the underlying asset:</i></p> <ul style="list-style-type: none"> <li>- Residential Mortgage-Backed Securities (RMBS)</li> <li>- Commercial Mortgage-Backed Securities (CMBS).</li> <li>- Other ABS (auto, credit card, leases, loans, receivables, and other)</li> </ul>
<p>Long term</p>	<p><b>Collateralised Debt Obligations (CDOs)</b>                  (backed by heterogeneous exposures to a limited number of names)</p>	<p><i>Based on the underlying asset:</i></p> <ul style="list-style-type: none"> <li>- Collateralized loan obligations (CLOs)</li> <li>- Collateralized bond obligations (CBOs)</li> <li>- Structured finance CDOs (such as CDOs of ABS).</li> </ul> <p><i>According to the aim of the transaction:</i></p> <ul style="list-style-type: none"> <li>- Balance-sheet CDOs.</li> <li>- Arbitrage CDOs.</li> </ul>
<p>Short term</p>	<p><b>Asset-Backed Commercial Paper (ABCP)</b></p>	

**Table 2:** Composition of the sample.

<b>Bank Type \ Year</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>TOTAL</b>
Commercial Banks	16	13	15	12	14	18	16	13	<i>117</i>
Savings Banks	37	36	31	32	31	36	33	24	<i>260</i>
Credit Cooperatives	2	4	4	3	5	6	6	1	<i>31</i>
<b>TOTAL</b>	<i>55</i>	<i>53</i>	<i>50</i>	<i>47</i>	<i>50</i>	<i>60</i>	<i>56</i>	<i>39</i>	<b><i>408</i></b>

**Table 3:** Number (and percentage) of entities comprising the sample that have securitised assets.

<b>Bank Type \ Year</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>TOTAL</b>
Commercial Banks	7 (43.8%)	6 (46.2%)	7 (46.7%)	5 (41.7%)	8 (57.1%)	8 (44.4%)	12 (75.0%)	11 (84.6%)	<i>64</i> (54.7%)
Savings Banks	8 (21.6%)	16 (44.4%)	20 (64.5%)	26 (81.3%)	27 (87.1%)	32 (88.9%)	30 (90.9%)	23 (95.8%)	<i>182</i> (70.0%)
Credit Cooperatives	1 (50.0%)	1 (25.0%)	0 (0.0%)	2 (66.7%)	3 (60.0%)	4 (66.7%)	5 (83.3%)	1 (100.0%)	<i>17</i> (54.8%)
<b>TOTAL</b>	<i>16</i> (29.1%)	<i>23</i> (43.4%)	<i>27</i> (54.0%)	<i>33</i> (70.2%)	<i>38</i> (76.0%)	<i>44</i> (73.3%)	<i>47</i> (85.5%)	<i>35</i> (92.1%)	<b><i>263</i></b> <b>(64.5%)</b>

**Table 4:** Bank-specific variables used in previous studies (in chronological order).

	Sample	Database	Model used	Bank-specifics variables				
				Liquidity or funding	Credit Risk	Equity or Regulatory Capital	Others characteristics (performance, cost...)	Control Variables
Calomiris and Mason (2004)	USA banks (1996)	Faulkner and Gray's Card Industry Directory / Nilson Report	Univariate / OLS regression / Probit / Tobit	<ul style="list-style-type: none"> <li>- Cash and government securities/ on-balance-sheet assets</li> </ul>	<ul style="list-style-type: none"> <li>- Total loans greater than 90 days past due or in nonaccrual status/total assets</li> <li>- Standard deviation of total loans greater than 90 days past due or in nonaccrual status/total assets</li> <li>- Insured deposits/total deposits</li> </ul>	<ul style="list-style-type: none"> <li>- Tier 1 and 2 capital/managed assets</li> <li>- Tier 1 and 2 capital/on-balance-sheet assets</li> <li>- Growth of tier 1 and 2 capital over past year (log difference)</li> </ul>	No	No
Minton, Sanders and Strahan (2004)	USA financial companies with publicly traded stock (1993-2002)	Compustat / Securities Data Corporation	Univariate / Probit / Tobit	No	<ul style="list-style-type: none"> <li>- Asset Risk (firm's stock return volatility)</li> <li>- Firm's debt rating (dummy)</li> <li>- Leverage (Capital-Asset Ratio)</li> </ul>	No	<ul style="list-style-type: none"> <li>- Return on Equity (ROE)</li> <li>- Issuer's tax payments</li> </ul>	<ul style="list-style-type: none"> <li>- Size (market capitalization)</li> <li>- Originator Type (dummy)</li> </ul>
Martin-Oliver and Saurina (2007)	Spanish banks (1999-2006)	Bank of Spain / Spanish Nacional Securities Market Commission	Probit / Tobit	<ul style="list-style-type: none"> <li>- Credit Growth (high, medium and low) (dummy)</li> <li>- Loan/Deposits</li> <li>- Interbank (relative weight of the interbank liabilities)</li> </ul>	<ul style="list-style-type: none"> <li>- Non-performing Loan Ratio</li> <li>- Non-performing Mortgage Ratio</li> <li>- Concentration of the Loan Portfolio (Herfindahl-Hirshman Index)</li> </ul>	<ul style="list-style-type: none"> <li>- Solvency Ratio (quotient between capital and risk weighted assets)</li> </ul>	<ul style="list-style-type: none"> <li>- Average cost of liabilities</li> </ul>	<ul style="list-style-type: none"> <li>- Size (log of its total assets)</li> <li>- Weight of the mortgage portfolio</li> <li>- Bank Type (dummy)</li> <li>- Year (dummy)</li> </ul>

Uzun and Webb (2007)	USA banks (2001-2005)	Call Reports	Univariate / Logistic Regression	No	No	- Total equity capital - Tier 1 capital - Total risk-based capital ratio - Tier 1 leverage ratio	No	- Size - Leverage (Loan Ratio) - Grow
Agostino and Mazzuca (2008)	Italian banks (1999-2006)	Bankscope / Talete Creative Finance	Probit	- Interbank Ratio - Net Loans/ Total Assets - Liquid Assets / Dep & ST Funding - Historical Cost - Leverage (Total Assets/ Total Equity) - Market Instruments Funding Ratio - Listing in Financial Markets (dummy)	No	- Tier 1 Ratio - Total Capital Ratio	- Return on Equity (ROE) - Return on Assets (ROA) - Net fees and Commissions Ratio - Interest bearing assets Ratio	- Size - Number of securitisations in previous years - Year (dummy)
Bannier and Hänsel (2008)	European banks (1997-2004)	Bankscope / Quarterly CDO Deal List by Standard and Poor's / European Securitization Deal List by Computershare Fixed Income Services Limited	Univariate / Logit	- Liquidity (money lent to other banks / money borrowed from other banks) - Low liquidity (decetile of banks with lowest liquidity) (dummy) - Low liquidity * liquidity	- Risk (Credit Risk Provision/ Net Interest Income) - High risk (decetile of banks with highest risk) (dummy) - High risk * risk - High risk * low tier 1 (dummy, stock-listed firms only) - Quality (gross interest income / gross outstanding accounts)	- Tier 1 Ratio - Low Tier 1 (decetile of banks with lowest tier 1 capital) (dummy) - Low tier 1 * tier 1 - Equity share (equity / total assets)	- Return on Equity (ROE) - Cost-Income Ratio (CIR) - Low performance (decetile of banks with highest CIR) (dummy) - Low performance * CIR - Tax	- Size (log of its total assets) - Business Variable - Year (dummy) - Country(dummy) - Bank Type (dummy)

**Table 5:** Explanatory variables employed in the analysis.

<b>Explanatory Variables</b>	<b>Expected Sign</b>
<i>A) Liquidity (or funding)</i>	
(1) Interbank Ratio	(-)
(2) Net Loans/Deposits & S.T. funding	(+)
(3) Liquid Assets/Deposits & S.T. funding	(-)
<i>B) Credit Risk</i>	
(4) Loan Loss Reserve/Gross Loans	(+)
(5) Non-performing Loans/Gross Loans	(+)
<i>C) Capital Regulatory</i>	
(6) Capital Adequacy Ratio	(-)
(7) Equity/Total Assets	(-)
<i>D) Performance</i>	
(8) Return On Assets (ROA)	(+/-)
(9) Return On Equity (ROE)	(+/-)
(10) Cost to Income Ratio (CIR)	(+/-)
<i>E) Others</i>	
(11) Firm size	(+)
(12) Bank Type (dummy)	---
(13) Year (dummy)	---

**Table 6:** Descriptive statistics of the variables.

		N	Range	5% percentile	95% percentile	Median	Mean		Std. Deviation
							Statistic	Std. Error	
NOT SECURITISE	(1) INTERBANK RATIO	145	983.89	3.74	532.05	76.26	136.18	14.64	176.27
	(2) LOANS/D & ST	145	160.20	3.25	114.96	81.19	75.96	2.66	32.00
	(3) LIQUID A./D & ST	145	94.12	1.65	63.64	21.80	23.84	1.49	17.95
	(4) LL RESERVE/GROSS L.	145	3.89	0.45	3.50	1.89	1.95	0.06	0.78
	(5) NON-PERF. L. /GROSS L.	145	2.73	0.24	2.24	0.89	1.04	0.05	0.58
	(6) CAPITAL RATIO	145	28.70	8.23	21.34	12.10	12.82	0.37	4.40
	(7) EQUITY/ T.A.	145	22.58	2.44	11.83	7.45	7.68	0.29	3.54
	(8) ROA	145	4.80	0.23	1.86	0.88	0.92	0.05	0.64
	(9) ROE	145	29.32	4.44	20.47	12.82	12.92	0.40	4.78
	(10) CIR	145	83.36	23.38	75.47	57.39	55.82	1.20	14.43
	(11) SIZE (LN Assets)	145	11.09	13.70	18.29	15.61	15.71	0.13	1.56
SECURITISE	(1) INTERBANK RATIO	263	815.03	8.14	525.03	86.98	133.05	9.24	149.89
	(2) LOANS/D & ST	263	161.35	64.77	135.59	96.27	97.67	1.40	22.69
	(3) LIQUID A./D & ST	263	58.83	2.05	36.39	12.74	14.87	0.71	11.48
	(4) LL RESERVE/GROSS L.	263	3.63	1.48	2.84	1.94	2.00	0.03	0.41
	(5) NON-PERF. L. /GROSS L.	263	3.38	0.37	1.99	0.83	0.95	0.03	0.52
	(6) CAPITAL RATIO	263	13.90	9.10	14.20	11.60	11.64	0.10	1.67
	(7) EQUITY/ T.A.	263	20.55	4.93	10.54	7.15	7.57	0.13	2.10
	(8) ROA	263	3.40	0.52	1.55	0.84	0.86	0.02	0.37
	(9) ROE	263	28.57	6.86	18.67	11.48	12.22	0.25	3.98
	(10) CIR	263	64.59	42.22	69.92	58.69	57.94	0.51	8.26
	(11) SIZE (LN Assets)	263	12.84	9.51	18.61	15.98	15.58	0.15	2.42



**Table 7: Analysis of Variance (ANOVA).**

Variables		Sum of Squares	df	Mean Squares	F	Sig.
(1) INTERBANK RATIO	Between Groups	913.839	1	913.839	0.036	0.850
	Within Groups	1.036E+07	406	25517.957		
	Total	1.036E+07	407			
(2) LOANS/D & ST	Between Groups	44034.845	1	44034.845	63.322	0.000***
	Within Groups	282335.483	406	695.408		
	Total	326370.328	407			
(3) LIQUID A./D & ST	Between Groups	7513.045	1	7513.045	37.668	0.000***
	Within Groups	80978.505	406	199.454		
	Total	88491.550	407			
(4) LL RESERVE/GROSS L.	Between Groups	.288	1	0.288	0.884	0.348
	Within Groups	132.498	406	0.326		
	Total	132.786	407			
(5) NON-PERF. L. /GROSS L.	Between Groups	.766	1	0.766	2.615	0.107
	Within Groups	118.872	406	0.293		
	Total	119.638	407			
(6) CAPITAL RATIO	Between Groups	130.839	1	130.839	15.102	0.000***
	Within Groups	3517.553	406	8.664		
	Total	3648.393	407			
(7) EQUITY/ T.A.	Between Groups	1.072	1	1.072	0.147	0.702
	Within Groups	2961.978	406	7.296		
	Total	2963.050	407			
(8) ROA	Between Groups	0.398	1	0.398	1.690	0.194
	Within Groups	95.478	406	0.235		
	Total	95.876	407			
(9) ROE	Between Groups	45.667	1	45.667	2.493	0.115
	Within Groups	7438.296	406	18.321		
	Total	7483.963	407			
(10) CIR	Between Groups	421.492	1	421.492	3.576	0.059*
	Within Groups	47850.961	406	117.860		
	Total	48272.453	407			
(11) SIZE (LN Assets)	Between Groups	1.586	1	1.586	0.343	0.559
	Within Groups	1879.959	406	4.630		
	Total	1881.545	407			

\*\*\* Significance at the 1%-level.

\*\* Significance at the 5%-level.

\* Significance at the 10%-level.

**Table 8:** Determinants of asset securitisation for Spanish Banks (2000-2007).

Model 1				
Variables	b	Std. Error	Wald	Exp(b)
(1) INTERBANK RATIO	-0.002**	0.001	5.354	0.998
(2) LOANS/D & ST	0.049***	0.010	22.798	1.050
(3) LIQUID A./D & ST	0.014	0.016	0.794	1.014
(4) LL RESERVE/GROSS L.	0.263	0.292	0.809	1.301
(5) NON-PERF. L. /GROSS L.	-0.519	0.320	2.628	0.595
(6) CAPITAL RATIO	-0.002	0.063	0.001	0.998
(7) EQUITY/ T.A.	-0.052	0.062	0.712	0.949
(9) ROE	0.113	0.047	5.783	1.120
(10) CIR	0.112***	0.019	33.425	1.119
(11) SIZE (LN Assets)	0.330***	0.122	7.326	1.391
(12a) COMMERCIAL B.	-0.058	0.602	0.009	0.944
(12b) SAVING B.	0.904*	0.519	3.036	2.469
Constant	-12.674***	2.717	21.752	0.000
Year dummy	Yes			
N securitise (N not securitise)	263 (145)			
Log likelihood	-357.046			
Likelihood ratio $\chi^2$	173.942***			
Pseudo-R <sup>2</sup> (Nagelkerke)	0.477			

*Notes:* The dependent variable equals one if a financial entity completes a securitisation transaction and zero otherwise. \*\*\* Significance at the 1%-level. \*\* Significance at the 5%-level. \* Significance at the 10%-level.

**Table 9:** Determinants of asset securitisation according to the characteristics of the underlying portfolio (2000-2007)

Variables	Model 2 <sup>1</sup> (ABS)		Model 3 <sup>2</sup> (Liabilities CDO)	
	b	Exp(b)	b	Exp(b)
(1) INTERBANK RATIO	-0.001 (0.001)	0.999	-0.003*** (0.001)	0.997
(2) LOANS/D & ST	0.037*** (0.008)	1.038	0.036*** (0.010)	1.036
(3) LIQUID A./D & ST	0.003 (0.015)	1.003	0.015 (0.022)	1.015
(4) LL RESERVE/GROSS L.	0.209 (0.291)	1.232	0.178 (0.406)	1.195
(5) NON-PERF. L. /GROSS L.	-0.461 (0.294)	0.631	-0.128 (0.407)	0.880
(6) CAPITAL RATIO	0.014 (0.057)	1.015	-0.053 (0.087)	0.948
(7) EQUITY/ T.A.	-0.073 (0.060)	0.929	0.033 (0.080)	1.034
(9) ROE	0.062 (0.043)	1.064	0.131 (0.050)	1.140
(10) CIR	0.076*** (0.017)	1.079	0.040 (0.022)	1.041
(11) SIZE (LN Assets)	0.458*** (0.110)	1.581	-0.544*** (0.157)	0.580
(12a) COMMERCIAL B.	-0.450 (0.540)	0.637	1.322 (1.184)	3.750
(12b) SAVING B.	-1.158** (0.460)	0.314	5.119*** (1.130)	167.243
Constant	-9.164*** (2.241)	0.000	-6.353* (3.301)	0.002
Year dummy	Yes		Yes	
N securitise (N not securitise)	185 (223)		150 (258)	
Log likelihood	-433.670		-285.675	
Likelihood ratio $\chi^2$	128.394***		251.001***	
Pseudo-R <sup>2</sup> (Nagelkerke)	0.361		0.628	

Notes: <sup>1</sup>The dependent variable equals one if a financial entity completes an ABS-transaction and zero otherwise. <sup>2</sup>The dependent variable equals one if a financial entity completes a Liabilities CDO-transaction (mainly CDO of *cédulas hipotecarias*) and zero otherwise. The Standard Error is reported in parentheses. \*\*\* Significance at the 1%-level. \*\* Significance at the 5%-level. \* Significance at the 10%-level.

**Table 10:** Analyses of robustness.

Variables	ABS <sup>1</sup>				Liabilities CDO <sup>2</sup>			
	Model 4 <sup>3</sup>	Model 6 <sup>4</sup>	Model 8 <sup>5</sup>	Model 10 <sup>6</sup>	Model 5 <sup>3</sup>	Model 7 <sup>4</sup>	Model 9 <sup>5</sup>	Model 11 <sup>6</sup>
(1) INTERBANK RATIO	0.000 (0.001)	0.000 (0.001)	---	-0.002 (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.002*** (0.001)	-0.002* (0.001)
(2) LOANS/D & ST	0.030*** (0.008)	0.034*** (0.009)	0.039*** (0.006)	0.031*** (0.008)	0.040*** (0.010)	0.036*** (0.010)	0.024*** (0.006)	0.046*** (0.017)
(3) LIQUID A./D & ST	0.003 (0.015)	0.013 (0.016)	---	0.012 (0.014)	0.012 (0.022)	0.013 (0.022)	---	0.017 (0.022)
(4) LL RESERVE/GROSS L.	-0.300 (0.264)	0.089 (0.297)	---	-0.259 (0.268)	0.332 (0.361)	0.196 (0.419)	---	0.143 (0.387)
(5) NON-PERF. L. /GROSS L.	---	-0.512 (0.295)	---	-0.491 (0.294)	---	-0.109 (0.406)	---	-0.118 (0.403)
(5) LOAN L. PROV. /NET INT. INC.	0.062 (0.022)	---	---	---	-0.060 (0.029)	---	---	---
(6) CAPITAL RATIO	0.037 (0.055)	---	---	0.037 (0.054)	-0.073 (0.089)	---	---	-0.102 (0.105)
(6) TIER 1	---	-0.107 (0.065)	---	---	---	-0.019 (0.081)	---	---
(7) EQUITY/ T.A.	-0.056 (0.060)	0.007 (0.067)	-0.091** (0.045)	-0.068 (0.059)	0.034 (0.080)	0.024 (0.091)	---	0.074 (0.088)
(9) ROE	0.087 (0.044)	0.057 (0.043)	---	0.148 (0.043)	0.125 (0.051)	0.133 (0.050)	---	0.012 (0.051)
(10) CIR	0.076*** (0.017)	0.069*** (0.017)	0.049*** (0.012)	0.075** (0.017)	0.045 (0.021)	0.040 (0.022)	---	0.023 (0.021)
(11) SIZE (LN Assets)	0.412*** (0.111)	0.395*** (0.115)	---	0.418*** (0.110)	-0.467** (0.161)	-0.543*** (0.167)	---	-0.496*** (0.192)
(12a) COMMERCIAL B.	-0.575 (0.543)	-0.582 (0.547)	0.967*** (0.269)	-0.393 (0.541)	1.367 (1.178)	1.346 (1.183)	---	1.311 (1.181)
(12b) SAVING B.	-1.229*** (0.465)	-1.247*** (0.463)	---	-1.192** (0.464)	5.211*** (1.113)	5.086*** (1.130)	3.569*** (0.399)	5.249*** (1.129)
Constant	-8.914*** (2.262)	-7.118*** (2.343)	-6.100*** (1.114)	-9.810*** (2.104)	-6.776** (3.248)	-6.830** (3.360)	-4.391*** (0.773)	-6.950** (3.007)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N securitise (N not securitise)	185 (223)				150 (258)			
Log likelihood	-428.178	-430.762	-490.430	-429.600	-281.307	-286.008	-314.711	-283.918
Likelihood ratio $\chi^2$	133.886***	131.301***	71.634***	132.464***	255.369***	250.669***	221.965***	252.758***
Pseudo-R <sup>2</sup> (Nagelkerke)	0.374	0.368	0.215	0.371	0.636	0.627	0.574	0.631

Notes: <sup>1</sup>The dependent variable equals one if a financial entity completes an ABS-transaction and zero otherwise. <sup>2</sup>The dependent variable equals one if a financial entity completes a Liabilities CDO-transaction (mainly CDOs of *cédulas hipotecarias*) and zero otherwise. <sup>3</sup>Models 4 and 5 include the Loan Loss Provisions/Net Interest Income ratio, in place of the Non-performing Loans/Gross Loans ratio. The rest of the variables remain the same. <sup>4</sup>Models 6 and 7 consider the Tier 1 ratio in place of the Capital ratio. The rest of the variables remain the same. <sup>5</sup>Models 8 and 9 employ a forward conditional stepwise method for the selection of variables. <sup>6</sup>Models 10 and 11 have been estimated using a random effects logistic regression model. The Standard Error is reported in parentheses. \*\*\* Significance at the 1% level. \*\* Significance at the 5% level. \* Significance at the 10% level.