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Looking Beyond Credit Ratings: Factors Investors Consider In Pricing European Asset-Backed Securities

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Abstract

In this paper, we empirically investigate what credit factors investors rely upon when pricing the spread at issue for European asset-backed securities. More specifically, we investigate how credit factors affect new issuance spreads after taking into account credit rating. We do so by investigating primary market spreads for tranches of non-mortgage-related asset-backed securities issued from 1999 to the year prior to the subprime mortgage crisis, 2007. We find that although credit ratings play a major role in determining spreads, investors appear to not rely exclusively on these ratings. Our findings strongly suggest that investors do not ignore other credit factors beyond the assigned credit rating.

Keywords: *asset-backed securities (ABS)*, *credit ratings*, *collateral*, *default risk*, *securitisation*, *over-reliance*

JEL classification: *G*21, *G*24, *G*32

1. Introduction

In the wake of the financial crisis that began in the summer of 2007 in the US subprime mortgage market, governments of major financial markets throughout the world are taking various steps to strengthen market regulation.[1] Particular focus has been on the securitisation market given the important role it played in the crisis and, despite

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[1] For an excellent description of the subprime mortgage crisis, see Gorton (2009).

its contribution to that crisis, the expectation of the growing role that securitisation will play in the future as the balance sheet of banks are anticipated to shrink. In the USA, for example, a US Treasury Department report released on 27 June 2009 ('Financial Regulatory Reform – A New Foundation: Rebuilding Financial Supervision and Regulation'[2]) made five recommendations to strength the securitisation market, one of which was to reduce the over-reliance by investors on credit ratings.

This concern regarding reliance on credit ratings is echoed in other government, agency, and industry association reports. In April 2008, for example, a report by the Financial Stability Forum ('Report on Enhancing Market and Institutional Resilience'[3]) states: 'Investors should address their over-reliance on ratings. Investor associations should consider developing standards of due diligence and credit analysis for investing in structured products.' (p. 37) In response, in late 2008 industry associations such as the Bank for International Settlements, European Fund and Asset Management Association, and the Committee of European Securities Regulators prepared industry guidelines to address the issue of over-reliance on ratings for securitised products such as an asset-backed security (ABS), mortgage-backed security (MBS), and collateralised debt obligation (CDO).

Our objective in this paper is to investigate what credit factors investors rely upon when pricing the spread at issue of tranches of European non-mortgage-backed securitisations issued from 1999 to the year prior to the subprime mortgage crisis, 2007. More specifically, we study whether credit factors are important in explaining new issuance spreads after taking into account credit rating. Although in the popular press the attack regarding investor reliance on credit ratings has focused on the subprime sector of the US mortgage market, as noted earlier, governments, regulators, and trade associations have recognised that this problem goes well beyond this sector of the capital markets.[4] Overall our empirical results suggest that besides credit ratings, credit factors already considered by a rating agency are important determinants of the primary market spread. Our findings suggest that investors do not ignore other credit factors beyond the assigned credit rating.

The rest of the paper is organised as follows. In Section 2, we review factors that the rating agencies disclose in their writings that they rely upon in assigning ratings to the tranches of a securitisation transaction. In Section 3, we describe our database and the explanatory variables we study. Our empirical results are reported in Sections 4, 5, and 6. Our conclusions are summarised in Section 7.

2. ABS Credit Analysis

The widely held view that investors should employ their own credit analysis rather than rely solely on the ratings assigned by the rating agencies is reasonable, but may not be straightforward for some types of investment vehicles. For example, in the case of corporate bonds, there are well-known metrics derived from the issuer's financial statements that can be used to assess an issuer's financial well being, as well as other

[2] http://www.financialstability.gov/docs/regs/FinalReport_web.pdf

[3] http://www.financialstabilityboard.org/publications/r_0804.pdf

[4] Ferri *et al*. (1999) and Reisen and von Maltzan (1999) suggest that the over-reliance on the ratings of emerging market sovereign bonds was a destabilising factor in the 1997-1998 Asian financial crisis.

factors such as the price volatility of the issuer's stock that have been found to be correlated with defaults and downgrades. The data needed for the analysis are readily available from the filings of publicly traded companies that are mandated by government entities regulating securities markets and from stock price data.

In contrast, the analysis of asset-backed securities is not as simple. The key element in a securitisation is to legally separate the credit risk of the corporation that originated the loans (or acquired them via conduit activities) from the legal entity issuing the ABS.[5] As a result, ABS investors can look only to the performance of the collateral for fulfilment of the terms of the debt obligation rather than the performance of the corporation that used the securitisation for funding.[6] Hence, the financial metrics and related stock price measures of an issuer that corporate credit analysts employ do not apply to the credit analysis of ABS.

Consequently, to determine the potential explanatory variables that should be employed to test the factors that investors consider in assessing ABS credit risk, we must know what factors are considered in ABS credit analysis and information available about the structure. The best source for factors to consider for assessing credit risk is those used by the rating agencies themselves. For this reason, we will discuss what, in general, rating agencies consider in assigning ratings.

2.1. *Factors considered in assigning ratings*

Our purpose for reviewing the factors considered by rating agencies in assigning ratings is twofold. First, if we want to know what independent analysis investors should be performing, it is necessary to understand what credit factors are important for them to analyse. Second, if rating agencies are considering the same credit factors and those credit factors are embodied in a tranche's credit rating, then in an empirical analysis of the factors that explain primary market spreads, credit factors already considered by rating agencies should be redundant.

The general methodology used by rating agencies for assigning ratings to tranches in a securitisation structure is published and freely available to investors. Moreover, the rating agencies also publish rating criteria for the different asset types that have been securitised. Although the three rating agencies (Moody's, S&P's, and Fitch) have different approaches in assigning credit ratings, they do focus on the same three general areas of analysis: (1) asset risks, (2) structural risks, and (3) third parties to the structure.[7]

Evaluating asset risks involves the analysis of the credit quality of the collateral. In evaluating asset risks, there is a major difference in philosophy by Moody's on the one hand, and S&P's and Fitch on the other. Moody's focuses on expected losses due to default while S&P and Fitch focus primarily on default probabilities.

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[5] See, for example, Hu and Black (2008) and Ayotte and Gaon (2010) who provide a discussion of the characteristics of this phenomenon.

[6] For example, while the ratings of the two US auto manufacturers, General Motors and Ford, were downgraded to junk bond status in May 2005, the ratings on several of their securitisation transactions were actually upgraded due to high subsisting levels of credit enhancement.

[7] For a further discussion of the general areas considered in assigning ratings, see Silver (2001) who describes the Moody's approach, Wong *et al*. (2007) who describe the S&P approach and Mistretta (2009) for the Fitch approach.

To evaluate structural risk, the rating agencies examine the extent to which the collateral's cash flow can satisfy all of the obligations of the tranches in the securitisation transaction. In doing so, any currency risk and/or mismatch between asset and liability cash flows are required to be hedged.

A key third-party provider to a securitisation investigated by the rating agencies is any credit guarantor. Although there can be different forms of third-party guarantees, the most common is a financial guarantee by a monoline insurer. In addition, rating agencies analyse the legal structure (i.e., the special purpose vehicle created for a securitisation). The legal analysis is performed to reduce the likelihood that the securitisation's collateral will not be declared by a bankruptcy judge as being part of the estate of the entity seeking funds that sold the pool of loans or receivables. The key in the securitisation in any country is the legal infrastructure that provides the safeguarding of the collateral on behalf of the holders of the ABS (i.e., creditor protection).

Historically, there have been defaults and/or downgrades but not due to the legal issues. Rather they have been due to third-party credit risks.[8] That is, the primary reason for defaults and downgrades has been the poor performance of the collateral because the default and recovery rates anticipated have differed from those used by the rating agency in evaluating scenarios for the determination of credit enhancement. Hence, an independent credit analysis that can be performed by investors rather than exclusively relying on credit ratings is to investigate the nature of the collateral and perform scenario analysis for a tranche under investigation using a wide range of assumption regarding default rates, recoveries, and timing of defaults that differ from that used by the rating agencies that have rated a tranche.

For the purposes of our study, the implication is as follows. There is not a metric that can be employed by us to proxy for the performance of the collateral under alternative scenarios. The explanatory variables that can be used to determine if investors use any metric other than credit rating and the other credit factors discussed above is the type of collateral, information on credit enhancement levels that are reported for each tranche at issuance, currency risk (if any), and proxies for creditor protection.

3. Data and Filters

The principal data source used in this study was collected from the data reported in *Structured Finance International* (SFI) magazine published by Euromoney Institutional Investor Plc. for securitisations issued between 1 January 1999 and 31 December 2006 in the Euromarket. From SFI we collected information only for all floating-rate tranches whose reference rate from securitisation deals issued at par with fixed spreads over EURIBOR. We excluded from our sample (1) collateralised debt obligations (CDOs), (2) mortgage-backed securities, (3) whole-business securitisations, (4) future receivable securitisations, (5) securitisations where the collateral was originated in emerging markets, and (6) tranches that did not report full credit rating information.

[8] There are risks associated with the performance of a trustee or a servicer. For example, one of the recent instances of fraud in asset-backed securities was National Century. National Century Financial Enterprises (NCFE) filed for bankruptcy in November 2002 and brought to the fore some unique risks of mishandling securitisation funds. There have been investor suits against trustees. For a further discussion of operational risks associated with securitisations, see Chapter 7 in Fabozzi and Kothari (2008).

We excluded collateralised debt obligations (CDOs) in our study because these structured products are managed products and the spread reflects the expected performance of the collateral manager and other factors such as the extent to which the collateral manager has taken an equity participation in the transaction. We excluded all MBS and mortgage-related ABS (i.e., subprime mortgage securitisations) because of the significant role that prepayment risk has on the spread. That is, the observed spread at issuance for a tranche in a mortgage-related securitisation reflects not only credit risk but also the significant prepayment risk exposure.[9] Finally, because future revenues and whole business securitisations are atypical structures, they are not considered in this study. (For a further discussion, see Fabozzi and Kothari (2008, pp. 187–95).) Our final sample consists of 580 tranches (total par value of €90 billion) from 126 deals. Descriptives for the sample are provided in Appendix A.

3.1. *Measuring spread*

The reason we use issuance spreads is because of the difficulty of obtaining reliable secondary market spreads which are typically derived from pricing matrices or dealer quotes. Consequently, issuance spreads are a more accurate measure not only of the actual cost of debt but also of the risk premium demanded by investors.

Fixed-rate or floating-rate tranches can be issued in a securitisation transaction. In fact, within a securitisation, there can be both fixed-rate and floating-rate tranches. The problem in dealing with fixed-rate tranches is that the credit spread must be estimated by selecting a suitable benchmark which is not easy to obtain. Because of the difficulty of doing so, we restricted our sample by excluding all fixed-rate tranches. In contrast, for a floating-rate tranche the coupon reset formula is the reference rate plus a spread. That spread, referred to as the quoted margin, is the additional compensation for the risk above and beyond the risk associated with the reference rate.

In the Euromarket, the reference rate for a floating-rate tranche of an ABS is the Euro Interbank Offered Rate (EURIBOR) used for the eurozone. EURIBOR reflects the average credit risk levels at which highly credit rated banks can borrow on an unsecured basis.

The spread above the interbank offered rate reflects the risks above this interbank market credit risk. Basically, it represents three components: (1) credit risk, (2) liquidity risk, and (3) optionality risk. Since in our study we exclude MBS and subprime mortgage deals, optionality risk in the form of prepayment risk is close to zero for the tranches in our study. We eliminated any tranches that are puttable or callable and tranches that allow the quoted margin to change over time. Consequently, the floating-rate tranches in our study are floaters with no optionality risk. Furthermore, we restricted the tranches in our sample to those that were issued at par value so that the quoted margin on the issues would reflect a spread above the interbank offered rate without being distorted by any premium or discount on the offering price. Hence, the quoted margin is the primary

[9] We say significant prepayment risk exposure because there are ABS where the borrowers of the underlying loans may have the right to prepay but the prepayment option is not exercised when interest rates decline. A good example is auto loan-backed securities where borrowers have the right to prepay but there is typically no economic advantage to do so when interest rates decline.

market spread in our study and basically reflects credit risk and liquidity risk at the time of issuance.

3.2. *Credit rating*

All tranches in our study have at least one credit rating. Our rating classification scheme consists of 13 credit-rating dummy variables corresponding to *Aaa/AAA, Aa1/AA+, Aa2/AA, Aa3/AA−, A1/A+, A2/A, . . . , Ba3/BB−*. In our sample we did not did find tranches with a rating below Ba3 or BB-.[10] If a tranche has a split rating – and thus multiple credit ratings – we selected the lowest rating and used this value for the tranche's credit rating. It is important to remember that the rating scales are inverse scales, so that spread is hypothesised to increase as rating decreases. Appendix B reports the breakdown of tranches by credit rating.

3.3. *Credit factors*

In Section 2, we explained the factors that rating agencies consider in assigning credit ratings. We refer to these factors as 'credit factors' and because, they are based on the rating agencies stated and well publicised methodology, these credit factors should be redundant in a regression that includes credit rating. We identified three main categories of credit factors: credit enhancement, collateral type, and country of origination. Each is discussed below.

3.3.1. *Credit enhancement*. Prior to the subprime mortgage crisis in the USA, the most common form of external credit enhancement was an insurance policy issued by one of the monoline insurers (i.e., an insurance company that provides only financial guarantees). Because monoline insurers guarantee a tranche's principal and interest payments, tranches that have an insurance wrap typically carry a triple A rating. For all of the tranches in our sample where there is external credit enhancement, it is in the form of monoline insurance. In our regressions, external credit enhancement is represented by a dummy variable that takes the value of one if the tranche is guaranteed by a monoline insurer and zero otherwise.

There are various forms of internal credit enhancement. The most common form of credit enhancement is the senior-subordinate structure as measured by a tranche's subordination level. The deal's waterfall sets forth how cash flows and collateral losses are to be distributed amongst the tranches. From this, one can determine how much subordination each tranche has within a deal's capital structure. To compute the subordination levels for all tranches in our sample, we first divided the par value of each tranche by the total amount of the transaction's liabilities. We then calculated a tranche's subordination level ratio which is the percentage of the total liabilities subordinate to that tranche. Thus, the tranche will not suffer any losses until after that percentage of the liabilities has been lost.

3.3.2. *Collateral type*. Securitisations are classified according to the nature of the collateral: consumer ABS and commercial ABS.[11] Consumer ABS (with the number

[10] Our treatment of credit ratings is similar to that of John *et al*. (2003).

[11] See Fabozzi and Kothari (2007, Chapter 14).

of tranches in our sample shown in parentheses) include automobile loans (101), credit card receivables (24), and consumer loans (101). Commercial ABS include equipment leases (63), small business loans (220), trade receivables (24), aircraft leases (5), and other types of commercial loans (42).

3.3.3. *Country of origination*. In our sample, there were 12 countries where collateral was originated.[12] When determining the rating on asset-backed securities, the rating agencies give careful consideration to the country where the collateral is originated since that can affect the performance of a securitisation transaction. We included creditor protection and currency risk in our analysis to proxy for country risk.[13]

Credit protection. The key in a securitisation transaction is to provide the holders of the tranches protection from the credit risk of the originator of the collateral, as noted in Section 2. This is done by establishing a legal entity, the SPV. The collateral is sold to this entity by the originator in a true sale at fair market value.

We had to obtain a suitable proxy for creditor protection that could be included in the regression model since this protection differs by country depending on the legal framework. To do so, we gathered data on creditor protection in the countries where the underlying collateral of the tranches were originated using the creditor rights index created by La Porta *et al*. (1998, 2000). They employed four legal rights variables to measure creditor protection by country.[14] Of these four variables, only one is relevant to the credit analysis and therefore pricing of ABS, namely *no automatic stay on the assets*. An automatic stay stops lawsuits, foreclosures, and all collection activity against the borrower the moment the borrower files a petition for bankruptcy petition.[15] In general, a no automatic stay provision is viewed favourably by investors, as well as by rating agencies in assigning a credit rating, since the creditor can recover collateral.

We measured creditor protection for each tranche in our sample by including a dummy variable taking the value of one if the underlying collateral was originated in a country where there is no automatic stay in the law, and zero otherwise.

Currency risk. This risk is the risk exposure in a securitisation structure when there is a difference between the currency denomination of the collateral's cash flows and the currency denomination of the cash flow of the liabilities. In our sample, there is currency risk for the tranches in our sample that were originated in Switzerland (6 tranches), United Kingdom (25 tranches), and Sweden (5 tranches).

Rating agencies take into account currency risk by measuring the likelihood of repayment in the currency of jurisdiction in which the issuer is domiciled. Also, rating agencies typically require that the legal entity issuing the ABS put on a hedge against

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[12] The distribution of tranches by country of origination for our sample is as follows: Austria (8), Belgium (2), France (34), Germany (75), Holland (25), Italy (129), Japan (11), Portugal (80), Spain (180), Sweden (5), Switzerland (6), and the UK (25).

[13] We did not include sovereign ratings in our analysis to control for country-specific risks because these risks are immaterial for tranches originated in developed countries.

[14] These variables are: *no automatic stay on the assets*, *secured creditors paid first*, *restriction for going into reorganisation*, and *management does not stay in reorganisations*. See La Porta *et al*. (1998, 2000) for a detailed description.

[15] The borrower in the case of a securitisation is the party whose loan is owned by the SPV.

currency risk. Consequently, a priori one would expect currency risk not to have an impact on the primary market spread since it is considered by the rating agency in assigning ratings. In our regression, currency risk is measured by a dummy variable that takes the value of one if a tranche is exposed to currency risk, and zero otherwise.

4. Impact of Credit Factors on Primary Market Spread

We present the results of our empirical tests in two parts. In Section 4.1, we examine the impact of credit factors on the primary market spread without including credit ratings. In Section 4.2, we analyse the impact of the credit factors on the spread in a model that includes credit ratings.

4.1. *The impact of credit factors when ratings are ignored*

In Table 1 we report the impact of the credit factors on the spread and other commonly used control variables in a pooled time-series and cross-sectional panel dataset. To remove systematic heterogeneity from the error term, we used a heteroskedasticity-consistent variance-covariance matrix (White, 1980). Regression (1) in Table 1 is run on the entire pooled time-series and cross-section (580 observations).[16] Since the ordinary least squares assumptions of independent errors are unlikely to be satisfied in regression (1), the computed *t*-statistics are potentially overstated because our dataset is a pooled time-series and cross-sectional panel. So observations in the aggregate may be affected by the same macroeconomic conditions; therefore, it is necessary to control for the time effect.

To account for the potential error-dependence problem, we follow Peterson (2009) and estimate regression (2) using dummy variables that correspond to different quarters. Because of the use of time dummies, we do not include any other macroeconomic variables in our analysis. A time series plot of quarter dummies is shown in Appendix C. The trend suggests that the primary market spread for our sample of ABS, on average, declined from 1999 until 2002. In mid 2002, there is an increase in spread that can be explained by the aftermath of the Dot Com bust. There is a substantial decline in spreads, corresponding to the favourable bond market conditions in the capital markets during most of the years after 2003.

Regression (3) reported in Table 1 is the same as regression (2) but we added a dummy variable for collateral type that corresponds to commercial and consumer collateral for each tranche in the sample.

Several important results emerge from the regression estimates we report in Table 1. For all three regressions, both credit enhancement factors (internal and external) have the expected signs and are significant at the 1% level. Credit enhancement factors add about 7-8% to the explanatory power in regression (3). The coefficient for both credit enhancement variables is negative. That is, the greater the credit enhancement, the lower the primary market spread after adjusting for the other factors included in the regression. The regressions strongly suggest that tranches that are guaranteed by monoline insurers during our study period have lower spreads.

Currency risk and creditor protection are statistically insignificant. As concerns the collateral type, tranches with commercial collateral tend to have significantly higher

[16] Tests for multicollinearity in all our regression models do not indicate a problem.

Table 1

Regressions estimating the credit factors when credit ratings are ignored for non-mortgage related ABS

This table reports ordinary least squares regressions estimating the credit factors of 580 non-mortgage related ABS tranches issued between 1999 and 2006. Our empirical specification is:

$$\text{ABS Spread}_{it} = \beta_0 + \beta_{1-5}\text{Credit factors}_{it} + \text{Controls}_{it} + \varepsilon_{it},$$

where ε_{it} is the idiosyncratic error term. *ABS Spread* is the spread above and beyond the risk associated with the EURIBOR rate for a tranche issued at par, *Credit factors* are factors that are taken into account by rating agencies in assigning ratings and are measured as follows. β_1 external credit enhancement represents a dummy variable that takes the value of one if the tranche is guaranteed by a monoline guarantor and zero otherwise. β_2 internal credit enhancement is the cumulative subordination level of each tranche in a transaction. β_3 collateral classification stands for two dummy variables, which are constructed based on the nature of collateral. The dummy variable is assigned a value of one if the tranche was part of a securitisation that corresponded to consumer ABS, and zero otherwise. Commercial ABS is a dummy variable of one if the tranche was part of a securitisation that corresponded to the commercial ABS, zero otherwise. β_4 creditor protection corresponds to a dummy taking the value of one if the underlying collateral was originated in a country where there is no automatic stay in the law, and zero otherwise. β_5 currency risk is measured by a dummy variable that takes the value of one if a tranche is exposed to currency risk, and zero otherwise. The size of the tranche in euro millions and quarter dummies are included as *Controls* that represent liquidity and bond market conditions, respectively, at the time of the issue of the tranche. To measure the liquidity of each tranche in our sample, we used the tranche's par value measured in euro millions. (In our sample all tranches are issued in euros.) To capture the effect on credit spreads in the market exerted by changes in market conditions, we created dummy variables that correspond to different quarters. Each of these equals one if the securitisation transaction was completed during the corresponding quarter, and zero otherwise. Quarter dummy variables are included in regressions (2) and (3) only but are not reported in the table. The first quarter of 1999 is the omitted category. The letters a, b, c denote parameter estimates for which zero falls outside the 99%, 95% and 90% posterior confidence intervals, respectively. The sign "–" denotes not included. The table shows the coefficient and *t*-statistic, corrected for heteroscedasticity, in parentheses.

	Predicted sign	(1)	(2)	(3)
Intercept		90.69[a]	54.73[a]	52.84[a]
		(14.20)	(5.80)	(4.35)
Internal credit enhancement	–	−87.65	−82.88[a]	−97.64[a]
		(−7.19)	(−6.65)	(−6.79)
External credit enhancement	–	−56.98	−57.89[a]	−64.55[a]
		(−10.62)	(−9.45)	(−9.50)
Commercial ABS	+	-	-	28.05[a]
		-	-	(3.75)
Creditor protection	–	3.06	−1.33	−4.68
		(0.46)	(−0.15)	(−0.53)
Currency risk	+	6.59	7.30	19.30
		(0.50)	(0.48)	(1.27)
Size of tranche	–	−0.59[a]	−0.60[a]	−0.59[a]
		(−6.88)	(−6.67)	(−7.15)
CREDIT RATING DUMMIES		no	no	no
QUARTER DUMMIES		no	yes	yes
adjusted R^2		0.13	0.13	0.15
F		19.76	3.50	3.84
Number of observations		580	580	580

spreads. The coefficient for tranches backed by commercial collateral is 28.05 and adds about 4-5% to the explanatory power of the model in regression (3). Thus, it is both statistically and economically significant. We sought an explanation for this finding that tranches backed by commercial collateral would trade at a higher spread. The literature does not suggest any hypothesis. However, a former high level member of a syndicate desk at two major banks in private correspondence provided us with the following insight:

> 'It was always believed by my syndicate desk that primary market spreads on consumer ABS were tighter than commercial ABS due to consumer ABS having greater secondary market trading liquidity—so from a trading, not credit, point of view it gave investors more comfort that they could more easily sell consumer ABS at a smaller price concession than commercial ABS. This belief was due to the fact that consumer ABS is a much deeper (more bonds) than commercial ABS.'

Our finding is consistent with that view: investors do discriminate by the type of collateral backing a tranche when credit rating is ignored.

The *F*-statistics indicate that each regression reported in Table 1 is significant at reasonable levels. Note that when we include quarter dummies in regressions (2) and (3), the significance of the credit factors does not change. Also, when we exclude liquidity in all three regressions, we obtain similar results (not reported here). Consequently, the adjusted R^2s of 0.13 in regressions (1) and (2) compared with the larger R^2 of 0.15 in regression (3) suggest that the credit factors provide explanatory power in these regressions. Thus, the results presented so far show that credit factors matter for the primary market spread if credit rating is ignored.

4.2. *The impact of credit factors when ratings are included*

We now investigate the impact of credit factors on the spread by a panel-data fixed-effects regression model that includes both the credit rating, credit factors, and commonly used control variables.

4.2.1. *Pooled sample*. Almost all credit ratings have a strong statistically significant coefficient and explain up to 69% of the variation in the spread in regression (1) in Table 2. Hence, credit rating is a key indicator of the primary market spread. For regression (3) in Table 2, we included not only credit ratings, but also credit factors and control variables. We find internal credit enhancement and currency risk with the expected sign, but insignificant. The other three credit factors also have the expected signs but are statistically significant: external credit enhancement, creditor protection, and commercial collateral.

Three things are worthy of note. First, credit factors add about 15% to the explanatory power of the model that excludes credit rating (see Table 1), and is reduced to 1% once credit ratings are included in the model in Table 2. Second, creditor protection is now significant, unlike our previous finding that it is insignificant with the correct sign in a model that excludes credit rating. Third, we see that the coefficients of commercial collateral and external credit enhancement are substantially lower in comparison to our findings that exclude credit ratings; however, both remain highly significant at the 1%

Table 2

Regressions estimating the credit factors when credit ratings are included for non-mortgage related ABS

This table presents ordinary least squares regressions estimating the credit factors after taking credit rating into account for 580 non-mortgage related ABS tranches issued between 1999 and 2006. Our empirical specification is:

$$\text{ABS Spread}_{it} = \beta_0 + \beta_{1-5}\text{Credit factors}_{it} + \Sigma(\gamma_j \text{Credit Rating}_{jit}) + \text{Controls}_{it} + \varepsilon_{it},$$

where ε_{it} is the idiosyncratic error term. The dependent variable and other explanatory variables are as defined in Table 1. Credit Rating stands for a set of credit rating dummies and correspond to AAA/Aaa though Ba3/BB-. Coefficients on quarter dummies are not shown. The omitted categories are: AAA/Aaa rating class for credit ratings, and consumer collateral for collateral type. The "–" sign denotes not included. The coefficient and *t*-statistic, corrected for heteroscedasticity, are shown in parentheses. The letters a, b, and c denote parameter estimates for which zero falls outside the 99%, 95% and 90% posterior confidence intervals, respectively.

	(1)	(2)	(3)
Intercept	21.62[a]	25.21[a]	30.79[a]
	(27.72)	(4.38)	(7.44)
Aal/AA+	2.00	4.09	9.21[b]
	(0.31)	(0.55)	(1.69)
Aa2/AA	21.96[a]	23.35[a]	19.13[a]
	(9.70)	(10.01)	(6.38)
Aa3/AA−	8.13	17.09[b]	15.73[a]
	(1.04)	(2.46)	(2.12)
A1/A+	38.88[b]	45.91[a]	43.70[a]
	(2.45)	(3.31)	(3.45)
A2/A	46.57[a]	45.04[a]	40.80[a]
	(16.60)	(15.95)	(13.15)
A3/A−	62.78[a]	67.02[a]	60.91[a]
	(4.70)	(5.77)	(5.43)
Baal/BBB+	98.38[a]	130.62[a]	121.37[a]
	(12.57)	(33.45)	(22.73)
Baa2/BBB	116.63[a]	116.85[a]	111.99[a]
	(17.16)	(18.14)	(16.33)
Baa3/BBB−	96.01[a]	106.25[a]	104.37[a]
	(7.77)	(9.52)	(9.04)
Bal/BB+	174.09[a]	180.77[a]	176.14[a]
	(5.88)	(5.34)	(5.25)
Ba2/BB	330.71[a]	334.33[a]	329.48[a]
	(10.19)	(10.33)	(10.22)
Ba3/BB−	395.38[a]	409.55[a]	399.83[a]
	(2.75)	(2.76)	(2.71)
Internal credit	-	-	−4.29
enhancement	-	-	(−0.68)
External credit	-	-	−21.22[a]
enhancement	-	-	(−3.78)
Commercial ABS	-	-	8.82[a]
	-	-	(2.62)
Creditor protection	-	-	−10.13[b]
	-	-	(−1.99)

Table 2
Continued

	(1)	(2)	(3)
Currency risk	-	-	10.82
	-	-	(1.57)
Size of tranche	-	0.02	−0.02
	-	(0.93)	(−0.89)
QUARTER DUMMIES	no	yes	yes
adjusted R^2	0.69	0.70	0.71
F	109.47	33.83	31.08
Number of observations	580	580	580

level and are responsible for 8.82 basis point (commercial collateral) and −21.22 basis points (external credit enhancement) in the cross-sectional variation of primary market spreads.[17]

These results suggest that credit rating is an important factor for an investor in pricing an ABS tranche, but investors do not appear to rely exclusively on the credit rating. Investors consider credit factors that are already taken into account by rating agencies in assigning ratings and therefore do rely on information beyond the credit rating. Moreover, investors do not ignore the underlying nature of the collateral after taking into account the credit rating, a finding that is consistent with the view of the syndicated desk as discussed in Section 4.1.[18]

4.2.2. *Consumer and commercial collateral*. Because commercial collateral may be riskier than consumer collateral, we tested whether the effect of the credit factors (i.e., the significance of the credit factors in a regression that both includes and excludes credit rating) is different for consumer collateral compared with commercial collateral. In our sample there are 226 tranches backed by consumer collateral and 354 backed by commercial collateral.

Regressions (1) and (5) in Table 3 are the regression results for a model that includes only credit ratings for our sample of consumer and commercial tranches, respectively.

[17] If we exclude credit ratings, the coefficient on size becomes significant with the correct sign (see Table 1), but it becomes insignificant after including credit ratings (regression (3) in Table 2). This can be explained by the high correlation between size and credit rating (−0.457, Appendix A). This high inverse correlation is easy to understand. The economics of securitisation transactions is that the issuer create as large as possible of highly rated tranches. So it is not unexpected that, on average, larger tranches have higher ratings, and therefore lower spreads. That explains the significant coefficient on size in a model that excludes credit rating and the insignificant sign once ratings are included.

[18] One could also argue that these findings are consistent with Brennan *et al*. (2009) who argue that credit ratings do not take into account the collateral's systematic risk. Most consumer loans (with the exception of residential mortgage-backed securities which are not included in our study) are short-term in nature. If we think of a portfolio of independent consumer loans over the short term, their independence would reduce the (short-term) default risk and consequently the beta compared to a portfolio of commercial loans that tend to be longer term and more susceptible to the economic cycle.

Table 3

Regressions estimating the credit factors for consumer and commercial ABS

This table presents ordinary least squares regressions estimating the credit factors after taking credit rating into account for 580 non-mortgage related ABS tranches issued between 1999 and 2006. Our empirical specification is:

$$\text{ABS Spread}_{it} = \beta_0 + \beta_{1-5}\text{Credit factors}_{it} + \Sigma(\gamma_j \text{Credit Rating}_{jit}) + \text{Controls}_{it} + \varepsilon_{it},$$

where ε_{it} is the idiosyncratic error term. The dependent variable and explanatory variables are as defined in Tables 1 and 2. Consumer ABS include automobile loans, credit card receivables, and consumer loans. Commercial ABS include equipment leases, small business loans, trade receivables, aircraft leases, and other types of commercial loans. Automobile loans are loans granted to borrowers in order to finance the purchase of new or used automobiles, and are typically secured by liens on the automobiles being financed. Credit card receivables are loans granted to consumers in order to finance the purchase of goods and services, and are generally unsecured. Consumer loans are unsecured loans granted to individuals and used for different purposes (e.g., car, home, equipment, and furniture). Equipment leases are considered to be small or medium-sized, while aircraft leasing falls under what is referred to in the industry as big-ticket leases. Small business loans are loans made available for small businesses seeking to make capital investments, and may be secured. Trade receivables are unsecured obligations generated when one business sells goods or services to another. Aircraft leases and equipment leases are both agreements between an owner (lessor) and a user (lessee), whereby the lessee makes a periodic payment to the lessor for the use of the equipment. Coefficients on quarter dummies are not shown. The omitted categories are: AAA/Aaa rating class for credit ratings, automobile loans for consumer collateral, and equipment leases for commercial collateral. Regressions (1) and (5) are the regression results for a model that includes only credit ratings for the consumer and commercial samples, respectively. Regressions (2) and (6) repeat regressions (1) and (5) but include controls. Regressions (3) and (7) examine the magnitude of the credit factors on the spread without credit ratings. Regression (4) repeats regression (3), but includes the credit rating for the consumer subsample of our database. We perform the same exercise for commercial collateral in regression (8). The "-" sign denotes not included. N.A. means none of the tranches are supported with external credit enhancement. The coefficient and *t*-statistic, corrected for heteroscedasticity, are shown in parentheses. The letters a, b, and c denote parameter estimates for which zero falls outside the 99%, 95% and 90% posterior confidence intervals, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Includes consumer tranches				Includes commercial tranches			
Intercept	24.34[a]	28.75[a]	7.16[a]	30.34[a]	19.85[a]	16.42[a]	78.02[a]	33.89[a]
	(23.32)	(6.20)	(4.96)	(6.27)	(18.23)	(2.83)	(2.98)	(3.37)
Aal/AA+	−6.34[c]	21.14[b]	-	22.80[b]	5.65	−0.69	-	2.03
	(−1.68)	(2.45)	-	(2.53)	(0.67)	(−0.08)	-	(0.30)
Aa2/AA	16.03[a]	14.75[a]	-	17.85[a]	24.98[a]	25.05[a]	-	13.07[b]
	(4.32)	(3.06)	-	(3.42)	(8.85)	(8.20)	-	(2.45)

Table 3
Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Includes consumer tranches				Includes commercial tranches			
Aa3/AA−	12.41	25.96[a]	-	28.97[a]	2.89	13.36	-	9.24
	(0.94)	(4.23)	-	(4.80)	(0.40)	(0.99)	-	(0.54)
A1/A+	19.80[c]	28.56[a]	-	34.69[a]	57.00[b]	63.77[a]	-	43.99[a]
	(1.67)	(2.78)	-	(3.49)	(2.00)	(2.92)	-	(2.34)
A2/A	37.49[a]	35.49[a]	-	38.87[a]	53.75[a]	53.37[a]	-	43.59[a]
	(12.38)	(12.60)	-	(11.73)	(12.17)	(11.46)	-	(7.55)
A3/A−	43.16[a]	46.70[a]	-	51.35[a]	83.86[a]	74.95[a]	-	57.99[a]
	(2.88)	(3.90)	-	(4.46)	(4.01)	(4.67)	-	(3.71)
Baal/BBB+	95.67[a]	120.20[a]	-	129.58[a]	-	-	-	-
	(9.03)	(13.08)	-	(12.97)	-	-	-	-
Baa2/BBB	118.64[a]	117.15[a]	-	120.59[a]	114.91[a]	115.74[a]	-	104.14[a]
	(11.64)	(13.33)	-	(14.36)	(12.48)	(12.79)	-	(10.42)
Baa3/BBB−	109.41[a]	113.87[a]	-	123.36[a]	93.48[a]	106.06[a]	-	96.44[a]
	(3.87)	(4.58)	-	(4.80)	(6.85)	(8.68)	-	(7.53)
Ba1/BB+	178.16[a]	207.43[a]	-	208.08[a]	173.15[a]	175.19[a]	-	157.94[a]
	(5.77)	(5.77)	-	(6.07)	(4.35)	(3.90)	-	(3.43)
Ba2/BB	392.33[a]	397.83[a]	-	400.64[a]	316.40[a]	319.90[a]	-	307.48[a]
	(27.98)	(31.57)	-	(31.55)	(8.05)	(8.02)	-	(7.80)
Ba3/BB−	-	-	-	-	397.14[a]	410.89[a]	-	388.05[a]
	-	-	-	-	(2.75)	(2.73)	-	(2.60)
Internal credit	-	-	−115.45[b]	14.66	-	-	−106.32[a]	−13.15
enhancement	-	-	(−2.20)	(0.98)	-	-	(−7.82)	(−1.60)
External credit	-	-	N.A.	N.A.	-	-	−70.08[a]	−25.53[a]
enhancement	-	-			-	-	(−9.70)	(−3.48)
Commercial	-	-	-	-	-	-	-	-
ABS	-	-	-	-	-	-	-	-

Creditor protection	-	-	−9.77 (−0.87)	−8.68[c] (−1.71)	-	-	−43.89 (−1.41)	−21.39 (−1.36)
Currency risk	-	-	0.40 (0.03)	5.98 (1.28)	-	-	42.71 (1.04)	25.66 (1.58)
Credit card receivables	-	-	42.41 (1.61)	−4.62 (−0.79)	-	-	- -	- -
Consumer loans	-	-	14.81 (1.64)	1.65 (0.42)	-	-	- -	- -
Aircraft leases	-	-	- -	- -	-	-	74.19[a] (3.21)	29.27[b] (2.11)
Small business loans	-	-	- -	- -	-	-	69.95[b] (2.51)	21.83[b] (2.00)
Trade receivables	-	-	- -	- -	-	-	21.88[b] (1.97)	2.17 (0.31)
Other	-	-	- -	- -	-	-	2.44 (0.20)	−4.99 (−0.67)
Size of tranche	-	0.01 (0.07)	−0.65[a] (−5.56)	0.06 (0.96)	-	0.04 (1.60)	−0.51[a] (−5.67)	−0.03 (−0.80)
QUARTER DUMMIES	no	yes	yes	yes	no	yes	yes	yes
adjusted R^2	0.83	0.87	0.16	0.87	0.65	0.66	0.16	0.67
F	101.58	38.06	2.23	35.10	62.22	19.46	3.47	16.49
Number of observations	226	226	226	226	354	354	354	354

Unsurprisingly, our results show that credit ratings are an important indicator for the primary market spread for both our samples. Note that we do see credit ratings explain a substantially higher portion of the spread in the consumer sample (83%, regression (1)) compared with the commercial sample (65%, regression (5)).

In regressions (3) and (7) in Table 3 we examine the magnitude of the credit factors on the spread without credit ratings for consumer and commercial tranches, respectively. Splitting our sample by collateral type, we have five credit factor variables for the consumer group and eight for the commercial group. The difference arises because we split the consumer group into three asset classes (auto, credit card, consumer) and commercial into five asset classes (aircraft, equipment, small business, trade, other). Note that external credit enhancement (i.e., monoline insurance) was not used in any of the consumer deals. (The lack of monoline insurance in consumer deals may be due to the lower average credit risk compared to commercial collateral.)

The effects are different across the two collateral-type groups. For the commercial group, our results are similar to the findings reported in Table 1 where we find that most of the credit factors have a significant impact on the spread that excludes credit ratings. In contrast, for consumer collateral, the only variable that is statistically significant is internal credit enhancement—it has the appropriate sign (negative) and is significant at the 5% level. Neither of the collateral dummies is significant for the consumer group, while we find three out of four collateral dummies (highly) statistically significant for the commercial group.

We now turn to regressions (4) and (8) in Table 3 where we examine the magnitude of the credit factors on the spread after taking into account credit ratings for consumer and commercial tranches, respectively. Overall, our consumer tranches in regression (4) show that most of the credit rating coefficients are significant with the correct sign, increasing as the credit rating gets worse. Looking at the credit factors, we see that only one of five is statistically different from zero at the 10% level: the coefficient on creditor protection is negative with the right sign after adjusting for credit rating. The low contribution of the other credit factors is not surprising: the analysis in regression (3) had shown that most of the credit factors for consumer collateral were insignificant in a model that excludes credit rating.

For our commercial group, we also find most credit ratings significant with the expected sign; however, compared with the consumer group, we do find three of the eight credit factors to be statistically different from zero. External credit enhancement is again highly statistically significant with the expected sign based on the common belief in the market at that time regarding the high credit quality of monoline insurers.[19] Thus, despite the fact that the rating agencies take into account credit enhancement provided by the monoline insurer in assigning a credit rating to a tranche, investors were willing to accept on average 25.53 basis points less at issuance when a tranche was insured.

Note that our results suggest that the collateral dummies capture additional risk that is not explained by the credit rating for our commercial sample. When the collateral for a tranche is a pool of aircraft leases or small business loans, there is a statistically significant higher spread of 29.27 and 21.83 basis points, respectively (equipment loan collateral is the omitted class).

[19] This is why we say expected sign because we know from the subprime mortgage crisis that ex post insurance did not perform the way it should have in maintaining the integrity of the tranche's original credit rating.

We will come back to these relationships in the next section where we explore the impact of credit factors on the primary market spread for our subsamples of consumer and commercial triple A rated tranches.

5. The Influence of Credit Factors on Triple A Rated ABS

Our focus thus far has been on examining whether credit factors matter in explaining new issuance spreads after taking into account the credit rating for tranches of an ABS structure. The main target of criticism by regulators and market commentators, however, has been on triple A rated tranches. (See, for example, Fender and Mitchell, 2009). In this section, we investigate what credit factors determine the spread at issuance for just the triple A rated tranches. Our sample includes 254 triple A rated tranches, 100 with consumer collateral and 154 with commercial collateral. Appendix D provides summary statistics for the two samples.

5.1. *Triple A pooled sample*

In regression (1) of Table 4, we regress spreads on the credit factors and control variables over the pooled sample of consumer and commercial triple A rated tranches. The R^2 for the regression is 0.7, and the credit factors add about 28% to the explanatory power of the model. Clearly, investors utilise more credit information beyond the credit rating in pricing these securities, consistent with our earlier findings.

With the exception of currency risk, all credit factors have the expected signs and are significant at the 1% level. Note that for triple A rated tranches, investors require, on average, a higher spread when tranches are backed by commercial collateral, a finding consistent with the view expressed in the quote earlier by a former high level member of the syndicate trading desk at two major banks.

So despite the fact that a tranche is rated triple A, investors still take into account the nature of collateral, credit enhancements (external and internal), and the level of creditor protection in pricing this tranche. The direction of the impact for each of these factors is as expected.

5.2. *Consumer and commercial triple A*

In regressions (2) and (3) in Table 4 we examine the significance of the credit factors for consumer-backed and commercial-backed triple A rated tranches, respectively. The credit factors add about 11% to the explanatory power of the regression model for the consumer sample and 39% for the commercial sample.

One can see that the primary market spread for both consumer and commercial triple A tranches is influenced by collateral type. For our consumer group, we find both explanatory variables on collateral class (credit card, consumer) significant at the 5% or 10% levels. Recall that we found insignificant coefficients for consumer asset classes in regression (4) in Table 3. This result shows that investors do discriminate by the type of collateral for the consumer triple A rated tranches in our study.

For the commercial group, for two of the four collateral classes (aircraft and trade) we find a significant coefficient at the 1% level. These results support our earlier tests using the entire commercial subsample (regression (8) in Table 3), suggesting that investors look beyond credit rating by considering the nature of the collateral.

Table 4

Regressions estimating the credit factors for triple A rated tranches

This table presents ordinary least squares regressions estimating the credit factors for 100 consumer and 154 commercial AAA rated ABS issued between 1999 and 2006. Our empirical specification is:

$$\text{ABS Spread}_{it} = \beta_0 + \beta_{1-5}\text{Credit factors}_{it} + \text{Controls}_{it} + \varepsilon_{it},$$

where ε_{it} is the idiosyncratic error term. The dependent variable and explanatory variables are as defined in Table 1. In regression (1), we examine the impact of the credit factors on the spread at issue of tranches for the pooled sample of consumer and commercial triple A rated tranches. In regressions (2) and (3), we repeat regression (1) for our consumer and commercial subsamples from our database, respectively. Coefficients for the quarter dummies are not shown. The sign "−" denotes not included. N.A. for consumer ABS means none of the tranches are supported with external credit enhancement. N.A. for commercial ABS means none of the tranches have currency risk. The omitted categories are: automobile loans for consumer collateral and equipment leases for commercial collateral. The coefficient and *t*-statistic, corrected for heteroscedasticity, are shown in parentheses. The letters a, b, and c denote parameter estimates for which zero falls outside the 99%, 95%, and 90% posterior confidence intervals, respectively.

	(1) Includes consumer and commercial triple A rated tranches	(2) Includes consumer triple A rated tranches	(3) Includes commercial triple A rated tranches
Intercept	34.43[a]	31.87[a]	33.72[a]
	(12.98)	(12.44)	(21.79)
Internal credit enhancement	−9.78[a]	−1.91	−11.88[a]
	(−4.90)	(−0.45)	(−4.79)
External credit enhancement	−19.94[a]	N.A.	−20.54[a]
	(−16.87)		(−15.07)
Creditor protection	−6.03[a]	−4.87[b]	−6.59[a]
	(−4.74)	(−2.21)	(−3.09)
Currency risk	1.42	4.85[b]	N.A.
	(0.55)	(2.20)	
Commercial ABS	3.97[a]	-	-
	(3.52)	-	-
Credit card receivables	-	−5.45[c]	-
	-	(−1.80)	-
Consumer loans	-	3.93[b]	-
	-	(2.03)	-
Aircraft leases	-	-	40.74[a]
	-	-	(10.05)
Small business loans	-	-	2.40
	-	-	(1.02)
Trade receivables	-	-	−6.94[a]
	-	-	(−2.99)
Other	-	-	−2.09
	-	-	(−1.03)
Size of tranche	−0.04[a]	−0.02	−0.03[b]
	(−2.82)	(−0.85)	(−2.26)
QUARTER DUMMIES	yes	yes	yes

Table 4
Continued

	(1) Includes consumer and commercial triple A rated tranches	(2) Includes consumer triple A rated tranches	(3) Includes commercial triple A rated tranches
adjusted R^2	0.70	0.61	0.84
F	21.85	5.83	22.27
Number of observations	254	100	154
R^2 change	0.281	0.106	0.389
F change	46.66	5.38	41.99
p change	0.000	0.000	0.000

For the consumer triple A sample, the coefficient for internal credit enhancement is not statistically significant. Note that that internal credit enhancement was also found to be insignificant in regression (4) in Table 3. In contrast, for the commercial group the coefficient for internal credit enhancement is highly significant (−11.88) and, as expected, inversely related. (Recall that there are no monoline insured tranches for the consumer group.) Thus, the primary market spread is significantly influenced by subordination for triple A rated tranches with commercial collateral, while those with consumer collateral are not.

As concerns creditor protection, the results reported in Table 3 show it to be weakly significant for the consumer group (−8.68, regression (4)) and insignificant for commercial tranches (−21.39, regression (8)) after taking into account the credit rating; however, it is highly significant in Table 4 for both the triple A consumer group (−4.87, regression (2)) and triple A commercial group (−6.59, regression (3)).

6. Analysis of Moody's and S&P

Most tranches are rated by at least two rating agencies. Typically the requirement of more than one rating is due to either a regulatory requirement imposed on institutional investors or a client-dictated requirement as set forth in investment guidelines. In our sample we find only 16.4% (95 tranches) rated by a single credit rating agency and 83.6% (485 tranches) rated by two or more rating agencies. About 67.5% of the tranches in our sample with at least two ratings are rated by both Moody's and S&P.

Thus far we did not make a distinction between ratings by S&P, Moody's or Fitch. Although the basic factors considered by all rating agencies in assigning ratings are similar, rating agencies employ different estimates for default probability and expected default loss and place greater emphasis on one than the other.

In this section, we investigate how the primary market spread is affected by the credit factors after taking into account the credit rating of Moody's and S&P. We do not focus on Fitch for two reasons. First, this rating agency serves as a third rating agency and its opinion primarily plays the role of tie-breaker between Moody's and S&P (see Bongaerts *et al*., 2010). Second, the rating system of Fitch is based on default probabilities, just as S&P.

To address this question, we partitioned our sample into two subsamples. The first subsample includes all tranches rated by Moody's, and which we refer to as the 'Moody's sample.' In this sample, there are tranches that are also rated by S&P and Fitch, as long as they were rated by Moody's. So, a tranche rated by Moody's and by Fitch but not rated

by S&P would be included in the Moody's sample. Similarly, in the second subsample we include all tranches rated by S&P (the 'S&P sample'). Tranches that were rated by S&P that also had ratings by Moody's and Fitch are also included in the S&P sample. The Moody's sample contains 478 tranches and the S&P sample contains 406 tranches.

6.1. *Credit rating agencies and the impact on the spread*

To investigate how tranches rated by the three rating agencies impact the primary market spread, we employ three rating agency dummy variables. When estimating regressions for the two Moody's and S&P samples, the credit rating dummy variable for the rating agency whose sample is being investigated is omitted.

To serve as a benchmark for our investigation, regression (1) of Table 5 presents the results for the entire sample. In that regression, the only credit rating dummy that we found significant is Fitch. The coefficient for this variable is −10.80 (significant at the 5% level) suggesting that a tranche that is rated by Fitch decreases the primary market spread by 10.80 basis points on average. This is an interesting result; however, the opinion of Fitch primarily plays the role of tie-breaker between Moody's and S&P as discussed above. For that reason, to investigate its statistical and economic significance we need to analyse the impact of the Fitch dummy variable on the spread in the Moody's and S&P sample.

Let's look first at the Moody's sample results. From regression (5) we once again see a statistically significant (at the 5% level) negative coefficient of 6.37 for the Fitch dummy. So in a regression that takes into account Moody's credit rating, an additional Fitch rating reduces the primary market spread. Furthermore, unlike regression (1), for our Moody's sample we see that the S&P dummy is statistically significant (at the 1% level) with a coefficient of −9.52.

The results for the S&P sample are quite different with regard to the impact of additional ratings (Moody's and Fitch) on the primary market spread. From regression (9) see that there is no significant reduction in the primary market spread when the tranche has an additional Fitch or Moody's rating.

Perhaps the reason for this difference between the results reported for the S&P and Moody's samples is that, on average, Moody's tends to assign a lower rating than S&P in ABS transactions according to Cantor *et al*. (2007). For that reason, investors appreciate the information conveyed by an additional rating, resulting in lower spreads for tranches rated by Moody's.

6.2. *The impact of credit factors on the spread taking into account Moody's and S&P ratings*

We now analyse the impact of credit ratings and credit factors on the primary market spread for the tranches in the S&P and Moody's samples. As we found earlier, credit ratings do indeed play a very major role in determining spreads in these samples. Almost all credit ratings have a strong significant coefficient and explain a significant proportion of the spread. The overall accuracy of the fit increases from 69% in regression (1) of Table 2 that includes the full sample to 80% for the Moody's sample in regression (2) and 84% in regression (6) for the S&P sample. Thus, these two rating agencies – each with a different approach in rating tranches – explain a substantially higher proportion of the spread compared with the benchmark model (i.e., regression (1) of Table 2), that is a combination of credit ratings of Moody's, Fitch, and S&P.

Table 5

Regressions estimating the credit factors for tranches rated by S&P and Moody's

This table presents ordinary least squares regressions estimating the credit factors after taking credit rating into account for 478 tranches rated by Moody's and 406 tranches rated by S&P issued between 1999 and 2006. Our empirical specification is:

$$\text{ABS Spread}_{it} = \beta_0 + \beta_{1-5}\text{Credit factors}_{it} + \Sigma(\gamma_j \text{Credit Rating}_{jit}) + \text{Controls}_{it} + \varepsilon_{it},$$

where ε_{it} is the idiosyncratic error term. The dependent variable and explanatory variables are as defined in Tables 1 and 2. Coefficients for the quarter dummies are not shown. The sign "–" denotes not included. The dummy variable representing a rating agency will take the value of one if the tranche is rated by that rating agency and zero otherwise. Regression (1) reports the results for the full sample that includes credit ratings by S&P, Moody's, and Fitch. Regressions (2) through (9) report the results for the two subsamples of the entire dataset (Moody's and S&P). There are four regressions for each subsample: regressions (2) through (5) are for the Moody's sample that includes tranches assigned a Moody's credit rating, and regressions (6) through (9) are for the S&P sample that includes tranches assigned an S&P credit rating. The explanatory variables for each of the four regressions per sample differ. Regressions (2) and (6) include only credit ratings as explanatory factors for our Moody's and S&P sample, respectively. Regressions (3) and (7) repeat regressions (2) and (6), but include control variables. Regressions (4) and (8) exclude credit ratings. Regressions (5) and (9) include all explanatory variables along with the credit rating dummy variables. The coefficient and *t*-statistic, corrected for heteroscedasticity, are shown in parentheses. The letters a, b, and c denote parameter estimates for which zero falls outside the 99%, 95%, and 90% posterior confidence intervals, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full sample	Includes Moody's credit rating				Includes S&P credit rating			
Intercept	42.79[a]	21.69[a]	26.16[a]	51.30[a]	37.08[a]	22.81[a]	27.54[a]	45.96[a]	29.58[a]
	(3.51)	(25.07)	(4.64)	(5.22)	(7.56)	(26.71)	(5.60)	(3.35)	(4.71)
Aal/AA+	8.18	15.10[a]	20.09[a]	-	13.44[a]	6.99	13.86	-	18.80[c]
	(1.43)	(3.05)	(4.26)	-	(3.15)	(0.71)	(1.10)	-	(1.91)
Aa2/AA	20.72[a]	20.74[a]	19.84[a]	-	13.63[a]	22.61[a]	20.66[a]	-	20.07[a]
	(6.62)	(7.23)	(6.06)	-	(3.75)	(7.27)	(7.27)	-	(6.20)
Aa3/AA–	14.53[b]	20.81	25.78[a]	-	20.22[b]	12.94	37.27[a]	-	38.22[a]
	(2.04)	(2.50)	(4.13)	-	(2.89)	(0.97)	(5.81)	-	(6.40)

Table 5
Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full sample	Includes Moody's credit rating				Includes S&P credit rating			
A1/A+	46.26[a]	56.33[a]	49.50[a]	-	45.55[a]	42.30[c]	44.96[b]	-	45.80[b]
	(3.56)	(7.77)	(8.00)	-	(7.36)	(1.78)	(2.31)	-	(2.55)
A2/A	42.96[a]	45.06[a]	43.70[a]	-	38.67[a]	43.49[a]	40.19[a]	-	40.17[a]
	(13.31)	(11.60)	(12.05)	-	(10.81)	(14.43)	(14.76)	-	(12.67)
A3/A−	62.50[a]	69.51[a]	70.81[a]	-	62.67[a]	46.79[a]	54.23[a]	-	54.17[a]
	(5.74)	(3.92)	(4.39)	-	(4.13)	(2.81)	(5.31)	-	(5.58)
Baal/BBB+	127.91[a]	110.21[a]	102.62[a]	-	93.40[a]	77.80[a]	86.69[a]	-	86.46[a]
	(21.60)	(6.61)	(6.62)	-	(5.80)	(6.12)	(11.25)	-	(8.75)
Baa2/BBB	113.19[a]	116.83[a]	115.31[a]	-	109.61[a]	110.91[a]	110.57[a]	-	109.99[a]
	(16.31)	(14.08)	(15.97)	-	(14.80)	(14.13)	(15.15)	-	(13.83)
Baa3/BBB−	103.88[a]	95.19[a]	110.53[a]	-	97.48[a]	101.19[a]	118.81[a]	-	117.43[a]
	(9.42)	(6.67)	(8.26)	-	(7.45)	(4.24)	(5.91)	-	(5.55)
Ba1/BB+	175.07[a]	245.81[a]	261.78[a]	-	251.69[a]	210.19[a]	226.96[a]	-	225.11[a]
	(5.50)	(5.25)	(6.00)	-	(5.86)	(4.68)	(4.69)	-	(4.69)
Ba2/BB	331.99[a]	393.87[a]	391.42[a]	-	386.24[a]	349.69[a]	352.90[a]	-	352.73[a]
	(10.08)	(16.35)	(18.25)	-	(17.88)	(13.41)	(14.06)	-	(13.86)
Ba3/BB−	397.07[a]	208.31[a]	226.02[a]	-	215.00[a]	764.69[a]	791.31[a]	-	784.91[a]
	(2.72)	(14.50)	(10.56)	-	(9.31)	(9.46)	(10.33)	-	(10.25)
Size of tranche	0.02	-	−0.02	−0.55[a]	−0.03	-	−0.01	−0.56[a]	−0.02
	(0.59)	-	(−0.10)	(−7.36)	(−0.81)	-	(−0.51)	(−6.36)	(−0.57)
Internal credit enhancement	−1.48	-	-	−98.00[a]	−14.70[b]	-	-	−102.23[a]	5.46
	(−0.23)	-	-	(−8.37)	(−2.43)	-	-	(−4.56)	(0.63)

External credit enhancement	−21.09[a]	-	-	−65.82[a]	−27.76[a]	-	-	−68.10[a]	−20.86[c]
	(−3.45)	-	-	(−8.81)	(−4.63)	-	-	(−5.00)	(−1.83)
Commercial ABS	9.21[a]	-	-	31.58[a]	15.86[a]	-	-	34.87[a]	6.30
	(2.58)	-	-	(4.30)	(4.27)	-	-	(3.83)	(1.41)
Creditor protection	−11.33[b]	-	-	−1.02	−3.15	-	-	−0.13	−7.35[c]
	(−2.28)	-	-	(−0.14)	(−0.85)	-	-	(−0.01)	(−1.67)
Currency risk	12.99[c]	-	-	13.39	9.39	-	-	28.36[c]	11.55
	(1.91)	-	-	(0.87)	(1.27)	-	-	(1.72)	(1.54)
S&P rating dummy	−5.75	-	-	-	−9.52[a]	-	-	-	-
	(−1.06)	-	-	-	(−2.65)	-	-	-	-
Moody's rating dummy	−7.87	-	-	-	-	-	-	-	−0.91
	(−0.96)	-	-	-	-	-	-	-	(−0.17)
Fitch rating dummy	−10.80[b]	-	-	-	−6.37[b]	-	-	-	−0.36
	(−2.52)	-	-	-	(−1.82)	-	-	-	(−0.09)
QUARTER DUMMIES	yes	no	yes	yes	yes	no	yes	yes	yes
adjusted R^2	0.71	0.80	0.84	0.21	0.85	0.84	0.87	0.10	0.87
F	29.54	156.80	59.89	4.51	56.22	183.19	66.91	2.28	58.24
Number of observations	580	478	478	478	478	406	406	406	406

Regressions (5) and (9) in Table 5 indicate how the primary market spread is affected by the credit factors after taking into account the credit rating for the Moody's and S&P sample, respectively. Once again, we find that credit factors matter in determining the primary market spread after taking into account the credit rating. The relationship between credit factors and the spread is stronger for the Moody's sample compared with the S&P sample.

For our S&P sample, we see in regression (9) that two of the five credit factors (external credit enhancement and creditor protection) are significant with the expected signs at the 10% level and have a large economic effect on the spread. Surprisingly, commercial collateral shows the appropriate sign, but is insignificant. However, for our Moody's sample in regression (5), the primary market spread is heavily influenced by credit factors after taking into account the credit rating. Internal credit enhancement, external credit enhancement, and commercial collateral have the expected signs and are highly significant, suggesting that the nature of the collateral and credit enhancements are statistically significant explanatory variables for explaining primary market spreads taking into account only the Moody's rating.

7. Conclusions

In this paper, we investigate what credit factors investors rely on other than credit rating in the analysis of non-mortgage related ABS issued in Europe. After describing the general credit factors considered by rating agencies in assigning a credit rating to an ABS tranche, we conclude that it is difficult to use simple metrics to include in a regression model for explaining new issuance spreads. The description of the credit factors considered by rating agencies, however, does provide us with an understanding of what credit factors should be redundant in a regression model to explain the primary market spread that includes both a tranche's credit rating and credit factors considered by rating agencies in assigning a credit rating. The other credit factors considered by rating agencies that we include in a regression model are credit enhancements (internal and external), nature of the collateral, currency risk, and creditor protection.

It is no surprise that we find that credit rating is the dominant determinate of the primary market spread. What is noteworthy is that investors do consider credit factors already considered by rating agencies in assigning ratings, suggesting that investors look beyond the credit rating in pricing ABS tranches. Specifically, we find that, credit factors such as collateral and credit enhancements are statistically significant explanatory variables and have a large economic impact on the primary market spread. Although its economic significance reduces once credit ratings are included, these factors still have a significant economic impact.

Partitioning our sample into tranches backed by consumer collateral and commercial collateral, we find that (1) the nature of collateral does not have a significant effect on the primary market spread for consumer tranches, (2) the nature of the collateral is highly significant for commercial tranches, and (3) for triple A rated tranches most of the credit factors are economically and statistically significant for both subsamples of commercial and consumer collateral, although these factors are more significant in the commercial sample.

When we investigate the impact attributable to a particular rating agency, Moody's or S&P, we find that credit factors matter after taking into account the credit rating assigned by a particular rating agency. We find a stronger association between the spread and credit factors for our Moody's sample compared with our S&P sample.

Appendix A

ABS data summary statistics for full sample

Appendix A presents descriptive statistics for the 580 non-mortgage related ABS tranches in our sample. Panels A and B report the statistics for the continuous and dummy variables, respectively. Column (1) in panel B presents the number of tranches where dummy variable takes the value of 1. Column (2) reports for each row the number in column 1 as a percentage of the total sample. Internal credit enhancement is the cumulative subordination level of each tranche in a transaction. Spread is the spread above and beyond the risk associated with the EURIBOR rate for a tranche issued at par. The size of the tranche is in euro millions. Credit rating is the numerical value corresponding to each credit rating assigned to each tranche, where AAA/Aaa stands for 1, and AA+/Aa1 stands for 2 *etc.* External credit enhancement represents a dummy variable that takes the value of one if the tranche is guaranteed by a monoline guarantor and zero otherwise. Collateral classification stands for two dummy variables, which are constructed based on the nature of collateral. The dummy variable is assigned a value of one if the tranche was part of a securitisation that corresponded to consumer ABS, and zero otherwise. Commercial ABS is a dummy variable of one if the tranche was part of a securitisation that corresponded to the commercial ABS, zero otherwise. Creditor protection corresponds to a dummy taking the value of one if the underlying collateral was originated in a country where there is no automatic stay in the law, and zero otherwise. Currency risk is measured by a dummy variable that takes the value of one if a tranche is exposed to currency risk, and zero otherwise. The time period spans January 1, 1999 to December 31, 2006.

Panel A. Continuous variables statistics

			Percentile				Correlation		
Variable		Mean	10	50	90	S.D.	1	2	3
Internal credit enhancement (in %)	1	11.583	0.000	5.399	40.000	17.956	1.000		
Spread (in basis points)	2	66.041	10.000	38.000	155.500	86.806	−0.247	1.000	
Tranche size (in million)	3	208.061	9.000	54.900	598.000	35.493	0.156	−0.268	1.000
Credit rating	4	4.131	1.000	3.000	9.000	3.434	−0.401	0.719	−0.457

Panel B. Dummy variables statistics

Variable	(1)	(2)
External credit enhancement	42	7.2%
Commercial ABS	354	61.0%
Consumer ABS	226	39.0%
Creditor protection	289	49.8%
Currency risk	39	6.7%

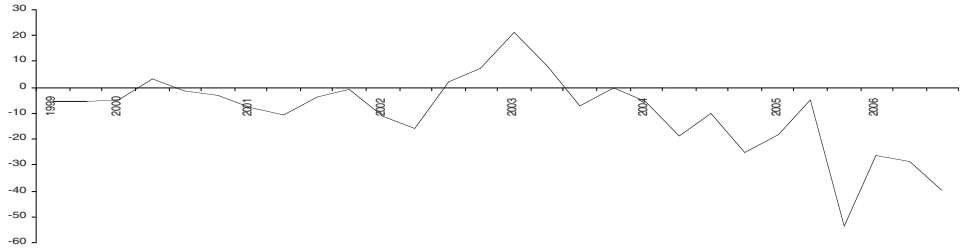
Appendix B
Distribution of ABS across credit ratings and commercial and consumer collateral classification

This table shows the distribution of tranches across credit ratings by commercial and consumer ABS in a sample of 580 non-mortgage related ABS. The commercial sample includes 354 commercial and 226 consumer rated ABS issued between January 1, 1999 and December 31, 2006.

Credit rating	Full sample	Commercial	Consumer
AAA/Aaa	254	154	100
AA+/Aal	8	6	2
AA/Aa2	57	41	16
AA−/Aa3	8	4	4
A+/A1	14	7	7
A/A2	111	60	51
A−/A3	15	7	8
BBB+/Baal	1	0	1
BBB/Baa2	66	38	28
BBB−/Baa3	19	15	4
BB+/Bal	7	5	2
BB/Ba2	15	12	3
BB−/Ba3	5	5	0
Total	580	354	226

Appendix C
Time series plot of time dummies

This figure presents a plot of quarter dummy coefficients obtained from regression (2) in Table 1 from our sample of 580 non-mortgage related ABS tranches issued between 1999 and 2006. The first quarter of 1999 is the omitted category. The vertical axis is in basis point, the years are presented on the horizontal-axis.



Appendix D

ABS data summary statistics for the triple A consumer and commercial samples

This table shows the mean and standard deviation of our dependent and independent variables for the 254 AAA rated ABS tranches in our sample issued between 1999 and 2006, partitioned into 100 consumer and 154 commercial AAA rated tranches. Standard deviation is reported below the mean in parentheses. Internal credit enhancement is the cumulative subordination level of each tranche in a transaction. External credit enhancement represents a dummy variable that takes the value of one if the tranche is guaranteed by a monoline insurer and zero otherwise. Creditor protection corresponds to a dummy taking the value of one if the underlying collateral was originated in a country where there is no automatic stay in the law, and zero otherwise. Currency risk is measured by a dummy variable that takes the value of one if a tranche is exposed to currency risk, and zero otherwise. Spread is the spread above and beyond the risk associated with the EURIBOR rate for a tranche issued at par. The size of the tranche is in euro millions. N.A. for consumer ABS means none of the tranches are supported with external credit enhancement. N.A. for commercial ABS means none of the tranches have currency risk.

Variable	Triple A consumer	Triple A commercial
Internal credit enhancement (in %)	11.451	25.644
	(13.833)	(24.619)
External credit enhancement	N.A.	0.233
		(0.425)
Creditor protection	0.380	0.506
	(0.487)	(0.501)
Currency risk	0.200	N.A.
	(0.402)	
Spread (in basis points)	24.342	19.851
	(10.165)	(13.327)
Tranche size (in million)	43.587	42.103
	(36.371)	(48.790)

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