The Arbitrage Free Approach to Securitisation Capital

Executive Summary

The Arbitrage Free Approach (AFA) and the Simplified AFA (SAFA) offer a simple, practical and comprehensive framework for the determination of securitisation regulatory capital requirements applicable by either originators or investors. The AFA framework is transparent, risk sensitive, and consistent both with Basel II on-balance-sheet capital requirements and, internally, between the versions it proposes for both IRB and standardised banks.

The transparency and simplicity of the AFA and the SAFA make them easy to explain to those who would apply them in regulatory institutions or banks. Their consistency with the on-balance-sheet capital formulae employed in Basel II will tend to discourage capital arbitrage-related financial activity.

The AFA leaves regulators firmly in control in that by adjusting transparently capital add-ons and parameters describing pool concentration, regulators may adjust or fine tune the level and of bank capital for securitisations and its distribution across tranches.

Background: Approaches to securitisation capital modelling

The role of securitisations in the recent financial crisis and the additional source of long term and non-recourse finance that securitisations could provide to funding the economy make assigning appropriate capital to securitisations a crucial issue for financial regulation.

The Basel Committee’s December 2012 consultative document on securitisation capital proposes a computation hierarchy headed by a capital formula termed the Modified Supervisory Formula Approach or MSFA. The approach is based on a complex underlying model and the capital charges it implies are inconsistent with the capital Basel II requires for on-balance sheet exposures such as corporate loans or bonds.

In particular, according to the MSFA, a bank that retains all the tranches of a securitisation would have to hold a large multiple of the capital charges required if it had held the underlying pool directly. The multiple in question varies widely in magnitude, making securitisation of high quality assets prohibitively expensive while that of some lower quality assets may remain unaffected.

Duponcheele, Perraudin and Totouom-Tangho argue that the non-neutrality of the proposed framework and its complexity run counter to the principles that should be followed in devising good financial regulation. They have, therefore, developed an alternative, simpler and more transparent capital formula that the industry has called the Arbitrage Free Approach or AFA.

This approach solves a basic flaw of the existing Basel II Supervisory Formula Approach (SFA), i.e. the so-called ‘cliff-effect’. The SFA applies to securitisations the Asymptotic

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1 The AFA is described in ‘A Principles-Based Approach to Regulatory Capital for Securitisations’ (21 Apr 2013), by Dr. Georges Duponcheele (Head of Banking Solutions Private Side, BNP Paribas), Dr. William Perraudin (Director of Risk Control Limited and Adjunct Professor of Imperial College, London) and Dr. Daniel Totouom-Tangho (Credit Quantitative Research, BNP Paribas). The paper is available from the website http://www.riskcontrollimited.com/afa_capital.html.
Single Risk Factor (ASRF) model, employed in Basel II as a basis for calculating capital for diversified banks. Applied to securitisations, the ASRF model implies that exposures with protection up to a certain level ($K_{IRB}$) should be deducted and that exposures attaching above that point should bear zero capital.

The SFA attempts to mitigate the cliff effect by assuming attachment points are unknown. This technical device is unrealistic and in any case leaves the cliff effect still present, just slightly less serious in magnitude. The MSFA goes further in mitigating the cliff effect by adding several layers of conservatism. The SSFA smooths the discontinuity using an ad hoc exponential function.

**The AFA – a short description**

In contrast, the AFA solves the cliff effect by building directly on the model used in Basel II to determine capital for on-balance sheet loans. It adopts the reasonable assumption that securitisation pools are more concentrated than bank balance sheets but share the same correlation with the bank’s on-balance sheet assets as assumed in the IRBA. This ensures that the total capital for all the tranches of a securitisation equals the capital for the underlying pool of assets.

The AFA is mathematically equivalent to a well-known, two-factor model of securitisation capital, the Pykhtin and Dev model. As standardly parameterised, however, the Pykhtin-Dev model implies that capital for all the tranches of a securitisation is less than that attracted by the pool. The AFA parameterisation resolves this issue, implying neutrality between on and off-balance sheet capital.

Note, the AFA does not advocate that securitisation should be capital neutral, only that deviations from neutrality be transparently and clearly specified within a model in which the starting point is neutrality. The approach effectively adopted by the MSFA is to adopt a series of conservative assumptions completely at variance with the on-balance sheet capital approach of the IRBA. Capital for some securitisation transactions is very substantially higher than would be attracted by the underlying pool, while for others the effect is less. A chaotic and un-thought-out series of distortions in banks’ choices as to whether or not to securitise will be the consequence.

The assumption made in the AFA that securitisation pools contain additional concentration risk (i.e. risk associated with an additional common factor) has the reasonable and common-sense implication that a bank’s balance sheet and securitisation pools to which it is exposed, are not perfectly correlated. The effect of the second factor is captured with a parameter denoted $\rho^*$. As this parameter increases, the effect is to distribute capital towards more senior tranches while leaving the overall quantity of capital for all the tranches together unchanged.

In setting $\rho^*$ to particular values, regulators may exercise their judgment as to how capital should be distributed across a securitisation while working within a simple, well-behaved model. Since $\rho^*$ reflects a genuine economic phenomenon, the additional concentration risk to be found in securitisation pools compared to bank balance sheets, it may also be calibrated using actual data.

The AFA paper presents an illustrative calibration of the $\rho^*$ parameter based on securitisation ratings histories. As $\rho^*$ approaches zero, the common factors driving securitisation pools, and hence their ratings, should move very closely together. By studying the degree of statistical
correlation between ratings histories for individual securitisations, one may, thus, identify an estimate of $\rho^*$. Fixing an appropriate level for $\rho^*$ for securitisations in general or for different categories of securitisation is a judgment to be made by regulators but it is an advantage that empirical evidence may be brought to bear on the issue. This rooting in empirical evidence of the regulatory parameter is another key advantage of the AFA compared to the other approaches: the SFA has a regulatory parameter ($\tau$) describing the degree of randomness in attachment points and ($\omega$) for smoothing the cliff-effect, the MSFA\(^2\) has a recovery variance ($\tau$) and ($\omega$) for smoothing the cliff-effect, the SSFA has a parameter ($p$) to smooth exponentially the cliff-effects.

Note that the AFA’s inputs include maturity-adjusted default probabilities (actual and stressed). The maturity adjustments are the same as those employed in the IRBA. This ensures that the AFA formula is capital neutral as far as total deal is concerned (and before any capital add-ons) for all maturities. There remains an issue whether the $\rho^*$ parameter which controls the dispersion of total capital across junior, mezzanine and senior tranches should have a maturity dimension. The authors of the AFA paper will shortly issue a research study analysing maturity effects in securitisation capital that sheds light on how $\rho^*$ should be adjusted for maturity.

To summarise, the AFA offers a practical solution to the determination of securitisation capital. It may be implemented using pool level inputs such as $K_{IRB}$ or $K_{SA}$, the capital that a securitisation pool is assigned under the Basel II IRBA or the Standardised Approach.

**SAFA**

In order to create a comprehensive framework, the authors of the AFA paper and the AFA Quant Group have developed a Simplified Arbitrage-Free Approach (SAFA) to calculate securitisation capital based on Risk Weights alone. This Simplified AFA, which is described in a separate paper\(^3\), together with the AFA itself, offer a consistent set of approaches for regulatory capital calculations that can be used by investor or issuer banks without relying on agency ratings.

The consistency of the AFA and SAFA has the significant advantage of eliminating the cliff effects\(^4\) that occur with the Modified Supervisory Formula Approach (MSFA) and the Simplified Supervisory Formula Approach (SSFA) recently suggested by the Basel Committee. These proposed formulae are based on different assumptions and so may imply quite different capital for a given securitisation tranche.

**Controlled adjustments and add-ons**

Securitisation structures distribute existing credit risk across tranches but do not create additional credit risk. However, it may be argued that some securitisations contain additional

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\(^2\) There are other conceptual issues with the MSFA, such as a change in capital definition for credit risk based on expected shortfall, the addition of expected loss with a risk premium, the maturity modelling in the volatility and various opaque approximations. These are explained in part in the AFA paper.

\(^3\) The SAFA paper is available from the website [http://www риск control limited.com/afa_capital.html](http://www.riskcontrollimited.com/afa_capital.html).

\(^4\) The term ‘cliff-effect’ is used here to indicate that a change in the applicable formula due to a small change in available regulatory information, for the same underlying capital, creates large jumps in the capital requirement of the entire securitised portfolios.
risks, such as “agency risk”. For example, when the interests of different participants in the securitisation process are imperfectly aligned, securitisation of assets may reduce incentives to avoid fraud or encourage asset management practices at variance with investors’ interests.

The resulting “agency” effects could justify increasing capital for securitisations over and above what the underlying assets require (and notwithstanding capital adjustments that should also be required on the underlying assets, for example when the securitised assets were subject to poor underwriting practices). Securitisation structures may also contain specific legal risks not present in the underlying assets, such as legal risks and counterparty risk associated with the use of swaps, that could justify increasing capital. In this case, within the AFA, one could boost capital, in a transparent manner, through proportional capital add-ons or by scaling the basic inputs to the AFA.

The advantage of increasing capital by adjusting the output of a basic model or key inputs such as $K_{SA}$ or $K_{IRB}$ is that it will not arbitrarily or unintentionally discourage securitisation of some asset types much more than others. Such an approach also controls and makes fully visible the reasons and overall magnitude of the capital adjustments that the authorities decide to impose.

Another conservative add-on one may consider is the model risk charge in the AFA. In the IRBA, a scaling factor of 1.06 was included with the objective of maintaining average capital levels consistent with those prevailing under Basel I. This created an additional layer of capital equal to 6% of the underlying risk weight of the pool. The AFA adopts this extra layer as a Model Risk Charge, having the same effect as a risk-sensitive floor. The authors of the SAFA paper have estimated that for banks using the Standardised Approach, this is equivalent to a floor representing 20% of the underlying risk weight of the pool.

To unify the approaches, for both IRB and SA banks, the AFA Quant Group has considered a Model Risk Charge higher than 6% for IRB banks and lower for SA banks, for example, by unifying the Model Risk Charge at 10% of the underlying pool risk weights, for banks of both types.

The AFA Quant Group, bringing together ‘credit quants’ from more than a dozen banks (currently from Germany, France, Italy, Spain, Belgium, UK and US) is currently working on proposals for a series of conservative add-ons. In that context, a ‘Monotone SAFA’ has been proposed, which includes the regulatory expected loss in the capital calculation. The working group has also developed adjustments to the AFA to take into account pool granularity, heterogeneity and maturity.

**Conclusion**

In conclusion, the AFA framework is consistent with principles for banking regulation set out in a recent speech by Wayne Byres. In brief, it is comprehensive yet simple, conservative but not burdensome, risk-based yet easy to understand and compare, flexible yet consistently applied, suitable for normal times but built on lessons from the crisis, built on consensus with a broad engagement but leaving the regulators in control.

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