CDO of ABS:
a primer on performance metrics and test measures

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[1] This article represents the views, thoughts and opinions of Suleman Baig in his individual private capacity. It should not be taken to represent the views of Deutsche Bank AG, or of Suleman Baig as a representative, officer or employee of Deutsche Bank AG.

Introduction
In recent years CDO's have developed into the fastest growing component of the securitisation market. CDO's structures manage default risk on the underlying collateral through credit enhancement and by maintaining levels of diversity in the portfolio. The inclusion of compliance tests in the structure to maintain par value and interest coverage, coupled with a ramping up period, encourages active trading on the collateral underlying the offered securities.

This facet of the CDO, which has traditionally applied to corporate and high yield debt, is now being extended to MBS and ABS products. Though CDO and ABS/MBS structures are similar, and both feature the sale of assets to a bankruptcy-remote special purpose vehicle (SPV), there is no trading of the underlying collateral in ABS/MBS products. Consequently, the "CDO of ABS" [2] has emerged in recent years to offer ABS/MBS issuers and investors the opportunity to take advantage of the relatively wide spreads that are a feature of these instruments. This market for CDO's backed by structured products is expected to continue to grow subject to the availability of ABS products and appropriate arbitrage opportunities.

This article is an introduction to the ABS/MBS product for those CDO practitioners working on this new type of transaction. Attention is given to the asset classes and the applied performance measures on the underlying collateral of the relevant ABS and MBS products.

Growth of ABS/MBS
The MBS market first appeared in the 1960's when the US government-chartered mortgage agencies began issuing pass-through securities collateralised by residential mortgages to promote the availability of cheap mortgage funding for US home buyers. The pass-through market inevitable grew as it provided investors in the secondary mortgage market with a liquid instrument and the lenders an opportunity to move interest rate risk off their balance sheet. Consequently, the ABS market came about as US finance companies began applying similar securitisation techniques to non-mortgage assets with expected payment streams. However, whilst MBS investors had, through the 'Ginnie Mae' government issues, benefited from implicit Treasury guarantees, the ABS market offered investors, in addition to a differing portfolio dynamic, an exposure to more diversified credit classes.

The low interest-rate environment and increasing number of downgrades in the Corporate Bond market has made the rating-resilient ABS/MBS issuance an attractive source of investment for investors. Like all securitisation products, ABS/MBS trade at yields that compare favourably to similar rated unsecured debt and as investors have sought alternatives to the volatile equity market, 2003 issuance for the European securitisation market on course to exceed the record €157.7 billion of 2002.

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[2] In Europe, both ABS and MBS transactions adopt an ABS structure, so the term 'CDO of ABS' makes no distinction between the two. They are also sometimes called Structured Finance CDOs.

European MBS Issuance
By Collateral Type—Through 2Q 2003

Mixed 5%
CBMS 5%
RMBS 90%
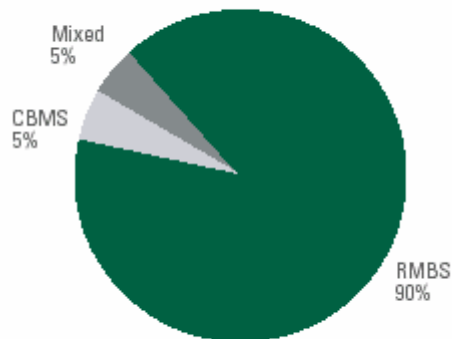
Sources: Dealogic Bondware, Thomson Financial Securities Data,
J.P. Morgan Securities Inc., EuroWeek

Exhibit 1 European MBS issuance. Reproduced with permission.

Whilst in the US it is auto-loan and credit card ABS that remain the prominent asset classes, alongside US-Agency MBS, in the European market the predominant asset class is Residential Mortgages (RMBS; see exhibit 1). RMBS accounted for over 55% of total issuance and over 90% of MBS in the European securitisation market in the first half of the year. A buoyant housing market, particularly in the UK, has driven high RMBS issuance. The CMBS market has benefited in recent years from the introduction of favourable insolvency coupled with the introduction of the Euro, eliminating currency concerns amongst investors

Collateral Types

ABS performance is largely dependent on consumer credit performance, and so, typical ABS structures include trigger mechanisms (to accelerate amortisation) and reserve accounts (to cover interest shortfalls) to safeguard against poor portfolio performance. Though there is no basic difference in terms of the essential structure between CDO and ABS/MBS, some differences arise by the very nature of the collateral and the motives of the issuer. Interestingly, whereas a CDO portfolio will have 100-200 loans for example, ABS portfolios will often have thousands of obligors thus providing the necessary diversity in the pool of consumers.

We now discuss briefly some prominent asset classes.

<u>Auto Loan</u>
Auto loan pools are were some of the earliest to be securitised in the ABS market and still remain a major segment of the US Market. Investors have been attracted to the high asset quality involved and fact that that the vehicle offers an easily sellable, tangible asset in the case of obligor default. In addition, since a car is seen as an 'essential purchase' and a short loan exposure (3-5 years) provides a disincentive to finance, no real pre-payment culture exists. Prepayment Speed is extremely stable and losses are relatively low, particularly in the prime sector.

Performance Analysis:
Loss Curves show expected cumulative loss through the life of a pool and so, when compared to actual losses, give a good measure of performance. In addition, the resulting loss forecasts can be useful to investors buying subordinate classes. Generally, Prime obligors will have losses more evenly distributed, whilst Non-Prime and Sub-Prime lenders will have losses recognised earlier and so show a steeper curve. In both instances, losses typically decline in the latter years of the loan.

The **Absolute Prepayment Speed (ABS)**[3] is a standard measure for prepayments, comparing actual period prepayments as a proportion to the whole pool balance. As with all prepayment metrics, this measure provides an indication of the expected maturity of the issued ABS and essentially, the value of the call option on the issued ABS at any time.
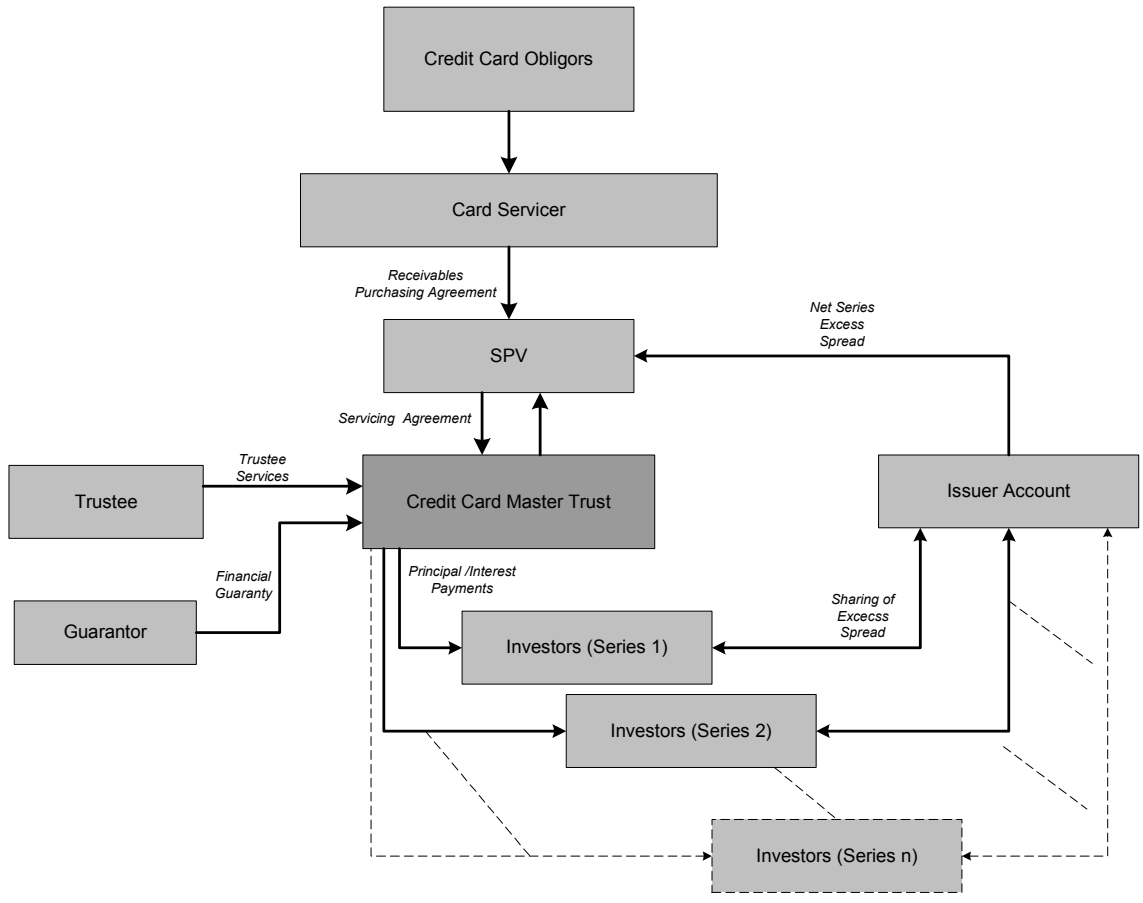
<u>Credit Card</u>
For specialised credit card banks, particularly in the US, the ABS market has become the primary vehicle to fund the substantial volume of unsecured credit loans to consumers. Credit Card pools are differentiated from other types of ABS in that loans have no pre-determined term. A single obligor's credit card debt is often no more than six months and so the structure has to differ from other ABS in that repayment speed needs to be controlled either through scheduled amortisation or the inclusion of a revolving period (where principal collections are used to purchase additional receivables).
Since 1991, the Stand-alone Trust has been replaced with a Master Trust as the preferred structuring vehicle for credit card ABS. The Master Trust structure allows an issuer to sell multiple issues from a single trust and from a single, albeit changing, pool of receivables. Each series can draw on the cash flows from the entire pool of securitised assets with income allocated to each pro rata based on the invested amount in the Master Trust.

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[3] Developed by Credit Suisse First Boston

Exhibit 2 Master Trust structure

Consider the example structure represented by Exhibit 2 above. An important feature is excess spread, reflecting the high yield on credit card debt. In addition, a financial guaranty is included as a form of credit enhancement given the low rate of recoveries and the absence of security on the collateral. Excess spread released from the trust can be shared with other series suffering interest shortfalls.

Performance Analysis:
The **Delinquency Ratio** is measured as the value of credit card receivables overdue for more than 90 days as a percentage of total credit card receivables. The ratio provides an early indication of the quality of the credit card portfolio.

The **Default Ratio** refers to the total amount of credit card receivables written off during a period as a percentage of the total credit card receivables at the end of that period. Together, these two ratios provide an assessment of the credit loss on the pool and are normally tied to triggers for early amortisation and so require reporting through the life of the transaction.

The **Monthly Payment Rate (MPR)**[4] reflects the proportion of the principal and interest on the pool that is repaid in a particular period. The ratings agencies require every non-amortising ABS to establish a minimum as an early-amortisation trigger.

Mortgages
The MBS sector is notable for the diversity of mortgage pools that are offered to investors. Portfolios can offer varying duration as well as both fixed and floating debt. The most common structure for agency-MBS is pass-through, where investors are simply purchasing a share in the cash flow of the underlying loans. Conversely, non-agency MBS (including CMBS), has a senior and a tranched subordinated class with principal losses absorbed in reverse order.

The other notable difference between RMBS and CMBS is that the CMBS is a non-recourse loan to the issuer as it is fully secured by the underlying property asset. Consequently, the Debt Service Coverage Ratio (DSCR) becomes crucial to evaluating credit risk.

Performance Analysis:
Debt Service Coverage Ratio (DSCR) = Net Operating Income / Debt Payments' and so indicates a borrowers ability to repay a loan with a DSCR of less than 1.0 meaning that there is insufficient cash flow generated by the property to cover required debt payments.

The **Weighted Average Coupon (WAC)** is the weighted coupon of the pool which is obtained by multiplying the mortgage rate on each loan by its balance. The WAC will therefore change as loans are repaid but at any point in time when compared to the net coupon payable to investors, give us an indication of the pools ability to pay.

The **Weighted Average Maturity (WAM)** is the average weighted (weighted by loan balance) of the remaining terms to maturity (expressed in months) of the underlying pool of mortgage loans in the MBS. Longer securities are by nature more volatile and so, a WAM calculated on the stated maturity date avoids the subjective call of whether the MBS will mature and recognises the potential liquidity risk for each security in the portfolio. Conversely, a WAM calculated using the reset date will show the shortening effect of prepayments on the term of the loan.

The **Weighted Average Life (WAL)** of the notes at any point in time is

$$s = \sum t.PF(s)$$

where

PF(s) = Pool Factor at s
t = actual/365.

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[4] This is not a prepayment measure since credit cards are non-amortising assets.

We illustrate this measure using the example below.

Example:

IPD	Dates	Actual Days (a)	PF(t)	Principal Paid	O/S	a/365	PF(t)*(a/365)
0	21/11/2003	66	1.00		89,529,500.00	0.18082192	0.18082192
1	26/01/2004	91	0.94	5,058,824.00	84,470,588.00	0.24931507	0.23522739
2	26/04/2004	91	0.89	4,941,176.00	79,529,412.00	0.24931507	0.22146757
3	26/07/2004	91	0.83	4,823,529.00	74,705,882.00	0.24931507	0.20803536
4	25/10/2004	91	0.78	4,705,882.00	70,000,000.00	0.24931507	0.19493077
5	24/01/2005	91	0.73	4,588,235.00	65,411,765.00	0.24931507	0.18215380
6	25/04/2005	91	0.68	4,470,588.00	60,941,176.00	0.24931507	0.16970444
7	25/07/2005	91	0.63	4,352,941.00	56,588,235.00	0.24931507	0.15758269
8	24/10/2005	92	0.58	4,235,294.00	52,352,941.00	0.25205479	0.14739063
9	24/01/2006	90	0.54	4,117,647.00	48,235,294.00	0.24657534	0.13284598
10	24/04/2006	91	0.49	4,000,000.00	44,235,294.00	0.24931507	0.12318314
11	24/07/2006	92	0.45	3,882,353.00	40,352,941.00	0.25205479	0.11360671
12	24/10/2006	92	0.41	3,764,706.00	36,588,235.00	0.25205479	0.10300784
13	24/01/2007	90	0.37	3,647,059.00	32,941,176.00	0.24657534	0.09072408
14	24/04/2007	91	0.33	3,529,412.00	29,411,765.00	0.24931507	0.08190369
15	24/07/2007	92	0.29	3,411,765.00	26,000,000.00	0.25205479	0.07319849
16	24/10/2007	92	0.25	3,294,118.00	22,705,882.00	0.25205479	0.06392448
17	24/01/2008	91	0.22	3,176,471.00	19,529,412.00	0.24931507	0.05438405
18	24/04/2008	91	0.18	3,058,824.00	16,470,588.00	0.24931507	0.04586606
19	24/07/2008		-	16,470,588.00	-	-	-

WAL 2.57995911

It is the time-weighted maturity of the cash flows allows potential investors to compare the MBS with other investments with similar maturity. These tests apply uniquely to MBS since principal is returned through the life of the investment on such transactions.

Forecasting prepayments is crucial to computing the cash flows of MBS. Though, the underlying payment remains unchanged, prepayments, for a given price, reduce the yield on the MBS. There are a number of methods used to estimate prepayment, two commonly-used ones are the Constant Prepayment rate (CPR) and the PSA method.

The CPR approach is:

$$CPR = 1-(1-SMM)^{12}$$

where **Single Monthly Mortality (SMM)** is the single-month proportional prepayment.

A SMM of 0.65% means that approximately 0.65% of the remaining mortgage balance at the beginning of the month, less the scheduled principal payment, will prepay that month. The CPR is based on the characteristics of the pool and the current expected economic environment as it measures prepayment during a given month in relation to the outstanding pool balance.

The **Public Securities Association (PSA)** has a metric for projecting pre-payment that incorporates the rise in prepayments as a pool seasons. A pool of mortgages is said to have 100%- PSA if its CPR starts at 0 and increases by 0.2% each month until it reaches 6% in month 30. It is a constant 6% after that. Other prepayment scenarios can be specified as multiples of 100% PSA. This calculation helps derive an implied prepayment speed assuming mortgages prepay slower during their first 30 months of seasoning.
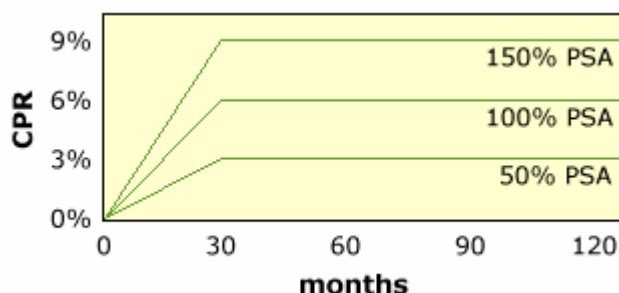
PSA = [CPR/ (.2) (m)]*100

where

m = number of months since origination.

Summary of performance metrics

Exhibit 3 lists the various performance measures we have introduced in this paper, and the asset classes to which they apply.

Performance Measure	Calculation	Typical Asset Class
Public Securities Association (PSA)	PSA = [CPR/ (.2) (months)]*100	mortgages, home-equity, student loans
Constant Prepayment Rate (CPR)	1-(1-SMM)12	mortgages, home-equity, student loans
Single Monthly Mortality (SMM)	prepayment / outstanding pool balance	mortgages, home-equity, student loans
Weighted Average Life (WAL)	$\sum$ (a/365).PF(s) Where PF(s)	mortgages
Weighted Average Maturity (WAM)	weighted maturity of the pool	mortgages
Weighted Average Coupon (WAC)	weighted coupon of the pool	mortgages
Debt Service Coverage Ratio (DSCR)	Net Operating Income / Debt Payments'	commercial mortgages
Monthly Payment Rate (MPR)	collections / outstanding pool balance	all non-amortising asset classes
Default Ratio	defaults / outstanding pool balance	credit card
Delinquency Ratio	delinquents / outstanding pool balance	credit card
Absolute Prepayment Speed (ABS)	prepayments / outstanding pool balance	auto loans, truck loans
Loss Curves	show expected cumulative loss	auto loans, truck loans

Exhibit 3

Conclusion

The CDO of ABS is conceptually similar to previous CDO but some of the compliance and performance test are different because of the different dynamics of the underlying assets. As such, it has become necessary for all those working and managing the product to familiarise themselves with ABS and MBS and the particular nuances between them that have been highlighted here for understanding.

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