

## Consulting Corner

### Back in the Forefront

by Andrew Davidson

The mortgage market has been the leader in securitization trends for many years. The mortgage-backed security, the collateralized mortgage obligation and the senior subordinate structure are innovations derived from the mortgage market. The mortgage market has also been the source of numerous other innovations in credit enhancement and structuring.

Over the past few years, the US mortgage market has trailed other markets including European mortgage markets. The recent growth of credit default swaps (CDS) and other synthetic transactions such as synthetic Collateralized Debt Obligations (CDO) in the US mortgage market, and particularly in the home equity (or sub-prime sector) will bring the mortgage market back into the forefront of innovation.

Due to the complexity of the mortgage market, mortgage research was in the forefront of analytical development. Effective duration, option adjusted spread and loss curves were all innovations that began in the mortgage market. However, in recent years the markets with synthetic trading of credit have developed more sophisticated credit risk measurement tools than the mortgage market. More analytical credit tools have been seeping into the mortgage market through the Basel II accord, which would bring the techniques used in other markets to the mortgage market.

With the development of the CDS market, the synthetic CDO market and the growing acceptance of Basel II approach to capital requirements, the seepage will become a flood. In a few years, all serious players in mortgage credit will be active users of the techniques of other credit products, including distribution assumptions, attachment points, correlations and copulas.

As a simple example of these techniques, I show the impact of changing the correlation between assets on the pricing of an extremely simplified mortgage transaction.

The transaction consists of \$100mm of imaginary one period mortgage assets. During the course of the one period (think one year), the assets can either make their full payment or default. There is a fixed probability for each loan to default, but the defaults of the loans are correlated. (Equivalently there is a common driving factor contributing to defaults for all loans.) Figure 1 shows the distribution of defaults from this simple model. All three lines show the distribution of defaults of 10%. That is, the average of the results is the same for all three curves. The lines differ in the amount of correlation among the defaults on individual loans. Equivalently, each line reflects a differing amount of the common factor. The model also assumes that there is a very large number of loans in the pool. Note in this model there are no prepayments.

For the situation with low correlation, the probability of default is centered on the average value of 10% and looks much like a normal distribution. As the correlation increases, the distribution becomes more

skewed. There is a substantial chance of low losses, but the chance of very high losses increases as well.

Figure 1.

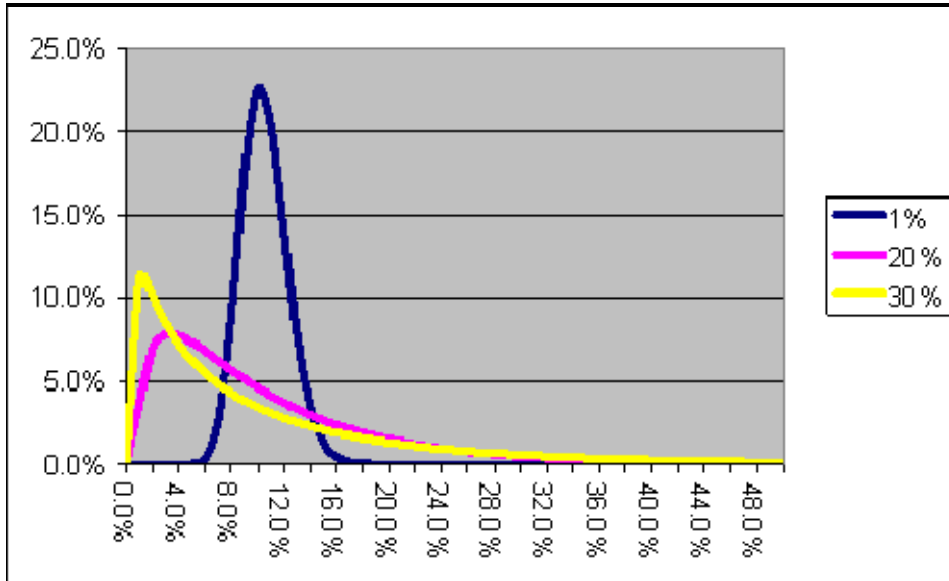


Table 1 shows the results of using this type of distribution to value simple securities.

The simple transaction presumes three securities: senior debt, mezzanine debt and equity. There is \$92 million of senior debt and \$4 million of mezzanine debt. The remaining balance represents the equity.

Using the model assumptions of 10% defaults, 25% severity and a 30% correlation, I determined the coupon required for each bond. Each bond is then repriced under a variety of scenarios. There are many interesting observations that can be made from the table. In particular, note how changing the correlation does not affect the value of the asset, but it does affect the distribution of value between the bonds. Also, note how a higher probability of default has the same impact as a higher severity on the value of the asset. However, they have different effects on the value of the securities.

Table 1.

		probability of default			
		5%	corr		
severity	25.0%		20%	30%	40%
		Asset	101.19	101.19	101.19
		Sr Debt	100.02	100.01	100.00
		Mezz	102.51	102.16	101.61
		Equity	4.97	5.01	5.06
		10%	corr		
severity	25.0%		20%	30%	40%
		Asset	100.00	100.00	100.00
		Sr Debt	100.01	100.00	99.99
		Mezz	101.43	100.00	98.44
		Equity	3.88	4.00	4.14
		15%	corr		
severity	25.0%		20%	30%	40%
		Asset	98.81	98.81	98.81
		Sr Debt	100.00	99.99	99.94
		Mezz	98.58	95.98	93.74
		Equity	2.93	3.15	3.37
severity	37.5%	10%	corr		
			20%	30%	40%
		Asset	98.81	98.80	98.81
		Sr Debt	99.97	99.90	99.79
		Mezz	97.14	94.53	92.64
		Equity	3.06	3.33	3.59
severity	12.5%	10%	corr		
			20%	30%	40%
		Asset	101.20	101.20	101.20
		Sr Debt	100.02	100.02	100.02
		Mezz	102.74	102.67	102.48
		Equity	4.96	4.97	4.98

For actual mortgage transactions, such simplified assumptions may hide important considerations of collateral performance and deal structure and the way various factors interact over time. Nevertheless, the simple model may provide insights into determining what components to include in a more detailed analysis.



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