11.432/15.427J Real Estate Capital Markets
Spring 2007

Case 3: CMBS Exercise
Due Thurs March 22, in class.

Purpose of assignment:
To give you some basic familiarity with a typical real world CMBS offering from the perspective of the
issuer, and to use that as a platform to build your understanding of some fundamental aspects of the
CMBS industry and the real estate capital markets .

You may work in groups of up to five. You should prepare a brief narrative report (typed doc max 4 pages plus at most 2 pages of exhibits) plus a PowerPoint presentation (max 5 slides) that your group will be ready to present to the class on the due date (both files should be handed in electronically plus hardcopy to the TA on the due date, with electronic cc to Prof. Geltner).

Background

In early 2005 General Electric Commercial Mortgage Corporation (GECMC) engaged Deutsche Bank Securities (DBS), a major CMBS investment bank, to launch a new series of CMBS certificates. GECMC is a subsidiary of General Electric Capital Corp (itself a subsidiary of GE Capital Services which is in turn a subsidiary of the giant parent firm, the General Electric Company). GE Capital is a major originator of commercial mortgages, including conduit loans.

GECMC wanted to sell a number of recently-issued loans to obtain cash so that GE Capital could originate more commercial mortgages, their primary business. Thus, GECMC had a diversified pool of loans that they hoped would make the core of a good CMBS issue. The pool that was put together consisted mostly of these GE Capital loans, but also included a few other loans from other major commercial mortgage lenders. The overall pool consisted of 127 commercial mortgages secured primarily by first liens on 138 commercial, multi-family and manufactured housing community properties. This included 92 loans from GE Capital, 17 loans from German American Capital Corporation, and 18 loans from Bank of America. The loans were all newly issued ("conduit" loans as opposed to "seasoned" loans), and in aggregate included $1,674,199,523 of outstanding balance ("par value"), collateralized by properties estimated to be worth in total approximately $2,355,000,000.

As usual, a trust was established (as a tax-exempt "REMIC" vehicle) to hold the pool of mortgage loans on behalf of the security holders, with LaSalle Bank acting as trustee. A master servicer contract was signed with GEMSA Loan Services (another GE subsidiary), to administer the pool and securities. A special servicer contract was signed with Lennar Partners to handle defaults, workouts, and foreclosures and other such problems that might (would) arise within the mortgage pool. (Lennar is a large, diversified real estate firm who ended up purchasing the so-called "B piece" of the issue, the security classes with credit ratings below the investment grade level of BBB-.) A team of investment banks was put together under the lead of DBS and Bank of America Securities. The securities were designed and structured, and credit ratings were obtained for the securities from S&P, Fitch, and Dominion Bond Rating Service. As required by the SEC

for any investment being offered to the public, a prospectus was prepared, dated February 3, 2005, and the public offering was made under the (not very sexy but typical) title of: "GECMC Commercial Mortgage Pass-Through Certificates, Series 2005-C1" (GECMC 2005-C1, for short). The issue closed on February 17.

By the standards of the day, this CMBS issue was considered a relatively simple, "plain vanilla" deal. Nevertheless, it might seem complex to the uninitiated. . .

A total of 27 classes (or "tranches") of securities were created from the underlying mortgage pool, including 22 par-valued classes and two IO classes described in the prospectus.[*] It was decided that 11 of the lower-rated tranches would be sold privately, not included in the public offering but included in the prospectus. The 12 top-rated par-valued classes, all those with a credit rating of "A-" or higher, containing the vast bulk of the loan pool value ($1,550,727,000 par value), plus one of the IO classes, was included in the public offering (13 classes in all). The private placement consisted of the remaining $123,427,000 in par value in 11 classes (including 10 with par values and one IO), with ratings of "BBB+" and lower.[†]

The Prospectus thus consists of two parts: A basic prospectus relating to the entire issue (24 tranches), and a more specific Supplement relating to the publicly-offered securities only (the front part of the document). The overall structure of the deal is summarized on page S-7 of the Supplement. The publicly-offered classes of securities are described in detail in pages 103-143 of the Prospectus Supplement, with the main description of the prepayment cascade in pp.108-126, and the main description of the credit loss cascade in pp.127-130. The loan pool is detailed in the Annex at the end of the Supplement (and also contained in the downloadable Excel file available on the course web site[‡]), and is summarized in pp.67-103 of the Supplement, with individual briefs on each of the 10 largest loans (and their underlying properties) on pp.10-65 of the basic Prospectus (after the annexes in the middle of the document). There is also a tabular summary of the pool characteristics at the end of the Annex and on pp.5-7 of the basic prospectus. As with all prospectuses, a major section is devoted to descriptions of the major investment risk considerations that potential buyers of the securities in the public market should be aware of (Supplement pp. 34-66).

The subordination structure of the GECMC 2005-C1 securities is typical of CMBS issues of the early 2000s. Of course, credit losses can occur from several sources, including loan payment delinquency, default, and losses in foreclosure (among others). Any credit losses to the pool (coming from _any_ of the mortgages) are assigned first to the bottom tranche (Class P), then to the next lowest (Class O), and so on up the ladder in reverse alphabetical order. Credit losses reduce the outstanding balance (par value) of whichever remaining class of security is lowest until that class is completely wiped out, before the next lowest class becomes exposed. (Reductions in par value commensurately reduce the amount of interest payments the security holders are entitled

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[*] The Prospectus mentions but does not describe three classes (L,R, and LR). These have no par value, are not for sale, and simply provide a device for the CMBS issuer to obtain "residual cash flows" in the pool, if any, after all of the other classes have been paid all that is owed to them. In essence, you may think of this CMBS issue including only the 24 classes described in the Prospectus.

[†] The seven lowest of these were bought by Lennar, representing 3.625% of the loan pool par value.

[‡] To open the Excel file, skip the password and open as "Read Only". You can still copy/paste data out of the file into another workbook.

to, as the interest owed equals the coupon rate times the par value for each bond.) The "senior classes" (the top seven classes: A-1 through A-5 plus A-AB and A-1A) all have equal subordination and would be docked credit losses on a pro-rata basis if all the subordinate classes were all already wiped out and there were still further credit losses in the pool.

Regarding default risk, the senior classes' initial subordination is 20% (meaning 20% of the initial pool par value is subordinated to the senior securities). Below that Class A-J has 13.375%. All eight of those "A" classes are rated AAA by the credit rating agencies. Below Class A-J, Classes B, C, D, and E have ratings of AA, AA-, A, and A- respectively. Together with Class X-P's IO securities, this completes the publicly offered securities of the GECMC 2005-C1 issue. The non-offered certificates range from the F Class' 6% subordination, which warrants an investment-grade BBB+ rating, down to Class O's 1.5% subordination (B- credit rating) and the first-loss Class P that has no protection (no rating).

Regarding maturity and interest rate risk (and prepayment risk), the retirement structure of the deal is "plain vanilla" except that the loans in the underlying pool were divided into two groups. The vast bulk of the loans are in Group 1, which is well diversified by property type. (Group 1 consists of 114 loans with over 91% of the total pool value.) Group 2 is not diversified by property type, consisting of 13 loans that are all secured by apartment properties.[*] The separation into two groups of loans is made to allow two different streams of principal payment cash flows to separately retire different classes of securities. In particular, payments of principal from the all-apartment Group 2 of loans will go first to the A-1A Class until that class is retired, while payments of principle from the diversified Group 1 of loans will cascade down the A-1 through A-5 classes until they are retired and only then may be available for A-1A if it still exists. Classes A-1 through A-5 will be retired sequentially in order, while Class A-AB will be retired according to a pre-specified schedule between months 60 and 113 (and will have first claim on payments of principal from the Group 1 loans for that purpose). After Class A-5 is retired, subsequent payments of principal will then retire Class A-J and then Classes B through P in alphabetical order. As most of the loans in the pool have a 10-year maturity (two loans have 15 year maturities), this results in contractual weighted average maturities (WAMs) ranging from 2.61 years for Class A-1, down to 9.85 years for Class A-5, and on down to 11.76 years for Class P at the bottom of the principal payment waterfall.

A final aspect of the GECMC 2005-C1 issue that is worthy of note is the pass-through coupon rates assigned to each class. These are generally assigned to allow the investment grade classes (Class H and above) to sell at or near par value, while the below investment grade classes are assigned coupon rates approximately equal to the original weighted average coupon rate in the pool.

Before beginning the exercises . . .

Download the Prospectus pdf file (which includes the Supplement in the front), and look it over briefly (obviously, we don't expect you to read it in its entirety for this assignment, but get a feeling for the nature of both the document and the security offering).

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[*] One loan is backed by a portfolio of three apartment properties in Charlotte, NC.

Download the *Morgan Stanley CMBS Primer, 5th Edition*, and use this (as well as Geltner-Miller Section 18.1 and Chapter 20) as a basic reference as you perform the exercises below. (If you make judgments based on these references, please cite the source in your case write-ups, to assist the TA.)

Exercise 1: Gaining familiarity with the loan pool…

The most fundamental aspect of any CMBS issue is the loan pool underlying the securities, and the properties collateralizing those loans. As a first exercise, we would like you to examine the loan pool information in the prospectus and in the downloadable "Annex_LoanPool" Excel file.

Deliverables:
(1) See if you can explain why the largest loan in the pool is represented as having a 63.77% LTV when the loan balance is $97,255,523 and the collateral property (a shopping mall in Michigan) is evaluated at $305,000,000.

(2) Use the Excel file to construct histograms (more detailed than the tables in the prospectus) of the frequency distribution of the loans' LTVs, DSCRs, and Remaining Term to Maturity (or advance payment date), as of the cut-off date of the CMBS issue.

(3) Identify the largest loan, the smallest loan, the ones with the longest maturity, and tabulate the percentage of total pool par value that is included in the 10 largest loans detailed in the Prospectus briefs.

(4) How many manufactured home community loans are there in the pool, and what fraction of the overall pool value do they represent?

Exercise 2: Default Risk…

As you know (from lectures and the text, right?...) default risk, and the potential "credit losses" associated with such risk, is a major source of concern for investors in CMBS. This risk (and its perception) can therefore have a large impact on the market value (and hence the prices obtained in the market place) for such bonds. A basic way to think about the amount of default risk in a mortgage based investment is to multiply the probability of mortgage default times the "severity" of the loss in the event of default. Though crude, the result is a kind of "expected credit loss" measure as a fraction of loan value, or, for a pool of mortgages, you could think of it as an expected loss of pool value due to credit events.[*]

The simplest way to measure the probability of mortgage default is by the "lifetime" or "cumulative" default probability for a given mortgage, that is, the probability that the loan will

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[*] This ignores the timing of the defaults within the life of the mortgage(s), and the resulting impact on the investment return or yield. For the interested student, a more in-depth perspective on the impact of credit losses on mortgage (or CMBS) market yields and asset valuation is presented in Sections 18.1 and 19.2 of the Geltner-Miller text (pps.439-448, 475-485). You are not, however, required to read these sections to do this exercise.

default *at any time* during its life, that is, any time prior to its contractual maturity. The simplest way to measure the loss severity is by the percent of outstanding loan balance owed at the time of default that would *not* be recovered through the foreclosure process.

Some historical data that is widely cited in the industry, relevant to both of these measures, is given in the Morgan Stanley Esaki at al study which you can download from the course web site

EXHIBIT 6B
Lifetime Default Rates by Origination Cohort (by Loan Count)
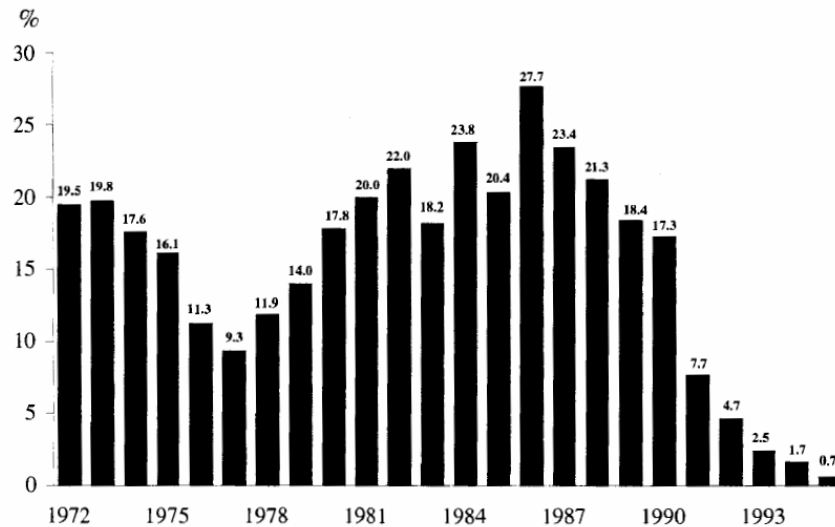
Source: Morgan Stanley.

in the "Esaki_REF2002" pdf file (see the Class Resources section of the Materials page).[*] Exhibit 6B of this report is reproduced here. Each bar in the exhibit shows the percentage of commercial mortgages issued in the year indicated on the horizontal axis, which experienced a default at some point in the loan life (up to the cutoff date of the study at the end of 2000).[†]

For example, the worst cohort was the loans issued in 1986, 27.7% of which had defaulted by the end of 2000. On the other hand, only 9.3% of the loans originated in 1977 ever defaulted. The overall average lifetime rate across all of the loan cohorts in Exhibit 6B is 16.4%.[‡] The Esaki

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[*] An updated version of this study is presented in Chapter 12 of the Morgan Stanley CMBS Primer, 5th Edition, which is also available in the Class Resources section of the course web site. And an updated version of the study is discussed in the Geltner-Miller text Chapter 18 (see section 18.1.3, pp.443-448). However, for this exercise let's use the 2002 *REF* article whose results are presented in the chart above.

[†] Note that the data source for the Morgan Stanley studies was the loan pool of the American Council of Life Insurers (ACLI). These are whole loans held in life insurance company portfolios. Thus, their default experience may be different from that of conduit loans, which are a much more recent phenomenon.

[‡] Note however that the more recently issued cohorts would not have had time to complete their entire lifetime default behavior by the end of the data cutoff in 2000. This is one reason the most recent cohorts have such a low default rate. Nevertheless, this data truncation cannot explain most of the recent decline in default rates, as historically almost half of all commercial mortgage defaults occur within the first five years of loan life. In fact, subsequent to the disastrous experience of the late 1980s and early 1990s commercial mortgage underwriting standards became stricter. This combined with a booming real estate market (either in the space market or the asset market, or both) in the late 1990s and early 2000s has given commercial mortgages a much better default performance record in recent years.

study found an overall average loss severity of 34%, meaning that among loans that defaulted, the average losses (in expenses, foregone interest, and lost principal) equaled 34% of the loan outstanding balances.

A crude but interesting way to understand the credit loss risk exposure of a CMBS issue is to apply expected credit loss analysis to the tranches in the issue. This can be done in a sensitivity analysis framework to gain insight about the nature of the credit loss risk the CMBS securities face, as a function of their credit ratings. We would like you to perform such an exercise on the GECMC 2005-C1 issue here…

Deliverables:
(1) Multiply the Esaki overall average lifetime default rate times the Esaki overall average loss severity to obtain a sort of overall average credit loss factor, a type of average expected losses among commercial mortgages. Then apply this loss factor to the GECMC 2005-C1 securities, from the bottom up (based on their subordination credit support), and tell us which tranches (which classes of securities) would be completely wiped out by such "average" credit losses, and which class of securities would be the bottom one affected at all, and what is its bond credit rating.

(2) Repeat the exercise (1) above only now model a "worst case" scenario in which the lifetime default rate of the worst historical cohort in the Esaki study happens again.

(3) Repeat the exercise again, only now assume that the default experience will be that indicated in the most recent five cohorts (1991-95) in Exhibit 6B.

(4) Present your findings here in a simple well designed PowerPoint graphic.[*]

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[*] You may (but need not if you have a better idea) model this on the graphic in class lecture notes entitled "Conduit Capital Structure vs ELS Study" (approximately Slide #36).

Exercise 3: Pricing the Securities…

The "bottom line" in any CMBS issue is the pricing of the securities. The most important and fundamental measure of the success of the issue is the gross profit (you can think of it as "NPV") generated by the difference in the aggregate price of the CMBS securities issued minus the cost of the mortgages placed into the pool. This profit represents the *economic value created* by the CMBS issuance, and from this gross profit the administrative costs and overhead and required profit margins of all of the various entities that participate in the creation and issuance of the CMBS securities must be obtained.[*] Here we want you to go through a somewhat simplistic (and only approximate), but illustrative and hopefully instructive, exercise of pricing the 24 tranches of securities created in the GECMC 2005-C1 issue.

To perform this exercise you will need to create a table in Excel in which each of the security classes is a row in the table, with much of the summary information from the table on page S-7 of the Prospectus Supplement entered in columns. You should be able to price each security class separately in the Excel worksheet. To do this, you will work with the fundamentals:

    (i)   The price of each security class is the present value of its expected (contractual) future lifetime cash flow stream discounted at the market yield to maturity applicable to that class;

    (ii)   (ii) The (contractual) cash flow stream is determined by the Class' initial par value, its coupon ("pass-through") rate (determines the interest), and its contractual maturity as indicated in the "Principal Window" column of the Summary table on page S-7 (determines the payout of principal balance in the tranche);

    (iii)   (iii) The market yield to maturity applicable to each class is a function of the default risk of the tranche (as indicated by its credit rating) and by its maturity as indicated by its weighted average life and the slope of the current yield curve in the bond market.

Deliverables:
(1) Expand your Excel table 180 columns out to the right to represent the 180 future months envisioned in the contractual lifetimes of the mortgages in the pool (note that the end of the longest principal window is 180 months for Class P, reflecting the fact that there are a couple of 15-year mortgages in the pool[†]). Assume that only interest is received by each tranche until the beginning month of its "Principal Window", and that the tranche is completely retired by the end of its Principal Window. For simplicity (and because it is probably approximately correct), assume that for each tranche the principal is amortized during the Principal Window by a monthly payment level annuity in arrears (i.e., of the type for which the Excel *PMT(coupon/12, EndWindowMonth – BegWindowMonth, Par$)* function can be used. For simplicity, assume that
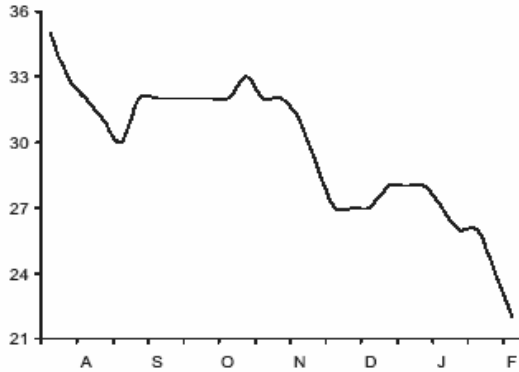
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[*] It should be noted that apart from the net difference between the cost of the loan pool and the gross proceeds from the sale of the securities based on it, there is another potential source of profit to the CMBS issuer, namely "residual cash flows" in the pool, that is, extra cash flow that none of the 24 security classes described in the Prospectus are entitled to.

[†] But please note: In general specific mortgages are not assigned to any specific classes of securities. The mortgages are completely "pooled" in the trust, and the securities get their cash from the trust. In the case of GECMC 2005-C1 there is some differentiation within the pool into the "Group 1" and "Group 2" loans, for purposes of (contractual) principal repayment. But this is sufficiently accounted for in the "Principal Window" indicated for Class A-1A in the table on page S-7. You need not (and should not) worry about assigning any specific mortgages to any specific classes in this exercise.

for the IO tranches the cash flow in the first month equals the notional par value times the notional coupon rate (divided by 12), and then assume this cash flow declines linearly over the entire Principal Window of 120 months (reflecting the reduction in excess interest as par value is retired from the pool).[*] The result should be a 24X180 cell table of future contractual cash flow projections for the certificate classes.

(2) Develop estimates of the market yields for each security class, based on the currently prevailing CMBS yield spreads and the currently prevailing yields in LIBOR Swaps and U.S. Treasury Bonds. You can do this using the spreads information for the six major fixed-rate credit ratings in the "CMBS Spreads" table below (taken from the February 4, 2005 issue of *Commercial Mortgage Alert*).[†] For simplicity (and consistency) assume that the relevant current yields are 4.3% for 5-year Swaps, 4.7% for 10-year Swaps, 3.7% for 5-year T-Bonds and 4.1% for 10-year T-Bonds; and assume that the yield curve is linear over the relevant range.[‡] Assume that a "+" rating reduces the spread by 2 basis points, and a "-" rating increases the spread by 2 basis points. Assume that the spread for the Non-Rated Class P is 1200 bps, and for the two IO classes it is 150 bps. The result should be a table presenting your estimated market yields for each of the 24 tranches.

(3) Apply the Excel *NPV(yield/12, CFrange)* function using the cash flows and yields you calculated in steps (1) and (2) above to derive an estimated market value for each of the 24 tranches.

CMBS SPREADS

10YR, AAA SPREAD OVER SWAPS

Fixed Rate (Conduit)	Avg. Life	Spread (bps)		
		2/1	Week Earlier	52-wk Avg.
AAA	5.0	S+19	S+22	S+29
	10.0	S+22	S+24	S+31
AA	10.0	S+29	S+31	S+38
A	10.0	S+39	S+40	S+46
BBB	10.0	T+124	T+124	T+128
BB	10.0	T+310	T+315	T+371
B	10.0	T+750	T+760	T+849
Floating Rate (Large-loan)				
AAA	5.0	L+15	L+15	L+15
AA	5.0	L+32	L+32	L+35
A	5.0	L+52	L+52	L+62
BBB	5.0	L+130	L+130	L+141

Source: Morgan Stanley

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[*] In reality the IO cash flow stream would be a bit more complicated than this. Also, the Class A-AB principal is retired according to a pre-specified schedule (in Annex 5 of the Prospectus Supplement). But we will ignore these subtleties in this exercise.

[†] Use the 2/1 spreads in the first column.

[‡] The bond market "yield curve" is explained in Geltner-Miller section 19.1.3 (pp.469-471), and is reported daily in the *Wall Street Journal* and web sites such as www.smartmoney.com. Usually shorter maturity bonds have lower market yield rates. Here in this exercise we are simplifying the yield curve while retaining its essence. As instructed here, for example, the yield for a bond with WAM of 2.5 years would be: 4.7% - (10-2.5)(4.7%-4.3%)/5 = 4.1% for a Swap; or 4.1% - (10-2.5)(4.1%-3.7%)/5 = 3.5% for a T-Bond. To this you would need to add the default risk premium spread indicated in the "CMBS Spreads" table from *CMA*. For bonds of rated above BBB+, the spread is added to the appropriate maturity Swap yield; for bonds BBB+ and below the spread is added to the appropriate maturity T-Bond yield. For our purposes in this exercise, assume that the Swap spread for any AAA bond less than 7.5 years WAM is the 19 bps indicated for the 5-yr average life, and for any AAA bond of longer maturity it is the 22 bps indicated for the 10-yr average life. (For this purpose assume the IO tranches have a 5-yr WAM.)

(4) Total the estimated market values across the 24 tranches and compare the resulting aggregate market value for the issue to the aggregate loan pool outstanding balance (par value). What is the resulting estimated gross profit (or loss) from the security issue, assuming that the loan pool actually cost its par value to acquire.[*] Add an additional $40,000,000 of present value of profit expectation to reflect private residual tranches held by the issuers, to get the overall profit up to typical magnitudes.

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[*] In reality this might not be the case. For example, if market interest rates have increased since the loans were issued the pool might be acquired for less than its aggregate par value. Also, in the primary market (from the perspective of the mortgage originators who are selling the loans into the pool), up-front fees and discount points in the mortgages could have caused the actual cost of issuing the loans to be less than their initial par values (initial outstanding principal balances). On the other hand, if interest rates have fallen since loan issuance, the pool might cost more than its aggregate par value. And keep in mind that the administrative and overhead costs and required profit of the intermediary and servicing agents must be paid from the gross profits (e.g., the investment bank fee). Note however that the quoted pass-though coupon rate is net of a service charge that is taken out of the pool cash flow each month to pay the regular servicing and administrative costs of the trust.

Exercise 4: Gaining Some Perspective…

The CMBS market has evolved in a rather interesting manner over the past several years. Similar to other aspects of the real estate capital markets and asset markets, the commercial mortgage and CMBS markets are much more aggressive and "expensive" than they were a few years ago. Down on Main Street, loan originators are being more aggressive in their underwriting (that is, applying loan approval conditions and terms that could result in more risk in the loans), though this is still a far cry from what was going on in the mid-to-late 1980s. On Wall Street, CMBS subordination levels have come down dramatically. (See the Exhibits below.) Thus, less credit support is now being required by the credit rating agencies to receive a given credit rating. Furthermore, CMBS spreads have narrowed, especially recently, to levels not seen since before the financial crisis of 1998.[*]

CMBS Spreads Over 10-Year Treasury: Investment Grade

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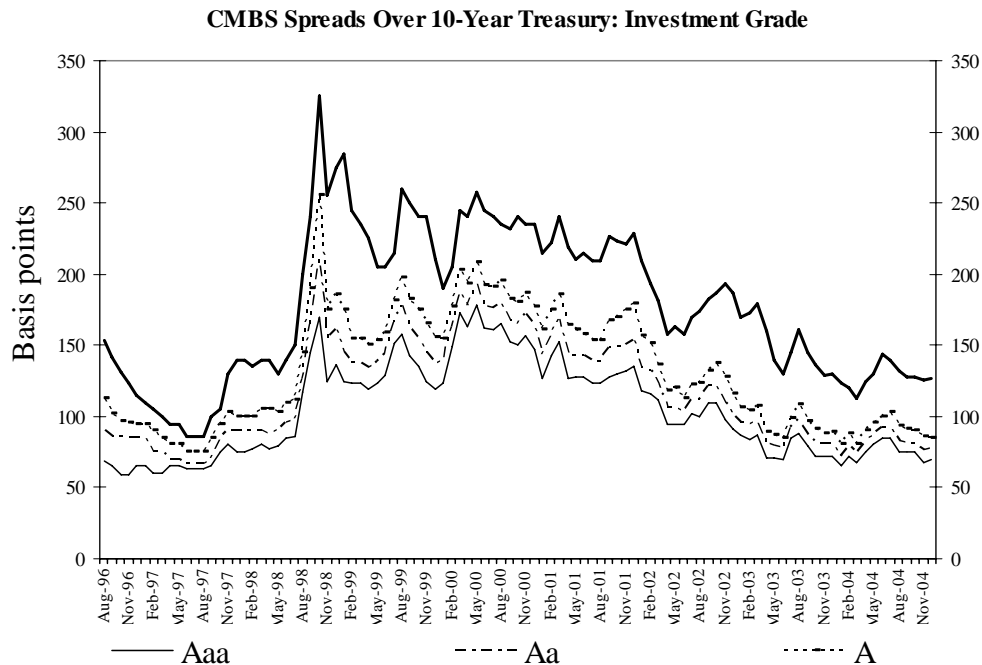
[*] See Geltner-Miller section 20.3.4 (pp.509-512) for a description of the 1998 financial crisis and the CMBS market at that time.

CMBS Spreads Over 10-Year Treasury:
Non-Investment Grade
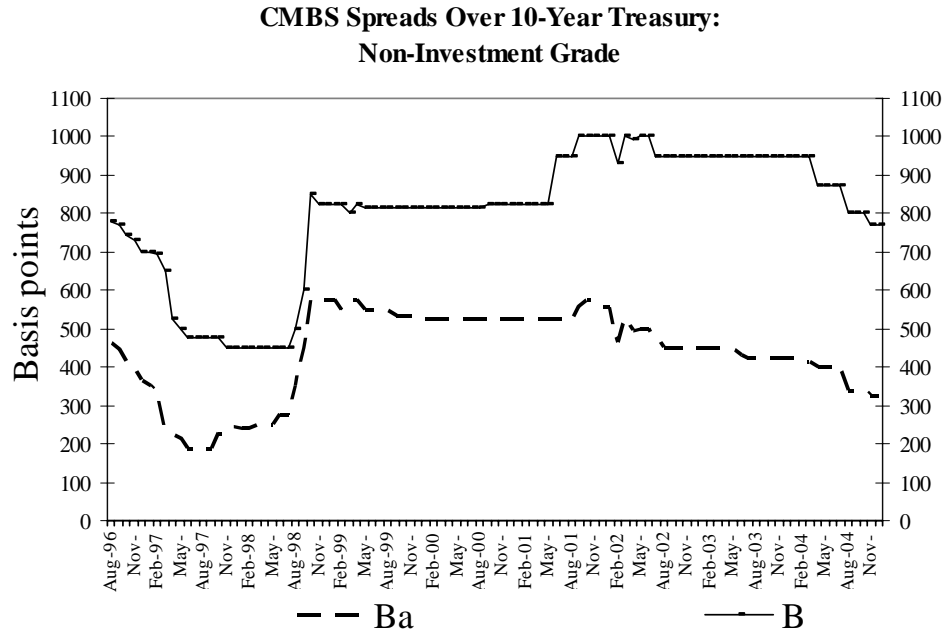
This means that investors buying CMBS are paying higher prices, in effect, for a given credit rating. In part, this certainly reflects the recent more favorable experience with commercial mortgage default, as indicated earlier in our discussion in Exercise 2 (for example in the Esaki studies). An in part it reflects the capital markets' newly acquired appetite for real estate investments of all types, and the resulting flow of capital into both debt and equity real estate investments.

Nevertheless, capital markets have been known to change and reverse directions quickly in the past, and it could happen again. In this exercise we would like for you to use the historical experience surrounding the 1998 financial crisis to see what would happen to the profitability of a CMBS issue such as GECMC 2005-C1 if conditions in the capital markets suddenly changed to levels experienced in the not-too-distant past. . .

Deliverables:
(1) Reprice the securities in the GECMC 2005-C1 issue holding everything as before (including credit rating, coupon rates and yield spreads, and the total amount of loans in the pool, and also including the $40,000,000 residual profit), only now suppose that this issue had to be structured using the credit support subordination levels that prevailed in 1998, according to Table 1 below. In performing this exercise, you will have to recalculate the amount of the pool's par value that will be assigned to the securities in aggregate within each of the six major credit rating levels (AAA, AA, A, BBB, BB, B).[*] What is the new aggregate market value for the issue as a whole?

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[*] In performing this exercise, hold constant the proportion of each class *within* each major credit rating category. For example, previously the total par value of the eight classes with AAA ratings (Classes A-1 through A-J) was: (100% – 13.375%)($1,674,200) = $1,450,275 (in thousands). Now it will be: (100% – 29%)($1,674,200) = $1,188,682. However, the *proportion within* that AAA total assigned to each class will remain the same. Thus, Class A-1 was $75,842 / $1,450,275 = 5.23%, and so it will now be: (.0523)($1,188,682) = $62,162 (thousands). Similarly, the two AA classes (Classes B and C) were (13.375% – 9.875%)($1,674,200) = $58,597 (thousands) both together. Now they will be: (29% – 24%)($1,674,200) = $83,710 (thousands).

How does this compare to your answer in Exercise 3 (Question 4)? In other words, how much value has been "created" by the credit rating agencies (as representatives of the bond market?) having "decided" that less credit support is necessary in CMBS issues (for a given credit rating), in other words, in effect, that commercial mortgages are less risky than the market previously thought? (Think about how much value could be "lost" if the market changed its mind and went back to the previous perception.)

Table 1

Subordination for Conduit/Fusion Transactions

	1998	1999	2000	2001	2002	2003	2004 [1]
AAA	29%	27%	23%	21%	20%	17%	14%
AA	24%	22%	19%	17%	16%	14%	12%
A	18%	17%	14%	13%	12%	10%	9%
BBB	13%	12%	11%	9%	8%	7%	5%
BB	6%	6%	5%	4%	4%	3%	3%
B	3%	3%	3%	2%	2%	2%	2%
CCC	2%	2%	2%	2%	2%	1%	1%

[1] As of August 19, 2004
Source: Morgan Stanley, Commercial Mortgage Alert

(2) Perform the same exercise as in (1) above, holding everything constant only now apply not only the 1998 credit support subordination levels, but also the *April* 1998 yield spreads, as indicated in Table 2 below. [*] Thus, you are pricing the GECMC 2005-C1 securities based on current 2005 interest rates, but with 1998 subordination levels and April 1998 yield spreads, *just prior to the 1998 financial crisis.* Note not only the aggregate value of the total of all of the securities, but also note in particular the value of the three "B" rated tranches (Classes M,N,O).

(3) Finally, perform the same exercise as in (2) above, only now apply the yield spreads of *December* 1998, reflecting the financial crisis of that year. Compute the total aggregate market value of all the securities, and compare this against the pre-crisis value you computed in (2) above. How much of a hit did the value of the entire issue take as a result of the crisis (both in absolute dollars and in percent of the aggregate issue value)? Perform the same comparison for the three B-rated classes (M,N,O). What percentage of the B classes' value has been lost. Suppose you were an investment bank specializing in CMBS like Nomura Securities at that time in 1998. Because of your confidence in your knowledge of the market, you were holding a huge

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[*] Note: the yield spreads in Table 2 are quoted relative to 10-year U.S. Treasury Bonds for *all* rating levels. Hold the T-Bond yield rates and yield curve assumption as before in Exercise 3, in effect, work with 2005 interest rates. We want you to see the pure effect of changing yield spreads (and subordinations in the previous question) holding everything else constant.

quantify of _highly levered_ investments in such B-rated securities. Do you see how you could be completely wiped out and bankrupted by such a "crisis" in the financial markets?[*]

Table 2: CMBS Mkt Yld Spreads (bps) over 10-yr T-Bonds			
	Dec.2004	Dec.1998	Apr.1998
AAA	70	136	77
AA	77	161	88
A	85	186	105
BBB	127	275	140
BB	325	575	250
B	770	825	450

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[*] Of course, this is exactly what did happen to Nomura Securities in 1998. Recall, furthermore, that the crisis of 1998 was not at all based in any fundamental problem in the real estate space or capital markets. Rather, it was caused by a default by the Russian government and a resulting panic that caused a "flight to quality" in the world bond markets, which bid up the price of U.S. Treasury Bonds and at least temporarily dried up the liquidity in other bond markets, especially for low-credit bonds.