90

CMBS Structure and Governance: An Empirical Analysis of Security Design and the Role of the Special Servicer

by

KRISTIN E. BLOUNT

B.S. Business Administration, Boston College, 1986

and

JAY G. HOOPER

A.B. Economics, Harvard University, 1984

Submitted to the Department of Urban Studies and Planning
In Partial Fulfillment of the Requirement for the Degree of

MASTER OF SCIENCE IN REAL ESTATE
at the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
September, 1998

Signature of Author .....
Department of Urban Studies and Planning
July 31, 1998

Signature of Author ...
Department of Urban Studies and Planning
July 31, 1998

Certified by .....
Timothy J. Riddiough
Associate Professor
Thesis Advisor

Accepted by .....
William C. Wheaton
Chairman, Interdepartmental Degree Program in Real Estate

CMBS STRUCTURE AND GOVERNANCE: AN EMPIRICAL ANALYSIS OF SECURITY DESIGN and THE ROLE OF THE SPECIAL SERVICER

by

KRISTIN E. BLOUNT
and
JAY G. HOOPER

Submitted to the Department of Urban Studies and Planning and the
Department of Architecture
on July 31, 1998 in Partial Fulfillment of the Requirement for
The Degree of Master of Science in Real Estate

ABSTRACT

The CMBS market has experienced tremendous recent growth. Issuances in 1998 are anticipated to double 1997 levels of approximately $44 billion. At this point in the development of the market, most participants have a good understanding of the basic investment characteristics of commercial mortgage-backed securities. However, as the CMBS market continues to evolve and as innovations occur in security design and structuring and in security governance, participants should be cognizant of the impact of these elements on subordination levels, as set by the rating agencies, and on security pricing, as set by investors.

This thesis empirically examines the determinants of CMBS security pricing and subordination levels, focusing on the influences of security design and governance as it pertains to special servicing. For security design, we examine whether rating agencies and investors recognize complexity. With respect to special servicing, we examine the contrasting theories of the conflict of interest between the AAA-rated classes and the Special Servicer, and of the efficiency of the Special Servicer governance mechanism.

Regression analysis is performed on 125 AAA-rated securities derived from 70 CMBS issuances between 1994 and 1996. The results of our analyses show that complexity is costly, as rating agencies increase subordination levels and investors increase security yield spreads in response to complexity issues in security design and structuring. In addition, regarding the role of the Special Servicer, our findings suggest that rating agencies and investors recognize the conflict of interest theory over the efficiency theory. Furthermore, rating agencies and investors appear to adjust subordination levels and prices in response to the presence of certain Special Servicers.

Thesis Supervisor: Timothy J. Riddiough
Title: Associate Professor

Acknowledgements

We would like to thank AEW Capital Management and Charter Research for their hospitality during the many hours we spent in their libraries compiling our database. We would also like to thank BankBoston, AMRESCO, and Fidelity Investments for their contributions.

Many thanks to Mike Ervolini of Charter Research, Steve L'Heureux of AEW, Tom Doherty of JP Morgan, Haejen Baek of Lehman Brothers, Tony Woods of John Hancock Research, Sameer Nayar of Moody's, Tim Dwyer of BankBoston, and Roger Mann of Corcoran Jennison for their thoughtful insights and words of advice. Most of all, we are grateful to Robin Davis of BankBoston for her undying patience and efficient editing.

Finally, we want to thank our advisor, Tim Riddiough. His wisdom and sense of humor were truly inspirational.

TABLE OF CONTENTS

Chapter 1

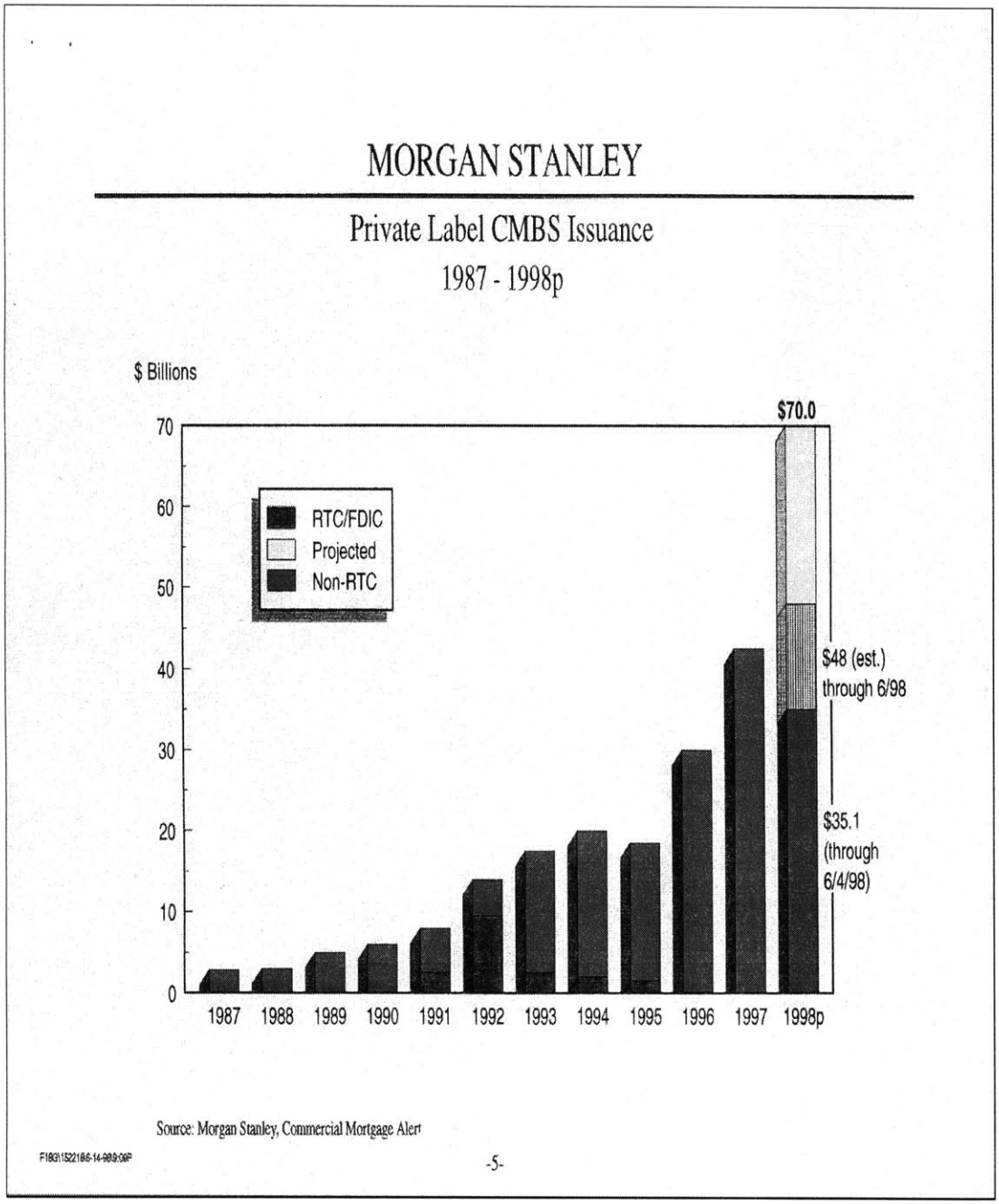
INTRODUCTION

The Research Topic and Its Importance

The secondary market for commercial mortgages has grown significantly over the past several years. Indeed, recent growth has been explosive, with record issuance in 1997 of approximately $44 billion, an increase of over 40% from 1996 issuances. Figure 1 illustrates the growth in CMBS issuances during the 1990s. According to Corcoran and Phillips (1998), the primary factors fueling this growth are declining interest rates, strong real estate fundamentals, and growing interest in CMBS relative to other fixed income investments. These conditions, coupled with low prices for CMBS securities - as evidenced by the declining trend in spreads over comparable Treasuries over the past few years – appear to have created fertile ground for a flourishing market.

Today, the CMBS market appears firmly established as a viable financing mechanism for real estate owners and is an alternative to traditional debt financing through whole loan providers. From a borrower's standpoint, this is an attractive financing mechanism because debt cost can be lower and time to closing shorter than with traditional lenders. From an investor's point of view, CMBS are desirable securities because risk is spread among different investors and tranches, and these assets are generally more liquid than owning a whole loan. Insurance companies, who were traditionally whole loan providers, are the largest class of CMBS investors. The popularity of CMBS is also

Figure 1


MORGAN STANLEY
Private Label CMBS Issuance
1987 - 1998p
$ Billions
$70.0
70
60
50
40
30
20
10
0
RTC/FDIC
Projected
Non-RTC
$48 (est.)
through 6/98
$35.1
(through
6/4/98)
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998p
Source: Morgan Stanley, Commercial Mortgage Alert
-5-

a function of the unique risk/return characteristics that these complex securities possess, particularly the lower rated tranches which exhibit both debt and equity characteristics.

At this point in the growth of the CMBS market, most participants have a good understanding of the basic attributes of CMBS. Much has been written about the performance of the underlying properties and the characteristics of the loan pool comprising CMBS, as well as their influence on subordination levels set by rating agencies and on prices paid by investors. However, little empirical research has addressed the impact of security structure and governance on subordination and pricing. This is meaningful because cash flow timing risk is introduced not only by the performance of the mortgages in the pool, but by the design and servicing of the securities. Additionally, by virtue of their complex nature, CMBS securities can be hard to understand and difficult to analyze. Moreover, the presentation of the deal prospectuses, as well as the legal language comprising it, is often confusing.

With the development and continued maturation of the CMBS market, the security design and structure of CMBS transactions has become increasingly important.
The basic structure of CMBS involves a senior-subordinated design that gives cash flow priority to the senior classes and shifts default risk down the structure to the lower classes. Nonetheless, there are variations between different CMBS deals in how cash flows are allocated, from relatively simple structures, as represented by Nomura issuances, to complex structures, as represented by some Lehman Brothers SASCO issuances. Underwriters and investment banks create different securities to satisfy the

demands of various investors and to differentiate themselves from their competitors. Financial innovation, however, often leads to a tendency to create complex and sophisticated securities to match perceived investor preferences with security risk. Complexity can diminish liquidity for a security, though, if fewer investors understand the security and this correspondingly results in a reduced level of demand. Thus, underwriters and investment banks must balance investors' desires for structural innovation with liquidity and complexity concerns. Consequently, it is important to understand how these securities differ, and whether investors and rating agencies respond to the complexity of the securities by adjusting pricing and subordination levels on CMBS transactions.

An additional, important structural component relating to security governance in CMBS is the Special Servicer. In the initial stages of the development of the CMBS market, transactions typically had a single servicer (a Master or Primary Servicer) who handled all aspects of loan servicing, including collection, disbursement, advancing, monitoring, and reporting. The servicing structure has evolved such that there typically is a Master Servicer who is responsible for the day-to-day loan servicing, and a Special Servicer who becomes active in the event of a loan default or an anticipated default.

The Special Servicer is the entity responsible for servicing non-performing mortgage loans and managing real estate assets that have been foreclosed on, including disposition of the foreclosed property. The role of the Special Servicer is important and vital to preserving collateral value and protecting a transaction's credit quality. Special Servicers

usually have significant flexibility to negotiate with borrowers, modify loans, foreclose on loans, and manage and liquidate real estate owned.

Although flexibility is valuable, the existence of a Special Servicer introduces a potentially serious conflict of interest issue within the CMBS structure. While the Special Servicer has a responsibility to act in the best interests of all certificate holders, the most subordinate investment class typically controls the Special Servicer. Because the interests of the senior and subordinate classes are not always aligned, the Special Servicer can make decisions that are favorable to the controlling (most subordinate) class and detrimental to the senior class. Its role becomes particularly crucial in the event of loan default on a balloon payment, because it controls the decision to foreclose or extend, and this imparts significant cash flow timing risk, as well as potential credit risk, for the senior classholders. The conflict of interest arises here because the senior classes would typically choose to foreclose quickly, since they have significant downside risk associated with loss of principal, and their upside potential is capped. This is particularly true when the loan-to-value ratio is high and/or when the market is deteriorating. Conversely, the subordinate classes would prefer to extend because they have minimal downside risk and significant upside potential. Extension not only delays their recognition of losses, which would reduce their certificate balances, but it creates the opportunity for recovery.

The role of the Special Servicer is important and seemingly under-appreciated by investors currently. The CMBS market gained its popularity in the early 1990s, at the tail

end of an economic recession. Moreover, it established its foothold in a bull market and has not experienced a full real estate cycle. Given the advancing stage of the current real estate cycle, the possibility of a forthcoming recession is present. The role of the Special Servicer becomes increasingly critical during times of economic hardship.

These two characteristics of CMBS, security structuring and governance as it pertains to special servicing, represent the key research areas for this thesis. Utilizing prior work of Polleys and Riddiough (1998) as a platform from which to explore these topics, our investigation will extend and will fill in the gaps in their analysis, which concentrated primarily on loan pool characteristics, and only tangentially addressed security design and governance. Similar to Polleys and Riddiough, our examination concentrates on the AAA tranches and encompasses CMBS issuances between 1994 and 1996. We have focused on this timeframe because it was a formative period in the CMBS market when investors were learning, the market was evolving, and participants were searching for fundamental structure.

For both security structuring and special servicing, we will identify and explore factors that might have relevance to both investors and rating agencies. Through quantitative analysis, we will attempt to identify which structural and governance factors are significant to pricing and the establishment of subordination levels. The significance of these variables will be tested using multiple regression analysis on 125 AAA-rated securities derived from 70 different CMBS offerings.

With respect to security design, the fundamental questions underscoring this thesis are: Does it matter how many or what kinds of tranches are created (i.e., how many AAA classes, subordinate classes, interest-only strips, principal-only strips, etc.)? Have structures become simplified over time, or have they become increasingly complex in response to investor demands for unique payoff characteristics? Do rating agencies and investors respond to the complexity of the bond structure? For example, will they increase subordination levels and spreads for a complicated cash flow distribution scheme?

Regarding special servicing, two opposing themes have emerged as this governance structure has evolved and become more complex. Riddiough (1997) proposes that the potential conflict of interest between the senior classes and the Special Servicer is significant and predominant, and would result in increased spreads and subordination levels for the AAA classes. On the other hand, our discussions with issuers, rating agencies, and investors have introduced an alternative hypothesis that the special servicing mechanism increases efficiency, enhances the resolution of problem loans in the pool, and helps maximize the value of the collateral. This contrasting argument would suggest the possibility of a countervailing force to the conflict of interest perspective and an altogether uncertain effect on pricing and subordination levels. Thus, the meaningful questions are: Do investors and rating agencies recognize the potential for "conflict" or "efficiency", or both? If they perceive both, which theme predominates?

A Summary of Our Findings

Based on our study, our conclusions can be summarized as follows. First, rating agencies and investors recognize and respond to complexity in security design and structure by increasing subordination levels and decreasing prices (i.e., increasing spreads). The results of our regressions indicate that numerous variables that proxy for complexity are significant in determining variations in subordination levels and security pricing. Both rating agencies and investors seemingly respond to the following factors: Total Number of Tranches, Percent Low-Rated Tranches, Number of Principal-Only Strips, Interest Pro Rata to AAAs and Interest-Only Classes, Prepayment Fees Good for AAAs, Number of Loan Groups, Percent Publicly Offered, and Clean-Up Call Percent. In addition, while the rating agencies also recognize Simple Distribution of Cash Flow and Complex Presentation, investors are shown to respond to Basic Waterfall Structure and Number of Residual Classes. Overall, our findings suggest that complexity is costly for CMBS issuers when designing and structuring deals.

Second, concerning the role of the Special Servicer, the conflict of interest theory dominates the efficiency argument based on the number of variables, as well as the magnitude of the variable coefficients, supporting conflict over efficiency. Variables confirming the conflict theory include Appraisal Reduction, Major Modifications Allowed, Superior Special Servicer, Extension Advisor, Standby Fees Paid to Special Servicer, and General Special Servicer Fees. Only Operating Advisor and Advances to the Junior Class support efficiency. Interestingly, Balloon Extension, Controlling Class

is the Junior Class, and Special Servicer Owns the Lowest Piece are found to be insignificant to both rating agencies and investors. It is likely that the impact of these variables is captured by other variables, such as Appraisal Reduction, Major Modifications Allowed, Extension Advisor, and Operating Advisor.

Third, rating agencies and investors respond to certain Special Servicers and adjust subordination levels and prices accordingly. Rating agencies appear to reduce subordination levels when Wells Fargo and Midland Loan Services are the Special Servicer, and increase them for Lennar Partners and CRIIMI MAE. Although only one Special Servicer, Bankers Trust, is shown to be significant to investors, this is most likely a reflection of their confirmation of the rating agencies' response.

Chapter 2

LITERATURE REVIEW

Overview

At present, the literature is rather limited on the subjects of security design and governance in CMBS. This is generally related to the relative youthfulness of the CMBS market, which originated in the 1980s and has only recently developed sufficient size to produce commentary. The recent strong growth in the CMBS market, however, should soon change this. Because of the vast differences between the residential and commercial mortgage-backed securities markets, literature pertaining to the residential market is not considered relevant to our research. In the sections below, we will review the limited general and CMBS-specific literature as it relates to our research topic.

Security Design

General literature regarding financial innovation and security structuring offer some limited insight into the nature of the evolution of security design. In particular, Allen and Gale offer an interesting history of financial innovation and propose several motives for its existence. According to Allen and Gale (1994), innovations are distinguished by what they accomplish, and some of the more significant motives for them are as follows:

1. The desire to capture profits.
2. The desire to make markets more complete, for example, to hedge some risk that was previously uninsurable or to reduce the cost of achieving some degree of insurance.
3. The desire to avoid or circumvent government regulations and taxation.
4. The desire to reduce transaction costs or increase liquidity.
5. The desire to reduce agency costs between different security holders.
6. The desire to change prices of assets that are being held.

Overall, the primary force behind financial innovation is the idea that splitting a security distributes risk among various parties and creates a situation where the sum of the parts is more valuable than the whole. There is a point, however, where innovation leads to complexity. Allen and Gale (1994, p. 10) state: "All these taxonomies have some value but there are so many ways of slicing the same cake, they threaten to become obstacles to understanding the principals at work behind the process of innovation." In essence, the design of the financial instrument may attempt to maximize value, but the structure itself may be so complex that it interferes with the objective of the security.

This literature has significance to our analysis because we are attempting to determine whether complex security design in CMBS transactions is meaningful to rating agencies and investors. The overriding objective of CMBS issuers is to maximize the economic pie – the net proceeds arising from the CMBS transaction – subject to the constraints of complexity, liquidity, flexibility, and efficiency. Consequently, they would most likely

be interested in knowing whether rating agencies and investors reward or penalize certain structures or security types.

Governance/Special Servicing

With respect to general literature on governance, Williamson (1996) argues that the many puzzles of economic organization turn on an analysis and interpretation of the mechanisms of ex post governance. He ascribes to the "discriminating alignment hypothesis," which suggests that transactions, which differ in their attributes, are aligned with governance structures, which differ in their costs and competencies. Overall, his analysis of the transaction cost economics associated with governance of contractual relationships in complex economic organizations emphasizes hazard mitigation through the mechanisms of governance. Williamson shows that simple contracts give way to complex contracts and internal organization as the hazards of contracting build up.

The relevance of Williamson's writing to the area of CMBS can be observed through consideration of the entity known as the Special Servicer, whose role comes into play when a loan in a CMBS pool goes into default or threatens to go into default. In the early stages of the development of the CMBS market, the Master Servicer performed the functions now typically assigned to the Special Servicer. However, over the past few years, the CMBS governance structure has evolved into a more complex mechanism that usually involves an Extension Advisor and an Operating Advisor, and furthermore gives voting rights over the Special Servicer to the lowest class of certificates. In addition, many rules – appraisal reduction mechanisms, restrictions on advances to the junior

classes for loans in default, restrictions on balloon extensions and other modifications – are incorporated ex ante to govern the ex post actions of the Special Servicer and protect the interests (i.e., hazard mitigation) of the senior classes.

Williamson's arguments can be extrapolated to form the foundation of a conflict versus efficiency argument concerning the Special Servicer. The continued evolution of the governance mechanism for loans in default will likely depend on the transaction cost economics associated with the pricing and credit support adjustments incorporated by investors and rating agencies, relative to the efficiencies resulting from the interaction of the Special Servicer, Extension Advisor, and Operating Advisor. A downturn in the market may be required to test the conflict versus efficiency theory and provide sufficient data for evaluating the governance structure.

CMBS governance issues are addressed in the work of Riddiough (1995), who argues that the junior securityholder should control the debt liquidation/renegotiation decision in multi-class asset-backed securities because the senior securityholder, being well protected from default loss, does not have the proper incentive. The equity-like, first-loss position of the junior securityholder is noted to strengthen his/her incentive to maximize the resulting payoff. This would suggest that the Special Servicer's ownership of the first loss piece, which is generally believed to be the majority occurrence today, might be a positive feature for a transaction and may align the interests of the Special Servicer.

Although junior securityholder control may be beneficial from an ex post, security value maximization perspective, Riddiough indicates that it may complicate ex ante security design because of the potential conflict between the senior and junior classes. This is due to the senior class' underlying predisposition for loan termination in default to preserve principal, which is opposite the junior class' preference for loan extension or modification. Additionally, Riddiough predicts that restrictions to loan extension will be observed in an effort to minimize the conflict of interest between the senior and junior classes. If extension is not completely restricted, he hypothesizes that subordination levels will increase, all else being equal.

Conclusion

Our review of the relevant literature would suggest the dual issues of complexity in security design and the influence of the governance mechanism should be significant in our analysis. In addition, complexity could also play a part in the significance of the governance mechanism in CMBS, as the evolution of this structure has become increasing complex and typically involves at least one, if not two, parties in addition to the Special Servicer.

Chapter 3

OVERVIEW OF CMBS SECURITY DESIGN

The focus of CMBS security design and structure for this thesis relates to the interactions of issuers, rating agencies, and investors in the establishment of various deal structures and security types, and the corresponding influence of these features on the AAA-rated classes. Generally speaking, the underlying nature of the loans in the CMBS pool appears to drive the complexity of the security design. Additionally, the level of innovation results from the risk/return profiles created by issuers – or created in response to demand by investors – to optimize the profit from the transaction.

In our analysis of the 70 CMBS transactions comprising the data set for this thesis, we found that complex structures typically correspond to portfolio issuances of seasoned loans, rather than conduit issuances. Also, we observed the use of Interest-Only Strips (IOs) to be common. An IO has a notional balance, rather than a certificate balance, because it does not have a right to receive principal payments on the loans. The IO's notional balance is usually "stripped" off of one or more of the other classes, but it also can be equivalent to the aggregate initial pool amount. Conversely, we found the use of Principal-Only Strips (POs), which do not have a right to receive interest payments, to be relatively infrequent. Furthermore, POs have very complex payoff characteristics that are difficult for investors to understand. Interestingly, the limited use of this kind of security

most likely exemplifies an efficient market response to limited demand by investors. This could be interpreted as a signal that complexity matters.

More recently – but not representative of any CMBS deals analyzed in this thesis – new security designs have emerged involving "FASITs" and "REREMICs". FASITs allow the substitution of assets in the mortgage pool, while REREMICs involve the resecuritization of existing CMBS certificates from multiple CMBS transactions.

Usually, complex security designs have ten or more investment classes and consist of multiple AAA tranches, multiple IOs, one or two POs, and multiple subordinate tranches that span the rating agency classifications (from AA to B-), as well as unrated tranches and two or three residual classes. In addition, complexity is most often associated with loan pools that have been split into two or three loan groups. The use of multiple loan groups generally reflects segregation of the loan pool by type of loan (e.g., fixed versus variable mortgage rates, or restructured loan versus performing loan), by kind of property (e.g., hotel, senior living), or in some cases by the credit quality of the loans. Simple structures, on the other hand, typically have fewer than ten investment classes overall and often contain only one AAA class and no IOs and POs.

The following diagrams illustrate representative CMBS security designs. Diagram 1 shows a typical simple structure, while Diagrams 2 and 3 are based on actual deals and portray more complicated designs.

Diagram 1

Class A (AAA)
Class B (AA)
Class C (A)
Class D (BBB)

Diagram 1 reflects a very simple structure where the security has been tranched into four investment classes rated from AAA to BBB, but does not contain an IO or a PO strip.

Diagram 2

(JP Morgan 1996-C3)

Class A1 (AAA)	Class A1X (AAA)
Class A2 (AAA)	Class A2X (AAA)
Class B (AA)	Class BCX (AA)
Class C (A)	
Class D (BBB)	
Class E (BBB-)	
Class F (BB)	
Class G (B)	
Class NR (Not Rated)	

Diagram 2 reflects a structure with twelve investment classes, including three IOs and one unrated class. The A1X and A2X IOs have notional balances equal to their respective AAA-rated tranches and reflect the right to receive excess interest over the passthrough rate of the corresponding AAA class. The BCX IO has a notional balance based on the certificate balances of both Class B and C.

Diagram 3

(Midland Realty Acceptance Corp, Series 1996-C1)

<table>
<tr><td rowspan="7">Class A – EC (AAA)

Excess Interest on Classes A-1 through E</td><td>A-1 (AAA)</td></tr>
<tr><td>A-2 (AAA)</td></tr>
<tr><td>A-3 (AAA)</td></tr>
<tr><td>B (AA)</td></tr>
<tr><td>C (A)</td></tr>
<tr><td>D (BBB)</td></tr>
<tr><td>E (BBB-)</td></tr>
<tr><td colspan="2">F (BB)</td></tr>
<tr><td colspan="2">G (B)</td></tr>
<tr><td>H-2 IO (Unrated)</td><td>H-1 PO (Unrated)</td></tr>
</table>

Diagram 3 reflects a structure with twelve investment classes overall, including two IOs and one PO. The AAA-rated IO (Class A-EC) receives excess interest on a notional balance stripped off of seven certificates, Classes A-1 through E. The unrated IO (Class H-2) has a notional balance corresponding to the PO's certificate balance; this IO is very risky because the PO is the most subordinate investment class and, therefore, the first piece to be allocated investment losses.

According to Jacob and Duncan (1994), issuers sometimes create more complex securities to optimize the pricing of risk along the credit curve. They also note that issuers may tranche principal cash flows in time to take advantage of periods of a steep yield curve, if the loans have long periods of callability or are amortizing loans.

The typical CMBS structure involves a sequential-pay format that allocates principal and interest payments in a top-down manner, while losses are allocated bottom-up. The sequential-pay format usually follows what is commonly referred to as the "basic waterfall" cash flow distribution schedule. This structure is outlined as follows:

1. First, interest is paid to the AAA classes, which usually includes an IO strip, pro rata. If there are multiple AAA classes, interest is distributed pro rata.
2. Second, payments for interest shortfalls go to the AAA classes, pro rata.
3. Third, payment is made in reduction of the principal balance of the AAA classes, usually sequentially if more than one AAA class exists.
4. Fourth, payments for reimbursement of unrealized losses go to the AAA classes, pro rata if more than one class exists.
5. Then, in the same order as numbers 1 through 4 above, payments are made to the next most senior class, and thereafter sequentially down through the class structure.

We did uncover structures that deviated from the basic waterfall scheme. Some examples are: structures that had IOs stripped off different tranches, dual waterfall structures where one or more loan groups existed, and structures that distributed interest to all classes first, then distributed principal sequentially.

Summary

Underwriters and investment banks often develop complex and sophisticated securities and structures in an attempt to make the sum of the parts greater than the whole. In the CMBS market, examples of this include the creation of IO and PO strips, the use of multiple loan groups, the variation of payment priority for different cash flow components (i.e., principal, interest, prepayment fees, default interest, etc.), and the creation of FASITs and REREMICs. However, complexity may ultimately reduce investor liquidity and have a negative impact on subordination levels and security prices.

Chapter 4

OVERVIEW OF SPECIAL SERVICING

The role of the Special Servicer has evolved considerably since the inception of the CMBS market in the 1980s. In the early stages of the development of the CMBS market, the Master Servicer performed the functions now typically assigned to the Special Servicer. In fact, many of the deals that we analyzed from 1994 did not mention a Special Servicer at all. The Special Servicer's responsibilities initially involved overseeing troubled loans, but since have expanded to include handling workouts, liquidating REO (real estate owned) properties, and in some cases, heading off a troubled loan. Moreover, over the past few years, the CMBS governance structure has developed into a more complex mechanism that usually involves an Extension Advisor and an Operating Advisor, and furthermore gives voting rights over the Special Servicer to the lowest class of certificates (the controlling class).

The Master Servicer handles the day-to-day loan servicing functions. According to Lederman (1996), it collects borrower payments, maintains accounting systems, prepares reports, remits funds for distribution to investors, oversees subservicers, inspects the collateral, and manages the delinquency process. The Master Servicer also ensures that a distressed loan makes a smooth transition into special servicing.

The Special Servicer is responsible for servicing any nonperforming loan in the portfolio. This entity normally becomes active in the event of nonperformance, a threat of nonperformance, a mortgagor's bankruptcy or inability to meet debt service payments, a notification or placement of a lien on a property, or an occurrence that materially adversely affects the value of a property. In these cases, the Special Servicer usually performs certain duties on a "Specially Serviced Mortgage Loan". These duties include servicing the loans by collecting certain payments, monitoring the property, and preparing certain reports. The Special Servicer's responsibilities also encompass administering and disposing of specially serviced loans, managing properties, and liquidating REO property. The Special Servicer also typically has the authority to modify, restructure, or foreclose on certain loans. The Special Servicer is expected to act in the best interests of all investment classes, though.

The rating agencies have some fundamental criteria for evaluating and rating a Special Servicer. Generally, they focus their review and assessment on the company's experience, organizational structure, management team, track record, and approach to servicing the loans. A summary of a servicing checklist utilized by Fitch is as follows:

1. *Management and Organization*

   Fitch is interested in the corporate strategy and business plan of the Special Servicer, as well as the background and development of its staff. Fitch reviews audited financial statements, any policies and procedures manuals, and quality controls. It also checks client references.

2. *Operating History*

Fitch evaluates a three-year portfolio history, broken out by client type, which includes number of loans and REO, principal balance, and the percentage of third party servicing. They also look at the cumulative number of loans serviced or assets managed, as well as the aggregate principal balance. In addition, they review a list of CMBS transactions serviced and a summary of the portfolio's history by non-performing loans, loans in foreclosure, and REO. Furthermore, they review a detailed list, by portfolio, of the resolution methods utilized.

3. *Special Servicing Methodology*

Fitch also rates a Special Servicer's procedures for acquiring new assets and portfolios, method of assigning assets to asset managers, and general workout philosophy. They review the procedures for foreclosing on loans, managing and liquidating assets, its ability to enhance a real estate asset's value, and its bankruptcy strategies.

4. *Information Systems and Reporting*

Fitch indicates that information systems and reporting are particularly important in determining a rating. Hardware and software configurations, loan servicing systems, asset management databases, systems capacity, customized reports, system security, data backup, and disaster recovery procedures are some important features.

Summary

The role of the Special Servicer is critical to preserving collateral value and protecting a transaction's credit quality. As previously mentioned though, the existence of this entity introduces a potentially serious conflict of interest with the AAA classes. The fact that the rating agencies evaluate and assign ratings to individual Special Servicers confirms the importance of this governance mechanism. We anticipate that the role of the Special Servicer will become increasingly critical for issuers, rating agencies, and investors as the market advances further in the current cycle.

Chapter 5

DATA AND METHODOLOGY

Overview

Our study uses the general data from the Polleys and Riddiough study (1998) as a platform for our research on security design and special servicing. Data were collected on the same 70 CMBS deals analyzed by Polleys and Riddiough. These deals were issued between March 1994 and December 1996 and resulted in 125 AAA-rated security classes. A list of the deals is located in the Appendix as ***Exhibit 1***.

It should be noted that the Polleys and Riddiough study excluded FNMA and Freddie Mac multifamily CMBS deals due to the implied government support imbedded in their prices. They also excluded RTC deals because of the inconsistent disclosure of information and the poor quality of the asset data. Security pricing data were obtained by Polleys and Riddiough from Nomura Securities and Standard & Poor's Corporation.

As with Polleys and Riddiough, we have focused our analysis on the AAA-rated classes only. As explained by them, the reasons for this are as follows:

1. Credit quality is highest and most homogeneous at the AAA level, which produces narrow spread variations relative to other rating categories.

2. AAA-rated securities have significant cash flow timing risk because they are first-in-line for return of principal. Thus, relative to credit factors considered by rating agencies in setting subordination levels, the effects of non-credit variables, such as the variables specified for our study, should be easier to identify.
3. The quality of data is superior at the AAA level.

The data for our special servicer and security design variables were obtained directly from the deal prospectuses. For our analysis, we have included the significant credit and non-credit variables – which primarily reflected loan pool characteristics – from the Polleys and Riddiough study in order to control for their impact. We have summarized the various credit and non-credit variables in ***Exhibit 2***. However, in this thesis, we focus our analysis on the variables that proxy for special servicing and security design and structure.

Summary of Data

The following tables summarize some of the important general characteristics of the data.

Year Securitized	Number of CMBS Pool Issues	Number of AAA-rated Security Classes
1994	16	23
1995	26	43
1996	28	59
Total	70	125

	Spread	Wt'ed Avg Life	Subordination (AAA Classes)	Issue Size (mm)	Class Size (mm)	% of Issue
Maximum	145	12.60	60.0%	$1,927	$652.70	100%
Minimum	48	1.30	27.0%	$ 78	$ 7.49	2%
Average	89	5.72	37.0%	$ 473	$129.50	34%

The following tables summarize the various explanatory variables for special servicing and security design and structure that we identified and used in our study.

Summary of Special Servicer Variables

SYMBOL	DESCRIPTION	EXPLANATION
APPRED01	Appraisal Reduction	Restricts payments to junior classes based on estimated unrealized losses; proxy for conflict
BALDMY	Balloon Extension	Describes the extent to which a Sp. Serv. can extend a loan; proxy for conflict
MMODIF	Major Modifications Allowed	Measures Sp. Serv. flexibility for modifying loans; proxy for conflict
CONTR	Controlling Class	Indicates whether Sp. Serv. controlled by the subordinate classes; proxy for conflict
ADVNR	Advances Paid to Junior Classes in Default	Indicates whether unrestricted advances are made to the junior classes; proxy for conflict
SUPSS	Superior Special Servicer	Indicates whether Sp. Serv. has been rated superior by Fitch; proxy for conflict
EXTADV	Extension Advisor	Indicates if an Extension Adviser is specified; proxy for conflict since this entity represents senior classes
OPADV	Operating Advisor	Indicates if an Operating Advisor is specified; proxy for conflict since this entity works for junior classes
SBFEED	Standby Fee	Indicates payment of standby fee to Sp. Serv.; proxy for conflict
FEEDMY	General Special Servicer Fees	Indicates level of Sp. Serv. fees (below avg., avg., above avg.); proxy for conflict
SSOWN	Special Servicer Owns Lowest Piece	Indicates whether prospectus specifies Sp. Serv. Either owns, will own, or can own the lowest piece; proxy for conflict

Summary of Security Design Variables

SYMBOL	DESCRIPTION	EXPLANATION
NUMBAAA	Number of AAA Tranches	Proxy for complexity
NTRANCHE	Total Number of Tranches	Proxy for complexity
PERCLOW	Percentage of Low Rated Tranches	Proxy for complexity
NUMBIO	Number of Interest-Only Tranches	Proxy for complexity
NUMBPO	Number of Principal-Only Tranches	Proxy for complexity
SIMPLCF	Simple Cash Flow Distributions	Indicates whether distribution is difficult or easy to follow; proxy for complexity
WTRFALL	Basic Waterfall Distribution of Cash Flows	Indicates whether distribution follows the Basic Waterfall pattern; proxy for complexity
INTPR	Interest Distributed Pro Rata to AAAs and IOs	Indicates whether interest is distributed to AAAs and IOs on a pro rata basis
PRSCMPLX	Complex Presentation	Indicates whether prospectus is difficult to follow and understand; proxy for complexity
PREPAY	Prepayment Penalties Distributed Pro rata to AAAs and IOs	Indicates whether prepayment fees are distributed primarily to AAAs
VRATE	Variable Pass Through Rate	Indicates whether tranche has variable or fixed pass-through rate; proxy for complexity
LNGRP	Number of Loan Groups	Proxy for complexity
PPUBLIC	Percentage of Deal Public	Proxy for liquidity and for information risk
RESIDS	Number of Residual Tranches	Proxy for complexity
CCCALL	Clean-Up Call or Optional Termination Percentage	Measures % of initial pool balance below which specified party has option to buy outstanding loans and terminate trust

Methodology

The objective of this thesis is to analyze the determinants of AAA-rated subordination levels and security pricing, with primary attention given to areas of special servicing and security design. The underlying hypotheses are that the Special Servicer governance mechanism creates conflict with the AAA classes and that complexity in security design matters to both investors and rating agencies. Additionally, we hypothesize that the market may differentiate between Special Servicers.

To test these hypotheses, we have conducted three separate sets of regressions on subordination levels and security prices, as reflected by the spread over Treasuries. The regressions are as follows:

1. *Full Regression:* In this test, the subordination or credit support level (i.e., the proportion of the total pool principal balance which is subordinated to the particular AAA tranche) will be regressed against all variables – loan pool characteristics, special servicer variables, and security design variables. To model this, we used an ordinary-least-squares, linear regression equation with the subordination level as the dependent variable and with all variables as explanatory independent variables.

2. *Partial Regression:* In this test, subordination will be regressed against only the significant variables from the Full Regression. A Wald test will be utilized to ensure that the omitted variables do not significantly alter the explanatory power of the model. Again, we used an ordinary-least-squares, linear regression equation with the subordination level as the dependent variable and with the significant variables from the Full Regression as explanatory independent variables.

3. *Influence of Certain Special Servicers:* In this test, we will sequentially substitute a dummy variable for an individual Special Servicer to determine whether rating agencies and investors recognize and compensate for that

specific Special Servicer. As with the Partial Regression, we used an ordinary-least-squares, linear regression equation with the subordination level as the dependent variable and with the significant variables from the Full Regression as explanatory independent variables. We have excluded the Superior Special Servicer variable from this analysis because of its correlation with the individual Special Servicers.

Description of the Special Servicer Variables

1. *Appraisal Reduction*: Appraisal Reduction represents a mark-to-market mechanism that estimates yet unrealized losses on defaulted loans and prevents payments of current interest on estimated losses. The purpose of this procedure is to protect the senior classes, particularly the AAA tranches, and minimize potential losses with respect to problem loans by restricting payments to the junior classes when a loan is in default, or in some cases is anticipated to go into default. In the event of loan default, within a certain amount of time the Special Servicer may be required to obtain an appraisal and reduce the value of the collateral as a result of the appraisal. Although a specific deduction (e.g., 25%) is sometimes applied for loans of $1 million or less, typically an appraisal reduction amount is calculated that results in a downward adjustment, or allocation of loss, to the outstanding certificate balance of the most subordinate tranche. The adjustment is calculated by taking the outstanding principal balance on the loan, plus any unpaid interest, unreimbursed advances, and any expenses that could result in a lien on the property (real estate taxes, construction costs, insurance premiums, etc.), and subtracting either 90% or 100% of the appraised value. Usually, such "losses" resulting

from appraisal reduction are allocated to the most subordinate tranche only. In our dummy variable specification, a "1" represents the presence of an Appraisal Reduction mechanism in the deal. Because the application of losses to the junior classes benefits the senior classes, the sign of the coefficient is anticipated to be negative in our analysis. This corresponds to an anticipated decrease in subordination levels and spreads if an appraisal reduction mechanism exists.

2. *Balloon Extension*: In the event of a default in a balloon payment or to enhance the recovery of principal with a problem loan, the Special Servicer is generally allowed to extend the balloon date or grant an extension of the maturity date. Although some deals allow unrestricted extensions and others explicitly forbid extensions, most permit extension periods ranging from six months to five years. However, extensions are almost always prohibited beyond the date two or three years prior to the Rated Final Distribution Date, which is usually two to three years after the latest maturity date of the loans in the pool. Because losses are allocated from the bottom up, loan extension is a potential source of conflict for the senior and junior classes. If a loan is extended, the junior classes continue to receive payments (unless restricted by another means) and forestall their potential loss. Moreover, they get a valuable call option that will be exercisable if conditions improve. Contrarily, as previously noted, the senior classes have little upside potential and significant downside risk should the situation worsen. They would prefer to force repayment of the loan or foreclose, particularly if interest rates are rising and/or values are declining. The potential for long-term, or indefinite, extension would be especially unattractive to senior bondholders due to interest rate risk, heightened default

risk, and reinvestment risk. Hence, the ability to extend a balloon loan would be expected to be detrimental to the senior classes from a conflict viewpoint.

On the other hand, both the Master Servicer and the Special Servicer have the responsibility to protect the welfare of all bondholders, inclusive of both senior and junior classes. By extending a loan, it can be argued that the Special Servicer is performing its function of protecting the general pool. Therefore, the Special Servicer's ability to extend loans in a relatively uninhibited manner, with the purpose of maximizing the proceeds from the loan on a present value basis, generates an argument for efficiency. If the rating agencies and investors perceive the Special Servicer's limited ability to extend a loan as detrimental to all bondholders, then it is possible that the Special Servicer's ability to extend loans is beneficial for the AAA tranches.

Overall, we predict that the potential for conflict will dominate the argument for efficiency. As a result, the sign of the coefficient in our regressions is anticipated to be positive. For our analysis, we have utilized a dummy variable which reflects a "0" for no extension allowed, a "1" for extensions up to three years, and a "2" for longer-term extensions beyond three years.

3. *Major Modifications Allowed:* This variable measures the impact of the Special Servicer's ability to modify loan terms, other than maturity extension. Some examples of generally permitted loan modifications include forgiveness of principal, forgiveness of interest (e.g., accrued, default), revision of the interest rate, waiver of fees, or extension

of compliance dates. Modifications can serve as a source of conflict because, like loan extension, they aid the junior classes to the potential detriment of the senior classes. However, as with loan extension, the Special Servicer's ability to modify a distressed loan could also be viewed as positive for the senior classes from an efficiency standpoint. Likewise, we anticipate that the potential for conflict will dominate the argument for efficiency, and that the sign of the coefficient will be positive, corresponding to an increase in subordination levels and spreads if the Special Servicer has the ability to modify loan terms. In our analysis, we have utilized a dummy variable, with a "1" signifying generally unrestricted modifications.

4. *Controlling Class/Voting Rights*: Whoever controls the right to hire and fire the Special Servicer plays a key role in the governance mechanism of a CMBS transaction. The Special Servicer usually works for the junior tranches, and often purchases the first loss piece (i.e., the most subordinate class, exclusive of the residual classes). Because these classes have the most to lose when a loan defaults, they generally have the right to replace the Special Servicer. However, in some cases, the right to hire and fire the Special Servicer does not reside with the most junior class or classes, but is subject to a majority vote of all classes, or is subject to approval of the senior classes. If the Controlling Class is the most subordinate tranche (or tranches), typically that tranche must have a minimum percentage of its initial certificate balance outstanding, otherwise Controlling Class status shifts to the next most subordinate tranche. This percentage typically varies between 0% and 50%, with 20% to 25% being most common. Because of inconsistencies regarding the basis for the percentage determination (some deals used a

minimum percentage of the initial or current aggregate certificate balance of the pool), our analysis utilizes a dummy variable, with a "1" signifying the junior class or classes represented the controlling class. The anticipated sign of the coefficient is positive, in expectation of the conflict theory between the senior and junior classes prevailing over the efficiency theory of the Special Servicer.

5. *Advances Paid to the Junior Class in Default*: In the event of a loan default, either the Master Servicer or the Special Servicer is usually required to advance payments to the certificate holders if the Special Servicer believes that the amounts are recoverable. The Master or Special Servicer is entitled to receive interest, usually at the prime rate, on any advances they make. However, some deals restrict or prohibit advances from being paid to the junior classes. Furthermore, some deals specify the kind of advances that are permitted, for example, interest only or interest and principal. Generally speaking, property protection expenses (i.e., payments for real estate taxes, insurance, etc.) are advanced in almost all cases as well. Restrictions on Advances to the Junior Class are beneficial for the AAA tranches and help protect against default loss, as well as mitigate cash flow timing risk. In our analysis, we have utilized a dummy variable, with a "1" signifying unrestricted Advances to the Junior Class. The expected sign of the coefficient for this variable is positive, which corresponds to an anticipated increase in subordination levels and spreads if the Special Servicer has to make advances for the benefit of the junior classes.

6. *Special Servicer Rated Superior*: This variable attempts to measure whether the quality of the Special Servicer is recognized by investors and rating agencies. Based on the ratings of Special Servicers set forth by Lederman (1996) in Fitch Research's "Commercial Mortgage Servicers in the Spotlight", we have controlled for "superior" Special Servicers. Superior Special Servicers are considered to possess a strong seasoned management team, extensive workout and disposition experience with a variety of asset types, and significant financial resources. Other ratings are categorized as Above Average, Average, Below Average, and Unacceptable. Fitch rated four Special Servicers as superior. These firms are AMRESCO Management, Inc., Banc One Management and Consulting Corp., J.E. Robert Companies, and Lennar Partners, Inc. In our dummy variable specification, a "1" represents a Special Servicer that has been rated Superior by Fitch. The expected sign of the coefficient is uncertain; although the conflict theory is predicted to prevail over the efficiency theory, the presence of a highly rated Special Servicer might be a neutralizing force.

7. *Extension Advisor Provided For*: Many of the deals specify an Extension Advisor which can be selected by the senior classes. The role of the Extension Adviser is essentially to approve any extensions proposed by the Special Servicer, although in many cases the Extension Advisor is limited to approving extensions beyond three years. The inclusion of an Extension Adviser is expected to be beneficial to the senior classes and could counteract the conflict of interest issues that arise in extending a loan when the Special Servicer is controlled by the junior classes. In our analysis, we have utilized a dummy variable, with a "1" signifying the presence of an Extension Advisor. The

expected sign of the coefficient for this variable is negative, which corresponds to an anticipated decrease in subordination levels and spreads.

8. *Operating Advisor Provided For*: If allowed, the Operating Advisor is usually hired by the most subordinate class to give advice on and to approve certain actions of the Special Servicer. Because the Operating Advisor represents a check on the Special Servicer, it is possible it could help reduce conflict. However, the presence of, or potential for, an Operating Advisor would generally be bad for the AAA-rated classes because the Operating Advisor works for the junior classes and because it is possible that the Operating Advisor could interfere with the Special Servicer's ability to protect the pool. Therefore, we anticipate the sign of the coefficient will be positive, indicating higher spreads and subordination levels will exist with the presence of an Operating Advisor, all else being equal.

9. Special Servicer Fees: The Special Servicer is normally compensated either up front, along the way, for performance, or by a combination of these methods. If payment is up front, it generally involves a "standby fee", where the Special Servicer receives a percentage of the aggregate principal balances of all outstanding loans, whether or not they become specially serviced loans. Usually, the Special Servicer is paid both along the way and for performance. The Special Servicer Fee is the most common method of compensation and reflects a percentage fee, often between 0.25% and 0.35%, applied to all specially serviced loans. In addition to the Special Servicer's Fee, the Special

Servicer is usually paid a Workout and/or a Liquidation Fee. The most common Workout and Liquidation Fees are 1.0% of the Workout or Liquidation proceeds.

In our analysis, we have created two dummy variables, Standby Fees and General Special Servicer Fees, to control for the effect of Special Servicer Fees on variations in subordination levels and spreads. For Standby Fees, a "1" indicates the Special Servicer is paid a Standby Fee. For General Special Servicer Fees, a 0/1/2 dummy variable has been utilized. A "1" reflects average Special Servicer compensation overall (no Standby Fee, 0.25% Special Servicer Fee, 1.0% Workout Fee, and 1.0% Liquidation Fee), "0" reflects an overall compensation level less than the specified average, and "2" reflects a higher than average compensation package. The coefficient sign is expected to be positive in recognition of the potential conflict of interest between the senior classes and the Special Servicer. In addition, the fact that the predominant payment to the Special Servicer is in the form of fees for performance – and above average fees might possibly give an adverse incentive to the Special Servicer –supports a positive coefficient.

10. Special Servicer Owns the Lowest Piece: This variable attempts to determine the impact on subordination and spreads resulting from the Special Servicer's willingness to put equity into the transaction. Because we were unable to get information directly from the Special Servicers on whether they owned the most subordinate class, we relied on the deal prospectuses for the specification of our dummy variable. Although this less precise method may result in measurement problems, in our analysis a "1" signifies that the prospectus noted the Special Servicer either owns, will own, or could own the lowest

investment class. Although an equity investment is typically viewed positively by the other non-AAA investors, our interpretation is that ownership of the first loss piece by the Special Servicer could exacerbate the conflict that exists between the senior classes and the Special Servicer by providing further incentive to promote the junior classes.

Description of the Security Design Variables

The variables detailed below are intended to proxy for deal complexity and/or adverse structuring for the AAA classes. With the exception of Simple Distribution of Cash Flow, Basic Waterfall Structure, Prepayment Fees to AAA Classes, and Percentage of Deal Publicly Offered, we hypothesize that these variables will have positive coefficient signs, indicative of an upward adjustment to subordination levels and spreads by rating agencies and investors. Because Simple Distribution of Cash Flow and Basic Waterfall Structure correspond to deal simplicity, and because Prepayment Fees to AAA Classes is beneficial for the AAA tranches, these variables are expected to have negative coefficient signs.

1. *Number of AAA Tranches:* This variable attempts to measure whether investors might be willing to overlook the potentially increased complexity associated with multiple AAA tranches, in order to purchase a security that better suits their risk/return needs, as well as their duration requirements. Most CMBS transactions are structured with between one and three AAA classes, although some deals we reviewed had as many as five or six AAA tranches. While the presence of more than one AAA class can be correlated with the overall size of the CMBS transaction, multiple AAA tranches are

often created to provide particular investment durations, thereby supplying more opportunities to fulfill the asset/liability-matching demands of investors. Sometimes, more than one AAA tranche is structured to provide investors with a certain amount of homogeneity within the loan pool. This often reflects a common characteristic of certain loans in the pool. For example, one AAA tranche might be created that is directly associated with all of the adjustable-rate mortgages in the loan pool and will have a variable pass-through rate; in addition, one or more AAA tranches will be created for the fixed-rate mortgages and these tranches will usually have a fixed pass-through rate.

2. *Total Number of Tranches:* Most issuances generally contain between 7 and 15 securities overall. The transactions reviewed indicated a range of total tranches between 6 and 21. As discussed with Number of AAA Tranches, this variable too can be correlated with deal size. Similarly, a larger number of tranches also offers greater flexibility and more choice for investors. The purpose of this variable is to capture whether a tradeoff exists between enhanced flexibility and increased deal complexity.

3. *Percentage of Low-Rated Tranches:* This variable represents the percentage of the issuance consisting of tranches rated BBB- and below. Most issuances consist of between 15% and 20% low-rated tranches, but our data set indicated a range between 0% and 48.5%. Although higher levels of low-rated tranches may indicate lower credit quality, we have controlled for credit factors by including the significant variables determined by Polleys and Riddiough, in an attempt to isolate the potential structural implications.

4. *Number of Interest-Only Tranches:* This variable reflects the actual number of Interest-Only ("IO") tranches and is intended to capture complexity effects. Although some older deals did not include an IO tranche, most recent deals typically have one or two IO strips, and some were observed to have as many as four IO strips. An IO has a notional balance, rather than a certificate balance, because it does not have a right to receive principal payments on the loans. Along with the coupon rate on the IO strip, the notional balance is used to determine the interest payment to the IO. The IO's notional balance is usually "stripped" off of one or more of the other classes, but it also can be equivalent to the aggregate initial pool amount.

5. *Number of Principal-Only Tranches:* This variable represents the actual number of Principal-Only ("PO") tranches and, like Number of Interest-Only Tranches, is intended to capture complexity effects. The inclusion of one or more PO tranches in CMBS security design occurs much less frequently than the utilization of IO tranches. Many deals did not include a PO strip; for issuances that used PO strips, the number generally varied between one and two strips.

6. *Waterfall Structure:* In the basic Waterfall Structure, cash flows follow a sequential, top-down distribution, with payments made first to the Class A certificates, in respect of interest, interest shortfalls, principal, and unreimbursed realized losses. Cash flows are then distributed to the other classes in the same manner, on a hierarchical basis. Principal is distributed only to the most senior class until its certificate balance has been

reduced to zero; thereafter, priority for principal distribution moves to the next most senior class until its certificate balance has been reduced to zero, and so on. After all distributions have been made, any remaining cash is typically distributed to the Residual Classes.

There are variations from this structure though. For example, interest is sometimes distributed first to all the classes, and then is followed by principal distributions. This is not as beneficial for the AAA tranches, however, because their principal distribution is secondary to interest payments to the junior classes. Also, in some deals we observed a dual waterfall structure where interest and principal are distributed simultaneously from two separate areas, often different loan groups; this is not necessarily bad for the AAA tranches as long as they have priority over the more subordinate classes for principal and interest.

In our analysis, this variable attempts to capture the effects of the use of the standard, sequential-pay financial structure (i.e., the "Waterfall" Structure) for distributing available cash flow. We used a dummy variable specification, with a "1" applied to deals possessing the basic waterfall structure. We expect that the coefficient sign will be negative.

7. *Simple Distribution of Cash Flow:* Although somewhat analogous to Basic Waterfall Structure, we have differentiated this variable so that a "1" reflects any cash flow distribution which was simple to follow and easy to understand. Some of the deals

we reviewed did not have a Basic Waterfall Structure, but they did have simple and easy to understand cash flow distributions. Complex distributions were sometimes associated with multiple loan groups, and were usually noted when sub-classifications (e.g., first-tier versus second-tier loans) within a loan group were utilized and more complicated cash flow allocations specified. Also, they were noted when the cash flow allocation, with respect to certain loans, did not flow sequentially from top to bottom. In essence, this variable attempts to capture the complexity of the cash flow determination and distribution combined, irrespective of whether the distribution reflects a Basic Waterfall Structure. We anticipate that this coefficient sign will be negative, signaling that rating agencies and investors will reward Simple Distributions of Cash Flow.

8. *Interest Pro Rata to AAAs and IO:* For the AAA classes, security designs that give equal priority to the AAA tranches and the IOs are inferior to structures that give cash flow priority to the AAA tranches over the IOs. Our dummy variable specification uses a "1" to measure the expected negative effect on subordination levels and spreads of deals with pro rata distribution to the AAA tranches and IOs.

9. *Complex Presentation:* This variable, although somewhat subjective, attempts to capture the structure and complexity of the deal prospectus and the corresponding ease with which investors and rating agencies can understand both the financial structure and the information provided. Through our review and analysis of the 70 CMBS deals, we found that many of the prospectuses were presented in the same manner. Most utilized common language and were reasonably well organized, with sections generally located in

similar areas. However, many deals, particularly those issued in 1994, were also significantly more difficult to read and understand, even though the actual security structure was not overly complicated. We anticipate that the coefficient sign for this variable will be positive, indicating increased subordination levels and spreads for the AAA tranches. For our analysis, we have utilized a dummy variable to test the impact and significance of our hypothesis, with a "1" reflecting a complex and confusing presentation.

10. Prepayment Fees Good for AAA's: Allocation of prepayment fees (e.g., yield maintenance fees, prepayment penalties) varies between deals. Most deals reviewed, particularly those with IO strips, either allocated 100% of the prepayment fees to the IO, or allocated the majority of the prepayment fees to the IO with the balance following the distribution of principal at that time. To capture a positive security design feature for the senior class, for our dummy variable specification a "1" reflects a deal where all or the majority of the prepayment fees go to the AAA tranches. The coefficient sign is therefore expected to be negative.

11. *Variable Rate:* This variable indicates whether or not the pass-through rate for the AAA tranche was fixed or variable. For our dummy variable specification, a "1" reflects a variable pass-through rate for the AAA tranche. Because a variable coupon exposes an investment class to increased basis risk, cash flow timing risk, and possibly credit risk, we expect the coefficient sign to be positive to reflect anticipated increases in subordination levels and spreads.

12. *Number of Loan Groups:* Most issuances have only one group of loans. However, some of the deals have two or more loan groups which are a subset of the overall loan pool; these are usually separated by type of loan (e.g., fixed versus variable mortgage rates, or restructured loan versus performing loan), by kind of property (e.g., hotel, senior living), or in some cases by the credit quality of the loans. The use of multiple loan groups in structuring CMBS deals seemingly increases complexity, but it also creates homogeneity within the transaction, which may be positive for both rating agencies and investors. The expected sign of the coefficient is uncertain. Although increased complexity is anticipated to dominate, homogeneity through loan segregation may be a neutralizing factor.

13. *Percentage of Deal Public:* This variable measures the amount of the deal that was expected to be registered with and approved by the Securities and Exchange Commission and subsequently offered in the public market. For the CMBS deals reviewed, this percentage ranged between 0% and 100%, with a mean of approximately 65%. Although increased liquidity is usually associated with publicly offered securities - which would be beneficial to the AAA tranches and imply a negative sign – this is counteracted by the generally superior information disclosure associated with private transactions. The expected sign of the coefficient is uncertain because of the tradeoff between liquidity and information.

14. *Number of Residuals:* This variable reflects the actual number of Residual Tranches for each issuance. Most deals are structured with between one and three Residual Classes, although some deals did not have any. The Residual Classes do not typically have a certificate balance. Additionally, they generally have no expectation of receiving any cash flow distribution during the life of the transaction. The Residual Classes are most often associated with a tax game pertaining to so-called "phantom" income generated by the issuance. We anticipate that the AAA classes interpret this tax strategy as a bad signal, and that the rating agencies and investors will correspondingly increase subordination levels and spreads.

15. *Clean-Up Call:* This variable represents the Optional Termination ("Clean-up Call") Percentage, which signifies the percentage of the initial pool balance below which a specified party (e.g.., Depositor, Master Servicer, Special Servicer, or owners of the Residual Classes) has the option to buy the outstanding loans, terminate the Trust Fund, and effect early retirement of the outstanding certificate balances. This percentage generally varies between 5% and 10%, although it was noted to range between 0% and 25%. We hypothesize that a high percentage sends a bad signal to the AAA tranches, and that rating agencies and investors will adjust subordination levels and spreads upward.

Chapter 6

REGRESSION RESULTS

1. Full Regression - Subordination

The purpose of this regression is to determine which factors the rating agencies consider when setting a subordination level for a transaction. To model this, we used an ordinary-least-squares, linear regression equation with the subordination level as the dependent variable and with all variables as explanatory independent variables. We should note that error terms have been corrected for serial correlation using an AR(1) function.

As illustrated in ***Exhibit 3***, the results from this test are quite strong and indicate that the model is a good fit. The Full Regression on subordination had an adjusted R^2 of 0.94, meaning that almost 95% of the variation in Subordination is explained by the independent variables. In addition, several Special Servicer and Security Design coefficients are significant, and most of the variables have the anticipated sign.

Discussion of the Special Servicer Variables:

The following table summarizes the salient Full Regression results for the Special Servicer variables.

VARIABLE	EXPECTED SIGN	ACTUAL SIGN	COEFF.	t-STAT
Appraisal Reduction	Negative	Negative	- 0.0289	- 2.09
Balloon Extension	Positive	Negative	- 0.0004	- 0.04
Major Modifications	Positive	Positive	0.0196	1.56
Controlling Class	Positive	Positive	0.0038	0.27
Advances to Jr. Class	Positive	Positive	0.0085	0.74
Superior Spec. Serv.	Positive	Positive	0.0313	2.43
Extension Adviser	Negative	Negative	- 0.0264	- 2.35
Operating Adviser	Positive	Negative	- 0.0202	- 2.28
Standby Fee	Positive	Negative	- 0.0133	- 0.80
General SS Fee	Positive	Positive	0.0135	1.68
SS Owns Lowest Piece	Positive	Positive	0.0113	1.38

As shown in the table, four of the Special Servicer variable coefficients are significant at the 5% level, and one is considered moderately significant. Only Balloon Extension, Operating Advisor, and Superior Special Servicer have unexpected coefficient signs; Balloon Extension, however, was determined not to be significant.

The interpretation and analysis of the significant Special Servicer variables is as follows. As expected, the rating agencies reduce subordination levels by almost 3.0% for deals with Appraisal Reduction, all else being equal. Furthermore, the existence of an

Extension or Operating Advisor will lower subordination levels by 2.6% and 2.0% respectively. Since the Extension Advisor represents the senior classes, this conforms to our expectations. However, the negative coefficient for the Operating Advisor is counterintuitive because this entity works with the Special Servicer, and thus for the junior classes. One possible explanation for this effect is that the involvement of the Operating Advisor places constraints on the Special Servicer and consequently reduces the potential for conflict.

Interestingly, the coefficient for Superior Special Servicer shows an increase (3.1%) in subordination levels when the Special Servicer is one of Fitch's superior-rated Special Servicers. It is possible that the rating agencies increase subordination for highly rated Special Servicers because they are more likely to do workouts and modifications - as opposed to foreclosing and recovering principal immediately - and this is considered more detrimental to the AAA classes. Also, the presence of a Superior Special Servicer may send a negative signal about pool quality or some other aspect of the deal that might necessitate a "superior" Special Servicer.

The coefficient for General Special Servicer Fees is judged to be moderately significant and indicates that average fees increase credit support by 1.4%, and abnormally high fees increase credit support by 2.7%. This generally supports the conflict theory – high fees may signal an adverse incentive for the Special Servicer to workout loans. It could also suggest that the rating agencies view typical special servicing fees to be excessive on the whole and consequently penalize most transactions for their fee structure. As seen in the

preceding Table, several Special Servicer variables that were expected to be important determinants of the subordination possess insignificant coefficients. Generally supportive, though, are Major Modifications and Special Servicer Owns the First Loss Piece, which might be considered weakly significant, but nonetheless exhibit the anticipated positive coefficients. The insignificance of Balloon Extension confirms the results of Polleys and Riddiough, who found the percentage of balloon loans in the pool had no significant impact on subordination.

Overall, our results support the conflict of interest theory between the Special Servicer and the AAA classes over the efficiency theory, and that the rating agencies prefer limitations on the Special Servicer to minimize the impact on the AAA classes. Eight of the eleven variables – Appraisal Reduction, Major Modifications, Controlling Class is Junior Class, Advances to Junior Class, Superior Special Servicer, Extension Advisor, General Special Servicer Fees, and Special Servicer Owns the First Loss Piece – have signs supporting the conflict theory. Furthermore, while the signs on the remaining three variables support the efficiency argument, only one, Operating Advisor, is significant and its coefficient has the smallest impact (-2.0%) of all the significant variables.

Discussion of the Security Design Variables:

The following table summarizes the salient regression results for the security design variables.

VARIABLE	EXPECTED SIGN	ACTUAL SIGN	COEFF.	t-STAT
Number of AAAs	Positive	Positive	0.0169	2.20
Number of Tranches	Positive	Negative	- 0.0109	- 2.83
% Low Rated Tranches	Positive	Positive	0.1507	1.90
Number of IOs	Positive	Positive	0.0021	0.36
Number of POs	Positive	Negative	- 0.0529	- 3.83
Simple Cash Flows	Negative	Negative	- 0.0364	- 1.79
Waterfall Structure	Negative	Positive	0.0126	0.79
Interest Pro rata	Positive	Positive	0.0761	3.57
Complex Presentation	Positive	Positive	0.0368	1.44
PrePay. Good for AAAs	Negative	Positive	0.0247	3.44
Variable Rate	Positive	Positive	0.0023	0.26
Number Loan Groups	Positive	Positive	0.0148	1.42
% Public	Negative	Positive	0.0230	1.34
Number of Residuals	Positive	Positive	0.0093	1.12
Clean-Up Call %	Positive	Positive	0.2123	1.85

As shown in the above table, five of the fifteen security design variables are statistically significant and three are considered moderately significant. Most of the variables have the anticipated signs, although four variables - Total Number of Tranches, Number of PO Strips, Basic Waterfall Structure, and Prepayment Fees Good for AAAs - have unexpected coefficient signs. Total Number of Tranches and Number of Principal-Only Tranches are the only significant variables that reduce subordination levels. Number of AAA Tranches, Interest Distributed Pro Rata to AAAs and IOs, and Prepayment Fees

Good for AAAs have significant coefficients that reflect upward adjustments in subordination levels.

The interpretation and analysis of the significant security design variables is as follows. As hypothesized, the rating agencies increase subordination levels for Number of AAA Tranches and Interest Pro Rata to AAAs & IO by 1.7% and 7.6% respectively, all else being equal. The size of the coefficient on Interest Pro Rata to AAAs and IO indicates that the rating agencies strongly view this as detrimental to the AAA classes. Interestingly, the coefficient for Prepayment Good for AAA Classes shows an increase (2.5%) in subordination levels. One possible explanation for this is that the rating agencies view the AAAs' priority in prepayment fee allocations as a bad signal concerning call risk in the loan pool, an impact that may not be entirely captured by other loan pool variables controlling for lockout and yield maintenance effects.

Contrary to expectations, the rating agencies appear to decrease credit support for Total Number of Tranches and the Number of Principal-Only Strips, all else being equal. The interpretation for Total Number of Tranches is that for each additional tranche added, subordination decreases by 1.0%. This could be explained by the fact that this variable might be a more appropriate proxy for deal size and liquidity factors, and that this offsets any potential complexity issues. The impact of Number of PO Strips is rather substantial and reflects a downward adjustment of 5.3% for each PO strip included in the structure. Although PO strips represent complex securities, typically possessing the highest risk profile of any kind of CMBS security, the fact that the majority of the PO strips are not

AAA rated – and thus act as credit support for the AAA classes – may explain the sign and magnitude of the coefficient.

Percentage of Low-Rated Tranches, Simple Distribution of Cash Flow, and Clean-Up Call Percentage were judged to be moderately significant in the analysis. All have the anticipated signs and generally indicate the rating agencies penalize complexity and adverse signals for the AAA classes. The remaining variables – Number of IO Strips, Complex Presentation, Variable Rate, Number of Loan Groups, Percent Publicly Offered, and Number of Residual Classes – all exhibit the anticipated sign for complexity or conflict with the AAA classes, despite having insignificant coefficients.

Overall, our results from this regression indicate that the rating agencies pay only moderate attention to complexity issues. Eleven of the fifteen variables have the appropriate signs indicating that complexity matters. However, only two variables possessing the expected signs have significant coefficients and, additionally, two variables (Simple Distribution of Cash Flow and Complex Presentation) expected to be strong proxies for complexity are not significant at the 5% level. Moreover, three of the four remaining variables – Total Number of Tranches, Number of PO Strips, and Prepayment Good for AAAs – have unexpected signs despite being significant, and Basic Waterfall Structure, anticipated to be a strong proxy for complexity, is insignificant. This suggests that the rating agencies are not concerned with them when setting subordination levels.

2. Partial Regression - Subordination

The purpose of this regression is to isolate the primary factors the rating agencies consider when setting a subordination level for a transaction. Using the ordinary-least-squares, linear regression equation from the Full Regression on subordination levels, we performed a Wald test to eliminate insignificant variables that do not significantly alter the explanatory power of the model. Again, the error terms have been corrected for serial correlation using an AR(1) function.

As illustrated in ***Exhibit 2***, the results from this Partial Regression test are equally strong and indicate that the model is a very good fit. The Partial Regression on subordination also had an adjusted R^2 of 0.94, meaning that almost 95% of the variation in Subordination is explained by the independent variables. Six Special Servicer variables and ten security design variables have significant coefficients. In addition, only two Special Servicer variables and three security design variables have unexpected coefficient signs.

Discussion of Special Servicer Variables:

The following table summarizes the salient partial regression results for the Special Servicer variables.

VARIABLE	EXPECTED SIGN	ACTUAL SIGN	COEFF.	t-STAT
Appraisal Reduction	Negative	Negative	- 0.0220	- 3.19
Major Modifications	Positive	Positive	0.0321	6.97
Superior Spec. Serv.	Positive	Positive	0.0302	4.99
Extension Adviser	Negative	Negative	- 0.0248	- 3.59
Operating Adviser	Positive	Negative	- 0.0165	- 3.18
General SS Fee	Positive	Positive	0.0168	3.82

All of the significant variables in this analysis possess the same sign as in the Full Regression, and only two (Superior Special Servicer and Operating Advisor) have unexpected signs. In addition, there are two newly significant variables in the Partial Regression, Major Modifications and General Special Servicer Fees, both of which are weakly to moderately significant in the Full Regression. The interpretation and analysis of the variables' coefficients and signs in the Partial Regression are analogous to the Full Regression. Also, except for Major Modifications, where the coefficient increased from 0.02 to 0.032, there were no significant changes in the magnitude of the coefficients for the variables. In this analysis, Major Modifications is highly significant and is shown to increase subordination levels by 3.2%.

Overall, the results of this analysis provide further evidence in support of the theory of conflict between the AAA classes and the Special Servicer. The addition of Major Modifications and General Special Servicer Fees as significant variables serves to strengthen the conflict argument. No new variables, or interpretations of coefficients, surfaced which would support the efficiency theory regarding the Special Servicer.

Discussion of the Security Design Variables:

The following table summarizes the salient partial regression results for the security design variables.

VARIABLE	EXPECTED SIGN	ACTUAL SIGN	COEFF.	t-STAT
Number of Tranches	Positive	Negative	- 0.0101	- 6.98
% Low Rated Tranches	Positive	Positive	0.2289	5.05
Number of POs	Positive	Negative	- 0.0476	- 7.63
Simple Cash Flows	Negative	Negative	- 0.0350	- 3.51
Interest Pro rata	Positive	Positive	0.0554	7.80
Complex Presentation	Positive	Positive	0.0267	2.99
PrePay. Good for AAAs	Negative	Positive	0.0152	4.32
Number Loan Groups	Positive	Positive	0.0224	3.79
% Public	Negative	Positive	0.0313	3.96
Clean-Up Call %	Positive	Positive	0.2113	2.90

All of the significant variables in this analysis possessed the same sign as in the Full Regression, and only three (Total Number of Tranches, Number of PO Strips, and Prepayment Fees Good for AAAs) had unexpected signs. Interestingly, though, there are several newly significant variables in the Partial Regression, including Percent Low-Rated Tranches, Simple Distribution of Cash Flow, and Clean-Up Call Percentage, which

were only moderately significant before, as well as Complex Presentation, Number of Loan Groups, and Percent Publicly Offered, which were insignificant. The interpretation and analysis of the variables' coefficients and signs in the Partial Regression are analogous to the Full Regression. Also, except for Percent Low-Rated Tranches, where the coefficient increased from 0.15 to 0.23, and Interest Pro Rata to AAAs and IO, where the coefficient decreased from 0.076 to 0.055, there were no major changes in the magnitude of the coefficients for the variables.

Overall, the results of this analysis, particularly the addition of six newly significant variables with anticipated coefficient signs, provide even stronger support for the theory that complexity in security design makes a difference. No new variables, or interpretations of coefficients, surfaced which would refute the complexity theory.

3. Influence of Certain Special Servicers on Subordination

The purpose of this test is to determine whether rating agencies recognize and compensate for specific Special Servicers. Using the results from the Partial Regression model for subordination, we sequentially substituted a 0/1 dummy variable specification for eight Special Servicers – J.E. Robert Cos., Lennar Partners, Midland Loan Services, AMRESCO, Banc One Management & Consulting Corp., Bankers Trust, Wells Fargo, and CRIIMI MAE. We selected these Special Servicers because they were most prominent in the data set. The following table summarizes the results from this analysis.

SPECIAL SERVICER	COEFFICIENT	t-STATISTIC
Significant		
Wells Fargo	- 0.054	- 3.74
Midland Loan Services	- 0.034	- 3.44
Lennar Partners	+ 0.032	+ 6.01
CRIIMI MAE	+ 0.028	+ 2.13
Insignificant		
Banc One	- 0.018	- 1.64
AMRESCO	+ 0.005	+ 0.36
J.E. Robert Cos.	- 0.001	- 0.15
Bankers Trust	- 0.001	- 0.06

As can be seen, four of the Special Servicers have significant coefficients. If Wells Fargo or Midland Loan Services is the Special Servicer, the rating agencies decrease subordination levels by 5.4% and 3.4% respectively. It is unclear whether the rating agencies favor these Special Servicers because they minimize conflict with the AAA classes, or because they are more efficient. The rating agencies increase subordination levels for Lennar Partners and CRIIMI MAE by 3.2% and 2.8% respectively. Interestingly, Lennar Partners is rated "Superior" by Fitch as a Special Servicer. This, when combined with the insignificant coefficients that are associated with three other "Superior" Special Servicers (AMRESCO, Banc One, and J.E. Robert Cos.) suggests that the rating agencies may recognize the potential for conflict with the senior classes over efficiency.

1. Full Regression - Security Pricing

The purpose of this regression is to determine which factors investors consider when determining purchase prices for different AAA-rated securities. Similar to the security design analysis, we modeled this using an ordinary-least-squares, linear regression equation with the security yield spreads (over comparable Treasury securities) at issuance as the dependent variable and with all variables as explanatory independent variables. Likewise, error terms have been corrected for serial correlation using an AR(1) function.

As illustrated in ***Exhibit 4***, the results from this test are also very strong and indicate that the model is a good fit. The Full Regression on security pricing had an adjusted R^2 of 0.88, meaning that almost 90% of the variation is explained by the independent variables. In addition, several Special Servicer and Security Design coefficients are significant, and many of the variables have the anticipated sign.

Discussion of the Special Servicer Variables:

The following table summarizes the salient regression results for the Special Servicer variables.

VARIABLE	EXPECTED SIGN	ACTUAL SIGN	COEFF.	t-STAT
Appraisal Reduction	Negative	Negative	- 1.45	- 0.29
Balloon Extension	Positive	Negative	- 4.86	- 1.64
Major Modifications	Positive	Positive	9.43	2.11
Controlling Class	Positive	Negative	- 0.22	- 0.04
Advances to Jr. Class	Positive	Negative	- 3.68	- 0.94
Superior Spec. Serv.	Positive	Positive	2.33	0.49
Extension Adviser	Negative	Negative	-13.36	- 3.46
Operating Adviser	Positive	Positive	3.95	1.17
Standby Fee	Positive	Positive	18.83	3.14
General SS Fee	Positive	Negative	- 7.15	- 2.45
SS Owns Lowest Piece	Positive	Positive	0.88	0.29

As shown in the table, four of the Special Servicer variable coefficients are significant. These variables are Major Modifications Allowed, Extension Advisor, Standby Fee, and General Special Servicer Fees. All have the expected coefficient sign except General Special Servicer Fees. With respect to the seven inconclusive variables, Balloon Extension, Controlling Class is Junior Class, and Advances to Junior Class had unexpected coefficient signs.

The interpretation and analysis of the significant Special Servicer variables is as follows. As expected, investors increase spreads by almost 10 basis points for deals allowing Major Modifications, all else being equal. This would imply that investors are concerned about the potential conflict between the senior and junior classes and want the Special Servicer to have limited ability to modify the terms of a non-performing loan. Payment of a Standby Fee to the Special Servicer has an even greater effect, as investors penalize

spreads by almost 20 basis points. Investors in AAA-rated securities do reward the presence of an Extension Advisor by adjusting spreads downward approximately 13 basis points.

General Special Servicing Fees is the only significant variable that is puzzling; its coefficient indicates that average fees decrease spreads by 7 basis points, while abnormally high fees decrease spreads by 14 basis points. This suggests that investors may recognize the efficiency of the Special Servicer and believe the fee structure properly aligns the Special Servicer's interests, or that investors believe the rating agencies have improperly accounted for this variable.

As seen in the preceding Table, several Special Servicer variables that were expected to be important determinants of the security pricing possess insignificant coefficients. In addition, almost half have unanticipated signs. With respect to Balloon Extension, the weak to moderate significance of its coefficient, coupled with its unexpected negative sign, may suggest that investors feel the rating agencies have overcompensated for call risk in the loan pool.

Overall, our results indicate that investors, like the rating agencies, recognize the conflict of interest theory between the Special Servicer and the AAA classes over the efficiency theory, and prefer limitations on the Special Servicer. Seven of the eleven variables – Appraisal Reduction, Major Modifications, Superior Special Servicer, Extension Advisor, Operating Advisor, Standby Fee, and Special Servicer Owns the First Loss Piece – have

signs supporting the conflict theory. Furthermore, while the signs on the remaining four variables support the efficiency argument, only one, General Special Servicer Fees, is significant and its coefficient has the smallest impact (-7 basis points) of all the significant variables.

Discussion of the Security Design Variables:

The following table summarizes the salient regression results for the security design variables.

VARIABLE	EXPECTED SIGN	ACTUAL SIGN	COEFF.	t-STAT
Number of AAAs	Positive	Negative	- 3.15	- 1.09
Number of Tranches	Positive	Negative	- 2.07	- 1.50
% Low Rated Tranches	Positive	Positive	64.86	2.29
Number of IOs	Positive	Positive	2.16	1.02
Number of POs	Positive	Positive	11.42	2.05
Simple Cash Flows	Negative	Positive	1.77	0.24
Waterfall Structure	Negative	Negative	-10.49	- 1.99
Interest Pro rata	Positive	Negative	- 4.38	- 0.55
Complex Presentation	Positive	Negative	- 8.02	- 0.88
PrePay. Good for AAAs	Negative	Positive	7.49	2.68
Variable Rate	Positive	Negative	- 0.31	- 0.10
Number Loan Groups	Positive	Positive	9.16	2.65
% Public	Negative	Positive	14.29	2.67
Number of Residuals	Positive	Positive	8.82	2.86
Clean up Call %	Positive	Positive	85.40	2.04

As shown in the above table, eight of the fifteen security design variables are statistically significant. In addition, many of the variables have the anticipated coefficient signs. Basic Waterfall Structure is the only significant variable that reduces security pricing,

and this corroborates our expectations regarding complex security design considering that it represents simple structure. Percentage of Low-Rated Tranches, Number of PO Strips, Number of Loan Groups, Percent Publicly Offered, Number of Residual Classes, and Clean-Up Call Percentage have significant coefficients that reflect upward adjustments in spreads. Prepayment Fees Good for AAAs, which also indicates an upward adjustment to spreads, is the only significant variable with an unexpected coefficient sign. Thus, with the exception of Prepayment Good for AAAs, all of the significant variables support the hypothesis that investors recognize complexity.

The interpretation and analysis of the significant security design variables is as follows. All else being equal, given a 10% increase in Percentage of Low-Rated Tranches, investors will increase spreads by 6.5 basis points. The impact of Number of PO Strips is rather substantial and suggests an upward adjustment of 11.4 basis points for each PO strip included in the structure. As mentioned above, investors decrease spreads for the presence of a Basic Waterfall Structure, with the adjustment being 10.5 basis points. The coefficient for Prepayment Good for AAA Classes shows an increase of 7.5 basis points in spreads, which is counterintuitive but analogous to the rating agencies reaction of increasing credit support. This parallel reaction by investors could be interpreted as confirming the bad signaling theory set forth earlier.

The significance of Number of Loan Groups, Number of Residual Classes, and Clean-Up Call Percentage lends further support to the complexity argument. The coefficients on the first two indicate that, all else being equal, increasing each variable by one will cause

spreads to increase by approximately 9 basis points each. For Clean-Up Call Percentage, a 10% increase in the Optional Termination Percentage causes spreads to increase by 8.5 basis points. As with the rating agencies, investors respond to an increase in the Percent Publicly Offered by increasing spreads; a 10% increase results in an upward adjustment to spreads of almost 1.5 basis points. Similarly, this may be a response to the negative information externality associated with public deals (i.e., greater information can be supplied to private investors).

Interestingly, with the exception of Number of IO Strips, all of the insignificant variables have unexpected coefficient signs. The insignificance of Simple Distribution of Cash Flows and Complex Presentation, however, is most likely correlated with the significance of Basic Waterfall Structure.

Overall, our results indicate that investors recognize and respond to complexity issues. All of the significant variables but one have the expected coefficient signs supporting the hypothesis that complexity is meaningful. Moreover, although most of the insignificant variables do not possess the anticipated sign, with the possible exception of Number of Tranches, none of the variables is even weakly to moderately significant.

2. Partial Regression - Security Pricing

The purpose of this regression is to isolate the primary factors investors consider when purchasing AAA-rated securities in a transaction. Using the ordinary-least-squares, linear regression equation from the Full Regression on spreads, we performed a Wald test

to eliminate insignificant variables that do not significantly alter the explanatory power of the model. Again, the error terms have been corrected for serial correlation using an AR(1) function.

As illustrated in ***Exhibit 4***, the results from this Partial Regression test are equally strong – possibly slightly superior – and indicate that the model is a very good fit. The Partial Regression on security prices had an adjusted R^2 of 0.89, meaning that almost 90% of the variation in spreads is explained by the independent variables. Five Special Servicer variables and ten security design variables have significant coefficients. In addition, only two Special Servicer variables and three security design variables have unexpected coefficient signs.

Discussion of Special Servicer Variables:

The following table summarizes the salient partial regression results for the Special Servicer variables.

VARIABLE	EXPECTED SIGN	ACTUAL SIGN	COEFF.	t-STAT
Major Modifications	Positive	Positive	11.28	5.60
Advances to Jr. Class	Positive	Negative	- 4.68	- 2.16
Extension Adviser	Negative	Negative	-12.47	- 4.84
Standby Fee	Positive	Positive	16.98	4.76
General SS Fee	Positive	Negative	- 4.85	- 2.62

All of the significant variables in this analysis possess the same sign as in the Full Regression, and only two (Advances to Junior Class and General Special Servicer Fees) have unexpected signs. In addition, there is one newly significant variable, Advances to Junior Class, in the Partial Regression. The interpretation and analysis of the variables' coefficients and signs in the Partial Regression are analogous to the Full Regression. There were no significant changes in the magnitude of the coefficients for any of the variables.

Overall, the results of this analysis provide further evidence in support of the conflict theory between the AAA classes and the Special Servicer. The three variables that support the conflict theory - Major Modifications, Extension Advisor, and Standby Fee - exhibit the anticipated signs and have the largest coefficients. While Advances to the Junior Class and General Special Servicer Fees have negative signs corresponding to the efficiency argument, the small size of the coefficients tends to minimize the meaningfulness of the efficiency theory relative to the conflict theory.

Discussion of the Security Design Variables:

The following table summarizes the salient partial regression results for the security design variables.

VARIABLE	EXPECTED SIGN	ACTUAL SIGN	COEFF.	t-STAT
Number of Tranches	Positive	Negative	- 2.19	- 3.24
% Low Rated Tranches	Positive	Positive	84.78	4.36
Number of POs	Positive	Positive	7.67	3.23
Waterfall Structure	Negative	Negative	- 7.23	- 2.85
Interest Pro rata	Positive	Negative	- 4.99	- 1.90
PrePay. Good for AAAs	Negative	Positive	6.15	3.80
Number Loan Groups	Positive	Positive	5.44	2.64
% Public	Negative	Positive	11.90	3.46
Number of Residuals	Positive	Positive	7.44	3.51
Clean-Up Call %	Positive	Positive	74.26	2.65

All of the significant variables in this analysis possessed the same sign as in the Full Regression, and only three (Total Number of Tranches, Interest Pro Rata to AAA's & IO, and Prepayment Fees Good for AAAs) had unexpected signs. Interestingly, though, there are two newly significant variables in the Partial Regression – Total Number of Tranches and Interest Pro Rata to AAA's & IO. The interpretation and analysis of the variables' coefficients and signs in the Partial Regression are analogous to the Full Regression. Also, except for Percent Low-Rated Tranches, where the coefficient increased from 64.9 to 84.8, there were no major changes in the magnitude of the coefficients for the variables. There were slight to moderate changes in some variables though – Number of PO Strips now indicates that each PO strip in a deal increases the spread by 7.7 basis

points rather than 11.4 basis points. Similarly, Number of Loan Groups now increases the spread by 5.4 basis points rather than 9.2 basis points. The positive impact of Basic Waterfall Structure declined from a 10.5 basis point reduction in spreads to a 7.2 basis point reduction.

Overall, the results of this analysis, particularly the addition of six newly significant variables with anticipated coefficient signs, provide further evidence for the theory that investors recognize and respond to complexity in security design. No new variables, or interpretations of coefficients, surfaced which would refute the complexity theory.

3. Influence of Certain Special Servicers on Security Pricing

The purpose of this test is to determine whether investors recognize and compensate for specific Special Servicers. Using the results from the Partial Regression model for security pricing, again we sequentially substituted a 0/1 dummy variable specification for the eight most prominent Special Servicers in the data set. The following table summarizes the results from this analysis.

SPECIAL SERVICER	COEFFICIENT	t-STATISTIC
Significant		
Bankers Trust	- 11.7	- 2.31
Insignificant		
AMRESCO	+ 5.2	+ 1.38
Lennar Partners	+ 2.5	+ 1.28
J.E. Robert Cos.	- 4.2	- 1.28
Midland Loan Services	- 1.7	- 0.48
CRIIMI MAE	- 1.4	- 0.33
Wells Fargo	+ 1.6	+ 0.33
Banc One	- 0.5	- 0.13

As can be seen, only one of the Special Servicer coefficients is significant; if Bankers Trust is the Special Servicer, investors decrease spreads by almost 12 basis points. The fact that seven of the eight Special Servicers are insignificant may indicate either that investors in AAA-rated securities are not interested in the actual Special Servicer, or they believe the rating agencies are accurately compensating for certain Special Servicers. This is potentially further supported by the fact that, despite many of the coefficients being insignificant in these analyses on subordination and pricing, there are only conflicting signs between the rating agencies and investors for two Special Servicers – Wells Fargo and CRIIMI MAE.

Chapter 7

CONCLUSION

We have empirically examined the determinants of CMBS security pricing and subordination levels, focusing on the influences of security design and governance as it pertains to special servicing. Through quantitative analysis of 125 AAA-rated securities derived from 70 different CMBS offerings, we have attempted to identify the significant aspects of CMBS security design and special servicing that cause rating agencies and investors to adjust credit support levels and prices, as reflected by the security yield spread over Treasuries.

The essence of security design and structuring is to maximize the economic pie associated with the underlying pools of commercial mortgages. Underwriters and investment banks create different securities – and different security designs – to satisfy investor demand and to differentiate themselves from their competition. However, financial innovation often leads to complex and sophisticated securities and structures, which may ultimately reduce investor liquidity. Consequently, underwriters and investment banks must balance investors' desires for financial innovation with liquidity and complexity concerns. The fundamental questions underlying our research in security design are: Do rating agencies and investors respond to the complexity of the bond

structure and the type of security?; if so, what factors are significant to pricing and the establishment of subordination levels?

With respect to CMBS governance, our research and review of the literature identified two contrasting theories regarding the impact of the role of the Special Servicer. While Riddiough argues that the potential conflict of interest between the senior classes and the Special Servicer is significant and predominant, our research introduced an alternative hypothesis that the special servicing mechanism increases efficiency and helps maximize value in the resolution of problem loans. Thus, we focused our research on the following questions: Do investors and rating agencies recognize the potential for "conflict" or "efficiency", or both? If they perceive both, what are the important factors and which theme prevails?

Based on our study, we can derive three main conclusions. First, rating agencies and investors appear to recognize and respond to complexity in security design and structure. The results of our regression analyses on subordination levels and spreads show that several variables that proxy for complexity are meaningful. Based on our Partial Regression analyses, which isolated the primary factors impacting subordination levels and spreads, ten out of fifteen security design variables were shown to be highly significant to both rating agencies and investors. Both rating agencies and investors seemingly respond to the following variables: Total Number of Tranches, Percent Low-Rated Tranches, Number of PO Strips, Interest Pro Rata to AAAs and IO, Prepayment Fees Good for AAAs, Number of Loan Groups, Percent Publicly Offered, and Clean-Up

Call Percent. While the rating agencies also recognize Simple Distribution of Cash Flow and Complex Presentation, investors are shown to respond to Basic Waterfall Structure and Number of Residual Classes. Thus, our findings demonstrate market recognition of complexity issues and confirm the existence of the tradeoff theory in security design and structure. Moreover, in general our results show that complexity is costly.

Second, we can conclude that rating agencies and investors recognize the conflict of interest theory over the efficiency theory in the role of the Special Servicer. This determination is based on the number of variables, as well as the magnitude of the variable coefficients, supporting conflict rather than efficiency. For the Partial Regression on subordination, only one variable (Operating Advisor) out of six supported the efficiency argument, while Appraisal Reduction, Major Modifications Allowed, Superior Special Servicer, Extension Advisor, and General Special Servicing Fees confirmed the conflict theory.

Similarly, although two (Advances to the Junior Class and General Special Servicer Fees) out of the five significant variables in the spread analysis supported the efficiency theory, these variables had the smallest coefficients, which minimized their overall impact to investors. Conversely, Major Modifications Allowed, Extension Advisor, and Standby Fee Paid to Special Servicer corroborate the conflict theory.

Third, we can conclude that rating agencies and investors seemingly compensate for certain Special Servicers. Four of the eight Special Servicers controlled for in our analysis of subordination are shown to be highly significant to rating agencies in the establishment of subordination levels. While the rating agencies appear to reduce subordination levels when Wells Fargo and Midland Loan Services are the Special Servicer, they increase them for Lennar Partners and CRIIMI MAE. Although only one Special Servicer, Bankers Trust, is shown to be significant to investors, this does not necessarily refute the idea that investors recognize certain Special Servicers. It may be an indication that they agree with the adjustment made by the rating agencies for the Special Servicer.

REFERENCES

Allen, Franklin and Douglas Gale. *Financial Innovation and Risk Sharing*. Cambridge, MA: The MIT Press, 1994, p. 1 – 50.

Ciochetti, Brian A. and Timothy J. Riddiough. "Understanding Commercial Mortgage Securitization and its Impact on Debt Financing for Retailing Centers." *The Journal of Shopping Center Research* (May 1996).

Corcoran, Patrick and Lindsay Phillips. "CMBS and Commercial Real Estate Outlook." *JP Morgan Securities, Inc.* (1998).

Fitch IBCA Structured Finance, "Commercial Mortgage Special Reports on: AMERESCO, Inc., Lennar Partners, Inc., Pacific Life Insurance Co., Archon Group L.P., Hudson Advisors LLC, Aetna Life Insurance Company, Wells Fargo Bank, N.A., GMAC Commercial Mortgage Corp., and Banc One Mortgage Capital Markets, LLC." 1996

Gajjar, Anand and Mary Griffin Metz. "Structural Innovations in CMBS." *Fitch Research* (February 1996)

Jacob, David and Kimball Duncan. "Commercial Mortgage-Backed Securities: An Emerging Market." *Nomura Mortgage Securities Research* (January 1994)

Kilgore, Charles Gene and Catherine Polleys. "An Empirical Investigation of Commercial Mortgage-Backed Securities Pricing and the Role of the Rating Agencies." Thesis, *Massachusetts Institute of Technology* (August 1996)

Lederman, Harvey M., "Commercial Mortgage Servicers in the Spotlight." *Fitch Research* (February 1996)

Nomura Securities International, Inc, "Commercial Real Estate Quarterly." *Global Real Estate Research* (January 1995)

Nomura Securities International, Inc, "Commercial Real Estate Quarterly." *Global Real Estate Research* (April 1995)

Nomura Securities International, Inc, "Commercial Real Estate Quarterly." *Global Real Estate Research* (October 1995)

Nomura Securities International, Inc, "Commercial Real Estate Quarterly." *Global Real Estate Research* (January 1996)

Nomura Securities International, Inc, "Commercial Real Estate Quarterly." *Global Real Estate Research* (April 1996)

Nomura Securities International, Inc, "Commercial Real Estate Quarterly." *Global Real Estate Research* (October 1997)

Polleys, Catherine and Timothy J. Riddiough. "An Empirical Investigation into CMBS Pricing and the Role of the Rating Agency." Unpublished White Paper, *Massachusetts Institute of Technology* (April 1998)

Riddiough, Timothy J., 1995, "Optimal Design and Governance of Asset-Backed Securities." Working Paper, *Massachusetts Institute of Technology*, (October 1995)

Rufrano, Glenn J., "Financing and Refinancing Existing Property." *Real Estate Capital Markets; Real Estate Review* (Winter 1998)

Standard & Poors Structured Finance, "Legal and Structural Finance Issues in Commercial Mortgage Securities." *Ratings Real Estate Finance* (Fall 1995)

Williamson, Oliver E., *The Mechanisms of Governance*. New York: Oxford Press, 1996 p. 3 – 92, 171-194

APPENDIX

Exhibit One
List of Issuances

NASC 1994-MDI
SASCO 1994-C1
KP 1994-C1
DLJ 1994-MF4
Debartolo
MLMI 1994-M1
KP 1994-C2
MLMI 1994-CI
CSFB 1994-CFB1
DLJ 1994-MF11
Gentra CRES 1994-I
MCFI 1994-MC1
KP 1994-C3
LTC Remic Corp
NASC 1994-C3
ASWF 1994-C2
SASCO 1995-C1
CSFB 1995-M1
NASC 1995-MDIII
MLMI 1995-C1
MSC 1995 GAL-1
ASW 1995-C1
Prud 95-C1
JPM 1995-C1
MCFI 1995-MC1
ASC 1995-D1
KS Mortgage
WHP, 1995-C1
PWMAC 1995-M1
OR CM 1995-1
LB 1995-C2
PWMAC 1995-M2
MLMI 1995-C2
CSFB 1995-AEW1
ASC 1995-MDIV
SASCO 1995-C4
CSFB 1995-MBL1
MLMI 1995-C3
ACMT 1995-C5
DLJ 1995-CF2
CSFB 1995-WF1
Prud 95-MCF2
CBM 1996-1
JPM 1996-C2
MSC 1 96-BKU1
SASCO 1996-CFL
MLIC, 1996-1
ASC 1996-D2
SBMS VII 1996-C1
GSMSC 1996-PL
NASC 1996-MD5
MLMI 96-C1
Natnlink Funding
MSC1 1996-MBL1
DLJ MAC 1996-CF1
Equitable SA No.174
JPM 1996-C3
MCFI 1996-MC1
BCF 1996-C2
MSC1 1996-WF1
GMAC 1996-C1
DLJ 1996-CF2
MLMI 1996-C2
SASCO 1996-C3
Chase CMSC 1996-2
MCFI 1996-MC2
ASC 1996 MD6
CMAC 1996-C1
Midland 1996-C2
CMAC 1996-C2

Exhibit 2

Summary of Credit and Non-credit Variables from Polleys and Riddiough Analysis

Variable	Description
WAL	Weighted Average Life of Class
RCT	Ratio Coupon to Treasury
SUBD	Subordination
DSIZE	Deal Size
PDEAL	Tranche Size / Deal Size
MFAM	Multi-Family / Total Pool Size
HLT	Hotel / Total Pool Size
OFF	Office / Total Pool Size
RET	Retail / Total Pool Size
INDW	Industrial or Warehouse / Total Pool Size
SR	Senior Housing / Total Pool Size
NUMLNS	Number of Loans
RBL	Number of Borrowers / Number of Loans
RBP	Number of Borrowers / Number of Properties
LO	Weighted Average Lockout Period / Weighted Average Maturity
PEN	Weighted Average Yield Maintenance / Weighted Average Maturity
PRE92	Pool Size Originated Prior to 1992 / Total Pool Size
CRSD	Dummy for Cross Default
CPN	Average Class Coupon
BALON	Ratio of Loan Balance with Balloon Loans at Issuance
LTV	Weighted Average Loan to Value Ratio
DSCR	Weighted Average Debt Service Coverage Ratio
SPLIT	Dummy for Split-Rating
RATES	Number of Ratings
COND	Dummy for Conduit Deal
GCONC	Highest State Concentration/Total Pool Size
CA	Collateral in California/Total Pool Size
MAXL	Size of Largest Loan
CA	Collateral in California/Total Pool Size

Exhibit 3

DETERMINANTS OF SUBORDINATION

	Full Regression		Partial Regression	
Variable	Coeff.	t-Stat	Coeff.	t-Stat
C	1.0887	5.57	0.8576	17.33
WAL	-0.0007	-0.64		
RCT	0.0226	0.39		
DSIZE	-0.0001	-2.27	0.0000	-2.20
PDEAL	0.0085	0.73		
MFAM	-0.1313	-1.81	-0.0957	-8.27
HLT	-0.0395	-0.44		
OFF	-0.1038	-1.26	-0.0458	-2.82
RET	-0.0361	-0.50		
INDW	-0.1555	-2.14	-0.1287	-3.17
SR	-0.1306	-1.45	-0.0848	-3.88
NUMLNS	0.0000	-0.23		
RBL	0.1292	4.93	0.1286	11.33
RBP	-0.1495	-4.70	-0.1494	-14.17
LO	0.0171	0.71		
PEN	-0.0574	-2.19	-0.0265	-2.47
PRE92	0.0341	2.21	0.0235	3.00
CRSD	-0.0318	-1.65		
CPN	-0.5143	-0.47		
BALON	-0.0143	-0.49		
LTV	-0.1570	-1.15		
DSCR	-0.3901	-4.84	-0.3323	-16.80
SPLIT	-0.0491	-7.09	-0.0521	-9.75
RATES	0.0444	2.99	0.0295	3.30
COND	-0.0414	-3.90	-0.0320	-4.89
GCONC	0.0485	1.58	0.0670	4.22
CA	0.0260	0.91	0.0400	2.85
MAXL	-0.0927	-1.73	-0.1014	-3.80
APPRED01	-0.0289	-2.09	-0.0220	-3.19
BALDMY	-0.0004	-0.04		
MMODIF	0.0196	1.56	0.0321	6.97
CONTR	0.0038	0.27		
ADVNR	0.0085	0.74		
SUPSS	0.0313	2.44	0.0302	4.99
EXTADV	-0.0264	-2.35	-0.0248	-3.59
OPADV	-0.0202	-2.28	-0.0165	-3.18
SBFEED	-0.0133	-0.80		
FEEDMY	0.0135	1.68	0.0168	3.82
SSOWN	0.0113	1.38		
NUMBAAA	0.0169	2.20		
NTRANCHE	-0.0109	-2.83	-0.0101	-6.98
PERCLOW	0.1507	1.90	0.2288	5.05
NUMBIO	0.0021	0.36		
NUMBPO	-0.0529	-3.83	-0.0476	-7.63
SIMPLCF	-0.0364	-1.79	-0.0350	-3.51
WTRFALL	0.0126	0.79		
INTPR	0.0761	3.57	0.0554	7.80
PRSCMPLX	0.0368	1.44	0.0267	2.99
PREPAY	0.0247	3.44	0.0152	4.32
VRATE	0.0023	0.26		
LNGRP	0.0148	1.42	0.0224	3.79
PPUBLIC	0.0230	1.34	0.0313	3.96
RESIDS	0.0093	1.12		
CCCALL	0.2123	1.85	0.2113	2.90
Adjusted R^2	0.94		0.94	
F-statistic	36.89		60.37	

Exhibit 4

DETERMINANTS OF SECURITY PRICING

	Full Regression		Partial Regression	
Variable	Coeff.	t-Stat	Coeff.	t-Stat
C	-75.12	-0.92	-75.25	-3.90
WAL	4.56	12.04	4.28	17.73
RCT	84.17	4.28	65.59	9.99
SUBD	18.17	0.43		
DSIZE	-0.01	-1.29	-0.02	-3.21
PDEAL	-4.63	-1.05		
MFAM	88.53	3.36	76.01	5.89
HLT	55.12	1.74	53.87	3.76
OFF	97.69	3.28	93.11	6.15
RET	88.83	3.48	79.47	6.14
INDW	13.16	0.48		
SR	96.41	2.94	78.41	6.25
NUMLNS	-0.02	-1.05		
RBL	26.94	2.39	24.77	4.43
RBP	-37.55	-2.90	-29.72	-4.44
LO	-20.27	-2.39	-8.23	-2.08
PEN	-0.14	-0.01		
PRE92	7.82	1.43	11.96	4.01
CRSD	-16.22	-2.30	-16.11	-4.32
CPN	-393.28	-1.07		
BALON	-29.44	-2.72	-22.39	-3.46
LTV	9.80	0.20		
DSCR	2.80	0.09		
SPLIT	9.27	2.81	8.44	4.12
RATES	10.41	2.08	8.76	2.77
COND	0.39	0.10		
GCONC	23.67	2.05	16.72	2.54
CA	17.46	1.68	19.73	3.92
MAXL	-88.31	-4.56	-57.44	-4.43
APPRED01	-1.45	-0.29		
BALDMY	-4.86	-1.64		
MMODIF	9.43	2.11	11.28	5.60
CONTR	-0.22	-0.04		
ADVNR	-3.68	-0.94	-4.68	-2.16
SUPSS	2.33	0.49		
EXTADV	-13.36	-3.46	-12.47	-4.84
OPADV	3.95	1.17		
SBFEED	18.83	3.14	16.98	4.76
FEEDMY	-7.15	-2.45	-4.85	-2.62
SSOWN	0.88	0.29		
NUMBAAA	-3.15	-1.09		
NTRANCHE	-2.07	-1.50	-2.19	-3.24
PERCLOW	64.86	2.29	84.77	4.36
NUMBIO	2.16	1.02		
NUMBPO	11.42	2.05	7.67	3.23
SIMPLCF	1.77	0.24		
WTRFALL	-10.49	-1.99	-7.23	-2.85
INTPR	-4.38	-0.55	-4.99	-1.90
PRSCMPLX	-8.02	-0.88		
PREPAY	7.49	2.68	6.15	3.80
VRATE	-0.31	-0.10		
LNGRP	9.16	2.65	5.44	2.64
PPUBLIC	14.29	2.67	11.90	3.46
RESIDS	8.82	2.86	7.44	3.51
CCCALL	85.40	2.04	74.26	2.65
Adjusted R^2	0.88		0.89	
F-statistic	17.86		29.30	