Structured Finance Modeling with Object-Oriented VBA
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Structured Finance Modeling with Object-Oriented VBA

EVAN TICK

John Wiley & Sons, Inc.
For Lisa
## Contents

**Preface**  xi  
**List of Acronyms**  xv  
**Acknowledgments**  xvii  
**About the Author**  xix  

### CHAPTER 1

**Cash-Flow Structures**  1  
1.1 Getting Started  1  
1.2 Securitization  3  
1.3 Synthetic Structures  10  
1.4 Putting It All Together  13  

### CHAPTER 2

**Modeling**  16  
2.1 Dipping a Toe in the Shallow End  17  
2.2 Swimming Toward the Deep End  22  
2.3 Types  29  
2.4 Class Architecture  33  
2.4.1 Weak Inheritance  37  
2.4.2 Parameterized Class  42  
2.4.3 Which Is Better?  43  
2.5 Exercises  46  

### CHAPTER 3

**Assets**  48  
3.1 Replines  49  
3.2 Portfolio Optimization  52  
3.2.1 Zero-One Program  53  
3.2.2 Simulated Annealing  56
CONTENTS

3.3 Losses, Prepayments, and Interest Rates 60
3.4 Cash-Flow Model 61
  3.4.1 Zero-Prepay Cash Flows 63
  3.4.2 Actual Cash Flows 66
  3.4.3 Examples 74
3.5 S&P Cash-Flow Model 75
  3.5.1 Model Parameters 77
3.6 Moody's Cash-Flow Model 80
  3.6.1 Model Parameters 82
  3.6.2 Algorithm 84
3.7 Option ARMs 86
3.8 Class Architecture: Multiple Inheritance 89
3.9 Doing It in Excel: SumProduct 94
3.10 Exercises 94

CHAPTER 4
Liabilities 98

4.1 Getting Started 98
4.2 Notation 102
4.3 Expenses 108
4.4 Interest 110
4.5 Over-collateralization 116
  4.5.1 Current Subordinated Amount 116
  4.5.2 Stepdown Date 118
  4.5.3 Target Subordinated Amount 119
4.6 Principal 122
  4.6.1 Gross Principal Distributions 122
  4.6.2 Detailed Principal Distributions 124
4.7 Writedowns and Recoveries 128
4.8 Derivatives 130
  4.8.1 Corridors 132
  4.8.2 Swaps 134
  4.8.3 Excess Reserve Fund Account 135
4.9 Triggers 137
  4.9.1 Call Features 138
  4.9.2 Overcollateralization Test 138
  4.9.3 Interest Coverage Test 139
  4.9.4 Delinquency Trigger 140
  4.9.5 Loss Trigger 141
4.10 Residuals: NIMs and Post-NIM 141
4.11 Class Architecture 144
  4.11.1 Passive Approach 144
Contents

4.11.2 Active Approach 158
4.11.3 Comparison 170
4.12 Doing It in Excel: Data Tables 170
4.13 Exercises 176

CHAPTER 5
Sizing the Structure 179
5.1 Senior Sizing 182
5.2 Subordinate Sizing 185
  5.2.1 Fully Funded vs. Non–Fully Funded 190
5.3 Optimizations and Complexity 192
5.4 Example of Sizing 196
5.5 NIM and OTE Sizing 198
5.6 Class Architecture 203
  5.6.1 Inheritance Revisited 203
  5.6.2 Odds and Ends 207
5.7 Doing It in Excel: Solver 210
5.8 Exercises 213

CHAPTER 6
Analysis 217
6.1 Risk Factors 217
  6.1.1 Prefunding 217
  6.1.2 Prepayments 217
  6.1.3 Buybacks and Cleanup Calls 219
  6.1.4 Defaults 219
  6.1.5 Interest Rates 221
  6.1.6 Spreads 221
  6.1.7 Miscellaneous 222
  6.1.8 Residual Sensitivities 222
6.2 Mezzanine and Subordinate Classes 223
6.3 NIM Classes 230
6.4 Putting It All Together 232
6.5 Exercises 234

CHAPTER 7
Stochastic Models 235
7.1 Static versus Stochastic 235
7.2 Loss Model 238
  7.2.1 Probability of Default from Transition Matrix 238
  7.2.2 Probability of Default from Spread 241
  7.2.3 Probability of Time to Default 242
<table>
<thead>
<tr>
<th>CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.3 Gaussian Copula</td>
</tr>
<tr>
<td>7.4 Monte Carlo Simulation</td>
</tr>
<tr>
<td>7.5 Synthetic Credit Indexes</td>
</tr>
<tr>
<td>7.5.1 Loss Lets</td>
</tr>
<tr>
<td>7.5.2 Analysis</td>
</tr>
<tr>
<td>7.5.3 Hedging</td>
</tr>
<tr>
<td>7.6 <em>Doing It in Excel</em></td>
</tr>
<tr>
<td>7.7 Exercises</td>
</tr>
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</table>

**Appendix A**

**Excel and VBA**

A.1 Spreadsheet Style 286
A.2 Code Style 290
A.3 Compilation 295
A.4 Bloomberg 299

**Appendix B**

**Bond Math**

B.1 Mortgage Payment 303
B.2 Yield to Price 305
B.3 Price to Yield 306
B.4 Duration 307
   B.4.1 Index or Interest-Rate Duration 308
   B.4.2 Discount Spread Duration 308
B.5 Hazard Rate 312
B.6 Static Credit Card Model 315

**References** 321

**Index** 325
Using even the most conservative estimates, asset-backed securities (ABSs) and collateralized debt obligations (CDOs) have grown tremendously over the past 10 years. ABS includes asset sectors in credit card debt, auto loans, student loans, subprime mortgages, home-equity loans, and equipment loans. This doesn’t even include prime mortgages, which are categorized as mortgage-backed securities (MBs). In 2004, the U.S. ABS supply reached $617 billion, with subprime mortgages and home-equity loans around half (J. P. Morgan 2005). These assets can be held as “raw” or whole loans on bank balance sheets, or bonds created through securitization. A percentage of the ABS bonds themselves are repackaged into CDOs. In 2004, $160 billion of cash CDOs were issued (Lucas 2006) of which about $50 billion were ABS CDOs (Bear Stearns 2006). There are also corporate, high-yield, and emerging market CDOs. CDO issuance has grown exponentially over the past 10 years. Synthetic CDOs (built with credit default swaps rather than cash assets) issuance is growing significantly faster than “cash” CDOs (Tavakoli 2003).

The phenomenal growth of these asset classes, and primarily subprime mortgages, can certainly be attributed to the structure of interest rates in the recent past. Historically low interest rates after the Internet bubble and 9/11 led to the rational response of increased debt levels. Subprime home buyers could borrow at affordable rates and prime home buyers could borrow against appreciated home values (home-equity loans). In addition, efficient credit scoring techniques and information on borrowers helped supply grow to meet demand. The Housing Affordability Index, measuring the average ratio of income to housing prices in the United States, reached 144% in 2003, a 30-year high (Molony 2003). The series of Fed interest rate hikes during 2004–2006 has damped growth, and perhaps we have seen the plateau of ABS supply. The big story of the past year has been one of squeezed margins of subprime originators, leading them to relax underwriting standards to goose volume. The chickens started to come home to roost in late 2005—recent vintages appear to be the worst ever in terms of delinquencies and defaults (Zimmerman 2007). But the lasting innovations during these past years are the financial structures for efficiently packaging debt.
Why such explosive growth? Two things: innovative assets and financial engineering. The continual evolution of assets makes borrowing more affordable. Securitization enables unparalleled partitioning and transfer of risk. The repackaging of risk, for example, has allowed banks to buy investment-grade pieces while hedge funds buy lesser-rated (and higher-return) residuals. Issuance has grown to fill market demand among these different niches. Regulated banks, insurance companies, and other investors that could not own whole loans on their balance sheets, either by charter or by severe capital requirements, found they could economically own securitized assets.

Over the past 10 years, on the whole, these investments have fared rather well. Comparing the historical constant annual default rates and recoveries of MBS and corporates, MBS (residential and commercial) do better across the ratings (Lucas 2006). ABS did not perform as well as corporates, but averaged with MBS, the ABS/MBS market as a whole is competitive with corporates, given this metric for risk.

These products are derivatives and hence can grow faster than the underlying assets. Debt is resecuritized—loans into bonds, bonds into CDOs, even CDOs built from other CDOs. On top of this, synthetic structures allow cash assets to be resecuritized any number of times. Thus, talking about the growth of these products may not mean much. Risk is not growing at the same rate because the products are often hedged and much of the risk cancels out.

Two things loom large on the horizon: market rates and regulation. ABS/MBS assets migrate as market conditions change. For example, recently with flat forward rates and uncertain outlook for inflation, U.S. borrowers are switching from floating- to fixed-rate loans. As affordability declines, subprime borrowers increase at the expense of prime borrowers. With rates high enough in the short term, new debt creation will decrease. However, derivatives built from these fixed-income assets will not necessarily decline. Basel II regulations give low-risk tranches better capital treatment, and risky tranches get penalized more (Fitch 2005). As these regulations are adopted, banks and other investors will likely shift their appetites for securitized product. This flexibility is conducive to the long-term health of the securitization market, which is second only to equities in the United States. It is a market that cannot be ignored; it is represented in any significant fixed-income portfolio. Lastly, new products are continually being innovated. Four years ago, synthetic baskets of corporate credits (IBOXX) started trading, evolving into trading standard tranches and then bespokes. In early 2006, synthetic baskets of ABS credits (ABX) started trading, leading to standard tranches in 2007 (TABX) (Morgan Stanley 2006). TABX had birth pains due to declining home prime appreciation creating a bearish one-sided market. If history is
any indicator, a more liquid market will develop once participants converge on a pricing model.

Originally, banks used securitization for balance-sheet arbitrage. Then other parties became involved in securitization, such as mortgage originators and hedge funds issuing CDOs. The growth of demand for mezzanine bonds was critical to this development. From 1998 to 2005 balance-sheet arbitrage dropped from 48% to 18% of new CDO issuance, replaced by transactions wherein the equity investor aims to arbitrage the excess spread (Mahadevan 2006a). The banks did and will continue to buy seniors, whatever the capital requirements are. High-risk investors (investment funds and hedge funds) will continue to buy the equity pieces. The weak link may very well be the mezzanine investors. Mezzanine demand comes from both “real” money investors and other securitizations. A key question is: How robust and diverse is this class of investors? How correlated are the assets due to the investor base? Should demand slow, can pricing adjust to shift investors outward to senior and equity tranches, keeping securitization as a viable business?

Modeling is essentially abstraction and simplification while producing an accurate estimate of some aspect of a complex system. If the system is physical or financial, the attributes of a good model remain the same. By modeling I am talking about a broader area than simply a mathematical representation of a system. I am also referring to the implementation of the model. Of the financial engineering innovations developed over the past 10 years of feverish ABS growth, the cash flow securitization model is key. In general, this model has three components: loss generation, collateral cash flow generation, and bond cash flow generation. Loss generation models the loss distribution of the assets. The collateral model takes the loss characteristics and produces asset cash flows. The bond model takes the asset cash flows and produces liability cash flows. Be it a vanilla securization or a CDO of CDOs, be it supported by mortgages, loans, or bonds, be it cash or synthetic, the valuation model is essentially the same.

This book introduces this model and its implementation. Illustrations of the model in action are given with empirical studies of the sensitivities of actual structures. To concretize the discussion, subprime mortgage securitization is used throughout the book as a unifying example. It was chosen because in combination with prime and commercial mortgages, mortgage assets and their securitizations make up the bulk of the securitized market. Modeling lessons learned in this sector can certainly be applied to other asset classes and sectors. Subprime is also topical because of the recent efforts to model TABX, perhaps with a combination of cash flow securitization model and market-spread-driven copula model.
The main topics covered in this book are:

- **Securitization**: asset and liability cash flow models, waterfalls, rating agency stresses, residuals, hedging, bond allocation, and sensitivity analyses. The details of the financial model are uncovered, with formal specifications given.

- **Stochastic models**: Monte Carlo, using copula to account for correlations, and credit index modeling. The previous static models are converted here to dynamically simulate (correlated) random variables. This increases accuracy and depth. For example, rather than boil loss down to a single expected value, the entire loss distribution can be used.

- **Optimization techniques**: simulated annealing, zero-one programming, search methods. Several problems arise in securitization that benefit from optimization, for example, allocating bonds and selecting collateral. Practical nonlinear methods are emphasized.

- **Object-oriented architecture**: classes, methods, and inheritance. Effective programming methodology is introduced that facilitates the implementation of these models. These techniques are popular in science, engineering, and certain areas of finance such as exotic derivatives. The same tools are leveraged here for cash flow modeling.

- **Excel and VBA**: advanced techniques, recommended style, and extensive examples. Many books introduce financial applications in Excel. Raise the level of your game with modular programming in VBA.

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# List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ABCDS</td>
<td>Asset-Backed Credit Default Swap</td>
</tr>
<tr>
<td>ABS</td>
<td>Asset-Backed Security</td>
</tr>
<tr>
<td>ABX</td>
<td>Asset-Backed Index</td>
</tr>
<tr>
<td>ADB</td>
<td>Amortized Defaulted Balance</td>
</tr>
<tr>
<td>AFC</td>
<td>Available Funds Cap</td>
</tr>
<tr>
<td>ARM</td>
<td>Adjustable-Rate Mortgage</td>
</tr>
<tr>
<td>API</td>
<td>Application Program Interface</td>
</tr>
<tr>
<td>BET</td>
<td>Binomial Expansion Technique</td>
</tr>
<tr>
<td>BEY</td>
<td>Bond Equivalent Yield</td>
</tr>
<tr>
<td>BRCFA</td>
<td>Basis Risk Carry-Forward Amount</td>
</tr>
<tr>
<td>CADR</td>
<td>Constant Annual Default Rate</td>
</tr>
<tr>
<td>CDI</td>
<td>CMO Description Information</td>
</tr>
<tr>
<td>CDO</td>
<td>Collateralized Debt Obligation</td>
</tr>
<tr>
<td>CDR</td>
<td>Constant Default Rate</td>
</tr>
<tr>
<td>CDS</td>
<td>Credit Default Swap</td>
</tr>
<tr>
<td>CLTV</td>
<td>Combined Loan-To-Value (ratio)</td>
</tr>
<tr>
<td>CMBS</td>
<td>Commercial Mortgage-Backed Security</td>
</tr>
<tr>
<td>CMO</td>
<td>Collateralized Mortgage Obligation</td>
</tr>
<tr>
<td>CMT</td>
<td>Constant Maturity Treasury</td>
</tr>
<tr>
<td>CPR</td>
<td>Constant Prepayment Rate</td>
</tr>
<tr>
<td>DLL</td>
<td>Dynamically Linked Library</td>
</tr>
<tr>
<td>ERFA</td>
<td>Excess Reserve Fund Account</td>
</tr>
<tr>
<td>FICO</td>
<td>Fair Isaac Company</td>
</tr>
<tr>
<td>FRM</td>
<td>Fixed-Rate Mortgage</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>HEL</td>
<td>Home-Equity Loan</td>
</tr>
<tr>
<td>IC</td>
<td>Interest Coverage (test)</td>
</tr>
<tr>
<td>IO</td>
<td>Interest Only (bond)</td>
</tr>
<tr>
<td>IRR</td>
<td>Internal Rate of Return</td>
</tr>
<tr>
<td>LC</td>
<td>Loss Coverage</td>
</tr>
<tr>
<td>LGD</td>
<td>Loss Given Default</td>
</tr>
<tr>
<td>LIBOR</td>
<td>London Inter-Bank Offered Rate</td>
</tr>
<tr>
<td>LTV</td>
<td>Loan-To-Value (Ratio)</td>
</tr>
<tr>
<td>MBS</td>
<td>Mortgage-Backed Security</td>
</tr>
</tbody>
</table>
LIST OF ACRONYMS

MPR  Monthly Payment Rate (credit cards)
MPS  Mathematical Programming System
NAS  Non-Accelerating Senior (bonds)
NIM  Net Interest Margin
O/C  Over-collateralization (Test)
OTE  Owner’s Trust Equity
PAC  Planned Amortization Class (bond)
PIK  Pay In Kind (bond)
PMF  Probability Mass Function
PO   Principal Only (bond)
PPR  Principal Payment Rate (credit cards)
PSA  Public Securities Association–Bond Market Association
REMIC Real Estate Mortgage Investment Conduit
RICO Racketeer-Influenced Corrupt Organization (act)
RMBS Residential Mortgage-Backed Security
S&P  Standard & Poor’s
SMM  Single Monthly Mortality
STCDO Single-Tranche CDO
VBA  Visual Basic for Applications
WAC  Weighted-Average Coupon
WAL  Weighted-Average Life
WAM  Weighted-Average Maturity
WARF Weighted-Average Rating Factor
ZPB  Zero Prepay Balance
Acknowledgments

I thank my colleagues at IXIS Capital Markets for their friendship over the years and for creating a great working environment. Rob Catarella, Joe Falcone, Bill Greenberg, John Hatzoglou, Rick Martino, Rene Mendez, Chris Nolle, Steve Pasko, Vaclav Polasek, Eric Raiten, and Andre Romain all shared their insights and expertise in developing this book. I am especially grateful to Andre, Eric, and Joe for reviewing early drafts, and William Dellal and Paul Monaghan for their support over the years. I also thank Young-Sup Lee at Morgan Stanley, Tim McLaughlin at Nomura Securities, Sylvain Jousseaume at Merrill Lynch and Ian Adelson for ongoing friendships and technical discussions. Special thanks go to Bill Falloon and his staff at Wiley.
About the Author

Evan Tick studied Electrical Engineering at MIT (MS, BS, 1982) and Stanford (PhD, 1987), before teaching at The University of Tokyo and The University of Oregon. He moved to New York in 1996 to work for Morgan Stanley and then Caisse des Dépôts CDC (now IXIS) soon after. He has been involved in fixed-income markets, focusing on portfolio optimization, risk management, asset-backed conduits, mortgage securitization, and credit derivatives. Perhaps his most crowning achievement was coaching the Douglass Panthers, who finished in sixth place in the 2005 First Lego League NYC-wide robotics tournament. Or it could have been cycling from Bolzano to the top of the Passo di Stelvio one horrible day in a freezing rainstorm in August 2000.
CHAPTER 1

Cash-Flow Structures

*If I listened to my customers, I would have invented a very fast horse.*

—Henry Ford

1.1 GETTING STARTED

A simplified “cash” structure, also known as a “true sale” structure, is illustrated in Figure 1.1. A seller sells assets into a trust from which bonds are issued to investors. The adjective “cash” is used to denote that real assets are purchased with cash collected from issued bonds. This is opposed to a synthetic structure where credit default swaps (CDSs) are entered into (discussed later in this chapter). The adjective “true sale” refers to the transfer of the assets into a trust or special-purpose vehicle (SPV) from the sellers. The transfer is a legal sale, isolating the assets from the seller.

The assets reside in the trust and generate interest and principal ($I + P$) cash flows. These collateral cash flows are routed to the various bonds that were issued as liabilities. The rationale behind this generic structure is to transform a group of assets with certain average credit risk into a set of bonds of distinct credit risks. These risks may be formalized by virtue of having a rating agency assign ratings (e.g., senior bonds are rated AAA).\(^1\)

The bonds are partitioned in an attempt to meet investor demand for different risks. The structure satisfies various counterparties in different ways. Senior investors may gain the ability to invest in asset types that were previously unavailable to them because of their raw risk. Equity investors may exploit

\(^1\)Throughout this book, S&P ratings are given unless the distinction between the different agency ratings is relevant.
the excess spread “arbitrage” between asset yields and issued bond costs. Seller/securitizers, underwriters, guarantors, and the like look to earn fees.

The AAA senior bonds, for example, achieve their low risk and high rating because they are supported (at a higher priority than other bonds) by asset cash flows and they have various forms of credit enhancement. One type of credit enhancement is the subordinate bonds shown in Figure 1.1. These bonds absorb any losses before the seniors do—all the subordinates need to be written down before the seniors realize any loss. The alchemy of transforming collateral of one rating into a security of another rating is subtle. Do the senior bonds have the same credit risk as other securities rated AAA (perhaps backed by different collateral) by the same rating agency? Where does the similarity end, making the rating nonequivalent (Davies 2006)?

Both the assets and the liabilities have various characteristics that are glossed over in this figure. Structural complications are hidden. How are interest and principal allocated to each bond over time? Are there triggers that cause cash flows to be rerouted or even terminate the deal? Are there auxiliary accounts, and how do they operate? Consider that a prospectus can be 150 to 250 pages long. The main difficulty in accurately modeling the structure (i.e., estimating the value of the bonds) is not necessarily this complexity, although complexity does make such models intricate. No, the key difficulty is in making the right input assumptions: Will the assets prepay and at what rate? How heavy will losses be, and what is their timing? Will forward interest rates be used or another view of rates taken?
Table 1.1 sketches a possible cash flow for this structure. Assets consist of $100MM worth of what is known as “2/28 hybrid ARM” loans. For simplicity, all the loans are considered to be the same: They remain fixed at 8.6% for two years until they float at six-month LIBOR + 6.3%. The collateral cash flows are shown on the left and the bond cash flows on the right. There are no losses assumed, although there are voluntary prepayments made on the collateral. Senior and subordinate floating-rate bonds are issued for a total of $98MM, thus implying that the deal is initially over-collateralized by 2%. Annualized one-month LIBOR rates are listed—the two bonds are floating on this rate: the senior bond at a 25 bps spread and the subordinate at a 140 bps spread. There is enough “excess spread” between the assets and liabilities that even after bond interest and principal is paid, there is a residual (rightmost column in Table 1.1). Note that the seniors get paid down entirely before the subordinates are paid any principal. In this structure, O/C is held constant at $2MM until the bonds pay down entirely, at which point the O/C slowly releases to the residual.

An overly simple example with actual numbers is introduced to help the reader visualize the core of all cash flow models. There are assets generating cash fed to liabilities absorbing cash. Both sides are driven by market rates, perhaps unevenly. The collateral can be driven by several factors, including losses and prepayments. The bonds are managed by potentially complex payment priorities. If one were to invest in the residual of this deal, for example, then an accurate present valuation of the residual cash flow would be necessary, under alternative scenarios. The sensitivity of the residual to various factors would be important to ascertain (e.g., how does its value change with a change in prepayment rate?).

The details of collateral cash flows are discussed in Chapter 3. The intricacies of bond cash flow generation are discussed in Chapter 4. How the over-collateralization amount, as well as the bond allocations, is optimally chosen is discussed in Chapter 5. The trade-offs between over-collateralization and excess spread are discussed in Chapter 6.

### 1.2 SECURITIZATION

Collateralized mortgage obligations (CMOs) and, in general, mortgage-backed securities (MBSs) are investment vehicles that support bond issuance with an underlying pool of mortgage assets. In general, interest cash flows from the assets support interest paid to the bonds, and principal cash flows from the assets support amortization of the bonds. In actuality, the transfer of cash flows can be a complex priority of payments as described in what is known as a waterfall. In general, the asset and liability balances match more
TABLE 1.1  Simplified Cash Securitization Structure: Cash Flows (x000). Monthly periods 1–12 and 45–60 shown. Rates are annualized (6m LIBOR not shown)

<table>
<thead>
<tr>
<th>Period</th>
<th>Collateral</th>
<th>Bonds</th>
<th>Senior Int</th>
<th>Senior Sub Dist</th>
<th>Senior Prin</th>
<th>Sub Bal</th>
<th>Residual</th>
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Cash-Flow Structures

or less. When the asset balance exceeds the liability balance, the structure is over-collateralized. This is beneficial to the bond holders because the excess can absorb defaulted mortgages. Most structures require a certain amount of over-collateralization (O/C) and when the OC is less than the target, the structure is undercollateralized. In such a case, payment priorities are shifted to pay down more senior bonds, hence increasing the OC.

Let's look in more detail at a typical deal, jumping into the deep water. The reader may wish to skim the remainder of this chapter and return to it after reading subsequent chapters. However, it is important to understand how the securitization business works before appreciating why models are built as they are. Subsequent chapters describe many of the points introduced here in greater detail.

The phases of a typical “cash” mortgage securitization are:

1. The Seller buys assets (it is called the Seller because it sells these assets into a Trust).
2. Underwriters bid to do the bond underwriting (potentially the Seller does its own bond issuance, in which case it is an underwriter).
3. The Seller picks a syndicate of underwriters with a lead.
4. The Seller works with the syndicate lead and the rating agencies to size and rate the structure.
5. The syndicate starts to sell the deal (i.e., solicit interest from Investors).
6. On Trade Date, the Seller and syndicate lead price the deal with live market spreads and interest rates. The syndicate finalizes sales to Investors at these prices for settlement on the Settle Date. Usually, all bonds are sold at this time.
7. The Seller books a sale of the assets on the Trade Date but retains certain risks until the Settle Date (around one month later). For example, should a loan entirely prepay, that loan must be replaced by the Seller. If the loan was purchased at a premium, since it prepays at par, there will be a loss to the Seller.
8. On settlement, the Seller sells the assets into the Trust.
9. The syndicate issues bonds supported by the Trust to Investors.
10. After settlement the Seller may be required to supply additional assets within some short period of time (called the prefunding period).
11. The Seller may also be allowed to trade assets during a period of time (called the reinvestment period).

Mortgage assets are sold in pools of loans by Originators who underwrite the individual loans. The pools are sold at auction. The first step above, buying assets, involves the following steps:

1. The Seller models the loan collateral to estimate a price.
2. The Seller wins its bid for the pool.
3. The Seller conducts due diligence on pool, potentially kicking out non-compliant loans.
4. The Trustee verifies that the collateral is compliant, issuing a Trust Receipt to the Seller.
5. The pool is now settled, that is, owned by the Seller.
6. The Seller monitors Servicer reports and reconciles invoices with cash receipts.
7. The Seller updates the loan balances and paid-through dates.
8. Within some short period of time after settling the pool, the Seller can put back noncompliant loans to the Originator.

Figure 1.2 summarizes a typical “cash” structure just at the point of settlement. Investors in the structure (also called Certificate Holders) pay cash to buy various bonds or tranches of the Trust (1). The Trustee is potentially paid up-front fees (2). The Trust buys the loans from the Seller (3). Previously, the loans were analyzed and bid, and due diligence was conducted by a third party (the Trustee). The final loan portfolio is passed into the Trust. Swap counterparties (“Basis Risk Cap Provider” and “NIM Cap Provider” in the diagram) may provide interest rate swaps and/or caps to the Trusts. Here, caps are assumed, requiring up-front fees (4,5). The caps reduce Trust exposure to any fixed-floating-rate mismatch. Servicing rights are sold to the Seller along with the loan portfolio. The Seller may sell these rights to a new Servicer, receiving cash (6).
Cash-Flow Structures

The Net Interest Margin (NIM) Trust is a monetized portion of the residual (equity) tranche of the structure. Potentially, three cash flows can be placed into the NIM Trust (7). Class X is residual interest, and class P is prepayment penalties. The NIM “corridor” is the flows from optional interest rate caps (the “NIM Cap Provider”). Class N is the NIM outflows, perhaps sold to Investors (8). The cash paid by NIM Investors flows through to the Seller (8,9) and into the original Trust in purchase of Classes X and P. This flow is implicitly netted against (3). A “post” NIM piece (OTE, or “Owner’s Trust Equity”) is the residual after Class N is paid. This may be retained by the Seller or sold to a counterparty (9). This example has one NIM, although a chain of NIMs is possible. Class R is constructed for tax purposes and related to real estate mortgage investment conduits (REMICs), a topic beyond the scope of this text. For one explanation of how this type of structure is taxed, see Morgan Stanley (2004a).

Figure 1.3 shows the structure in the steady state. The assets in the Trusts pay interest and principal to the Investors (1,6). These payments are supported by the Basis Risk Cap (BRC) paid by the Cap Provider should interest rates exceed the strike (2,3). These payments are also supported by the Servicer should any assets miss payments due to delinquency or default (4). Should recoveries be made on defaulted assets, the servicer is repaid any advances from recoveries (4). The Trustee distributes payments from the Cap Providers and Servicers to the Trusts (2,5). The assets also make payments to the Trustee: ongoing Trustee fees and Class X, P, and R cash flows (2). The Class X and P flows are paid to the NIM Trust (5). The post-NIM residual is paid back to the Trustee (7) and ultimately to its owner.

![Figure 1.3 Typical Trust Structure: Steady State Cash Flows](image-url)
The first phase of syndication (bidding on an asset pool) is illustrated in Figure 1.4. These actions occur within a few days and are repeated throughout the period when assets are warehoused, leading to a securitization takeout. Collateral data, arriving from an originator, are scrubbed and entered into a collateral management system. The system then produces stratification reports for traders to ascertain pricing assumptions for the pool, perhaps by comparing to similar pools. Loss distribution models are run (rating agencies may have their own proprietary models), producing loss severity and foreclosure frequency reports. A repline file (describing the collateral) is generated for structurers to lay out a tentative structure (what tranches at what ratings) that is then fleshed out (how large each tranche is) in the sizing model. The sizing model requires market inputs for curves and spreads, as well as rating agency constraints. The sizing model generates a final structure that can then be priced with the pricing model. Over time, if the model price drifts from other bids in the market, the model inputs should be reconsidered. For instance, one might ask: Are the assumed market spreads still correct?

To summarize, for each asset pool of interest, the models outlined take the best available input assumptions at the time and generate a bid price. This price is an estimate of pool value assuming eventual securitization takeout. The pool can be viewed on its own (as if the securitization were supported only by these assets) or in conjunction with what is already owned.

In reality, securitization is more complex than previously described. Figure 1.5 illustrates the purchase of assets over time. Starting on the left of the timeline, an ongoing operation is to bid and purchase loan pools. These loans are added to the overall open position of the Desk. A securitization “closes” on the Settle Date. One month prior to this, the bonds are structured, priced, and sold vis-à-vis a Prosup (short for Prospectus Supplement) pool. This pool has the required collateral size and characteristics for closing. The rating agencies bless this pool and certain stressed performance results are published in the Prosup for sales purposes. One week prior to settlement, the initial settlement pool is selected. This pool must adhere to the Prosup pool characteristics within very tight bands. The rating agencies again need to bless this pool. Loans originally in the Prosup pool that have settled and pass all performance constraints can be removed from the initial settlement pool and substituted with other loans, as long as the overall profile is acceptable. After closing, the prefunding account is used to buy additional loans to complete the collateral. These loans are usually selected in three phases, one per month, each reviewed by the rating agencies.

Figure 1.4 also summarizes daily mark-to-market of the bonds. Every day, the current aggregated assets are run through the pricing model. The only inputs that should change are market curves and (less frequently) market...