

**RE-SHAPING FITNESS LANDSCAPES:
A CASE STUDY OF THE EMERGENCE OF MORTGAGE-BACKED SECURITIES
IN THE U.S. BETWEEN 1960 AND 1987**

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Comments welcome

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IN THE U.S. BETWEEN 1960 AND 1987

Existing research assumes that firms searching for positions on a fitness landscape accept the shape of the landscape as given. In this paper, I argue that this assumption results in a limited understanding of firm behavior and explore a range of strategies firms use to reshape their fitness landscapes. This paper analyzes one setting in which such reshaping took place, the emergence of the market for mortgage-backed securities (MBS) in the U.S. between 1960 and 1987, focusing on how firms changed the shape of the landscape to promote the acceptance of MBS by bond investors. Over the period I study, the mortgage lenders and (quasi-)government agencies issued multiple generations of MBS which over time reshaped the fixed-income securities landscape to make MBS more attractive to bond investors. The securities' issuance necessitated the recruitment of bond ecosystem participants such as investment bankers, credit rating agencies and bond dealers to structure, rate, and distribute MBS, thus, furthering the similarity between MBS and bonds. The MBS issuers then lobbied for changes to the regulatory framework, which helped erode the differences between MBS and bonds. By showing how searching on the landscape and reshaping the landscape go hand in hand, this work helps create a more nuanced understanding of the conditions that shape firms' strategy repertoires.

Competitive positioning is a subject of interest for both scholars and practitioners of strategy. Recent advances in competitive positioning research have conceptualized firms' search for a competitive position as occurring over a fitness landscape (Adner, Csaszar and Zemsky 2014). In this view of competitive positioning, firms choose their positions on the landscape by selecting the combinations of attributes to offer in their products, and the firms' positions on the landscape determine the firms' profits or fitness levels (Csaszar and Levinthal 2015; Adner, Csaszar and Zemsky 2014). This view brings together two schools of thought: the ideas of competitive positioning rooted in industrial organization (Porter 1996) and the research on fitness landscapes rooted in evolutionary economics and behavioral theory of the firm (Levinthal 1997).

This conceptualization of competitive positioning inherits an important assumption from its antecedent literatures, namely, that the firms take the shape of the landscape as given in making their positioning decisions. This assumption is important because it constrains the set of strategies available to the firms. Specifically, under this assumption, the firms' strategies are limited to searching the landscape for attractive positions or peaks, with such search made harder by the need to react to the changes in the landscape that take place due to factors outside of the firms' control (Levinthal and Warglien 1999).

This paper considers a possibility not previously explored in the literature on competitive positioning, namely, that firms can play an active role in shaping their fitness landscapes. Allowing for this possibility leads me to consider a broader range of firm strategies than those described by the previous literature. Specifically, I argue that firms can change their fitness levels not just by moving to different positions on the landscape, but also by changing the shape of the landscape. In other words, in addition to searching for more attractive positions on the landscape and moving to those from their existing positions, firms can also re-shape the landscape to make their existing positions more attractive, thus, turning previously less desirable positions into landscape peaks or "basins of attraction" (Levinthal 1997, p. 941).

I argue that firms can reshape the landscape to improve their fitness levels, by pursuing one of two paths. First, they can change their performance along the vertical dimensions of the landscape by changing the benefits customers realize from their products by, for instance, finding new uses for their products. For example, Thomas Edison originally marketed phonographs as a replacement for a live stenographer—a use most customers were not willing to pay for. The product did not gain popularity with customers until it was used for music recording and reproduction (Hargadon and Douglas 2001). By changing the benefits the customers derive from the product, the firms can attract more customers as well as grow the existing customers' willingness-to-pay for their products, with both options contributing to an increase in the height of the peak of the firms' current position on the landscape.

Second, firms can alter the horizontal dimensions of the landscape by manipulating customers' perceptions of the distances between different attribute combinations in order to move the currently attractive positions or peaks closer to the firms' existing positions. For example, producers of generic drugs can draw the customers' attention to the similarity between the generic drugs they are offering and the brand name drugs that share the same active ingredients. By highlighting the similarities in the relevant product attributes and making the attributes of generic drugs appear closer to the attributes of branded drugs, this approach can move the branded drug peak in the landscape closer to the generic drug's position and move customers from the branded drug peak to the generic drug manufacturers' position without the generic drug manufacturers' having to make changes to their products.

There are several reasons why the existing strategy literature has not considered the possibility of firms' changing the shape of their landscapes. First, the literature has focused on established industries, with changes to such industries modeled as exogenous shifts in the environment from the perspective of the focal firm (Levinthal 1997, Levinthal and Warglien 1999). The focus on established rather than emerging industries hindered researchers from asking where landscapes come from and what role firms play in how landscapes evolve over time (Kim and Mauborgne 2005).

Second, the existing literature has focused on the single-firm level of analysis. At this level of analysis, individual firms have little agency over the shape of the landscape and, consequently, a focal firm has little choice, but to accept the shape of the landscape as given. The shifts in the landscape may require the cooperation of multiple firm and non-firm actors and studying the role of firms in such shifts may require abstracting to a higher level of analysis. In the emerging industry settings in which multiple firms work together to establish a market position, it might be more informative to describe competitive positions of groups of firms rather than an individual firm. A related literature on how ecosystems shape the performance of nascent industries has considered the important roles played by ecosystems in enabling nascent industry performance (Adner and Kapoor 2010, Kapoor and Lee 2013), but paid less attention to the roles played by firms in shaping their ecosystems.

Third, the traditional perspectives on competitive positioning implicitly assumed that firms have more control over the product attributes than they do over the shape of the landscape. This may not always be the case. Firms may be especially likely to turn to landscape-shaping strategies when they are limited in their ability to change the attributes of their products. Both firms that are constrained in their product-attribute choices and firms that have exhausted their repertoires of product modification options can pursue profits by attempting to change the shape of their competitive landscapes.

Finally, the competitive positioning literature has focused on product attributes at the expense of consumer perceptions of these attributes, thus, neglecting the role of consumer perceptions in shaping fitness landscapes. This was due to an implicit assumption inherited from economic theory that product changes always translate into changes in the consumer perception of the product (Lancaster, 1990).

Questioning the assumption that product attributes and customer perceptions go hand in hand brings focus to the idea that the distance between the attribute combinations on the landscape is a matter of customer perception. If the change in the product attributes is not perceptible to the customers, it does not constitute a change in competitive position. The customer perception of distances between different attribute

combinations or product similarities may play an especially important role in the adoption of network goods, products the benefits of which increase with the number of customers that use them.

I explore the roles played by firms in shaping their landscapes in the context of a historical case study of the emergence of mortgage-backed securities (MBS) in the U.S. between 1960 and 1987, a context in which multiple firm and government actors came together to create a market for a new product by reshaping the landscape of the existing market for fixed-income securities. By looking at an emergent industry and taking into account the role played by the entire ecosystem in the industry's emergence, I consider a setting in which firms are more likely to have influence over the shape of the landscape.

I find that the emergence and evolution of mortgage-backed securities were an outcome of mortgage lenders' and government officials' efforts to attract bond investors' capital to mortgage lending. In pursuit of this goal, the architects of MBS combined the re-positioning strategies described by the previous literature with a set of strategies aimed at re-shaping the fixed-income securities landscape. Specifically, MBS issuers created two lines of products: a mortgage-type line that gradually acquire more bond attributes to move MBS closer to bonds and a bond-type line that gradually introduced more mortgage features to make mortgage attributes more acceptable to bond investors. Furthermore, mortgage bankers and government officials recruited investment bankers, bond dealers, credit rating agencies and other participants of the bond ecosystem to promote the similarity between MBS and bonds. By issuing MBS that carried the bond label but increasingly incorporated mortgage attributes, MBS issuers changed the perceived distance between MBS, and by extension mortgages, and bonds. The changes to the tax code, implemented as a result of MBS issuer lobbying, eroded the significance of the remaining distinctions between MBS and bonds, thus, solidifying the appeal of MBS to bond investors.

Landscapes and Competitive Positioning

This paper builds on the recent work in competitive positioning which conceptualizes the horizontal dimensions of the multi-attribute fitness landscape as different combinations of product attributes (Adner,

Csaszar, and Zemsky 2014). While the formal modeling of competitive positioning so far has focused on 2-dimensional differentiation, scholars of product positioning have long recognized that differentiation among products can proceed along multiple dimensions (Lancaster 1990). For example, early generations of the minivan were defined by the following attributes: front wheel-drive, seating capacity for 7 people, and enough cargo space to fit a 4 by 8 sheet of plywood between the wheel wells (Rosa et al. 1999).

In the multi-attribute setting, the “horizontal” dimensions of the landscape can be conceptualized as an n -dimensional hyperplane which contains all possible product attribute combinations. The horizontal dimensions map the firms’ products’ performance on each of the n attributes. The vertical dimensions of the landscape reflect the firms’ profit functions (Adner, Csaszar, and Zemsky 2014). These profit functions are determined by the distribution of customer preferences over the range of attribute combinations and customer valuation functions over those combinations, i.e. the number of customers with positive willingness-to-pay for a given set of attribute combinations as well as a measure of the customers’ willingness-to-pay. Together, these two pieces of information translate into the height of the landscape peak which places an upper limit on the firms’ profitability function.

A question of interest to the positioning scholars is one of understanding the distance between two positions on the landscape. The notion of distances on the landscape has been described in the organizational learning literature in the context of exploration and exploitation. Specifically, scholars have considered the distances between firms as the aggregates of distances between the technological classes that the firms patent in (Rosenkopf and Almeida 2003) or firm attributes (Lavie and Rosenkopf 2006). In addition to these objective measures of distance, scholars have also argued that cognition plays an important role in firms’ own classifications of their rivals (Porac et al. 1995). The set of measures adopted in the empirical literature can be interpreted to suggest that the distance between the attributes exists independently of the consumer perceptions. However, this interpretation does not fully explain the existence of advertising and other means firms employ to manage the perception of good interchangeability, e.g. shelf positions of brand-name and private-label goods. In this paper I am going to

think about distances between positions on the landscape both in terms of objective attributes and consumer perceptions, operationalized as consumer reception of a given product.

Much of the fitness landscape literature focuses on search strategies employed by firms and how different search strategies result in different outcomes (Csaszar and Levinthal 2015, Gavetti and Levinthal 2000, Rivkin and Siggelkow 2003, Siggelkow and Rivkin 2006). However, with notable exceptions (Gavetti 2012) the work on search strategies has assumed a coupling between the firms' capabilities of finding a peak and moving to the peak, leading some scholars have described firms' search of the NK landscape as a production function (Adner, Csaszar, Zemsky 2014). In this view, firms can change their position on the fitness landscape by changing the combinations of attributes their products offered. Separating the search for peaks from moving to peaks allows firms to search the landscape before moving to peaks (Gavetti 2012). The literatures on competitive positioning and search have offered a number of search strategies, this paper draws on the innovation literature for strategies that allow firms to move to their chosen peaks, we can turn to the innovation literature which discusses material, rhetorical, and political strategies.

Material strategies. In the innovation context, material strategies such as designing a product have been described as matching of a solution (innovation) to a problem (customers' needs) (Alexander 1964, Clark 1985) or alternatively as "the emergent arrangement of concrete details that embodies a new idea" (Hargadon and Douglas 2001, p. 476). The innovator shapes how the audience perceives the innovation through the product's design which focuses the audience's attention on the familiar aspects of innovation, highlights novelty of other aspects, and keeps yet others unseen (Hargadon and Douglas, 2001). From a material strategies' perspective, the innovator's task is to use design to position a product in a way that complies with the audience's expectations. In the landscape setting, the design strategies can be thought of as an outcome of firms' policy choices that affect the product attributes.

Rhetorical strategies. While economists traditionally categorize the rhetoric around a firm's products as either cheap talk or soft information (Mullainathan et al. 2008), innovation scholars who adopt the

institutional theory lens have suggested that in addition to material strategies, rhetorical strategies such as discourse, theorization, framing, and labeling play an important role in facilitating the diffusion of new practices and ideas (Suddaby and Greenwood 2005, Kaplan 2008, Granqvist, Grodal, and Woolley 2013). Specifically, innovators can use such rhetorical strategies to affect the customer perceptions of the product attributes and, with them, a product's position on the landscape.

Political strategies. Beside material and rhetorical strategies, innovation scholars have also considered the importance of political strategies in helping promote the diffusion of innovations by helping innovators position their products on a competitive landscape. These researchers have described a range of strategies that includes engaging with policy makers to help shape the regulation of an emergent industry (Leblebici et al. 1991), recruiting the relevant ecosystem participants to help ensure the survival of an emergent industry (Adner and Kapoor 2010), or helping the ecosystem participants develop new evaluation standards for an emergent product (Rao, Monin, and Durand 2005). The use of such political strategies as lobbying for changes to the regulatory framework, recruiting and educating ecosystem participants can be helpful in diffusing innovations and reshaping landscapes.

METHODS

A longitudinal historical case study of emergence, evolution, and diffusion of MBS between 1960 and 1987 is an appropriate research strategy for studying the process by which firms reshape their competitive landscapes. Like prior work on innovation, my research design is longitudinal (Hargadon and Douglas 2001), draws on a combination of primary and secondary historical data sources (Tripsas 1997), and focuses on an innovation of economic importance (MacKenzie 2011). My analysis is at the level of the ecosystem, a choice that provides a better opportunity to observe firm agency over the changes in the shape of the landscape than a single-firm level of analysis.

The MBS market context is a particularly fertile ground for understanding how firms shape their fitness landscapes because during the period I study it, MBS represents an emergent market with multiple firm

and non-firm actors working together to help position MBS on the fixed-income-securities landscape. In this context, the mortgage lenders had little control over the attributes of the mortgages¹ that they packaged as MBS which meant that re-shaping the landscape was an important part of their strategy repertoires. Also, both mortgages and mortgage-backed securities are legal contracts with minimal room for disagreement about the contracts' provisions which makes them an ideal setting for studying the role of consumer perceptions. Furthermore, like other financial products, MBS are network goods in the sense that their value depends on how many customers are willing to buy and sell them.

Data collection

Historical case studies are valuable tools in building theory about how processes unfold over time and have been used extensively to study the diffusion of innovation (Hargadon and Douglas 2001; Eisenhardt and Graebner 2007) and, more specifically, innovation in financial markets (MacKenzie and Millo 2009, Etzion and Ferraro 2010, MacKenzie 2011, Funk and Hirschman 2014). The data I draw on in this study consists of a combination of archival documents and interviews. My insights rely on both qualitative and quantitative data which were obtained through systematic searches around the events related to new MBS product introductions. For a chronology of the events of interest, see Table 1.

INSERT TABLE 1 ABOUT HERE

The data collection for this project proceeded in two stages. I began the first stage by interviewing a select group of current and former industry participants and regulators who were involved in the creation and diffusion of different generations of MBS. Between 2008 and 2010, I conducted 21 semi-structured interviews to understand which organizations from which industries participated in the evolution of MBS, what roles these organizations played and how they interacted with other organizations. In choosing the individuals I interviewed and the organizations they represented, I relied on theoretical sampling (Glaser

¹ This was because the attributes of mortgages were shaped by state- and federal-level laws that sought to build in consumer protections in the aftermath of first the Panic of 1893 and then the Great Depression. The Panic of 1893 became precipitated the banning of prepayment penalties in mortgages and the post-Great Depression legislation introduced the 30-year fixed-rate fully amortized mortgage loans.

and Strauss 1967), continuing to recruit interviewees until I covered the entire MBS value chain. I used the transcripts of my detailed notes from the interviews to compile a list of products, organizations, and individuals instrumental in the emergence, evolution and acceptance of MBS as bonds.

In the third stage of my data collection, I searched online databases ABI Inform/Global and ProQuest Historical Newspapers for archival materials using as keywords the names of the different mortgage-backed securities², organizations³, and individuals⁴ associated with the development of the market for mortgage-backed securities. I also searched WorldCat, an online bibliographic catalog, for manuals, pamphlets, and white papers either authored by or describing the activities of the securities' issuers, rating agencies, and industry trade associations. I also consulted industry trade manuals to understand how the practitioners thought about the history of the industry's products and how the attributes of these products evolved over time. I supplemented my searches of the online databases with reading published academic manuscripts dealing either with MBS directly, e.g. (MacKenzie 2011), or the history of mortgage lenders (Haveman 1992, Jacobides 2005). I followed the reading by cross-checking the references of these papers against the publications in my archive and adding the relevant publications from these papers to my archive. When specific industry publications were not available from public sources, I requested copies of these publications directly from their authors.

The combination of these efforts yielded a collection of 379 publications including 13 books and 366 industry documents and periodicals spanning the period from 1960 to 2007. The industry documents I gathered include prospectuses of individual securities, annual reports of the securities' issuers and the issuers' regulators, as well as listings of the individual securities in regulatory filings and rating agencies' publications. The periodicals section of the archive includes stories from major newspapers (*Wall Street*

² For example: "mortgage-backed securities (MBS)", "mortgage-backed bonds (MBBs)", "pass-through certificates", "pay-through certificates", "guaranteed mortgage certificate (GMC)", "pay-through bonds", "collateralized mortgage obligation (CMO)", "real estate mortgage investment conduit (REMIC)."

³ These included "Federal National Mortgage Association (FNMA or Fannie Mae)", "Government National Mortgage Association (GNMA or Ginnie Mae)", "Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac)", "Salomon Brothers", "First Boston", "Merrill Lynch", etc.

⁴ Such as Lewis Ranieri and Frank Fabozzi.

Journal, New York Times, Washington Post, Los Angeles Times, Chicago Tribune), general interest business journals (*Business Week, Forbes, Fortune*), journals focusing on investing (*Barron's, Crain's, Kiplinger's, Money*), as well as trade publications for the different industry groups involved in creating, buying, and selling mortgage-backed securities with a specific focus on mortgage lenders (*American Banker, Bottomline, Mortgage Banking, Savings Bank Journal, Savings & Loan News, Real Estate Review*), bond investors (*Bond Buyer, Institutional Investor, Pensions and Investments, Pension World*), and their regulators (*Federal Reserve Bank of New York Quarterly Review, Review— Federal Reserve Bank of St. Louis, Federal Home Loan Bank Board Journal, etc.*).

Analysis

In my analysis of this data, I relied on the comparison and contrast techniques of grounded theory (Glaser and Strauss, 1967; Bechky, 2003; Corbin and Strauss, 2008). This was an iterative process of tracing the lineages of the different MBS product designs, comparing and contrasting the attributes of the different MBS product generations, comparing my findings to the established results in the literature on search and competitive positioning, and iteratively refining the theoretical categories I arrived at.

Step 1. I first read the documents in my archive to understand the different types of participants in this market and their roles (see Table 2 for detailed descriptions of the market participants).

INSERT TABLE 2 ABOUT HERE

Step 2. I then coded the data focusing on the different strategies used at first by mortgage lenders and government officials to encourage bond investors to invest in mortgages and then by the MBS issuers (mortgage lenders and (quasi-)government agencies) to help promote the acceptance of MBS as bonds. Table 3 contains the description of the different strategies and the data sources I used to document them.

INSERT TABLE 3 ABOUT HERE

After compiling a list of MBS issuers' strategies, I re-read the documents in the archive to understand the bond investors' reactions to the different product generations and their objections to investing in MBS.

Step 3. To understand the features of the different generations of the MBS products, I catalogued the designs of MBS products issued as public offerings during the study period⁵. Between 1970 and 1983, six distinct designs of MBS were introduced with the sixth design accepted as a bond by the bond investors. Because I am interested in the question of how the evolution of MBS affected the fixed-income securities landscape, I also include a design launched in 1987 after the reshaping of the fixed-income securities landscape was formalized in the 1986 Tax Act. Altogether, I examine seven designs of MBS, including their features, how each design differs from the predecessor MBS product designs and the resultant products' appeal to bond investors and mortgage lenders.

One challenge with tracking these different MBS designs was that MBS issuers used different terms to refer to the same securities depending on whether they were addressing fellow issuers, other experts, or potential investors. Table 4 contains a representative sampling of the trade names (the names issuers and other experts used when addressing experts) and labels (the names used to present MBS to the investor audience). In the paper, I refer to the different MBS designs using their trade names and point to the labels as necessary. This choice allows me to highlight two divergent rhetorical strategies pursued by the MBS issuers: changing the security trade names with every MBS design generation, thus, enabling the MBS issuers and experts to distinguish among the different MBS designs while using the same labels across the different MBS generations, thus, allowing MBS issuers to conceal the differences between the different generations of MBS from the investors.

INSERT TABLE 4 ABOUT HERE

⁵ I focused on securities that were offered to the public rather than private offerings because I was interested in the broad diffusion of MBS and also because the costs incurred in bringing the securities to the public market meant that the issuers believed the acceptance of the products by the public to be especially likely. One of the costs of creating public offerings is that making a new security public invites competitor firms to copy the design. Innovators in the financial markets strive to avoid recognition which makes it hard to identify the first firm to privately offer a design.

Step 4. In analyzing the descriptions of bond investors’ reactions to the different generations of MBS, I consistently came across references to attributes that bonds had and MBS lacked and vice versa. By iteratively coding these attributes, I put together a mortgage-bond attribute spectrum which enabled me to plot the different generations of MBS based on their attributes. For attribute descriptions, see Table 5.

INSERT TABLE 5 ABOUT HERE

In my analysis, I treat the principal and interest payment frequency as a single attribute. For the graphical depiction of the resultant mortgage-bond attribute spectrum, please see Figure 1.

INSERT FIGURE 1 ABOUT HERE

SELLING MORTGAGES TO BOND INVESTORS

This paper describes the development of the MBS market from 1960, a time when according to the *New York Times* coverage: “Mortgage bankers are increasing their efforts to persuade pension fund trustees to invest at least as much money in mortgages as they put into stocks and bonds. The bankers believe pension funds would end the tightness of mortgage money” (Enots 1960, p. R1) to 1987, when the MBS design reflecting the redrawing of the bond category boundaries was first issued. Five years after the end of the period studied, a writer for *Pensions and Investments*, a pension-fund trade publication, categorized MBS as follows: “The mortgage sector represents the largest segment of the bond market after Treasuries [government bonds], dwarfing the \$120 billion corporate bond market” (Star, 1992, p. 3).

I will describe the evolution of MBS as the pursuit of two strategies by mortgage lenders—positioning mortgages closer to bonds and moving bonds closer to MBS and by extension mortgages, with the two strategies culminating in the blurring of the distinctions between MBS and bonds. Figure 2 depicts the evolution of MBS over time with different designs of MBS plotted as a progression on the mortgage-bond spectrum.

INSERT FIGURE 2 ABOUT HERE

If the assumption of the existing literature held and firms issuing MBS took the fixed-income securities landscape as given, we would expect to see a one-way movement on the landscape from mortgages towards bonds, starting with the most mortgage-like security (pass-through certificates) and ending with the most bond-like security (agency MBBs). We would also expect the bond investors to accept the most bond-like security they were offered because accepting this security would require the least adjustment of the part of the bond investors.

However, instead of seeing a steady progression of MBS from mortgages to bonds, we see two paths—one that takes MBS from mortgages closer to bonds and a second one that brings MBS from being closer to bonds to being closer to mortgages. The first path is consistent with the assumption in the existing literature that firms use their positions on the landscape to approach observed peaks, i.e. the re-positioning path. The second path suggests a shift of customer perceptions of the distance between mortgages and bonds and, consequently, a change in the shape of the fixed-income landscape—this is a path not previously described in the literature. Without a shift in customer perceptions, it is hard to explain why bond investors accepted a product, the attributes of which were so far away from either the products they were used to or the new products they were offered.

Repositioning on the Landscape: Bringing mortgages closer to bonds

Mortgage-backed securities were created in response to the pension funds' resistance to investing in mortgages directly. Starting in the 1960s, mortgage lenders and government officials wanted to convince bond investors, more specifically pension funds, to invest in mortgages (Enots, 1960). However, the pension funds resisted investing in mortgages because they viewed mortgages as an inferior investment to bonds. Specifically, mortgages came in smaller denominations than bonds which meant that bond investors had to buy a greater number of mortgages than bonds in order to invest the same amount of money. Also, each mortgage was accompanied by voluminous documentation which varied from loan to loan. The complexity and heterogeneity of mortgage documentation made the credit quality of individual mortgage loans hard to analyze. Moreover, the investors in mortgages were expected to collect the

mortgage payments from the end borrowers, i.e. service the loans. By contrast, bonds came in large denominations, had standardized documentation with easy to understand credit ratings and the bond investors received payment checks without having to invest in a separate payment-collection function.

Pension funds resisted the mortgage bankers' sales efforts in part because they lacked the capabilities necessary for investing in mortgages. Developing such capabilities would have required making investments that pension funds were not willing to make. Even if such capabilities could be developed without incurring major costs, investing in mortgages would still be a costlier proposition than investing in bonds due to the smaller denominations of mortgages compared to bonds. Thus, the attribute gap between mortgages and bonds translated into mortgages being a costlier investment vehicle than bonds. Customer preferences for bonds rather than mortgages were grounded in the prospective buyers' missing the capabilities necessary to engage in mortgage investing and mortgage investing being more costly.

This attribute gap between mortgages and bonds translated into a lack of liquidity in the mortgage markets that mortgage lenders and government officials sought to remedy by attracting the bond investors' capital. In the words of the Kaiser Commission, appointed by President Lyndon Johnson to analyze the supply of urban housing:

A mortgage is not the most appealing investment to many investors. Often it is not easily converted into cash without a substantial discount... Mortgages require investors or their servicing agents to have special staffs which add to the cost of investing in them, costs that may prove prohibitive for smaller investors. A Federally guaranteed debenture would overcome all over these problems and prove attractive to all lenders (Kaiser Commission Report, 1968, pp. 131-132).

In keeping with the commission's recommendation, the desire to attract bond investors' capital to the mortgage market led to the creation of MBS, securities that addressed the bond investors' objections while channeling money into the mortgage market. Mortgage lenders and government officials attempted to overcome the gap between mortgage and bond investing by packaging mortgages into mortgage-backed securities, a new product which was meant to make investing in the mortgage market both cheaper and easier. MBS came in larger denominations than mortgages, had standardized documentation and the

servicing of the loans backing the securities was assigned to a third-party. Furthermore, the repayment of the mortgage loans backing the securities in the first generation of MBS was guaranteed by the Federal government meaning that the securities had no credit risk. This guarantee together with the third-party servicing provisions obviated the need for the bond investors to hire staff with the expertise necessary to evaluate the credit quality of each individual mortgage and to collect money from mortgage borrowers.

The first generation of MBS was launched as two distinct product types: a mortgage-type product and a bond-type product. I will discuss the mortgage-type product here and postpone the discussion of the bond-type product for the changing the horizontal dimensions of the landscape section of the findings.

First generation. Mortgage lenders had high hopes for the prospects of pass-through certificates (the first generation of mortgage-type MBS) capturing a share of the bond investors' portfolios. In words of Bundy Colwell, the board chairman and president of the Colwell Company, fifth largest mortgage bank in the U.S., "More and more, this is the way mortgages will be marketed. They will tap markets, particularly pension funds and other institutions, that are not equipped to handle mortgages as such. All they have to do is treat them like bonds" (Loehwing 1970, p. 49). Others in the mortgage industry agreed with Mr. Colwell's assessment of pass-through certificates. Here is how Louis Nevins, a director of the National Association of Mutual Saving Banks, described the function of pass-through certificates: "What the security does is to transform the mortgage into a bond-type instrument" (Nevins, 1972, p. 23).

These high hopes notwithstanding, the attributes of pass-through certificates were closer to those of mortgages than to the attributes of bonds. Investments in pass-through certificates represented partial ownership of a pool of mortgages rather than purchase of a debt obligation of the mortgage lender. Like mortgages, pass-through certificates made monthly payments of interest and principal and had uncertain repayment dates. The uncertainty in when the mortgages backing the securities would be repaid exposed investors to the possibility that the securities would be repaid before their due date, a risk known as

prepayment risk. By contrast, bonds were debt instruments (debts of their issuers), made semi-annual payments of interest, and returned their principal once at a pre-determined date.

Among these differences, bond investors' resistance to accepting new securities focused on two issues: the prepayment risk and the monthly frequency of payments. Even mortgage bankers proselytizing for the new securities acknowledged the bond investors' concerns about prepayment risk: "The modified pass-through security is more like a bond than a mortgage, but the holder still has no protection against accelerated payments" (Nevins 1972, p. 42).

Phillip Kidd, Assistant Director of Research for the Mortgage Bankers' Association characterized the problem of prepayment risk as follows:

The only feature the "bond" man looks for today that the mortgage banker cannot provide is assurance of call protection. Accelerated cash flows through prepayments and foreclosures can be estimated from FHA statistics, but the bond man would still fear a further acceleration if interest rates fell sharply and borrowers refinanced their mortgages. Neither FHA nor VA mortgages permit a prepayment penalty. Historically, this type of prepayment is rare and a drop so sharp as to induce refinancing in interest rates seems unlikely in the foreseeable future (Kidd 1970, p. 41).

Based on this characterization, the prepayment risk in pass-through certificates stemmed from an attribute that pass-through certificates inherited from mortgages that MBS issuers could not control—the absence of prepayment penalties in the mortgages, backing the new securities. The lack of predictability in the repayment patterns of pass-through securities made it difficult for investors to compute yield (Seiders 1982, p. 339), a common metric on which investors used to price and compare bonds.

In addition to prepayment risk as the major barrier to the acceptance of pass-through certificates, the investment bankers trying to sell the securities also ran into bond investor resistance to another feature pass-through certificates shared with mortgages, namely, the monthly payment frequency. As Lewis Ranieri, a driving force behind MBS market development, later recalled:

We created problems for the accountants because the pass-throughs were monthly pay securities and all the other bonds were semiannual. In fact, after John Hancock bought a mortgage security, my customer came back two months later and said, 'Gee, Lewis, I love this stuff but I can't buy anymore because my

back office is threatening to quit.’ We needed to overcome the bookkeeping inconvenience of a security that paid interest monthly (Ranieri, 1996, p. 36).

Bond investors were so used to securities that paid semiannual interest that they had a hard time handling the cash flows, never mind appreciating the compounding advantage that monthly interest payments offered compared to semi-annual interest payments. The manual put together by investment bankers specializing in pass-through certificates described this lack of appreciation as follows:

Another reason for the underestimation of the comparative yields on Ginnie Maes⁶ is the failure to take into account the compounding effect of monthly payments upon yield. Since most bonds pay interest semiannually, adjustment factors must be used to equate their yields with Ginnie Mae yields (GNMA Mortgage-Backed Securities Dealers’ Association 1977, pp. 12-13).

As the texts cited above indicate the monthly payments of principal and interest were a problem for two reasons: one, they caused accounting and back office challenges which made it difficult for buyers to handle new securities, and two, in combination with prepayment risk, they made it more difficult to calculate yield—an important metric on which bond investors compare and price securities.

While bond investors rejected pass-through certificates, traditional mortgage investors who learned how to work around the difficulties associated of prepayment risk and monthly payments switched their mortgage purchases to pass-throughs, a development anticipated by MBS issuers:

Most likely, traditional single-family mortgage investors—mutual savings banks and savings and loan associations—will give the warmest reception to the instrument. These financial institutions already know the drawbacks of direct investment in single-family mortgages—costly review of mortgage documents, loss of income due to long foreclosure litigation, and low liquidity. Moreover, they have lived for years with the problem of reinvesting monthly amortization and know how to tie it into their cash flow needs (Kidd 1970, pp. 39-40).

In part, the traditional mortgage investors’ enthusiasm was due to pass-through certificates reducing the cost of mortgage investing while retaining the favorable tax status investing in real estate. In reflecting on

⁶ Pass-through certificates guaranteed by the Government National Mortgage Association (GNMA) were nicknamed Ginnie Maes, a derivative of Ginnie Mae, the name MBS traders also used to refer to the agency itself.

the history of the market development, a Barron's reporter wrote that: "The early buyers of Ginnie Maes were thrift institutions⁷, which immediately realized big tax breaks from them" (Thomas 1977, p. 3).

Despite anticipating the success of pass-throughs with traditional investors, the combination of that success with a failure to attract new investors to the mortgage market led to soul-searching and finger-pointing among both mortgage lenders and investment bankers as the quotes below suggest.

To date about two-thirds of the mortgage-backed securities issued are held by savings and loan associations and savings banks. To those who had hoped that this security would become a device to attract the funds of credit unions, insurance companies, commercial banks and pension funds, this has been somewhat of a disappointment (Nevins 1972, p. 23).

The purchase of GNMA securities by [traditional] mortgage buyers has always distressed the architects of the program and the government officials who intended that GNMA's would be used to tap the vast wealth of pension funds. In 1971, many market observers openly charged issuers and dealers with taking the easy way out, selling to the same old mortgage buyers instead of devoting the time and effort required to bring new money into the mortgage market (Ganis 1974, p. 61).

MBS issuers responded to the lack of bond investors' interest in pass-through certificates by changing the attributes of the securities to position them in a way that responded to bond investors' concerns.

Second generation. Pay-through certificates, the second generation of mortgage-type MBS, were issued by Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac) in 1975. The new securities made semiannual interest payments and annual payments of principal. Pay-through certificates represented a movement of MBS towards bonds by changing the payment frequency and partially addressing the bond investors' concerns about the extension component of the prepayment risk. Like the pass-through certificate issuers before them, pay-through certificates' issuers were explicit about their target customer demographic.

The Guaranteed Mortgage Certificate is intended to appeal to non-traditional real estate mortgage investors who are not equipped to cope with monthly receipts of interest and principal and who prefer a form of investment which is similar to a corporate or municipal bond (Strine 1978, p. 1030).

⁷ "Thrift" was a common term for describing savings and loan association and mutual savings banks.

Addressing investor preference for semi-annual interest payments involved trade-offs in the choice of target customers. Semiannual interest payments meant that the securities would not be counted as real-estate investments and the mortgage investors would not be able to realize the tax benefits associated with such investments (Struck 1978, p. 17) and would not buy the securities. Thus, bond investor targeting came at the expense of the securities' appeal to traditional mortgage investors. In another manifestation of the explicit targeting of bond investors was the recruitment of "blue-chip bond marketers" (Forbes, June 15, 1977, p. 100), i.e. bond dealers to distribute the new securities. The recruitment was a break with Freddie Mac's prior practice of employing an internal salesforce to market MBS.

However, despite the changes in the payment frequency attribute and the recruitment of bond dealers to distribute the new securities, bond investors' demand for pay-through certificates was insufficient to cover the extra costs incurred by Freddie Mac in issuing the securities. Consequently, pay-through certificates were discontinued in 1979 (Savings Institutions 1983, p. 117) after \$2.95B of securities were issued (Federal Home Loan Mortgage Corporation, 1982). Freddie Mac did not attempt to revive pay-through certificates until 1983 by which point the MBS issuers have changed the fixed-income securities landscape enough to make the securities' attributes more palatable for the bond investors.

Changing the Landscape: Bringing bonds closer to mortgages

First generation. Agency mortgage-backed bonds (MBBs), the first generation of bond-type MBS were first issued at the same time as the first issues of pass-through certificates in 1970. Agency MBBs were positioned as an attractive option for pension funds interested in mortgage investing. The press coverage focused on the advantages of investing in agency MBBs compared to buying mortgages directly:

What makes the bonds more attractive than actual mortgage loans to pension funds according to GNMA officials is the absence of a need for the pension funds to service the mortgages—collect monthly payments, and, if the homeowner defaults, foreclose on the loan (Samuelson 1970, p. D13).

Agency MBBs were targeted explicitly at bond investors: they bore the mortgage-backed bond label and offered protections from both prepayment and credit risks via government repayment guarantee⁸.

The attributes of the bond-type MBS were closer to the attributes of bonds than to those of mortgages. These securities were debt obligations of their issuers, made semi-annual interest payments, and a single payment of principal at a pre-determined date. The similarities between agency MBBs and bonds were highlighted by business press: “Like normal bonds, the new securities will pay interest rates at regular intervals (semi-annually) and the principal on the maturity date” (Samuelson 1970, p. D13). In announcing the securities to the business press Woodward Kingman, president of the Government National Mortgage Association (GNMA or Ginnie Mae), the government agency guaranteeing the repayment of first-generation MBS, focused on the salience of payment frequency and repayment features in making a distinction between mortgage-type and bond-type MBS:

The first securities to be issued, he said, will be of the “pass through” type in which mortgage principal and interest payments are passed through as they are collected to holders of the securities.... Another new type of mortgage-backed security expected from the Federal government is the bond-type security. It is designed, like other bonds, to pay interest regularly and principal at maturity (Wall Street Journal, February 16, 1970, p. 7).

The first generation of MBS attenuated the distance between MBS and bonds by shedding the mortgage features that bond investors objected to: small denominations, complex documentation, and need to service the loans. Agency MBBs began changing the distance between mortgages and bonds in the fixed-income securities landscape by pairing a bond-type security with mortgage collateral. For a graphical representation of how bond-type and mortgage type MBS bridged the distance between mortgages and bonds, see Figure 3.

INSERT FIGURE 3 ABOUT HERE

⁸ While both mortgage-type and bond-type MBS were backed by a federal government repayment guarantee, the guarantee in pass-through certificates only covered credit risk (the risk that a mortgage would default) in which case the government would repay the principal of the mortgage. However, the bond-type MBS were structured in a way that made the issuing agencies responsible for bearing prepayment risk. The investors were protected against prepayment risk unless the (quasi-)government agency issuing the securities were to default.

Originally, Federal National Mortgage Association (FNMA or Fannie Mae) and Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac), (quasi-)government agencies authorized to issue the securities, were planning to bring to market both short- (12-60 months) (Silverman 1970) and long-maturity (20-25 year) MBBs. The bond investors bought the short-term MBBs, but the (quasi-) government agencies were not able to sell long-term MBBs except at eyebrow-raising losses⁹:

One incredulous mortgage banker noted privately: “That’s more than the yield on the mortgages underlying the [Freddie Mac’s 25-year MBBs] bonds. How can they pay interest they don’t earn”...No one, including top FNMA officials who held a directors’ meeting in Miami Beach concurrently with the MBA [Mortgage Bankers’ Association] convention, thought that the FHL Mortgage Corp. could possibly break even on its first offering of mortgage-backed bonds (Matthews 1970, pp. 81-82).

The investors’ preference for short-maturity over long-maturity MBBs meant that securities’ issuance failed to solve the problem of attracting long-term capital investments to the mortgage market and made the issuance of bond-type MBS impractically costly¹⁰. Consequently, agency MBBs were discontinued in 1973 (GNMA Mortgage-Backed Securities Dealers’ Association 1977, p. 5) after only \$2.4 B of securities were issued (Ganis, 1974).

Second generation. First issued by mortgage lenders in 1975, private MBBs became the second generation of bond-type MBS. Private MBBs retained the bond label and addressed the bond investors’ objections to investing in agency MBBs by offering securities with shorter maturities. Private MBBs’ maturities of 8-10 years fell between the short- and the long-term versions of the first generation of bond-type MBS. In words of William Scheu, president of First Federal Savings & Loans of Rochester, one of the first mortgage lenders to issue private MBBs: “the maturity and average life [of private MBBs] happened to fit very well with the requirements of our investors” (Savings & Loan News, 1976, p. 81).

The change in maturity of the second generation of bond-type MBS design necessitated a change in the type of issuers. Once the (quasi-)government agencies discontinued the issuance of bond-type MBS, it

⁹ Fannie Mae’s issues of long-term MBBs were first postponed and then shelved for good (Wall Street Journal, August 27, 1970, p. 16).

¹⁰ The excess cost of agency MBB issuance was due to the fact that agencies could issue non-collateralized short-term bonds without incurring the expense of structuring and maintaining collateral.

took a series of regulatory and institutional changes to enable private companies (typically mortgage lenders) to issue MBBs. The collaboration between investment bankers, government regulators, and rating agencies played an instrumental role in spurring this series of changes. The excerpt below describes the role of the Loeb, Rhoades & Co. investment bank in helping bring about such collaboration:

Loeb, Rhoades had "already developed its concept for mortgage-backed bonds to the point where it felt it would be acceptable to the Federal Home Loan Bank Board and would meet the requirements being defined for the Board's [then] proposed mortgage-backed bond regulations," explained association President Scheu in his case study. "Just as importantly, Loeb, Rhoades had been working closely with Standard & Poor's rating agency in developing a rationale for rating such bonds. As a result, Standard & Poor's policy of not rating any security issue of a savings association was modified" (Savings & Loan News, 1976, p. 81).

In switching the type of issuer from (quasi-)government agency to private firms, MBS issuers changed the template to which the bond-type MBS conformed from that of government bond to that of corporate bond. In practice, this translated into the introduction of credit and prepayment risk into bond-type MBS. Agency MBBs which were modeled on government bonds were treated by the markets as not needing a credit risk rating because "it is considered inappropriate to apply a credit rating, which implies a non-zero probability of default to securities issued or guaranteed by the United States Treasury or one of its agencies" (Askin 1985, p. 501). By contrast, private MBBs like corporate bonds were subject to credit risk (the risk of investors not being paid back) and their issuance necessitated rating agency participation.

What differentiated private MBBs from both corporate bonds and agency MBBs was the presence of prepayment risk. Like corporate bonds, private MBBs had credit risk. However, unlike corporate bonds, private MBBs had collateral, the existence of which translated the presence of the credit risk in the securities into the presence of prepayment risk. This was because a default of the issuer could trigger the sell-off of the collateral to pay off the bondholders before the bonds were due¹¹. While agency MBBs in theory could have had this problem, government repayment guarantees effectively took care of the issuer default scenario, thus, protecting the investors from prepayment risk.

¹¹ During the 1986-1989, savings and loan crisis a number of private MBB issuers were taken over by other thrifts. The takeover gave the new firms the option to repay the MBBs which carried higher interest rates and keep the lower-interest-rate securities that required lower payments to investors outstanding; thus, bringing to life investors' concerns about both curtailment and extension risk respectively (Weberman 1990, p. 195).

Private MBBs moved closer to the bond investors' preferred position along the maturity dimension and the recruitment of credit agencies furthered the similarity between private MBBs and corporate bonds. However, even as these changes made the securities more appealing to the bond investors, the securities also increased the investors' exposure to prepayment risk, thus, simultaneously moving the securities closer to the position of mortgages along the prepayment risk dimension. These changes in bond-type MBS attributes took place as the securities retained the "mortgage-backed bond" label. The securities' issuance introduced the notion that a security could combine the bond label with exposure to prepayment risk; thus, moving the securities closer to mortgages.

The second generation of MBS further bridged the distance between bond-type and mortgage-type MBS. While pay-through certificates moved closer to the bond design buy switching to semi-annual interest payments, private MBBs introduced prepayment risk into bond-type MBS. For a graphical representation of the bridging, please see Figure 4.

INSERT FIGURE 4 ABOUT HERE

Bond investors were wary of private MBBs because they were not familiar with the credit quality of the mortgage lenders issuing the securities (Savings & Loan News, December 1978). Between 1975 and 1983 \$7B of securities were issued (Fisk et al. 1984). Mortgage lenders, issuing MBS, attempted to make up for this lack of familiarity and concerns about prepayment risk by overcollateralizing the securities they issued by 75-100% (Standard & Poor 1979, p. 117; Joseph 1982, p. 29), a form of protection that was costly for the issuers.

Third generation. Pay-through bonds, the third generation of bond-type MBS focused on solving the issuers' rather than the investors' problems. Private MBB issuers were dissatisfied with having so much of their loan portfolios tied up in overcollateralization which was meant to help assuage investors' concerns about default and prepayment risk. To address this problem, investment bankers came up with

what they described as a hybrid of bond-type and mortgage-type MBS (Joseph 1982, p. 29), pay-through bonds—securities that were debt obligations of their issuers, but passed the mortgage prepayments to the investors as they occurred. Different designs of the new securities varied the payment frequencies from monthly to quarterly and semi-annual. While these securities were brought to market using the same label as the first two generations of bond-type MBS, the only attribute they had in common with conventional bonds was that they were still debt obligations of their issuers.

Even the remaining debt obligation attribute was diluted to address investor objections to investing in MBS. The investor concerns about the credit quality of bond-type MBS issuers led to the issuance of pay-through bonds via shell corporations, which were meant to protect investors in pay-through bonds from the credit and prepayment risk associated with MBB issuer bankruptcy. While addressing investor concerns about credit risk, this change diluted the meaning of the debt obligation attribute.

In summary, the pay-through bonds transferred the prepayment risk from the issuer to the investors, were issued via shell corporations, and with payment frequencies other than semi-annual. This security shifted the bond landscape along the prepayment risk, debt obligation, and payment frequency dimensions by combining its features with the continued use of the “mortgage-backed bond” label.

Pay-through bonds continued the movement of bond-type MBS towards mortgages along the prepayment risk dimension by explicitly transferring the prepayment risk to bond investors. However, pay-through bonds also shifted the bond peak on the fixed income securities’ landscape by retaining retained the “mortgage-backed bond” label despite the fact that their attributes more closely matched those of the pass-through certificates than those of previous generations of MBBs. Figure 5 provides a graphical depiction of how pay-through bonds bridged the gap between the mortgage- and bond-type MBS.

INSERT FIGURE 5 ABOUT HERE

The pay-through bonds did not achieve commercial success despite addressing some issuer concerns and the needs of some bond investors. Only \$1.5B of securities were issued (Sullivan et al. 1985). However, the use of the bond label in pay-through bonds shifted the perception of what it meant to be a bond. As the quotes below suggest, by the 1980s, the market participants saw the differences in the debt obligation attribute as the only difference between mortgage-type and bond-type MBS and, by extension, between mortgage-type MBS and bonds.

There are two types of bonds backed by mortgage loans and they should not be confused. This section deals with the mortgage-backed bond while the pay-through bond is covered in the next section. The pass-through certificate, although backed by mortgage loans, is not a bond because it arises through the sale of assets and thus it is not an obligation of the issuer (Brick 1984, p. 195).

The pooling of residential mortgages to make them the basis of mortgage-related securities has been practiced for well over a decade. The overwhelming majority of mortgage securities issued so far have been mortgage pass-throughs, and a smaller portion have been mortgage-backed bonds. The primary distinction between the two is that pass-throughs are issued as sales of assets by the issuer, while bonds are carried on the issuer's books as debt (Hu 1984, p. 42).

The next generation of MBS set out to erase this final difference.

Blurring the Peaks

Fourth generation. Like the generations of MBS that preceded it, the Collateralized Mortgage Obligation (CMO) issued in 1983 was designed to address bond investors' objections to previous MBS designs.

However, previous generations of MBS belonged to either the mortgage-type or the bond-type lineage of MBS designs. By contrast, the CMO was designed to be part of the mortgage-type MBS lineage, but due to a last minute regulator ruling, was issued as a debt obligation of the issuer and subsequently classified as a pay-through bond or bond-type MBS. (See Figure 6 for how the technical features of the CMO compared to those of its predecessor securities). Thus, while the previous generations of MBS bridged the gap between mortgage-type and bond-type MBS, the issuance of the CMO blurred the boundary between the bond-type and mortgage-type MBS lineages.

INSERT FIGURE 6 ABOUT HERE

In preparation for issuing this new type of mortgage-type MBS (pay-through certificate)¹², Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac), the security's issuer, obtained a letter from the Internal Revenue Service (IRS), the arm of the U.S. Treasury responsible for tax policy interpretation and enforcement, allowing it to issue the new security without exposing security investors to undesirable tax consequences (Savings Institutions, 1983). However, an hour before Freddie Mac was expected to register the new security with the Securities and Exchange Commission (SEC), the primary financial markets regulator, it received notice that the IRS had withdrawn the letter (Fink, 1996). The withdrawal left Freddie Mac with three options: cancel the issue entirely, proceed with the issuance of the security as designed with investors incurring adverse tax consequences, or change the security design by structuring it as a debt obligation of the issuer (the typical design of pay-through bond) rather than a sale of assets (the typical design of pay-through certificates) to avoid adverse tax consequences for the investors.

Freddie Mac opted for the third course of action—issuing the security as debt obligation of the issuer, i.e. as a pay-through bond. The convergence of the bond-type and mortgage-type MBS lineages made the design of pay-through bonds sufficiently similar to that of pay-through certificates—the original design of the new security—to allow the change in the security's design to be completed within 15 days. 15 days after the IRS letter was revoked, Freddie Mac issued the new securities as debt obligations. One of the participants in the transaction later reflected on the ease with which the transformation of the pay-through certificates (mortgage-type MBS) into pay-through bonds (bond-type MBS) occurred: “Basically what we did was to take the prospectus, scratch out GMC [Guaranteed Mortgage Certificate, Freddie Mac's proprietary name for pay-through certificates] and write in CMO” (Fink, 1996).

¹² These securities were designed as a type of pay-through certificates that provided prepayment risk protection for investors by splitting up the prepayments from the securities among different classes of pay-through certificates. Instead of issuing a single class of securities, backed by a single pool of mortgages, the issuer directed the cashflows from a single pool of mortgages to multiple security classes: faster pay and slower pay. The fast-pay securities would have the shortest maturities because they would absorb the first slew of prepayments, while the slow-pay securities would be protected from prepayments by the fast-pay securities' absorption of prepayments.

The speed with which MBS issuers were able to convert a mortgage-type security into bond-type MBS following the IRS ruling offers evidence of the effectiveness with which prior generations of MBS bridged the distance between mortgage-type and bond-type MBS. While reshaping the fixed-income securities' landscape to bridge the distance between bond-type and mortgage-type MBS took 15 years, the blurring of the boundary between the two MBS lineages after the bridging was complete took 15 days. Figure 7 contains the texts of the three major newspaper articles documenting the speed of the transformation of the security from mortgage-type MBS to bond-type MBS.

INSERT FIGURE 7 ABOUT HERE

The May 16 New York Times article in Figure 7 previewed the issuance of a new type of pay-through certificates (mortgage-type MBS); the May 17 Wall Street Journal article warned of a one-week delay in the issuance of pay-through certificates (still mortgage-type MBS) to resolve what Freddie Mac, the new securities' issuer, termed "technical tax issues," and the June 1 Los Angeles Times article documented the issuance of collateralized mortgage obligations, i.e. pay-through bonds (bond-type MBS), by Freddie Mac. The change in the CMO design from a pay-through certificate to a pay-through bond, triggered by a last-minute IRS decision, completed the bridging of the distance between bond-type and mortgage-type MBS, thus, blurring the boundary between the two lineages of MBS.

The new security which combined the features of mortgage-type and bond-type MBS was accepted by bond investors as a bond. One piece of evidence for such acceptance is the inclusion of CMOs in indexes of corporate bonds which served as benchmarks for evaluating the bond investors' performance (Hamecs 1984). Another piece of evidence of such acceptance was that pension funds bought the new security in much greater numbers than any MBS design that came before (Business Week 1983). The acceptance of CMOs by the bond investors suggests that the blurring of the boundaries between the bond-type and mortgage-type MBS also represented the blurring of the boundaries between MBS and bonds. Bond

investors were willing to invest in the security despite it carrying such mortgage features as prepayment risk, suggesting that bond peak on the fixed-income securities' landscape had shifted sufficiently to add CMOs to the bond investors' consideration set.

Bond investors bought CMOs, suggesting that the changes made in the design of MBS were sufficient to move them to the MBS position on the landscape. The acceptance of this security is evidence of the shifting of the landscape because its attributes were closer to those of mortgages than those of bonds. The security fully transferred the prepayment risk to the investors, relying on tranching to manage the prepayment risk. The security's issuance created the appearance of the issuers' ability to issue securities that closely matched the investors' expectations of maturity. This security was accepted by investors despite academic research suggesting that the tranching tool was unlikely to be effective (Estrella and Silver 1984, p. 59).

Fifth generation. While bond investors flocked to CMOs, the CMO issuers had two problems that needed to be solved. One, issuing securities as debt obligations posed problems for mortgage lenders

Currently, many CMO issuers, such as home builders, book the bonds as debt. Many mortgage bankers, however, view the mortgages behind the bonds as assets and treat the issue of CMO bonds as a sale of assets. For these mortgage bankers, calling CMOs debt threatens to skew their balance sheets—with possibly disastrous effects (Berton and Monroe 1984, p. 41)

Two, the lack of real-estate-investment tax status made the securities less attractive to the traditional mortgage buyers. Both of these problems were addressed in the Tax Reform Act of 1986 which created the Real Estate Mortgage Investment Conduit (REMIC), a CMO security that allowed investors to treat their investments as debt instruments regardless of whether the issuer elected to structure the securities as sale of asset or debt obligation. The provisions of the act also allowed the investments in the securities to be treated as real estate investment, thus, attracting the mortgage investors to the security.

Real Estate Mortgage Investment Conduit (REMIC) had the same underlying structure as a CMO, but became a legal framework created to allow the investors to treat their investments in REMICs as debt

instruments regardless of whether the issuer issued the security as a debt obligation or sale of assets. It also endowed the security with the “real estate investment” tax status, thus, ensuring that traditional mortgage investors would receive the same benefits from investing in REMICs as they would from investing in mortgages or pass-throughs. \$550B of REMIC and non-REMIC CMOs were issued between 1983 and 1992 (Kuhn 1992).

Summarizing the Findings

My analysis of the evolution of MBS suggests that MBS issuers pursued two strategies in parallel to promote the acceptance of MBS by bond investors. One, they used the mortgage-type lineage of MBS to make MBS more bond-like by switching the interest payment frequency from monthly to semi-annual and recruiting bond dealers to distribute the securities. Two, they used bond-type MBS to move bonds closer to the position of mortgages on the fixed-income-securities landscape. MBS issuers achieved this change in the shape of the landscape by simultaneously making their securities more bond like by, for instance, recruiting investment bankers to structure and rating agencies to rate MBS and, at the same time, introducing mortgage features into securities bearing the label of “mortgage-backed bonds”. For the representative tombstones used to advertise different generations of bond-type MBS, see Figure 8.

INSERT FIGURE 8 ABOUT HERE

The MBS issuers’ efforts culminated in the acceptance of CMO, a type of MBS that fully transferred prepayment risk to the investors, as a bond. CMO acceptance is evidence of the shift in the shape of the fixed-income- securities landscape because the vast majority of CMO issues were collateralized not with mortgages, but with pass-through securities (Hamecs 1984), a type of MBS rejected by bond investors in the 1970s. Much like pass-through securities were a means of packaging mortgages to make them more palatable for the bond investors, CMOs became a means of packaging pass-through securities—a means accepted by bond investors as bonds. The quote below suggests that another commonality between pass-

through securities and CMOs is that the underlying mortgages fully determine the securities' performance:

By far the most familiar to most portfolio managers are the "agency pass-throughs"—Ginnie Mae, Fannie Mae and Freddie Mac, which have been discussed through-out this book. These securities "pass-through" to the bondholder the payments made by the individual mortgagors. There are many other issuers of mortgage-backed securities, and many structures other than pass-throughs which occur. One special class, collateralized mortgage obligations (CMOs), will be discussed later in this chapter. All depend on the behavior of the underlying instrument, the residential mortgage, for their value and their special characteristics" (Sega 1985, pp. 349-350).

Thus, MBS issuers succeeded in achieving their original goal of selling mortgages to bond investors by convincing investors that mortgages when pooled and structured by investment bankers, rated by rating agencies, and distributed by bond dealers are bonds.

The argument that this paper advances is that the MBS issuers' success was due to their successful management of bond investors' perceptions, potentially at the expense of the bond investors' interests. I will illustrate the effects of such perception management using the example of prepayment risk. Bond investors gradually traded investor protection from prepayment risk in the form of government guarantees in agency MBBs, to overcollateralization by private mortgage lenders with some possibility of investor exposure in private MBBS, to the risk being fully born by tranches of investors in CMOs. While mortgage-backed bonds never constituted a large proportion of the market for MBS, their existence helped shift the fixed-income securities landscape by changing the set of attributes a security could have while still being labeled a bond. These changes in the set of attributes suggest a gradual devolution of what it meant to be a bond from prepayment (and default) risk protections, semi-annual payments, and debt obligation of the issuer down to just the debt obligation of the issuer. MBS issuers then successfully lobbied to have the significance of that one last distinction eroded by the changes in the tax code.

DISCUSSION AND CONCLUSION

This study offers an analysis of firm search for a position on a competitive landscape which demonstrates that in their positioning decisions firms supplement the search for the optimal position on the existing

landscape with efforts to reshape the landscape to make their positions more attractive. The results provide us with a detailed understanding of the landscape reshaping process, thus, extending our understanding of how firms navigate fitness landscapes. Moreover, the focus on the firm strategies employed in landscape reshaping both expands our understanding of the repertoire of strategies that firms use and highlights the important role played by ecosystems in negotiating the shape of the landscape.

Examining firm agency in shaping of the fitness landscape allows us to further our understanding of the interaction between firm policy levers and the shape of the landscape. Examining the emergence of MBS specifically allows a different understanding of the role search plays in matching firm strategy repertoires and the shapes of the landscape. Whereas previous research has focused on designing local action in response to changes in the landscape, the participants of the MBS ecosystem changed the shape of the landscape to accommodate their repertoires of local action. When they could not change the attributes of the underlying product, i.e. the 30-year mortgage with no prepayment penalties, they changed the bond investors' expectations about the acceptability of such attributes in a product with a bond label.

This research demonstrates the important role played by consumer perceptions in shaping the firms' fitness landscapes. Specifically, it highlights the importance of these perceptions in shaping distances on the landscape. By drawing attention to the role played by customer perceptions of such distances, this paper begins to explore the role of firm strategies in shaping such perceptions. Because this was a historical case study of one industry, it cannot provide definitive evidence on the efficacy of different strategies for shaping the landscape in other industries. However, by taking a product which is effectively a legal contract with minimal possible disagreements about what it does and does not entail, and showing the important role played by customer perceptions in this setting, it is suggestive of the power firms have in shaping landscapes in settings with products that are richer in features and leave more room for disagreements. By linking product features with the firm strategies, it enables us to think about the conditions under which firm efforts to shape landscapes are more likely. Examining these conditions helps us understand which strategies are more likely to succeed in which settings.

Four conditions are useful for thinking about how firms decide when to search on the landscape and when to reshape the landscape: firm control over product attributes, ambiguity about the connection between product attributes and performance, limited customer attention span, and the number of attributes used by the consumer to evaluate the product positions. Firms that are limited in their product positioning choices, e.g. generic drug manufacturers, may be especially likely to turn to landscape-shaping strategies in order to promote their products. Causal or temporal distance between product attributes and their effects on the products' performance may make firm efforts to manipulate the customer perceptions of the products especially effective. The extent to which customers' attention span is limited; such limitation in combination with a large number of plausible attributes for evaluating a product's position may make perception manipulation by firms especially effective.

This paper contributes to the competitive positioning literature by suggesting that firms' positioning decisions may be shaped by the firms' agency of re-shaping the fitness landscape. In so doing, the paper draws attention to the need to consider both search and non-search strategies in evaluating the firms' strategy repertoires. Future research could consider the interaction between search and non-search strategies in influencing the firms' performance. Another promising direction for future research is to explore the cognitive bases of the mechanisms described in this paper.

This paper also contributes to the literature on the roles played by ecosystems in shaping the performance of nascent industries by exploring the relationship between the recruitment of different ecosystem participants and the firms' efficacy at re-shaping their competitive landscapes. Finally, this paper extends the connection between research on innovation and competitive positioning by examining the conditions under which firms can benefit from using strategies that have been shown by the innovation scholars to promote the diffusion of innovation.

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Figure 1: Mortgages and bonds compared along the attributes of importance to bond investors

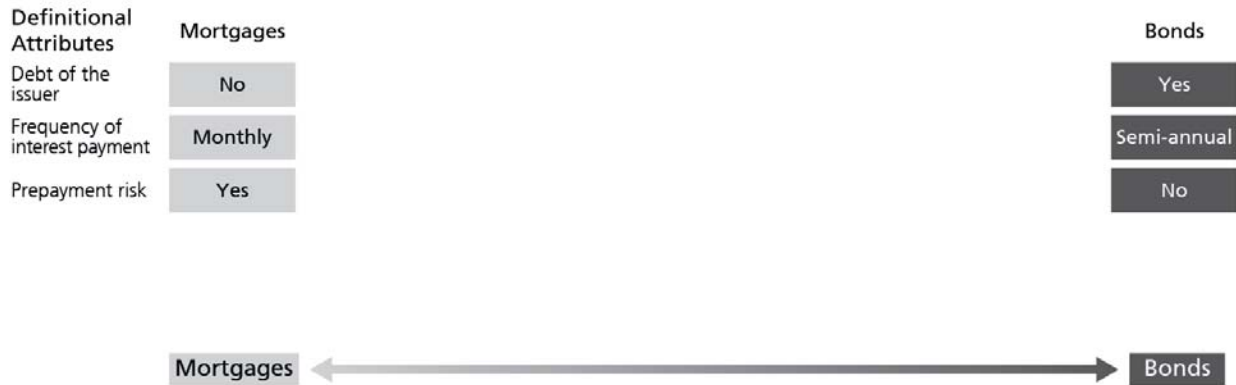


Figure 2: Evolution of MBS along the mortgage-bond attribute spectrum

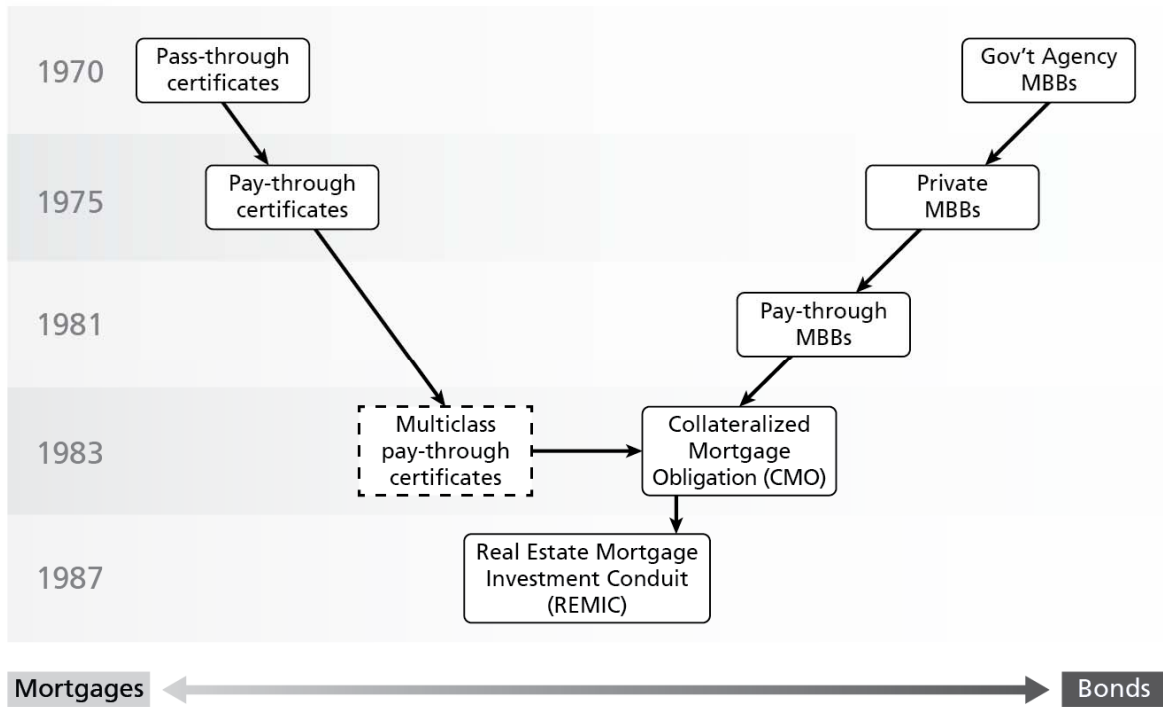


Figure 3: First generation of MBS on the mortgage-bond spectrum

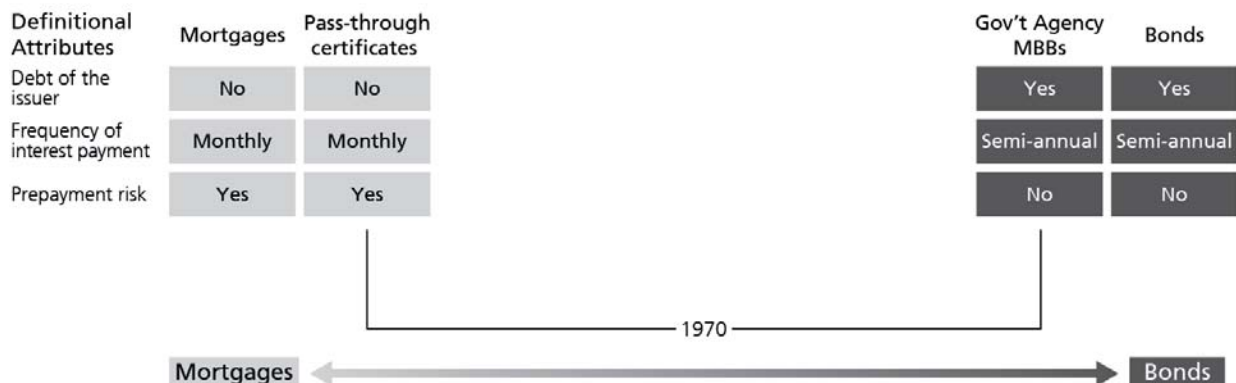


Figure 4: First and second generations of MBS on the mortgage-bond spectrum

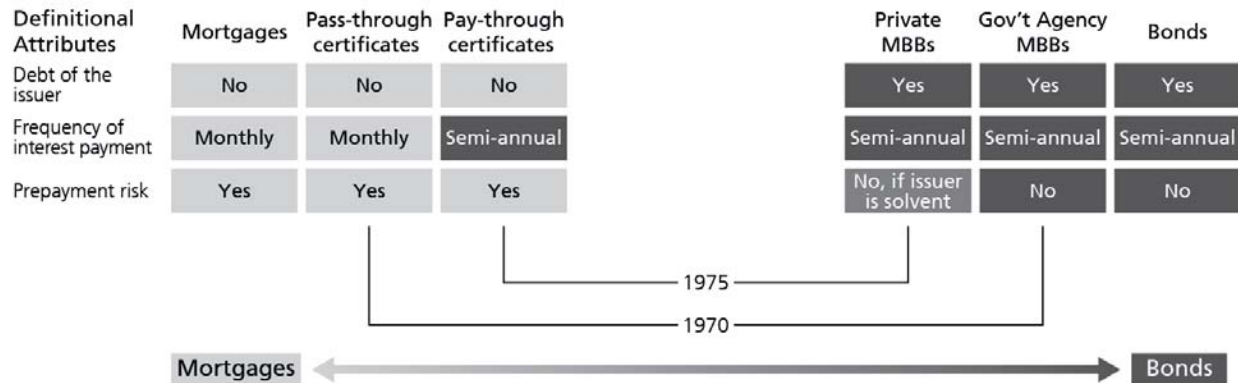


Figure 5: First, second, and third generations of MBS on the mortgage-bond spectrum

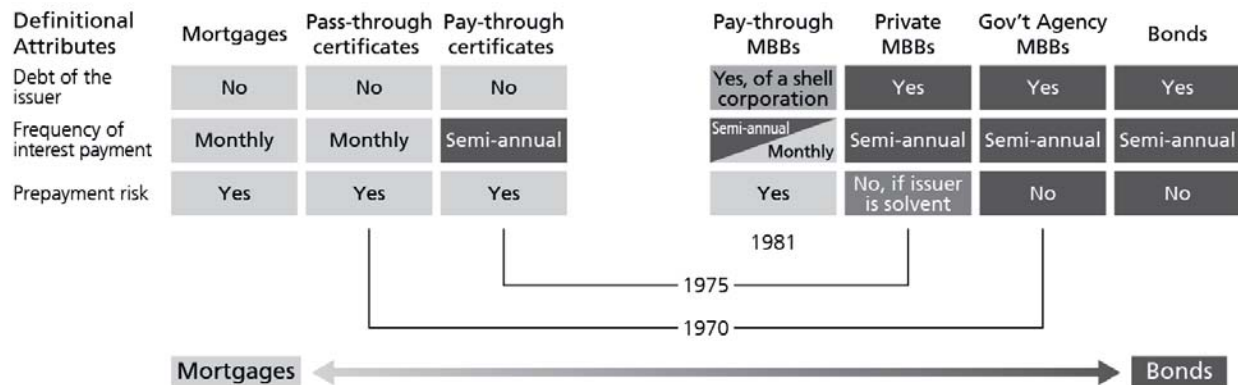
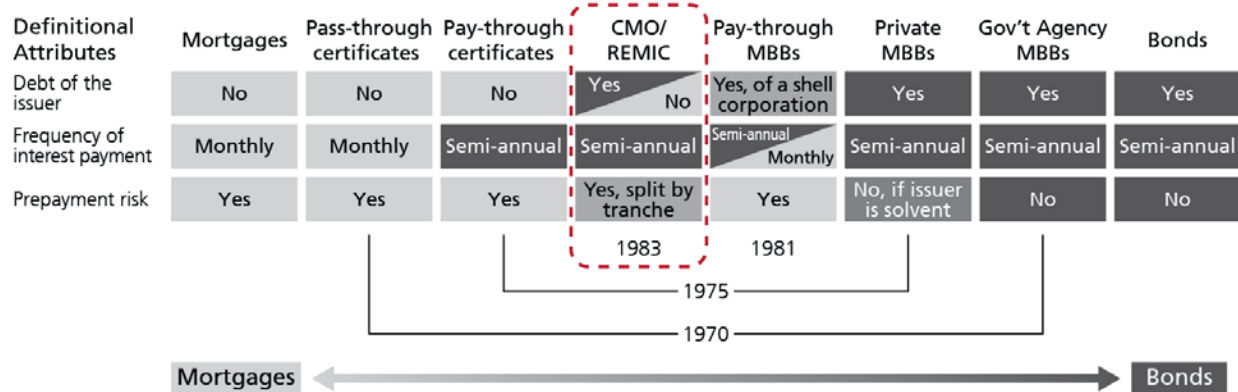


Figure 6: All generations of MBS on the mortgage-bond spectrum



 denotes the type of MBS accepted by the bond investors as a bond.

Figure 7: The timeline of Freddie Mac's pay-through certificates turning into a pay-through bonds

<h2>Freddie Mac Sets Offering</h2> <p>The Federal Home Loan Mortgage Corporation will announce today the offering of \$1 billion of guaranteed mortgage certificates that will be priced and sold by an underwriting syndicate led by the First Boston Corporation and Salomon Brothers.</p> <p>"The offering will be the largest ever of a mortgage-related security," Edward S. Atwater, vice president of First Boston, said yesterday.</p> <p>"Because Freddie Mac has never made so large an offering, we will start introducing it to prospective investors Monday morning before pricing the issue and setting an actual sales date, he said. "What we can say now is that the issue will be sold in multiples of \$25,000."</p> <p>The \$1 billion offering, aimed at increasing the flow of investment funds to the housing market, will consist of loans the Federal agency has committed to purchase from mortgage lenders in the last three weeks, according to Lynn March, a spokesman for the agency. "All the loans involved have been made to home buyers since May 1, 1982," she added.</p>	<h2>Freddie Mac Delays Offering of Certificates At Treasury's Request</h2> <p><small>By a WALL STREET JOURNAL Staff Reporter</small> NEW YORK—The Federal Home Loan Mortgage Corp. said it delayed for one week its \$1 billion guaranteed mortgage certificate offering scheduled for this week because of a request from the Treasury Department.</p> <p>Freddie Mac, as the corporation is known, said the Treasury Department wanted the offering delayed to resolve "certain technical tax issues."</p> <p>Kenneth Thygerson, president of Freddie Mac, said he hasn't any details on what tax problems had to be settled. But he added: "We expect to resolve whatever problems may occur in time to make the offering next week."</p>	<h2>Freddie Mac said it will offer \$1 billion in securities.</h2> <p>The Federal Home Loan Mortgage Corp. said the proposed offering is the largest public issue of a mortgage-related security in U.S. history, and is part of Freddie Mac's effort to aid the growing recovery of the housing industry. The collateralized mortgage obligations will be general obligations of Freddie Mac and will be secured by \$1 billion in conventional home mortgages, including mortgages that the corporation has committed to buy between April 27 and May 9, 1983. All the mortgages in the special programs were originated after May 1, 1982. Freddie Mac's recent purchases allow lenders "to clean off their shelves," and the \$1 billion in proceeds from the sale will be used</p>
<p>"guaranteed mortgage certificates," i.e. pay-through certificates (New York Times, 1983)</p>	<p>"guaranteed mortgage certificates," i.e. pay-through certificates (Wall Street Journal, 1983)</p>	<p>"collateralized mortgage obligations," i.e. pay-through bonds (Los Angeles Times, 1983)</p>
<p>May 16, 1983</p>	<p>May 17, 1983</p>	<p>June 1, 1983</p>

Figure 8: “Mortgage-backed bonds” label from the MBS tombstones across three generations of bond-type MBS (1970-1981)

Generation 1: Agency MBBs:

\$200,000,000 Mortgage Backed Bonds
fully guaranteed as to principal and interest by
Government National Mortgage Association,
issued by Federal National Mortgage Association
Due October 1, 1990—coupon 8⁵/₈%, price 100

Source: Wall Street Journal, 1970b.

Generation 2: Private MBBs:

\$75,000,000
California Federal
Savings and Loan Association
7⁵/₈% Mortgage-Backed Bonds, Series B, Due June 15, 1984

Source: Wall Street Journal, 1976.

Generation 3: Pay-through bonds:

\$38,600,000
PHM Credit Corporation
15³/₄% Mortgage-Backed Bonds, Series A,
Due April 1, 2009

Source: Wall Street Journal, 1981.

denotes the label of the mortgage-backed security.

Table 1: Timeline of Events

Year	Event
1968	Congress authorizes the issuance of mortgage-backed securities guaranteed by the full faith and credit of the U.S. Government.
1970	First pass-through certificates are issued by a number of mortgage lenders.
1970	First agency mortgage-backed-bonds (agency MBBs) issued by Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac) and Federal National Mortgage Association (FNMA or Fannie Mae).
1973	Agency MBBs are discontinued.
1974	Federal Home Loan Bank Board (FHLBB) authorizes the issuance of MBBs by savings and loan associations.
1975	First pay-through certificate issued by Freddie Mac.
1975	First public offering of private MBBs issued by California Federal Savings and Loan Association.
1979	Pay-through certificates are discontinued.
1981	Department of Labor authorizes private pension funds to invest in mortgage-related securities.
1981	First public offering of pay-through bonds issued by PHM Credit Corporation.
1983	First Collateralized Mortgage Obligations (CMOs) issued by Freddie Mac.
1986	Congress authorizes the issuance of Real Estate Mortgage Investment Conduits (REMICs), a type of CMO.
1987	First REMICs are issued by a number of mortgage lenders.

Table 2: MBS Market participants and their roles

Role	Participant Types	Description
Mortgage lenders	Mortgage banks, savings and loan associations	Mortgage banks originated mortgage loans and sold them to investors. Savings and loan associations originated mortgage loans and retained ownership of the loans until the loans were paid off by the borrowers.
MBS issuers	Mortgage banks, savings and loan associations, (quasi-) government agencies	In addition to issuing their own MBS, mortgage lenders had the option of selling their loans to (quasi-) government agencies such as Federal National Mortgage Association (FNMA or Fannie Mae) or Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac) that would in turn issue the MBS.
Bond ecosystem participants	Bond dealers, credit rating agencies, investment banks	Bond dealers distributed bonds to investors. Credit rating agencies rated the riskiness of bonds. Investment banks structured stock and bond securities issues.
Traditional mortgage investors	Savings and loan associations, commercial banks, insurance companies	Savings and loan associations received tax incentives for investing in real estate. Other investors invested in mortgages without government incentives
Bond investors	Pension funds, commercial banks	Pension funds were among the biggest investors in the bond market.
Policy makers and regulators	U.S. Congress, White House, Attorney General, U.S. Treasury, Internal Revenue Service (IRS), Department of Housing and Urban Development, Department of Labor, Federal Home Loan Bank Board (FHLBB), Office of the Currency Comptroller (OCC), Federal Reserve, Securities and Exchange Commission (SEC)	The policy affecting MBS was shaped by the decisions of the different branches and agencies of the federal and state governments. Each class and subclass of the MBS market participants was regulated by a different regulator or set of regulators.

Table 3: Mortgage lenders’ strategies and the relevant data sources

Strategy type	Strategy	Data Sources
Rhetorical	Labeling	Security prospectuses (official descriptions of securities mandated by the SEC), offering circulars (the prospectus equivalents for securities exempt from the SEC registration requirements), and tombstones (ads placed in the financial sections of major newspapers by the investment bankers structuring the security or bond dealers bringing the issue to market) ¹³ .
	Framing	Major newspaper and trade press articles, discussing the arguments used by the MBS issuers to appeal to bond investors.
Material	Design	Security prospectuses, offering circulars, and tombstones, trade journal articles comparing and contrasting the features of the different MBS products; MBS issuers’ annual reports.
Political	Coercion	Major newspaper and trade press coverage of government involvement in marketing mortgages and MBS to bond investors
	Recruiting ecosystem participants	Trade press interviews with key decision-makers; credit rating agency publications; bond dealer ads; trade groups’ publications; and MBS issuers’ annual reports.
	Changing the regulatory framework	Texts of legal rulings that affected the MBS market participants’ willingness and ability to issue and invest in MBS; major newspaper, business magazine, and trade press coverage of these rulings.

Table 4: Trade names and labels of different generations of MBS (1970-1987)

Trade name	Label for external use
Pass-through certificates	Mortgage-backed securities (Wall Street Journal, 1970c); mortgage backed certificates ¹⁴ (GNMA Dealers’ Association, 1977)
Pay-through certificates	Guaranteed Mortgage Certificates if issued by Freddie Mac ¹⁵
Agency MBBs	Mortgage-backed bonds
Private MBBs	Mortgage-backed bonds
Pay-through bonds	Mortgage-backed bonds
CMO/REMIC Tranches	Bonds

¹³ The ads are called tombstones because they list the securities’ underwriters or distributors in order of importance.

¹⁴ The GNMA-backed pass-through certificates were nicknamed GNMA’s or Ginnie Maes by the MBS traders (Ganis, 1974)

¹⁵ The Freddie-Mac issued pay-through certificates were nicknamed “Freddie Mac motorcycles” by the MBS traders (Allan 1977, p. F5)

Table 5: Attributes of bonds and mortgages

Attributes	Bonds	Mortgages
Debt of the issuer	Bonds were <i>debt obligations</i> of the government agency or private corporation issuing the bonds. In case of default on the bonds, the bond investors could take the seller (the bond issuer) to court.	Mortgages were <i>not debt obligations</i> of the firm selling mortgages to investors. Mortgages were debt obligations of the homeowners who took out the mortgage. In case of mortgage default, the investors could initiate foreclosure proceedings against the homeowners, but had no recourse against the seller of the loans.
Frequency of interest payments	Bond issuers made <i>semiannual</i> interest payments.	Homeowners made <i>monthly</i> interest payments.
Frequency of principal payments	The bond issuers repaid the principal in a <i>single payment</i> at the end of the bond's term.	Homeowners made <i>monthly payments</i> of principal.
Fixed date of principal repayment	The bond principal repayment date was fixed at the time of the bond's issuance and the bond issuer <i>could not repay</i> the bond prior to this date without incurring penalties. ¹⁶	Mortgages had a final maturity date, by which mortgages had to be repaid, but most mortgage borrowers <i>could repay</i> their loans before the final maturity date without incurring a penalty.

¹⁶ Some issuers issued callable bonds, bonds that the issuers could repay before the final maturity date. Callable bonds' contracts specified periods when the issuers could not repay the bond principal and financial penalties associated with the early repayments.