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## Mortgage Research

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# The Impact of the Internet on Mortgage Prepayments

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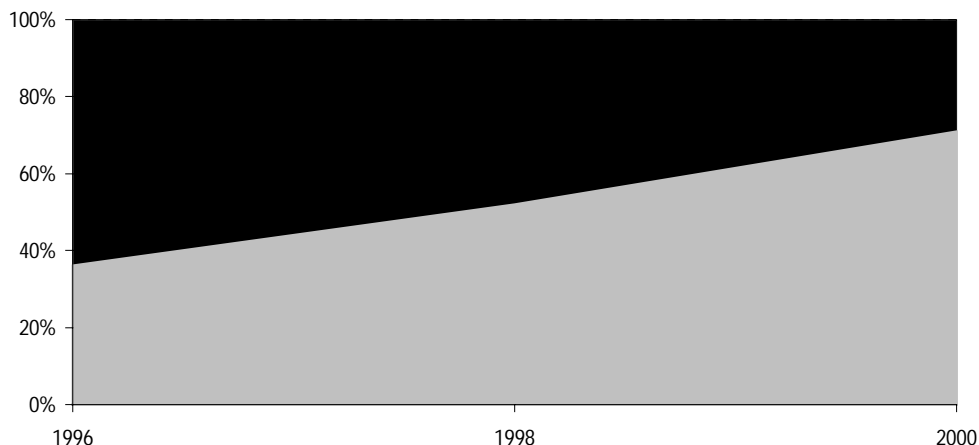
## Introduction

There has been considerable speculation (and hype) over the impact that the Internet will have on the mortgage origination process, and the resulting implications for prepayments. In this report, we examine the current status of online mortgage originations (after defining exactly what we mean by this somewhat fuzzy term), discuss potential developments, and estimate the likely effect of online mortgage processing on prepayment behavior.

### Internet Usage in Everyday American Life

Figure 1 shows that, over the last four years, Internet usage or access has penetrated the life of the vast majority of American adults. For the age group most active in the US real estate market, the penetration rate exceeds 80% (Figure 2).

**Figure 1. Americans With Internet Access at Home or Work, 1996–2000**



Source: Fannie Mae National Housing Survey.

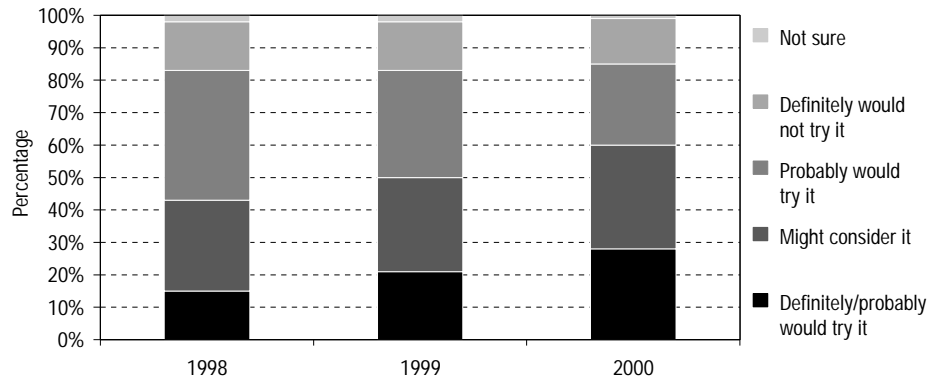
**Figure 2. Proportion of American Adults with Internet Access in 2000**

Age Group	Internet Access
18-24	84%
25-39	80%
40-54	81%

Source: 2000 Fannie Mae National Housing Survey.

This substantial level of Internet usage in everyday American life has definite implications for the mortgage sector. Figure 3 shows that the proportion of people considering applying for a mortgage over the Internet crossed the 50% mark over the past two years. Just over 50% of Americans believe that in 2005 most mortgages will be originated online, and the same proportion believes that the Internet application process is easier and faster.

**Figure 3. Comfort Level Applying for a Mortgage Over the Internet**



Source: 2000 Fannie Mae National Housing Survey.

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## The Status of Online Originations

What steps in the mortgage origination process can be completed online now – in early 2001? Information about mortgage products and pricing is now widely available online. About 56% of home purchasers in the first half of 2000 stated that they got information about homes for sale over the Internet.<sup>1</sup> Prospective buyers save time and trips by learning about a neighborhood, checking available listings, looking through school reports, and taking virtual tours. Sites like Realtor.com claim to have over 1.4 million listings. Although they are often incomplete, they do provide information about realtors and neighborhoods.

A significant number of homebuyers use the Internet for a variety of reasons – to educate themselves about mortgage products that are available in the market, to access mortgage calculators, and to find out more about the process. Although 21% of recent purchasers said they shopped for a mortgage using the Internet, only 4% actually applied for a mortgage over the Internet.<sup>2</sup> A total of 77% of consumers agree that comparing rates, options, and fees is easier online.<sup>3</sup>

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### How Do We Define Online Mortgage Origination?

Since there is no standard industry definition of an online mortgage origination, we define an online mortgage as one that was processed online at all critical stages<sup>4</sup> – application, approval, and closing. As we discuss below, this strict definition means that to date there have been almost no true online mortgage originations.

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### Application, Loan Approval and Settlement Stages

As described in an earlier report,<sup>5</sup> there are three stages in the mortgage origination process: *application*, *loan approval*, and *settlement*. The application process was relatively easy to move to the Web, and the mortgage industry was quick to start accepting online mortgage applications. This saves time for both the customer and the lender. Industry leaders like Countrywide follow-up on an application with a telephone call shortly after the application is submitted. Others show flexibility in provisions. For instance, Priceline.com allows borrowers to design mortgage terms for purchase or refinancing and then decides within six hours whether such a loan is available.

When an online application is completed, the lender will typically give a quote subject to verification of the borrower's application information. Some sites offer an

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<sup>1</sup> 2000 Fannie Mae National Housing Survey.

<sup>2</sup> 2000 Fannie Mae National Housing Survey.

<sup>3</sup> 2000 Fannie Mae National Housing Survey.

<sup>4</sup> Some sources define an online mortgage as one where only the application is completed online.

<sup>5</sup> *The Evolution of the Mortgage Origination Process*, January 1999, Salomon Smith Barney.

opportunity to sign up for automated e-mail reminders that will be sent once interest rates hit a certain trigger level, implying an enhancement of the *media effect*.<sup>6</sup>

The other two stages in the mortgage origination process (loan approval and settlement) have proved more difficult to move online. Figure 4 reviews the different steps in each stage of the online mortgage origination process, with comments on the likely effect of the Internet on each step.

**Figure 4. Likely Impact of the Internet on the Steps in a Mortgage Origination**

Processing step		Likely Impact of the Internet
<b>Application</b>		One of the easiest steps of the origination process to move online. Many lenders already have online applications on their Web sites. Online applications are likely to become the norm.
<b>Loan Approval</b>	<i>Appraisal</i>	Government-sponsored enterprises (GSEs) already waive full appraisal in certain cases. Databases and automated or drive-by appraisals will be used more frequently to verify that there is no major damage since previous appraisal. Hand-held devices, digital cameras, computer maps, and e-mail reduce time and cost versus full appraisals.
	<i>Credit Report + Information Verification</i>	GSEs' automated underwriting (AU) systems have been linked to credit agencies. Credit check will be instantaneous and at a lower cost.
	<i>Document Preparation</i>	Electronic processing will likely be used to streamline preparation of documents for closing (the mortgage, note, and truth-in-lending statement).
	<i>Flood Certification</i>	Many flood zone maps are already available online and most certifications are automatic now. Cost will gradually decrease.
	<i>Origination</i>	Origination costs and points should decrease as the process becomes more automated and connected to GSE AU systems.
	<i>Survey</i>	Measurements of land will be put in electronic format; surveyors will only update records for improvements. Old references to known points and dimensions will already be on file.
	<i>Tax Service</i>	Fees for monitoring and timely payments of the borrower's property taxes and for preventing tax liens from occurring will decrease as services become further automated.
	<i>Underwriting</i>	As AU systems develop further, these costs should fall.
<b>Closing Settlement (escrow)</b>	<i>Attorney/Escrow Agent</i>	"Closing" work of this third party <sup>a</sup> will change from handling paperwork to coordinating and securing the online process. Fees are likely to fall while accuracy and productivity should increase.
	<i>Notary</i>	Electronic attesting and certification of documents will cost less. New laws likely eliminate all paper stamp and seal requirements.
	<i>Title Search and Title Insurance</i>	Automation is proceeding along two paths. First, search bureaus are creating online databases for searches done in the past or duplicating official records. Second, many county recorders' offices are converting paper and microfiche documents into digital format and will use online records going forward. Once the information is available online (which in some parts of the US could be many years from now), the process will take from a few minutes to a few hours, as opposed to the current 3-5 days.
	<i>Recording Fees</i>	As recorders' offices migrate online, fees should go down, as speed and accuracy increases.
	<i>Courier fee</i>	Cost of an electronic transmission will be almost zero

<sup>a</sup> Can be either an escrow company, an attorney, or a title company depending on the state.  
Source: Salomon Smith Barney.

<sup>6</sup> See *Anatomy of Prepayments: The Salomon Smith Barney Prepayment Model*, April 2000.

We note that one part of the home purchase process, the home inspection, while not a mandatory part of government-sponsored enterprises' (GSE) underwriting requirements, is nevertheless done by many customers and lenders, but will be difficult to move online. Currently, it could take up to two weeks to wait for an inspector.

As Figure 4 indicates, progress is being made to migrate many parts of the mortgage process online, although some steps, such as the title search and insurance, will be difficult to completely move online for many years, since the underlying information, in county recorders' offices, is often not available in electronic format. However, two developments — the recent passage of the “E-Sign” bill, and the increasing involvement of Fannie Mae and Freddie Mac — should help facilitate the move of mortgage originations online.

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### Electronic Signatures Are Legalized

According to e-commerce industry sources, the online mortgage industry is going to be the first to benefit from *The Electronic Signatures in Global and National Commerce Act*, signed on June 30, 2000 by President Clinton (referred to as the “E-Sign” bill). Effective October 1, 2000, the E-Sign bill gave nationwide legal recognition to digital signatures, thus facilitating the execution of transactions online. From March 1, 2001 (under some circumstances June 1, 2001) records of transactions may be stored electronically. Because insurance is state regulated, the legislation made clear that it applies to title insurance as well.

The E-Sign bill lifts an important legal barrier to the paperless mortgage origination future. It allows participants in the mortgage origination process to sign, exchange, and store documents electronically. Once the technology is implemented, it will significantly reduce time and increase the accuracy of mortgage processing. The signature is going to be either a password, a special card, or a 3½ inch diskette that will have the digital signature on it.

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### Fannie Mae and Freddie Mac Internet Initiatives

Fannie Mae has launched a pilot project to purchase 100 mortgages online, and Freddie Mac has recently started a similar program. Only a handful of transactions have been done so far. “Online” in this case means the GSE gets the note in electronic, not paper, form.

As these pilot programs are not yet completed, it is hard to determine when the process will be fully standardized, but the GSEs are clearly taking the initiative. In October 2000, Fannie Mae released its “Electronic Mortgage Guidelines,” which selected XHTML (a combination of Extensible Markup and Hypertext Markup Languages) as the language for open data format for documents to be delivered to Fannie Mae. The GSE also required that an e-mortgage note contain clauses that the borrower has agreed to the electronic transaction and that requirements of the Electronic Signatures Act (discussed above) are met. Fannie Mae stated it is developing its own platform that will have electronic databases for electronic appraisals, title insurance, flood insurance, and mortgage insurance.

Freddie Mac migrated its *Loan Prospector Automated Underwriting System* online in January 2000. All major credit repositories (Equifax, Experian, and Trans Union) agreed to exchange information electronically with the system. Loan Prospector on the Internet is affordable. Mortgage brokers pay only \$20 to evaluate each conventional, FHA, or VA loan. Lenders pay similar fees.

In a further move to help transfer the origination process online, Freddie Mac enhanced Loan Prospector with an option in certain cases to forego the time consuming appraisal process. Among the requirements are an LTV of 80% or less and the loan being a first-lien purchase mortgage. The cost of using the feature is \$200, which is well below an estimated national average cost of \$334 for an appraisal.

The involvement of the GSEs will undoubtedly be a significant catalyst for moving to the online environment the steps of the origination process that involve them. However, it may take some time before borrowers see the benefits. For example, despite the low cost of using the automated systems, mortgage borrowers still typically pay several hundred dollars in underwriting fees.

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## Obstacles to Completely Online Mortgage Originations

As Figure 4 indicates, there are many independent participants involved in the various stages of a mortgage origination. Each one has its own priorities and strategies. The decentralized nature of the process means that there is no coordinated effort within the industry to move the entire origination process online. Challenges to moving the entire mortgage origination process online include the following:

- Many borrowers are wary of using the Internet when hundreds of thousands of dollars are at stake. Some will just refuse to obtain a mortgage online.
- Electronic databases have to be created for title searches and record keeping.
- Income information such as tax-return copies and pay stubs are difficult to verify online.
- Many steps that involve physical contact with the property, such as appraisals or home inspections, will be difficult to move entirely online (although, as discussed earlier, for borrowers with good credit, the GSEs may waive an appraisal or use home price databases in place of, or as a supplement to, a full-physical appraisal).

Perhaps the major challenge for online mortgage originations is the coordination and development of multiple pieces of compatible software for all parties in the mortgage processing community. Any online software needs to be able to communicate with other parties in the process, and no standards exist at the moment. The Mortgage Bankers Association of America (MBA) did become involved to help standardize XML (Extensible Markup Language), to allow for easy information sharing within the mortgage industry. Freddie Mac got involved in developing the XML interface for its Loan Prospector Automatic Underwriting system. As noted above, Fannie Mae selected XHTML (combination of Extensible Markup and



Hypertext Markup Languages) as the language for open data format for documents to be delivered to Fannie Mae.

In early February 2001, the Mortgage Industry Standards Maintenance Organization (MISMO) announced a new E-mortgage Work Group that will focus on the architectural and technical challenges of secure electronic transactions. MISMO was founded by the MBA and works closely with technology companies, Fannie Mae and Freddie Mac. The new standards will be related to servicing, title, flood, and hazard insurance, appraisals and applications. Should this effort to develop standards and software prove successful, it could provide a tremendous boost to online mortgage originations.

**First Completely Online Mortgage Origination.** The hurdles described above explain why the first completely online mortgage origination took place only recently, on July 24, 2000 in Broward County, Florida. A \$140,000 house was sold by Arvida Homebuilders to Mr. Jose Ignacio Arroyo who electronically executed the promissory note and mortgage. Mr. Arroyo's loan closing took less than three hours and he says he saved about \$200.

The processing of the mortgage was paperless, used electronic documentation, and a variety of proprietary technologies for its processing. Remarkably, title search and insurance was done electronically as well. Fannie Mae purchased this mortgage and the time to bring it to the secondary market was reduced to less than five hours versus the average of 45 days. However, this is only a pilot project for Fannie Mae and the electronic documentation was duplicated on paper. Potential cost savings could be several hundred dollars, but it is not clear how much of the savings will be passed on to consumers.

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### Estimated Volume of Online Originations Going Forward

Although the definitions of online mortgage used by many industry sources vary, and it is difficult to give an accurate forecast, a Forrester Research estimate that was widely publicized projects 10% of mortgages to be online by 2003 (although online here means that *most* but perhaps not all of the steps will be completed electronically). This number gives us some idea where the industry is headed; namely, it will be a slow but steady progression toward online mortgage originations.

## Impact on Mortgage Origination Costs

The challenges of building the online mortgage-processing network imply that cost reductions are likely to occur in steps. What costs reductions can borrowers expect, and in what steps of the mortgage origination process?

An early estimate by a software vendor in the Freddie Mac publication *Secondary Mortgage Markets* is shown in Figure 5. It was projected that the cost of obtaining a \$100,000 mortgage may eventually go down 70% from \$3,000 to \$900. The key word here is eventually — apart from the application process, it is fair to say that most borrowers have not yet seen the benefits of the Web translated into lower closing costs. This may be partly because cost savings to the lender have not yet been passed onto the borrower. However, it is also probably true that, like other areas where the Internet is changing how business is done, there was much hype and the immediate impact on consumers was greatly overestimated.

**Figure 5. An Early Estimate for Cost and Time Reductions**

	Current Average	Final	Total Savings
Total Cost	\$3,000	\$900	70%
Time Required	Four-to-Five Weeks	One Week	78%

Source: *Secondary Mortgage Markets*, April 1999, Freddie Mac.

In Figure 6, we show estimates, based on discussions with industry sources, of the cost to the lender of each part of the origination process, once it migrates online, along with an estimate of the cost to the borrower. Also shown are current estimated industry averages for a traditional origination, and quoted costs from a popular online mortgage Web site.

**Figure 6. Estimates of Closing Costs for a \$100,000 Mortgage**

	Current Industry Estimates for Traditional Origination	Projected Eventual Cost to Lender if Completely Online	Projected Eventual Cost to Borrower if Completely Online	Current Quote from a Popular Mortgage Web Site
Application	\$225 <sup>a</sup>	\$25	\$50	—
Appraisal	\$334	\$100	\$200	\$325
Credit Report	\$50	\$20	\$25	—
Document Preparation	\$175	\$0	\$0	\$30
Flood Certification	\$25	\$10	\$15	—
Origination	\$1,000 (One Point)	\$175	\$175	\$892
Survey	\$125 <sup>a</sup>	—	—	—
Tax Service	\$75	\$30	\$45	—
Underwriting	\$175	\$100	\$150	—
Attorney/Escrow Agent	\$500	\$225	\$300	\$325
Notary	\$75	\$35	\$50	\$75
Title Search Insurance	\$400	\$100	\$300	\$406
Recording Fee	—	\$15	\$25	\$65
Reconveyance Fee	—	—	—	\$50
<b>Total Costs</b>	<b>\$2,809<sup>b</sup></b>	<b>\$935</b>	<b>\$1,305</b>	<b>\$2,153</b>

<sup>a</sup> Often waived. <sup>b</sup> We assume that the application and survey fees have been waived.

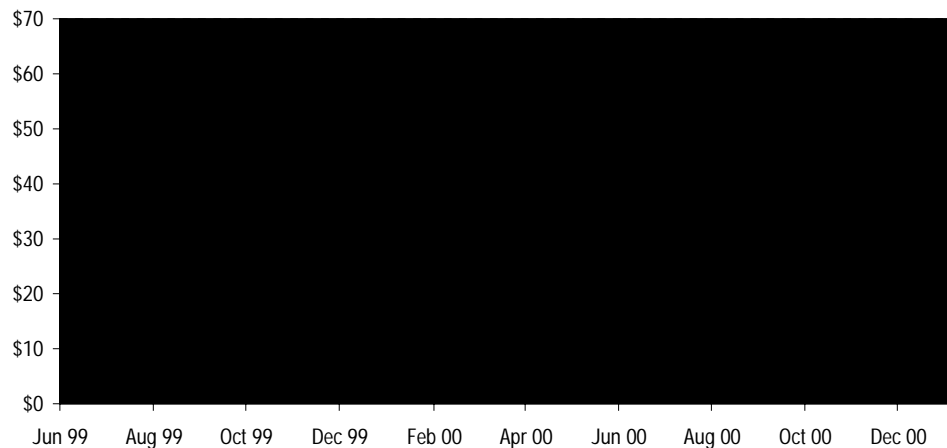
Source: Salomon Smith Barney.

It has to be emphasized *that the projected cost savings for completely online mortgage originations are very speculative, may take many years to realize, and may, in many cases, not be passed through to borrowers.* Furthermore, these cost and time reductions are going to affect the customers with the best credit first (who would be the most likely to refinance anyway).

Although it might be tempting to use current costs charged by some Internet services as a proxy of prices expected in the future, we believe this would be a mistake, for two reasons. First, many Internet firms sell loans below their cost. This consideration, along with other market realities that equity investors seem to be finally taking into account likely explains most of the sharp drops in the stock prices of most online mortgage lenders; as Figure 7 indicates, many are trading at less than 10% of their highs in 1999.

Second, nobody operates a mass online mortgage processing operation yet. Therefore, the costs (see Figure 6 for current pricing available on the Internet) in the current competitive environment are more reflective of the willingness to acquire an online customer rather than of the economic efficiencies of online processing. The actual loss per such loan could be as much as several thousand dollars.

Figure 7. E-Loan Stock Price History



Source: Salomon Smith Barney.

## The Potential Impact on Prepayments

For MBS investors, the bottom line is: what impact will online mortgage originations have on prepayments? Assuming that online mortgage lending lives up to its promise, and with the caveat that it will most likely be several years before we see the full impact, we foresee four major impacts:

- Lower closing costs, and a resulting “elbow shift”;
- Reduction in friction and an enhanced media effect;
- A reduction in the time between mortgage application and closing;
- A “Follow-On Effect”, leading to more refinancings and greater negative convexity for pools with higher proportions of online mortgages.

**Lower Closing Costs.** While there is much uncertainty regarding the degree and timing of cost reductions for borrowers, it seems almost certain that the Internet will lead to lower closing costs for mortgage borrowers. This means an increase in the refinancing incentive, which can be thought of as a shift in the “refinancing elbow”. For example, assuming that cost savings will be passed on to customers, total mortgage costs may decrease by 1% for a \$100,000 mortgage over the next several years (see Figure 6). This saving is roughly equivalent to a 20bp–25bp reduction in the coupon rate, or shifting the elbow by 20bp–25bp.

**An Enhanced Media Effect.** The media effect will be enhanced by the use of e-mail, with potential refinancers receiving e-mail notification when mortgage rates drop below a specified trigger level. Lower transaction costs and hassle, or friction, may stimulate more frequent refinancings, after smaller interest-rate moves. However, some studies show that Internet users tend to be better educated than average, suggesting that the borrowers most affected are the ones most likely to refinance anyway. In other words, there may be a “preaching to the choir” effect, so that the actual effect on refinancing rates may be marginal.

**Shorter Processing Time.** Increasing automation has already reduced the time needed to originate a mortgage to a month or less for a refinancing. The Internet is likely to reduce it even further, as steps such as credit checks are moved online. In fact, if and when the title search process is moved online, it is possible to see mortgages being originated in a matter of days, or even hours, for good credit borrowers. This may reduce costs, since lenders will have less pipeline-hedging expenses, for example.

**The “Follow-On Effect”.** Borrowers who obtained their mortgage online may be more likely to subsequently refinance their loan. They will have had the experience of a faster and less document-intensive online process, and are likely to obtain future mortgages online as well. We will label this tendency to repeatedly refinance online, resulting from the familiarity with the electronic process, the “Follow-On Effect”. Thus, pools where a significant proportion of the mortgages borrowed their loans online will be more negatively convex and, hence, less desirable from the investors point of view.

### Conclusions

Although its impact has been overstated, there is no doubt that the Internet is having a profound effect on the mortgage origination process. The proportion of mortgages that are originated completely online is likely to remain small, but the Internet is leading to a gradual, albeit slow, decline in origination costs, some of which will be passed through to borrowers. In addition, and perhaps just as important, the Internet has the potential to significantly reduce the friction, or the hassle factor, in the origination process. In this sense, the impact of the Internet will not be anything novel, but rather, it will sustain the trend towards lower costs and more efficient refinancing behavior seen in the mortgage market over the last decade.

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