

## The Determinants of Mortgage Default Contrasting the American and Swedish Experiences

by Patric H Hendershott and Bengt Turner

**R**eal estate values in general and house prices in particular have decreased in a number of countries in recent years, and many lenders and loan default insurers have become concerned about credit losses. To illustrate, nominal house prices have declined by over 20 percent in greater Helsinki, London and Stockholm, and delinquency and default rates have surged. This paper attempts to increase understanding of default determinants and to lay out a framework for explaining differences in the level of home mortgage loan defaults in a variety of countries.

This paper begins with a statement of the hypotheses regarding the determinants of default. The primary determinants are the level of homeowner equity in the house (when the equity is negative, default might be optimal) and legal rules regarding lenders' recourse to nonhousing assets of defaulters (when much recourse is available, negative homeowner equity is not sufficient to make default optimal). Of secondary importance is whether households "have to move" because this lowers effective home-

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owner equity.

We then discuss evidence from the United States and Sweden, countries with which we are familiar. The timing of default problems in the two countries differs markedly. Defaults increased in the United States in the 1980s, in a manner consistent with the default model; Sweden's possible problems are just developing. The causes of the difficulties also vary. U.S. defaults surged largely due to a decline in general inflation (and a regional economic problem caused by the plunge in oil prices); Sweden's problems are largely attributable to policy-induced declines in real house prices. Finally, the likely outcomes differ owing to differences in the two legal systems. Lenders have little recourse to non-housing assets in the U.S., but widespread recourse in Sweden, including access to future labor earnings (personal bankruptcy is not allowed).

Because the U.S. problem is a decade old, analysis already exists (Hendershott and Waddell, 1992; Hendershott and Schultz, 1993) and is simply summarized here. Because the Swedish problem is just developing; a detailed analysis is not yet possible. However, household leverage based upon a cross-section analysis of leverage in 1991 and movements in local house prices since then is reported. We conclude that, using the book value of mortgages, over 10 percent of all mortgaged households have current LTVs above 90% and 7 percent are above 100%.

Nonetheless default rates on owner-occupied housing are likely to be significantly less in Sweden than in the U.S., for two reasons. First, the subsidies on existing debt mean that the ratio of debt market-value to house value is lower than the ratio of book-value to house value. Second, strong recourse laws exist in Sweden. Defaults on Swedish loans funding co-op housing and rental housing in corporate ownership, where recourse is not possible, are likely to be a greater problem. A conclusion briefly summarizes the paper and suggests how the general framework could be used to predict the differential default experiences in a variety of countries. Comparisons of the predictions with actual outcomes would, of course, constitute a test of the hypotheses.

### **HYPOTHESES REGARDING MORTGAGE DEFAULT<sup>1</sup>**

The owner of a house financed by mortgage debt will default on that debt (stop making payments) if the expected benefits from doing so exceed the costs.<sup>2</sup> Three general factors determine the likelihood of default: the equity the borrower has in the house, whether or not the borrower "has to move" in the absence of default (has insufficient income to make mortgage payments or needs to relocate), and what recourse the lender has to the borrowers non-housing assets if the borrower does default. We presume lenders can eject defaulters and take their houses, and/or have recourse to

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other borrowers assets. Otherwise borrowers have little incentive to make any payments.<sup>3</sup>

The benefits from defaulting are the value of the mortgage debt eliminated from the borrowers balance sheet and the free rent that can be obtained between the time of default and actual foreclosure (when the non-payer is ejected from the house). The debt eliminated is the market, not book, value of the mortgage. If a household had initially obtained a far below-market loan interest rate (e.g., the government provided a large rate subsidy) that can be transferred with the house (as is the case in Sweden), default is unlikely because the collateral value is really the house plus the value of the below-market financing. Moreover, even if the borrowing rate initially starts at market, an increase in the current market rate relative to the borrowers coupon rate (the borrower does not have a freely adjustable rate) will reduce the market value of the mortgage, discouraging default for the same reason.<sup>4</sup>

The costs of defaulting are the house given up, losses of non-housing assets, including human capital (future labor income), the dollar "costs of moving," and the psychological or moral cost of defaulting. The dollar costs of moving include the transactions cost of purchasing or renting another house, and, if lenders do not have recourse to other assets, the lost one-sided option the borrower currently has to house price appreciation (further declines in the existing house value would be absorbed by the lender, but the owner would receive price increases), as well as the costs associated with moving one's family and belongings. The free rent one can obtain depends on laws regarding how soon eviction can occur following default, and losses of non-housing assets depend on laws regarding recourse to other assets, including future household income, which lenders can obtain if personal bankruptcy is not allowed. Where lenders have substantial recourse, default is unlikely.

While the default condition is similar in

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principle whether or not households have to move, the likelihood of a household defaulting is significantly increased (assuming severe recourse is not allowed) if the household has to move in the absence of default.<sup>5</sup> First, the household must pay the costs of selling the house if it chooses not to default.<sup>6</sup> This cost of not defaulting now acts as an incentive to default. Second, the costs of moving do not act as a deterrent to default; they must be paid whether or not default occurs.

The likelihood of having to move is positively correlated with three events: dissolution of the household (death or divorce), becoming unemployed, and sharply rising housing costs (e.g., increased interest rates on existing adjustable-rate mortgages). Note, though, that none of the "have to move" variables are relevant if the household has substantial equity in the house; selling the house would be preferred to defaulting. And none may be relevant if severe recourse exists. The implied specific hypotheses regarding determinants of default and foreclosure are:

H1: those with high LTVs are more likely to default than those with lower LTVs. Of course, LTVs will be higher, the greater was the initial LTV and the lower house price appreciation has been since the loan was originated.

H2: those who "have to move", owing to loss of income, increases in out-of-pocket housing costs, or changes in family structure, are more likely to default (holding LTV constant) than those who do not.

H3: those living in regions/countries where non-payers can be evicted rapidly are less likely to default than those in regions/countries where eviction takes longer.

H4: those living in regions/countries where lenders have greater recourse to borrowers non-housing assets, including

future labor income, are less likely to default than those living where lenders have little recourse to other assets.

## EVIDENCE FROM THE UNITED STATES

Most studies of mortgage default have been based on data on FHA mortgages. The Federal Housing Administration was established as a U.S. Government agency during the depression to encourage the use of long-term fixed-rate mortgages. These mortgages generally are fully amortizing over 30 years, carry a fixed-rate over the entire loan term, and have high initial loan to value ratios (the FHA insures investors against losses due to borrower default). FHA insures roughly one-seventh of home mortgage loans; there are currently over 6 million FHA fixed-rate loans outstanding. Over 60 percent of these loans had initial LTVs of over 90 percent.

Casual inspection of aggregate FHA defaults over time suggest the importance of homeowner equity to default (Hendershot and Waddell, 1992). If equity is important one would anticipate two results. First, for any origination/insurance year, higher LTV loans should default more than lower LTV loans. For loans originated in the 1975-85 period, there is a monotonically increasing relation between initial LTV and the incidence of default. Second, for any given LTV, loans originated/insured just prior to a period of rapid house price appreciation should default less than loans originated just prior to a period of slow (or negative) appreciation. Less than five percent of loans originated in 1975-78 had defaulted by 1992 (house price appreciation averaged 12.5 percent during the 1977-80 period). In stark contrast, 19 percent of loans insured in 1981 and 1982 have defaulted (house price appreciation averaged only 2.8 percent during the 1982-85 period).

Numerous statistical studies have established the importance of homeowner equity to mortgage default (Foster and Van Order 1984 and 1985, and Cooperstein, Redburn

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and Meyer). In these studies, the researchers used estimates of the mean drift and standard deviation in house prices since the origination date to calculate the percentage of originations that would have negative equity at some later date. Defaults were statistically related to the calculated negative equity percentages.

Most recently, Hendershott and Schultz (1993) analyzed a 1990 FHA data set, which consisted of over 5 million loans originated during the 1975-88 period that were still outstanding. Owing to normal repayment and extraordinary refinancing of loans with high initial interest rates, nearly half of the loans were originated during the 1986-88 period. For each of five LTV categories, 931 aggregate conditional default probabilities were calculated based on year of origination (14), year since origination (2 to 15), and seven real loan size categories.

Strong support was found for the first two hypotheses. First, for any given initial LTV, default was negatively related to average housing equity build-up (based on changes in average house prices and mortgage interest rates since origination) and positively related to regional house price dispersion (with greater dispersion, more houses will have negative equity, other things equal). Further, loans with initial LTV of 90 percent were seven times more likely to default than loans with initial LTV of 80 percent, and loans with initial LTV of 96 percent were 20 times more likely to default. Second, default was positively related to the unemployment rate (the higher is unemployment, the more households are forced to move). Moreover, the impact of unemployment was less the more the initial equity of the home-

owner (lower the initial LTV). Because unemployment has a strong regional component, investing in a national portfolio of loans is less risky than investing in a regional portfolio.

Claurentie and Hertzog (1992) provide some evidence on hypotheses 3 and 4, using the fact that foreclosure laws vary by state in the United States. Default is less likely in states where non-paying borrowers can be quickly evicted and where recourse to non-housing assets is available.

## EVIDENCE FROM SWEDEN

The general decline in inflation in Sweden in the early 1990s was quite similar to that in the U.S. in the early 1980s; the inflation rate fell from 10 percent in 1989-90 to 4 percent in 1991-92. The behavior of house prices was far different, however. While real house prices in the U.S. fell by less than 5 percent, on average, real Swedish house prices declined by 30 percent between the first quarter of 1991 and the first quarter of 1993. Nominal Swedish house prices have declined by 20 percent, on average, while U.S. house prices continued rising in nominal terms. The Swedish nominal decline has been widespread but uneven, with the greatest percentage declines occurring in the highest valued houses and in Stockholm and Göteborg. Houses assessed at under 350,000 skr fell by 15 percent in value, versus 23 percent for those over 500,000 skr (assessed values are for 1987, market prices in 1989 were, on average, 50 percent higher). Prices in Stockholm and

Göteborg fell by 28 percent, versus 15 percent in the rest of Sweden.

The plunge in Swedish house prices is largely a response to changes in housing subsidy policies and to a recession that lowered interest rates and expected inflation. The reduction in housing subsidies (increase in user cost) and decline in real incomes reduced the demand for housing and thus lowered house prices through the normal economic channels. Similarly, the decline in expected inflation, along with a sharp decrease in tax rates and a constant nominal interest rate up to 1992, increased real after-tax interest rates and thus tended to lower house prices.

A relevant issue is what the LTVs of Swedish homeowners are today, given the fact that prices declined by 20 percent in nominal terms between 1991 and 1993. To obtain an estimate of current LTVs of Swedish homeowners, we have simulated the debt and house values of each of the 3,585 respondents in the 1991 survey. The simulations are based on the following assumptions. First, the lesser of each of the computed 1991 house values and the 1991 loan value is extrapolated to a 1993 value assuming the observed price change (decline) for the municipality in which the house is located. Second, this value is multiplied by the lesser of the observed LTV ratio of the household for 1991 and 100 percent (initial LTVs above 100 percent reflect measurement error). Third, debt is amortized from its 1991 value (reduced by 3 percent) and divided by the estimated 1993 house value.

The 1991 distribution of households by the

**Table 1** : Extrapolated LTV ratio in early 1993: percentage of households, by recentness of last move, in different LTV ranges

	<90	90-100	100-110	110-120	>120	Total
Quite recent movers (2 years or less)	5.0	1.5	1.1	0.8	1.5	9.8
Somewhat recent movers (3 to 5 years)	9.3	0.8	0.6	0.3	0.8	11.8
Distant movers (6 to 10 years)	15.3	0.7	0.2	0.5	0.5	17.3
Quite distant movers (over 10 years)	58.8	1.1	0.4	0.3	0.4	61.1
<b>Total</b>	<b>88.5</b>	<b>4.2</b>	<b>2.3</b>	<b>1.8</b>	<b>3.2</b>	<b>100.0</b>

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certainly go into bankruptcy. Thus data on the operations and leverage of corporations owning rental housing are crucial to assessing the likely impact on lenders.

The default decision for co-op loans is more complicated. Default would generally proceed in two steps. First, individual co-op owners would have to decide to forego their units; stopping co-op "rental payments" and moving out (making private market rental payments) would have to be preferred to continuing the co-op payments. A key is comparison of co-op rental payments with private market rents; declining market rents cause some co-op unit owners to abandon their units, which leads to higher co-op rental payments for the remaining unit owners. Second, a sufficient number of these decisions would have to be made so that the co-op itself would be unable to convince remaining owners to increase their payments to cover the co-op costs.

In this framework, the likelihood of lender losses on co-op loans depends importantly on the debt of the co-op, but not on the personal debt of individual co-op owners. Owing to recourse, owners cannot easily avoid their personal debt. In fact, if this debt is below-market subsidized debt (associated with recently constructed co-ops), existence of the debt would deter, not encourage, default (recourse would be to the book value of the debt, which exceeds the present value of the below-market debt payments). On the other hand, the greater the co-op debt, the higher are co-op rental payments and the smaller are the declines in market rents that would induce unit owners to begin abandoning their units. In general, more recently constructed co-ops with higher construction costs and LTV ratios located in areas with greater rental vacancies (more rapidly declining rents) are more likely candidates for default.

In light of these factors, it should not be surprising that bankruptcy of co-ops in Sweden is extremely rare. To illustrate only 2 co-operatives declared bankruptcy in 1990 and 6 in 1991. However, in 1993, 35 co-operatives declared bankruptcy

(Henriksson, et.al., 1993).

## CONCLUSION

Hypotheses regarding default have been developed and evidence from the American and Swedish experiences has been examined. The U.S. evidence is quite consistent with the equity-driven default model: households will exercise their option to default in increasing numbers the more negative is their equity. It is too early to know precisely what the Swedish experience will be, but the strong recourse to other assets, including future labor earnings, suggests that the default option will be exercised far less "ruthlessly" by homeowners. Where recourse is not so available - loans with co-op units and corporate private rental units as collateral, default will likely be a greater problem for lenders.

If one wished to forecast the likelihood of significant defaults in different countries in the next few years, three determinants must be considered. First and foremost is the change in nominal house prices: where nominal house prices are still rising more than 5 percent a year, significant defaults seem very unlikely. Second, even if nominal house prices are not rising or are even declining slightly, significant default will not occur if market loan-to-value ratios were initially low. Third, even with sharp nominal declines, significant defaults are unlikely if lenders have strong recourse to non-housing assets and future wealth. Because countries differ significantly in their house price experiences, their indebtedness, and their recourse laws, a comparative study of default would be useful to quantify the importance of these different factors. ■

## NOTES

<sup>1</sup> This section draws on Hendershott and Schultz (1993).

<sup>2</sup> The household decision to default is as-

sumed to be a decision to default is assumed to be a decision to let the house go to foreclosure unless the economic situation changes prior to the lender foreclosing. Changed situations could include the lender re-negotiating the terms of the loan.

<sup>3</sup> Of course, lenders then have little incentive to make loans. The lack of eviction and foreclosure mechanisms is a major problem for housing finance in Central and Eastern Europe.

<sup>4</sup> When the current market rate falls below the borrower's coupon rate and the borrower can truncate the increase in mortgage market value by refinancing - by converting the mortgage market value to the book value, the book value plus the costs of refinancing (origination costs, any expense of repurchasing mortgage default insurance for low down-payment loans, and costs of prepaying the existing mortgage) is what is gained by defaulting.

<sup>5</sup> Non-movers could default more than movers if they have market interest rates and cannot refinance (possibly owing to negative equity in the house on a book value basis). Here, though, lenders should be willing to re-negotiate because they will lose the benefit of the above-market interest rate if default occurs. See Caplin, Freeman and Tracy (1994).

<sup>6</sup> If full recourse exists, the selling cost will be paid even if default occurs.

<sup>7</sup> See Gulbrandsen (1993) on Norwegian credit losses.

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## Building and Social Housing Foundation

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*The Building and Social Housing Foundation is now calling for entries for 1995. Preliminary submissions must reach by 31 July 1995.*

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