

# WORKING P A P E R

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## Financial Literacy, Social Perception and Strategic Default

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LABOR AND POPULATION

# FINANCIAL LITERACY, SOCIAL PERCEPTION AND STRATEGIC DEFAULT

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## Abstract

As a result of sustained housing market fragility, a growing number of borrowers are walking away from their underwater homes even though they have the ability to pay. Despite recent advances, questions remain about what influences this decision. In this paper, we use survey data to examine the role of social expectations, financial literacy and knowledge of default consequences. We find that homeowners who believe that others are likely to strategically default in the future are more willing to walk away as they anticipate reduced social stigma. Financially literate borrowers appear better able to calculate the benefits of strategically defaulting and are more willing to walk away at high levels of shortfall. We also find evidence that those who better understand the consequences of default, particularly that a default's impact on one's credit score weakens over time, have a higher willingness to walk away. Our results suggest that policies that help shape expectations about future strategic defaults may influence present foreclosures.

**Keywords:** Strategic Default, Foreclosure, Financial Literacy.

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# 1 Introduction

The recent financial crisis and associated collapse of the U.S. housing market has had a profound impact on homeowners. In 2010, a record 2.9 million U.S. properties received a foreclosure filing (a default notice, scheduled auction, or bank repossession), impacting 1 in every 45 U.S. housing units.<sup>1</sup> The record represented a 2% increase from 2009, a 23% increase from 2008, and an astonishing 123% increase in the level of foreclosure activity experienced in 2007.<sup>2</sup>

The rise in foreclosures was accompanied by a precipitous drop in housing prices, leaving many homeowners with a mortgage balance that exceeded the value of their house. Zillow estimates that in the first quarter of 2011 more than 28% of single-family homeowners with a mortgage had negative equity in their home.<sup>3</sup> In several large metropolitan areas, this fraction exceeded 50%, reaching an astounding 68% in Phoenix, Arizona.<sup>4</sup> Not only is negative equity pervasive, the amount of the shortfall is often significant. For example, in the first quarter of 2010 the *average* ratio of home equity to home value in Modesto, California was -35%.<sup>5</sup> Such extreme shortfalls in value can create a strong incentive for a borrower to default.

A “strategic default” occurs when a borrower has the financial ability to pay his mortgage, but chooses not to because of other considerations. Strategic defaults are difficult to identify empirically because a defaulter’s motivations are unobservable, but several studies have estimated that they account for a significant and growing fraction of recent foreclosures.<sup>6</sup> Tiruppatur and Egan (2010) use borrower level data and define a default as strategic if a borrower is underwater on his mortgage, but has other meaningful non-mortgage obligations on which he continues to make payments. Using this methodology, they estimate that strategic defaults rose from insignificant levels in 2007 to approximately 12% of all defaults in February 2010. A study conducted by Wyman (2009) used a similar methodology and estimated that 19% of all defaults in the second quarter of 2009 were strategic.<sup>7</sup> Guiso et al. (2011) conduct a survey asking respondents about the number of people they know to have defaulted and how many of those defaults they think were strategic. Taking a ratio of the responses of the two questions, the authors estimate that strategic defaults increased from 26% of all defaults in March 2009 to 35% in September 2010.

The rise in mortgage defaults generally, and strategic defaults specifically, has generated considerable scholarly attention. Bajari et al. (2008) find that liquidity constraints and declining house prices are two important factors influencing subprime mortgage defaults. The authors estimate that for homeowners with a 30 year fixed-rate mortgage and no downpayment, a 20% decline in home price makes the borrower 15.38% more likely to default than a comparable borrower with a stable house price. Elul et al. (2010) also find that liquidity constraints and negative equity

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<sup>1</sup><http://www.realtytrac.com/content/foreclosure-market-report/record-29-million-us-properties-receive-foreclosure-filings-in-2010-despite-30-month-low-in-december-6309>

<sup>2</sup><http://www.realtytrac.com/landing/2009-year-end-foreclosure-report.html?a=b&acct=233496>

<sup>3</sup><http://zillow.mediaroom.com/index.php?s=159&item=228>

<sup>4</sup>Other examples include Atlanta, Georgia (56%); Riverside, California (51%); Tampa, Florida (60%); and Sacramento, California (51%).

<sup>5</sup><http://www.forbes.com/2010/05/06/foreclosure-home-equity-lifestyle-real-estate-unemployment-cities.html>

<sup>6</sup>Foote et al. (2008) examined the Massachusetts real estate market during the 1991 recession and estimated that the only 6.4% of homeowners with negative equity lost their homes. The recent crisis, however, was both more severe and pervasive, creating a stronger incentive for underwater homeowners to default.

<sup>7</sup>The authors identified strategic defaulters as individuals who went straight from current to 180 days late on their mortgage without being seriously delinquent on other debt obligations.

are significant determinants of default, with similarly sized marginal effects. Gerardi et al. (2007) find that the probability of mortgage default increases significantly when house prices are depreciating. Bhutta et al. (2010) estimate that while the median homeowner won't walk away until he owes 62% more than his home is worth, once home equity reaches -50% half of defaults are strategic.

While considerable attention has been paid to the role of negative equity in the decision to strategically default, recent work has begun to examine the role of non-pecuniary factors. White (2010a, 2010b) provides anecdotal evidence that emotions, including guilt and fairness, can be important determinants. Towe and Lawley (2010) find that social interactions influence foreclosure decisions; having a neighbor in foreclosure increases the likelihood of default by as much as 28%, possibly as a result of reduced social stigma. Guiso et al. (2011) use survey data and find that social considerations, including morality and fairness, play an important role in the decision to strategically default. The authors also find evidence of a social contagion effect; knowing someone who has strategically defaulted in the past reduces the perceived probability of litigation, increasing one's willingness to default. Seiler et al. (2012) also find that morality and peer networks play important roles; those who don't believe strategic default is immoral and have a family member or close friend that has defaulted are more likely to walk away.

In this paper we use survey data to measure the propensity to strategically default, and examine how the decision to walk away varies based on demographic and social characteristics and notions of morality, fairness, and guilt. Similar to Guiso et al. (2011), we pose a series of hypothetical situations in which homeowners are asked whether they would default if facing hypothetical shortfalls of various levels.<sup>8</sup> In contrast to previous work, we also examine how financial literacy and default perceptions impact the decision. Specifically, we examine how respondents' expectations about how often others are likely to default in the future influences their willingness to do so today. We also survey respondents' knowledge about the consequences of default and examine how their understanding influences their propensity to walk away. Our data come from a survey of 1,200 homeowners in RAND's nationally representative household survey, the American Life Panel.

We find that expectations about future strategic defaults have a small, but statistically significant, impact. Those who believe that strategic defaults will be pervasive in the future are more likely to declare a willingness to default today. However, once shortfalls reach extreme values, expectations become inframarginal as the size of the shortfall dominates. Further, we find that expectations about future defaults as a result of an inability to pay (non-strategic defaults) have no impact on one's propensity to default strategically, suggesting the increased willingness to default when strategic defaults are expected to be prevalent is driven by social considerations, such as social stigma, not price impacts.

Financial literacy is also an important predictor of default propensity. For relatively moderate levels of shortfall, financially literate homeowners appear similar to their less literate peers. However, once negative equity reaches 50%, financial literate homeowners are significantly more willing to walk away. Taken together, the results suggest that penalties to defaulting are highly salient, but those who are better able to calculate the benefits from defaulting are more likely to do so.

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<sup>8</sup>While hypothetical questions are obviously an abstraction from real world decisions with actual pecuniary and social consequences, they allow us to elicit the expectations, social perceptions and personal experiences central to our analysis.

We find there is considerable confusion about the consequences of strategic default, and some evidence that respondents who know more about the outcomes are more willing to walk away. In particular, respondents who correctly assert that a default’s impact on one’s credit score weakens over time are more willing to declare an intention to walk away.

Similar to previous work, we find that morality, guilt and fairness all play important roles in the decision. Those who would feel guilty or believe it is immoral to default are significantly less likely to do so. In contrast, those who feel that banks have treated borrowers unfairly are significantly more likely to express a willingness to walk away. As one might expect, we find that individuals who have checked their credit score recently (a proxy for its importance) are significantly less likely to strategically default. Interestingly, homeowners who know their neighbors well are also less willing to walk away. This may be because they do not want to impose a negative externality on people they know well, but familiarity with one’s neighbors may also be correlated with housing satisfaction more generally.

In contrast to previous work, we do not find that knowing someone who has strategically defaulted significantly increases the probability one will do so, although the effect is positive. This may be because many of our respondents only know a casual acquaintance who has defaulted, rather than a family member or close friend (Seiler et al. (2012)). However, our estimate of how frequently strategic default occurs is similar to that found in previous studies. Using the ratio of strategic defaults and total defaults our respondents were personally aware of (as constructed in Guiso et al. (2011)), we estimate that approximately 30% of defaults are strategic.

Our results provide further evidence that social considerations play an important role in the decision to walk away. Our examination of expectations, however, has novel policy implications. Policies that help shape expectations about future strategic defaults may influence foreclosures today. For example, policies designed to stabilize future house prices may do so in part through a signalling effect, reducing underwater homeowners’ willingness to strategically default.

The following section presents a simple theoretical framework motivating our study. Section 3 discusses our survey data, while Section 4 presents the results of our analysis. Section 5 concludes.

## 2 Theoretical Motivation

An underwater homeowner considering strategic default must weigh the costs and benefits of walking away against those derived from remaining in the home. By defaulting, a homeowner rids himself of an underwater asset, but may face financial and social penalties. Should the borrower continue to make mortgage payments, there is a possibility that his home value will appreciate to a point where strategic default is no longer attractive.

Consider a simple two period (present and future) framework in which borrowers face this tradeoff. Specifically, suppose there are two types of borrowers, high types and low types, where fraction  $p$  of borrowers are high types.

$$\theta = \begin{cases} \theta_H & \text{w/ prob } p \\ \theta_L & \text{w/ prob } 1 - p \end{cases}$$

Low types are assumed to have suffered an adverse financial or liquidity shock (such as a significant medical expenses) rendering them unable to continue to meet their mortgage payment obligations. Consequently, low types will default with probability 1. High types, on the other hand, haven't experienced such a shock and must decide whether to default on their mortgage, despite the ability to pay. Let  $\phi$  denote the expected fraction of high-types who will default.

In the future (second period of our framework) a borrower faces the decision of whether to repay his remaining mortgage balance<sup>9</sup>,  $M_2$ , or to default. If the borrower chooses not to default, he pays off his mortgage and is left with a house of value  $V_2$ . If he defaults he neither pays the mortgage nor has an asset of any value, but faces the costs of defaulting,  $C_D$ . We decompose the costs of defaulting into two components, financial and social.

$$C_D = C_F + C_S(1 - \phi)$$

$C_F$  represents the financial costs of strategically defaulting, including the impact to one's credit score, while  $C_S$  represents the social costs and is assumed to be proportional to the expected fraction of consumers who choose to meet their debt obligations (an assumption we will investigate empirically). Thus, in the second period, a borrower will choose not to default if

$$V_2 - M_2 > -C_D. \quad (1)$$

Equation 1, though simple, reveals negative equity is a necessary condition for default. If a homeowner has positive equity, selling his home both avoids default and delivers a positive profit. However, negative equity is not a sufficient condition. If the financial and social costs to strategically defaulting are substantial, a borrower may meet his mortgage obligation even if it exceeds the value of his home.

In the first period, a borrower faces a slightly different decision. Should he chose to walk away, he incurs the same costs of defaulting,  $C_D$ . If he chooses not to default, he must meet his monthly mortgage obligation,  $m_{pay}$ , but may be in a position in which he would prefer to pay his remaining mortgage balance in the next period. Suppose future housing values are subject to a random percentage price shock  $w_1 \sim F(w)$  which is depressed by an amount proportional to the total fraction of foreclosures. Thus, let

$$V_2 = V_1(1 + w_1 - \gamma(1 - p + p\phi))$$

where  $1 - p + p\phi$  is the total proportion of strategic and non-strategic defaults. Let  $\lambda$  represent the fraction of a borrower's monthly mortgage payment going to principal so that  $M_2 = M_1 - \lambda m_{pay}$ . A borrower will prefer to default in the first period if

$$-C_D > -m_{pay} + Prob(V_2 - M_2 > -C_D)(V_2 - M_2) + (1 - Prob(V_2 - M_2 > -C_D))(-C_D). \quad (2)$$

Substituting for future values and rearranging yields

$$Prob(V_2 - M_2 > -C_D) = Prob\left(w_1 > \frac{M_1 - \lambda m_{pay} - C_F - C_S(1 - \phi)}{V_1} - 1 + \gamma(1 - p + p\phi)\right).$$

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<sup>9</sup>Substantively, this can represent a situation in which a borrower faces a balloon payment or must sell his home for exogenous reasons, such as a job relocation.

A homeowner will want to retain his home in the second period if the shock to housing prices is sufficiently positive. The further one is underwater (the higher the ratio  $\frac{M_1}{V_1}$ ), however, the less likely this is to occur. Notice that an increase in the expected proportion of strategic defaults,  $\phi$ , also decreases the probability a homeowner will prefer to retain his home in the future. An increase in strategic defaults both depresses house prices and reduces the social stigma associated with walking away.

Let  $\bar{w} = \frac{M_1 - \lambda m_{pay} - C_F - C_S(1-\phi)}{V_1} - 1 + \gamma(1 - p + p\phi)$ . Rearranging Equation 2 and taking expectations yields:

$$m_{pay} > Prob(w_1 > \bar{w})[E(V_2|w_1 > \bar{w}) - M_2 + C_D]. \quad (3)$$

A borrower will prefer to default today if the cost of making his monthly mortgage payment exceeds the option value of remaining in his home. By waiting, a borrower may experience a positive shock to housing prices. If the shock is sufficiently positive, the borrower will pay off his remaining mortgage balance in the second period, yielding a net financial position of  $V_2 - M_2$ , and avoid the financial and social costs of defaulting.

This simple theoretical framework makes a couple seemingly sensible predictions. First, the further a borrower is underwater (measured as the ratio of mortgage debt to house value) the more likely he is to walk away. Second, borrowers who believe that strategic defaults will be pervasive in the future are more willing to default today. An increase in the expected amount of strategic default reduces both expected house price appreciation and social stigma. In the following sections we will test the framework's predictions by empirically separating and examining the importance of social and financial considerations.

### 3 Data

While mortgage defaults are easily observable in secondary data, it is difficult to determine whether those defaults were strategic. Strategic defaulters have strong financial and social incentives to hide their motivations. Further, even if one were able to identify which defaults were strategic, it is impossible to determine how those decisions were shaped by personal experiences and beliefs without direct contact.

Survey data, however, can be used to examine how expectations and social factors impact default decisions. We presented respondents with hypothetical scenarios to determine if and when they are likely to walk away from an underwater mortgage. While hypothetical questions are obviously an abstraction from real world decisions with actual pecuniary and social consequences, they allow us to elicit the expectations, social perceptions and personal experiences central to our analysis. In addition, employing a survey methodology allows us to examine how behavior might change if negative equity became either more pervasive or more acute, providing insight into which policies might be most effective in stabilizing a deteriorating housing market.

Data for this analysis come from a new survey in the American Life Panel (ALP). Maintained by the RAND Corporation, the ALP is an Internet panel of approximately 5,000 respondents ages 18 and older. To complete surveys, the majority of respondents in the panel use their own Internet access. For panel members without Internet access, RAND provides a Web TV or a laptop and

access to the Internet. This eliminates the bias found in many Internet survey panels which include only computer owners.

Respondents have been recruited to the ALP in a variety of ways. The first cohort was recruited after completing the Monthly Survey (MS) of Michigan’s Survey Research Center in 2006.<sup>10</sup> Later cohorts of the ALP were recruited by inviting members of Stanford University and Abt ARBI’s National Survey panel to join the sample.

ALP Panel members are requested to complete questionnaires about twice a month. Typically an interview will take no more than 30 minutes, and respondents are paid an incentive of about \$20 per thirty minutes of interviewing. Most respondents respond within one week and the majority within three weeks.

Our survey, MS196, was released on June 30, 2011 and includes a sample of 1,471 respondents. Panel members were included in the survey if they indicated that they owned a home in one of two recent surveys. The first question in our survey identified respondents who no longer own a home and excluded them from the sample. Additionally, we excluded respondents who claimed not to be primarily or jointly responsible for household financial decisions, resulting in a sample of 1,297 respondents. These intentional restriction ensures that only respondents who are currently in a position to make decisions related to homeownership answer the survey questions.

### 3.1 Demographic Characteristics

Upon joining the panel, respondents complete a demographic survey which includes questions on individual characteristics, work history and household characteristics. This background information is updated with each questionnaire. Demographic characteristics include birthdate, gender, education, race, ethnicity, marital status, job status and income. Table 1 displays the summary statistics for the demographic variables from the full sample and the analysis sample for the regressions.<sup>11</sup> In the full sample, more than half of respondents are female, and there is a small percentage of minority respondents. Respondents in the ALP are generally more well educated and older than the general population, and almost two-thirds earn more than the median U.S. income. Three-quarters of the sample is married, and 20% is either divorced, separated or widowed (no longer married). 17% of respondents in the sample do not earn an income, either because they are unemployed and looking for work, disabled or a homemaker. Almost one-quarter of respondents are retired, and a similar number have a child who attends a public school in the neighborhood where the household resides. The majority of the sample live in the Midwest and South (excluded), 34% and 31%, respectively.

### 3.2 Housing Characteristics

In our survey, we first consider background information on the respondent’s primary residence, including the type of unit they own, the purchase date and purchase price. Over 86% of respondents

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<sup>10</sup>The MS produces the widely used Index of Consumer Expectations and is one of the leading consumer sentiment surveys.

<sup>11</sup>The analysis sample excludes respondents who did not answer some of the questions captured by the dependent or control variables.



Table 1: Demographic Variable Summary Statistics

<b>Variable</b>	<b>Full Sample</b>		<b>Analysis Sample</b>	
	Mean	S.D.	Mean	S.D.
Female	0.5641	0.4961	0.5596	0.4966
Black	0.0320	0.1762	0.0315	0.1746
Hispanic	0.0258	0.1585	0.0257	0.1582
Some College	0.3500	0.4772	0.3502	0.4772
College Degree	0.2773	0.4479	0.2815	0.4499
Professional Degree	0.2086	0.4065	0.2103	0.4077
Age 30 to 44	0.1437	0.3510	0.1432	0.3504
Age 45 to 59	0.4102	0.4921	0.4089	0.4918
Age 60 to 74	0.3531	0.4781	0.3551	0.4788
Age > 75	0.0680	0.2518	0.0687	0.2531
Inc > Median US	0.6484	0.4776	0.6515	0.4767
No Income	0.1734	0.3788	0.1714	0.3770
Retired	0.2406	0.4276	0.2401	0.4273
Married	0.7250	0.4467	0.7285	0.4449
No Longer Married	0.1992	0.3996	0.1978	0.3985
Kids in Pub School	0.2359	0.4247	0.2417	0.4283
North East	0.1484	0.3557	0.1465	0.3538
Midwest	0.3352	0.4722	0.3444	0.4754
West	0.1969	0.3978	0.1987	0.3992
Observations	1,280		1,208	

live in single family homes, while 8% reside in townhomes or condominiums, and the remainder live in mobile homes. A large portion of respondents, 45%, indicated they bought their home after 2000, while 29% indicated they bought in the 1990s and 14% indicated they bought their home in the 1980s. The mean self-reported purchase price was \$162,000, with a standard deviation of \$211,000. The purchase price of homes increase significantly over time, with a low mean purchase price of \$51,000 for homes bought in the 1950s, to a high of \$274,000 for homes bought since 2010.

To understand the extent to which respondents experienced the housing market bubble through the evolution of their home values, we examined the (self reported) maximum value the house attained while it was owned by the respondent, when this value was reached, and the respondent's best guess for the current (mid 2011) value of the house. Figure 1 shows the purchase price and maximum value of homes for respondents who purchased a home after late 1969 and whose home value was less than \$500,000.<sup>12</sup> There is a wide dispersion in purchase price, but the general evolution of housing prices in the sample appears to mimic the population at large. Most of the respondents report their homes reached a maximum value between 2006 and 2008, the height of the housing market bubble.

Figure 1: Self-reported Purchase Price and Maximum Housing Value

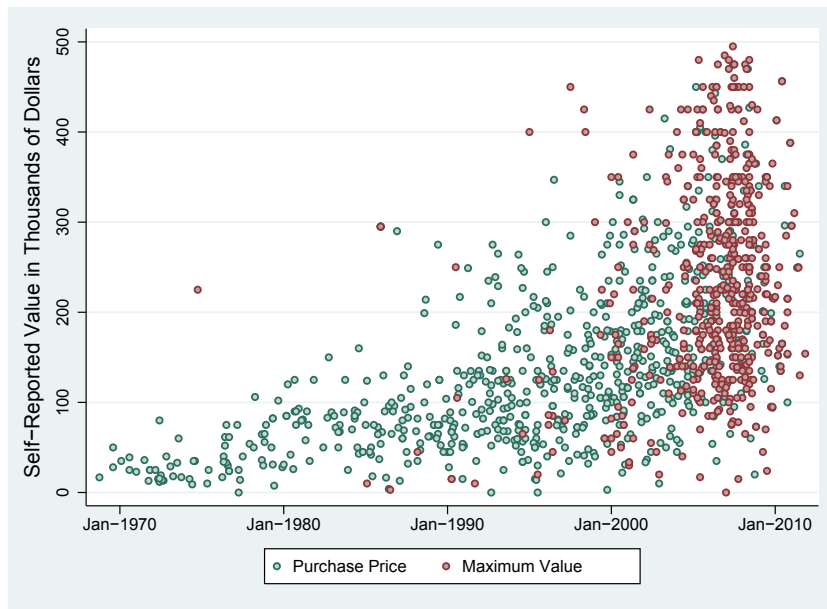
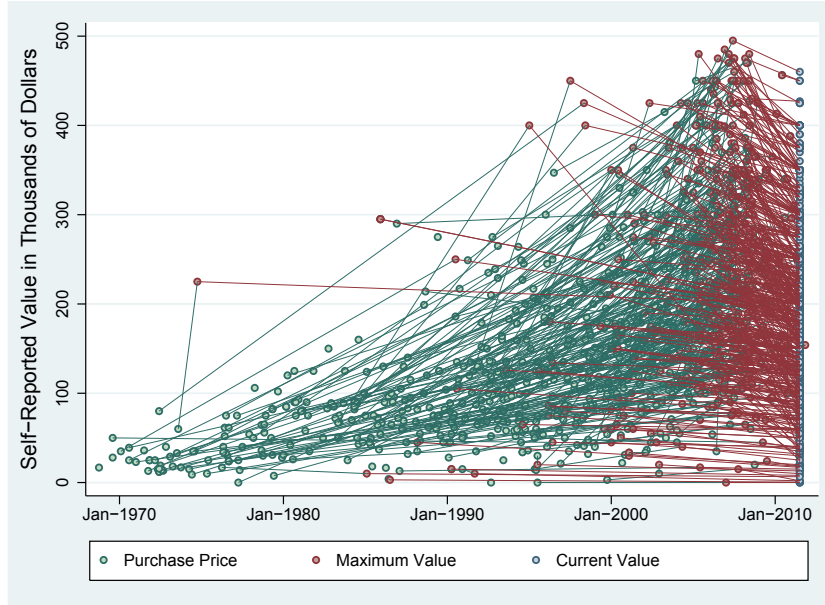


Figure 2 displays changes to self reported home values, with three observations plotted per respondent against a time axis: purchase price, maximum value and current value. The line connecting the three values reveals the changes in self reported home values for each respondent. It is evident that most respondents experienced a steep incline in the value of their homes, followed by a significant drop. The average increase in home values was over \$142,000 or 88 percent of the mean purchase price. From its maximum value, home values dropped an average of \$57,200 or 28 percent of current market value. The largest reported increases and eventual drops in home value

<sup>12</sup>These figures exclude 214 respondents whose homes were either more than \$500,000 or purchased before November 1969 for ease of display.

were experienced by homeowners who purchased their home in the 1970s.

Figure 2: Changes in Self-reported House Value



To get a better understanding of respondents’ current housing situation, we asked questions about the type and size of their mortgage, including how much was borrowed at the time of purchase, how much is currently owed, and their last monthly payment. The average mortgage size was \$107,000 with a standard deviation of \$130,000. At the time of the survey, 32% of respondents had paid off their mortgage in its entirety. Of the remaining respondents, the average amount still owed is \$137,000. Average monthly payments for respondents who still owe money were \$1,228.<sup>13</sup> Very few respondents in our sample believe they are underwater. A total of 8.4% of homeowners in the full sample owe more than their home than they believe it is worth. For these borrowers, the average amount of the shortfall is \$41,000, or 36% of the value of the home.

The outcomes of interest for this study are the respondents’ default decisions in a number of hypothetical situations in which they were asked to assume their primary residence had negative equity. Based on the theoretical framework, we presented negative equity as a shortfall measured as a percentage of the current house value. For example, we ask the respondent the following question: “If the value of your mortgage were to exceed the value of your house by 10 percent (i.e. you owed **\$(.1\*\$X)** more on your mortgage than the value of your house), would you walk away from your house (i.e. default on your mortgage) even if you could afford to make your monthly mortgage payments?” In this question the **\$(.1\*\$X)** term is replaced by a dollar amount corresponding to ten percent of the current house value reported by the respondent in an earlier question. Each respondent was asked a series of strategic default questions where negative equity was either 10%, 25%, 50%, or 75%.

<sup>13</sup>This calculation excludes 14 respondents who reported monthly mortgage payments greater than \$20,000. Including these respondents increases the average monthly payments to \$2,947.

Table 2 summarizes the responses to this series of questions. Very few respondents (less than 3%) would default at 10% negative equity, so we do not analyze this outcome any further. Approximately 13% of respondents would default if negative equity reached 25%, one third default at 50%, and 45% would default if negative equity reached 75%.

Table 2: Strategic Default with Negative Equity as % of House Value

Variable	Mean	Std. Dev.	N
Underwater <b>10%</b> of House Value	0.0298	0.1701	1208
Underwater <b>25%</b> of House Value	0.1258	0.3319	1208
Underwater <b>50%</b> of House Value	0.3289	0.4700	1204
Underwater <b>75%</b> of House Value	0.4471	0.4974	1201

In addition to default decisions and demographic characteristics, we elicited a variety of personal characteristics and beliefs to serve as control variables in our analysis. The variables we employed are summarized in Table 3. First, we control for the type of mortgage held by the respondent. As mentioned earlier, 32% of respondents have paid off their mortgage in full. Of the homeowners who still owe money on their mortgage, the majority, 54% of the total sample, hold a fixed rate mortgage. Other mortgage types include ARM, IO, FHA, VA and “other”. We also control for whether the home is underwater (the value of the home is less than what is owed on the mortgage), whether the house has been owned for more than 10 years<sup>14</sup>, and the self reported current value of the house. Local foreclosure rates were obtained from RealtyTrac to control for external factors that affect home values. The mean zip code foreclosure rate is quite low at 2%, although a few zip codes have foreclosure rates above 30%.<sup>15</sup>

We also control for state level variation in the ability of lenders to recoup more than the value of the defaulter’s home. Non-recourse states are those in which borrowers are not financially responsible for the difference between the amount owed on the mortgage and their house value at the time of default. Following Ghent and Kudlyak (2009), we classify 12 states as non-recourse states, comprising 26% of our sample.<sup>16</sup> Many people are ignorant of the recourse rules in their state, so we also elicited respondents’ perceived probability defaulters will be sued. Specifically, we asked “(i)n your state of residence what do you expect are the chances that lenders will sue people who default on their mortgage for the remainder of the money owed?”. We find that on average respondents believe there is a 40% chance that they will be sued if they default.

Previous research suggests morality, guilt, and fairness may have important impacts on a borrower’s willingness to default. 85% of respondents in our sample believe that it is morally wrong to default when a homeowner can afford to make mortgage payments, and 71% would feel guilty if they strategically defaulted. 77% of respondents feel that banks have treated borrowers unfairly, and 84% believe that the government has been ineffective in helping borrowers who are underwater.

<sup>14</sup>More than 64% of respondents in our sample have owned their homes for more than 10 years.

<sup>15</sup>In cases where the zip code level foreclosure rate was missing we used the county level foreclosure rate provided by RealtyTrac.

<sup>16</sup>These states are Alaska, Arizona, California, Connecticut, Florida, Idaho, Minnesota, North Carolina, North Dakota, Texas, Utah, and Washington.

Table 3: Control Variable Summary statistics

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>
No Mortgage	0.3204	0.4668
Fixed Rate Mortgage	0.5447	0.4982
ARM Mortgage	0.0563	0.2306
IO Mortgage	0.0182	0.1338
FHA Mortgage	0.0430	0.2030
VA Mortgage	0.0149	0.1212
Other Mortgage	0.0488	0.2156
Underwater	0.0844	0.2782
Value in 1000 \$	241.47	254.88
Own House 10+ yrs	0.6457	0.4785
Local Foreclosure Rate	0.0198	0.0253
Non-recourse State	0.2641	0.4410
Chance Sued if Default	0.4031	0.2985
Default Immoral	0.8460	0.3611
Default Feel Guilty	0.7103	0.4538
Banks Unfair	0.7657	0.4237
Gov't Ineffective	0.8386	0.3681
Chance House Prices Up in 1 yr	0.2492	0.4327
Chance House Prices Down in 1 yr	0.2459	0.4308
Chance House Prices Up in 5 yrs	0.7036	0.4568
Chance House Prices Down in 5 yr	0.1482	0.3554
Know Neighbor Well	0.1556	0.3627
Know Strategic Defaulter	0.1954	0.3966
Check Credit Report	0.4801	0.4998
Observations	1,208	

We also control for expectations concerning the evolution of local housing prices. About one-quarter of respondents believe housing prices in their neighborhood will increase in the next year, and the same percentage believe they will decrease in the next year. Looking at a longer time horizon, more than 70% of respondents believe housing prices will increase in their neighborhood over the next 5 years, whereas 15% of respondents feel that housing prices will decrease in that time period.

The next set of control variables account for other factors that may affect strategic default. 16% of respondents know their neighbors well, and 20% say they know at least one person who has strategically defaulted. Finally, we include an indicator for whether the respondent has checked his/her credit report in the last year as a proxy for its importance – 48% of respondents indicated they recently checked their credit history.

### 3.3 Default Literacy

How much borrowers know about the consequences of default is likely to influence their willingness to walk away. We measured respondents knowledge of a lender’s ability to pursue a deficiency judgment in their state of residence, how long before a default can be removed from a credit report, how a default’s impact varies over time, how a default impacts future borrowing opportunities and credit card limits, and whether a defaulter can be jailed. Specifically, the following series of questions and true/false statements was posed:

- “In your state of residence, can a lender sue someone who has defaulted on his/her mortgage to recover the difference between the house value and the amount owed on the mortgage?”
- “If you default on your mortgage, how long before you can remove the default from your credit report?”
  - (a) 1 year      (b) 3 years      (c) 5 years      (d) 7 years      (e) 10 years
  - (f) It can never be removed      (g) Don’t know
- “While a default is on your credit report, does its impact on your credit score weaken over time?”
- “If you default on your mortgage, it is impossible to get a mortgage for another house in the future.”
- “If you default on your mortgage, your current credit card limits may be reduced.”
- “If you default on your mortgage, you may go to jail.”

Based on the responses to these questions, we created an index measuring the number of questions respondents answered correctly. Overall, there is considerable confusion regarding the consequences of strategic default. Approximately half the respondents answered 3 or less questions correctly and only 5% answered all six questions correctly.

While the default literacy index aggregates overall knowledge, it doesn’t necessarily correlate with perceived negative outcomes. In some cases, answering a question correctly indicates that the

Table 4: Default Literacy

Questions Answered Correctly	Fraction of Respondents
0	0.1%
1	1.6%
2	17.1%
3	30.8%
4	26.9%
5	19.0%
6	4.6%

respondent is aware of a potential negative outcome while in other cases a correct answer connotes knowledge that a particular penalty cannot be imposed. Therefore, we also examine the impact of answering each of the default literacy questions individually. Note that respondents who live in a nonrecourse state would need to know that they cannot be pursued for a deficiency judgment in order to answer this question correctly. Conversely, respondents living in recourse states would need to know that they can be sued. Table 5 summarizes the correct responses to the default literacy questions.

Table 5: Default Literacy Questions Correct Summary Statistics

Variable	Mean	Std. Dev.
Lender Can Sue, Correct	0.1705	0.3763
Lender Can Not Sue, Correct	0.0273	0.1631
Overestimate Default On Credit Score	0.1755	0.3805
Underestimate Default One Credit Score	0.0513	0.2208
Default Weakens Over Time, Correct	0.6051	0.4890
New Mortgage Possible, Correct	0.8022	0.3985
Credit Limit Reduced, Correct	0.6175	0.4862
Default No Jail, Correct	0.9520	0.2139
Observations	1,208	

### 3.4 Financial Literacy

It can be difficult to estimate the financial costs and benefits of strategically defaulting. Even if one were perfectly aware of all possible consequences, determining how these consequences will impact lifetime wealth is challenging. On the benefits side, defaulting alleviates the requirement to devote a future stream of payments to an underwater asset. It may, however, be difficult evaluate the present value of this future stream of payments relative to the present shortfall in house value. On the costs side, defaulting often entails a higher cost of future borrowing. Determining how much this higher cost will reduce future wealth can be arduous.

To measure financial literacy, we posed the same series of questions asked in Lusardi and Mitchell (2006).<sup>17</sup> Specifically, we asked the following:

- “Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?  
(a) More than \$102      (b) Exactly \$102      (c) Less than \$102      (d) Don’t know
- “Suppose you had \$100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?”  
(a) More than \$200      (b) Exactly \$200      (c) Less than \$200      (d) Don’t know
- “Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?”  
(a) More than today      (b) Same as today      (c) Less than today      (d) Don’t know
- “Assume a friend inherits \$10,000 today and his sibling inherits \$10,000 but 3 years from now. Who is richer today because of the inheritance?”  
(a) My friend      (b) His sibling      (c) They are equally rich      (d) Don’t know
- “Suppose that in the year 2012, your income has doubled and prices of all goods have doubled too. In 2012, will you be able to buy more, the same or less than today with your income?”  
(a) More than today      (b) Same as today      (c) Less than today      (d) Don’t know

Our measure of financial literacy is a single dimensional index developed in Hung et al. (2009) based on the responses to these questions (called basic financial literacy or BF). This single dimensional index uses models from item response theory to model the probability of answers as a function of the underlying trait the test item was intended to measure. It takes into account missing data that arises from survey non-response, item non-response and the ALP survey design. The index is a result of an estimation model that gives the optimal estimates of the underlying unobserved value of the financial literacy concepts captured by the survey questions.<sup>18</sup> The financial literacy index has a mean of .2193 and a standard deviation of .6421 in our analysis sample. Similar to Hung et al. (2009), the financial literacy index is increasing in age and education status, and higher for men than women.

### 3.5 Social Perceptions

Previous research suggests that social factors may play a substantial role in the decision to strategically default (Guiso et al. (2011), Towe and Lawley (2010), Seiler et al. (2012)). Given that foreclosures are highly visible, perceptions about others’ behavior may influence one’s willingness to walk away. In particular, those who believe that underwater homeowners will default in high numbers may be more willing to default themselves.

To measure our respondents’ beliefs regarding how pervasive strategic defaults have been in the past and are likely to be in the future we asked the following: “In the past (next) 12 months, on a

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<sup>17</sup>Many respondents in our sample were asked this series of questions in a previous survey. If these questions were answered previously, they were not re-asked in our survey

<sup>18</sup>For more details on how the index was calculated and the properties of the index, see Hung et al. (2009).



scale of 0 to 100, what percentage of homeowners in the US do you think have walked (will walk) away from their primary residence (i.e. default on their mortgage) even though they can afford to make their monthly mortgage payments?” We also elicited their beliefs over the same time horizon about the fraction of US homeowners that have lost (will lose) their homes because they could not afford to make payments.

Table 6 shows the summary statistics for these four variables. On the whole our respondents believe things are likely to improve in the future, but are still quite pessimistic about the housing market generally. There is also considerable heterogeneity in beliefs as evidenced by the large standard deviations.

Table 6: Social Perceptions Summary Statistics

Variable	Mean	Std. Dev.
Past Perceived Foreclosure Rate	0.3019	0.2290
Past Perceived Strategic Default	0.1875	0.1588
Future Perceived Foreclosure Rate	0.2553	0.2214
Future Perceived Strategic Default	0.1415	0.1397
Observations	1,208	

## 4 Results

We estimate the impacts of the control variables described in the previous section using linear probability models.<sup>19</sup> All estimations use Huber-White heteroscedasticity consistent standard errors.

Less than 3% of respondents indicated they would strategically default if they were 10% underwater. This provides too little variation to generate sufficiently reliable estimates of the independent variables. As a result, we only present results for shortfalls of 25%, 50% and 75%, respectively.

### 4.1 Baseline Specification

Table 7 presents the results for our baseline specification. We find few differences in the decision to strategically default based on demographic characteristics. At a shortfall of 25%, homeowners with a college degree are more likely to strategically default, while those with household incomes above the national median are less likely to walk away. However, neither variable has a significant impact on the decision to default at higher levels of shortfall. Age does not appear to play an important role when controlling for other characteristics. However, age is correlated with retirement status and retirees are significantly less likely to walk away when shortfall becomes large. Retirees are 8 and 12 percentage points less likely to walk away once shortfalls reach 50% and 75% respectively.

<sup>19</sup>Estimates from probit models are very similar and available from the authors upon request.

Interestingly, employment status does not have a statistically significant impact on the decision to walk away. However, this result is not surprising. The control variable “Not Employed for Income” includes respondents employed as homemakers and in other professions without monetary reward. Many of these respondents are likely to have other sources of household income. Further, respondents were posed hypothetical situations in which they were asked to assume that they could afford to continue making mortgage payments, rendering current employment status largely irrelevant.

Table 7: Baseline Regression

	<b>Walk 25</b>	<b>Walk 50</b>	<b>Walk 75</b>
Female	0.0121 (0.0206)	-0.0247 (0.0286)	-0.0477 (0.0303)
Black	0.0931 (0.0602)	0.1005 (0.0740)	0.0325 (0.0801)
Hispanic	0.0476 (0.0658)	0.0690 (0.0756)	0.0157 (0.0779)
Some College	0.0197 (0.0284)	0.0244 (0.0405)	-0.0314 (0.0434)
College Grad	0.0573* (0.0316)	0.0517 (0.0439)	0.0288 (0.0474)
Prof Grad	0.0296 (0.0335)	-0.0224 (0.0480)	0.0100 (0.0523)
Income > US Median	-0.0474* (0.0247)	0.0157 (0.0329)	-0.0292 (0.0344)
Not Employed for Income	0.0205 (0.0279)	-0.0419 (0.0378)	-0.0481 (0.0395)
Retired	-0.0205 (0.0292)	-0.0770* (0.0396)	-0.1189*** (0.0417)
Age 30-44	-0.1095 (0.0763)	-0.0878 (0.0986)	-0.0054 (0.0974)
Age 45-59	-0.1076 (0.0755)	-0.0623 (0.0986)	-0.0163 (0.0956)
Age 60-74	-0.0660 (0.0771)	0.0223 (0.1018)	0.0992 (0.0989)
Age > 75	-0.0664 (0.0866)	0.0891 (0.1147)	0.1663 (0.1136)
Married	0.0108 (0.0398)	0.0231 (0.0520)	0.0420 (0.0574)
No Longer Married	0.0078 (0.0437)	0.0243 (0.0562)	0.0141 (0.0618)
Have School Age Kids	0.0123 (0.0227)	0.0232 (0.0317)	0.0191 (0.0342)
Region NE	0.0394 (0.0310)	0.1163*** (0.0437)	0.0840* (0.0458)

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Table 7 – continued from previous page

	Walk 25	Walk 50	Walk 75
Region NW	0.0373 (0.0235)	0.0579* (0.0326)	0.0270 (0.0353)
Region W	-0.0288 (0.0318)	0.0536 (0.0439)	0.0029 (0.0475)
Non-Recourse State	0.0334 (0.0265)	-0.0135 (0.0340)	0.0003 (0.0369)
Own > 10 Yrs	0.0111 (0.0211)	-0.0390 (0.0315)	-0.0378 (0.0329)
Value in 100,000	0.0032 (0.0036)	0.0079 (0.0053)	0.0075 (0.0057)
Mort Fixed Rate	-0.0473 (0.0362)	-0.0348 (0.0651)	0.0188 (0.0698)
Mort ARM	-0.0137 (0.0468)	0.1065 (0.0776)	0.0613 (0.0782)
Mort IO	-0.1627*** (0.0400)	-0.1323 (0.0974)	-0.1141 (0.1054)
Mort FHA	-0.1200** (0.0473)	-0.0285 (0.0787)	-0.0176 (0.0856)
Mort VA	-0.0797 (0.0612)	-0.0179 (0.1112)	0.0702 (0.1200)
Mort Other	-0.0999** (0.0446)	-0.0001 (0.0714)	0.0483 (0.0796)
No Mortgage	-0.0619 (0.0421)	-0.0327 (0.0712)	0.0214 (0.0758)
Underwater	-0.0589** (0.0296)	-0.1156** (0.0459)	-0.0345 (0.0529)
Area Foreclosure Rate	-0.1886 (0.3506)	-0.5149 (0.5467)	-1.2790** (0.5156)
Check Credit Report	-0.0536*** (0.0188)	-0.0545** (0.0264)	-0.0597** (0.0280)
Chance Lender Sues	-0.0158 (0.0312)	0.0041 (0.0429)	-0.0306 (0.0460)
Know Strategic Defaulter	0.0148 (0.0246)	0.0169 (0.0336)	0.0450 (0.0354)
Know Neighbor Very Well	-0.0345 (0.0238)	-0.0592* (0.0338)	-0.1003*** (0.0367)
Default Morally Wrong	-0.0816** (0.0385)	-0.1248*** (0.0444)	-0.0802* (0.0430)
Feel Guilty if Default	-0.1407*** (0.0296)	-0.2872*** (0.0362)	-0.2903*** (0.0355)
Bank Treat Borrowers Unfair	0.0456** (0.0200)	0.0494 (0.0311)	0.1061*** (0.0335)
Gov't Not Helping Borrowers	-0.0263 (0.0254)	-0.0184 (0.0352)	-0.0676* (0.0375)

Continued on next page

**Table 7 – continued from previous page**

	<b>Walk 25</b>	<b>Walk 50</b>	<b>Walk 75</b>
Housing Prices Increase Next 1 Year	-0.0530** (0.0224)	-0.0358 (0.0323)	0.0007 (0.0348)
Housing Prices Decrease Next 1 Year	-0.0079 (0.0276)	0.0358 (0.0375)	0.0681* (0.0396)
Housing Prices Increase Next 5 Years	0.0460* (0.0278)	0.0462 (0.0386)	0.0294 (0.0413)
Housing Prices Decrease Next 5 Year	0.0051 (0.0315)	0.0112 (0.0479)	-0.0537 (0.0525)
Constant	0.3985*** (0.1170)	0.6247*** (0.1554)	0.7108*** (0.1581)
Observations	1,208	1,204	1,201
R-squared	0.111	0.164	0.154

Respondents in the northeast are more likely to strategically default than those in the south once the level of shortfall becomes large, but we find few other regional differences. There is also little difference in default decisions based on mortgage type. Those who do not have a mortgage appear to be similarly willing to default as those who do. This is important for our inferences given that a large fraction of our sample doesn't owe any money on their home. Borrowers with an interest-only loan, an FHA loan, or a loan they've indicated as "other" are less likely to default at a shortfall of 25%. However, these impacts should be interpreted with caution. Less than two percent of respondents indicated they have an interest-only loan and less than five percent claimed to have an FHA or "other" type loan.

Homeowners who have owned their home for 10 years or more are less likely to strategically default when shortfall reaches 50%, but this effect is not statistically significant. Self reported home value also doesn't significantly impact the propensity to walk away. This is not surprising given that respondents were presented with shortfalls based upon their home values. Interestingly, a lender's ability to pursue a deficiency judgement doesn't appear to be an important determinant, largely because respondents are unaware of the laws in their respective states. Respondents who live in high foreclosure areas are less likely to walk away, though the effect is only significant once shortfall levels become extreme.

For moderate levels of shortfall, respondents who owe more on their home than it is worth are less likely to walk away than those with positive equity. This is likely a result of sample selection. Our survey only includes respondents who currently own their home. As a consequence, borrowers who were underwater and defaulted are not included in our analysis. Those who are underwater and still own their home are, by definition, less likely to walk away at the experienced level of shortfall. The average amount of shortfall for our underwater borrowers is \$40,400, or 36% of home value. Interestingly, if shortfall were to reach 75%, underwater borrowers in our sample would not be significantly less likely to default than those with positive equity.

Unsurprisingly, respondents who are concerned about their credit report are significantly less likely to strategically default. Those who checked their credit report in the last year (a proxy for

its importance) are 5 percentage points less likely to walk away. Individuals who believe lenders are highly likely to sue to recover losses are no less likely to default, but there is considerable uncertainty regarding this probability.

Consistent with previous research, we find that guilt and morality play an important role in the decision. Individuals who believe it is immoral to strategically default are 8 to 12 percentage points less likely to do so. Respondents who would feel guilty if they defaulted are also much less likely to walk away, between 14 and 29 percentage points. A sense of fairness also has an impact. Respondents who believe banks have treated borrowers unfairly are 5 to 11 percentage points more likely to strategically default. People who believe the government has done a poor job helping underwater borrowers are less likely to walk away, though the effect is only statistically significant at a shortfall of 75%.

In contrast to previous work, we do not find that knowing someone who has strategically defaulted significantly increases the probability one will do so, although the effect is positive. This may be because many of our respondents only know a casual acquaintance who has defaulted, rather than a family member or close friend (Seiler et al. (2012)). However, our estimate of how frequently strategic default occurs is similar to that found in previous studies. Using the ratio of strategic defaults and total defaults our respondents were personally aware of (as constructed in Guiso et al. (2011)), we estimate that approximately 30% of defaults are strategic.<sup>20</sup>

Interestingly, we find that people who know their neighbors well are less likely to default, particularly at higher levels of shortfall. Homeowners who have a close relationship with their neighbors may be less willing to impose a negative externality upon them, but knowing neighbors well is also likely to be correlated with general housing satisfaction.

Short run house price expectations generally have the anticipated impact. Respondents who believe house prices will appreciate in the next year are less likely to walk away, though the affect is significant only at a shortfall of 25%. In contrast, people who expect house prices to fall in the next year are more likely to strategically default, though the impact is only significant once shortfall reaches 75%. Longer term price expectations appear to be less important. Somewhat strangely, respondents who believe house prices will rise over the next five years are significantly more likely to default at a shortfall of 25%. This affect, however, is no longer statistically significant once we introduce additional economic and social controls.

## 4.2 Moral Prompting

Survey responses may vary based upon how a particular question is framed or how a sequence of questions is ordered. As noted in Guiso et al. (2011), survey participants who previously indicated they would be willing to walk away may be less likely to state that strategic default is immoral. While we expect this bias to be less of a concern in anonymous internet surveys than in telephonic interviews, we randomized the order in which respondents were asked about their views regarding guilt and morality. One third of respondents were asked about guilt and morality prior to the

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<sup>20</sup>In constructing this ratio we eliminated participants who claimed to know more than 100 people who had defaulted. This eliminated three respondents who claimed to know 10,000, 200,000 and 200,000,000 defaulters, respectively.

hypothetical shortfall scenarios. Another third were asked the same questions after the hypothetical scenarios, but before being asked about bank behavior and the effectiveness of government intervention. The final third received the guilt and morality questions after both the hypothetical scenarios and the questions about fairness.

We found no statistical differences in responses regarding morality or guilt based upon question order. The fraction of respondents who felt strategic default is morally wrong ranged from a high of 86% for those asked prior to the hypothetical scenarios to a low of 84% for those asked after questions about fairness. The fraction of respondents who indicated they would feel very guilty if they defaulted ranged from a high of 88% for those asked after the hypothetical scenarios, but before questions about fairness, to a low of 87% for those asked after the questions about fairness.

However, question order did have a significant impact on the respondents' willingness to strategically default. Those prompted to consider guilt and morality concerns prior to making a decision regarding strategic default were significantly less likely to express a willingness to walk away. Across the different shortfall levels, respondents asked about guilt and morality before the hypothetical scenarios were 5.3 - 8.7 percentage points less likely to choose strategic default.

Table 8: Impact of Moral Prompting - Full Sample

	<b>% Walk 25</b>	<b>% Walk 50</b>	<b>% Walk 75</b>
Unprompted	14.8%	35.9%	47.1%
Prompted	9.5%	27.2%	39.3%
Equal means p-value	0.0073	0.0017	0.0074

The impact survives the presence of additional controls, as can be seen in Table 9. When included in the baseline specification, moral prompting decreased the probability of strategic default by 4.6 - 7.9 percentage points. This suggests that lenders attempts to appeal to underwater borrowers' sense of moral obligation and guilt may prove effective in preventing default (White (2010b)).

Table 9: Probability of Strategic Default - Impact of Moral Prompting

	<b>% Walk 25</b>	<b>% Walk 50</b>	<b>% Walk 75</b>
Moral Prompting	-0.0457** (0.0182)	-0.0785*** (0.0257)	-0.0657** (0.0280)
Demographic Characteristics	Yes	Yes	Yes
Housing Characteristics	Yes	Yes	Yes
Other Characteristics	Yes	Yes	Yes
Observations	1,208	1,204	1,201
R-squared	0.115	0.170	0.158

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 4.3 Default Literacy

How much borrowers know about the consequences of default is likely to influence their willingness to walk away. We find some evidence that respondents who know more about the ramifications are more likely to default. Table 10 displays the regression results of the probability to strategically default at the 3 shortfall levels as a function of the default literacy index. At shortfalls of 25% and 50%, answering one additional default literacy question correctly is associated with 1.3 and 2.0 percentage point increases in the propensity to strategically default. At a shortfall of 75% the impact is positive, though not significant.

Table 10: Probability of Strategic Default - Default Literacy Index

	<b>% Walk 25</b>	<b>% Walk 50</b>	<b>% Walk 75</b>
Default Literacy Index	0.0132* (0.0077)	0.0205* (0.0110)	0.0112 (0.0119)
Demographic Characteristics	Yes	Yes	Yes
Housing Characteristics	Yes	Yes	Yes
Other Characteristics	Yes	Yes	Yes
Moral Prompting	Yes	Yes	Yes
Observations	1,208	1,204	1,201
R-squared	0.1173	0.1721	0.1581

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

While those with more knowledge of the consequences of default appear more willing to walk away, further investigation is required to determine what is driving this result. As described earlier, the default literacy index aggregates overall knowledge, but doesn't necessarily correlate with perceived negative outcomes. In some instances, answering a question correctly indicates that the respondent is aware of a potential negative outcome while in other cases a correct answer connotes knowledge that a particular penalty cannot be imposed. To disentangle these effects, we examined the impacts of each question separately.

Respondents who live in a nonrecourse state and correctly surmise that they cannot be pursued for a deficiency judgment are more likely to walk away. Conversely, respondents that correctly indicate that they can be sued are less likely to walk away. Neither effect, however, is statistically significant.

Respondents who underestimate the time a default is required to remain on one's credit report are more likely to strategically default, though this impact is only significant at the 10% level when shortfall reaches 75%. Those who overestimate this impact are less likely to walk away at a shortfall of 25%, but are more likely to walk away at shortfalls of 50% and 75%, though again the effect is only significant at 75%. The latter effect is not altogether surprising. It is likely that respondents who either over or underestimate the duration of the credit impact are less concerned about their credit scores than those who know precisely how long a default must remain on one's credit report.

Those who know that a default's impact on one's credit score weakens over time are 4-5 percentage points more likely to walk away at shortfall levels of 50% or under. At a shortfall level of 75%, the impact is positive though no longer significant.

Table 11: Probability of Strategic Default - Default Literacy Questions Correct

	<b>% Walk 25</b>	<b>% Walk 50</b>	<b>% Walk 75</b>
Lender Can Sue, Correct	-0.0015 (0.0254)	-0.0193 (0.0364)	-0.0545 (0.0393)
Lender Can Not Sue, Correct	0.1080 (0.0781)	0.0801 (0.0873)	0.1021 (0.0817)
Overestimate Default On Credit Score	-0.0112 (0.0245)	0.0222 (0.0348)	0.0607* (0.0364)
Underestimate Default One Credit Score	0.0481 (0.0514)	0.0412 (0.0595)	0.0998* (0.0599)
Default Weakens Over Time, Correct	0.0424** (0.0193)	0.0475* (0.0269)	0.0264 (0.0288)
New Mortgage Possible, Correct	0.0034 (0.0231)	-0.0421 (0.0323)	-0.0290 (0.0335)
Credit Limit Reduced, Correct	-0.0051 (0.0205)	0.0683** (0.0271)	0.0691** (0.0294)
Default No Jail, Correct	-0.0050 (0.0418)	0.0318 (0.0592)	0.0367 (0.0665)
Demographic Characteristics	Yes	Yes	Yes
Housing Characteristics	Yes	Yes	Yes
Other Characteristics	Yes	Yes	Yes
Moral Prompting	Yes	Yes	Yes
Observations	1,208	1,204	1,201
R-squared	0.1230	0.1820	0.1703

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



We find little impact from knowledge regarding future mortgage borrowing opportunities and the possibility of going to jail. This is in part due to little variation in answers. Over 80% respondents know that it may be possible to get another mortgage in the future after a default and over 95% of respondents know that a mortgage default will not result in jail time.

Somewhat strangely, we find that those who know that a defaulter’s credit card limits may be reduced are more likely to walk away and that this effect is significant at shortfalls of 50% and 75%. It is possible that some respondents conflated default with bankruptcy and interpreted the question as a reduction in credit card *balances* rather than credit card *limits*. Recreating the default literacy index omitting the response to this question yields similar, though slightly altered, results. Under the revised index, knowing more about the consequences of default is still associated with a higher propensity to walk away at shortfalls of 25% and 50%, though the effect is no longer significant at 50%. At a shortfall of 75% the impact is now negative, but remains statistically insignificant.

While we find some evidence that those who know more about the consequences of default are more likely to walk away (particularly those who know that a default’s impact on one’s credit score weakens over time), it is possible that some respondents have educated themselves about the consequences *because* they are considering strategically defaulting. However, the vast majority of our sample has positive equity, and as a result, little incentive to seek out this knowledge because they are unlikely to default in the near future. Perhaps more problematically, there is some evidence that respondents may not have understood some of the questions and that our index does a poor job of measuring knowledge regarding the consequences of default.

Table 12: Probability of Strategic Default - Default Literacy Index Instrumental Variables

	<b>% Walk 25</b>	<b>% Walk 50</b>	<b>% Walk 75</b>
Default Literacy Index	0.1228*	0.1871*	0.1426
	(0.0731)	(0.1028)	(0.1049)
Demographic Characteristics	Yes	Yes	Yes
Housing Characteristics	Yes	Yes	Yes
Other Characteristics	Yes	Yes	Yes
Moral Prompting	Yes	Yes	Yes
Observations	1,208	1,204	1,201
R-squared	0.0001	0.0125	0.0693
Test of Endogeneity	0.1083	0.0791	0.1896
First Stage F-test	17.008	16.892	17.263

Note: Robust standard errors in parentheses: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The “Test of Endogeneity” reports the robust regression-based F-statistic for the endogenous regressor. The “First Stage F-test” reports the F statistic for weak instruments.

To investigate the plausibility of reverse causality and measurement error, we instrumented for our default literacy index using news exposure. 56% of respondents indicated they had seen or heard a news story covering strategic default. As demonstrated in Table 12, news exposure explains

considerable variation in our default literacy index and is not a weak instrument. In addition, at a shortfall of 50%, there is evidence that an exogeneity assumption is violated. In our two stage least squares estimation, default literacy is still positive and significant at shortfalls of 25% and 50% and positive and insignificant at 75%. However, our estimated effect sizes have increased dramatically, suggesting measurement error is a problem and that our OLS estimates have been attenuated.<sup>21</sup>

#### 4.4 Financial Literacy

Individuals with high financial literacy may be better able to assess the financial costs, benefits or both, leading to systematic differences in willingness to default. Many of the costs associated with defaulting are fixed<sup>22</sup>, while the benefits to defaulting increase directly with the size of the shortfall. Consequently, if those with high financial literacy have a different estimate of the costs of defaulting than their counterparts with low financial literacy (but similar estimates of the benefits), we'd expect to see similar sized differences between the two groups in their willingness to walk away across shortfall levels. Conversely, if highly financially literate individuals are better able to assess the benefits of strategically defaulting, we'd expect to see the differences in default proclivities between the two groups to increase as the size of the shortfall increases.

Table 13: Probability of Strategic Default - Financial Literacy Index

	% Walk 25	% Walk 50	% Walk 75
Financial Literacy Index	-0.0069 (0.0146)	0.0461** (0.0202)	0.0626** (0.0222)
Demographic Characteristics	Yes	Yes	Yes
Housing Characteristics	Yes	Yes	Yes
Other Characteristics	Yes	Yes	Yes
Moral Prompting	Yes	Yes	Yes
Observations	1,208	1,204	1,201
R-squared	0.1155	0.1730	0.1628

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 13 presents the results of our estimation controlling for financial literacy. At a shortfall of 25%, there is no statistical difference between respondents on the basis of financial capability. However, once shortfall reaches 50%, more financially literate respondents are significantly more likely to default than their less financially literate counterparts. In addition, the effect size increases with the size of the shortfall. A one unit increase in our financial literacy index increases the chance of default by 4.6 percentage points at a shortfall of 50% and 6.3 percentage points at a shortfall of 75%. Our results suggest that the costs of defaulting are highly salient, but those who are more financially literate are better able to calculate the benefits of walking away and are more likely to do so once the level of shortfall becomes large.<sup>23</sup>

<sup>21</sup>If reverse causality was a driving influencing behind our OLS results, we'd expect our two stage least squares coefficients to be smaller in magnitude. If respondents who are more likely to walk away are also more likely to educate themselves about the consequences of default, this would create a positive correlation between our default literacy index and the error term.

<sup>22</sup>Guiso et al. (2011) estimate that the cost of defaulting increases less than proportionally with the size of the shortfall.

<sup>23</sup>We also ran regressions with both the default and financial literacy index included as regressors. The coefficients

## 4.5 Social Perception

Given that previous research has found that social factors may play an important role in the decision to strategically default, it is plausible that mere expectations regarding others' future behavior might also influence the decision. Table 14 presents our results controlling for social expectations.

Table 14: Probability of Strategic Default - Social Expectation

	% Walk 25	% Walk 50	% Walk 75
Past Perceived Foreclosure Rate	-0.0669 (0.0759)	-0.1471 (0.1079)	-0.0299 (0.1163)
Past Perceived Strategic Default	-0.1294 (0.1015)	-0.0604 (0.1332)	-0.0482 (0.1428)
Future Perceived Foreclosure Rate	-0.0116 (0.0793)	0.0511 (0.1079)	0.0045 (0.1143)
Future Perceived Strategic Default	0.2464* (0.1280)	0.3269** (0.1432)	0.2222 (0.1503)
Financial Literacy Index	-0.0076 (0.0145)	0.0505** (0.0203)	0.0666*** (0.0222)
Demographic Characteristics	Yes	Yes	Yes
Housing Characteristics	Yes	Yes	Yes
Other Characteristics	Yes	Yes	Yes
Moral Prompting	Yes	Yes	Yes
Observations	1,208	1,204	1,201
R-squared	0.1212	0.1792	0.1649

Note: Robust standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Incorporating social perceptions and expectations into our previous specifications, we find that beliefs about past strategic defaults and past and future foreclosures don't significantly impact one's willingness to walk away.<sup>24</sup> Expectations about future strategic defaults, however, do appear to play a small but important role. At moderate levels of shortfall, respondents who believe that strategic defaults are likely to be prevalent in the future are more willing to walk away today. At a shortfall of 25%, a one standard deviation increase in the perceived amount of future strategic defaults is associated with a 3.4 percentage point increase in default propensity. At 50%, a one standard deviation increase is associated with a 4.6 percentage point increase.<sup>25</sup> Once the shortfall ratio reaches 75% however, beliefs about others' behavior become inframarginal.

and significance at all shortfall values remained the same for both indices in these regressions.

<sup>24</sup>Given the heterogeneity in beliefs, we also examined specifications in which we excluded observations in the top 1% of any of the four sets of beliefs. The results are very similar and qualitatively unchanged after removing these outliers.

<sup>25</sup>Since questions about willingness to walk away and expectations regarding others' behavior were asked in the same survey, one might be concerned that those who claimed that strategic defaults are likely to be prevalent in the future did so because they indicated they themselves would be willing to walk away. However, if this were a likely explanation for the result, one would expect the same effect would be present in beliefs regarding past strategic defaults, but it is absent. Additionally, our survey was an anonymous internet survey asking participants to respond to hypothetical scenarios. It is unlikely respondents felt compelled to rationalize their decisions.

Recall that our theoretical framework suggests that there are two principal ways in which expectations regarding future strategic defaults might impact current behavior: through social stigma or price effects. Future non-strategic defaults, however, are expected to influence one's willingness to walk away exclusively through price impacts since an inability to pay doesn't reflect a conscious decision to default on one's debt obligations. Since we don't find evidence that expectations about future defaults as a result of an inability to pay impact one's current willingness to walk away, our results suggest that those who expect strategic defaults to be prevalent in the future are more willing to walk away today because of expected reductions in social stigma.

## 5 Conclusion

As a result of the financial crisis and associated collapse of the US housing market, millions of Americans now have a mortgage balance that exceeds the value of their home. A growing number of these borrowers are simply choosing no longer to pay, despite having the financial resources to do so.<sup>26</sup> Despite the marked increase in strategic defaults, there is relatively little research examining the factors that influence the decision.

In this paper, we have investigated how a homeowner's willingness to strategically default is impacted by social factors, including expectations regarding others' behavior, financial literacy, and his knowledge of the consequences of default. At moderate levels of shortfall, we find that homeowners who expect strategic defaults to be prevalent in the future are more likely to walk away today. However, once the level of shortfall becomes extreme, social expectations become infirm. We find no evidence that this increased propensity to default is attributable to expected price decreases, suggesting the increased willingness to default is driven by social considerations, like social stigma.

Financial literacy also significantly influences one's willingness to strategically default. At relatively moderate levels of shortfall, financially literate borrowers appear similar to their less literate peers. However, once shortfall reaches half a property's value, financially literate borrowers are more likely to walk away. Moreover, the difference in default propensity between financially literate borrowers and their less literate counterparts increases with the size of the shortfall, suggesting those who are more financially literate are better able to calculate the benefits from strategically defaulting.

Despite a large amount of confusion about the consequences of default, we find some evidence that homeowners who know more about the ramifications are more willing to walk away. In particular, those who know that a default's impact on one's credit score weakens over time are more likely to default.

Our results provide further evidence that social considerations play an important role in the decision to walk away. Our examination of expectations, however, has novel policy implications. Policies that help shape expectations about future strategic defaults may influence foreclosures today. For example, policies designed to stabilize house prices may do so in part through a signalling effect, reducing underwater homeowners' willingness to strategically default. While our results are

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<sup>26</sup>[http://bottomline.msnbc.msn.com/news/\\_2011/12/21/9614305-as-home-prices-fall-more-borrowers-walk-away](http://bottomline.msnbc.msn.com/news/_2011/12/21/9614305-as-home-prices-fall-more-borrowers-walk-away)

intuitive and consistent with prior research, responses to hypothetical questions could, of course, differ from actions taken under similar conditions in the real world. Further research should be undertaken before any particular policy is enacted.

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