



# Who is Credit Constrained Among Denied or Discouraged Borrowers?

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Working paper 199

November 2010

# Who is Credit Constrained Among Denied or Discouraged Borrowers?\*

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November 23, 2010

## Abstract

Since the seminal work of Jappelli (1990), it has become standard to identify as liquidity-constrained, borrowers who were either turned down for credit or did not apply because they might be turned down. In this paper, we show that the so-called “denied or discouraged” proxy does not capture accurately consumers’ credit access when consumers seek credit to finance expenditure on durable goods. Our sample is drawn from the *Panel Study of Income Dynamics*. We document systematic misclassification of unconstrained households as constrained. We argue that: for durables, this proxy captures best the intensity put forth by the borrower when shopping for a loan.

**JEL Codes:** E21; D12

**KEY WORDS:** Borrowing constraints; Mortgage loans; Consumer search.

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\*Touna Mama thanks Economic Research Southern Africa (ERSA) for financial support as well as University Research Committee (URC) for funding through the Start-up Grant. The views presented should not be attributed to Statistics Canada or University of Cape Town.

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# 1 Introduction

Borrowing constraints can have far reaching implications on a variety of policy issues including fiscal stimulus, income inequality, financial development and economic growth (Johnson, Parker and Souleles, 2006; Galor and Zeira, 1993; Guiso, Sapienza and Zingales, 2004; Jappelli and Pagano, 1994). In practice, however, it is difficult to identify credit-constrained consumers because we usually observe the amount of credit transacted rather than the demand for loans or the supply.

Following the seminal paper of Jappelli (1990), a large body of the literature on credit markets has classified as credit-constrained those households whose credit applications have been rejected by a financial institution (henceforth “denied”) or those who feel that they would have been rejected had they applied to such an institution (henceforth “discouraged”). Jappelli’s key contribution is to show that survey questions are critical if one is to elicit information on who is credit-constrained. However, a salient assumption in Jappelli (1990) is that this measure captures constrained consumers irrespective of whether the expenditures they want to finance are durables or not. The rationale for making no distinctions is that financial institutions look at similar characteristics whether the credit application is secured or not.

The nature of the expenditures to be financed has peculiar implications for the demand for credits, and can in turn affect the likelihood that the applicant will be denied or discouraged. One such peculiarity is the fact that consumers’ sensitivity to changes in the interest rate is substantially higher for durable goods than for nondurables; households being more dependant on credit to acquire durable goods. In the United States, for instance, Mankiw (1985) found that a one percentage point increase in the interest rate reduced consumption of nondurables and services by 0.5%, and reduced the stock of durables by as much as 3.4%. More recently, Attanasio, Goldberg, and Kyriazidou (2008) estimated the interest rate elasticity for expenditures on durables, using data on car loans. They conclude that people who are not liquidity constrained (e.g.: individuals with high income) have a higher interest rate sensitivity than constrained individuals. If during the credit search process, such people with a high interest rate elasticity renounce some credit offers more often than individuals with a low elasticity, then some individuals may be incorrectly classified as, say, “discouraged” applicants.<sup>1</sup>

In this paper, we analyze the reliability of the denied or discouraged measure in the particular case of consumers seeking credit to finance housing expenditures. Using a unique dataset of American households,

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<sup>1</sup>This is as a result of the interest rate being the principal metric for loan-to-loan comparisons.

we follow prior research by estimating the determinants of being denied or discouraged among observable correlates of the loan performance. Unlike past studies, however, we also consider observable correlates associated with the year the household reported seeking credit. In fact, correlates such as the gender and the race of the family's head are time-invariant, while others such as education, age, marital status, job status, or location can change over time. As far as we know, there is no systematic study of the reliability of this measure.

To preview our results, we find *systematic* misclassification of unconstrained households as liquidity-constrained. More specifically, denied or discouraged households in our sample display unusually *superior* characteristics compared to the "typical" liquidity-constrained household, and they recently obtained sizable mortgage loans. The denied or discouraged measure seems to capture an effect that has nothing to do with the credit status *per se*, while still being correlated with a behavior associated with credit search. In section 5, we discuss the possibility that in the case of durables this measure captures best the intensity put forth by the applicant when shopping for a loan.

A recent paper by Johnson and Li (2010), in this journal, is also concerned with indicators of borrowing constraints. Using the Survey of Consumer Finance, they find that the ratio of debt payments to disposable personal income helps predict whether a household is denied or discouraged. In addition, they find that the likelihood of being denied or discouraged is substantially higher among households with high debt service ratio (threshold above 30%) than those with low ratios. The latter group of households is dominated by mortgage holders because of the level of the monthly debt payments displayed. Consequently, our findings suggest that the prediction power of the debt service ratio is likely overstated by the presence of misclassified households among households with high debt service ratios.

The rest of the paper is organized as follows. In section 2, we review the main findings of the literature on liquidity constraints relative to the characteristics of consumers and we describe our sample. In section 3, we estimate a model of the probability of being denied or discouraged. In section 4, we run additional estimations and we discuss the results. We conclude in section 5.

## 2 Previous studies and the data

Previous studies have tried to determine the profiles of liquidity constrained households.<sup>2</sup> Irrespective of the variable used to classify constrained consumers, most studies conducted on the U.S. economy have found that families with low income, low net worth, who don't own their home, who are large in size and/or living in States with significant bankruptcy exemptions, are more likely to be constrained. In addition, households that are headed by non-married, young, female or non white individuals are also more likely to be liquidity constrained.

After Jappelli (1990), several studies used direct information on credit access, to split the sample between households likely to be constrained and those likely to be unconstrained (see for instance, Calem and Mester, 1995; or Jappelli, Pischke, and Souleles, 1998; and more recently Johnson and Li, 2010). Most of these papers share two caveats. First, questionnaires do not always make it clear from which credit markets the applicant has been rejected or discouraged. Thus, denied or discouraged applicants are systematically classified as liquidity-constrained irrespective of the types of expenditure they want to finance. Second, since the year an applicant was denied or discouraged is usually unavailable in the survey, most studies assume that the credit status evolves slowly over time.<sup>3</sup> The data set used in this paper is not subject to these limitations as the questionnaire only refers to housing expenditures and report the year of the application was made.

Our study is based on a sample of American households extracted from the *1996 Panel Study of Income Dynamics* (PSID). In the 1996 PSID, a special supplement to the core survey asked questions related to the household's experience when shopping for a home loan, i.e., mortgage, refinanced mortgage, land contract, loan from seller, home equity, home improvement or line of credit loan, during the five-year period preceding the survey.<sup>4</sup> We exclude from our sample, households with missing information on the household head's age, gender, number of years of schooling, work status as well as family size, income and geographic location. The data we work with contains 7,896 households. We define "mortgage-shoppers" as households that submitted applications for mortgage loans or thought of submitting them. Mortgage-shoppers constitute the total pool of potential credit-constrained on the market for home loans. The

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<sup>2</sup>An excellent review of this literature can be found in Crook (2006).

<sup>3</sup>One exception is the studies that use the Survey of Household Income and Wealth of Italy (see Guiso, Jappelli, and Terlizzese, 1996). The time period to which the questions referred to is the previous year.

<sup>4</sup>We will use the generical term "mortgage" when referring to all types of home loans, that is mortgage, refinanced mortgage, land contract, loan from seller, home equity, home improvement or line of credit loan.

“denied” or “discouraged” are those households among mortgage-shoppers whose credit applications were rejected by a financial institution and/or who considered any other loan options or places to borrow money but changed their minds about applying.<sup>5</sup>

One point about this measure is worth stressing. Unlike being rejected, being classified as discouraged entails some elements of subjectivity. Possible reasons why respondents considered a loan but decided not to apply included “Interest too high”, “Down payment too high”, “Closing costs/fees too high”, “Monthly payment too high”, “Poor service/treated unfairly” and “Other”. “Other” is broad enough to include motives that are unrelated to discouragement (e.g.: a negative income shock during the credit search process). Consequently, it is one obvious channel of misclassification of unconstrained households as being credit-constrained. In what follows, we will explore the sensitivity of the results to a narrower definition of denied or discouraged that excludes respondents who answered “Other” (henceforth *proxy* II); 255 households did not specify an explicit reason.

Table 1: Selected characteristics of U.S. households

Variables	Whole sample	Mortgage-shoppers				
		All	Denied or Discouraged		Denied	Discouraged
			<i>proxy</i> I	<i>proxy</i> II		<i>proxy</i> I
(1)	(2)	(3)	(4)	(5)	(6)	
Household level						
Income	43,982	68,110	69,013	74,367	54,747	84,421
Monthly mortgage payment		516	1,542	1,506	1,481	1,558
Homeowner (%)	0.56	0.73	0.78	0.85	0.62	0.97
Family size	2.70	3.18	3.22	3.30	3.25	3.32
Household’s head level						
Education (years)	12.53	13.83	13.83	13.91	13.1	14.34
Age (years)	44.35	39.64	40.0	40.85	39.60	41.50
White (%)	0.62	0.75	0.75	0.77	0.57	0.87
Male (%)	0.70	0.85	0.86	0.873	0.82	0.90
Married (%)	0.52	0.73	0.743	0.78	0.68	0.83
Employed (%)	0.71	0.90	0.90	0.91	0.85	0.94
Observations	7,896	3,369	993	608	205	788

Source: Authors’ calculations based on the 1991, 1992, 1993, 1994, 1995 and 1996 PSID. Income is the sum of family taxable market income, family transfer income and family social security income. *proxy* I (*proxy* II) indicates that we do (not) classified as “discouraged”, respondents who gave “Other” as the reason for considering a loan but deciding not to apply.

<sup>5</sup>People might change their mind as a result of some screening rules that lenders use to deal with the self-selection of the pool of applicants. Ignoring discouraged applicants ultimately leads to biased estimates of the probability that consumers are credit-constrained (Jappelli, 1990).

About 3,369 households in our sample have shopped for a mortgage loan, and 29.5% of them (993 households) were denied or discouraged in the market for home loans (12.6% of the whole sample). Discouraged shoppers represent 79% of this group (788 households). The primary reason for discouragement, with more than 50% of positive responses, were “interest rate too high”; followed by “Other” with about 40% of positive responses. On the other hand, possible reasons why respondents were rejected included “Credit history problems”, “Too much debt/expenses”, “Income not high enough/not stable enough”, “Couldn’t make down payment” or “Other”. Surprisingly, the majority of denied shoppers (more than 70% of positive responses) answered “Other”; followed by “Credit history problems” (around 20% of positive responses).

Table 1 presents an overview of selected characteristics for the whole sample (column 1), all mortgage-shoppers (column 2), denied or discouraged mortgage-shoppers under *proxy* I (column 3), denied or discouraged mortgage-shoppers under *proxy* II (column 4), and denied (column 5) and discouraged (column 6) both under *proxy* I. The means in the various samples are noticeably different. Compared to households in the whole sample, Denied or discouraged households (column 3) were more often married and headed by males, white with more schooling and considerably younger. Their income was, on average, 57% higher than that of households in the whole sample and 90% were currently employed compared to 71% for the whole sample.

The denied or discouraged households had favorable demographic characteristics, irrespective of whether *proxy* I (column 3) or *proxy* II is used (column 4). So, this observation does not simply follow from the wording of the questionnaire. However, it is surely driven by the group of discouraged (column 6). Except for the age of the household’s head, every categories display a higher average among discouraged applicants (column 6) than among denied applicants (column 5). The two groups are noticeably heterogenous but for the purpose of this study we follow the literature, and we assume both groups to be liquidity-constrained.

To some extent, it is not surprising that the socioeconomic and demographic characteristics of the group of denied or discouraged shoppers were more favorable than those of the sample as a whole. In fact, a vast majority of mortgage-shoppers obtained a loan or believed they could qualify for a loan during the past five years. This intuition is confirmed when the group of shoppers is compared to the entire sample. Mortgage-shoppers displayed the same favorable demographics, that is they had higher income, more years of schooling, they did not belong to ethnic or gender minorities (column 2). What is surprising, however, is the persistence of this pattern when denied or discouraged households (columns 3 and 4) are compared to

mortgage-shoppers (column 2).<sup>6</sup> In fact, denied or discouraged shoppers also display markedly favorable characteristics than mortgage-shoppers.

To summarize, the characteristics of the denied and discouraged households display a *systematic* pattern: among other things, they have high income, are married and have an employed head. With the latter characteristics, the odds of having a demand for credit rejected should be very low. The contrast with the profile of a typical credit-constrained household is quite striking. This systematic pattern is puzzling because it does not simply follow from households' status as mortgage-shoppers. About 12% of the PSID is concerned by this effect. Even considering measurement errors, this is a significant fraction of the population.

### 3 Estimation results

In this section, we investigate whether the systematic pattern observed above is statistically persistent. We follow Jappelli (1990) by using a Logit model to regress a binary indicator variable—taking the value of 1 if the household is classified as denied or discouraged, and 0 if not—on a list of explanatory variables consisting of household head and household socioeconomic attributes. The model relates the household's experience applying for, or thinking of applying for a mortgage-loan during the previous five years to its *current* characteristics (hereafter, scenario I). The validity of this model rests on the assumption that many of the determinants of the probability of being liquidity-constrained evolve slowly over time.<sup>7</sup>

In the regressions, family income, home equity, family size, age, years of schooling and the constant are all quantitative variables, whereas sex, racial group, marital status, employment status, ownership status and geographic locations are dummy variables. The reference categories are: women, singles, nonwhites, no homeownership, unemployed, neither live in North East and North Central nor live in the South.

Based on both previous studies and intuition, one expects the sign of income level, homeownership status, and marital status to be negative. For example, married-heads should increase their chances of

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<sup>6</sup>Beside, given the level of their monthly mortgage payments (\$1,542), denied or discouraged shoppers were able to borrow substantially higher amount, at some point, than to mortgage-shoppers (\$516). They certainly have higher debt service ratio because the monthly mortgage payments are three times higher while the income is not.

<sup>7</sup>Most of the studies on the U.S. economy assume that an individual is more likely to be borrowing constrained sometime in the future if she is borrowing constrained today. This assumption is almost imposed by data limitation because surveys are not conducted every year and/or questions relative to the credit status are not included in every survey.



obtaining the desired loan amount by co-signing their home mortgage loan application with their spouse. In general, there is no consensus regarding the sign of the age variable. In the case of mortgage borrowing, however, the need to accumulate enough savings to meet down payment constraints suggest that this sign should be negative. If the level of education captures the prospect of future income, one expects heads with more education to have less chances of being rejected.

Column I in *Table 2* presents the results of the baseline regression. Most characteristics of the denied or discouraged are statistically better than the whole sample. The coefficients of the income level, home-ownership status, and marital status are highly significant, but none of their signs accord to expectations. Instead, all three variables prove to be positively related to the probability of being liquidity-constrained. It is not due to discrimination as neither the gender variable nor the race variable are significant. Moreover, redlining seems not to be the issue either because all regional variables are non-significant and all display a negative sign.

The significance of age and age squared variables suggest important life-cycle effects. As the household's head becomes older, the probability of being denied or discouraged rises. The non-linearity with respect to the age variable is inherited from the age profile of home ownership which is hump-shaped as in most countries (see for example Chiuri and Jappelli, 2003). Finally, the education variable is significantly positive. The likelihood of being denied or discouraged increases with the head's years of schooling. It is especially true for the group of denied and discouraged shoppers in our sample because of their already high income levels and young age relative to the whole sample. This amount to the previous finding which not only are significant but display the opposite sign to what is expected.

These findings are driven by the group of discouraged shoppers (see column III). Only the income variable is significant when we estimate the model for the sample of denied shoppers but most of the signs are unchanged, except for the race variable. From column IV, all the findings carry on if instead one excludes from the group of discouraged those respondents who answered "Other" to the possible reasons they considered a loan but decided not to apply.

## 4 Further estimations

In the previous section, we found that for the average American household shopping for a home loan, the odds of being discouraged from applying for credit or having a credit application rejected, increase signif-

Table 2: Logit Models of "Denied or Discouraged" U.S Households (scenario I; RHS = *current* characteristics)

Variables	<i>proxy I</i>						<i>proxy II</i> (excl. "Other")								
	Denied or discouraged			Denied			Discouraged			Denied or discouraged			Discouraged		
	Coef (I)	z-stat		Coef (II)	z-stat		Coef (III)	z-stat		Coef (IV)	z-stat		Coef (V)	z-stat	
Income	0.064***	(3.35)		0.070**	(2.41)		0.062***	(3.22)		0.034***	(4.56)		0.051***	(3.43)	
Income squared/100	-0.050	(1.30)		-0.078	(1.62)		-0.047	(1.29)		-0.022*	(2.21)		-0.030*	(1.66)	
Home equity	-0.032***	(3.86)		0.053***	(2.79)		-0.029***	(3.31)		-0.018***	(4.66)		-0.029***	(3.81)	
Employed	0.201	(1.57)		0.163	(0.69)		0.207	(1.38)		0.129*	(1.70)		0.351	(1.46)	
Homeowner	0.951***	(9.25)		0.432**	(2.14)		1.148***	(9.79)		0.672***	(10.43)		2.856***	(10.03)	
Family size	0.066**	(2.23)		0.123**	(2.30)		0.041	(1.22)		0.049***	(2.59)		0.044	(0.96)	
Married	0.347***	(2.79)		0.287	(1.17)		0.368***	(2.61)		0.190**	(2.42)		0.473**	(2.17)	
Male	0.061	(0.46)		0.267	(1.08)		-0.003	(0.02)		0.010	(0.12)		-0.150	(0.59)	
White	0.234***	(2.65)		-0.380	(2.37)		0.455***	(4.39)		0.104*	(1.86)		0.828***	(4.96)	
Age (years)	0.067***	(3.28)		0.007	(0.20)		0.092***	(3.82)		0.030**	(2.50)		0.121***	(3.17)	
Age squared/100	-0.107***	(4.60)		-0.029	(0.75)		-0.140***	(5.06)		-0.046***	(3.42)		-0.167***	(3.86)	
Education (years)	0.139***	(7.28)		0.061	(1.63)		0.162***	(7.60)		0.068***	(5.73)		0.196***	(6.62)	
North East	-0.095	(0.87)		-0.183	(0.87)		-0.087	(0.71)		-0.049	(0.71)		-0.079	(0.48)	
North Central	-0.091	(0.88)		-0.307	(1.50)		-0.042	(0.36)		-0.108	(1.62)		-0.175	(1.11)	
South	-0.035	(0.34)		-0.254	(1.21)		0.017	(0.15)		-0.040	(0.61)		0.005	(0.04)	
Constant	-6.069***	(12.99)		-4.836***	(6.39)		-7.30***	(13.14)		-3.624***	(12.69)		-11.023***	(11.97)	
Wald chi <sup>2</sup> (.)	607.39***			110.99***			552.76***			489.91***			321.69***		
Pseudo R <sup>2</sup>	0.135			0.055			0.159			0.151			0.238		
Log-pseudo likelihood	-2584.24			-881.23			-2135.82			-1792.39			-1186.41		
Observations	7896			7109			7690			7511			7305		

Source: Authors' calculations based on the 1991, 1992, 1993, 1994, 1995 and 1996 PSID. Scenario I (scenario II) indicates that for constrained household, the statistical information of the current year (the year they

faced credit constraints) is used in regression models. Sample size gap between scenarios I and II are due to differences in usable information regarding some covariates. \*\*\*, \*\*, \* indicate that parameters are statistically significant at 1%, 5% and 10% levels respectively. Robust Z-statistics are in parentheses. Each of Income and Home equity in scenario II is converted in 1996 U.S. Constant dollars using the U.S consumer price index all items. Income is measured in units of \$10,000 while Home equity denotes logarithm of home equity. Individual characteristics are those of the household head. *proxy II* exclude from the group of discouraged those respondents who answered "Other" to the possible reasons they considered a loan but decided not to apply.

icantly with family income, home equity, household head’s employment status or educational attainment. In what follows, we try to explain why our results diverge so markedly from previous studies.

#### 4.1 Accounting for timing issues

We start by departing from our assumption that access to credit evolve slowly over time. Given the cross-section nature of our dataset, one cannot rule out that “timing issues” contaminated the main findings. For example, it could be the case that the conditions of denied or discouraged households in our sample only improved recently as they build a credit history or they accumulated savings to make a down payment. Accordingly, individuals most likely to be constrained are the young, especially at the beginning of their careers and who anticipate significant growth in income. In the U.S., this constraint has been found to be binding in the age groups 26-35 and 36-45 (see Chiuri and Jappelli, 2003), with the bulk of denied or discouraged shoppers falling into the 36-45 age bracket.

To control for timing issues, we use the longitudinal aspect of the Panel Study of Income Dynamics (PSID) to allocate denied/discouraged households the time-variant socioeconomic attributes (education, marital and employment status, area of residence, age, family size) they had the year they were either denied access to credit or discouraged from applying for it. For instance, those households reportedly denied/discouraged in 1991 were allocated the statistical information provided that year. We then proceed to estimate a logit model where denied or discouraged applicants are allocated their *past* characteristics (henceforth, scenario II).

In *Table 3*, we reproduce *Table 2* under scenario II. First and foremost, notice that some variables acquire an independent effect (employment status) or become more significant (family size) when comparing column I with the baseline regression. However, there is no sign reversal and the puzzling findings of *Table 2* persist if one uses past characteristics. The only significant variable with the expected sign is the family size variable, as applicants with large family are more likely to be denied or discouraged. Based on these experiments, there is little support for the hypothesis that recent improvements of applicants’ conditions caused the results in *Table 2*. Scenario II is also useful to control for business cycles factors.

#### 4.2 Accounting for creditworthiness

Having a bad credit history may offset an applicant’s chances to obtain a loan even with favorable demographics. To test this hypothesis, we compare the characteristics of a group of households with bad credit

Table 3: Logit Models of "Denied or Discouraged" U.S Households (scenario II; RHS = *past* characteristics)

Variables	<i>proxy I</i>						<i>proxy II</i> (excl. "Other")								
	Denied or discouraged			Denied			Discouraged			Denied or discouraged			Discouraged		
	Coef (I)	z-stat		Coef (II)	z-stat		Coef (III)	z-stat		Coef (IV)	z-stat		Coef (V)	z-stat	
Income	0.071***	(3.71)		0.062***	(2.60)		0.070***	(3.07)		0.060***	(4.15)		0.055***	(3.45)	
Income squared/100	-0.051	(1.35)		-0.043	(1.56)		-0.052	(1.11)		-0.034*	(1.74)		-0.030	(1.46)	
Home equity	-0.054***	(6.48)		-0.051***	(3.40)		-0.053***	(5.87)		-0.051***	(5.52)		-0.051***	(4.85)	
Employed	0.482***	(3.47)		0.365	(1.45)		0.543***	(3.25)		0.515***	(2.91)		0.729***	(2.80)	
Homeowner	0.316***	(3.32)		0.279	(1.47)		0.313***	(2.96)		0.807***	(6.43)		1.196***	(6.95)	
Family size	0.089***	(3.00)		0.173***	(3.17)		0.059*	(1.75)		0.116***	(3.12)		0.068	(1.44)	
Married	0.50***	(3.91)		0.182	(0.73)		0.609***	(4.22)		0.520***	(3.11)		0.807***	(3.50)	
Male	0.143	(1.06)		0.40	(1.58)		-0.066	(0.43)		0.142	(0.78)		-0.057	(0.22)	
White	0.327***	(3.66)		-0.458***	(2.77)		0.583***	(5.56)		0.332***	(2.90)		0.974***	(5.62)	
Age (years)	0.057***	(2.73)		-0.026	(0.75)		0.091***	(3.63)		0.042	(1.61)		0.098***	(2.66)	
Age squared/100	-0.094***	(3.91)		0.004	(0.11)		-0.137***	(4.60)		-0.076**	(2.56)		-0.145***	(3.31)	
Education (years)	0.152***	(7.88)		0.081**	(2.19)		0.169***	(7.75)		0.162***	(6.79)		0.207***	(6.75)	
North East	-0.106	(0.93)		0.039	(0.17)		-0.165	(1.30)		-0.073	(0.53)		-0.163	(0.94)	
North Central	-0.035	(0.33)		-0.473**	(2.01)		0.055	(0.47)		-0.168	(1.25)		-0.043	(0.27)	
South	0.032	(0.30)		0.017	(0.08)		0.031	(0.27)		0.043	(0.34)		0.057	(0.37)	
Constant	-6.258***	(13.36)		-4.843***	(6.28)		-7.553***	(13.38)		-7.032***	(12.10)		-10.074***	(11.83)	
Wald chi <sup>2</sup> (.)	549.28***			125.56***			492.31***			450.31***			394.29***		
Pseudo R <sup>2</sup>	0.134			0.068			0.153			0.147			0.204		
Log-pseudo likelihood	-2507.9			-807.10			-2101.27			-1735.91			-1208.11		
Observations	7841			7054			7635			7456			7250		

Source: Authors' calculations based on the 1991, 1992, 1993, 1994, 1995 and 1996 PSID. Scenario I (scenario II) indicates that for constrained household, the statistical information of the current year (the year they

Source: Authors' calculations based on the 1991, 1992, 1993, 1994, 1995 and 1996 PSID. Scenario I (scenario II) indicates that for constrained household, the statistical information of the current year (the year they

failed credit constraints) is used in regression models. Sample size gap between scenarios I and II are due to differences in usable information regarding some covariates. \*, \*\*, \*\*\*, \* indicate that parameters are statistically significant at 1%, 5% and 10% levels respectively. Robust Z-statistics are in parentheses. Each of Income and Home equity in scenario II is converted in 1996 U.S. Constant dollars using the U.S consumer price

index all items. Income is measured in units of \$10,000 while Home equity denotes logarithm of home equity. Individual characteristics are those of the household head. *proxy II* exclude from the group of discouraged those respondents who answered "Other" to the possible reasons they considered a loan but decided not to apply.

history with those obtained using the denied or discouraged measure.

We classify as bad creditworthy, respondents who declared themselves “unable to pay [your] bills when they were due” in the last five years. Not paying bills could be a minor blunder that can be committed both by mortgage shoppers as well as non-shoppers, yet, it signals a state of financial distress. The delinquency in repaying liabilities is an important indicator of credit worthiness; and, a bad credit history may lower an applicant’s chances to obtain a loan even with favorable demographics.

This new measure is also suitable to capture liquidity-constrained households. Evidence of shoppers facing liquidity constraints can be found both for homeowners and non owners. Englehardt (1996) found that down payment constraints force first-time home buyers to reduce consumption in the period prior to accessing homeownership. Hurst and Stafford (2004) isolated a group of homeowners who were liquidity-constrained. They found that faced with adverse income shocks, households in the latter group typically refinance and draw down their home equity, albeit that is an expensive source of funds. Unlike nonliquidity-constrained refinancers, they use the equity they liquidated to finance current consumption.<sup>8</sup>

In *Table 4*, we present logit estimates of the determinants of credit status based on the new proxy. The signs for the coefficients of total income, education, marital status and the family size are the reverse of those obtained with the denied or discouraged measure (see column III of *Table 1*). Liquidity-constrained households are seen to have a lower total income, to be larger in size, to be headed by a less educated individual and less likely to be married. The coefficient for the latter variables are highly significant within both the group of mortgage shoppers and all households. Notice that, the coefficient of the age variables keep the same signs and are still highly significant across all three groups, signaling the presence of strong cohort effects.

The group of households with bad creditworthiness is markedly different than the group of denied or discouraged shoppers. We conclude that factors other than a bad credit history explain our findings.

### 4.3 Discussion

The characteristics of the group of denied or discouraged are too systematic to be spurious. Neither timing issues nor the credit worthiness seem to explain our findings. It seems that the denied or discouraged measure, in our sample, captures an effect that has nothing to do with the credit status per se, while still

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<sup>8</sup>The equity they removed when refinancing can be used to adjust the housing stock (do up, build additions, etc.) or to readjust their portfolio by allocating some of their housing equity into other financial assets.

Table 4: Logit Models of Liquidity-Constrained (“unable to pay bills”) U.S Household

Variables	Full sample		Mortgage shoppers		Non-shoppers	
	Coef (I)	z-stat	Coef (II)	z-stat	Coef (III)	z-stat
Income	-0.150***	(8.27)	-0.184***	(6.08)	-0.113***	(3.40)
Income squared/100	0.100***	(7.714)	0.123***	(6.17)	0.031	(0.13)
Home equity	-0.056***	(4.16)	-0.030	(1.59)	-0.102***	(5.75)
Employed	0.054	(0.68)	-0.260*	(1.67)	0.083	(0.91)
Family size	0.162***	(7.38)	0.179***	(5.02)	0.148***	(5.30)
Married	-0.308***	(3.49)	-0.540***	(3.61)	-0.154	(1.41)
Male	-0.223***	(2.86)	-0.139	(0.89)	-0.259***	(2.88)
White	-0.095	(1.49)	-0.223**	(2.16)	-0.023	(0.28)
Age (years)	0.079***	(6.50)	0.048*	(1.84)	0.085***	(6.06)
Age <sup>2</sup> /100	-0.114***	(8.65)	-0.079***	(2.74)	-0.121***	(7.90)
Education (years)	-0.0510***	(3.89)	-0.056**	(2.55)	-0.054***	(3.35)
North East	-0.006	(0.07)	0.139	(0.98)	-0.118	(1.06)
North Central	0.056	(0.67)	0.430***	(3.20)	-0.176	(1.61)
South	-0.071	(0.85)	0.079	(0.59)	-0.165	(1.51)
Constant	-1.000***	(3.22)	0.025	(0.04)	-1.074**	(2.93)
Log-pseudolikelihood	-3,914.4		-1,525.1		-2,356.5	
Wald chi <sup>2</sup> (15)	709.47***		247.81***		462.81***	

Source: see *Table 3*

being correlated with a behavior associated with the credit application process. In what follows we will conjecture that the denied or discouraged measure captures best the intensity put forth by the applicant when shopping for a loan.

Since our findings are driven by the group of discouraged households, we try infer the underlying behavior from the latter group. It is very telling because the interest-rate is the principal metric for loan-to-loan comparisons. More than 50% are discouraged because of “interest rate too high” (around 40% chose “Other”). Thus, giving up on one lender when doing comparison shopping, because of high interest rate, would also qualify as being “discouraged”.<sup>9</sup> The question therefore is: why are applicants with “favorable” characteristics, such as those found above, also more willing to do comparison shopping?

We provide some descriptive evidence drawn from the 1996 PSID in order to illustrate the search intensity. First, it appears that 43% of applicants among denied or discouraged shoppers had no business relationship with the lender from whom they obtained a mortgage loan; compared to only 30% of shoppers who were not denied or discouraged. Second, relative to the other two groups, denied or discouraged households certainly have a large desired-consumption of housing because on average they have more family members (see *Table 2*). It follows that their intensity of search is likely to have been higher as well, everything else being equal.<sup>10</sup>

Numerous studies have linked information frictions to consumer behaviors in several asset and debt markets. For instance, information barriers explain the “non-participation puzzle”, that is the fact that some individuals choose zero holdings for stocks and other financial assets (Guiso and Jappelli, 2005). Information costs are also related to the borrowers’ lack of knowledge of their contractual terms (Bucks and Pence, 2008; and Lusardi and Tufano, 2009). In both cases, acquiring and processing information is likely to be more costly for borrowers with less income and education, older borrowers and minorities.<sup>11</sup>

Consequently, having high income and being more educated makes denied or discouraged shoppers more likely to afford these information costs. If the latter claim is true, one expects the holding of financial assets to be more widespread among denied or discouraged households. As it turns out the proportion of households that are participating in financial markets is higher for denied or discouraged

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<sup>9</sup>Crook (1999) distinguishes between households who are discouraged from those who are not. He focuses on applicants who think the Equal Credit Opportunities Act (1976) is not respected by certain lenders.

<sup>10</sup>The intensity put forth when shopping increases with the size of the expenditures to be financed (Stigler, 1961).

<sup>11</sup>This is particularly true for the mortgage market because of both the inherent complexity of financial information and the proliferation of product choices dimensions.

mortgage-shoppers relative to both mortgage-shoppers, and the whole sample. More than 47.6% of denied or discouraged shoppers (*proxy* II) have a participation rate greater than zero compared to 31.9% for the whole sample, and 42.39% for the group of shoppers.

## 5 Conclusion

The objective of this paper was to assess the reliability of the denied or discouraged measure in capturing credit-constrained households in the particular case of consumers seeking credit to finance expenditure on durables. Using a sample of American households, we have isolated a group of consumers who have been denied or discouraged at some point during their search process for a mortgage loan. We have shown that: for this pool of consumers, the odds of having their demand for credit rejected should be very low based on the variables used to screen credit applications. About 12% of the PSID could be incorrectly classified as credit constrained. Even considering measurement errors, this is a significant fraction of the population.

While we cannot definitely state what caused the phenomenon documented in section 3, the evidence seem to support the idea that the intensity of search is the behavior captured by the denied or discouraged indicator in the mortgage market. The difficulty in identifying credit-constrained households is to find a measure that applies indifferently to all the sample, and irrespective of the type of expenditures to be financed.<sup>12</sup> Ultimately, this paper suggests that further research is required to identify credit constrained households.

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<sup>12</sup>Classifying as liquidity-constrained, respondents who declared themselves “unable to pay [your] bills when they were due” seems to overcome this difficulty (see *Table* 4). In fact, not paying bills can be committed indifferently by mortgage shoppers as well as non-shoppers. Using this measure, 25% of the U.S. households are liquidity-constrained as opposed to the 20% found by Jappelli (1990).



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Table 5: Appendix A

Concept	Definition
Households	US. Survey families whom all the necessary information to set up the variables used in our descriptive and multivariate analyses were available.
Mortgage loans	All types of home loans, that is mortgage, refinanced mortgage, land contract, loan from seller, home equity, home improvement or line of credit loan between 1991 and 1995.
Mortgage shoppers	Households that submitted applications for mortgage loans or thought of submitting them.
Discouraged household	First, among people who answered "No" to the question "At the time you obtained this [loan/refinancing], did you consider any other loan options or places to borrow money?", discouraged households are those who went on and answered "Interest too high", "Down payment too high", "Closing costs/fees too high", "Monthly payment too high" or "Poor service/treated unfairly" to the question "Why didn't you apply for these other loans?". Second, among people who answered "Yes" to the question "Did you apply for financing on any of the homes that you considered?", discouraged households are those who went on and answered "Interest too high", "Down payment too high", "Closing costs/fees too high", "Monthly payment too high" or "Poor service/treated unfairly" to the question "Why didn't you apply for financing?".
Denied households	First, among people who answered "No" to the question "At the time you obtained this [loan/refinancing], did you consider any other loan options or places to borrow money?", denied households are those who went on and answered "Credit history problems", "Too much debt", "Income not high enough/not stable enough", "Couldn't make down payment", "Other" to the question "Why was it turned down? Second, denied households are those who answered "Yes" to the question "Since January 1991, did you have an application for a loan on this property turned down?". Third, among people who answered "Yes" to the question "Did you apply for financing on any of the homes that you considered?", denied households are those who went on and answered "Credit history problems", "Too much debt", "Income not high enough/not stable enough", "Couldn't make down payment", "Other" to the question "What happened with your application?".
<i>Proxy I</i>	Households who answered "other" to the question "Why didn't you apply for these other loans?" were included from the sample used in our descriptive and multivariate analyses.
<i>Proxy II</i>	Households who answered "other" to the question "Why didn't you apply for these other loans?" were excluded from the sample used in our descriptive and multivariate analyses.