MORTGAGE DELINQUENCY AND PROPERTY TAXES*

Nathan B. Anderson, University of Illinois, Chicago
Jane K. Dokko, Federal Reserve Board

In this paper, we examine an under-studied aspect of the recent housing market crisis: property taxes and escrow accounts. Since mid-2006, homeowners, particularly adjustable-rate subprime borrowers, have defaulted at increasingly alarming rates on their mortgage payments. A unique feature of many subprime adjustable-rate mortgages is the lack of an escrow for property tax payments and insurance. Using loan-level data combined with administrative property tax data, we conduct an event study around property tax due dates to estimate whether the payment shock from property tax bills contributes to greater numbers of missed mortgage payments and foreclosures in communities across the United States. We find that cumulative mortgage delinquency and foreclosure rates increase at a faster pace after property tax due dates, suggesting that escrow accounts influence borrowers' abilities to make mortgage payments. Our results have important implications for the design of subprime mortgage contracts.

INTRODUCTION AND BACKGROUND

While the majority of prime mortgages feature escrow deposit accounts for property taxes, private mortgage insurance, and hazard insurance, escrow accounts are not common among subprime mortgages. Industry estimates suggest that approximately 25 percent of outstanding subprime loans have escrow accounts, which were not required by investors purchasing subprime mortgages.[1] In contrast, lenders in the prime market often use escrow funds to pay the borrower's property tax bills and insurance premiums when they are due, which allows borrowers to avoid making large lump-sum payments for taxes and insurance.[2] Also, escrow accounts assure the lender that these payments are being paid on time: in the event of a property tax delinquency, lenders (as well as borrowers) may face forfeiture of the property to the local taxing jurisdiction.[3]

As a direct consequence of not having an escrow account, many subprime borrowers face large, and often unanticipated, semi-annual property tax bills. In 2007, the median annual property tax payment was $2,099, or 140 percent of the median monthly housing cost of $1,464.[4] Subprime households are borrowers who have demonstrated an inability to make loan payments on time and thus have impaired credit histories. The ability of these types of households to make their mortgage payments in response to these semi-annual financial obligations is the focus of this paper.

Since about mid-2006, borrowers with subprime mortgages, particularly those with variable rates, have missed mortgage payments or defaulted at an alarming and historically unprecedented rate. For example, the foreclosure start rate in the second quarter of 2008 was 6.6 percent among subprime variable-rate mortgages, which is more than a three-fold increase from 1.9 percent in the second quarter of 2006.[5] To explain the rise in mortgage delinquencies and foreclosures, researchers have noted the importance of falling house prices and lax underwriting standards whereby lenders issued loans without regard to borrowers' ability to pay. The causal effect of the lack of an escrow account on mortgage outcomes, which we investigate in this paper, has not been explored or estimated.

Lack of Escrow Accounts in the Subprime Market

Currently, the lack of escrow accounts and the associated financial obligations are important public policy concerns for the subprime mortgage market. In July of 2008, the Federal Reserve Board revised the Home Ownership Equity Protection Act (HOEPA) and approved a rule requiring escrow accounts for "higher-priced mortgage loans." The escrow rule is to be phased in during 2010 and applies to nearly all subprime loans.[6] Congressional leaders have also called for escrow requirements for subprime mortgages, and some lenders, such as

*We would like to thank Joshua Miller, Colin Motley, and Michael Mulhall for invaluable research assistance. The views expressed in this paper do not necessarily reflect the opinions of the Federal Reserve Board or its staff. Anderson received research support from the Institute of Government and Public Affairs, University of Illinois.

Washington Mutual (now JPMorgan Chase), began requiring escrow accounts on all new subprime loans beginning in mid-2007.

These concerns about the importance of escrow accounts are predicated on the view that subprime households are unable, for whatever reason, to meet their mortgage and property tax payment obligations without a commitment device. Indeed, Fannie Mae has acknowledged that they "do not recommend waiving escrows for a borrower who has a blemished credit record because the borrower may find it difficult to maintain homeownership if he or she is faced with the need to make lump-sump payments for taxes and/or insurance."[7] It is a widely held view that underwriting calculations did not account for property tax and insurance payments, which enabled subprime homebuyers to purchase a home based on lower stated monthly payment amounts than if the mortgage payment had included provisions for an escrow account. As a result, subprime buyers were able to purchase "more house than they could afford," while lenders were able to issue larger balance mortgages than if they had considered property tax and insurance payments in their assessments of the borrower's ability to repay the loan.

Property Taxes

As stated earlier, semi-annual property tax bills are non-trivial payments that homeowners must make or risk losing their homes to forfeiture. In 2007, just over 63 percent of households with mortgages faced an annual property tax bill larger than $1,500. California, Minnesota, and Maryland, which are the three states we study in this paper, have median property tax bills larger than the national median. Table 1 shows these median amounts. In California, the median annual property tax bill among households with mortgages is $3,116 compared to median monthly housing costs of $2,314. In Minnesota, the median annual property tax bill is $2,042 compared to median monthly housing costs of $1,500. In Maryland, the median annual property bill is $2,517 compared to median monthly housing costs of $1,881. In California and Maryland, approximately 80 percent of homeowners with mortgages pay more than $1,500 in annual property taxes, while in Minnesota approximately 68 percent pay above $1,500.

Table 2 describes the distribution of property tax due dates across the United States. For taxpayers in 33 states and the District of Columbia, property tax payments vary at the state level and are due on the same date within the state on a quarterly, biannual, or annual basis. In the remaining 17 states, property tax due dates vary by county and sometimes even by taxing district, with cities and school districts having taxes due on different dates. Seemingly, property owners generally receive their bill at least one month prior to the due date. Most states allow homeowners to pay property taxes with a credit card, but most charge a fee for this convenience. Some counties in California, for example, charge a 3 percent fee for paying taxes with a credit card.

To identify the causal effect of the lack of an escrow on mortgage outcomes, we exploit the timing of property tax due dates relative to when a mortgage is originated. The identifying assumption, which is empirically falsifiable, is that borrowers do not time their home purchases with respect to property tax due dates. We examine mortgage delinquency and foreclosure outcomes relative to the first property tax due date, which marks the first time a homeowner receives a property tax bill.

The mortgage outcomes we study include 60- and 90-day cumulative delinquency rates as well as the cumulative foreclosure rate. In future work, we will also examine the cumulative prepayment probability.[8]

DATA AND SAMPLE

The loan-level data on subprime and alt-A loans are from First American Loan Performance (LP), which covers loans sold into subprime or alt-A securities. The LP database captures about 70 percent of subprime securities and 95 percent of alt-A securities. Variables in the LP data include loan origination characteristics and monthly indicators for whether a loan is current, 30/60/90 days delinquent, in foreclosure, or in REO ("real estate owned," or whether the bank/lender has taken control of the property guaranteeing the loan).[9] The loans studied in this paper were originated between 2000 and 2007; Table 3 shows the number of nonprime, first-lien, purchase loans and refinances originated in each year.

The subsample of loans studied in this paper includes those originated in California, Minnesota, and Maryland. We chose a quasi-arbitrary subset of states in order to make the empirical analysis tractable yet interesting. Even among this limited set, there are 817,648 subprime and 723,657 alt-A

Table 1
Property Tax Institutions

State	*Installment Due Dates (Delinquency Dates)*	*Penalty*	*Forfeiture Proceedings*	*Assessment Cycle*	*Median Property Tax (2007)*
CA	Nov. 1 (Dec. 10) and Feb. 1 (April 10)	Fees plus 10% of delinquent installment amount. After June 30, 1.5% per month of entire tax bill plus fees.	As soon as 90 days (Mello-Roos Districts), but more typically 5 years. Lender has rights to auction proceeds net of taxes and fees.	Property assessed only at change in ownership.	$3,116
MN	May 15 (May 16) and Oct. 15 (Oct. 16)	Depends on property classification, but increases as each month passes from 2% to 14% of delinquent amount.	Homestead 5 years; Non-homestead 3 years. Lender has no right to auction proceeds.	Assessments updated January 2nd of each year.	$2,042
MD	Sept. 30 (Oct.1) and Dec. 31 (Jan. 1)	Fees plus between 1% and 2% per month on the unpaid balance (varies by county and municipality). If property is sold at tax sale, penalties could include lawyer/court fees of lien holder.	As soon 9 months after first delinquency. Lender has rights to auction proceeds net of taxes and fees.	Not reassessed at change in ownership. Maintain a 3-year cycle.	$2,517

Source: CCH State Tax Law Editors (2008), state Web sites, county Web sites, e-mail correspondence, and telephone conversations. Table 1 displays information on property tax due dates, delinquency dates, delinquency penalties, forfeiture proceedings, and the assessment cycle for California, Minnesota, and Maryland. All three states have due dates that are uniform throughout the state. Due dates are often separate from delinquency dates. In CA, the first tax installment is due Nov. 1, but the payment is not considered delinquent unless it remains unpaid on Dec. 10. Forfeiture is the process by which the state, county, or other jurisdiction takes over the first lien on the property and sells it at auction. Median property tax amounts are from the U.S. Census Bureau (2007), Table S2506: 1-year estimates for real estate taxes paid.

purchase-only loans in the LP database. During 2000 to 2006, many regions in California experienced large increases in house prices, and many households used nonprime loans to finance and refinance their homes. Indeed, in 2005, there were 7 subprime originations per 100 housing units in California, which was the third highest rate after Nevada and Arizona.[10] Loans from Minnesota and Maryland are in our subsample in order to provide geographic heterogeneity and some crude variation in property tax amounts. We also feel that we understand the property tax institutions in these states well. In future work, we intend to expand our coverage of states to the full set.

Unfortunately, the LP data do not have an indicator for whether a loan has an escrow. Furthermore, it is not possible to infer the existence of an escrow account based on the loan's monthly payment amount and tracking how the loan's outstanding balance evolves over time.[11] Because of this data limitation, we analyze all purchase-only loans originated between 2000 and 2007, including those that may have an escrow. As a result, our estimates may be interpreted as intent-to-treat (ITT) parameters, where the unconditional probability of experiencing payment shock due to the lack of an escrow is upwards of 0.75, according to industry estimates.

Data on property tax due dates for 2000 to 2007 were obtained from *the U.S. Master Property Tax Guide* (CCH State Tax Law Editors, 2008), Internet resources, and phone calls and e-mail with property tax-collecting government officials. In California, Minnesota, and Maryland, property taxes are due semi-annually, and the due dates are uniform within a state. Table 1 shows the property tax due dates for California, Minnesota, and Maryland. In Minnesota, for example, the first installment of property taxes is due on May 15th and the second installment is due on October 15th. If a loan is originated on

Table 2
Property Tax Due Dates in the United States

State	*Number of Installments*	*Uniform Within State*
AK	Multiple Variations	Varies by Borough
AL	Annual	Yes
AR	Annual	Yes
AZ	Bi-Annual	Yes
CA	Bi-Annual	Yes
CO	Bi-Annual	Yes
CT	Bi-Annual/Quarterly	Varies by Tax District
DC	Bi-Annual	Yes
DE	Annual	Yes
FL	Annual	Yes
GA	Annual/Bi-Annual	Varies by County
HI	N.A.	N.A.
IA	Bi-Annual	Yes
ID	Bi-Annual	Yes
IL	Bi-Annual	Varies by County
IN	Multiple Variations	Varies by County
KS	Bi-Annual	Yes
KY	Annual	Yes
LA	Annual	Yes
MA	Bi-Annual/Quarterly	Varies by County
MD	Bi-Annual	Yes
ME	Annual/Bi-Annual	Varies by County
MI	Bi-Annual/Tri-Annual	Varies by Tax District
MN	Bi-Annual	Yes
MO	Annual	Yes
MS	Annual	Yes
MT	Bi-Annual	Yes
NC	Annual	Yes
ND	Bi-Annual	Yes
NE	Bi-Annual	Varies by County
NH	Bi-Annual/Quarterly	Varies by Tax District
NJ	Quarterly	Yes
NM	Bi-Annual	Yes
NV	Quarterly	Yes
NY	Multiple Variations	Varies by Tax District
OH	Bi-Annual	Varies by County
OK	Bi-Annual	Yes
OR	Tri-Annual	Yes
PA	Bi-Annual	Yes
RI	Multiple Variations	Varies by Tax District
SC	Annual	Yes
SD	Bi-Annual	Yes
TN	Annual	Yes
TX	Annual	Yes
UT	Annual	Yes
VA	Multiple Variations	Varies by Tax District
VT	Multiple Variations	Varies by Tax District
WA	Bi-Annual	Yes
WI	Multiple Variations	Varies by County
WV	Bi-Annual	Yes
WY	Bi-Annual	Yes

Source: CCH State Tax Law Editors (2008), state Web sites, county Web sites, e-mail correspondence, and telephone conversations.

Table 3
Number of First-Lien Subprime and Alt-A Loans by State and Year of Origination

	Subprime Loans				*Alt-A Loans*			
Panel A. Purchases	*CA*	*MN*	*MD*	*All*	*CA*	*MN*	*MD*	*All*
2000	18,916	2,345	1,695	22,956	12,425	460	601	13,486
2001	22,756	2,327	2,036	27,119	18,260	614	1,161	20,035
2002	42,777	3,117	2,580	48,474	28,383	1,120	1,699	31,202
2003	94,970	6,183	5,141	106,294	52,592	2,832	3,634	59,058
2004	242,622	18,782	18,183	279,587	208,414	12,556	17,126	238,096
2005	155,478	13,806	16,194	185,478	149,455	9,683	15,078	174,216
2006	107,285	9,175	13,710	130,170	124,963	7,414	12,293	144,670
2007	10,588	1,013	1,456	13,057	36,328	1,773	2,680	40,781
Total	698,946	57,261	61,441	817,648	632,733	36,542	54,382	723,657
Panel B. Refinances	*CA*	*MN*	*MD*	*All*	*CA*	*MN*	*MD*	*All*
2000	21,169	4,049	3,059	28,277	4,725	157	203	5,085
2001	42,319	6,731	3,315	52,365	12,816	426	531	13,773
2002	80,078	10,990	5,446	96,514	20,800	848	912	22,560
2003	186,277	18,415	16,158	220,850	52,512	2,910	3,087	58,509
2004	445,461	37,241	52,326	535,028	181,342	7,004	10,305	198,651
2005	225,357	19,191	43,050	287,598	177,192	5,924	11,603	194,719
2006	148,205	12,185	37,807	198,197	165,267	4,906	13,001	183,174
2007	29,006	2,158	7,922	39,086	55,593	1,547	4,211	61,351
Total	1,182,283	111,894	169,713	1,463,890	670,946	23,757	43,907	738,610

Source: LoanPerformance (2009).

March 1st, the first property tax due date is May 15th. If a loan is originated on September 30th, the first property tax due date is October 15th. Because the identification strategy exploits these property tax due dates relative to when loans are originated, we are able to control for state, calendar month, and year fixed effects. As we expand the number of states we study in future work, we intend to use the data that we have already collected on other states' property tax due dates, including those where the due dates vary at the county or municipality level.

It is likely for buyers and sellers to negotiate the exact nature of property tax liability during the settlement process. For example, the seller of the home may offer a concession to the buyer to cover a prorated portion of property taxes. Regardless of the negotiations between the buyer and seller, however, someone must actually remit the property taxes to the government on or before the property tax due date. If a buyer established an escrow account, they would make an initial deposit into the escrow account during the settlement process, and the escrow agent would remit the tax due to the local government. A buyer without an escrow account, however, would have to remit the taxes themselves. The previous owner is not liable for property taxes due after the sales date.[12]

In both Maryland and Minnesota, the property is not immediately reassessed upon sale and the new homeowner must pay only any remaining tax installments. California, however, practices acquisition value assessment, and as a consequence, buyers receive supplemental tax bills that add on to any existing tax liabilities. Under acquisition value assessment, any change in ownership generates a supplemental tax bill based on the property's sales price, which is its new (usually higher) assessed valuation. The exact mechanics of the supplemental tax bill depend on the timing of the sale, but these bills almost always leave the buyer with a much higher property tax bill than the previous owner's bill.

There are three types of analyses we may conduct in future work in order to gauge the importance of using all purchase-only loans rather than just those without an escrow account. First, it is

Table 4
Average Origination Characteristics of Nonprime, Purchase-only Loans by Number Months Between Origination and 1st Property Tax Due Date

Panel A. Subprime Loans

	# Months Until 1st Property Tax Due Date			
	1-3	*4-6*	*7-9*	*10+*
Sale Price	252,838.69	244,684.65	233,642.36	253,321.96
Fico	657.335	657.938	656.450	658.798
CLTV	91.834	91.396	90.713	90.764
% w/Full Documentation	.466	.501	.493	.450
% w/PP Penalty	.862	.865	.870	.893
Initial Interest Rate	7.167	7.082	7.163	7.161
% ARM	.925	.916	.921	.922
% Originated in:				
2000	.028	.028	.025	.029
2001	.034	.033	.032	.028
2002	.062	.053	.050	.035
2003	.118	.093	.084	.081
2004	.372	.377	.340	.296
2005	.232	.229	.226	.204
2006	.149	.172	.186	.215
2007	.004	.015	.056	.112
CA	.827	.830	.906	.981
MN	.092	.103	.031	0
MD	.082	.067	.063	.018
Sample Size	303,333	222,405	165,454	109,032

Panel B. Alt-A Loans

	# Months Until 1st Property Tax Due Date			
	1-3	*4-6*	*7-9*	*10+*
Sale Price	413,628.2	420,025.97	409,164.29	415,847.05
Fico	716.461	718.627	716.679	715.638
CLTV	86.855	86.536	87.012	86.786
% w/Full Documentation	.243	.252	.224	.210
% w/PP Penalty	.456	.448	.445	.484
Initial Interest Rate	5.377	5.411	5.449	5.507
% ARM	.755	.753	.727	.741
% Originated in:				
2000	.021	.016	.015	.019
2001	.031	.021	.023	.027
2002	.041	.046	.041	.037
2003	.071	.052	.050	.049
2004	.392	.341	.269	.211
2005	.242	.246	.228	.224
2006	.184	.203	.228	.239
2007	.017	.075	.146	.193
CA	.850	.860	.915	.983
MN	.066	.073	.023	0
MD	.083	.068	.062	.017
Sample Size				

Source: LoanPerformance (2009). Sample includes first-lien nonprime loans originated between 2000 and 2007 for purchases in CA, MN, and MD.

Figure 1: **Event Analysis of Mortgage Outcomes Around Month of 1st Property Tax Due Date**

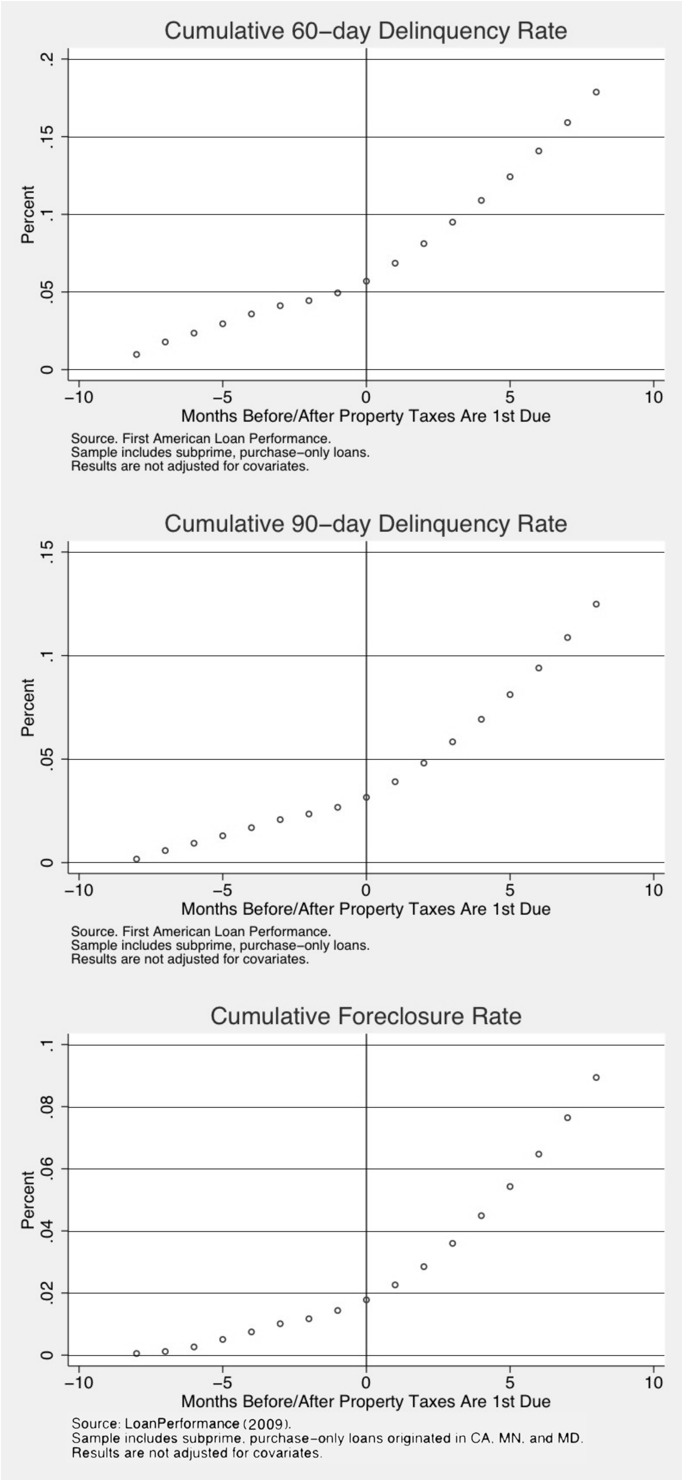
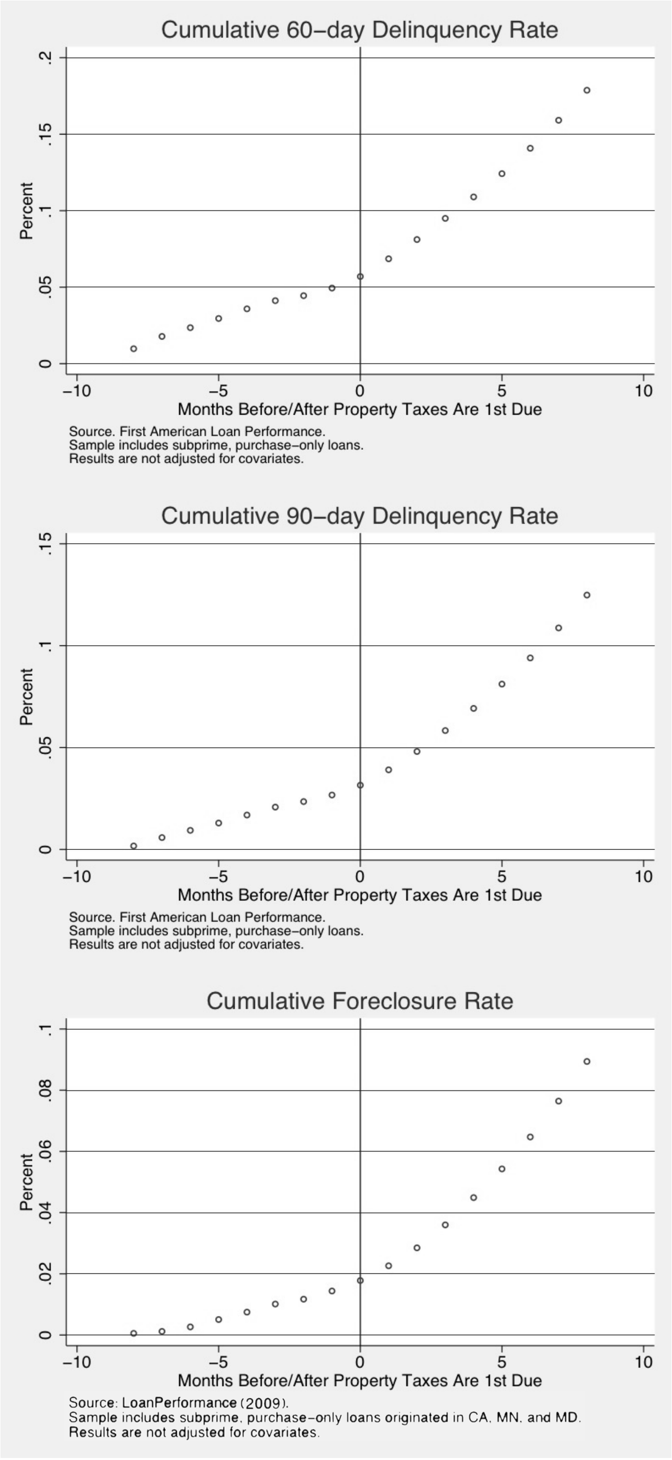


Figure 2: Event Analysis of Mortgage Outcomes Around Month of 1st Property Tax Due Date



possible to apply the same analysis to loans that are refinances, which, because of prior experiences with property tax bills, ought not to experience payment shock to the same extent.[13] Second, we can compare separate results for subprime and alt-A loans. If alt-A borrowers are less likely to be liquidity constrained than subprime borrowers, we expect the payment shock effects to be smaller among alt-A loans. Finally, we can apply our analysis to data from McDash Analytics, which we have recently acquired and which provide an escrow flag for approximately 90 percent of prime loans and roughly 30 percent of subprime loans that are securitized.

RESULTS

Table 4 tests the validity of the research design by comparing the origination characteristics of loans that are originated close to and far away from property tax due dates. The top panel compares the origination characteristics of subprime, purchase-only loans, while the bottom panel presents the results for purchase-only alt-A loans. Fortunately, these characteristics are quite similar across the columns. In particular, the average FICO score of borrowers using these loans, which in principle is a sufficient statistic for the underlying ex ante default probability of the borrower, is similar for loans originated close to and far away from property tax due dates. Consistent with this finding (and with risk-based pricing), the average initial interest rate is similar across the columns of Table 4.

Figure 1 displays the results from the event analysis around the property tax due dates. We estimate mortgage outcomes for the eight months before and after these due dates.[14] In each of the panels, a clear trend break in the rate of increase in the three types of mortgage delinquencies is visible around the time when property taxes are due.[15]

CONCLUSION AND POLICY IMPLICATIONS

We interpret the trend break around property tax due dates as suggesting that the payment shock associated with property tax bills accelerates the pace of mortgage delinquency outcomes. Future work will gauge the quantitative importance of the trend break at the time when property taxes are due by estimating a trend break model and allowing for additional control variables.

As we discuss earlier, the penalties for mortgage delinquency appear higher than the penalties for property tax delinquency, so it is somewhat puzzling to see the trend break in Figure 1. One possible explanation is that omitting escrow payments reduced monthly mortgage payments and closing costs, which in turn may have obscured the true costs of homeownership. The arrival of the property tax bill and the associated large, lump-sum tax liability may provide new homeowners with information on the true costs of homeownership. Upon receiving this information, borrowers may realize that they cannot afford ownership and they may thus become delinquent and decide to default on their mortgage. This and other explanations are the topic of future work.

Notes

1 B & C Escrow Rate Called Low (2005).

2 The escrow feature among prime loans is due to requirements put forth by Fannie Mae and Freddie Mac, who are the largest purchasers prime or "conforming" loans. In certain circumstances, lenders are allowed to waive the escrow requirement on first liens, however, the Government Sponsored Enterprises (GSEs) retain the right to enforce the escrow requirement if the borrower fails to pay his or her property taxes.

3 Forfeiture results in the home being sold at auction with the lender often receiving no compensation. Forfeiture rarely occurs as most lenders pay the buyer's delinquent taxes. Lender rights to auction proceeds vary by state. In Minnesota the lender receives nothing from forfeiture. In Maryland and California, the lender only receives net proceeds after all delinquent taxes and fees have been paid. Conversations with local officials indicate that the fees and delinquency penalties are large and that the net proceeds provided the lender are often very small.

4 U.S. Census Bureau (2007).

5 Mortgage Bankers Association, 2nd Quarter (2008). The quarterly average of this series between 1998 and 2006:Q1 is around 1.8 percent, and it ranges between 1.3 percent and 2.2 percent.

6 Federal Reserve Board (2008).

7 See Fannie Mae (2005a, Part VII), Fannie Mae (2005b, Part III), and Freddie Mac (2008, Chapter 59).

8 Loans may be prepaid because borrowers either default or because they refinance.

9 The monthly indicator for foreclosure roughly identifies when the foreclosure process starts, not when it ends (which is typically a long time away from when the borrower stops making payments).

10 Mayer and Pence (2008).

11 This is because certain fields in the LP data are not well populated by the data provider.

12 Technically, liability for real property taxes is often on the land, not the current owner or previous owner. See, for instance Minnesota State Statute 272.31. Usually ownership cannot be transferred if there are delinquent taxes on the property.

13 Certainly, during the subprime lending boom, a non-trivial fraction of borrowers refinanced their loans before their first mortgage payment was due, much less their property tax payment. So we do not expect refinances to be entirely insensitive to property tax due dates.

14 Note that the axes in the three panels display different scales.

15 The estimates in Figure 2 are quite precisely estimated and plotting 95 percent confidence intervals results in tick marks that visually overlay the estimates (and are thus somewhat distracting).

References

B&C Escrow Rate Called Low. *Mortgage Servicing News*. February 23, 2005. http://www.mortgageservicingnews.com/plus/archive/?ts=1109181607

CCH State Tax Law Editors. U.S. Master Property Tax Guide. Chicago: CCH Inc., 2008.

Fannie Mae.

Selling Guide. Washington, D.C., 2005a. https://www.efanniemae.com/sf/guides/ssg/index.jsp

Servicing Guide, Washington, D.C., 2005b. https://www.efanniemae.com/sf/guides/ssg/index.jsp

Federal Reserve Board. Press Release, July 14, 2008. http://www.federalreserve.gov/newsevents/press/bcreg/20080714a.htm

Freddie Mac. Single-Family Seller/Servicer Guide. McLean, VA, 2008. http://www.freddiemac.com/sell/guide/

LoanPerformance. San Francisco, CA: First American CoreLogic, 2009.

Mayer, Christopher and Karen Pence. Subprime Mortgages: What, Where, and to Whom? Cambridge, MA: National Bureau of Economic Research, 2008. NBER Working Paper W14083.

Mortgage Bankers Association. National Delinquency Survey. Washington, D.C., 2008.

U.S. Census Bureau. American Community Survey. Washington, D.C., 2007.