Internet Appendix for "A Model of Mortgage Default"

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1 Pricing kernel

In order to calculate the present value of the cash-flows that mortgage providers receive we need to discount them by a rate that takes into account their risk. Although our model is partial equilibrium, we can use it to derive a pricing kernel that plays such role. In our model household i permanent income v_{it} follows a random walk, with innovations given by η_{it}:

$$v_{it} = v_{i,t-1} + \eta_{it}. \tag{1}$$

The innovations to permanent income can be decomposed into an individual specific component η_t^i and an aggregate component η_t^a:

$$\eta_{it} = \eta_t^i + \eta_t^a \tag{2}$$

If we assume that the shocks to the aggregate component of permanent income are perfectly correlated with innovations to house prices, so that $\eta_t^a = \alpha\delta_t$, we can re-write:

$$\eta_{it} = \eta_t^i + \alpha\delta_t \tag{3}$$

And since η_t^i and δ_t are uncorrelated with each other:

$$\sigma_{\eta_i}^2 = \sigma_{\eta^i}^2 + \alpha^2\sigma_\delta^2 \tag{4}$$

In our parameterization, $\sigma_{\eta_i} = 0.063$, $\sigma_\delta = 0.162$ and $corr(\eta_t, \delta_t) = 0.191$. It follows that $\alpha = 0.0743$, $\sigma_{\eta^j} = 0.062$ and $\sigma_{\eta^a} = 0.012$. The parameter of interest is the variance of aggregate permanent income shocks.

Let C_t^a denote the date t level of aggregate real consumption. For power utility:

$$E_t\beta(\frac{C_{t+1}^a}{C_t^a})^{-\gamma} = \frac{1}{1+R_{1t}} \tag{5}$$

where R_{1t} is the one period real interest rate. Assuming log normality and letting lower-case letters denote the log of their upper-case counterpart:

$$E_t\Delta c_{t+1}^a = \frac{1}{\gamma}[log(1+R_{1t}) + log(\beta) + \gamma^2\frac{\sigma_{c_a}^2}{2}]. \tag{6}$$

We assume that aggregate consumption innovations equal the innovations to aggregate permanent income, and that the expected consumption growth rate is related to the real interest rate. In our baseline parameterization, $\gamma = 2$, $\beta = 0.98$ and $\sigma^2_{y_a} = 0.012^2$.

In our model for each level of the expected log inflation rate, there are two possible levels of the real interest rate. When the log inflation rate is low (equal to 0.0201), the log real interest rate $log(1 + R_{1t})$, can either be low or high, -0.0128 or 0.0155. Similarly, When the log inflation rate is high (equal to 0.038), the log real interest rate can either be low or high, equal to 0.0086 or 0.0370. We can use equation (6) to calculate expected consumption growth. It follows that the corresponding values of $E_t \Delta c^a_{t+1}$ are -0.0164 and -0.002, and -0.006 and 0.009. For each of these cases innovations to aggregate income can be negative or positive so that the corresponding nominal discounting factors are given by:

$$0.98 \times exp(-0.0164 - 0.012)^{-2}/exp(0.021) = 1.0166 \tag{7}$$

$$0.98 \times exp(-0.0164 + 0.012)^{-2}/exp(0.021) = 0.9688 \tag{8}$$

$$0.98 \times exp(-0.002 - 0.012)^{-2}/exp(0.021) = 0.9882 \tag{9}$$

$$0.98 \times exp(-0.002 + 0.012)^{-2}/exp(0.021) = 0.9418 \tag{10}$$

And for periods in which expected inflation is high:

$$0.98 \times exp(-0.006 - 0.012)^{-2}/exp(0.038) = 0.9773 \tag{11}$$

$$0.98 \times exp(-0.006 + 0.012)^{-2}/exp(0.038) = 0.9314 \tag{12}$$

$$0.98 \times exp(0.009 - 0.012)^{-2}/exp(0.038) = 0.9499 \tag{13}$$

$$0.98 \times exp(0.009 + 0.012)^{-2}/exp(0.038) = 0.9053 \tag{14}$$

We use the above nominal discount factors to discount the nominal cash-flows received by financial institutions.

2 Complete results

In the paper we have reported results for two representative levels of initial interest rates, low and high, that correspond to the lowest and the second highest level of initial yields in our model. In this appendix we report the complete set results, for all four levels of initial interest rates in our model. This is done in Tables A.1 through A.6.

3 Robustness

3.1 Recourse

In the baseline model we have assumed non-recourse mortgages. This is the case in several US states. In others, even though there is recourse, the restrictions on deficiency judgements are so onerous that mortgages are effectively non-recourse. In order to see the extent which the recourse/non-recourse nature of the loan affects the household incentives to default and the mortgage premia required by lenders, we have solved a version of our model in which we allow recourse to current financial assets. More precisely, we assume that in case of default, in addition to seizing the house, the lender can seize the defaulting household's current financial assets, up to the lower bound on cash-on-hand, but not the household's future labor income. These assumptions do not require an additional state variable. The results for the ARM are shown in the second Panel of Table A.7.

3.2 Housing choice

In the baseline model we have assumed that housing and other goods preferences are separable, and that housing is fixed. This was done for tractability. Existing theoretical models of mortgage default also make this assumption. But there may be interesting interactions between default choice and housing choices. We extend our model to allow for housing choice in the

event of default.[3]

More precisely, we allow defaulting households to freely choose between three different levels of housing. The levels that we consider are those that correspond to an initial LTI of 2.5, 3.5 or 4.5. We assume separable preferences between housing and other consumption so as to be consistent with the baseline model. Thus household preferences are given by:

$$U(C_{it}, H_{it}) = \frac{C_{it}^{1-\gamma_i}}{1-\gamma_i} + \theta_i \frac{H_{it}^{1-\gamma_i}}{1-\gamma_i}. \tag{15}$$

In this extended model there is one more choice variable in the default state, but no additional state variables are needed. The ARM results for θ_i equal to 0.3 are reported in Panel C Table A.7. As we would expect, default rates are higher when households are allowed to choose house size in the default state. Furthermore, although not reported in the table, those individuals who default tend to choose the smallest house size in the default state, which helps them to reduce their housing expenditures. The effects on the probability of cash-out are relatively small, so that there is little additional incentive for households to cash-out and adjust house size. Naturally, the degree to which they wish to do so will depend on the degree of substitutability between housing and other goods consumption in household preferences. But overall the results in this panel that the default probability and mortgage premia patterns that we have emphasized in this paper are robust to this alternative model in which we allow for house size choice.

3.3 Hedging

In our model homeownership provides insurance against fluctuations in the price of housing. This happens for two reasons. First, renters must make payments that are proportional to the value of housing (Sinai and Souleles, 2005). Second, households derive utility from terminal real wealth that is calculated using a composite price index that is an average of the price of housing and the price of other goods consumption. In our model labor income acts as a partial hedge against such fluctuations in house prices, since permanent labor income shocks

[3]It would be considerably more complicated to allow for housing choice in the no-default state, since this would require additional state variables. In addition it is likely that most households considering default cannot change house size without default, since they are likely to have negative home equity.

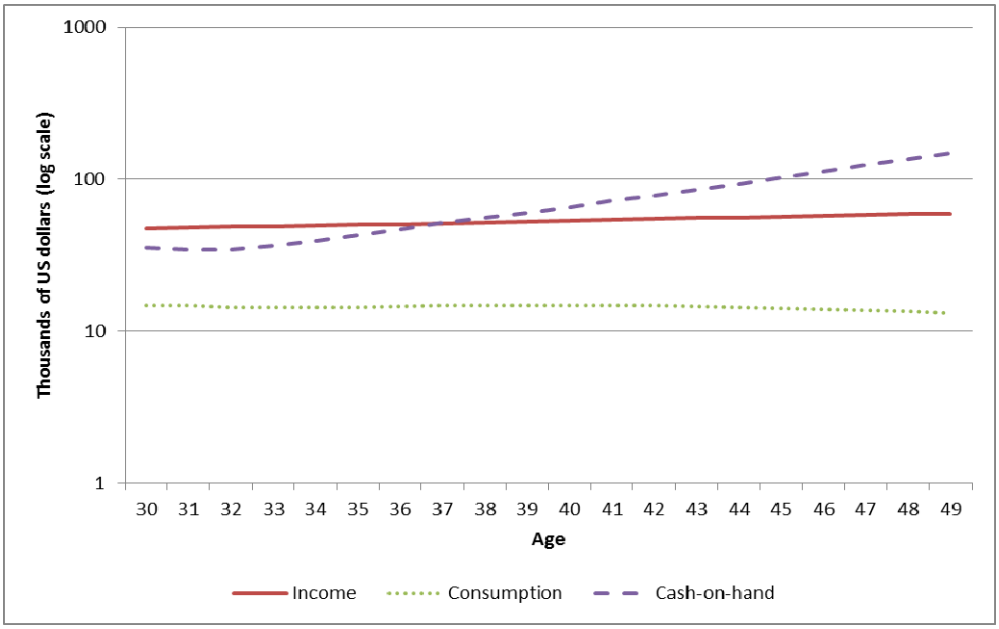
are positively correlated with house price shocks. But the estimated value for this correlation, 0.19, is not very large.

We are interested in evaluating the extent to which hedging motives play an important role in deterring borrowers from defaulting on their mortgages. A simple and clear way to do so in the context of our model is to scale terminal real wealth by the price level, that is, to let $P_{T+1}^{Composite} = P_{T+1}$. This reduces the hedging motives for homeownership, but it does not eliminate them altogether since homeownership still provides insurance against fluctuations in the per period rental cost of housing.

The last panel of Table A.7 shows ARM default probabilities with a reduced hedging motive for homeownership. There is a considerable increase in both the probability of default and of cash-out. The increase in the probability of default is solely due to an increase in the probability of default conditional on negative equity. Although not directly observable from the table there are also horizon effects. As the horizon shortens, the hedging motives for homeownership are reduced, and households have more of an incentive to default.

These results are interesting since they illustrate the importance of hedging motives as a default deterrent. The disappearance or reduction of such hedging motives may trigger default. That will be the case for instance for households who are underwater and now expect to have to move to another region for employment reasons.

Figure A.1: Mean consumption, income and cash-on-hand.



Note to Figure A.1: The data are from simulating the model for the ARM with the parameters in Table 1.

Table A.1: Probabilities of default, cash-out and interest-rate refinancing, lender profitability, and mortgage premia, conditional on initial interest rates.

1-Year bond yield	0.73%	3.56%	4.67%	7.51%
Slope of the term structure	2.88%	0.38%	−0.38%	−2.88%
Panel A: ARM				
Prob(Default)	0.044	0.042	0.037	0.036
Prob(Cash-out)	0.583	0.592	0.595	0.610
Profit(Default)	-0.175	-0.142	-0.139	-0.105
Profit(Cash-out)	0.079	0.080	0.077	0.075
Profit(Other)	0.162	0.164	0.160	0.161
Initial Mort Payment/Inc	0.234	0.362	0.410	0.544
Prem over 1-year yield	1.50%	1.60%	1.60%	1.70%
Panel B: FRM				
Prob(Default)	0.034	0.043	0.051	0.068
Prob(Cash-out)	0.572	0.387	0.369	0.249
Prob(Refinancing)	0.000	0.419	0.471	0.678
Profit(Default)	-0.122	-0.095	-0.094	-0.042
Profit(Cash-out)	0.086	0.075	0.077	0.098
Profit(Refinancing)	0.000	0.127	0.122	0.113
Profit(Other)	0.137	0.144	0.166	0.245
Initial Mort Payment/Inc	0.344	0.395	0.433	0.544
Prem over 20-year bond yield	0.75%	2.05%	2.85%	5.70%
Prem over 20-year annuity yield	1.69%	2.26%	2.63%	4.69%
Panel C: ARM/FRM				
Welfare gain of ARM	-0.12%	0.91%	1.12%	3.24%

Note to Table A.1: This table reports results for mortgage contracts with LTV=0.9 and LTI=4.5 and for a standard deviation of temporary income shocks equal to 0.225, for all levels of initial 1-year bond yields. The first two rows report the initial level of 1-year rates and the corresponding slope of the term structure, measured as the difference between the 20-year and the 1-year log bond yield. For each of these levels, and for the ARM and FRM contracts, the table reports the mortgage premium required by lender, the initial mortgage payments relative to income, the probability of default, of cash-out, and for the FRM contract of interest-rate refinancing. This table reports probabilities calculated across aggregate states and individual shocks. The table also reports the lenders' average profitability, as a function of households' decisions. Profitability is calculated as the present discounted value of the cash-flows that lenders receive divided by the initial loan amount. The last row reports welfare gains of ARMs relative to FRMs, under the form of consumption equivalent variations. The table reports the percentage difference in the constant consumption stream that makes the individual as well off in the ARM contract as in the FRM contract.

Table A.2: Inertia in interest rate FRM refinancing.

Initial 1-Year bond yield	0.73%	3.56%	4.67%	7.51%
Panel A: Inertia = 0.5				
Prob(Default)	0.034	0.038	0.046	0.054
Prob(Cash-out)	0.572	0.522	0.424	0.334
Prob(Refinance)	0.000	0.140	0.367	0.571
Initial Mort Payment/Inc	0.344	0.384	0.428	0.495
Prem over 20-y ann yield	1.69%	1.66%	2.18%	2.99%
Welfare gain of ARM	-0.12%	0.05%	0.72%	1.50%
Panel B: Inertia = 0.7				
Prob(Default)	0.034	0.038	0.043	0.055
Prob(Cash-out)	0.572	0.571	0.482	0.384
Prob(Refinance)	0.000	0.023	0.250	0.483
Initial Mort Payment/Inc	0.344	0.379	0.418	0.478
Prem over 20-y ann yield	1.69%	1.51%	1.88%	2.49%
Welfare gain of ARM	-0.12%	-0.21%	0.35%	0.97%
Panel C: Inertia = 1.0				
Prob(Default)	0.034	0.038	0.039	0.042
Prob(Cash-out)	0.572	0.580	0.584	0.599
Prob(Refinance)	0.000	0.000	0.000	0.000
Initial Mort Payment/Inc	0.344	0.378	0.401	0.432
Prem over 20-y ann yield	1.69%	1.46%	1.38%	1.19%
Welfare gain of ARM	-0.12%	-0.30%	-0.30%	-0.40%

Note to Table A.2: This table reports results for different levels of inertial in interest rate FRM refinancing. The first row reports the initial level of 1-year rates. This table reports results for the case in which in each period fifty percent of the individuals who would benefit from refinancing do so, for the case in which in each period thirty percent of the individuals who would benefit from refinancing do so, and for the case in which no individual refinances. For each of these cases the table reports the morgage premium, the ratio of initial mortgage payments to income, the probability of default, the probability of cash-out and of interest-rate refinancing. This table reports probabilities calculated across aggregate states and individual shocks. The last row of the table reports welfare gains of ARMs relative to FRMs, under the form of consumption equivalent variations.

Table A.3: Initial LTI and LTV.

Initial 1-Year bond yield	0.73%	3.56%	4.67%	7.51%	0.73%	3.56%	4.67%	7.51%	0.73%	3.56%	4.67%	7.51%
Panel A: ARM	A.1: lti = 4.5, ltv = 0.90				A.2: lti = 3.5, ltv = 0.90				A.3: lti = 4.5, ltv = 0.80			
Prob(Default)	0.044	0.042	0.037	0.036	0.041	0.039	0.034	0.032	0.023	0.019	0.018	0.021
Prob(Equity<0)	0.554	0.545	0.538	0.526	0.548	0.546	0.538	0.528	0.278	0.269	0.271	0.255
Prob(Def|Equity<0)	0.080	0.077	0.069	0.068	0.075	0.071	0.063	0.061	0.082	0.072	0.067	0.084
Prob(Cash-out)	0.583	0.592	0.595	0.610	0.508	0.509	0.513	0.516	0.646	0.659	0.656	0.678
Initial Mort Payment/Inc	0.234	0.362	0.410	0.544	0.181	0.279	0.316	0.421	0.232	0.361	0.408	0.546
Prem over 1-y yield	1.50%	1.60%	1.60%	1.70%	1.45%	1.50%	1.50%	1.60%	1.45%	1.55%	1.55%	1.75%
Panel B: FRM	B.1: lti = 4.5, ltv = 0.90				B.2: lti = 3.5, ltv = 0.90				B.3: lti = 4.5, ltv = 0.80			
Prob(Default)	0.034	0.043	0.051	0.068	0.033	0.043	0.049	0.059	0.013	0.015	0.023	0.039
Prob(Equity<0)	0.548	0.542	0.548	0.526	0.548	0.542	0.548	0.527	0.275	0.266	0.268	0.530
Prob(Def|Equity<0)	0.061	0.079	0.094	0.129	0.061	0.080	0.090	0.112	0.047	0.056	0.087	0.073
Prob(Cash-out)	0.572	0.387	0.369	0.249	0.508	0.270	0.281	0.129	0.628	0.547	0.473	0.306
Prob(Refinance)	0.000	0.419	0.471	0.678	0.000	0.546	0.543	0.807	0.000	0.212	0.389	0.633
Initial Mort Payment/Inc	0.344	0.395	0.433	0.544	0.267	0.314	0.339	0.429	0.342	0.379	0.421	0.498
Prem over 20-y ann yield	1.69%	2.26%	2.63%	4.69%	1.69%	2.56%	2.73%	4.89%	1.64%	1.76%	2.28%	3.39%
Panel C: ARM/FRM	C.1: lti = 4.5, ltv = 0.90				C.2: lti = 3.5, ltv = 0.90				C.3: lti = 4.5, ltv = 0.80			
Welfare gain of ARM	-0.12%	0.91%	1.12%	3.24%	-0.10%	1.05%	1.01%	2.57%	-0.04%	0.28%	0.87%	1.82%

Note to Table A.3: This table reports results for different initial levels of LTI and LTV and for different initial values of the 1-year bond yield. This table reports results for households facing a standard deviation of temporary income shocks equal to the baseline value of 0.225. The table reports the mortgage premium required by lenders, the ratio of initial mortgage payments to income, and it decomposes the probability of default into probability of negative equity and the probability of default conditional on negative home equity. It also reports the probabilities of cash-out and for the FRM contract of interest-rate refinancing. The table reports probabilities calculated across aggregate states and individual shocks. Negative home equity corresponds to situations when $(1-c)\times$ Nominal house value $<$ Outstanding debt. The last row of the table reports welfare gains of ARMs relative to FRMs, under the form of consumption equivalent variations.

Table A.4: Different levels labor income risk.

Initial 1-Year bond yield	0.73%	3.56%	4.67%	7.51%	0.73%	3.56%	4.67%	7.51%	0.73%	3.56%	4.67%	7.51%
Panel A: ARM	A.1: Base case				A.2: Higher inc risk				A.3: Correlated inc risk			
Prob(Default)	0.044	0.042	0.037	0.036	0.046	0.046	0.048	0.053	0.064	0.052	0.051	0.040
Prob(Cash-out)	0.583	0.592	0.595	0.610	0.602	0.613	0.625	0.642	0.659	0.614	0.621	0.578
Prem over 1-y yield	1.50%	1.60%	1.60%	1.70%	1.55%	1.65%	1.75%	1.95%	1.85%	1.70%	1.75%	1.65%
Panel B: FRM	B.1: Base case				B.2: Higher inc risk				B.3: Correlated inc risk			
Prob(Default)	0.034	0.043	0.051	0.068	0.035	0.055	0.068	0.098	0.133	0.075	0.102	0.093
Prob(Cash-out)	0.572	0.387	0.369	0.249	0.593	0.397	0.397	0.266	0.695	0.651	0.361	0.111
Prob(Refinance)	0.000	0.419	0.471	0.678	0.000	0.446	0.453	0.635	0.000	0.000	0.479	0.792
Prem over 20-y ann yield	1.69%	2.26%	2.63%	4.69%	1.74%	2.66%	2.98%	5.79%	3.29%	2.06%	3.68%	5.84%
Panel C: ARM/FRM	C.1: Base case				C.2: Higher inc risk				C.3: Correlated inc risk			
Welfare gain of ARM	-0.12%	0.91%	1.12%	3.24%	-0.13%	1.34%	1.29%	4.21%	3.53%	1.33%	3.30%	4.52%

Note to Table A.4: This table reports results for different types of income risk and for different initial values of the 1-year bond yield. The first row reports the initial level of 1-year rates. This table reports results for households facing a standard deviation of temporary income shocks equal to 0.225, for those facing a higher income risk (a standard deviation of temporary labor income shocks equal to 0.35), and for those facing higher income risk that is correlated with the level of real interest rates (correlated). For each of these cases, and for the ARM and FRM contracts, the table reports the mortgage premium, the probability of default, the probability of cash-out and for the FRM contract of interest-rate refinancing. This table reports probabilities calculated across aggregate states and individual shocks. The last row of the table reports welfare gains of ARMs relative to FRMs, under the form of consumption equivalent variations.

Table A.5: Other household parameters.

Initial 1-Year bond yield	0.73%	3.56%	4.67%	7.51%	0.73%	3.56%	4.67%	7.51%	0.73%	3.56%	4.67%	7.51%
Panel A: ARM	A.1: Base case				A.2: Higher inc growth				A.3: Lower discount factor			
Prob(Default)	0.044	0.042	0.037	0.036	0.044	0.042	0.036	0.035	0.048	0.048	0.041	0.045
Prob(Cash-out)	0.583	0.592	0.595	0.610	0.569	0.577	0.581	0.595	0.637	0.646	0.654	0.673
Prem over 1-y yield	1.50%	1.60%	1.60%	1.70%	1.50%	1.58%	1.58%	1.70%	1.60%	1.70%	1.75%	1.90%
Panel B: FRM	B.1: Base case				B.2: Higher inc growth				B.3: Lower discount factor			
Prob(Default)	0.034	0.043	0.051	0.068	0.034	0.042	0.051	0.065	0.034	0.043	0.052	0.085
Prob(Cash-out)	0.572	0.387	0.369	0.249	0.558	0.374	0.356	0.249	0.603	0.499	0.472	0.388
Prob(Refinance)	0.000	0.419	0.471	0.678	0.000	0.425	0.477	0.680	0.000	0.274	0.362	0.522
Prem over 20-y ann yield	1.69%	2.26%	2.63%	4.69%	1.69%	2.26%	2.63%	4.64%	1.72%	2.06%	2.48%	4.79%
Panel C: ARM/FRM	C.1: Base case				C.2: Higher inc growth				C.3: Lower discount factor			
Welfare gain of ARM	-0.12%	0.91%	1.12%	3.24%	-0.13%	0.89%	1.08%	2.99%	-0.22%	0.43%	0.63%	3.31%

Note to Table A.5: This table reports results for different household parameters and for different initial values of the 1-year bond yield. This table reports results for households facing the baseline parameters, for those facing a higher growth rate of labor income (equal to 0.012), for those with a lower discount factor (equal to 0.92), for those facing a higher probability of an exogenous house move (equal to 0.06), and a desutility from default. For each of these cases, and for the ARM and FRM contracts, the table reports the mortgage premium, the probability of default, the probability of cash-out and for the FRM contract of interest-rate refinancing. This table reports probabilities calculated across aggregate states and individual shocks. The table reports welfare gains of ARMs relative to FRMs, under the form of consumption equivalent variations.

Table A.5 (Continued): Other household parameters.

Initial 1-Year bond yield	0.73%	3.56%	4.67%	7.51%	0.73%	3.56%	4.67%	7.51%
Panel A: ARM	A.4: Higher moving probability				A.5: Stigma			
Prob(Default)	0.055	0.051	0.049	0.047	0.034	0.03245	0.029	0.027525
Prob(Cash-out)	0.690	0.696	0.702	0.712	0.586	0.594	0.596	0.6105
Prem over 1-y yield	1.70%	1.75%	1.80%	1.90%	1.45%	1.55%	1.55%	1.65%
Panel B: FRM	B.4: Higher moving probability				B.5: Stigma			
Prob(Default)	0.042	0.049	0.061	0.076	0.025	0.033	0.040	0.054
Prob(Cash-out)	0.685	0.689	0.430	0.323	0.573	0.392	0.371	0.249
Prob(Refinance)	0.000	0.000	0.441	0.592	0.000	0.413	0.475	0.689
Prem over 20-y ann yield	1.81%	1.66%	2.93%	4.59%	1.64%	2.16%	2.53%	4.34%
Panel C: ARM/FRM	C.4: Higher moving probability				C.5: Stigma			
Welfare gain of ARM	-0.07%	-0.17%	1.27%	2.85%	-0.14%	0.85%	1.07%	2.96%

Table A.6: ARM contract with a teaser rate and lower target profitability.

1-Year bond yield	0.73%	3.56%	4.67%	7.51%	0.73%	3.56%	4.67%	7.51%
Panel A: ARM	A.1: Baseline profitability				A.2: Lower target profitability			
Prob(Default)	0.044	0.042	0.037	0.036	0.041	0.038	0.034	0.032
Prob(Cash-out)	0.583	0.592	0.595	0.610	0.582	0.590	0.592	0.605
Prem over 1-y yield	1.50%	1.60%	1.60%	1.70%	1.25%	1.30%	1.30%	1.40%
Panel B: FRM	B.1: Baseline profitability				B.2: Lower target profitability			
Prob(Default)	0.034	0.043	0.051	0.068	0.031	0.036	0.045	0.054
Prob(Cash-out)	0.572	0.387	0.369	0.249	0.570	0.428	0.368	0.250
Prob(Refinancing)	0.000	0.419	0.471	0.678	0.000	0.339	0.471	0.685
Prem over 20-y ann yield	1.69%	2.26%	2.63%	4.69%	1.44%	1.71%	2.18%	3.59%
Panel C: ARM Teaser	C.1: Baseline profitability							
Prob(Default)	0.046	0.044	0.040	0.038				
Prob(Cash-out)	0.584	0.593	0.596	0.611				
Prem over 1-y yield	0%/1.75%	0%/1.85%	0%/1.85%	0%/2.00%				
Panel D: ARM/FRM/ARM Teaser	D.1: Baseline profitability				D.2: Lower target profitability			
Welfare gain of ARM/FRM	-0.12%	0.91%	1.12%	3.24%	-0.10%	0.55%	1.04%	2.39%
Welf gain ARM /ARM Teaser	0.09%	-0.02%	-0.04%	0.00%				

Note to Table A.6: This table reports results for a lower level of lender profitability (equal to 0.08) and for an ARM with a teaser rate, for different initial values of the 1-year bond yield. The ARM contract with a teaser rate has a interest rate equal to the 1-year bond yield for the first year of the contract, that is reset to a higher value in subsequent years. This table reports probabilities calculated across aggregate states and individual shocks. The last row of the table reports welfare gains of ARMs relative to FRMs, and of ARMs relative to the ARM teaser under the form of consumption equivalent variations.

Table A.7: ARM contract with recourse, housing choice in the rental state, and reduced hedging motive.

1-Year bond yield	0.73%	3.56%	4.67%	7.51%
Panel A: Baseline				
Prob(Default)	0.044	0.042	0.037	0.036
Prob(Cash-out)	0.583	0.592	0.595	0.610
Prem over 1-y yield	1.50%	1.60%	1.60%	1.70%
Panel B: Recourse				
Prob(Default)	0.015	0.016	0.014	0.015
Prob(Cash-out)	0.595	0.602	0.605	0.618
Prem over 1-y yield	1.35%	1.45%	1.45%	1.60%
Panel C: Housing Choice				
Prob(Default)	0.065	0.065	0.060	0.063
Prob(Cash-out)	0.602	0.615	0.628	0.647
Prem over 1-y yield	1.70%	1.80%	1.85%	2.05%
Panel D: Hedging				
Prob(Default)	0.053	0.050	0.049	0.053
Prob(Cash-out)	0.644	0.653	0.655	0.675
Prem over 1-y yield	1.60%	1.70%	1.75%	1.95%

Note to Table A.7: This table reports results for the ARM contract for the baseline parametrization (Panel A), for the case in which lenders have recourse to the household's current financial assets (Panel B), for the case in which households are allowed to choose the size of the house in the rental state (Panel C), and for the case in which there is a reduced benefit of homeownership as an hedge since terminal wealth is scaled by the price level (Panel D). The table reports results for different initial values of the 1-year bond yield.