Mortgage Choice in Families*

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Abstract

I show that family experience impacts mortgage choice. Using the universe of Danish residential mortgage originations, I document that borrowers whose immediate family members have previously selected adjustable-rate mortgages (ARMs) are more likely to choose ARMs themselves. This relationship persists after conditioning on rich borrower characteristics and fixed effects that account for systematic differences in origination timing. To address potential within-family correlation in risk preferences or other reflection concerns, I implement an instrumental variables strategy that compares otherwise similar borrowers whose relatives faced different interest rate environments. The estimates indicate that recent exposure to an ARM—rather than a fixed-rate mortgage—increases a borrower's probability of originating an ARM by nearly 6 percentage points.

Keywords: Mortgage choice; household finance; social finance.
JEL Codes: G21; D14; D85.

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1 Introduction

The structure of residential mortgages—most notably whether rates are fixed or adjustable—is a fundamental determinant of the financial risks households face and the passthrough of monetary policy (Campbell & Cocco, 2003; Calza *et al.*, 2013; Di Maggio *et al.*, 2017; Campbell *et al.*, 2021). While existing research has characterized key time-series factors driving mortgage choice (e.g. Koijen *et al.*, 2009; Badarinza *et al.*, 2018), much less is known about the cross-section. Borrowers who look similar on paper, and who face similar prices, often make different decisions. Standard models explain only a limited share of this dispersion (Andersen *et al.*, 2023). Meanwhile, a growing literature has highlighted the central influence peers, friends, and co-workers play in household finance (e.g., McCartney & Shah, 2022; Maturana & Nickerson, 2019; Kuchler & Stroebel, 2021). Together, these patterns suggest that social interactions—left out of traditional frameworks—may meaningfully affect the mortgages borrowers choose.

In this paper, I show that family experience impacts mortgage choice. Specifically, borrowers whose parents, siblings, or children have previously taken an adjustable-rate mortgage are more likely to choose one themselves. To do so, I use administrative data covering the universe of mortgage originations in Denmark—a setting that, like the United States, was historically dominated by fixed-rate mortgages but now includes a substantial adjustable-rate segment. The Danish data allow me to construct the history of mortgage borrowing within families, and to link these histories to detailed information on demographics and household balance sheets.

I begin by documenting a robust correlation in adjustable-rate mortgage (ARM) choice within families. For example, if the most recent mortgage taken by a family member was an ARM, a borrower is roughly 7 percentage points more likely to choose an ARM as well. The relationship holds even with a comprehensive set of fixed effects and controls that account for timing, geography, and observable borrower characteristics. Still, an important question remains: does this correlation reflect the influence of family members on mortgage choice, or simply unobservables—such as risk preferences, expectations, or financial constraints—that are shared in families?

To address this identification challenge, I implement an instrumental variables strategy that compares otherwise similar borrowers whose *relatives* faced different interest rate environments in the past. Specifically, I instrument the relative's ARM choice with the prevailing *FRM-ARM Spread* the month they originated their mortgage.[1] This spread is a well-established time-series driver of the aggregate ARM share, and is a strong predictor of the relative's choice in the Danish data.

The key finding is that the *FRM-ARM Spread* the relative faced, even years ago, is also a strong predictor

[1]The *FRM-ARM Spread* captures the difference in interest rates on fixed- versus adjustable-rate mortgages.

of the borrower's choice today. Under the assumption that these historical spreads affect the borrower only through the relative's decision, the design identifies a causal effect of within-family exposure to ARMs. My estimates indicate that exposure increases a borrower's likelihood of choosing an ARM by nearly 6 percentage points. The result is robust to alternative exposure measures, holds across parents, children, and siblings, and remains stable across various sample restrictions and levels of fixed effects—including those that address the timing of relatives' originations.

This evidence contributes to two strands of the literature. First, it adds to work on mortgage choice that emphasizes interest rates and aggregate market conditions by showing that an important part of the remaining cross-sectional variation reflects borrowers' family environments. Second, it contributes to the social finance literature by showing that family experience matters for the choice of mortgage contract itself, not just for downstream decisions such as refinancing or portfolio adjustments. In that sense, the results suggest that households' exposure to interest rates, and therefore to monetary-policy transmission, is shaped not only by market prices and borrower balance sheets, but also by social interactions. I provide a more detailed overview of related literature in Appendix A.

The importance of family could reflect the transmission of useful information, helping borrowers better navigate a complex financial product. Alternatively, it could stem from other forms of social influence that distort household choices. Regardless of the mechanism, my findings indicate that mortgage choices are tied to social factors that sit outside standard models of household decision-making.

2 Background and Data

I analyze data drawn from annual 2009-2018 snapshots of all outstanding mortgages issued by Danish mortgage banks. The data include details on mortgage terms, the municipality of the mortgaged property, and personal identifiers for all borrowers.[2] To construct the sample, I first select all residential mortgages originated between 2009 and 2018. Close to half of these mortgages are fixed-rate (FRMs). The remainder are adjustable-rate mortgages (ARMs).

I use personal identifiers to match each borrower to data provided by the Danish Civil Registration System (*CPR Registret*). This allows me to identify any immediate family members: parents, children, and siblings. For each borrower, I also merge on age, gender, marital status, net income, and net wealth, all as recorded the year the loan was originated. Income and wealth data are provided by the Danish Tax Authority (*SKAT*), which receives wage and financial information directly from employers and financial

[2] Throughout, I define a borrower as an individual at the time that they originate a mortgage. Consequently, the same individual can appear as a borrower more than once if they originate multiple mortgages, and each co-borrower on a given mortgage is treated as a separate borrower.

institutions.

I link borrowers to the full set of mortgages originated by immediate family members satisfying the following criteria: (i) the relative originated the mortgage prior to the borrower, (ii) the borrower is not listed on the relative's mortgage, (iii) the relative originated the mortgage in the year 2000 or later, and (iv) the relative's mortgage was active at some point after 2009.[3] I retain only borrowers with at least one match.

Using this matched data, I construct three summaries of exposure to ARMs within the family. For borrower i and mortgage j, *Any ARM in Family*$_{ij}$ is a binary indicator equal to one if any matched relative's loan is an ARM. *Family ARM Share*$_{ij}$ captures the fraction of originations by matched relatives that are ARMs. *Most Recent Relative Chose ARM*$_{ij}$ is equal to one if the most recent mortgage originated by a relative was an ARM.

Table 1 presents summary statistics. The matched sample is large and broadly representative of the Danish market. Of the 3.47 million borrower-originations in the full sample, 2.63 million can be linked to at least one origination by a relative. The average borrower is linked to 3.86 such relatives. Appendix B provides a more detailed overview of the construction of the dataset, the key variables used in the analysis, and their interrelationships.

3 Analysis and Results

3.1 Mortgage Choice is Correlated in Families

I begin by showing that borrowers whose relatives have taken ARMs in the past are more likely to do so themselves. This pattern is evident in the summary statistics presented in Table 1. Columns 3 and 4 restrict to borrowers linked to a previous ARM in the family (*Any ARM in Family*$_{ij}$=1), while columns 5 and 6 restrict to borrowers without one (*Any ARM in Family*$_{ij}$=0). The ARM share is 5 percentage points higher in the former group.

Figure 1 demonstrates that this relationship is stable in the time series. While there is substantial aggregate variation in the use of ARMs over time—falling from over 75% in 2009 to below 40% in the mid 2010s—there is a persistent gap between borrowers with family exposure to ARMs (shown in red), and those that have not been exposed (shown in black).

I next show that the within-family correlation in mortgage choice holds even when conditioning on observable borrower characteristics and a rich set of fixed effects for the timing and location of both the borrower and the relative's mortgage. Specifically, for borrower i originating mortgage j, I consider linear

[3]Note that requirement (iv) is a consequence of the fact that I do not observe loans that were originated and terminated prior to 2009.

regressions of the following form:

$$ARM_{ij} = \beta Family\ ARM\ Exposure_{ij} + X'_{it(j)}\eta + \tau^B_{t(j)} + \mu^B_{geo(j)} + \tau^R_{t(r(i,j))} + \mu^R_{geo(r(i,j))} + \varepsilon_{ij} \quad (1)$$

Here, ARM_{ij} is an indicator equal to one if the borrower chooses an ARM. $X_{it(j)}$ represents borrower characteristics (dummies for 10-year-age-bins, gender, deciles of net wealth and net income, and marital status). $\tau^B_{t(j)}$ and $\tau^R_{t(r(i,j))}$ are dummies for the origination month of the borrower B and relative R that most recently took a mortgage. $\mu^B_{geo(j)}$ and $\mu^R_{geo(r(i,j))}$ are dummies for the municipality of the mortgaged property of the borrower and most recent relative.[4] Depending on the specification, $Family\ ARM\ Exposure_{ij}$ is defined either as $Most\ Recent\ Relative\ Chose\ ARM_{ij}$ or $Family\ ARM\ Share_{ij}$. Appendix C presents probit versions of this analysis—as well as the analysis in Section 3.2—to confirm that the approach is robust to nonlinear specifications.

The results, shown in Table 2, demonstrate a positive relationship between family ARM exposure and ARM choice, which holds across specifications that progressively introduce the controls in Equation 1. Conditioning on borrower characteristics and fixed effects slightly attenuates the unconditional correlation, but leaves a large and precisely estimated coefficient. For example, column 3—which corresponds exactly to Equation 1—indicates that borrowers whose most recent matched relative chose an ARM are 7.2 percentage points more likely to choose an ARM themselves, while a shift in the Family ARM share from 0 to 1 predicts 10.5 percentage point higher take-up.

Notably, the results are unchanged when comparing borrower-relative pairs with identical origination timing, implemented by including fixed effects for every $\tau^B_{t(j)} \times \tau^R_{t(r(i,j))}$ pair (column 4). This rules out explanations based on families systematically originating mortgages at times when ARMs are relatively more or less attractive. The results are also robust to requiring a gap of 5+ years between borrower and relative originations (column 6), and to restricting attention to relatives originating after 2009 to address potential sample selection issues (column 5).

3.2 The Causal Impact of Family Exposure on Mortgage Choice

Of course, these regression estimates do not demonstrate a causal impact of family exposure on ARM choice. Even conditional on observable controls, unobserved factors like risk preferences or beliefs might correlate within families and impact mortgage choice.

To provide causal evidence, I turn to an instrumental variables strategy based on the *FRM-ARM Spreads*

[4] Origination month refers to the origination month×year (e.g. June, 2015). I double-cluster standard errors by the connected set of all mortgages originated by co-borrowers of the borrowers on mortgage j, and by origination month $t(j)$. Results are not sensitive to alternatives, e.g. clustering only on mortgage j.

a borrower's relatives faced at the time of origination. The spread captures differences in initial interest costs between FRMs and ARMs, is correlated with expected costs over the life of the loan, and is a strong empirical predictor of ARM choice across countries and contexts (Badarinza *et al.*, 2018).

In practice, I instrument for *Family ARM Exposure*$_{ij}$ with the *FRM-ARM Spread* in a slightly modified version of Equation 1:[5]

$$\textit{Family ARM Exposure}_{ij} = \gamma\ \textit{FRM-ARM}_{t(r(i,j))} + X'_{it(j)}\theta + \tau^B_{t(j)} + \mu^B_{geo(j)} + \tau^R_{y(r(i,j))} + \mu^R_{geo(r(i,j))} + \nu_{ij}. \tag{2}$$

The slight modification is that I include fixed effects for the *year* of the most recent relative's origination, rather than the *month*, because the latter would be collinear with the instrument. This restricts to variation in the FRM-ARM spread across relatives who originated their mortgages in different months of the same year. In the main specification, I define Family ARM Exposure$_{ij}$ as *Most Recent Relative Chose ARM*$_{ij}$, and measure *FRM-ARM*$_{t(r(i,j))}$ in the month the most recent family member originated their mortgage. I also show results using *Family ARM Share*$_{ij}$, defining *FRM-ARM*$_{t(r(i,j))}$ as the average across all originations by matched relatives.

The key intuition is that the historical *FRM-ARM Spread* faced by a relative is a meaningful determinant of the relative's mortgage choice, but should not otherwise affect the borrower's decision. This variation therefore allows us to compare otherwise similar borrowers who differ in their exposure to ARMs solely because their relatives originated mortgages under different interest-rate environments.

Figure 2 illustrates this logic by plotting a reduced-form version of the approach. Specifically, it shows coefficient estimates from versions of Equation 2 that omit $X'_{it(j)}$ and use a range of alternative dependent variables. The first estimate, labeled *ARM*, corresponds to a reduced-form specification in which the borrower's own ARM choice is the outcome. The relative's *FRM-ARM Spread* is a strong and statistically significant predictor of this choice. In contrast, the remaining estimates show no relationship between the relative's spread and observable borrower characteristics—wealth, income, age, gender, or marital status—consistent with the identifying assumptions underlying the instrument.

The results of the instrumental variables strategy, reported in Table 3, indicate a meaningful causal effect of family exposure on mortgage choice. Across specifications, the first stage is highly significant: the *FRM-ARM Spread* strongly predicts relatives' mortgage decisions in the Danish data. The corresponding second-stage estimates are positive and significant in all columns. For example, column 2 indicates that family exposure (*Most Recent Relative Chose ARM*$_{ij}$=1) increases the probability of choosing an ARM by 5.8 percentage points. This effect is modestly smaller than the corresponding OLS estimate, but economically

[5] In any month t, I measure the FRM-ARM Spread as the average interest rate difference among all originations in the Danish data.

meaningful. The estimates are qualitatively similar—and somewhat larger—when exposure is measured using the *Family ARM Share*$_{ij}$, and are robust to restricting the sample to borrower-relative pairs separated by at least five years or to relatives who originated their mortgages in 2009 or later.

Figure 3 shows that the effect of family exposure on ARM choice is present across different types of family relationships. These bars report coefficient estimates from both OLS and IV approaches, where Family ARM Exposure$_{ij}$ is constructed using only a specific relative type. Across specifications, exposure through parents and children generates larger effects than exposure through siblings, but the estimates are economically meaningful and statistically significant for all groups. Taken together, these patterns suggest that family experience is an important determinant of mortgage choice.

4 Conclusions

Using Danish administrative data, I link borrowers to their family members and document a strong within-family correlation in mortgage contract choice. Borrowers are substantially more likely to choose an adjustable-rate mortgage when a relative has done so previously, even after conditioning on origination timing, location, and detailed borrower characteristics. To establish causality, I implement an instrumental variables strategy that exploits time-series variation in relatives' incentives to choose ARMs driven by movements in the *FRM-ARM spread*. The estimates imply that a recent ARM origination within the family raises a borrower's likelihood of choosing an ARM by nearly 6 percentage points. Consistent with recent work in social finance, these results show that family experience plays a central role in mortgage choice.

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Tables

TABLE 1: SUMMARY STATISTICS

	Full Sample		Any ARM in Family		No ARM in Family	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Panel A: ARM Share in the Full Sample of Danish Mortgage Originations						
ARM Share	0.51	0.50				
Panel B: Mortgage Characteristics in the Matched Sample						
ARM Share	0.51	0.50	0.52	0.50	0.47	0.50
FRM-ARM Spread at Origination	2.05	0.34	2.04	0.34	2.10	0.35
# of Matched Relatives	3.86	2.83	4.25	2.94	2.37	1.69
ARM Share (Relatives)	0.54	0.37	0.68	0.28	0.00	0.00
Most Recent Relative Chose ARM	0.55	0.49	0.70	0.45	0.00	0.00
FRM-ARM Spread (Relatives)	2.06	0.30	2.09	0.28	1.94	0.36
Panel C: Borrower Characteristics in the Matched Sample						
Age	45	13	45	13	44	13
Male	0.52	0.50	0.52	0.50	0.53	0.50
Married	0.67	0.47	0.67	0.47	0.66	0.48
Income (DKK, millions)	0.43	0.32	0.44	0.33	0.42	0.28
Net Wealth (DKK, millions)	0.18	1.17	0.19	1.20	0.18	1.04
Panel D: Relative Characteristics in the Matched Sample						
Mother	0.16	0.36	0.15	0.36	0.18	0.39
Father	0.18	0.39	0.18	0.38	0.22	0.41
Sibling	0.48	0.50	0.49	0.50	0.44	0.50
Child	0.18	0.39	0.18	0.39	0.16	0.37
Originated 2000–2006	0.34	0.47	0.32	0.47	0.44	0.50
Originated 2007–2012	0.48	0.50	0.49	0.50	0.39	0.49
Originated 2013–2018	0.18	0.39	0.18	0.39	0.17	0.38
Borrowers in Full Sample	3,468,135					
Borrowers in Matched Sample	2,633,933		2,077,155		556,778	
Relative Originations × Borrowers	10,153,591		8,836,352		1,317,239	

Notes: Panels A–C report summary statistics for Danish residential mortgages originated between 2009–2018. Panel A includes all originations; Panels B and C restrict the sample to mortgages linked to a prior mortgage originated by an immediate family member. Income and wealth are winsorized at the 0.1st and 99.9th percentiles. Statistics are weighted at the borrower level, defined as an individual taking out a specific mortgage. Each co-borrower on a given mortgage is treated as a separate borrower, and the same individual may appear as a borrower more than once if they originate multiple mortgages. Panel D reports summary statistics for the mortgage originations of the corresponding matched relatives, weighted at the relative–origination × borrower level. The third and fourth columns consider only borrowers linked to a relative who has taken an ARM in the past, while the fifth and sixth columns consider only borrowers not linked to a relative who has taken an ARM in the past.

TABLE 2: ARM CHOICE BY EXPOSURE WITHIN THE FAMILY – OLS ESTIMATES

	Full Sample				2009–2018	Gap: 5 Years+
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Most Recent Relative						
Relative Chose ARM	0.096***	0.069***	0.072***	0.072***	0.082***	0.051***
	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Panel B: All Matched Relatives						
ARM Share Among Relatives	0.126***	0.104***	0.105***	0.105***	0.110***	0.069***
	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Observations	2,633,933	2,618,427	2,618,415	2,617,730	1,938,055	1,989,881
Controls and Fixed Effects						
Borrower Controls + Municipality FE	×	✓	✓	✓	✓	✓
Borrower Origination Month FE	×	✓	✓	×	✓	✓
Relative Municipality FE	×	×	✓	✓	✓	✓
Relative Origination Month FE	×	×	✓	×	✓	✓
Borrower × Relative Orig. Month FE	×	×	×	✓	×	×

Notes: Coefficients from OLS regressions of an indicator equal to 1 if a borrower chooses an ARM on measures of family exposure to ARMs. Panel A considers only the most recently linked relative to take a mortgage, and defines exposure as a dummy variable equal to one if that relative chose an ARM. Panel B considers all linked relatives, and defines exposure as the average ARM share among those relatives. The sample is constructed at the borrower level, defined as an individual taking out a specific mortgage. Each co-borrower on a given mortgage is treated as a separate borrower, and the same individual may appear as a borrower more than once if they originate multiple mortgages. The first four columns consider the full linked sample. The fifth column restricts to relatives with originations in 2009–2018. The final column restricts to relatives with originations at least 5 years before the borrower. Standard errors are double clustered by the connected set of all mortgages ever originated by the co-borrowers on the mortgage and by the borrower's origination month, and are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

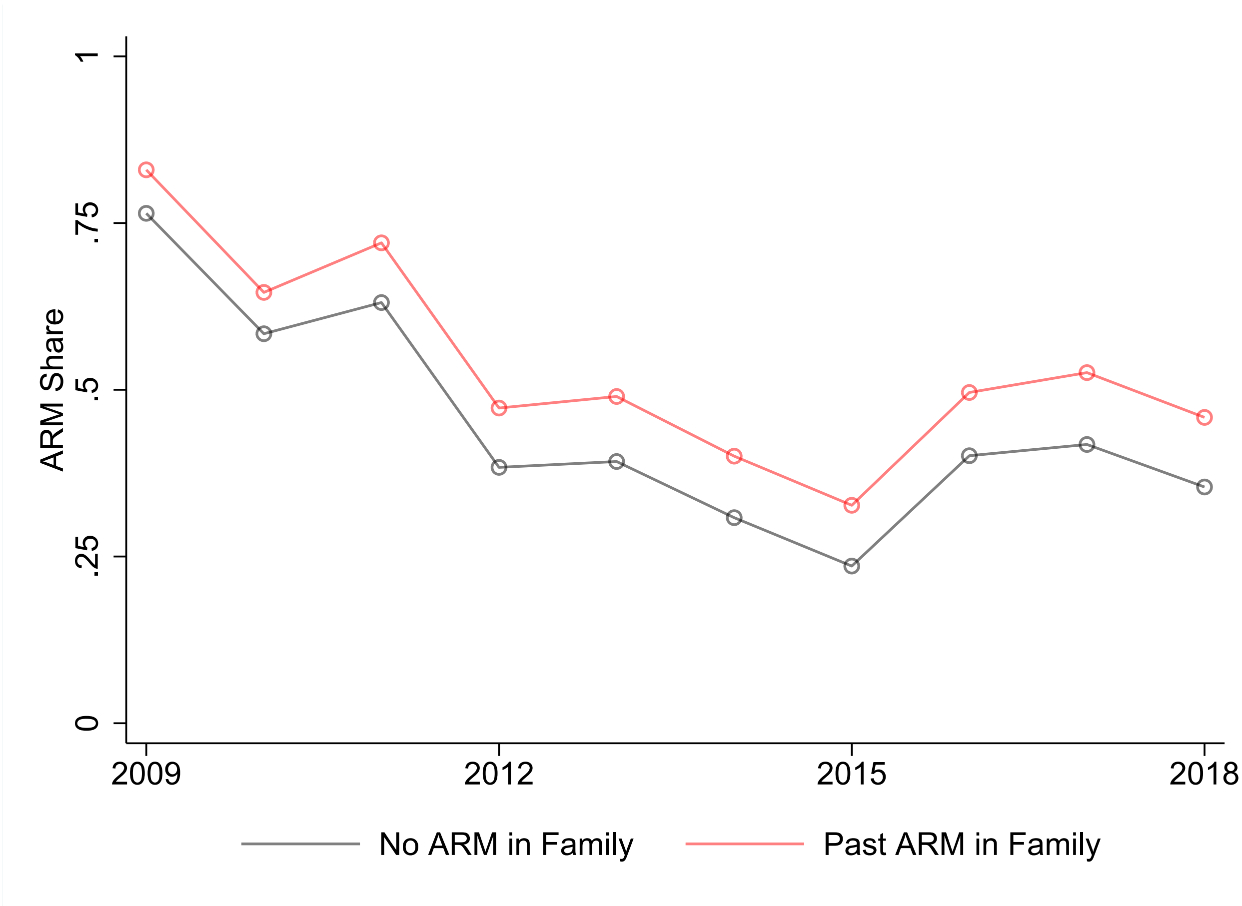
TABLE 3: THE IMPACT OF FAMILY EXPOSURE ON ARM CHOICE – IV ESTIMATES

	Most Recent Relative				All Matched Relatives			
	Full Sample		2009–2018	Gap: 5 Years+	Full Sample		2009–2018	Gap: 5 Years+
	IV	IV	IV	IV	IV	IV	IV	IV
Relative Chose ARM	0.056***	0.058***	0.031***	0.069***				
	(0.003)	(0.007)	(0.004)	(0.005)				
					0.100***	0.075***	0.054***	0.084***
					(0.005)	(0.009)	(0.004)	(0.007)
First stage								
FRM-ARM Spread (Relative)	0.343***	0.251***	0.480***	0.213***	0.250***	0.202***	0.484***	0.205***
	(0.011)	(0.014)	(0.015)	(0.012)	(0.004)	(0.005)	(0.016)	(0.007)
Observations	2,618,415	2,618,415	1,938,055	1,989,881	2,618,415	2,618,415	1,938,055	1,989,881
First-stage F-Statistic	906.8	315.6	1013.6	331.9	3892.8	1435.8	934.5	875.9
Controls and Fixed Effects								
Borrower Controls + Municipality FE	✓	✓	✓	✓	✓	✓	✓	✓
Borrower Origination Month FE	✓	✓	✓	✓	✓	✓	✓	✓
Relative Municipality FE	✓	✓	✓	✓	✓	✓	✓	✓
Relative Origination Year FE	×	✓	×	×	×	✓	×	×

Notes: Coefficients from instrumental variables regressions of an indicator equal to 1 if a borrower chooses an ARM on measures of family exposure to ARMs. The first four columns consider only the most recently linked relative to take a mortgage and define exposure as an indicator equal to one if that relative chose an ARM. In these columns, exposure is instrumented with the FRM–ARM spread in the relative's origination month, measured as the average difference in interest rates on fixed- versus adjustable-rate mortgages in the full sample of Danish residential mortgage originations. The final four columns consider all linked relatives and define exposure as the average ARM share among those relatives; exposure is instrumented with the average FRM–ARM spread across all originations by matched relatives. Across all columns, the sample is constructed at the borrower level, defined as an individual taking out a specific mortgage. Each co-borrower on a given mortgage is treated as a separate borrower, and the same individual may appear as a borrower more than once if they originate multiple mortgages. First-stage F-Statistic refers to the Kleibergen–Paap rk Wald F-statistic. The third and seventh columns restrict to relatives with originations in 2009–2018. The fourth and eighth columns restrict to relatives with originations at least 5 years before the borrower. Standard errors are double-clustered by the connected set of all mortgages ever originated by the co-borrowers on the mortgage and by the borrower's origination month, and are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

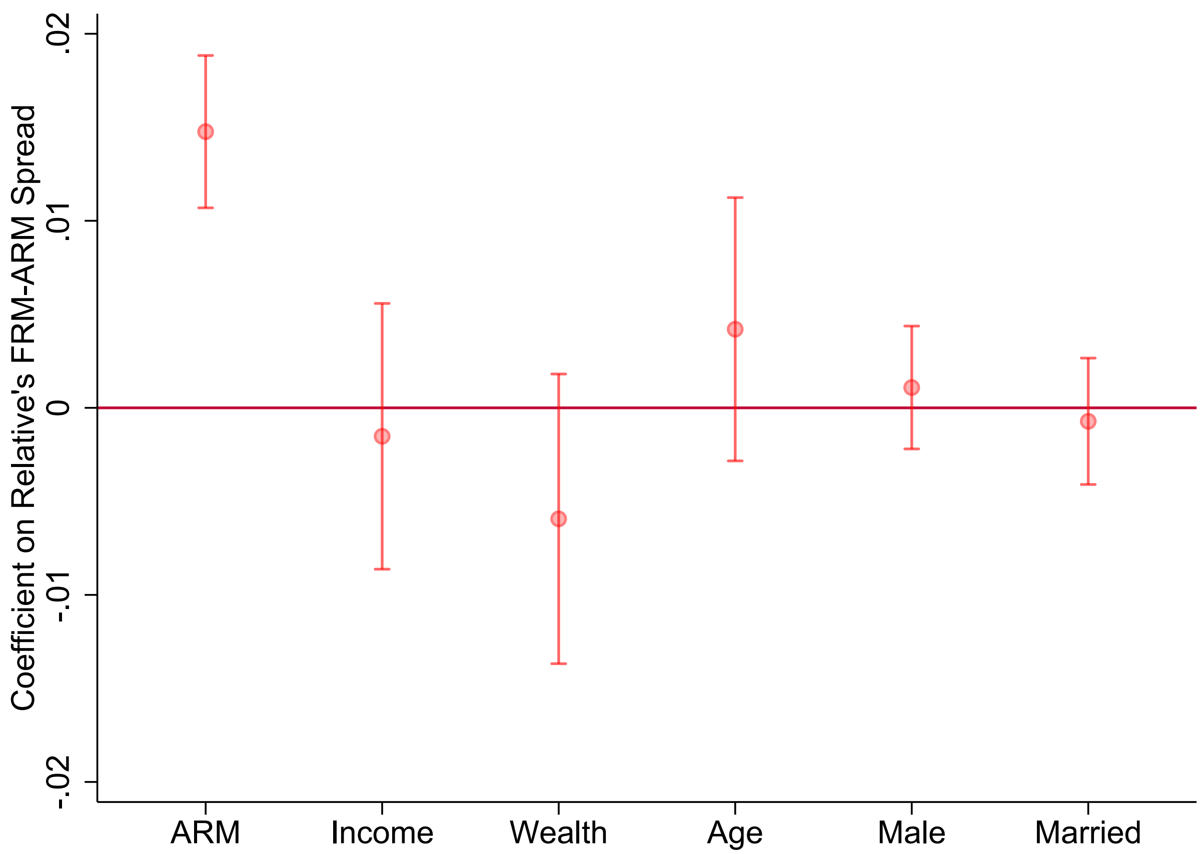
Figures

FIGURE 1: ARM CHOICE BY PAST EXPOSURE TO ARMS IN THE FAMILY



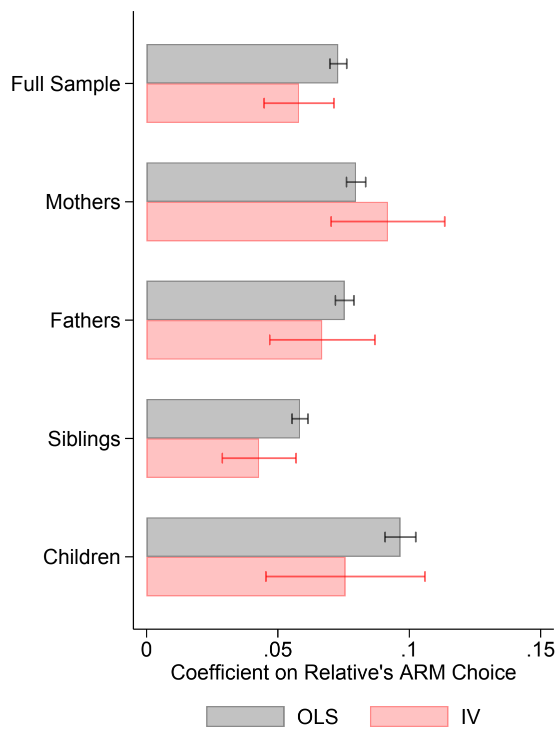
Notes: The red line plots the annual ARM share among borrowers linked to at least one relative who previously chose an ARM. The black line plots the annual ARM share among borrowers linked only to relatives who previously chose FRMs.

FIGURE 2: RELATIVE'S FRM-ARM SPREAD PREDICTS BORROWER'S ARM CHOICE BUT NOT BORROWER CHARACTERISTICS

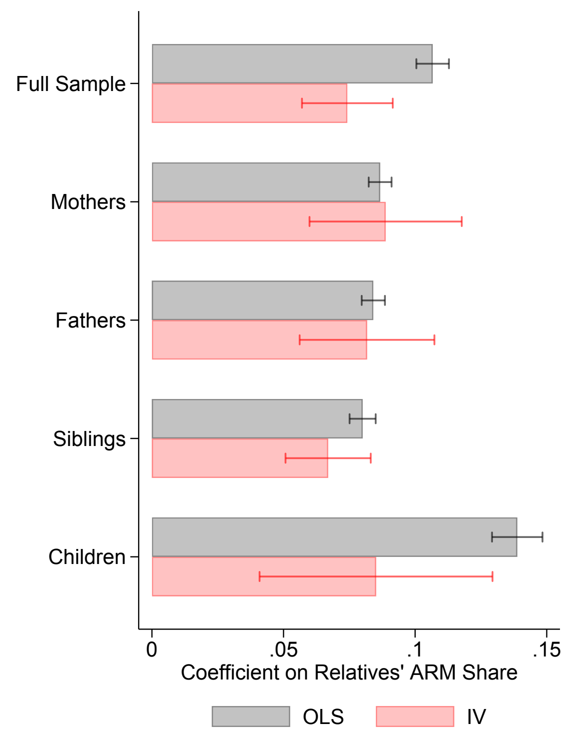


Notes: This figure presents coefficients and 95% confidence intervals from regressions of the listed borrower-level variables on the FRM–ARM spread in the origination month of the most recently linked relative to take out a mortgage. ARM is an indicator equal to 1 if the borrower chose an ARM. Continuous variables (income, wealth, and age) are measured in standard deviations. All regressions include fixed effects for the borrower's origination month, the relative's origination year, and the municipality of both the relative and the borrower. Confidence intervals are based on standard errors double-clustered by the connected set of all mortgages ever originated by the co-borrowers on the mortgage and by the borrower's origination month.

FIGURE 3: THE IMPACT OF FAMILY EXPOSURE TO ARMS BY RELATIONSHIP



PANEL A: MOST RECENT RELATIVE



PANEL B: ALL RELATIVES (AVERAGE EXPOSURE)

Notes: This figure presents coefficients and 95% confidence intervals from OLS and instrumental variables regressions of an indicator equal to 1 if a borrower chooses an ARM on measures of family exposure to ARMs. Panel A considers only the most recently linked relative to take a mortgage and defines exposure as an indicator equal to one if that relative chose an ARM. For the IV regressions, exposure is instrumented with the FRM–ARM spread in the relative's origination month, measured as the average difference in interest rates on fixed- versus adjustable-rate mortgages in the full sample of Danish residential mortgage originations. Panel B considers all linked relatives and defines exposure as the average ARM share among those relatives. For the IV regressions, exposure is instrumented with the average FRM–ARM spread across all originations by matched relatives. Across all regressions, the sample is constructed at the borrower level, defined as an individual taking out a specific mortgage. Each co-borrower on a given mortgage is treated as a separate borrower, and the same individual may appear as a borrower more than once if they originate multiple mortgages. Each specification limits the sample to consider only the listed relative type when linking borrowers. All regressions include borrower controls and fixed effects for the borrower's origination month, the most recently linked relative's origination year, and the municipality of both the relative and the borrower. Confidence intervals are based on standard errors double-clustered by the connected set of all mortgages ever originated by the co-borrowers on the mortgage and by the borrower's origination month.

Internet Appendix: For Online Publication

This Internet Appendix provides supplementary material that supports and extends the analysis in the main text. Appendix A develops the paper's relationship to the relevant literature in greater detail. Appendix B provides additional information on the data, sample construction, key variables, and their interrelationships. Appendix C reports nonlinear specifications as a robustness exercise.

A Literature

My analysis is most directly related to two strands of the literature on mortgages and household decision making. The first is work on the choice between ARMs and FRMs, which has largely emphasized the financial and macroeconomic determinants of mortgage choice. For example, Alm & Follain (1987) highlights the covariance between household income and interest rates and Campbell & Cocco (2003) develop a life-cycle model that incorporates borrowing constraints and future income risk. Koijen *et al.* (2009) and Moench *et al.* (2010) study time-series variation in the use of ARMs, focusing on the US, while Badarinza *et al.* (2018) do so in a cross-country setting. Evidence on the cross-section of mortgage choice has similarly emphasized borrower characteristics and financial factors (e.g. Dhillon *et al.*, 1987; Brueckner & Follain, 1988; Brueckner, 1992; Follain, 1990; Coulibaly & Li, 2009; Johnson & Li, 2014; Andersen *et al.*, 2023). This paper contributes to that literature by showing that an important part of the remaining cross-sectional variation in mortgage choice reflects a non-financial channel: borrowers' exposure to mortgage choices within the family. In that sense, the results highlight that mortgage contract choice is shaped not only by prices, constraints, and borrower balance sheets, but also by social exposure that does not directly affect cash flows.

The second is the growing literature on social factors in mortgage borrowing. Maturana & Nickerson (2019) show that schoolteachers' refinancing decisions are influenced by the activity of their coworkers. Similarly, McCartney & Shah (2022) show that borrowers' refinancing decisions are influenced by the decisions of their neighbors, particularly when those neighbors are of the same race. Bailey *et al.* (2019) show that the house-price experiences of a borrower's friends influence the amount of leverage the borrower takes on when purchasing a home. On the default side, Guiso *et al.* (2013) provide survey evidence that individuals who have interacted with others who strategically default on a mortgage are themselves more willing to do so, while Gupta (2019) show that nearby foreclosures increase the likelihood of default and attribute part of this effect to peer interactions. More broadly, social factors have been shown to matter across a wide range of household financial decisions; see Kuchler & Stroebel (2021) for an overview. This paper contributes by showing that social interactions are an important determinant of mortgage contract choice ex-ante, thereby influencing both the distribution of risk across households and the extent to which that risk is correlated within families.

Finally, this work relates to a broader literature showing that mortgage decisions are shaped by forces that extend beyond standard financial determinants; see Gomes *et al.* (2021) for an overview. Some papers emphasize the role of beliefs and personal experience, showing, for example, that households' inflation experiences affect mortgage choice (Botsch & Malmendier, 2023). Others highlight inertia and limited responsiveness to financial incentives, documenting that even large gains from refinancing or contract adjustment often go unrealized (Andersen *et al.*, 2020). A related line of work points to the importance of the supply side, showing that lenders can influence the contracts borrowers receive through steering and other features of the origination process (Foà *et al.*, 2019; Guiso *et al.*, 2022). This paper shows that family interactions belong alongside beliefs, behavioral frictions, and supply-side influences as an important non-financial factor governing borrower behavior.

B Data and Sample Construction

This appendix provides an overview of the data sources, variables, and sample used in the analysis. Appendix Table B.I provides a concise summary of all variables, while Table B.II reports pairwise correlations among these variables.

Mortgage Data. I use administrative mortgage data from Danmarks Nationalbank, which compiles information reported by mortgage institutions via the Association of Danish Mortgage Banks (Realkreditrådet) and the Danish Mortgage Banks' Federation (Realkreditforeningen). The dataset consists of annual snapshots of the full stock of outstanding mortgages across all Danish mortgage banks over the period 2008–2018. It includes unique personal identifiers for borrowers, loan-level identifiers, and detailed contract characteristics such as principal, coupon rate, fees, maturity, loan-to-value ratios, and origination dates.

These data provide several key variables for the analysis. The first is ARM_{ij}, an indicator equal to one if borrower i chooses an adjustable rate for mortgage j. Here, ARM_{ij} is inclusive of traditional hybrid ARMs with interest rates that are fixed for an initial period, variable rate mortgages with no fixed introductory period, and capped ARMs that feature an upper limit on the interest rate.[6] The second is Geo_j, the municipality of the mortgaged property. The third is $FRM\text{-}ARM_t$, the spread between interest rates on adjustable versus fixed rate mortgages in month t. This is measured as the average interest rate for fixed rate mortgages originated in month t in the data, less the average interest rate for adjustable rate mortgages.

[6] The large majority are traditional hybrid-ARMs, but roughly 4 percent are variable rate.

Demographic Data. I complement the mortgage data with demographic information from the Danish Civil Registration System (CPR Registeret). These records cover the full Danish population and provide individual-level identifiers, along with basic characteristics such as gender, date of birth, and marital history. The data also include identifiers for each individual's parents. This allows me to identify any immediate family members: parents, children, and siblings. I draw several control variables for the analysis from these data. The first is Age_{it}, the age of individual i in month t. The second is $Married_{it}$, an indicator equal to 1 if individual i is married in the year containing month t. The third is $Male_{it}$, an indicator equal to 1 if individual i is listed as male in the year containing month t.

Financial Data. I obtain detailed information on individual-level income and wealth from the Danish Tax Authority (SKAT). The information is collected directly from third-party sources: employers report wages paid to employees, while financial institutions provide information on deposits, interest income and expenses, securities holdings, and dividend payments. Because most taxes in Denmark are withheld or reported at the source, these administrative records provide a highly accurate measure of individuals' income and wealth. A limitation is that some components of wealth are not observed. In particular, the records exclude holdings such as unbanked cash, vehicles, private business assets, defined-contribution pension savings, and informal debts or assets. As a result, some individuals appear to have negative net financial wealth in the data because liabilities are recorded while certain assets are not—for example, when borrowing is used to finance a car purchase. I use these data to construct two control variables, $Income_{it}$ and $Wealth_{it}$, the net income and net wealth of individual i in the year containing month t. Both are measured in DKK.

Sample Construction. Each observation in the sample is at the individual $\times$ mortgage level. The same individual may appear multiple times in the sample if they originate multiple mortgages, and the same mortgage may appear multiple times in the sample if there are multiple co-borrowers listed on the loan. For the main sample, I consider all residential mortgages originated between 2009–2018.

To construct measures of family exposure, I link each individual $\times$ mortgage to the full set of mortgages originated by immediate family members (parents, siblings, or children) that satisfy the following criteria: (i) the relative originated the mortgage prior to the borrower, (ii) the borrower is not listed on the relative's mortgage, (iii) the relative originated the mortgage in the year 2000 or later, and (iv) the relative's mortgage was active at some point after 2009. I retain only borrowers with at least one match.

Using this matched data, I construct three measures of exposure to ARMs within the family. For borrower i and mortgage j, $\textit{Any ARM in Family}_{ij}$ is an indicator equal to one if any matched relative's loan is an ARM. *Family ARM Share*$_{ij}$ measures the fraction of originations by matched relatives that are ARMs. *Most Recent Relative Chose ARM*$_{ij}$ is equal to one if the most recent mortgage originated by a relative is an ARM. If multiple relatives share the most recent origination, the measure is the fraction of those relatives who took an ARM.

Summary Statistics. Table 1 presents summary statistics for the sample I consider. Between 2009–2018, 51% of residential mortgages were ARMs both in the full sample of Danish mortgage originations and in the sample matched to at least one family member's mortgage. In the matched sample, the average FRM-ARM spread at origination is 2.05%. The average loan is matched to just under 4 relative originations, and the share of adjustable rate mortgages for those relatives is 54%. The FRM-ARM spread for relatives' originations is 2.06%.

In the matched sample, the average age at origination is 45. 52% of borrowers are male, and 67% are married. The average borrower has net income of 430,000 DKK and net wealth of 180,000 DKK. Among matched relatives, just under half (48%) are siblings. The remainder are roughly equally split between mothers, fathers, and children. 34% originated their mortgages between 2000–2006, 48% between 2007–2012, and 18% between 2013–2018.

Correlations Among Key Variables. Table B.II reports pairwise correlations among the main variables used in the analysis. The three family exposure measures are positively correlated with one another, but far from perfectly, suggesting that they capture overlapping yet distinct aspects of exposure within the family. Each measure is also positively correlated with borrower ARM choice, with somewhat larger raw correlations for *Family ARM Share*$_{ij}$ and *Most Recent Relative Chose ARM*$_{ij}$ than for *Any ARM in Family*$_{ij}$. By contrast, correlations between borrower ARM choice and the demographic and financial controls are generally modest, while the contemporaneous *FRM-ARM*$_t$ spread is positively correlated with ARM take-up. Correlations among the demographic and financial controls are also broadly in line with expectation, with older borrowers more likely to be married and wealthier, and higher-income borrowers tending to have greater wealth.

TABLE B.I: VARIABLE DEFINITIONS

Variable	**Definition**
ARM_{ij}	Indicator equal to 1 if borrower i chooses an adjustable-rate mortgage for loan j. Includes hybrid ARMs, variable-rate mortgages, and capped ARMs.
$Any\ ARM\ in\ Family_{ij}$	Indicator equal to 1 if any matched relative of borrower i has an adjustable-rate mortgage.
$Family\ ARM\ Share_{ij}$	Fraction of mortgages originated by matched relatives that are adjustable-rate mortgages.
$Most\ Recent\ Relative\ Chose\ ARM_{ij}$	Equal to 1 if the most recent mortgage originated by a matched relative is an adjustable-rate mortgage. If multiple relatives share the most recent origination, this is the fraction choosing an ARM.
$FRM\text{-}ARM_t$	Difference between the average interest rate on fixed-rate mortgages and adjustable-rate mortgages originated in month t.
Geo_j	Municipality of the property associated with mortgage j.
$Married_{it}$	Indicator equal to 1 if individual i is married in the year containing month t.
$Male_{it}$	Indicator equal to 1 if individual i is listed as male in the year containing month t.
$Income_{it}$	Net income of individual i in the year containing month t, measured in DKK.
$Wealth_{it}$	Net wealth of individual i in the year containing month t, measured in DKK.
Age_{it}	Age of individual i in month t.

TABLE B.II: CORRELATION MATRIX

	ARM_{ij}	Any ARM in $Family_{ij}$	Family ARM $Share_{ij}$	Most Recent Rel. Chose ARM_{ij}	$FRM\text{-}ARM_t$	$FRM\text{-}ARM_t^{Rel}$	$Married_{it}$	$Male_{it}$	Age_{it}	$Income_{it}$	$Wealth_{it}$
ARM_{ij}	1.000										
Any ARM in $Family_{ij}$	0.040	1.000									
Family ARM $Share_{ij}$	0.094	0.747	1.000								
Most Recent Rel. Chose ARM_{ij}	0.095	0.580	0.744	1.000							
$FRM\text{-}ARM_t$	0.228	-0.080	0.020	0.070	1.000						
$FRM\text{-}ARM_t^{Rel}$	-0.012	0.205	0.203	0.165	-0.012	1.000					
$Married_{it}$	0.024	0.017	0.006	0.007	0.017	0.012	1.000				
$Male_{it}$	0.004	-0.001	-0.001	0.000	0.007	0.000	-0.012	1.000			
Age_{it}	0.031	0.048	0.032	0.020	-0.048	0.043	0.299	0.034	1.000		
$Income_{it}$	0.031	0.030	0.020	0.011	-0.077	-0.017	0.054	0.199	-0.030	1.000	
$Wealth_{it}$	0.016	0.003	0.006	0.007	-0.013	0.000	0.053	0.055	0.292	0.138	1.000

Notes: This table reports pairwise correlations among key variables used in the analysis.

C Non-Linear Specifications

To assess robustness to functional form, we re-estimate the baseline specifications using probit models. The dependent variable is an indicator for whether borrower i chooses an ARM for loan j, and we report average marginal effects for ease of interpretation. The probit specifications correspond to a latent index model of the form

$$ARM^*_{ij} = \beta\, Family\ ARM\ Exposure_{ij} + X'_{it(j)}\eta + \tau^B_{t(j)} + \mu^B_{geo(j)} + \tau^R_{t(r(i,j))} + u_{ij}, \tag{3}$$

where $ARM_{ij} = 1[ARM^*_{ij} > 0]$.

Columns (1)–(3) of Table C.I present standard probit estimates of this specification. Columns (4)–(5) implement the same instrumental variables strategy using an IV probit estimator, which accounts for the potential endogeneity of family exposure under the assumption of jointly normally distributed errors. Specifically, we model exposure as

$$\text{Family ARM Exposure}_{ij} = \gamma\, FRM\text{–}ARM_{t(r(i,j))} + X'_{it(j)}\theta + \tau^B_{t(j)} + \mu^B_{geo(j)} + \tau^R_{y(r(i,j))} + \nu_{ij}, \tag{4}$$

and allow the unobservables (u_{ij}, ν_{ij}) to be jointly normal.

As in the baseline analysis, we instrument for Family ARM Exposure$_{ij}$ using the FRM–ARM spread faced by the borrowerś relatives at the time of their mortgage origination. In Panel A, exposure is based on relatives' mortgage choices in the most recent month in which any linked relative originates a mortgage (defined as the share choosing an ARM if multiple relatives originate in that month), and is instrumented using the FRM–ARM spread in that month. In Panel B, exposure is defined as the average ARM share across all linked relatives and is instrumented using the corresponding average spread across relatives' origination months.

Relative to the baseline linear probability specifications, we make one simplification due to the computational burden of the nonlinear estimator: in specifications that include them, we omit relative municipality fixed effects and borrower-by-relative origination time fixed effects. Finally, note that the exposure measures in both panels take values between 0 and 1, so the IV probit specification treats family exposure as a continuous endogenous regressor. While this variable is bounded and therefore does not strictly satisfy the normality assumptions underlying the IV probit model, treating it as continuous provides a tractable approximation for incorporating endogeneity in a nonlinear specification. Accordingly, the reported average marginal effects summarize how the probability of choosing an ARM changes with exposure.

Despite these differences, the probit and IV probit estimates are quantitatively similar to the baseline results, indicating that the findings are not sensitive to the linear probability model approximation.

Table C.I: ARM Choice by Exposure within the Family – Probit and IV Probit Estimates

	Probit			IV Probit	
	(1)	(2)	(3)	(4)	(5)
Panel A: Most Recent Relative					
Relative Chose ARM	0.096***	0.069***	0.073***	0.056***	0.054***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.006)
Panel B: All Matched Relatives					
ARM Share Among Relatives	0.126***	0.104***	0.107***	0.101***	0.072***
	(0.001)	(0.001)	(0.001)	(0.005)	(0.007)
Observations	2633933	2618337	2618337	2618337	2618337
Controls and Fixed Effects					
Borrower Controls + Municipality FE	×	✓	✓	✓	✓
Borrower Origination Month FE	×	✓	✓	✓	✓
Relative Origination Month FE	×	×	✓	×	×
Relative Origination Year FE	×	×	×	×	✓

Notes: Reported estimates are average marginal effects from probit and IV probit models of an indicator equal to 1 if a borrower chooses an ARM on measures of family exposure to ARMs. Columns (1)–(3) report standard probit estimates. Columns (4)–(5) report IV probit estimates that account for endogeneity of the exposure measure, estimated by full-information maximum likelihood. Panel A defines exposure based on relatives' mortgage choices in the most recent month in which any linked relative originates a mortgage. If multiple relatives originate in that month, exposure is defined as the share choosing an ARM. Panel B considers all linked relatives, and defines exposure as the average ARM share among those relatives. As a result, the exposure measures may take values between 0 and 1. In columns (4)–(5) of Panel A, exposure is instrumented with the FRM–ARM spread in the relative's origination month, measured as the average difference in interest rates on fixed- versus adjustable-rate mortgages in the full sample of Danish residential mortgage originations. In Panel B, exposure is instrumented with the average FRM–ARM spread across all originations by matched relatives. The sample is constructed at the borrower level, defined as an individual taking out a specific mortgage. Each co-borrower on a given mortgage is treated as a separate borrower, and the same individual may appear as a borrower more than once if they originate multiple mortgages. Standard errors clustered at the level of the connected set of all mortgages ever originated by the co-borrowers on the mortgage are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

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