UNIVERSITÄT BONN

THE MACRO-ECONOMICS OF INEQUALITY GRK 2281

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Date: May 2021

RTG 2281 – Discussion Papers

No. 2021-9

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Funded by DFG Deutsche Forschungsgemeinschaft German Research Foundation

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Abstract

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JEL codes: E21, J16, J18, N32, R21, R38

Keywords: household debt, female access to credit, equal credit opportunity, credit constraints

* I thank Alessandra Fogli, Louis Hyman, Moritz Kuhn, Christine Laudenbach, Cathrin Mohr, Christian Moser, Tim Obermeier, Avner Offer, Fabrizio Perri, Kasper Roszbach, Moritz Schularick, Sebastian Siegloch, Michaela Slotwinski, Nils Wehrhöfer, Eugene White, Lingwei Wu and seminar participants at the Bank of England, Bundesbank, Copenhagen Business School, CREi, CSEF, Danmarks Nationalbank, IWH, University of Bonn, University of Munich and University of Vienna for their helpful comments and suggestions. Dominik Wehr provided valuable research assistance. This research was funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany´s Excellence Strategy – EXC 2126/1– 390838866.

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1 Introduction

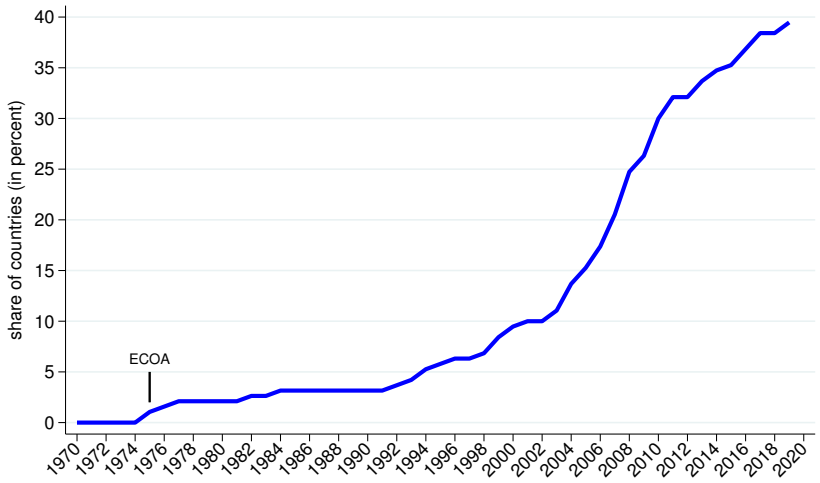
Access to credit is an essential part of the economic lives of millions of people in the United States and elsewhere. Yet only half a century ago, this access was restricted for a substantial share of the United States' citizens. Until the 1970s, discrimination in credit transactions based on characteristics like sex, marital status or race was widespread and institutionalized. Among women, especially those who were married faced severe restrictions. For instance, they could hardly obtain credit in their own name. Moreover, it was common to discount the wife's income by 50% when a couple jointly applied for a mortgage, or to even completely disregard it (Kendig 1973). This is of particular importance because mortgage debt is the dominant form of household debt, accounting for about 80% of total household borrowing (cf. Bartscher et al. 2020). Female labor force participation had increased substantially since the 1950s and kept rising, particularly among married women (Juhn and Potter 2006). With stable female employment becoming more and more common, the established practice of income discounting increasingly failed to live up to married couples' reality of life.

Given the relevance of borrowing, and in particular mortgage debt, for economic participation and consumption smoothing, it is important to understand the effects of legislative attempts to lift restrictions in access to credit. In the early 1970s, not a single country in the world had a law that explicitly prohibited gender-based discrimination in credit access (see Figure 1). This changed when the Equal Credit Opportunity Act (ECOA) was passed in the United States in 1974, becoming effective in October 1975 (Smith 1977). The new law precluded discrimination in lending based on sex and marital status, including the practice of income discounting. It thus constitutes a natural experiment to study if and to what extent the relaxation of income-related borrowing constraints affects households' access to homeownership and mortgage credit.

While the macroeconomic literature has mainly focused on loan-to-value constraints to model frictional financial markets, income-related borrowing constraints have only recently gained more attention (Greenwald 2018). I apply difference-in-difference and event study techniques to show that the ECOA had sizable and significant positive effects on the homeownership and mortgage borrowing rate of married couples with working wives. These results provide clear evidence in support of the importance of debt-to-income constraints. Moreover, I use a simple quantitative life-cycle model to study the interactions between households' behavior in the mortgage market and women's behavior in the labor market. By increasing the creditable share of married women's incomes, the ECOA raised their return to working. I find that the labor supply incentives of the act were powerful enough to motivate women to join the labor force. The increased labor force participation in turn strongly amplifies the positive effects on homeownership and borrowing.

Although the ECOA required creditors to profoundly change their lending practices

Figure 1: Laws prohibiting discrimination in access to credit based on gender



Notes: The graph shows the share of countries with explicit laws against discrimination in access to credit based on gender in a sample of 190 economies. Note that the ECOA became effective in 1975, and applied to Puerto Rico as well. Data source: World Bank Women, Business and the Law (WBL) database.

(Smith 1977), its effectiveness in increasing women's access to credit have remained an open question. Elliehausen and Durkin (1989) provide theoretical arguments why they think the ECOA did not increase credit availability "to anyone", whereas Ladd (1982) and Haurin and Kamara (1992) provide suggestive empirical evidence pointing to the contrary. However, none of these studies conducts a comprehensive econometric analysis of the topic.

In the empirical part of the paper, I attempt to fill this gap by analyzing data from the Panel Study of Income Dynamics (PSID). In particular, I exploit the institutional setting to estimate difference-in-difference regressions at the federal and event study regressions at the state level. My main focus is on married households with working wives. Since the ECOA ended the practice of income discounting, my hypothesis is that households with a higher income contribution of the wife could benefit more from the new law. I therefore compare households with a higher to those with a lower female income contribution (first difference) before and after the reform (second difference).

My results show that subsequent to the ECOA, the increase in mortgage-to-income ratios was higher the more the wife's earnings had contributed to total household income in the pre-reform years. During the pre-reform period, there was no differential trend in mortgage-to-income ratios depending on the wife's income share. The effect on mortgage debt is mainly driven by the extensive margin, i.e. by a higher relative share of households holding a mortgage. Additionally, I find a relative increase in homeownership, which entails increases in housing-to-income ratios and home size. The relative increase in home size mostly stems from households moving from smaller rented to larger owned properties. My estimates imply that the introduction of legislation against gender-based credit discrimination allowed 1.4 million of married households to move to an own home, and 1.8 million to take out a mortgage.

The first congressional hearings on equal credit opportunity for women, which finally led to the passage of the ECOA, took place in 1972. Appendix Figure A.4 provides graphical evidence on how attention for the topic "women and credit" surged from 1972 on, based on data from the Google Books Ngram Viewer. Against this background, I use 1971 as the last pre-reform year in the federal-level difference-in-difference regressions. Another important aspect is that several states already introduced equal credit opportunity laws on their own initiative in the interim period between the first congressional hearings of 1972 and the effective date of the ECOA at the federal level in 1975 (U.S. Department of Labor 1975).

An advantage of this interim period is that it allows me to exploit state-level variation in an event study design. For this purpose, I collected information on the respective state laws. While the national-level difference-in-difference design relies on a comparison of households with higher versus lower pre-reform female income contributions within a state, the state-level event study design compares households with a working wife in states which have already implemented an anti-lending-discrimination law in a given year to similar households in states which have not done so yet. The results corroborate the national-level evidence based on state-level variation. While the structure of the data does not allow me to run the event-study regressions with mortgage debt as the outcome (see discussion in Section 3), I find positive and significant effects on homeownership, house size and housing-to-income ratios of married couples in treated relative to untreated states after the reform, whereas there were no differential trends during the pre-reform years.

An important strength of the state-level regressions is that they are unlikely to pick up other contemporaneous events, given that these would have to coincide geographically and temporally with the introduction of the state-level laws. I further conduct a battery of robustness checks for the national-level regressions to minimize the risk that the results are driven by confounding events, such as the return of veterans from the Vietnam War in the early 1970s, who could obtain advantageous mortgage conditions due to insurance by the Department of Veterans Affairs (VA) (Foote and Peterson 2008).

On impact, the new legislation was most beneficial for households in which the wife had already been working, as lenders were still allowed to take employment continuity into account when determining mortgage eligibility (Geary 1976, Cairns 1976). However, the ECOA may have changed the labor supply incentives for women in the subsequent years. There can be two opposing effects on female labor supply. On the one hand, a wife ceteris paribus had to work less after the reform to afford a mortgage of a given size. On the other hand, the return to labor supply in terms of borrowing capacity increased with the reform, providing positive work incentives. These changes in labor supply incentives will not only affect existing households, but also and in particular couples who only form a household (and make their housing and labor market decisions) after the reform. For these households, it is not possible to rely on pre-versus-post-reform comparisons in the

data. In order to examine the potential labor supply effects, I therefore build a life-cycle model of married households' homeownership and mortgage choices, drawing on previous work by Pizzinelli (2018), Attanasio et al. (2012), Druedahl (2015) and Bottazzi, Low, and Wakefield (2007). Couples face idiosyncratic income risk and can choose whether to rent or own a house. If they opt for ownership, they can borrow against their house up to the minimum of a loan-to-value and debt-to-income constraint. Mortgages are modeled as long-term debt. I calibrate the model to the early 1970s, and simulate it under the assumption that either 50% or 100% of the wife's labor income can be counted toward a mortgage.

The results show that the ECOA was powerful enough to encourage married women to join the labor force. Under the given calibration, an increase in the female income discounting factor from 50% to 100% entails an increase in the female labor force participation rate of 2 percentage points. The additional female labor supply approximately doubles the effect on married couple's homeownership. The effects are strongest for young households, consistent with the empirical fact that households typically buy their first home home before their mid-thirties. Moreover, the effects are stronger for households in which the husband earns less than the median male income. This is again in line with the data, where the effects on homeownership and debt are stronger the more the wife (and the less the husband) contributes to the household's income. While the new equal credit opportunity legislation already had sizable positive effects on married couple's homeownership upon its introduction, the model suggests even larger medium- to long-run effects due to the amplification via increased female labor force participation, because the number of households benefiting from the possibility to count the wife's income toward a mortgage increases with more women entering the labor force.

My work is related to different strands of literature. First, it contributes to the literature on women's financial rights and decisions. For instance, Hazan, Weiss, and Zoabi (2019) find that the extension of married women's property rights to movable property in the U.S. since the 1850s induced significant shifts in household portfolios. Goldsmith-Pinkham and Shue (2020) show that even today, housing wealth is associated with gender differences in the U.S. They find that single women earn substantially smaller returns on housing compared to single men, while couples range in between. The authors name differences in market timing as an important explanation, but also point to the possibility of discrimination in negotiations.[1] My research shows that granting women the same rights as men in mortgage applications has important effects both on household balance sheets and wives' labor supply decisions.

My paper also adds to the literature on home financing, the role of debt-to-income constraints and their interaction with female labor supply. Foote, Loewenstein, and Willen

[1]However, Andersen et al. (2020) argue based on Danish data that the return difference between single men and women can be entirely explained by individual and property characteristics, which are not available in the U.S. data of Goldsmith-Pinkham and Shue (2020).

(2018) examine the computerization of U.S. mortgage lending in the 1990s, which permitted higher debt-to-income ratios to be accepted due to a stronger focus on credit scores, and find that this change in lending standards helped to raise homeownership rates. Greenwald (2018) points out that the importance of debt- and payment-to-income limits has remained understudied in macroeconomics, and highlights their importance for monetary policy transmission, especially via their interaction with loan-to-value constraints. These papers however do not study interactions between borrowing constraints and labor supply. A relaxation of debt-to-income constraints has different effects on labor supply incentives than a relaxation of loan-to-value constraints. Relaxing loan-to-value constraints allows households to borrow more against their house. Since additional borrowing can be used to cushion idiosyncratic income shocks (Braxton, Herkenhoff, and Phillips 2020, Herkenhoff, Phillips, and Cohen-Cole 2020), wives' labor supply incentives are reduced, as there is less need to provide insurance against husbands' negative income shocks (cf. Attanasio, Low, and Sánchez-Marcos 2005, Pruitt and Turner 2018). By contrast, a loosening of debt-to-income constraints has opposing income and substitution effects on labor supply, as discussed above.

Empirical papers have found negative effects of relaxed loan-to-value constraints and increased credit supply on female labor supply (Kumar and Liang 2019, Del Boca and Lusardi 2003, Dao Bui and Ume 2020). In contrast, women in households with larger mortgages, or households being closer to the debt-service constraint based on other than female labor income, have a higher probability to participate in the labor force, and tend to work more (see, e.g., Fortin 1995, Atalay, Barrett, and Edwards 2016 and Appendix Table A.1). Causality can run in both directions, as housing, mortgage and labor supply choices may be determined jointly (Kohlhase 1986, Atalay, Barrett, and Edwards 2016). My results show that a relaxation of income-related borrowing constraints which directly operates on the creditable share of the wife's income has the potential to motivate women to join the labor force, and that the increased labor force participation amplifies the positive direct effects of relaxing the constraint on homeownership and borrowing.

The ECOA paved the way for similar laws in many countries around the world, which are collected in the World Bank's Women, Business and the Law (WBL) database. Figure 1 shows that today, 40% of the 190 countries in the WBL panel have explicit laws against gender-based credit discrimination. This however also implies that female access to credit is still not explicitly legally protected in more than half of the world's countries. While this does not necessarily mean that women suffer credit discrimination in all these countries, it still suggests there is scope for improvement. This may be particularly true for developing countries (see also Hyland, Djankov, and Goldberg 2020, Brock and De Haas 2020).[2]

[2]Only seven OECD countries did not have explicit laws against gender-based credit discrimination by 2019. Out of these, five ranked below the average in the Economist's 2020 "Glass Ceiling Index", which compares 29 OECD countries with respect to women's chances for equal treatment at work. Among them are South Korea, Japan, Turkey and Switzerland, which occupy the lowest echelons in the ranking.

Previous research has shown that strengthening women's financial rights in developing countries can have positive economic and social effects. For instance, Field et al. (2019) find that providing Indian women with access to their own bank accounts induces them to increase their labor supply, and exerts a positive influence on gender norms. My results suggest that developing countries can gain from improving women's inclusion in financial markets, encouraging women's labor force participation and allowing their household to build up wealth. Furthermore, discrimination in lending has recently regained attention also in developed countries due to the increased usage of algorithms and artificial intelligence in lending decisions. Such algorithms can be biased by human decisions in the process of their design, and their complexity can make it harder to detect violations of anti-discrimination laws, which puts new emphasis on the importance of equal access to credit (Morse and Pence 2020, Fuster et al. forthcoming).

The paper is structured along the following outline. First, I will retrace the historical context of the ECOA in Section 2. After briefly describing the data in Section 3, I will present the empirical results in Section 4. Section 5 looks at the labor supply incentives of the act based on a life-cycle model. Section 6 concludes.

2 Historical context

I will start with a short recapitulation of the events leading to the passage of the ECOA. Moreover, I will give a brief overview of the ensuing debate about the law's effectiveness.

2.1 Women and credit in the U.S. until the 1970s

Until the 1970s, American women faced various difficulties if they wanted to borrow money. The obstacles they encountered are documented in the Report of the National Commission on Consumer Finance (1972). Single women were often unable to obtain credit, especially mortgages. Lenders commonly denied them credit in their own name, or at least required a (male) cosigner. For married women, it was even more difficult to borrow. As Cairns (1976, p. 967) puts it, married women had "greater difficulty in obtaining credit than [...] any other women".

Upon marriage, women could be required to re-apply for credit, often only under their husband's name. When a couple jointly applied for credit, it was a common practice to discount the wife's income. In certain cases, her income was not counted at all, e.g., if the marriage had lasted for less than five years, or if the couple was of young age (Kendig 1973). Income discounting was especially common if the wife was of "childbearing age" (see also Ladd 1982). Women could be required to sign an affidavit that they were practicing birth control and would not have any more children in order to get a mortgage (Kendig 1973, Cairns 1976). Lenders could even ask for a written confirmation of this from a medical practitioner, known as a "baby letter" (Geary 1976). Many creditors

applied stricter standards for applications if the wife, instead of the husband, was the main wage earner (Cairns 1976).

It is hardly surprising that women perceived practices like the "baby letter" as a violation of their privacy. Moreover, women complained about economic disadvantages entailed by the described lending practices. For instance, mortgage credit can provide access to better jobs, education and healthcare facilities by providing the opportunity to move to a different neighborhood. The historian Louis Hyman (2012) emphasizes the importance of credit for women from the upper-middle class as an "indispensable foundation of their economic and social lives" (Hyman 2012, p. 191). Yet credit in the 1970s was not only important for well-off households, but rather a "necessity for all" (Cuomo 1981, p. 126).

While the prevailing lending practices entailed economic disadvantages for women and their families, the economic justifications for maintaining them were less clear. In the 1970s, persistent female employment had become much more prevalent than in the post-war years. The female labor force participation rate had increased from around 33% in 1948 to around 45% in the early 1970s, and kept rising (see Appendix Figure A.1). This trend was mostly driven by married women (Juhn and Potter 2006). A large literature has identified important catalysts of this trend, including structural change and associated shifts in skill demand and skill premia, more favorable working conditions, legal and normative changes, as well as the increased availability of contraceptives and time-saving household appliances (see, e.g., Costa 2000, Juhn and Potter 2006, Greenwood, Seshadri, and Yorukoglu 2005 and references therein).

Of course, women still left the workforce due to pregnancy, but they also returned in increasing numbers (Lally 1974). Importantly, Lally (1974) points out that it would hardly be rational for a woman to leave the labor force to take care of her child if this would lead to a default on the mortgage with the consequent foreclosure.[3] In line with this reasoning, Fortin (1995) shows with Canadian data that women are more likely to work if their household would approach the debt-service constraint without their income. In Appendix Table A.1, I show that a similar pattern emerges for U.S. households in the 1970s. I also estimated event study regressions with annual hours worked and labor income as the outcome, and the purchase of a home after renting as the event. The results in Appendix Figure A.2 suggest that married women even slightly increase their hours worked and labor income after a home purchase, and their average labor income follows a similar trajectory as that of their husbands.

Already at the time of the ECOA's passage, economic studies provided evidence that women are on average no worse, or even better, credit risks than men (see, e.g., Lally 1974, Cairns 1976). Kendig (1973, p. 1) concludes that there was "no economic justification for automatically discriminating against women applicants for mortgages". A group of 180

[3]Diamond, Guren, and Tan (2020) show that foreclosures do not only entail substantial financial, but also non-pecuniary costs, and that these are disproportionately borne by the households losing their home.

economists even signed a "Statement of Economists" against the "[a]rbitrary exclusion of persons who have the economic capacity to participate in the [mortgage] market place".

The Federal Housing Administration (FHA) had already decided to count the income of most working wives in support of a mortgage as early as 1965, acknowledging that more and more wives were participating in the labor market.[4] However, changes in norms and attitudes can take time. Fernández (2013) shows for the U.S. that the approval rate of married women going to work closely followed the S-shaped profile of married women's labor force participation over time. She develops a model in which intergenerational learning gives rise to cultural change, which initially evolves slowly and then accelerates. In line with this reasoning, it took time until all FHA field office personnel and local lenders became aware of the changes and implemented them (cf. Thurston 2018). Other important market participants, e.g., the Veterans Administration (VA), the Government-Sponsored Enterprises (GSEs) and commercial mortgage lenders, continued to commonly discount the wife's income until the 1970s (Kendig 1973).

In 1972, attempts toward more equal access to credit gained momentum. The Federal National Mortgage Association (Fannie Mae) had abolished previous guidelines that recommended to discount a working wife's income by 50% in December 1971 (Kendig 1973). The above-mentioned "Statement of Economists" was signed in March 1972, and the Equal Rights Amendment to the Constitution, which would have made discrimination against women in mortgage lending unconstitutional, was approved by the U.S. Senate in the same month.[5]

In May 1972, the National Commission on Consumer Finance held congressional hearings on the availability of credit to women. In response to the hearings and the commission's recommendations, several states already enacted laws banning discrimination on the basis of sex or marital status in the subsequent years (see Table B.2). At the federal level, the ECOA was signed into law in October 1974 (Smith 1977). It required "that financial institutions and other firms engaged in the extension of credit make that credit equally available to all creditworthy customers without regard to sex or marital status" (Public Law 93-495, Title V, §502). The Board of Governors of the Federal Reserve System was mandated to write regulations for the implementation of the act, leading to the publication of "Regulation B" in October 1975, the month the ECOA had been scheduled to become effective. Importantly, the ECOA prescribed substantial penalties for violations[6], which were perceived as "adequate to sufficiently deter creditors from willful violations" (Smith 1977, p. 610). In 1976 , the act was amended to include discrimination for any purpose

[4] In 1964, Title VII of the Civil Rights Act (Public Law 88-352) had outlawed employment discrimination based on race, color, religion, sex and national origin. The market share of the FHA was around 16% in the 1960s, reached a short-lived peak of 24% in 1970, and then fell to around 7% in the mid-1970s (Golding, Szymanoski, and Lee 2014).

[5] However, it later was not ratified by a sufficient number of states, and finally failed in 1982 (Kendig 1973, Gladstone 2004).

[6] The penalties allowed for up to 10,000 dollars in punitive damages in individual and 500,000 dollars or one percent of the creditor's net worth in class actions, plus attorney costs and legal fees.

(Public Law 94-239), effective in March 1977 (Smith 1977).

2.2 The debate about the ECOA's effects and effectiveness

After the enactment of the ECOA, a debate ensued about its effectiveness in extending women's access to credit. Some researchers argued that the act might actually exacerbate households' difficulties to obtain credit if lenders passed on the costs of compliance, for example costs for legal counsel, training of staff or the provision of new application forms (cf. Smith 1977). Smith (1977) reasons that if women are ceteris paribus better credit risks than men, the prohibition to use sex and marital status as predictors in lending models might *decrease* their chances to obtain credit (see also Elliehausen and Durkin 1989). However, Hyman (2012) documents that lending was still hardly based on statistical analysis in the early 1970s. Lenders would commonly apply point systems, assigning, e.g., one point for singles and two for married couples (Lally 1974). Hyman (2012, p. 191) writes: "While limited numeric systems existed, these were rarely based on detailed statistical analysis. Loan officers' everyday prejudices and assumptions more decisively determined credit eligibility." While some lenders already used some form of credit scoring, it was neither widespread nor very elaborate yet (cf. Cairns 1976, Exler and Tertilt 2020).

In the case of married couples jointly applying for a mortgage, some observers were worried that households relying on male and female income might be more risky borrowers than similar households relying on the husband's income alone (cf. Lally 1974). However, the ECOA only prohibited to discount the wife's income *merely* because she was female. It was still allowed to consider aspects like the probability of employment continuity (Geary 1976, Cairns 1976). If they had valid economic reasons to expect a couple to be more risky, lenders could demand higher interest rates (Agarwal et al. 2020, Hurst and Stafford 2004). Yet married couples with and without a working wife paid very similar interest rates after moving to a new home both before and after the ECOA. This remains true when controlling for mortgage and household characteristics (see Appendix Figure A.3).[7]

Analyzing the act from a legal perspective, Cuomo (1981) concludes that it laid the ground for more equality. However, only a few researchers have examined effects of the ECOA empirically. Based on theoretical reasoning against the existence of discrimination in efficient markets and ex-post survey data, Elliehausen and Durkin (1989) conclude that "there is little evidence [...] that the act has increased credit availability to anyone". However, the survey data they use may not adequately capture whether women faced restrictions in credit availability prior to the ECOA, as the questions were asked several years after the first efforts against credit discrimination, and were by default addressed to the husband, as discussed in Appendix E.

[7] Based on post-1990 data, Tzioumis (2017) and Jakucionyte and Singh (2020) find performance differences between mortgages with and without co-borrowers, which are however not priced by lenders. However, they show that mortgages with a co-borrower have a significantly *lower* probability of default.

Ladd (1982) uses mortgage application data from California and New York for 1977 and 1978 to investigate the prevalence of discrimination against women after the ECOA. She concludes that the ECOA had a positive impact on female access to credit, whereas it was less successful for other protected groups like racial minorities. She suggests that the ECOA's relative success in providing credit access to women may be due to the "rapidly changing role of women in the labor market" (ibid., p. 170; cf. also Hyland, Djankov, and Goldberg 2020). Yet as she does not have pre-reform data, she cannot directly compare the extent of discrimination before and after the ECOA. Haurin and Kamara (1992) take a step in this direction with data from the National Longitudinal Surveys of Young and Mature Women from 1972/73 and 1982/83. They find that the homeownership rate increased between the two survey dates for married women and singles, conditional upon household characteristics, and argue that this is in line with positive effects of the ECOA.

In summary, there is suggestive evidence that the ECOA might have had important positive effects on married women's access to credit, but formal econometric evidence is missing. In the following, I will explore the effects of the ECOA in a difference-in-difference design. I will use data from the PSID, which allows me to track the same households over time, and to include pre-reform characteristics in the estimation.

3 Data

The PSID is a widely used representative survey of U.S. families. It was conducted at an annual frequency between 1968 and 1997, and has been continued at a biennial frequency since then. In order to obtain household-level data, I aggregated PSID families who are living together into one household (cf. Pfeffer et al. 2016). I use data from the PSID's "Survey Research Center (SRC) sample", which is nationally representative and tracks households from the first PSID wave over time, as well as the new households formed by former members of these households, e.g., adult children moving out.[8] Survey weights are used for the calculation of descriptive statistics (Hill 1991).[9] Specifically, I use the longitudinal PSID family weights and post-stratify them to match age, race and homeownership from the Current Population Survey (CPS), following the procedure of Kuhn, Schularick, and Steins (2020). All nominal variables were deflated with the CPI, obtained from the *Macrohistory Database* (Jordà, Schularick, and Taylor 2017), such that the reported results are in 2016 dollars.

Before the ECOA, women's access to credit was restricted both for secured and unsecured debt. Comprehensive information on wealth is available in the PSID only since 1984, and was initially only queried every five years. Questions on components of personal debt like student and credit card debt are only available since 2011. However, the majority of

[8]The full original 1968 PSID sample was a combination of two independent samples: the SRC sample, and an over-sample of low-income families, the "Survey of Economic Opportunity (SEO) sample".

[9]Solon, Haider, and Wooldridge (2015) discuss the pros and cons of using weights when estimating causal effects. I verified that my estimation results are similar with weights. Results are available upon request.

household debt in the U.S. consists of housing debt (Bartscher et al. 2020). Information on the outstanding mortgage balance is available in the PSID since 1969, as well as information on monthly mortgage payments. Unfortunately, both of these variables are missing for 1973-1975 and 1982. Information on the asset value of houses and their size is available without interruptions since 1968. Moreover, the survey provides information on the labor income of household heads and spouses, as well as total household income. Additionally, it contains a wide range of demographic variables, such as age, number of children and state of residence.

For some complementary results, I also use data from the "SCF+". This data set combines the modern Survey on Consumer Finances (SCF) with its historical predecessors. Kuhn, Schularick, and Steins (2020) describe this data source in detail.

4 Effects of the ECOA

As discussed in Section 2.1, married women arguably had the greatest difficulties of all women to obtain access to credit prior to the ECOA, in particular regarding mortgages. Moreover, even if the share of single households living in an owned and mortgaged property increased after the mid-1970s, it was still comparatively small (see Figure A.5 in the Appendix). Therefore, I will focus my analysis on married households. To guide the analysis, I give a brief theoretical motivation before proceeding to the empirical results.

4.1 Some brief theoretical background

Let us consider a stylized model of married couples' household debt and housing choices over the life cycle. Households live from period $j = 1$ to J and consist of a male spouse m and a female spouse f who earn labor income y_j^m and y_j^f. Borrowing d_j is only possible if the household owns a house ($h_j > 0$), and is limited by a debt-to-income (DTI) constraint:

$$\phi(y_j^m, y_j^f) = \lambda^y(y_j^m + \lambda^d y_j^f). \tag{1}$$

λ^y is the DTI limit, and λ^d determines by how much the wife's income is discounted. Household thus have to maximize their utility subject to a budget constraint and the relevant borrowing constraint, which is zero if the household does not own a house, and otherwise given by equation (1), such that $\lambda^y(y_j^m + \lambda^d y_j^f) \geq d_{j+1}$.

Consequently, λ^d only matters for the household problem if the household owns a house ($h_j > 0$) and the DTI constraint is binding. As a first pass, let us abstract from potential changes in labor supply. In the short run, this assumption seems reasonable for two reasons. Firstly, adjustments in labor supply may require search time due to frictions in the labor market. Secondly, banks were still allowed to take employment continuity and income stability into account, such that short-term labor supply increases would not immediately translate into a relaxation of DTI constraints. Potential changes in

labor supply are however likely to play a role in the medium to long run, and will be examined in Section 5. If λ^d is raised, households which were previously limited by the DTI constraint will be enabled to take out a mortgage and buy a home. The response will be stronger for households in which the wife contributes more to total household income y_j. To see this, consider a household at the DTI constraint, and take the derivative with respect to the income discounting factor λ^d:

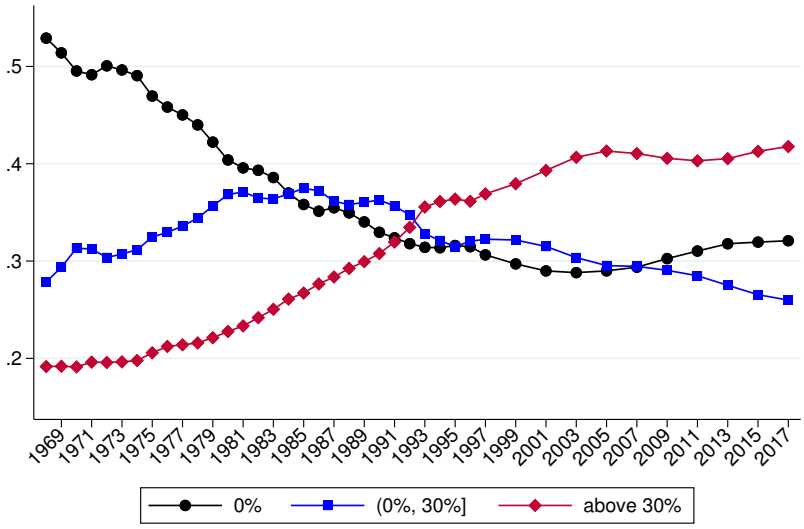
$$\frac{\partial d_{j+1}}{\partial \lambda^d} = \lambda^y y_j^f = \lambda^y s_j^f y_j > 0.$$

s_j^f denotes the share of the wife's labor income in household income y_j. The derivative shows that the household will increase its debt if λ^d increases, and the response will be stronger the higher the wife's income share is. Based on these considerations, my hypothesis is that married households in which the wife contributed a larger share to household income have increased their housing debt by more in response to the reform. As I will show in the following, the PSID data provide clear evidence in support of this conjecture.

4.2 Descriptive evidence

As discussed in Section 2, female labor force participation had increased substantially by the 1970s and kept rising, such that more and more households relied at least in part on female labor income. Figure 2 stratifies married households by the wife's contribution to the household's total income. Around 50% of wives did not contribute any earnings to their household's income in the early 1970s.[10] This share steadily declined over the

Figure 2: Shares of married households by labor income share of wife



Notes: The graph shows shares among all married households, stratified by the wife's labor income contribution to total household income. The series were smoothed by taking a 3-year moving average.

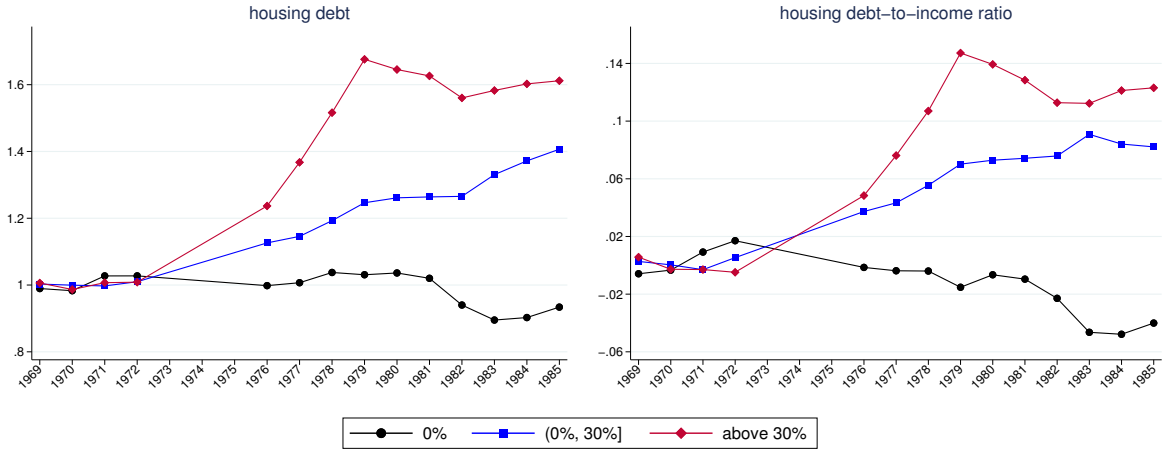
[10]This corresponds to about a third of all (married and non-married) households at the time.

following years, until it leveled off at around 30% in the late 1990s. The share of households in which the wife's earnings make a moderate contribution of less than 30% of total household income increased slightly over the 1970s, stayed more or less constant until the early 1990s, and declined again thereafter. By contrast, the share of households in which the wife's labor income accounts for more than 30% of total household income has increased considerably over time, from less than 20% to 40%.

In 1986, the Reagan Tax Reform Act introduced major changes in mortgage markets (Bartscher et al. 2020), and potentially also labor markets (Juhn and Potter 2006, Bastian 2020). Therefore, I will focus on the period until 1985 in the following, which corresponds to a period of ten years after the ECOA's effective date in 1975. Single households are excluded from the sample, and the head is defined to be the male partner in all cases. I will refer to this sample as the baseline sample throughout.

Figure 3 shows the trajectory of housing debt for the three groups of married households from Figure 2. It reveals that married households with a working wife increased their housing debt more after the ECOA than married households with a non-working wife, for whom there was almost no change over the 1970s. The effect is stronger the more the wife contributes to total household income. In the right panel, I normalize housing debt with total household income to make sure that the divergence in debt does not simply reflect a divergence in incomes. While normalizing by income introduces some more noise, the qualitative patterns remain the same.

Figure 3: Housing debt of married households by female income contribution

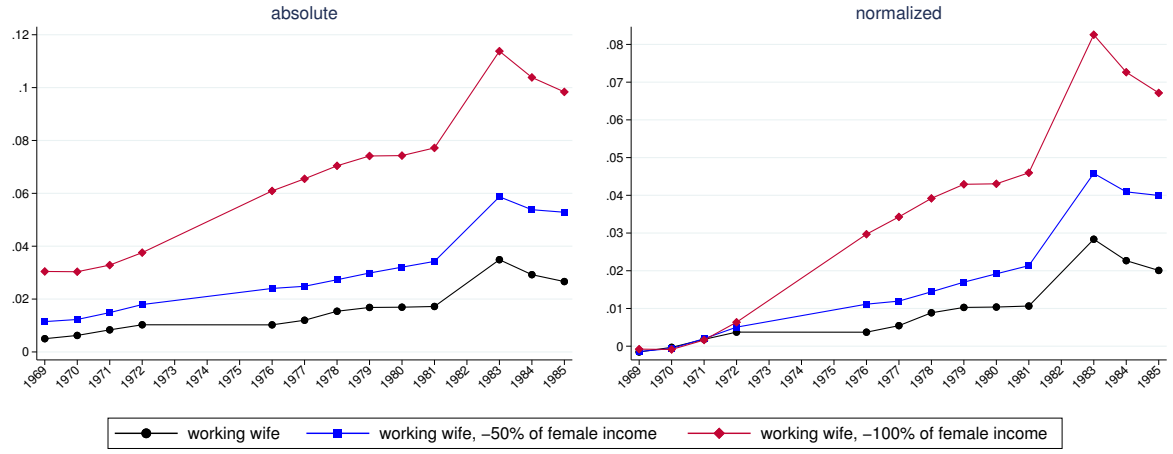


Notes: The graph shows housing debt of married households over time. It differentiates between households in which the wife's labor income accounts for different shares of total household income. All series were normalized with their average over the period 1969-1971. The left panel shows average housing debt, and the right panel shows the average housing debt-to-income ratio, after winsorizing at the 99th percentile within each year. The series were smoothed by taking a 3-year moving average.

The faster debt increase of married households with a working wife subsequent to the ECOA suggests that the possibility to (fully) count the wife's income toward a mortgage enabled married households to buy a home who had previously been restricted by debt-service constraints. After the reform, the extent to which married households relied on the

wife's income for mortgage borrowing increased substantially. In the United States of the 1970s, banks viewed 25% of gross income as a critical threshold which mortgage payments should not exceed upon origination (Lally 1974, Gigot 1981). Figure 4 shows the shares of married households with a working wife whose debt-service-to-income (DSTI) ratio exceeds 25%. Additionally, it shows the share of households whose DSTI ratio *would be* above 25% if 50% or 100% of the wife's income were discounted.

Figure 4: Share of households with debt-service ratio above 0.25



Notes: The left panel shows the share of households with a debt-service-to-income ratio above 25% among households with a working wife. Households with implausibly high ratios (above the 99.8th percentile) were excluded. The blue lines with squares (red lines with diamonds) show counterfactual shares based on debt-service ratios excluding 50% (100%) of the wife's income. The series were smoothed by taking a 3-year moving average. The right panel normalizes each series with its average over the period 1969-1971.

Households with a working wife already relied on female income before the ECOA, as the left panel of Figure 4 shows. When the wife's income is partially or fully disregarded, the share of households with a high debt-service ratio in 1969-1971 increases from around 1% to 1.5% or 3%, respectively. However, the reliance on female income grew substantially after the ECOA. This becomes clearer in the right panel of Figure 4, which normalizes the series from the left panel by subtracting their 1969-1971 averages. The share of households who would exceed the critical threshold without the wife's income surges rapidly after the reform, demonstrating the increased reliance on female income. More than 10% of married households with a working wife would have found themselves above the threshold without the wife's income in the early 1980s.[11] Looking at the share of households with a high DTI ratio leads to similar conclusions (see Appendix Figure A.6).

A DSTI or DTI constraint typically only binds upon origination of a mortgage. If it is violated at a later point, e.g., due to a short-lived negative income shock, this is usually not sanctioned, as long as the household is still able to make the mortgage payments. Hence, there is no one-for-one mapping between the share of households violating the constraint and the share of households who are unable to service a mortgage. Yet Figure 4 suggests that many of the households who took out a mortgage in the period after the

[11]Note that some lenders began to relax debt service restrictions in the early 1980s (Gigot 1981).

ECOA could not have borrowed as much without relying on the wife's income, unless the husbands would have had scope to work substantially more (see also Offer 2007).

4.3 Difference-in-difference estimates

To gain formal empirical evidence, I estimate simple difference-in-difference regressions. As discussed above, I will treat 1971 as the last pre-reform year, because the first actions toward equal access to credit for women were taken after this year. The empirical specification is as follows:

$$Y_{ist} = \sum_{t=1969,\, t\neq 1971}^{1985} \beta_t \cdot \delta_t \cdot share_i^{pre} + \alpha_{st} + \gamma_i + \Gamma' X_{ist} + \epsilon_{ist}. \tag{2}$$

Y_{ist} is the outcome variable, for instance the housing debt-to-income ratio of household i living in state s in year t. δ_t are year dummies and $share_i^{pre}$ is the average share of the wife's labor income in total household income over the period 1969-1971. Labor income includes wages and salaries, as well as the labor portion of other income, e.g., from businesses.[12] I use the average pre-reform income share, because it is predetermined with respect to the reform. A robustness check with contemporaneous income shares is presented in Appendix B.

I control for state-year fixed effects α_{st} to absorb aggregate and state-specific trends, for example in house prices (cf. Offer 2007). Moreover, I exploit the panel dimension of the PSID by including household fixed effects γ_i to absorb all household characteristics that are constant over time. X_{ist} is a vector of time-varying demographic controls.[13] In particular, I include age group dummies and the number of children to control for life-cycle patterns, as well as income group dummies.[14] The inclusion of the state-year and age dummies implicitly controls for cohort membership. Standard errors are clustered at the household and state level.

The coefficients of interest are those on the interaction term, β_t. Given the previous discussion, it can be expected that households profited all the more from the reform the more the wife contributed to the household's income. The idea is therefore to use households with a lower pre-reform female income share as a control group for those with a higher share. One may also estimate a more coarse but slightly simplified version of equation (2), using a binary indicator as the interaction variable and thus comparing households with a positive to those with a zero pre-reform female income share. I will present results from this simplified version of the model below in Section 4.4, and use

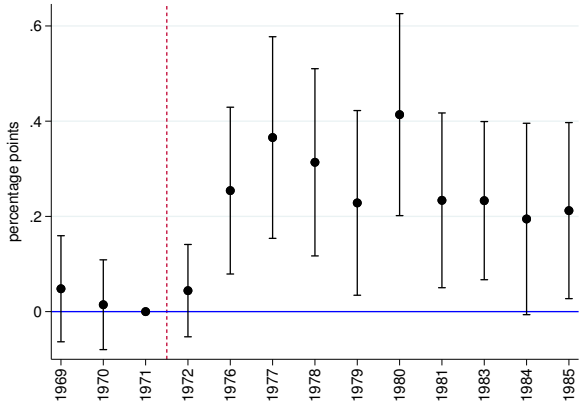
[12] For simplicity, I will refer to the wife's income share in the following. This should always be understood as the share of the wife's labor income.

[13] Additionally, I examined the robustness of my results to the inclusion of an interaction between the predetermined level of the wife's education in 1971 and the year dummies. While this make the specification more demanding, it hardly changes the effects. Results are available upon request.

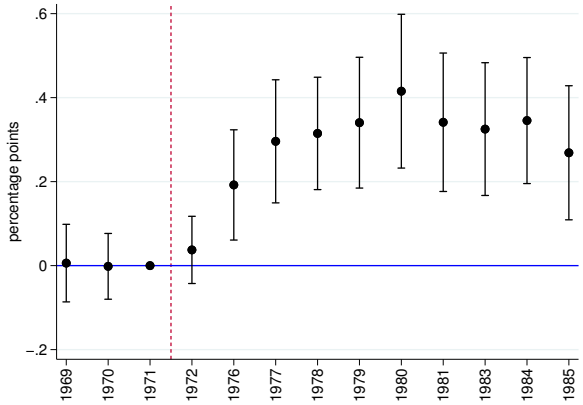
[14] Following a common classification, I group households into three income categories: bottom 50%, middle 40% and top 10%.

Figure 5: Housing debt

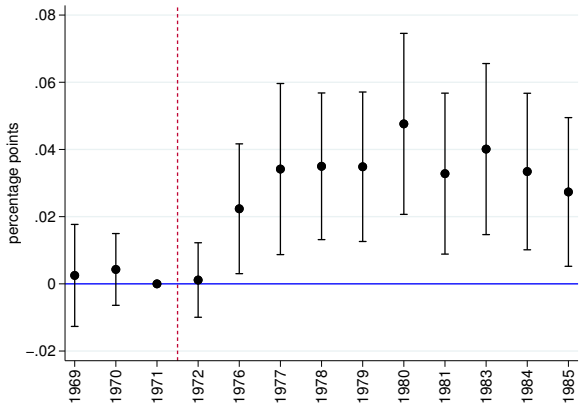
(a) Housing debt-to-income ratio



(b) Mortgagor rate



(c) Debt-service-to-income ratio



Notes: The graph presents the coefficients on the interaction term in equation (2). The base year is 1971. The wife's income share and the DTI and DSTI ratios are defined in percent. The DTI and DSTI ratios were winsorized at the 99th percentile within each year. The whiskers indicate 95% intervals.

them to quantify the aggregate effects of the reform.

As a first outcome, I consider the housing debt-to-income ratio in Figure 5a, which plots the coefficients β_t over time.[15] Before 1971, housing debt-to-income ratios evolved similarly for all married households, no matter how much the wife's earnings contributed to total household income. Yet after the ECOA, households increased their housing debt-to-income ratios all the more the larger the wife's pre-reform income share was. The effect is persistent and remains significant at the 95% level until the mid-1980s (apart from one slightly less significant point estimate). Table 1 presents difference-in-difference point estimates obtained by replacing the year dummies in equation (2) with a dummy for the period after 1971. The point estimate for the DTI ratio in Table 1 implies that a household in which the wife's average pre-reform income share was one percentage point higher increased its housing debt-to-income ratio by around 0.21 percentage points (column 1)

[15] Appendix Figure B.14 shows that a similar pattern emerges with non-normalized housing debt as the outcome.

Table 1: Housing debt

	DTI	DTI, int. (log DTI)	DTI, ext. (mortgagor)	DSTI	DSTI, int. (log DSTI)
Post 1971	0.210***	-0.002	0.003***	0.025***	-0.001
× Tot. Inc. Share Wife 71	(0.063)	(0.001)	(0.001)	(0.008)	(0.001)
Controls	yes	yes	yes	yes	yes
Household FE	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes
Mean	36.548	3.915	0.513	5.092	2.100
Observations	20,188	10,225	20,190	20,188	10,222

Notes: The table presents results for equation (2), after replacing the year dummies with a dummy for the period after 1971. The abbreviations "int." and "ext." refer to the intensive and extensive margin. Standard errors are given in parentheses and are clustered at the household and state level (* p<0.1, ** p<0.05, *** p<0.01). The debt-to-income (DTI) and debt-service-to-income (DSTI) ratios were winsorized at the 99th percentile within each year. The wife's income share and the DTI and DSTI ratio are defined in percent.

after the reform. Correspondingly, a thirty-percentage-point increase in the wife's income share translates into a six-percentage-point (30×0.21) increase in debt-to-income, which is approximately 16% of the average in-sample debt-to-income ratio of 36.55%.

Home equity extraction only became popular and widespread in the 1980s (see Bartscher et al. (2020) and references therein). It is therefore likely that the relative increase in housing DTI ratios of households with a high female income contribution is at most partially driven by additional borrowing of incumbent owners against their home. Consistently, the effect operates through the extensive margin. This means that DTI ratios increase because more households take out mortgages, and not because existing borrowers increase their mortgage balance. The clear visual pattern from Figure 5b translates into a strongly significant point estimate in Table 1.[16] According to the estimate, a one percentage point higher female income contribution leads to a 0.3 percentage points higher probability of having housing debt (column 3). By contrast, the coefficient for log housing debt relative to income in column 2, which captures the intensive margin, is small, insignificant, and actually negative. As the relative share of households with positive housing debt increases among households with a high female income contribution, the relative share of households making mortgage payments increases as well. This leads to a highly significant point estimate for the debt-service-to-income (DSTI) ratio in column 4, while there is no effect at the intensive margin (column 5). Figure 5c confirms that also for the DSTI ratio, there were no pre-trends before the reform.

Absent home equity extraction, there are two other plausible reasons for increases in the extensive margin of housing debt. First, households may rely less on other sources of home financing, e.g., borrowing from their family (cf. Del Boca and Lusardi 2003). Second, the

[16]For a comparison of regressions with and without controls, see Table B.1 and Figure B.1.

Table 2: Housing

	HTI	HTI, int. (log HTI)	HTI, ext. (homeowner)	LTV	number of rooms
Post 1971	0.327***	0.001	0.002***	-0.117***	0.004**
× Tot. Inc. Share Wife 71	(0.120)	(0.001)	(0.000)	(0.039)	(0.001)
Controls	yes	yes	yes	yes	yes
Household FE	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes
Mean	157.611	5.073	0.816	25.803	5.868
Observations	26,767	21,768	26,776	16,353	26,289

Notes: The table presents results for equation (2), after replacing the individual year dummies with a dummy for the period after 1971. The abbreviations "int." and "ext." refer to the intensive and extensive margin, respectively. Standard errors are given in parentheses and are clustered at the household and state level (* p<0.1, ** p<0.05, *** p<0.01). The housing-to-income (HTI) and loan-to-value (LTV) ratios were winsorized at the 99th percentile within each year. The wife's income share and the HTI and LTV ratio are defined in percent.

homeownership rate may increase. Figure 6b confirms that homeownership has indeed increased more for households with a high female income contribution. This relative increase at the extensive margin has lead to a corresponding relative increase in housing-to-income (HTI) ratios (see Figure 6a). Table 2 contains the related difference-in-difference point estimates. The average HTI ratio rises by around 0.3 percentage points more for every additional percentage point of the wife's average pre-reform income share (column 1), and the likelihood of homeownership increases by 0.2 percentage points (column 3).

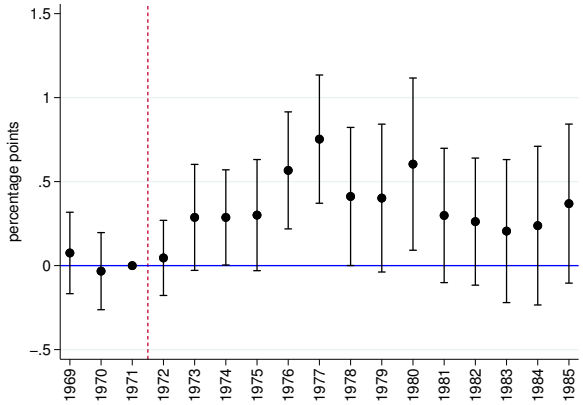
Like the debt effect, the effect on housing mainly works through the extensive margin. The coefficient on the log housing-to-income ratio in the second column of Table 2 is positive, but very small and not significant. By construction, the loan-to-value (LTV) ratio is only defined for homeowners, and thus does not reflect changes at the extensive margin of housing. Together with the small negative effect at the intensive margin of housing debt, the small positive effect at the intensive margin of housing translates into a negative LTV effect (column 4). Finally, I find that households with a higher female income contribution increase the size of their home by more after the reform (see Figure 6c and column 5 of Table 2). This effect is mainly driven by households moving from a smaller rented to a larger owned property.[17] A few households also upgrade to larger homes, in line with the small positive intensive-margin effect.

The main focus of this paper is on married households, because married women arguably had the greatest difficulties to obtain credit in the pre-reform era. However, singles may also have benefited from the reform, given that it precluded credit discrimination related to both sex and marital status. To investigate whether their access to credit improved as well, I estimated similar regressions for singles (see Appendix C). Appendix Figure C.3

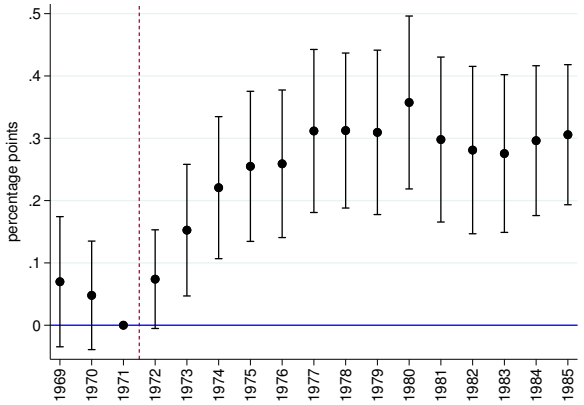
[17] In my baseline sample, rented homes have 4.9 rooms on average, compared to 6.1 for owned properties.

Figure 6: Housing

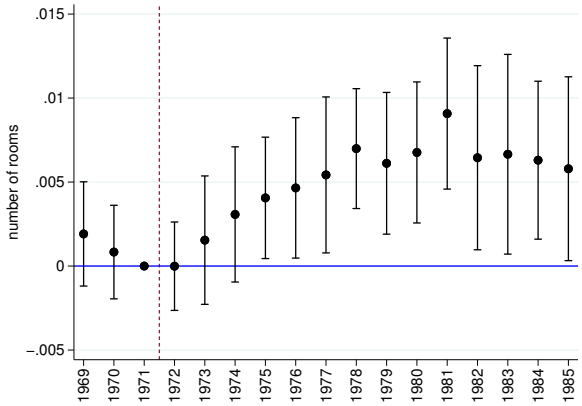
(a) Housing-to-income ratio



(b) Homeownership



(c) House size



Notes: The graph presents the coefficients on the interaction term in equation (2). The base year is 1971. The wife's income share and the HTI ratio are defined in percent. The HTI ratio was winsorized at the 99th percentile within each year. The whiskers indicate 95% intervals.

shows that singles indeed borrowed more subsequent to the ECOA, compared to married households with a non-working wife. However, there is no evidence of an associated increase in homeownership. A possible interpretation is that singles could substitute away from other financial sources, such as loans or transfers from relatives (cf. Del Boca and Lusardi 2003), which are generally less important for married couples. Appendix Figure C.4 shows that the responses were similar for single men and single women.

4.4 Translation into aggregate effects

How do the estimated effects at the micro level translate into macro variables such as the homeownership rate? In order to quantify the effects on overall mortgage borrowing and homeownership, I replace $share_i^{pre}$ in equation (2) with a binary indicator equal to one if $share_i^{pre}$ is positive, and the year dummies with a dummy equal to one after 1971. This strategy allows me to directly compute the total effect on households with working

wives.[18] Moreover, the resulting estimate can be compared more easily to the effect size under the alternative event study identification in Section 4.5.1. The point estimates for the borrowing and homeownership rates are summarized in Table 3, and the dynamic effects are shown in Appendix Figure B.2. The point estimate of around 0.08 for the extensive margin of mortgage debt, multiplied by the average share of married households with a working wife in 1971 ($\approx 34.5\%$) and the total number of households in this year ($\approx$ 64,778,000) yields a number of 1.8 million additional borrowers. The analogous calculation for homeownership implies that 1.4 million households were enabled to buy their own home. This corresponds to a ceteris-paribus change of around 3.3 percentage points in the average homeownership rate of married households.[19]

Table 3: Point estimates with binary interaction

	mortgagor rate	homeowner-ship rate
Dummy ×	0.083***	0.062***
Post 1971	(0.021)	(0.014)
Controls	yes	yes
Household FE	yes	yes
Time FE	yes	yes
Mean	0.513	0.816
Observations	20,190	26,776

Notes: The table presents the results of estimating a binary version of equation (2), where the interaction term is replaced by the interaction between a dummy for whether the average pre-reform share of the wife's labor income was positive and a dummy for the post-reform period after 1971. Standard errors are given in parentheses and are clustered at the household and state level (* p<0.1, ** p<0.05, *** p<0.01).

As discussed by Cuomo (1981), the ECOA did not abolish all credit discrimination against women. For instance, married women without an own income could still not obtain credit without their husband's approval in separate property states (ibid.) However, he acknowledges that the ECOA provided more comprehensive protection to working wives earning their own income. My results show that this increased protection translated into sizable and significant positive effects on access to credit for working wives and their households. In particular, more married households with working wives could take out mortgages to become homeowners and increase the size of their home. In the following, I will examine the robustness of my baseline findings.

[18] Alternatively, I could use the point estimates from the third columns of Tables 1 and 2, and aggregate over households with different female income contributions. The resulting numbers are similar (1.3 million more homeowners and 1.6 million more borrowers).

[19] For comparison, the average homeownership rate of married households in the data changed by around 6.5 percentage points between 1971 and 1985.

4.5 State-level evidence and robustness

While the results of the national-level difference-in-difference regressions are consistent with plausible effects of the ECOA, they may still, at least partly, capture effects of other contemporaneous events that might have affected households with working wives differentially, such as the return of veterans from the Vietnam War. While I perform an extensive set of robustness checks in Section 4.5.2, the institutional setup allows me to provide even stronger evidence based on state-level variation. As described in Section 2.1, some U.S. states already introduced laws against discrimination before the ECOA became effective at the federal level. This setup opens up the possibility to exploit variation across states for identification. Such an approach is much more robust to potential confounding events, because these events would have to occur both in the same states and at the same time as the introduction of anti-lending-discrimination laws. For this reason, I use information on the relevant state laws and estimate event study regressions to assess whether my previous findings are consistent with those obtained from this alternative identification strategy. In Section 4.5.2, I then explicitly consider likely candidates for potential confounding events at the national level, and investigate the robustness of the federal-level results against the background of these events. Additional details and figures can be found in Appendix B.[20]

4.5.1 State-level variation

According to the U.S. Department of Labor (1975, p. 384), 40 states had "legislation or regulations on some aspect of discrimination in credit based on sex and/or marital status" as of April 1975. Table B.2 in the Appendix provides an overview over these laws. States which introduced anti-credit-discrimination legislation earlier might have witnessed effects on homeownership and housing debt earlier. To test this hypothesis, I estimate event study regressions similar to the specification in equation (2):

$$Y_{ist} = \sum_{j=\underline{j}}^{j=\overline{j}} \beta^j \cdot D_{st}^j + \alpha_s + \delta_{rt} + \gamma_i + \Gamma' X_{ist} + \varepsilon_{ist}. \tag{3}$$

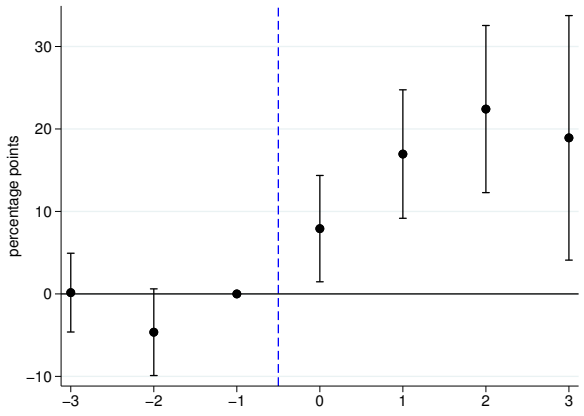
α_s are state fixed effects, δ_{rt} are census-region-times-year fixed effects and the remaining notation is as in equation (2). The region-times-year fixed effects are included to capture differences in house price trends across census regions (cf. Bartscher et al. 2020).[21] The event time index j denotes periods relative to the event e_s in state s, covering an event window from $\underline{j}$ to $\overline{j}$. The treatment period e_s is chosen as the year when the law in state s became effective. For all states which had not introduced any state-level legislation against credit discrimination in home financing before the effective date of the ECOA in 1975, I choose 1975 as the treatment year. This includes seven states whose laws did not

[20] Some robustness checks are not reported for the sake of space. All results are available upon request.
[21] State-level house price indices are only available since 1975.

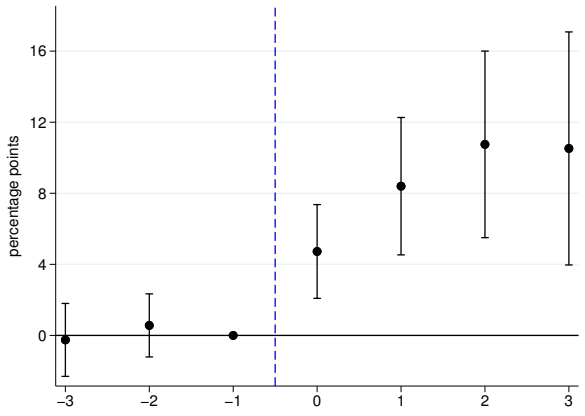
pertain to home financing (see Table B.2). In order to achieve identification in this setup, I drop observations with $t \geq e_s + H$, where H denotes the difference between the latest and earliest event year in the data, as recommended by von Bismarck-Osten, Borusyak, and Schönberg (2020).[22]

Figure 7: Event studies housing

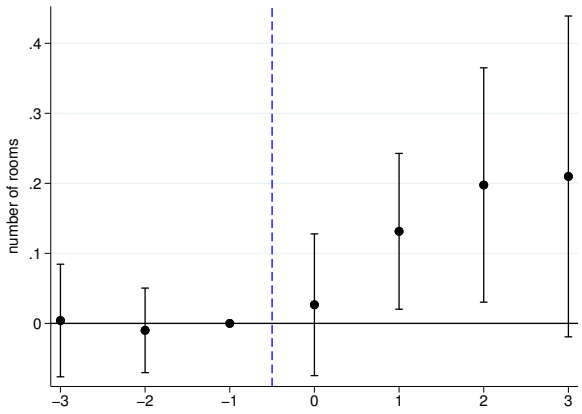
(a) Housing-to-income ratio



(b) Homeownership rate



(c) House size



Notes: The graph shows the coefficients on the treatment indicators D^j_{st} from equation (3). The sample was restricted to households in which the wife had a positive average labor income over the three years prior to the event. Observations with $t \geq e_s + H$ are excluded, where H is the gap between the latest and earliest event year. Standard errors are clustered at the state level. The whiskers indicate 95% intervals.

Given the data availability, I focus on the housing outcomes.[23] I consider households in which the wife had a positive average labor income over the three periods prior to the event, and compare their outcomes between treated and untreated states before and after the event. Note that in the national-level difference-in-difference regressions, the effects are identified from a comparison between households with different female income contributions (or households with and without a working wife in the binary case) before and after the reform. However, one may be worried that households with a working wife are

[22] Alternatively, one may "bin" the end points together to identify the dynamic treatment effects when there are no never-treated units (Schmidheiny and Siegloch (2020)).

[23] Due to the timing of the reforms, I cannot use the mortgage-related variables, as I do not observe them between 1973 and 1975.

not fully comparable to households with a non-working wife for potentially unobservable reasons. While I include demographic controls and household fixed effects in my federal-level regressions, a further advantage of the event study design is its immunity to this concern, because the identification here comes from a comparison of households with a working wife in states which have already introduced anti-discrimination legislation in a given year to similar households with a working wife in states which have not introduced such legislation yet.[24]

The results are shown in Figure 7. Households with a working wife in the pre-reform period increased their housing-to-income ratio, homeownership rate, and house size significantly more in treated states than in control states after the reform. By contrast, there were no differences across states in the pre-reform years. The homeownership effect stabilizes at slightly above ten percentage points, which is similar to the results from the binary difference-in-difference specification at the federal level shown in Appendix Figure B.2b.[25] The dynamic pattern also resembles the one found in the difference-in-difference regressions, with a gradual build-up of the effect, consistent with the fact that housing is a slow-moving variable.

Recent work in econometrics has shown that for difference-in-difference regressions with variation in treatment timing, the estimation with two-way fixed effects may be biased in the presence of heterogeneous treatment effects (see Goodman-Bacon 2021, Sun and Abraham 2020 and the references therein). It should be noted that treatment effects may unfold dynamically over time under the assumption of homogenous treatment effects, but they may not differ across different treatment cohorts (Schmidheiny and Siegloch 2020, Sun and Abraham 2020).[26] Appendix Figure B.11 shows that the results obtained with the "interaction-weighted estimator" of Sun and Abraham (2020), which is robust to heterogeneous treatment effects, are very similar to those obtained from estimating a comparable model with two-way fixed effects. The fact that the effects obtained from the alternative event study identification align well with those found in the difference-in-difference setup lends support to a causal interpretation of the national-level results.

4.5.2 Contemporaneous events

The event study results provide evidence in support of the hypothesis that the national-level results do not simply reflect the effects of other events in the reform period. In

[24] Favara and Imbs (2015) mention the possibility that if a neighboring state has already implemented a reform, houses near the border in a no-reform state could be financed with a loan from a lender in the reform state. However, they find that such arbitrage only happens to a significant extent in immediate proximity to a border (less than 15 miles). The publicly available PSID data do not allow to observe if a household lives near a border. Arbitrage would however weaken the difference between reform and non-reform states, reducing the likelihood of finding a positive effect.

[25] The same is true for the other two outcomes. Results are available upon request.

[26] For instance, heterogeneous effects may arise if treatment units select their initial treatment timing based on treatment effects. This would however not violate the parallel trends assumption, which is only violated if the timing is chosen based on the evolution of the outcome (Sun and Abraham 2020).

order to lend further credibility to my results, I examine plausible candidates for potential confounding events in more detail, and assess the robustness of the national-level difference-in-difference results to corresponding control strategies.

One potential concern is that the entrance of the baby boomer cohort born 1946-1964 into housing markets in the 1970s might be driving my results. However, I implicitly control for cohort membership via the age and time fixed effects. Moreover, I verified that the same patterns emerge when restricting the sample to households with a wife or head below 30 or 35 years of age in 1971. Furthermore, I investigated the robustness of the results to exploiting the cohort dimension in a triple-difference design. As noted in Section 2, the likelihood of a working wife's income being discounted was lower if she was no longer of childbearing age. It can thus be expected that women who were already older at the time of the reform were less affected. Based on this reasoning, I added the difference between younger and older cohorts to my regressions (see Section B.2). Appendix Figure B.3 shows that the triple-difference identification supports the results from the difference-in-difference estimations. The point estimates are even slightly larger than in the baseline, consistent with the hypothesis that the effects are stronger for younger households.

Leombroni et al. (2020) argue that the Great Inflation of 1965 to 1982 induced portfolio shifts from equity to housing in the 1970s.[27] I therefore want to make sure that my results are not driven by differential stock market exposure of married households with different female income contributions. Due to lacking information on financial assets in the data, I cannot directly control for stock ownership. However, the SCF+ data show that the income-richest 10% of households held 70% to 80% of all stock wealth in the 1970s. At the same time, the effect of inflation on the user cost of housing via taxes is more pronounced for high-income households (Poterba 1991). I hence assessed the robustness to excluding top-10% households. Reassuringly, the patterns are very similar to the baseline.

In 1972, another equal opportunity law was passed: the Equal Employment Opportunity Act (EEOA). The EEOA authorized the Equal Employment Opportunity Commission of 1965 to initiate lawsuits on behalf of workers, and expanded the coverage of Title VII of the 1964 Civil Rights Act, which outlawed discrimination in wages and employment opportunities, to employers with more than 15 instead of 25 employees (Hill 1977). Yet the original version of Title VII became effective a whole decade prior to the ECOA, and the Equal Pay Act had already mandated equal pay for equal work of men and women in 1963 (Altonji and Blank 1999). Apart from that, I use the average female income share before 1972 as the interaction variable, which is independent of the EEOA. Theoretically, women with a higher pre-1972 income share could have been more likely to sue for higher wages after 1972, boosting their total household income. However, I control for household income and consider outcomes normalized by income to make sure that the effect is not

[27] The mechanism is that higher expected inflation lowers the expected after-tax real return of equity, but tends to reduce the user cost of housing, because housing capital gains are quasi untaxed in the U.S., whereas mortgage interest is tax-deductible (Poterba 1984).

driven by simple differential changes in available household income.

The year 1973 was also marked by a severe oil crisis. However, cars were of course not only used by working wives at the time, but also by homemakers, who had become an important clientele for car makers and were actively targeted in advertisements (Hill 2002). As a validation, I controlled for the household's total number of cars as a proxy for their exposure to oil prices, or the households' average commuting costs in 1970 and 1971. The results remain virtually unaltered.

The 1960s and 1970s also saw important changes in birth-control and divorce laws. "The pill" spread rapidly among married women after its introduction in 1960, facing a peak in 1967 (Goldin and Katz 2002). The diffusion among singles was delayed because their access to oral contraceptives was initially impaired by state laws on the age of majority (see also Bailey 2006). The abolition of these laws in the 1960s and early 1970s predominantly affected single women. However, one might imagine that the households of married women were enabled to borrow more because the wife had had early access to the pill before marriage, and could hence obtain a higher level of education (Goldin and Katz 2002) or gain more work experience (Bailey 2006), making her more creditworthy. I therefore used the data on state consent laws determining early access to the pill from Bailey (2006), and re-estimated the state-level event studies after including additional event dummies for these laws. Appendix Figure B.6 shows that very similar patterns emerge.

With more liberal divorce laws, financially independent women might have a higher likelihood of divorce. Appendix Figure B.4 however shows that divorce rates already started to increase around 1965. Chang (2018) shows that a liberalization of divorce laws puts downward pressure on married households' homeownership, as houses are indivisible and thus cannot be split easily upon divorce. If within the group of married households with working wives those without a house were more likely to get divorced and leave the sample, while the same was not true for those with a non-working wife, this might lead to a larger increase in homeownership among the former. Yet while I find a negative association between homeownership and the likelihood of divorce in the data, I find no evidence that this relationship would depend on the wife's earnings. Moreover, I restricted the sample to households who had entered the PSID at the latest in 1971, were still in the survey in 1985, and never reported a transition from married to single in between. Although this reduces the sample size by about a third, Appendix Figure B.5 shows that the baseline pattern survives. Finally, I re-estimated the event studies after controlling for additional event dummies based on the state-level introduction of unilateral divorce from Gruber (2004), finding similar results to the baseline (see Appendix Figure B.6).

Previous research has demonstrated the positive effects of inter- and intrastate bank branching deregulation on homeownership and mortgage credit (Favara and Imbs 2015, Tewari 2014). While interstate branching deregulation only occurred after 1994, intrastate

branching restrictions were already lifted during the 1970s in six states[28]. I verified that the effects from both the national- and state-level regressions survive in a sample excluding these states. The 1970s also saw several housing and mortgage market reforms at the federal level, such as the Housing and Community Development Act of 1974, the Emergency Home Purchase Assistance Act of 1974 or the Emergency and Housing Act of 1975 (cf. Milgram 1994). There is no evident reason why any of these reforms should have differentially benefited households with different (pre-determined) female income contributions, in particular after controlling for total household income. However, as some of these reforms explicitly targeted low-income households and households facing temporary economic hardship, I verified that similar results emerge when only considering households between the 50th and 90th percent of the income distribution, or excluding households in which the head was temporarily unemployed in the mid-1970s.

Another important event in the 1970s was the end of the Vietnam War in 1975. Returning veterans could obtain cheaper loans due to insurance by the Department of Veterans Affairs (VA) (Foote and Peterson 2008). One could imagine that many of them were single, and that if they were married, the wife contributed more to the household's income while her husband was at war. However, most U.S. troops had already been withdrawn from Vietnam by 1972 (see Appendix Figure B.7). As a robustness check, I re-estimated the regressions for married households on a sample excluding all households whose head had been in the armed forces any time between 1969 and 1975. Of course, this also excludes households whose head was in the armed forces without being a veteran. Nevertheless, Appendix Figure B.8 shows that the results are still similar for this restricted sample.

Finally, Bastian (2020) argues that the introduction of the Earned Income Tax Credit (EITC) in 1975 induced around one million American mothers to join the labor force. The EITC is an earnings subsidy to working parents. In its original design, parents with annual nominal earnings of up to 4,000 dollars could obtain a maximum subsidy of 400 dollars. Reduced subsidies were available to households with earnings up to 8,000 dollars. It is important to note that households were eligible for the EITC independent of the wife's work status, as long as the household's total labor income did not exceed the thresholds, and at least one child lived in their home. In order to test if my results nevertheless simply capture effects of the EITC, I excluded all eligible households from my sample and only retained households with total nominal earnings above 8,000 dollars, or without children living at home, for the years after 1975. Appendix Figure B.9 shows that the baseline results remain intact.

4.5.3 Alternative variable specifications

Lastly, I also tested the robustness of my results to the use of alternative outcome and interaction variables. As both income and housing or housing debt might change in

[28]Maine (1975), New Jersey (1977), New York (1976), Ohio (1979), Vermont (1970) and Virginia (1978)

response to the reform, I chose to use the wife's pre-reform income share as my interaction variable in the baseline. I verified that similar qualitative patterns emerge when using the wife's contemporaneous income share (see Appendix Figure B.13). In Appendix Figure B.14, I further use non-normalized housing debt and assets as the outcome. Both variables increase after the reform, although the effect on housing is estimated with less precision.

In the baseline analysis, I use the share of the wife's *labor* income in *total household income*, since comprehensive information on other income of the wife is only consistently available since 2005 in the PSID. However, labor income accounts for the largest share of most households' income, with a median of 83% between 1969 and 1985. As a robustness check, I used the wife's share in the total *labor* income of head and spouse. The results are reported in Table B.3 and Figure B.16 in the Appendix, and resemble the baseline. The effect is somewhat smaller, with an increase in the mortgage borrowing rate of 0.1 percentage points for a one percentage point higher average pre-reform share in the couple's total labor income. There are some households in which the wife earns a substantial share of the couple's total labor income, but still a small share of total household income. For instance, the wife may earn a small salary on a part-time job, whereas the head does not work for money at all, but receives substantive capital income. In such a case, the wife may contribute 100 percent to the household's *labor* income, but her contribution to overall income is still minor and thus will not substantially affect the household's borrowing capacity. A somewhat smaller effect can thus be expected.

5 Labor supply incentives

Upon its introduction, the ECOA primarily affected households in which the wife had already been working, given that banks were still allowed to take employment continuity and income stability into account. However, the ECOA might also have incentivized women to increase their labor supply in the subsequent years in order to benefit from the new lending rules. The theoretical effects on labor supply are ex ante ambiguous. In order to buy a house of a given quality and size, a woman can afford to work less if 100% instead of 50% of her income are considered. On the other hand, an additional dollar of income now translates into a higher borrowing capacity one-for-one, making labor supply more attractive. Consider the stylized example of a woman with an earnings potential of 30 dollars. Her husband currently earns 30 dollars, and their housing preferences are such that a suitable home would at least require a mortgage of 120 dollars. With a maximum DTI ratio of 2, they would need at least 60 dollars of income. As long as the couple can only borrow against half of the wife's income, i.e. 15 dollars, they will still not be able to buy their desired home even if the wife is working. Yet once her full income can be used, there is a strong incentive for her to take up work.

Given that employability declines with age, whereas the probability of already being a homeowner increases (and the empirical analysis has shown that the effects mainly

work though the extensive margin, i.e. transitions from renting to ownership), positive employment incentives can be expected to be strongest for young women living in recently founded households. Yet the empirical setup, which relies on comparisons between the pre- and post-reform period, does not allow to study the behavior of households that are only formed after the reform. Would a woman at the beginning of her (economic) life cycle make different plans for her financial and professional future in the post-reform world compared to the pre-reform world? To answer this question, I use a structural model of households' homeownership and borrowing over the life cycle.[29]

Based on a life-cycle model calibrated to data from the British Household Panel Survey (BHPS) for the period 1991 to 2002, Bottazzi, Low, and Wakefield (2007) show that the empirical correlation between large housing debt and longer female hours worked can be generated by the requirement to meet current mortgage obligations. They further show that a tightening of the DTI constraint, which operates on both male and female income in their model, leads to delayed home purchases. They do not report effects on female labor force participation (FLFP), but note that the effects they found were small. Pizzinelli (2018) calibrates a similar two-earner model to BHPS data from 1991 to 2008, and allows the income of the secondary earner to influence the DTI constraint in a different way than that of the primary earner. In his specification, the DTI always depends on full-time earnings, i.e., the earnings that the secondary earner would have when working full time. He simulates a relaxation of this DTI constraint by increasing the multiplier on the secondary earner's full-time labor income, and finds a positive labor supply effect. His results further imply that the secondary earner's LFP response can amplify the increase in homeownership.

In the following, I will build a life-cycle model similar to the frameworks in these papers. After describing the model and my strategy to calibrate it to the early 1970s in the following subsections, I will use it as a laboratory to examine whether and to what extent the act had the power to change married women's labor supply incentives.

5.1 Model

My goal is to examine whether married women changed their financial and career planning at the beginning of the life cycle in response to the reform. To do so, I build a simple life-cycle model with borrowing constraints. Households are formed at age $j = 25$. Both spouses retire at age 65, and die at age 80.[30] They maximize their utility over consumption c_j, female labor supply n_j^f and housing h_j:

[29] As a proxy, one may look at households that have already been formed, but do not own a home yet and the wife is not working or working very little. Results from an explorative event study are shown in Appendix Figure B.12 and suggest a positive effect on labor force participation, but should be interpreted with caution due to the small sample size.

[30] The household's age is defined to be the age of the head.

$$u(c_j, n_j^f, h_j) = \frac{c_j^{1-\sigma}}{1-\sigma} + \theta^f(j)\,\frac{(1-n_j^f)^{1-\psi}}{1-\psi}\,\mathbb{I}_{j\leq 65} + \left[\chi(j)\mu^h + \phi^h \frac{h_j - \underline{h}}{\overline{h} - \underline{h}}\right]\mathbb{I}_{h>0}.$$

The parameter σ determines the degree of risk aversion. $\theta^f(j)$ determines the strength of preferences for a working-age wife's time spent on other activities than market work, which can vary over the life cycle to reflect changes in the disutility of working induced by, e.g., the presence of small children in the household or the need to take care of grandchildren. ψ governs the elasticity of female labor supply. The strength of basic housing preferences depends on the parameter μ^h, and ϕ^h determines the preference for a larger house. Households can buy houses of a smaller size $\underline{h} = 1$ or a larger size $\overline{h} = 2$. Following a suggestion of Druedahl (2015), preferences for owning versus renting are allowed to vary over the life cycle, reflecting factors such as changing mobility preferences and changes in demand for space. I model these time-varying preferences in a reduced-form way, similar to Pizzinelli (2018), by pre-multiplying μ^h with an age-dependent factor $\chi(j)$ (see Section 5.2 and Appendix D.2 for details).

Log hourly wages w_j^s are modeled as the sum of a deterministic function of age and an autoregressive process:

$$\begin{aligned} ln(w_j^s) &= \alpha_0^s + \alpha_1^s j + \alpha_2^s j^2 + \alpha_3^s j^3 + \alpha_4^s j^4 + ln(z_j^s), \quad s = m, f \\ ln(z_j^s) &= \rho^s ln(z_{j-1}^s) + \varepsilon_j^s, \quad \varepsilon_j^s \sim N(-\frac{\sigma_{\varepsilon^s}^2}{2}, \sigma_{\varepsilon^s}^2). \end{aligned} \tag{4}$$

Both spouses' wages are subject to idiosyncratic risk. Men always have a standard full-time contract, corresponding to 40 hours per week. Women can choose whether to work or not, and whether to work full-time or part-time. Specifically, they can choose to work 20, 30, 40 or 50 hours a week. In other words, they choose between discrete contracts in the set $\mathcal{N} = \{0, 20/T, 30/T, 40/T, 50/T\}$, which express n_j^f as hours worked relative to the total number of non-sleeping hours per week $T = 7 \times 16 = 112$.[31] Working less than 40 hours a week is associated with a part-time penalty $\mathcal{P}$. After age 65, both spouses receive a retirement income based on the replacement rate b. The retirement income is calculated as b times the realization of the wage process in the last pre-retirement period.[32]

Households can save in a risk-free financial asset a_j at the interest rate $r = r^s$. They can also borrow $d_j = -a_j$ at a rate of $r = r^b$. This implies that households cannot hold both positive financial assets and mortgage debt at the same time, as in Attanasio et al. (2012) and Pizzinelli (2018).[33] Borrowing is limited by the minimum of a LTV and DTI constraint:

[31] I experimented with different specifications of $\mathcal{N}$. Contracts with more than 50 hours are never chosen under plausible calibrations. This is in line with the data, where less than 1 percent of women report such high working hours in the early 1970s.

[32] Women's retirement income is computed based on a full-time contract.

[33] As discussed by Druedahl (2015), this simplification comes at the cost of ruling out precautionary balance sheet expansions. He shows that the difference between the net and gross debt formulation of the model of Attanasio et al. (2012) is less important if there is an interest rate spread.

$$\phi(h_j, y_j^m, y_j^f) = min\left\{\lambda^h p h_j,\ \lambda^y(y_j^m + \lambda^d y_j^f)\right\}, \tag{5}$$

where λ^h is the LTV limit and p is the house price. This implies that there are three options: (a) the household does not own a house, in which case asset holdings must be positive; (b) the household owns a home, but the LTV constraint ($\lambda^h p h_j \geq d_{j+1}$) binds before the DTI constraint; or (c) the household owns a home, and the DTI constraint ($\lambda^y(y_j^m + \lambda^d y_j^f) \geq d_{j+1}$) binds before the LTV constraint.

Mortgages are modeled as long-term debt, meaning that households must only fulfill the LTV and DTI constraint upon origination of the mortgage (Attanasio et al. 2012, Kaplan, Mitman, and Violante 2020). An alternative modeling option would be to impose a DSTI instead of a DTI constraint. However, the DSTI and DTI ratio are directly proportionate for a mortgage with fixed duration and interest rate, as shown in Appendix D.1.[34] An advantage of formulating the constraint in terms of debt rather than mortgage payments relative to income is that it can be compared directly to the LTV constraint, as illustrated in Appendix Figure D.1.

I follow Attanasio et al. (2012) and require that households at least pay the interest $r^d d_j$ on their outstanding debt. As shown in Appendix D.1, this is equivalent to the constraint $d_{j+1} \leq d_j$. Since the model is meant to describe the early 1970s, when home equity withdrawal was still uncommon, households are not allowed to extract home equity.[35] Households close to or in retirement (above 60 years of age) cannot take out new debt, but can continue to repay their pre-existing debt. This implies $\phi(\cdot) = 0\ \forall\ j \geq 65$.

Since it is not the interest of this paper to model debt and homeownership in old age, I abstract from bequests. In the last period of life, households are required to pay all outstanding debt and consume what is left of their wealth. Households choose c_j, a_{j+1}, n_j^f, and h_j, given the current vector of states $X_j = [a_j, h_{j-1}]$. The model is in partial equilibrium. A household can either own a house ($h_j \in \{\underline{h}, \overline{h}\} > 0$) at prices $\underline{p}$ and $\overline{p}$, or rent one ($h_j = 0$) at cost q. Selling or buying a house is subject to transaction costs F^s and F^b, reflecting costs for real estate agents, legal fees and transaction taxes (cf. Attanasio et al. 2012).

In summary, households have to solve a utility maximization problem subject to a budget constraint and borrowing constraints which depend on whether the household is a renter, owns a "regular-size" house ($h_j = 1$) or owns a large house ($h_j = 2$). The wife's labor income depends on her labor supply choice $n_j^f \in \mathcal{N}$, where her wage is discounted by part-time penalties $\mathcal{P}$ if she chooses to work less than full-time. Mathematically, the problem can be summarized as follows:

[34] Adjustable-rate mortgages were allowed only in 1982 (Garn–St. Germain Depository Institutions Act).

[35] Hardly any households had second mortgages in the early 1970s (Bartscher et al. (2020)). HELOCs only spread in the mid-1980s (Maki 2001). Cash-out refinancing was not yet common either. In the 1977 SCF, only 3% of the respondents stated they had ever refinanced their first mortgage.

$$V_j(X_j) = \max_{c_j, n_j^f, a_{j+1}, h_j} u(c_j, n_j^f, h_j) + \beta \mathbb{E}_j V_{j+1}(X_{j+1}) \quad s.t. \tag{6}$$

$$c_j + a_{j+1} + p h_j (1 + F^b \, \mathbb{I}_{h_j \neq h_{j-1}}) + q \, \mathbb{I}_{h_j = 0} = (1 + r) a_j + y_j^m + y_j^f + p h_{j-1} (1 - F^s \, \mathbb{I}_{h_j \neq h_{j-1}})$$

$$y_j^f = w_j^f n_j^f \mathcal{P} T$$

$$a_{j+1} \geq \begin{cases} 0 & if \; h_j = 0 \\ min\{a_j, 0\} & if \; h_j > 0 \; \wedge \; h_j = h_{j-1} \\ -\phi(h_j, y_j^m, y_j^f) & if \; h_j > 0 \; \wedge \; h_j \neq h_{j-1} \end{cases}$$

$$h_j \in \{0, 1, 2\}$$

$$n_j^f \in \mathcal{N}.$$

5.2 Calibration

I calibrate the model to the early 1970s, and investigate the effects of relaxing the DTI constraint based on the creditable share of the wife's income. The LTV and DTI limits are set to $\lambda^h = 1$ and $\lambda^y = 2$, which corresponds to the 90th percentile of the LTV and DTI distributions for new homeowners in the baseline sample between 1969 and 1971. House values and net rental costs are chosen based on the same data. The rental cost is set to the median rental cost of around 5,300 dollars in the data. The value of the "entry-level" house is set to the average house value among households between ages 25 and 35, which is approximately 110,000 dollars. The value of the larger house is set to match the average for households aged 40 to 50 in the data (around 135,000 dollars), which is the period when life-cycle house values peak in the data. To calibrate the mortgage interest rate, I use the 1971 wave of the SCF+. Specifically, I compute the median mortgage interest rate of married homeowners aged 25 to 64 who bought a home within the same or previous

Table 4: Externally calibrated parameters

name	value	definition	target/source
λ^h	1	LTV limit	PSID
λ^y	2	DTI limit	PSID
λ^d	0.5	income discounting factor	ECOA
q	0.53	net rental cost	PSID
$p_1 h_j$	11	house value $h_j = 1$	PSID
$p_2 h_j$	13.5	house value $h_j = 2$	PSID
r^s	0.043	interest rate on savings	Federal Reserve
r^b	0.063	interest rate on debt	SCF+
σ	2	CRRA parameter	
β	0.94	discount factor	
b	0.7	pension replacement rate	Attanasio et al. (2012)

Notes: The table summarizes the externally calibrated parameters (see text for details).

Table 5: Internally calibrated parameters

name	value	definition
ψ	1.64	labor elasticity parameter
μ^h	2.51e-3	basic housing preference parameter
ϕ^h	5.01e-3	house size preference parameter
F_b	0.04	buying cost
F_s	0.07	selling cost
$\theta^f(j)$	see Appendix D.2	female leisure preference profile
$\chi(j)$	see Appendix D.2	housing utility profile

Notes: The table summarizes the internally calibrated parameters (see text for details).

year and have an interest-bearing mortgage, which is 6.3%. The savings interest rate is set to the annual three-month treasury bill rate published by the Board of Governors of the Federal Reserve System (FRED series TB3MS), which was 4.3% in 1971. The CRRA parameter σ is set to the common value of 2, and the discount factor β is chosen as 0.94. The pension replacement rate is set to 0.7, as in Attanasio et al. (2012). An overview of the externally calibrated parameters is given in Table 4.

The remaining parameters are chosen to minimize the average squared distance between moments from the data and the model. I target average homeownership, mortgagor and FLFP rates in ten-year age bins. A summary of the model and data moments is given in Appendix Table D.2. Table 5 summarizes the internally calibrated parameters. The estimated value for the parameter ψ is 1.64. Based on a 30-hour contract and a time endowment of $T = 112$ non-sleeping hours, this implies a labor supply elasticity of $(1 - 30/112)/(1.64 \cdot 30/112) \approx 1.67$, which is within the range of estimates for the aggregate elasticity (intensive and extensive margin) over the life cycle (between 1.37 and 1.93) found by Attanasio et al. (2018). With values of 4% and 7%, the transaction cost parameters F_b and F_s are similar to the median selling and buying costs of 2.5% and 7% reported by Martin and Gruber (2004) based on the U.S. Consumer Expenditure Survey. I use polynomials to model the age-dependent preference parameters $\theta^f(j)$ and $\chi(j)$. The resulting profiles are plotted in Figure D.2. Their shape aligns well with the timing of life-cycle events such as the arrival of children and grandchildren, as discussed in more detail in Appendix D.2.

I estimate the wage processes from equation (4) based on my baseline sample of married households. Following Borella, De Nardi, and Yang (2018), I include households between 20 and 70 years of age when estimating the deterministic part to avoid end point problems, but compute the variances based on working-age households between 25 and 64. The wage processes are estimated separately for husbands and wives.[36] Men and women working

[36] In the model simulations, ε_j^s, $s = m, f$ are allowed to be correlated, following a standard approach in the literature. I employ a correlation coefficient of 0.25 based on the estimate of Hyslop (2001).

Table 6: Parameters of wage profiles

names	values
α_0^m, α_1^m, α_2^m, α_3^m, α_4^m	-1.5381, 0.4036, -0.0132, 0.0002, -1.1439e-6
α_0^f, α_1^f, α_2^f, α_3^f, α_3^f	-0.7490, 0.2889, -0.0085, 0.0001, -4.8191e-7
$\sigma^2_{\varepsilon^m}$, $\sigma^2_{\varepsilon^f}$	0.0062, 0.0056
$\mathcal{P}^{50}$, $\mathcal{P}^{75}$	0.8301, 0.9368

Notes: The table shows the estimated coefficients of the log wage processes from equation (4) and the estimated part-time penalties $\mathcal{P}^{50}$ and $\mathcal{P}^{75}$. See text for details.

below 500 hours per year are considered as not working in that year, such that their wages are set to zero. I regress log real hourly wages on a quadratic polynomial in household age, dummies for the number of children, as well as state and 5-year cohort fixed effects. For the wives, I apply a Heckman model, in which selection is based on "other" household income (total household income net of the wife's labor income), the number of children and the total household size. The intercepts α_0^s are determined by averages for the cohort born between 1945 and 1950, who were of typical "home-buying age" in the early 1970s. As women can work part-time in the model, I allow for part-time penalties $\mathcal{P}^{50}$ and $\mathcal{P}^{75}$ by including dummies for working 50% or 75%.

Following the previous literature, the parameter ρ^s is set to one for both spouses. The variances $\sigma^2_{\varepsilon^s}$, $s = m, f$ are estimated according to the method of Heathcote, Perri, and Violante (2010).[37] Table 6 shows the estimated coefficients, and Appendix Figure D.1 plots the resulting income profiles under certainty. Additional details on the model solution are given in Appendix D.2.

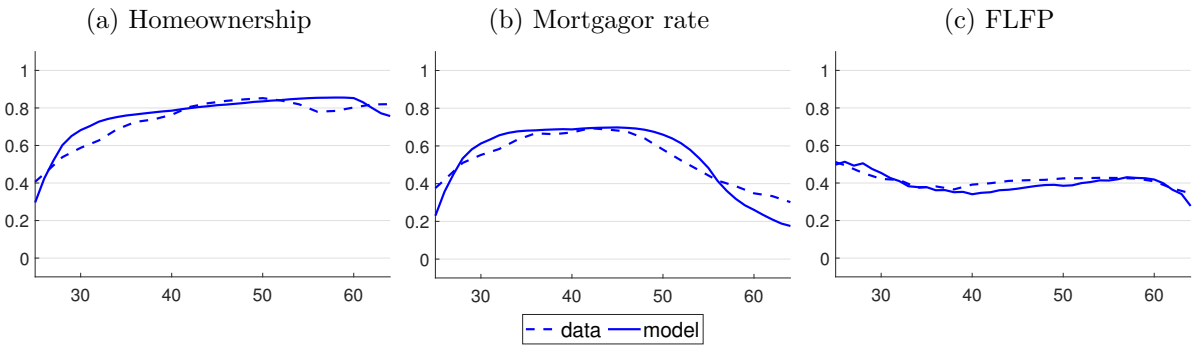
5.3 Experiment: relaxation of DTI constraint via female income

Figure 8 shows the homeownership rate, the share of households with mortgage debt, and the female labor force participation rate over the life cycle, computed from 10,000 simulations of the model. The model produces similar average homeownership, mortgagor and FLFP rates within ten-year age bins, which is a success of the calibration strategy (cf. Appendix Table D.2). Besides, the model is also able to reproduce the overall shape of the empirical life-cycle profiles from the PSID, which are shown as dashed lines in Figure 8. It should also be noted that despite the simplification of a choice between discrete contracts, the model produces an intensive margin of labor close to the data, with an average of slightly above 28 compared to 31 hours.

In the following, I will use the model as a laboratory to simulate the effects of relaxing the

[37] This estimation is based on identifying autocovariance moments in levels, as the alternative identification based on moments in differences tends to overestimate the variance of the permanent shock, leading to an unrealistic growth of wage inequality over the life cycle (see also Daly, Hryshko, and Manovskii 2018).

Figure 8: Comparison to data



Notes: The graph compares the homeownership rate, the share of mortgagors and the FLFP rate over the life cycle from the model to the corresponding life-cycle profiles from the PSID for the period 1969-1971. The FLFP rate in the data refers to women working at least 500 hours per year. The data profiles were smoothed by taking a three-year moving average.

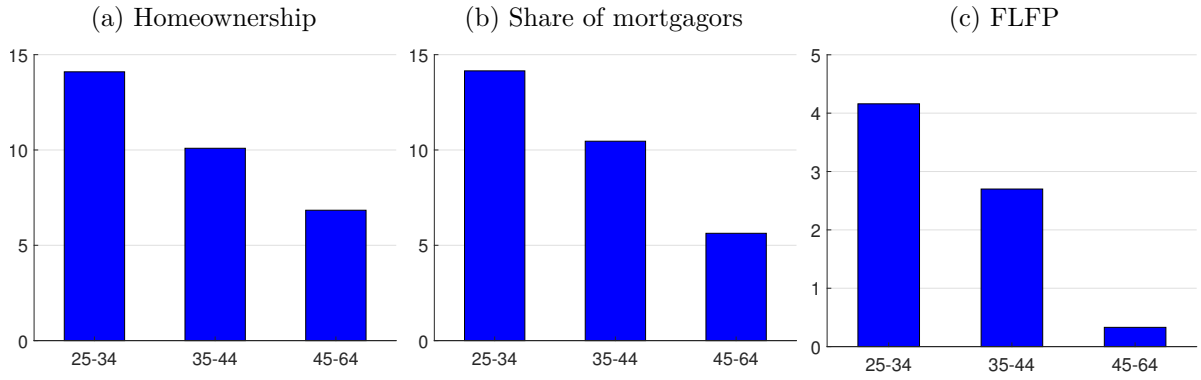
borrowing constraint via the female income discounting factor λ^d. Table 7 summarizes the results of my experiment. It shows how the shares of homeowners, mortgage holders and working wives change when the female income discounting factor λ^d is raised from 50% to 100%, such that households can count all of the wife's income toward a mortgage. In the cross section, the homeownership rate of married households between ages 25 and 64 increases by 9.5 percentage points. The surge in the share of households holding mortgage debt is similar, with 9 percentage points. These increases are not merely due to the fact that households can borrow against a higher share of what the wife would have earned anyway. The third row of Table 7 shows that the reform produces incentives for women to join the labor force, such that the FLFP rate increases by around 2 percentage points. To generate a similar increase in FLFP under the pre-reform scenario, average female wages would have to rise by around 4%. At the intensive margin, female labor supply changes little, with women working about half an hour less per week on average. This is because on the one hand, the women who would also have worked in the pre-reform scenario with

Table 7: Comparison: $\lambda^d = 0.5$ versus $\lambda^d = 1$

variable	difference	difference with fixed labor supply
homeownership	0.095	0.051
mortgagor rate	0.090	0.048
FLFP	0.019	0
hours (intensive margin)	-0.561	0

Notes: The first column shows the average changes in homeownership, the share of mortgagors and female labor force participation (in percentage points) as well as the change in average intensive-margin female hours worked (in hours) among households aged 25 to 64 when increasing the income discounting factor λ^d. from 0.5 to 1. The second column shows the respective differences when holding female labor supply choices constant at the optimal values from the pre-reform scenario with $\lambda^d = 0.5$.

Figure 9: Life-cycle effects of raising λ^d from 0.5 to 1



Notes: The graph shows the change in the homeownership rate, the share of mortgagors and the FLFP rate (in percentage points) over the life cycle when increasing the female income discounting factor λ_d from 0.5 to 1.

$\lambda^d = 0.5$ choose to work slightly less (around 20 minutes per week). On the other hand, the women who join the labor force under the new scenario, but would not have worked in the old one, work somewhat less than the average (23.5 compared to 28 hours per week).

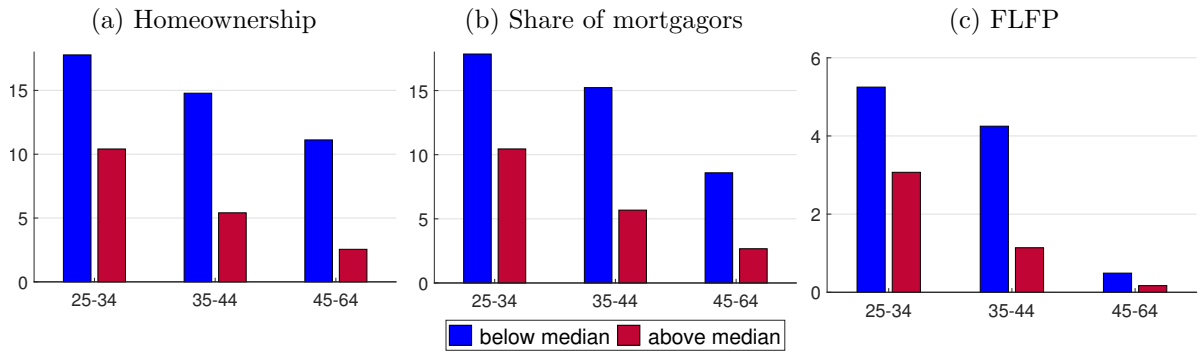
In order to get an impression of the relative importance of the change in female labor supply for the change in homeownership, the last column of Table 7 presents a counterfactual exercise. I compute conditional policy functions for each possible female labor supply choice under the post-reform scenario with $\lambda^d = 1$. In the simulations, I then use the realized trajectory of n_j^f from the simulation under the pre-reform scenario with $\lambda^d = 0.5$, and compute the asset and housing choices based on the conditional policy functions corresponding to these "old" labor supply choices in each period. In other words, I simulate a scenario in which women can now use their full income for the mortgage, but they cannot adapt their labor supply relative to the pre-reform scenario. Without additional women joining the labor force, the increase in homeownership and the share of mortgage holders would only be around 5 percentage points. This is a similar order of magnitude as the empirical estimate of 3.3 percentage points found in the data for women who had already been working (see Section 4.4). The model therefore suggests that the medium- to long-run effects of the ECOA on homeownership even exceeded the impact effects by encouraging more married women to join the labor force.

Figure 9 shows the effects of the reform over the life cycle. Consistent with the theoretical arguments discussed above, the effects are strongest for young households between 25 and 34 years of age, and decline as households become older. For households in the young group, who are of typical "home-buying age", the wives' LFP increases by around 4 percentage points. The ability to count twice as much of the wife's income toward the mortgage as before, combined with the active increase in FLFP, enables households to prepone homeownership, such that the homeownership rate in the youngest group increases most drastically.

Finally, Figure 10 further decomposes the results from Figure 9 by male income. In line

with the empirical results and theoretical considerations, the reform bears the greatest advantages for households with lower-income husbands. Interestingly, the effect is much more persistent over the life cycle for households with relatively low male incomes. While young households benefit from the reform even if the husband has above-average earnings, the effects at older ages are almost exclusively driven by households with lower male earnings.

Figure 10: Heterogeneous effects: high versus low male income



Notes: The graph shows the effects of the experiment in Figure 9, stratified by the husbands' incomes. Blue bars show the respective changes (in percentage points) for households with below-median male earnings, and red bars refer to households with above-median male earnings.

5.4 Discussion

The model shows that women who were planning their future in the early 1970s, based on the prevailing economic information, were more likely to embark on a working career. It further illustrates that additional female labor supply could substantially amplify the positive effects of equal credit opportunity laws on married couples' homeownership rates in the longer run, especially for younger couples and couples with lower male earnings.[38]

In an overlapping generations setup with intergenerational learning, the ECOA could generate further dynamic effects on labor supply by accelerating the pace at which women learn about the true cost of working (Fernández 2013). Furthermore, there might be spillovers to male employment and earnings in a setup with involuntary unemployment and search. In an important series of papers, Kyle Herkenhoff and coauthors have shown both empirically and theoretically that unemployed households take longer to find a job if they have more access to credit, but achieve higher earnings replacement rates, such that welfare improves (Herkenhoff 2019, Braxton, Herkenhoff, and Phillips 2020, Herkenhoff, Phillips, and Cohen-Cole 2020). As mentioned, home equity extraction became more popular from the 1980s on, and became even easier in the 1990s (Hurst and Stafford 2004). Hurst and Stafford (2004) have established that households experiencing an un-

[38] Of course, LFP and homeownership decisions in the data can also be influenced by factors such as changes in house prices, interests rates, household composition or the availability of alternative sources of financing. Incorporating these factors into the model would go beyond the scope of this paper, but could be an interesting avenue for further research.

employment shock while having low liquid assets have a substantially higher propensity to refinance their mortgage and extract equity. Against this background, the ability to borrow against the home based on the wife's income if the husband becomes unemployed could allow the husband to search longer for a new job and obtain a better match.

Additionally, home equity lines of credit (HELOCs) were introduced on a large scale in the mid-1980s (Maki 2001). Although they typically require the household to meet a debt-to-income constraint upon application, it will not require another income assessment every time the line is drawn on (see also Braxton, Herkenhoff, and Phillips 2020). Therefore, both husbands and wives who were able to buy a house with the help of the wife's income and establish a HELOC gained the ability to flexibly borrow against their home in the case of future unemployment, allowing them to better smooth their consumption and adapt their job search behavior. I view the analysis of the potential effects of the ECOA on job search and within-household income and consumption smoothing as an interesting avenue for further research.

6 Conclusion

This paper has shed light on the effects of the Equal Credit Opportunity Act on homeownership and mortgage borrowing of married households. The ECOA proscribed discrimination in mortgage lending based on sex and marital status. In particular, it prohibited the formerly common practice to partially or even fully discount the wife's income in joint mortgage applications of married couples. It therefore provides a natural experiment to study the relaxation of income-related borrowing constraints. Although the ECOA required profound changes in creditors' lending practices, its effects on female access to credit have long remained an open question.

Using data from the PSID, I find that married households with a working wife increased their mortgage borrowing, and with it homeownership and house size, subsequent to the passage of the ECOA. The results are supported by event study regressions exploiting state-level variation. Furthermore, the national-level results are robust to controlling for other contemporaneous events. The estimates imply that the new legislation enabled 1.4 million married households to move to an own home upon its introduction, and 1.8 million to take out a mortgage.

While the law initially mostly benefited households with a wife who had already been working, it also changed the labor supply incentives for women in future cohorts of new homeowners. I draw on a life-cycle model to explore potential changes in the incentives for married women's labor supply. The model shows that the incentives of the ECOA were powerful enough to increase the labor force participation rate of married women, thus amplifying the positive effects on married couples' homeownership and borrowing rates in the longer perspective.

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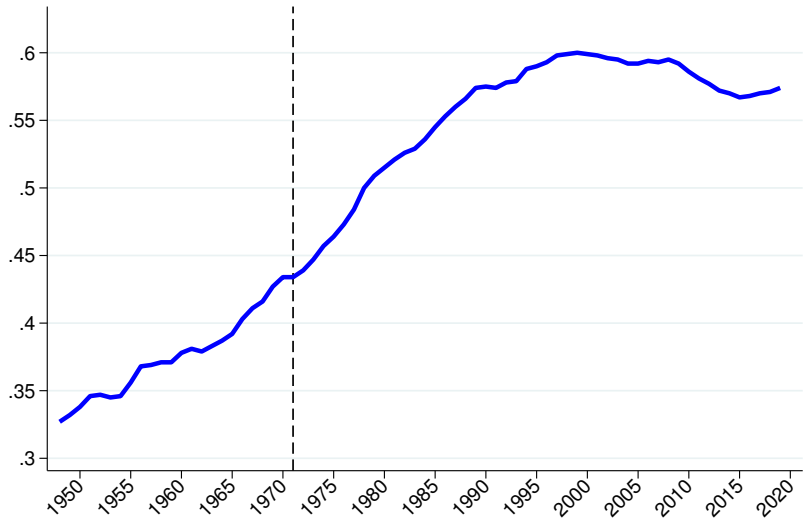
A Supplementary analyses

A.1 Female labor supply

Figure A.1 shows the aggregate female labor force participation rate from the U.S. Bureau of Labor Statistics over time. By the early 1970s, it had already increased considerably compared to the 1950s, and its growth even slightly accelerated in the subsequent years.

Figure A.1: Female labor force participation



Notes: The graph shows the civilian labor force participation rate of women. Data source: U.S. Bureau of Labor Statistics.

In order to examine the labor supply decisions of married women around the time of a home purchase, I restrict my baseline PSID sample to households in which both spouses are below 60 years of age. As the effects on homeownership and housing debt in Section 4 mainly work via the extensive margin, I focus on renter-to-owner transitions. In a first step, I look at couples in which both spouses are working at the time of the home purchase. For couples that I observe over the 5 years subsequent to the home purchase (about 970 households between 1969 and 1985), I compute the number of those years during which the wife is still working.[39] Mortgage lenders who discounted the female's income were most concerned about debt-service capacity during the first years of a mortgage, which they considered as the most risky period (Thurston 2018; see also Foote, Loewenstein, and Willen 2018). In my data, only 10% of the wives worked for less than 50% of the period covering the home purchase and the 5 following years. Another 7% worked for half of that period, and 61% stayed employed over the full period.

These numbers do not suggest that discounting female income across-the-board was justified. Nevertheless, female employment continuity was still below that of men. In the

[39] I use the years after 1985 to calculate forward-looking variables, and then truncate the sample to end in 1985, as in the baseline.

same households, 96.6% of the husbands worked every year during the period covering the home purchase and the subsequent 5 years. Yet while women are more likely to stop working, often to take care of children, it would not be a rational choice for a woman to voluntarily leave the labor force for childcare reasons if this means jeopardizing her mortgage and risking foreclosure (see also Lally 1974). In line with this reasoning, Fortin (1995) shows that Canadian women are more likely to work if their household would be close to the debt-service constraint without their income.

Following the approach of Fortin (1995), I regress an indicator for female employment on indicators for whether the household's DSTI ratio without the wife's labor income is between 10% and 17.5%, between 17.5% and 25%, or above 25%, restricting the sample to homeowners. The regression includes age, state, household and region-year fixed effects. In model (2), I additionally control for the income group, the number of children, the value of the house, and the remaining mortgage balance. Table A.1 confirms that the patterns found by Fortin (1995) also apply to the PSID data.

Table A.1: Female labor force participation and debt service obligations

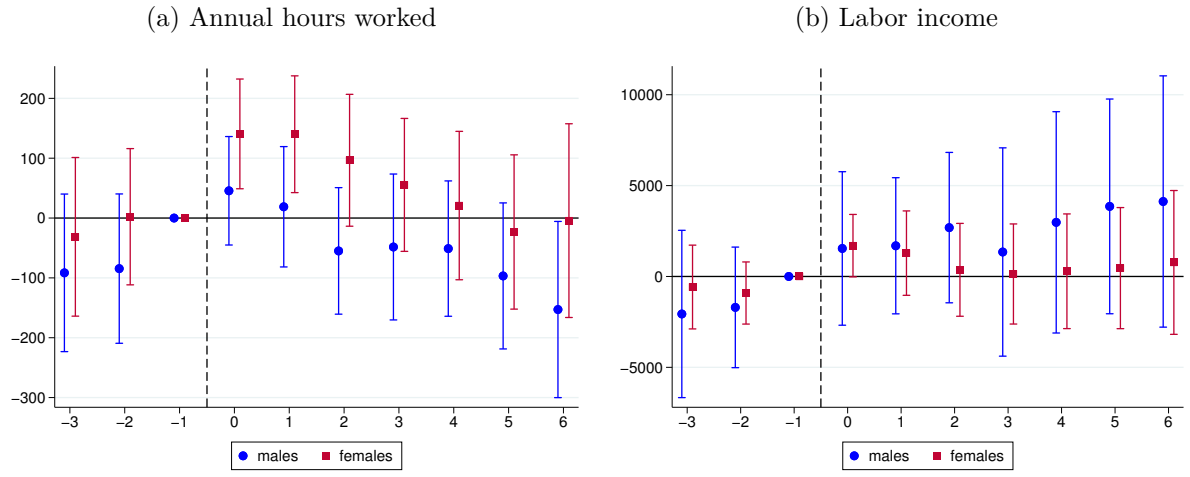
	(1)		(2)	
$DSTI^{wo}$ 10% - 17.5%	0.006	(0.011)	0.044***	(0.013)
$DSTI^{wo}$ 17.5% - 25%	0.030***	(0.011)	0.091***	(0.015)
$DSTI^{wo} > 25\%$	0.096***	(0.016)	0.177***	(0.023)
50% - 90%			0.133***	(0.013)
Top 10%			0.201***	(0.027)
1 Child			-0.059***	(0.011)
2 Children			-0.139***	(0.022)
3+ Children			-0.185***	(0.030)
House Value			-0.001	(0.001)
Mortgage Balance			-0.008***	(0.002)
FE	yes		yes	
Mean	0.656		0.656	
Observations	16,265		16,265	

Notes: The graph shows the results of regressions in which the outcome variable is a dummy for whether the wife works. $DSTI^{wo}$ is the household's DSTI ratio without the wife's labor income. The regressions include age, state, household and region-year fixed effects. The sample was restricted to married homeowners below 60 years of age. Standard errors are clustered at the household and state level (* p<0.1, ** p<0.05, *** p<0.01).

To obtain a more direct impression of female labor supply and income around the time of a home purchase, I estimate event studies similar to equation (3), where the event in period 0 is defined as the purchase of a home after having been a renter. All right-hand-side variables are interacted with a spouse dummy to allow a comparison between husbands

and wives. The results in Figure A.2 show that women who reported a positive labor income in the period of the home purchase even slightly *increase* their average annual hours worked after buying a house. Their average labor income also increases slightly, and evolves very similarly to that of their husbands. It should be noted that I could not detect a differential probability for the birth of a first or additional child before and after a home purchase. Indeed, the same data give rise to substantial and persistent drops in female income subsequent to childbirth, in line with the evidence on "child penalties" by Kleven et al. (2019). The corresponding results are available upon request.

Figure A.2: Female hours worked and income around home purchase



Notes: The graph shows the results of estimating event studies similar to equation (3), where the event is a home purchase after renting. All right-hand-side variables are interacted with a spouse dummy to allow a comparison between husbands and wives. Observations outside the estimation sample (covering 1969-1985) are used in computing the leads and lags. The sample was restricted to married couples below 60 years of age who both reported positive labor income in the year of the home purchase. Standard errors are clustered at the household and state level. The whiskers indicate 95% intervals.

A.2 Debt service

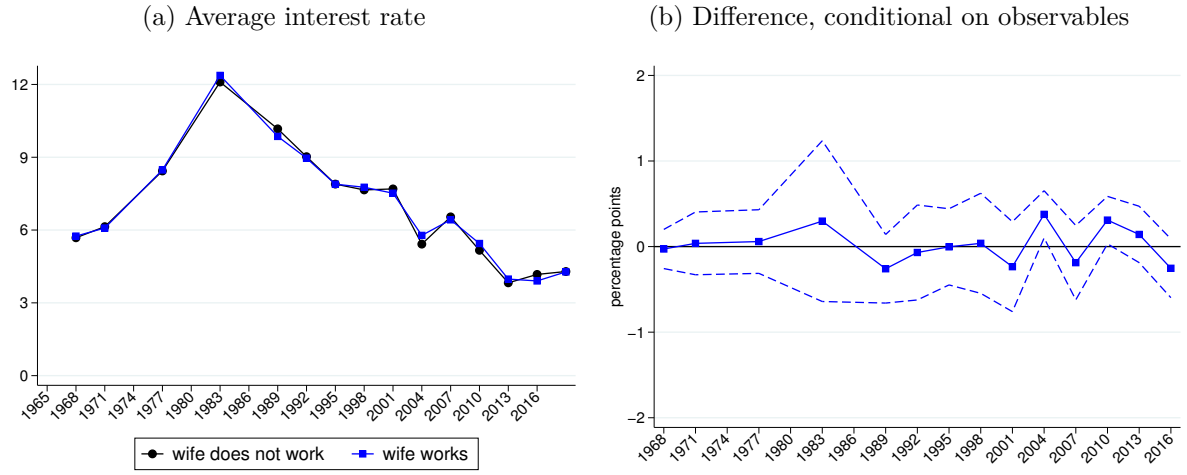
Figure A.3a shows the average interest rate on the principal residential mortgage of married recent homeowners from the SCF+. Recent means that the household has moved into its current residence during the current or the previous two years. The graph shows that there is no systematic difference in interest rates between married households with versus without a working wife. However, households with a working wife might have different characteristics. Therefore, I regressed mortgage interest rates on observable socioeconomic variables to control for potential confounders:

$$r_{it} = \beta_0 \tilde{y}_{it} + \beta_1 h_{it} + \beta_2 d_{it} + \beta_w works^w_{it} + \sum_{t=1971}^{2016} \beta_t \cdot \delta_t \cdot works^w_{it} + \delta_t + age_{it} + kids_{it} + black_{it} + college^h_{it} + college^w_{it} + \epsilon_{it}, \tag{A.1}$$

where $\tilde{y}_{it}$ denotes log total household income, h_{it} is the asset value of the house, d_{it} is

the outstanding mortgage balance, $works_{it}^{w}$ is a dummy for whether the wife works, δ_t are time dummies, age_{it} is a set of age dummies, $kids_{it}$ are dummies for the number of children, $black_{it}$ is a dummy for being black, and $college_{it}^{h}$ and $college_{it}^{w}$ are dummies for whether head and wife have a college degree.[40] Figure A.3b shows the coefficients $\beta_w + \beta_t$ over time. The results confirm that there is no systematic interest rate difference between the two groups.

Figure A.3: Mortgage interest rates of recent owners



Notes: The left panel shows the average mortgage interest rate on the first mortgage of married recent homeowners (meaning they moved in the previous or current year) with and without a working wife over time. The right panel shows the coefficients $\beta_w + \beta_t$ from equation (A.1). The dashed lines show 95% CIs, based on robust standard errors taking multiple imputation into account.

A.3 Additional graphs

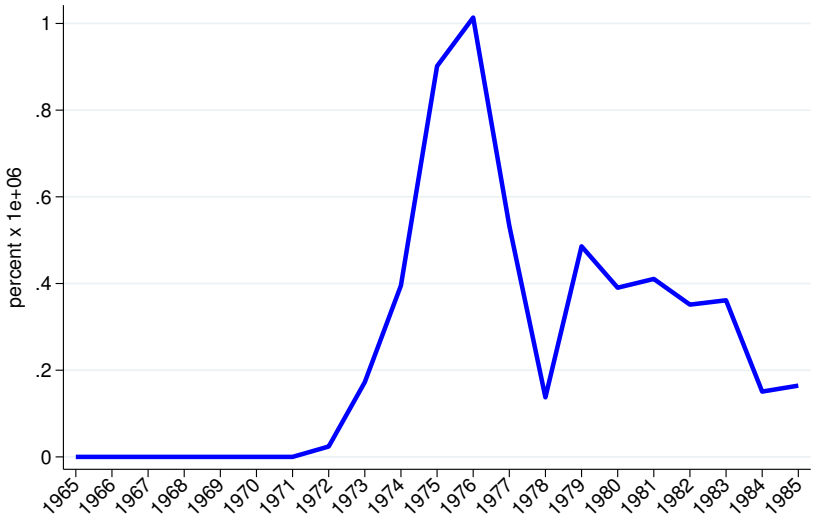
Figure A.4 shows how mentions of the term "women and credit" in English books have evolved over time, using data from the Google Books Ngram Viewer. This online search engine displays the frequency of search strings (*n-grams*) in millions of digitized books (Michel et al. 2011). The mention frequency is zero until 1971, becomes positive in 1972, and sharply increases thereafter.

Figure A.5 shows the shares of single and married households with and without a mortgage in the PSID over time.

Figure A.6 shows similar results as Figure 4 for DTI instead of DSTI ratios.

[40] If not otherwise stated, demographics refer to the household head. Note that the SCF+ does not have a panel dimension, such that I could not include household fixed effects.

Figure A.4: Google Books Ngram Viewer

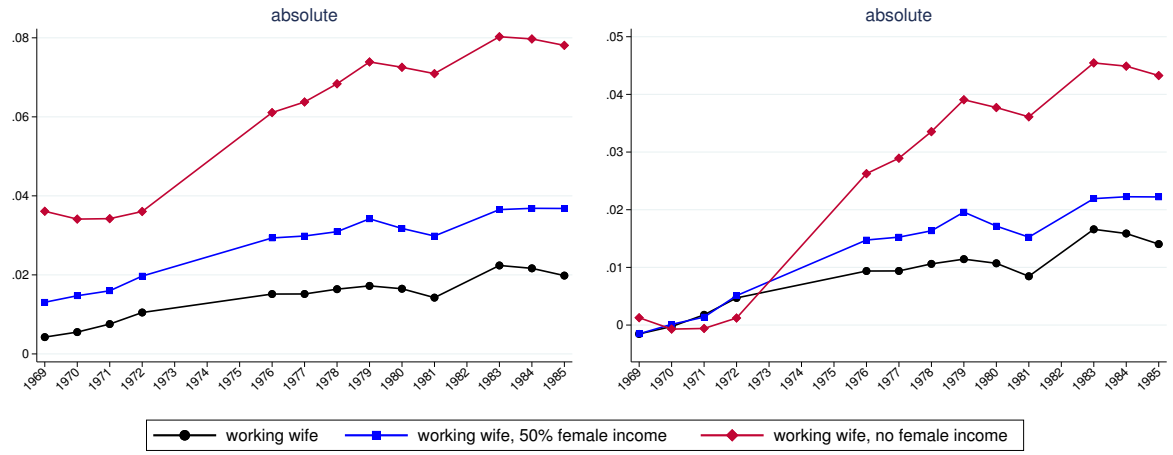


Notes: The graph shows how mentions of the 3-gram "women and credit" (case insensitive) have evolved over time. The figure is based on data from the Google Books Ngram Viewer. The y-axis shows the share of this 3-gram among all 3-grams contained in the Google sample of English books. The Google data are normalized with the total number of books published in each year.

Figure A.5: Single and married mortgage holders

Notes: The graph shows the shares of single and married households with and without a mortgage over time.

Figure A.6: Household with debt-to-income ratio above 2



Notes: The left panel shows the share of households with a debt-to-income ratio above 25% among households with a working wife. Households with implausibly high ratios (above the 99.8th percentile) were excluded. The blue lines with squares (red lines with diamonds) show counterfactual shares based on debt-to-income ratios excluding 50% (100%) of the wife's income. The series were smoothed by taking a 3-year moving average. The right panel normalizes each series with its average over the period 1969-1971.

B Robustness

B.1 Point estimates with and without controls

One can simplify the model in equation (2) by replacing the individual year dummies with an indicator D_t equal to 1 for years after 1971:

$$Y_{it} = \beta_0 + \beta_1 \cdot D_t + \beta_2 \cdot D_t \cdot share_i^{pre} + \Gamma' X_{it} + \gamma_i + \delta_t + \epsilon_{it}. \tag{B.1}$$

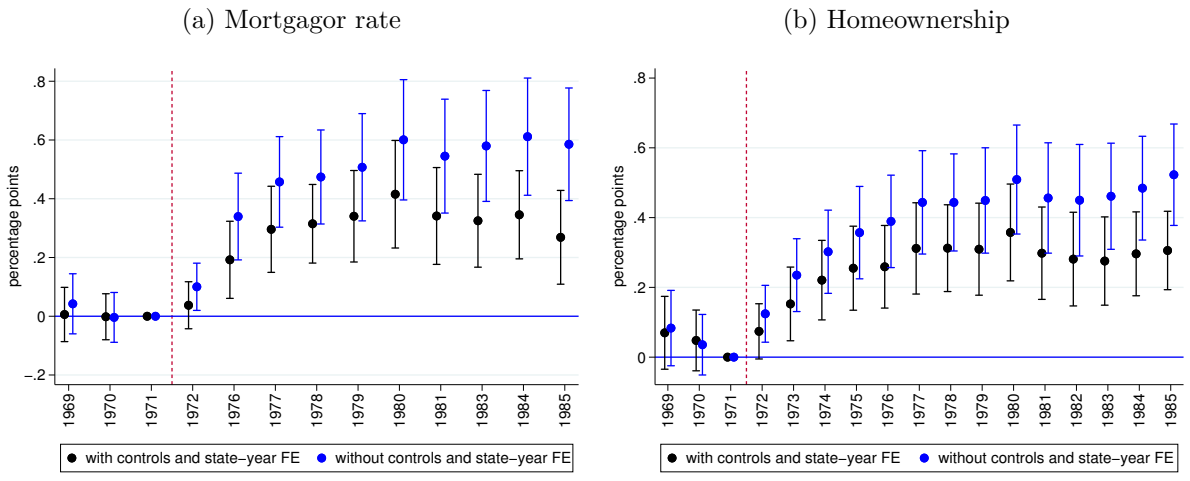
The corresponding point estimates for the housing debt-to-income ratio as the outcome variable are summarized in Table B.1.

Table B.1: Effect of controls: mortgagor rate

	(1)		(2)	
Post 1971 × Tot. Inc. Share Wife 71	0.004***	(0.001)	0.003***	(0.001)
25-34			0.303***	(0.040)
35-44			0.406***	(0.047)
45-54			0.420***	(0.050)
55-64			0.337***	(0.051)
65+			0.221***	(0.068)
50% - 90%			0.054***	(0.013)
Top 10%			0.089***	(0.020)
1 Child			0.055***	(0.013)
2 Children			0.143***	(0.019)
3+ Children			0.150***	(0.025)
Household FE	yes		yes	
Year FE	yes		no	
State-year FE	no		yes	
Mean	0.513		0.513	
Observations	20,192		20,190	

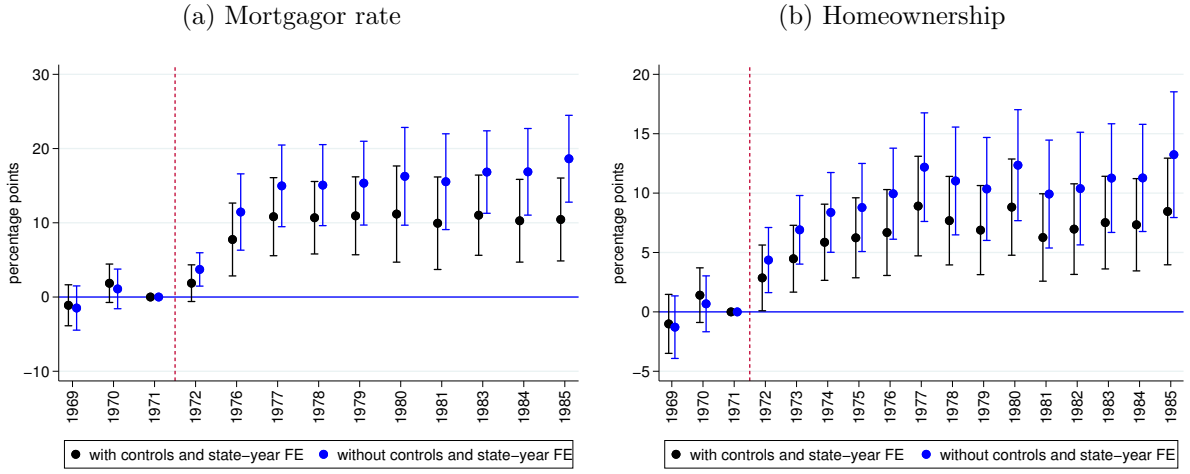
Notes: The table presents results for equation (B.1). The interaction variable is the average share of the wife's labor income in total household income over the pre-reform years. Standard errors are given in parentheses and are clustered at the household and state level (* p<0.1, ** p<0.05, *** p<0.01). The wife's income share is defined in percent.

Figure B.1: Effect of controls



Notes: The graph compares the results from Figures 5b and 6b to versions without the controls X_{ist} and the state-year fixed effects. The whiskers indicate 95% intervals.

Figure B.2: Dummy interaction with and without controls



Notes: The graph shows the coefficients on the interaction term in equation (2), where $share_i^{pre}$ was replaced with a dummy for whether the average share of the wife's labor income in total household income over the pre-reform years (up to 1971) was positive. It also shows the results for the same regressions without the controls X_{ist} and the state-year fixed effects. The whiskers indicate 95% intervals.

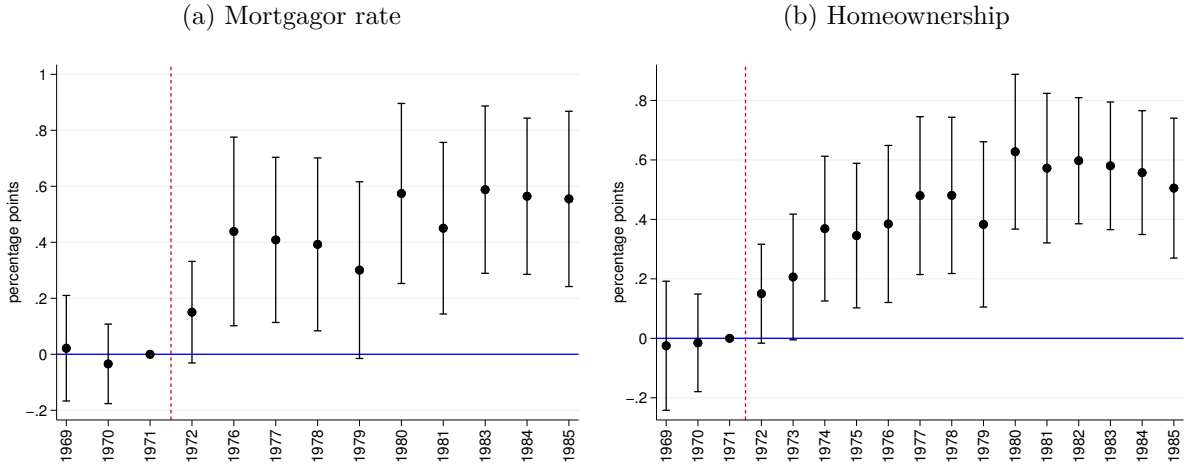
B.2 Triple difference

As explained in Section 2, income discounting was especially common when the wife was of childbearing age. Therefore, one may use older women as an additional control group in a triple-difference regression:

$$Y_{ist} = \sum_{t=1969,\, t\neq 1971}^{1985} \left[\beta_t^1 \cdot \delta_t \cdot share_i^{pre} \cdot D_i^{<35\,pre} + \beta_t^2 \cdot \delta_t \cdot share_i^{pre} + \beta_t^3 \cdot \delta_t \cdot D_i^{<35\,pre}\right] + \Gamma' X_{ist} + \gamma_i + \alpha_{st} + \epsilon_{ist}, \tag{B.2}$$

where $D_i^{<35\,pre}$ is an indicator for whether the wife was below 35 years of age in 1971. Figure B.3 plots the coefficients on the triple interaction term.

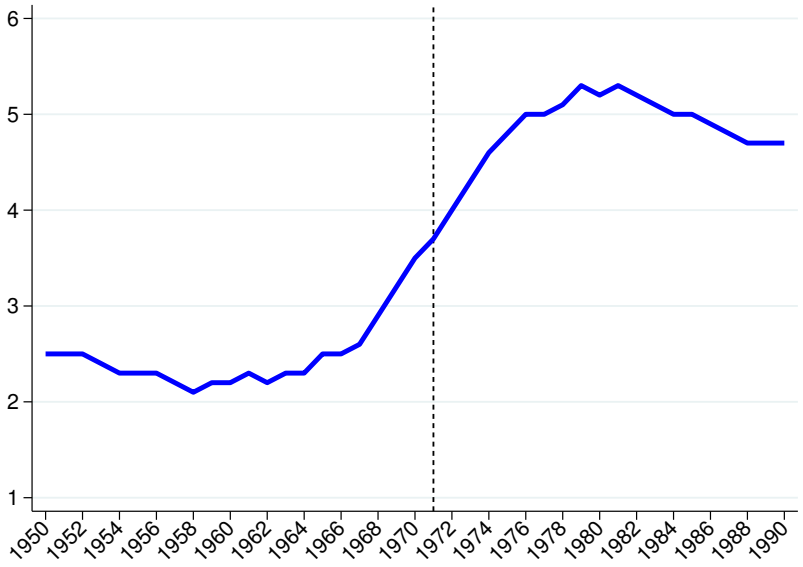
Figure B.3: Triple difference with cohort



Notes: The graph presents the coefficients β_t^1 on the triple interaction in equation (B.2). The age dummies were omitted from the controls, as this regression already includes time and cohort dummies. The whiskers indicate 95% intervals.

B.3 Divorce rates

Figure B.4: Divorce rates

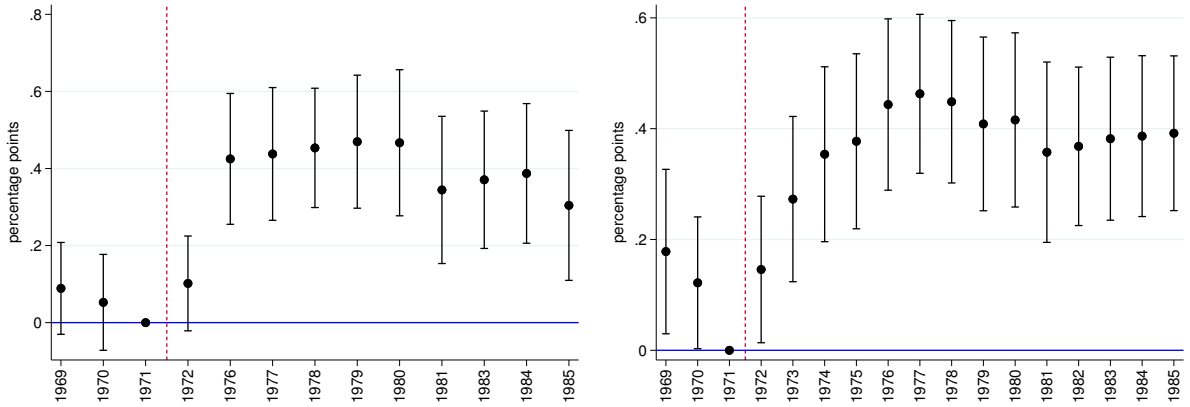


Notes: The graph shows the number of divorces per 1,000 inhabitants based on data from the National Center for Health Statistics (NCHS). The data were made available by Randal Olson at `http://www.randalolson.com/wp-content/uploads/us-marriages-divorces-1867-2014.csv`.

Figure B.5: Excluding households who got divorced

(a) Mortgagor rate

(b) Homeownership

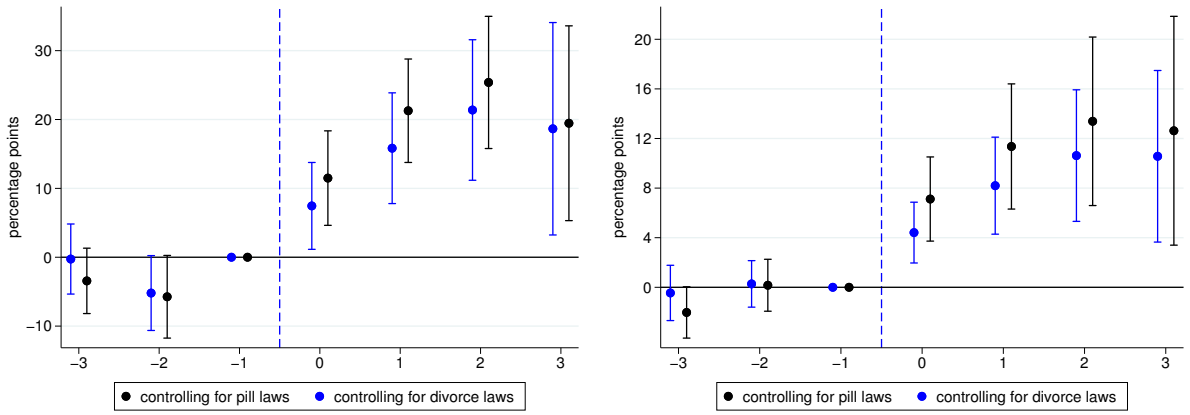


Notes: The graph shows a robustness check for Figures 5b and 6b, estimated on a sample restricted to households who had entered the PSID at the latest in 1971, were still in the survey in 1985, and never reported a transition from being married to being single in between. The whiskers indicate 95% intervals.

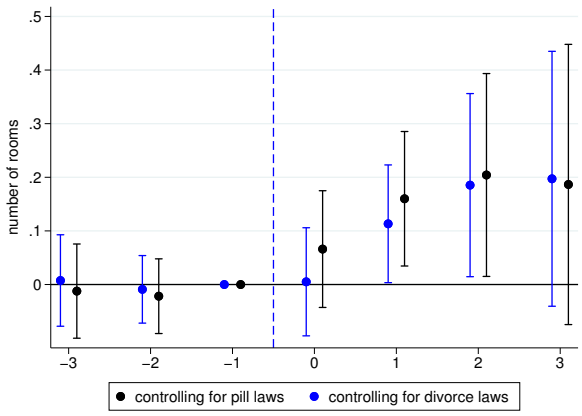
Figure B.6: Event studies housing

(a) Housing-to-income ratio

(b) Homeownership rate



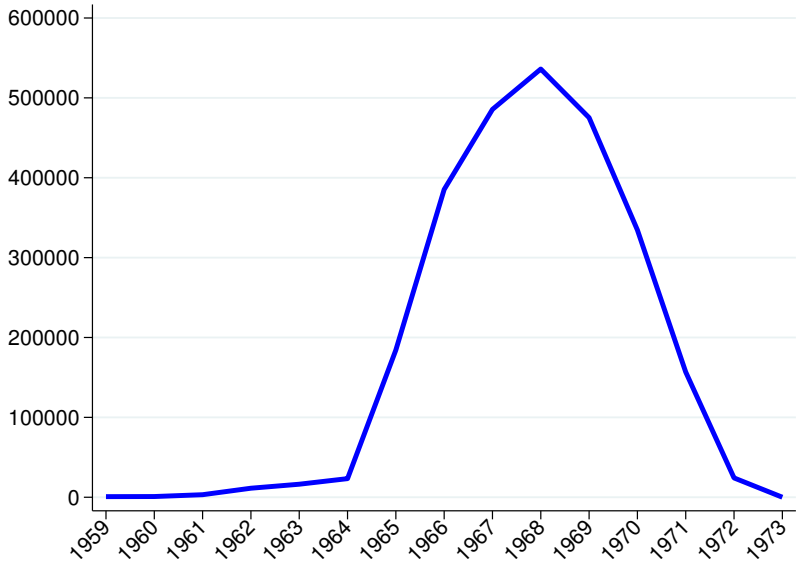
(c) House size



Notes: The graph shows a robustness check for Figure 7 in which I additionally control for event dummies indicating state consent laws determining early access to the pill from Bailey (2006) or state laws on unilateral divorce from Gruber (2004).

B.4 End of Vietnam War

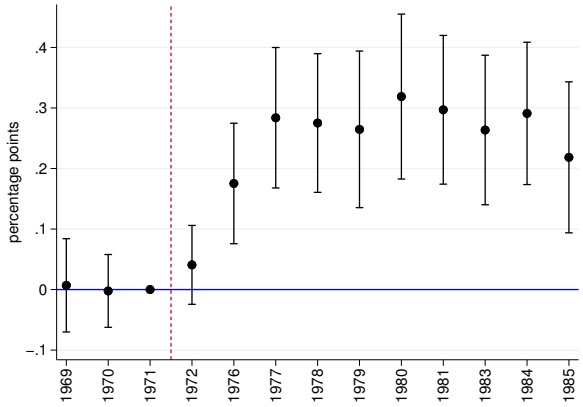
Figure B.7: Number of U.S. soldiers in Vietnam



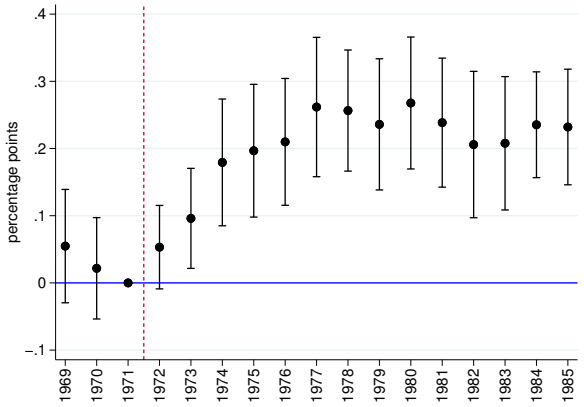
Notes: The graph shows the number of U.S. soldiers in Vietnam (source: `https://www.americanwarlibrary.com/vietnam/vwatl.htm`).

Figure B.8: Excluding heads in armed forces

(a) Mortgagor rate



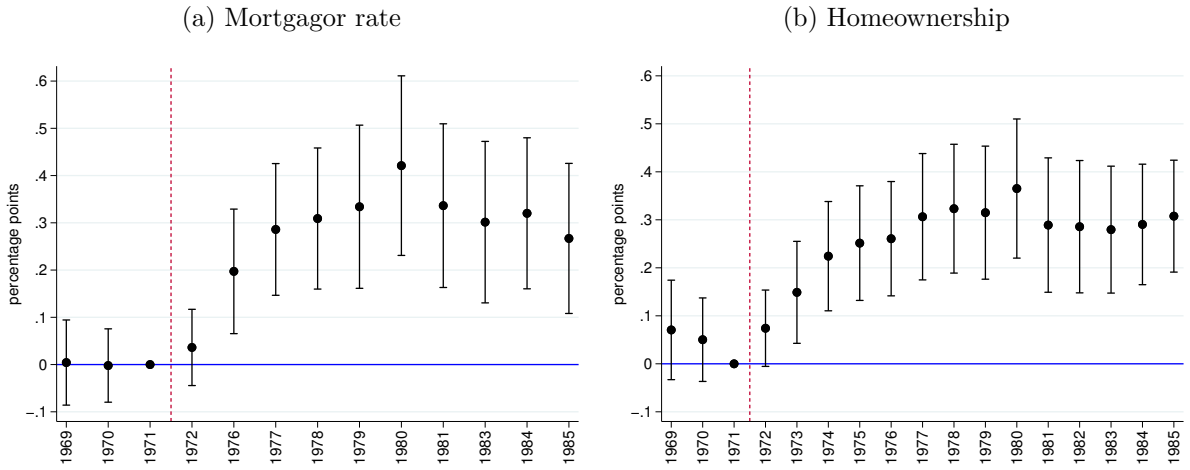
(b) Homeownership



Notes: The graph shows a robustness check for Figures 5b and 6b, estimated on a sample which excludes all households whose head had been in the armed forces any time between the beginning of the sample in 1969 and the official end of the Vietnam War in 1975. The whiskers indicate 95% intervals.

B.5 Earned Income Tax Credit

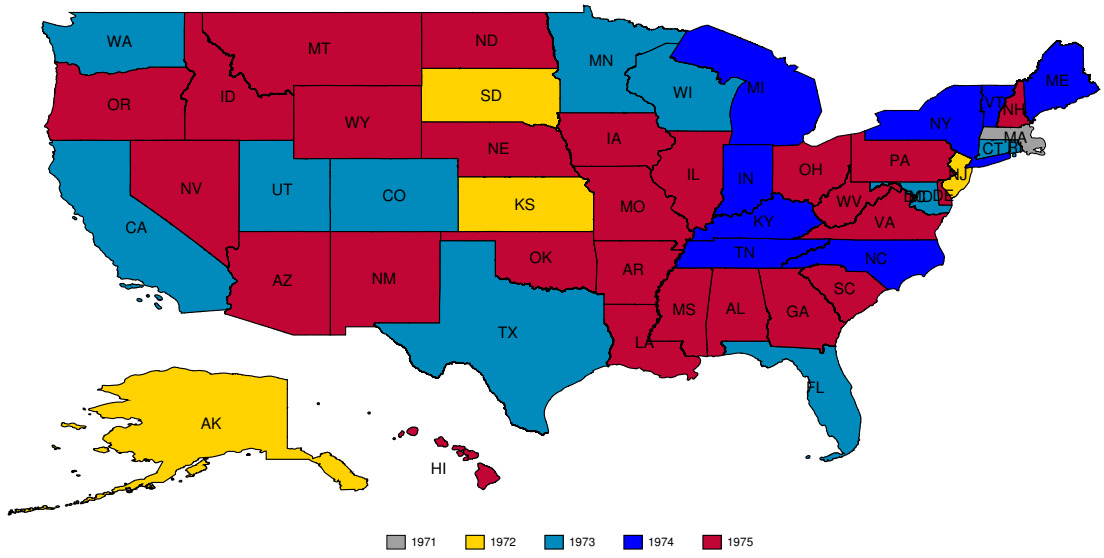
Figure B.9: Excluding households eligible for EITC



Notes: The graph shows a robustness check for Figures 5b and 6b, estimated on a sample which excludes all households who were eligible for the EITC after its introduction in 1975. The whiskers indicate 95% intervals.

B.6 State laws

Figure B.10: Geographic location of states introducing laws



Notes: The map gives a geographical overview of the states introducing legislation against discrimination in access to credit for women in a given year.

Table B.2: Overview: state laws

state	passed	effective	notes	source
Alaska	1972		does not include marital status	Gates (1974)
Arkansas*	1975		consumer credit only	Arkansas Code §4-87-104
California	1973/10		prohibits discrimination against *women*, not sex in general	Beckey (1974)
Colorado	1973/6			Beckey (1974)
Connecticut	1973/6	1973/10		Beckey (1974)
D.C.	1973/11			Beckey (1974)
Florida	1973/6	1973/10		Beckey (1974)
Georgia	1975/4			Acts and Resolutions of the General Assembly of the State of Georgia 1975, vol. 1, law no. 510
Hawaii	1975/5		only includes marital status	Session Laws of Hawaii. Act 109, H.B. no. 499
Illinois*	1973/9	1973/10	only applies to credit cards	Beckey (1974)
Indiana	1974			Bowdish (2010)
Iowa	1974	1975		Code of Iowa 1975, vol. 1, §601A.9
Kansas	1972		does not include marital status	Gates (1974)
Kentucky	1974/6			Bowdish (2010)
Louisiana	1975			Louisiana Revised Statutes, title 9, ch. 3
Maine	1974/2	1974/6		Bowdish (2010)
Maryland	1973/7			Gates (1974)

Table B.2: Overview: state laws (ctd.)

state	passed	effective	notes	source
Massachusetts	1971		does not include marital status; more general law against credit discrimination since 1973/4, but applicability to mortgages unclear	Beckey (1974)
Michigan	1974/8			U.S. Office of Consumer Affairs (1975), Michigan Penal Code §750.147a
Minnesota	1973/5	1973/8		Beckey (1974)
Missouri*	1974/6		retail credit only	Laws of Missouri: Laws Passed by the Seventy-seventh General Assembly, Missouri Digital Heritage
Montana	1975/3			Laws and Resolutions of the State of Montana, vol. 1 1975, ch. 121
Nevada	1975			Nevada Revised Statutes, title 52, ch. 598b
New Jersey	1972			Beckey (1974)
New Mexico	1975			U.S. Advisory Commission on Intergovernmental Relations (1976)
New York	1974/6	1974/7		Beckey (1974)
North Carolina	1974/4			U.S. Office of Consumer Affairs (1975)
Ohio	1975/6			"Legislative Column" (1975)
Oklahoma*	1974		consumer credit only	Oklahoma Statutes §14A-1-109
Oregon*	1973/10		public accommodation only	Gates (1974)

Table B.2: Overview: state laws (ctd.)

state	passed	effective	notes	source
Pennsylvania*	1969/6	1969/7	commercial property only	H.B. 567, Regular Session 1969-1970†
Rhode Island	1973/5			Gates (1974)
South Dakota	1972		does not include marital status	Gates (1974)
Tennessee	1974/4			Bowdish (2010)
Texas	1973/6	1973/8	does not include marital status	Gates (1974)
Utah	1973/5		does not include marital status; only state-regulated enterprises	Gates (1974)
Vermont	1974/2	1974/7		Gates (1974)
Virginia	1975			U.S. Office of Consumer Affairs (1976)
Washington	1973/3	1973/6		Beckey (1974)
West Virginia*	1973		public accommodation only	Gates (1974)
Wisconsin	1973/8			Gates (1974)

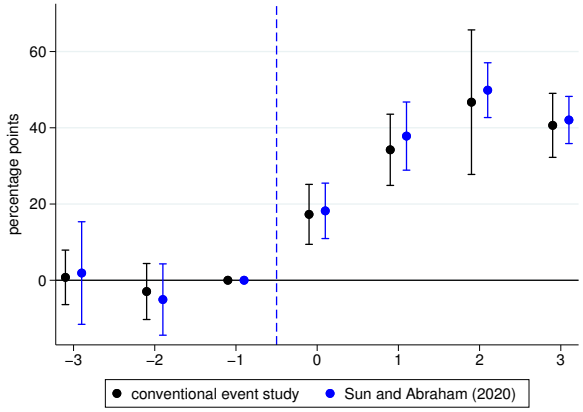
Notes: The table gives an overview of state laws against credit discrimination. If there is information that the dates of the law's passage and effectiveness differed, both are indicated. An asterisk (*) indicates laws which do not apply to home financing.
† The wording was changed from "commercial housing" to "housing accommodation or commercial property" by H.B. 141, Regular Session 1985-1986.

B.7 Alternative event study estimator

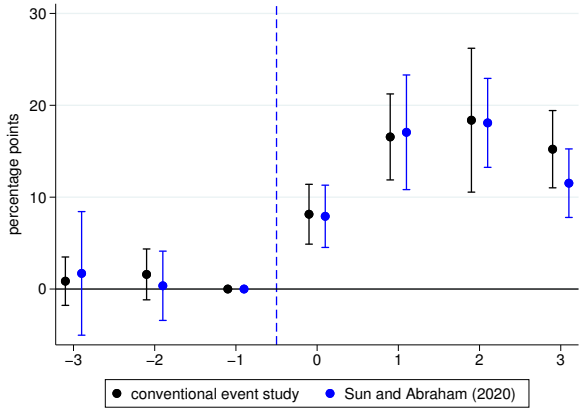
Figure B.11 compares the estimated coefficients from a "conventional" event study with two-way fixed effects to those obtained by using the "interaction-weighted estimator" proposed by Sun and Abraham (2020), which is robust to heterogeneous treatment effects. In a setting without never-treated units, the approach of Sun and Abraham (2020) requires to drop time periods $t \geq \max(e_s)$, because each unit is treated from that point on, such that there is no well-defined control group that would allow to compute their estimator. Therefore, I exclude $\max(e_s) = 1975$ and all subsequent years in the estimation of both specifications. Moreover, I abstain from using additional controls in the two-way fixed effects model for consistency across the two strategies. The patterns produced by both estimation procedures turn out to be very similar.

Figure B.11: Comparison to estimator of Sun and Abraham (2020)

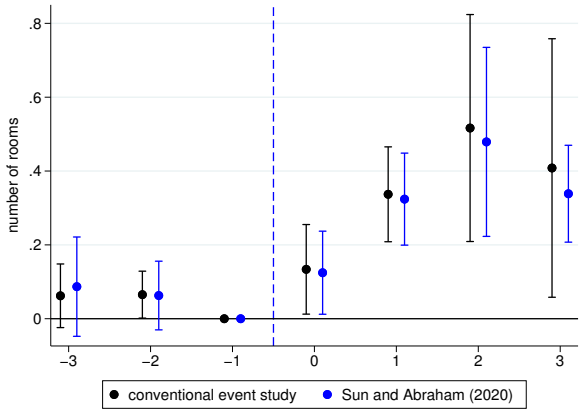
(a) Housing-to-income ratio



(b) Homeownership rate



(c) House size

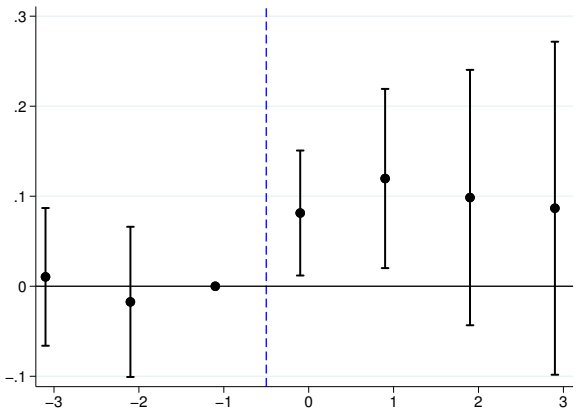


Notes: The graph presents a comparison of the coefficients obtained using a two-way fixed effects model with state and year fixed effects to those obtained with the "interaction-weighted estimator" of Sun and Abraham (2020). The sample is restricted to the years prior to 1975 and no further covariates are included, as required by the approach of Sun and Abraham (2020). Standard errors are clustered at the state level. The whiskers indicate 95% intervals.

B.8 Explorative regression: female labor supply

Figure B.12 shows the results of an event study for the wife's probability to work more than 500 hours per year, which corresponds to a quarter of full-time employment. The sample includes young households (below age 45, the median age in my baseline sample in the early 1970s) who were renters in the three pre-reform years, and whose wife was at most loosely attached to the labor force (i.e., working less than a quarter of annual full-time hours on average over this period). This group may be considered as a proxy for households who are at the beginning at their life cycle shortly after the reform, and have to decide whether to buy a home and whether the wife wants to work. Due to the small sample size (less than 200 households), these results should be taken as suggestive and interpreted with caution. While estimating the same regression on the full sample yields a zero effect, Figure B.12 suggests that married women from the described group increased their labor supply after the reform in treated states, compared to their counterparts in untreated states.

Figure B.12: Explorative event study: female labor supply

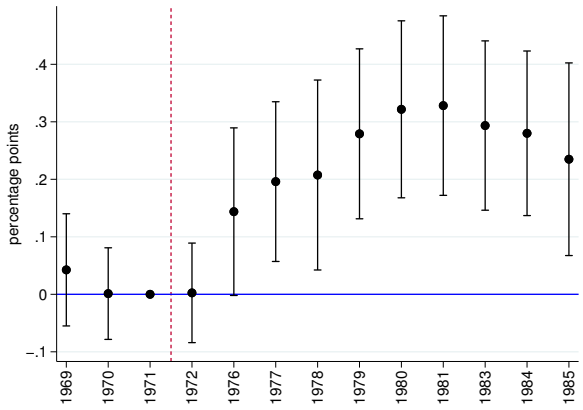


Notes: The graph shows the coefficients on the treatment indicators D_{st}^{j} from equation (3), using a dummy for whether the wife works more than 500 hours per year as the outcome. The sample was restricted to households who were renting and below age 45 prior to the reform, with a wife at most loosely attached to the labor force. Standard errors are clustered at the state level. The whiskers indicate 95% intervals.

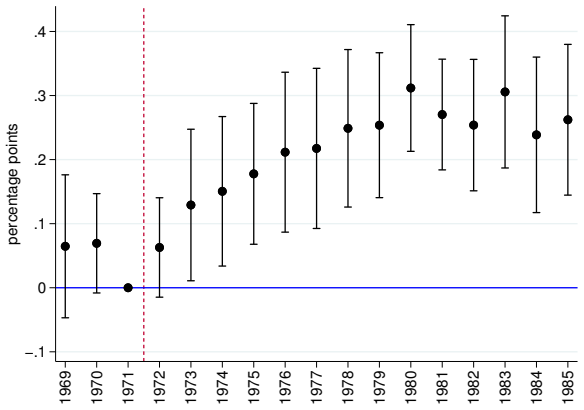
B.9 Share in contemporaneous income

Figure B.13: Housing debt: share of contemporaneous income

(a) Mortgagor rate



(b) Homeownership

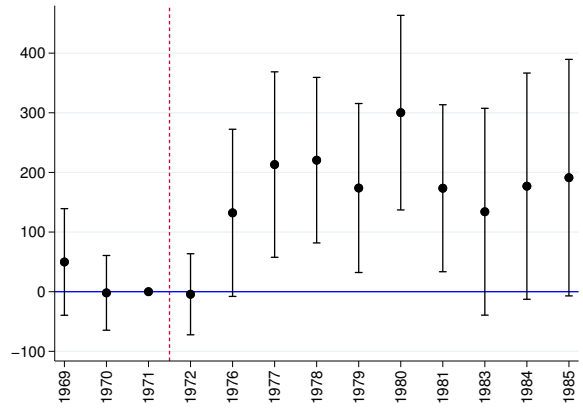


Notes: The graph presents the coefficients on the interaction term in equation (2), where $share_i^{pre}$ was replaced with the wife's contemporaneous income share (in percent). The sample consists of the same households as in the baseline. The whiskers indicate 95% intervals.

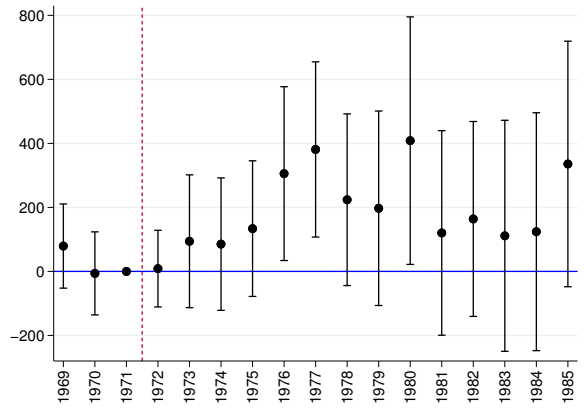
B.10 Non-normalized housing debt and housing assets

Figure B.14: Housing debt and housing

(a) Housing debt



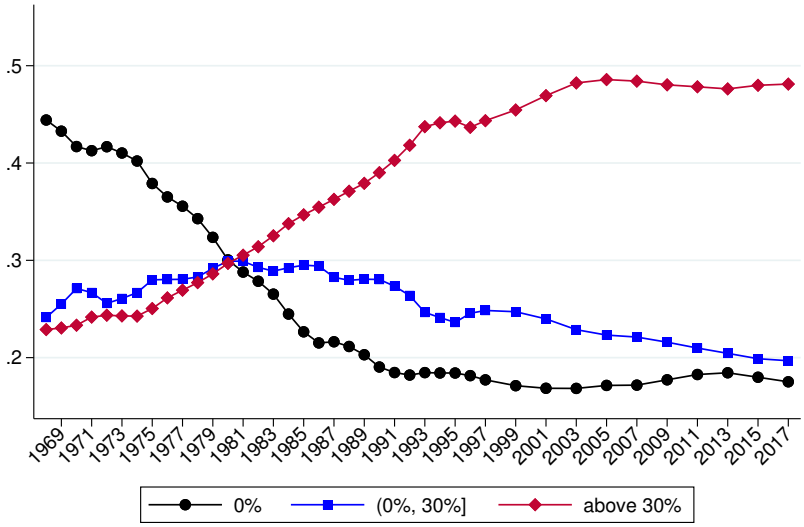
(b) Housing assets



Notes: The graph presents the coefficients on the interaction term in equation (2). The wife's income share is defined in percent. The whiskers indicate 95% intervals.

B.11 Share of wife in joint labor income of both spouses

Figure B.15: Shares of married households by labor income share of wife in *labor* income



Notes: The graph shows shares among all married households with positive labor income, stratified by the wife's labor income contribution to the couple's total labor income. The series were smoothed by taking a 3-year moving average.

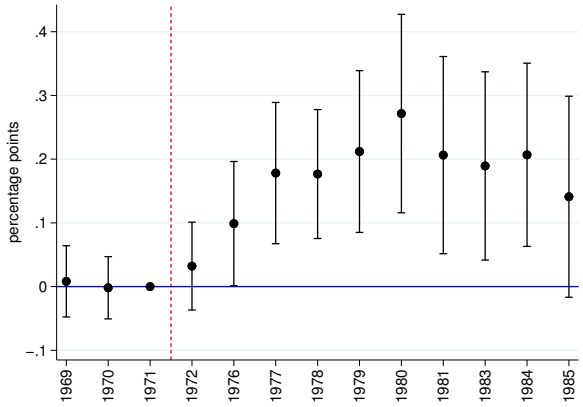
Table B.3: Mortgagor rate: share in *labor* income

	(1)		(2)	
Post 1971 × Lab. Inc. Share Wife 71	0.002***	(0.001)	0.001***	(0.000)
25-34			0.309***	(0.039)
35-44			0.412***	(0.047)
45-54			0.428***	(0.050)
55-64			0.346***	(0.053)
65+			0.225***	(0.070)
50% - 90%			0.053***	(0.013)
Top 10%			0.088***	(0.020)
1 Child			0.058***	(0.013)
2 Children			0.147***	(0.019)
3+ Children			0.156***	(0.025)
Household FE	yes		yes	
Year FE	yes		no	
State-year FE	no		yes	
Mean	0.526		0.526	
Observations	19,571		19,569	

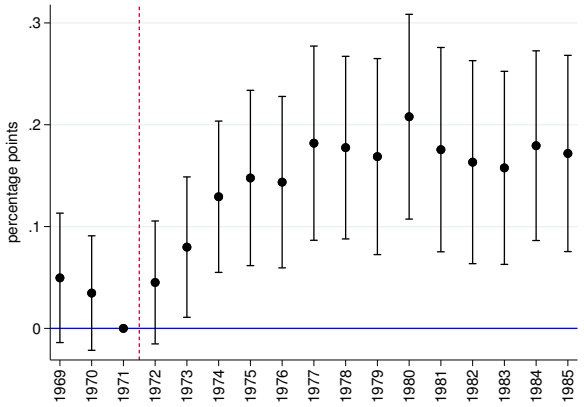
Notes: The table presents results for a version equation (B.1) in which the interaction variable is the wife's average share in both spouses' labor income over the pre-reform years. Standard errors are given in parentheses and are clustered at the household and state level (* p<0.1, ** p<0.05, *** p<0.01). The wife's income share is defined in percent.

Figure B.16: Share in *labor* income of head and spouse

(a) Mortgagor rate



(b) Homeownership



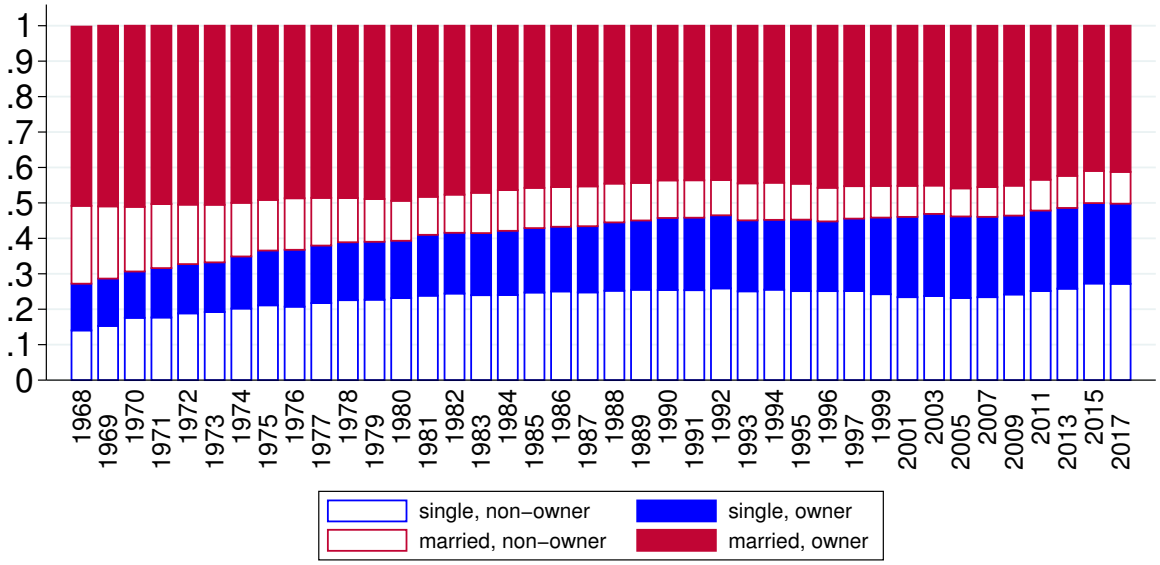
Notes: The graph presents the coefficients on the interaction term in equation (2), where $share_i^{pre}$ was replaced with the wife's average share in both spouses' labor income over the pre-reform years (up to 1971). The wife's income share is defined in percent. The whiskers indicate 95% intervals.

C Results for single households

It should be noted that the ECOA does not prohibit creditors from asking about marital status in general. The only exception are applications for unsecured, separate accounts in separate property states or community property states allowing both spouses to manage and control the community property (Geary 1976). Yet as Geary (1976) points out, Regulation B limits the use a lender can make of marital status information.

One could imagine a scenario in which an increase in the share of singles with housing debt reflects demographic changes, e.g., an increase in divorces. However, the divorce rates in Figure B.4 have evolved smoothly over time. The same is true for the sample shares of single and married households, as Figure C.1 shows.

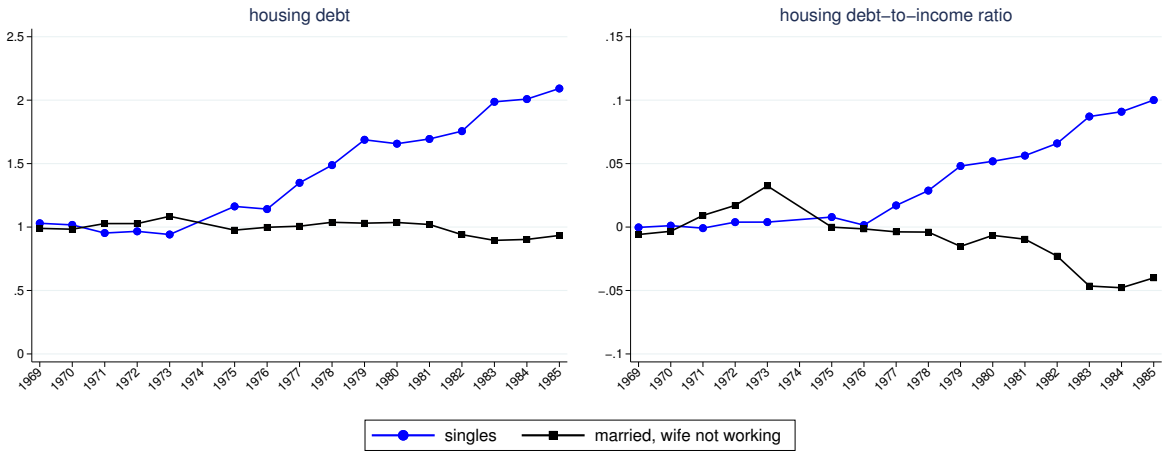
Figure C.1: Single and married homeowners



Notes: The graph shows the shares of single and married households with and without a house over time.

Figure C.2 presents descriptive evidence, similar to Figure 3 in the main text. It shows that housing debt began to increase faster for singles than for married households with a non-working wife in the early 1970s.[41] A similar pattern emerges when normalizing with total household income.

Figure C.2: Descriptive evidence, singles



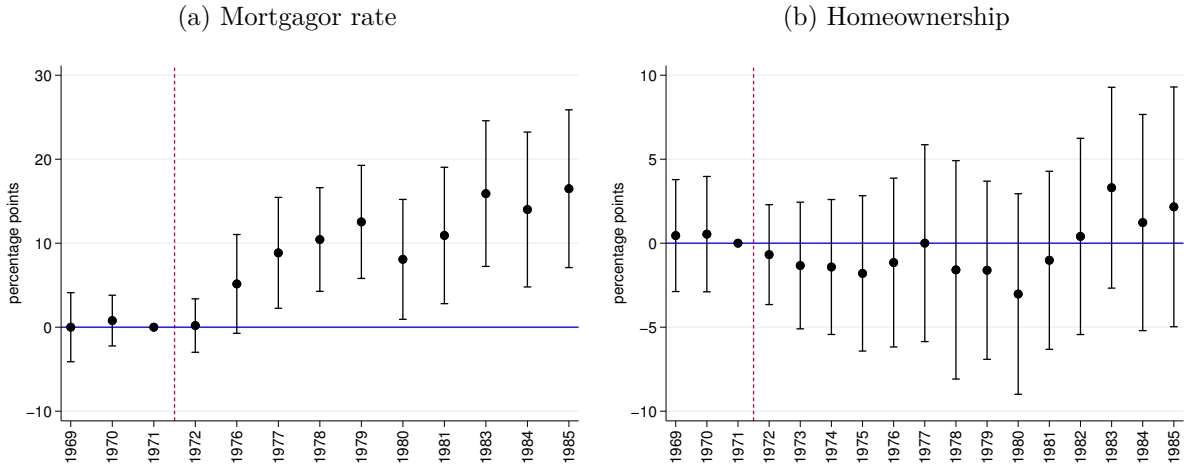
Notes: The graph shows housing debt from the PSID for singles and married households with a non-working wife over time. All series were normalized with their average over the period 1969-1971. The left panel shows average housing debt, and the right panel shows housing debt-to-income, after winsorizing at the 99th percentile within each year. The series were smoothed by taking a 3-year moving average.

I estimate a regressions similar to equation (2), replacing $share_i^{pre}$ by an indicator for being single in 1971, $single_{i,71}$. A male household head who is single in 1971 might for

[41] I excluded widowed households from the sample because they differ substantially from other single households with respect to demographic characteristics and homeownership.

instance marry a working wife, such that the estimated effect might pick up effects on dual-earner couples if the treatment group was defined only according to single status in 1971. I therefore define the treatment group as single households who were already single in 1971. The control group is chosen as in the binary version of my baseline regression, i.e. married households in which the wife was not working in 1969-1971. I include the same set of controls as in the baseline.

Figure C.3: Housing debt of singles



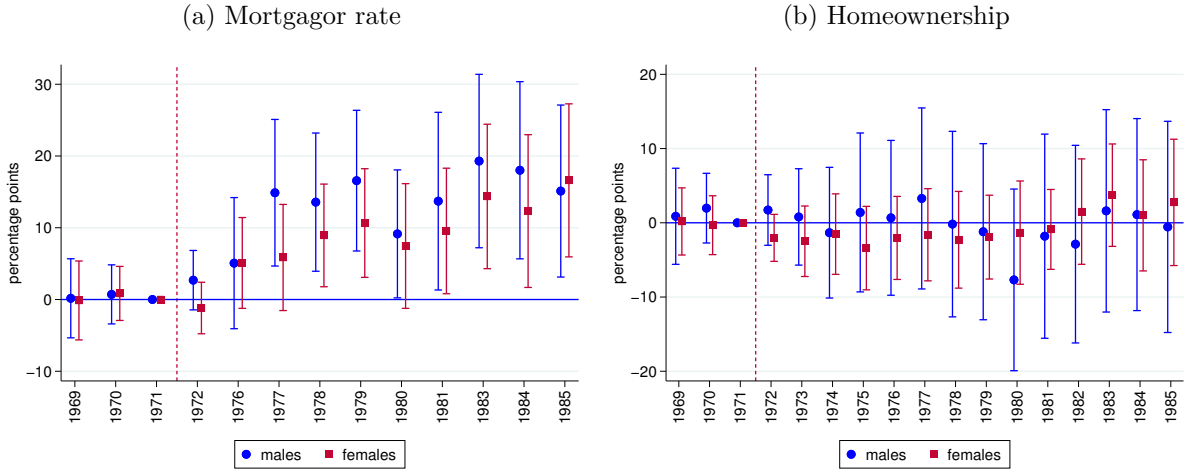
Notes: The graph presents the coefficients on the interaction term of the single dummy and the year dummy, as described in the text. The DTI ratio is defined in percent and was winsorized at the 99th percentile within each year. The whiskers indicate 95% intervals.

Figure C.3 shows the coefficients on the interaction term of the single dummy and the year dummy for regressions with the extensive margin of housing debt and homeownership as the outcome variables. There is a pronounced increase in the extensive margin of singles' debt compared to married households with a non-working wife. However, there is no increase in homeownership. This would be in line with the interpretation that singles could substitute away from other financial sources, such as transfers or loans from their families (cf. Del Boca and Lusardi 2003).

The PSID asks the head about financial help he received from relatives outside the household in the last year. Information on similar transfers to the wife are only available since 1985. Likewise, information on transfers from non-relatives outside the household and loans from relatives are only available in more recent survey waves. I found that single heads had a lower probability of receiving financial support from relatives than heads from the control group in the post-reform period, whereas the difference was close to zero in the pre-reform years. Although the point estimates are not statistically significant at conventional levels, I interpret this as suggestive evidence in support of the substitution channel. The results are available upon request.

Figure C.4 stratifies the singles by sex. It shows that there is no evidence of differential effects on single women compared to single men.

Figure C.4: Housing debt of singles, by sex



Notes: The graph presents the coefficients on the interaction term of the single dummy, the year dummy and a dummy for singles' sex. The DTI ratio is defined in percent and was winsorized at the 99th percentile within each year. The whiskers indicate 95% intervals.

D Additional information on life-cycle model

This section provides additional details on the life-cycle model and its solution.

D.1 Supplementary calculations

$$d_{j+1} = (1+r)d_j - m_j,$$

where m_j are per-period mortgage payments. The constraint $d_{j+1} \leq d_j$ implies

$$(1+r)d_j - m_j \leq d_j \quad \Leftrightarrow \quad rd_j \leq m_j \ .$$

If the mortgage is scheduled to be amortized over T periods using constant payments m, a debt-to-income constraint upon origination is directly proportional to a debt-service-to-income constraint. To see this, let d_0 be the original mortgage upon origination:

$$\begin{aligned} d_T = (1+r)^T d_0 - \sum_{i=0}^{T-1}(1+r)^i m = (1+r)^T d_0 - \frac{(1+r)^T - 1}{r} m = 0 \quad \Leftrightarrow \\ \frac{d_0}{y_0} = \frac{(1+r)^T - 1}{r(1+r)^T} \frac{m}{y_0}. \end{aligned} \tag{D.1}$$

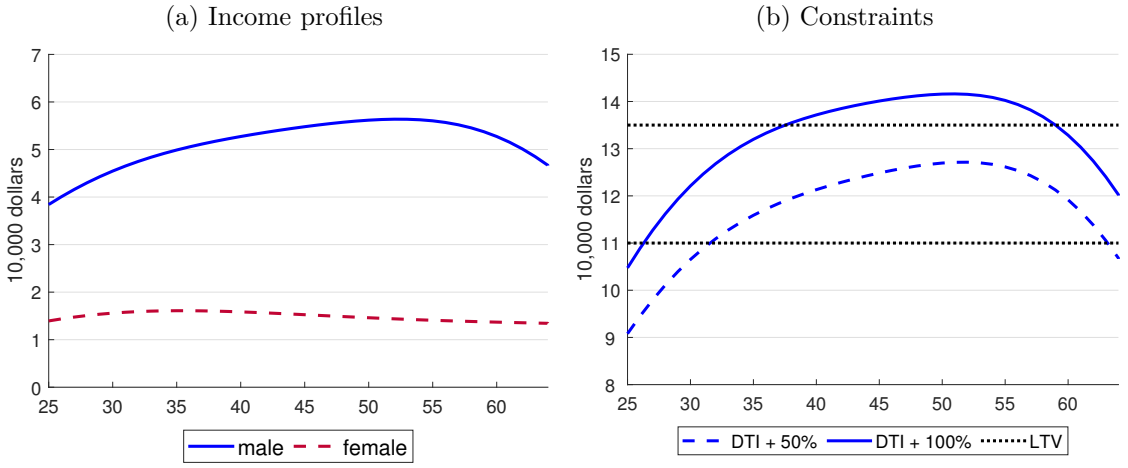
D.2 Computational solution and life-cycle profiles

As explained in Attanasio et al. (2012), the structure of the optimization problem does not allow to rely on the existence of smooth first order conditions when solving the model. Therefore, I use value function iteration to find a solution. I compute "conditional" value

functions for each current housing state ($h \in \{0, 1, 2\}$) based on corresponding "conditional" asset grids with 120 grid points. The solution is found recursively by iterating backwards from the end of the life cycle.

The wage processes from equation (4) are discretized using the method of Tauchen (1986), as adapted to the life-cycle setup and structure of the wage process by Attanasio et al. (2012). A choice of 14 grid points (both for men and women) yields a reasonably good approximation of the autoregressive processes. Figure D.1a shows the income profiles of husbands and wives under certainty, obtained by multiplying the estimated wage profiles with 40 hours times 50 weeks for the husband, which corresponds to a typical contract in the data, and 20 hours times 50 weeks for the wife, corresponding to a typical half-time contract. Figure D.1b illustrates how these profiles map into the DTI constraint when the household is allowed to count 50% or 100% of the wife's income toward the mortgage.

Figure D.1: Income profiles and constraints



Notes: The left panel shows the income profiles from estimating equation (4) and abstracting from income risk, assuming a standard contract of 50 work weeks à 40 hours for the husband, and a half-time contract of 20 hours for the wife. The right panel shows the LTV constraints associated with the smaller and the bigger house, as well as the DTI constraints when the household is allowed to count 50% or 100% of the wife's income from the left panel toward the mortgage.

The initial distribution of net wealth is estimated from the SCF+ for the period 1969-1971, restricting the sample to married households with a head between ages 24 and 26. A few households report negative net wealth in the data, mainly due to personal debt. As my model does not include personal debt, I follow Pizzinelli (2018) and winsorize the distribution at 0. Moreover, I winsorize it at the 99th percentile to exclude a few households reporting exceptionally high net wealth. Households start their life cycle without owning a house.

The age-dependent female leisure parameter $\theta^f(j)$ is modeled as a third-order polynomial and the factor $\chi(j)$, which pre-multiplies the basic housing preferences μ^h, is modeled as the maximum of a second-order polynomial and one. The coefficients are reported in Table D.1, and the resulting profiles are depicted in Figure D.2. The female leisure preference is initially high and increases until the early thirties. Thereafter, the probability of

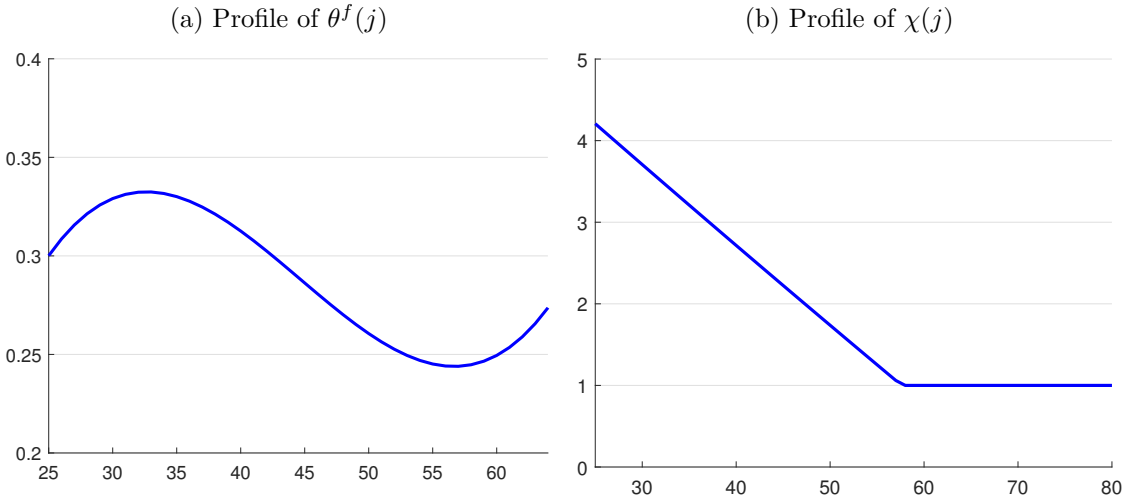
additional children arriving decreases (see Figure D.3a), and women's leisure preferences decrease. From the mid-fifties on, when retirement is approaching and the first grandchildren arrive, the leisure preference increases again. The housing preferences start at a high level and then decline almost linearly until the late fifties, which is the point in the life cycle when households sizes stabilize in the data (see Figure D.3b).

Table D.1: Polynomical coefficients

$\theta^f(j)$		$\chi(j)$	
θ_0	-0.5997	χ_0	6.7559
θ_1	0.0707	χ_1	-0.1035
θ_2	-0.0017	χ_2	0.0001
θ_3	1.2748e-5		

Notes: The table shows the coefficients of the polynomials used to model the age-dependent female leisure preferences $\theta^f(j)$ and housing preferences $\chi(j)$.

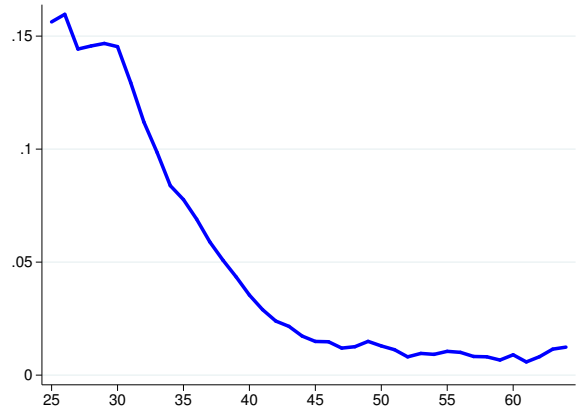
Figure D.2: Age-dependent preference parameters



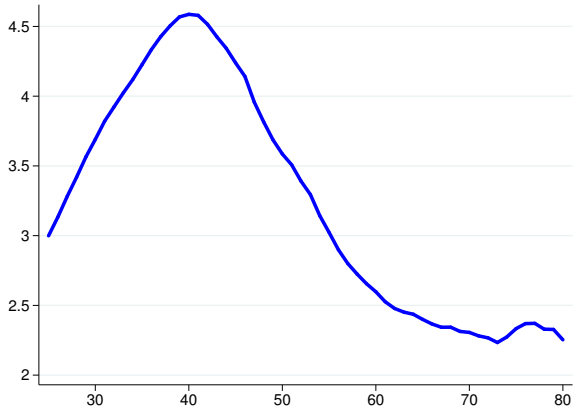
Notes: The graph shows the age-dependent leisure preferences $\theta^f(j) = \theta_0 + \theta_1 j + \theta_2 j^2 + \theta_3 j^3$ and the housing preferences $\chi(j) = \max(\chi_0 + \chi_1 j + \chi_2 j^2, 1)$.

Figure D.3: Arrival of new children and household size over the life cycle

(a) Arrival of new children



(b) Household size



Notes: The left panel shows the share of households in the baseline sample reporting an increase in the number of children over the life cycle. The right panel shows the average household size over the life cycle. The data were smoothed by taking a three-year moving average.

Table D.2: Targeted moments

	data	model
homeownership, 25-34	0.58	0.61
homeownership, 35-44	0.78	0.78
homeownership, 45-54	0.84	0.83
homeownership, 55-64	0.8	0.83
mortgagor rate, 25-34	0.55	0.54
mortgagor rate, 35-44	0.68	0.69
mortgagor rate, 45-54	0.57	0.65
mortgagor rate, 55-64	0.35	0.29
FLFP, 25-34	0.43	0.45
FLFP, 35-44	0.39	0.36
FLFP, 45-54	0.42	0.39
FLFP, 55-64	0.39	0.39

Notes: The table compares the homeownership, mortgagor and FLFP rates by age group in the model and the data. The FLFP rate in the data refers to women working at least 500 hours per year.

E Questions related to the ECOA from the 1977 SCF

Elliehausen and Durkin (1989) draw on evidence from the Survey of Consumer Finances (SCF) of 1977, which included several questions related to the ECOA. In the following, I will summarize the answers to several of these questions. Indeed, the responses provide

mixed evidence of self-reported discrimination, consistent with the findings of Elliehausen and Durkin (1989). However, there are several reasons why the responses may not adequately reflect the impact of the ECOA. First, the survey was conducted in August and September 1977, five years after the congressional hearings of 1972 that prepared the ground for the ECOA. Second, more than 99% of married household in the 1977 SCF have a male head (cf. Kuhn, Schularick, and Steins 2020). Questions addressed to the heads may conceal problems of their wives to obtain credit. Third, the question if a couple was unable to obtain the desired amount of credit does not capture whether they had adjusted their desired amount based on common lending practices. An important aspect of the ECOA was to educate the public about their new financial rights (Cairns 1976, Geary 1976), which may have changed households' reference points for what they can afford.

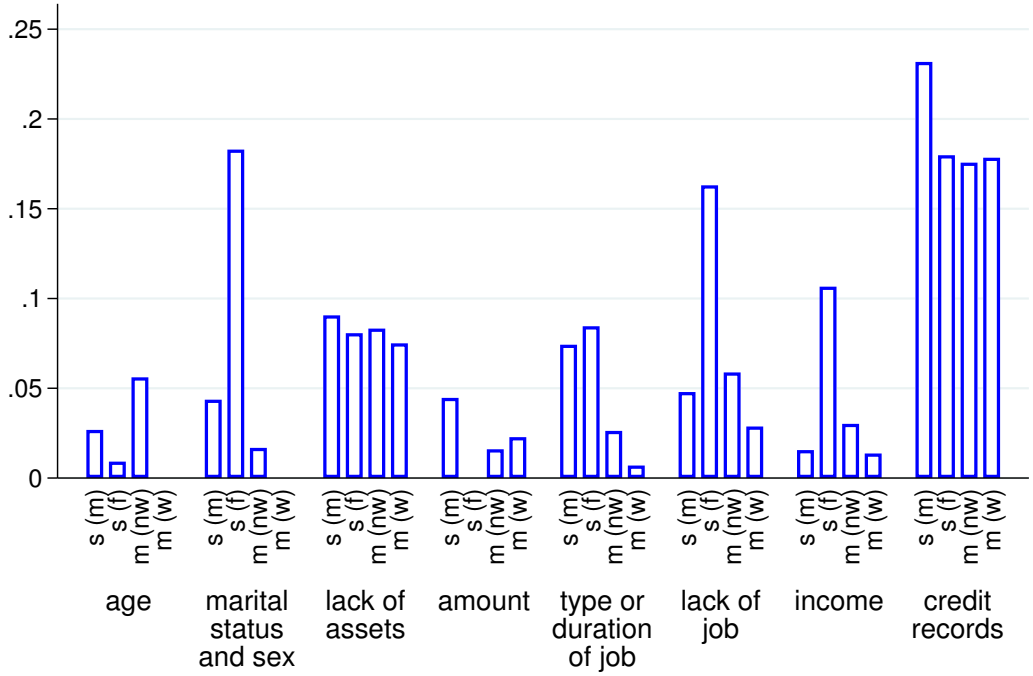
Singles, in particular women, reported larger perceived difficulties to obtain credit (see Table E.1). Looking at the reasons in Figure E.1, marital status and sex seem to be an important problem for single women, whereas these aspects are perceived as less problematic by single men, and hardly any married households report such problems. However, as the question asks for the respondent's credit experiences, it remains silent on potential problems of the spouse.

Single women also have above-average approval rates for the response options lack of job and income. This may in part reflect discriminatory practices, because lenders commonly did not accept alimony and child support as income before the implementation of the ECOA (see Cairns 1976). It may however also reflect justified economic reasons for single women's problems to obtain credit. Both male and female singles also report the type or duration of their job as a problem more often than married households. Credit records are the biggest problem for all groups, and especially for male singles. These results indicate that single households' difficulties to obtain credit were not only related to discrimination, but also to economic factors – even according to the self-perception of these households.

Table E.1: Would it be difficult for people like yourself to get credit?

	single men	single women	married, wive no work	married, wive works	Total
no	64.70	53.80	80.59	84.70	74.31
yes	30.95	43.54	17.08	13.93	23.36
depends	4.36	2.66	2.33	1.37	2.32
Total	100.00	100.00	100.00	100.00	100.00

Figure E.1: Why would it be difficult?



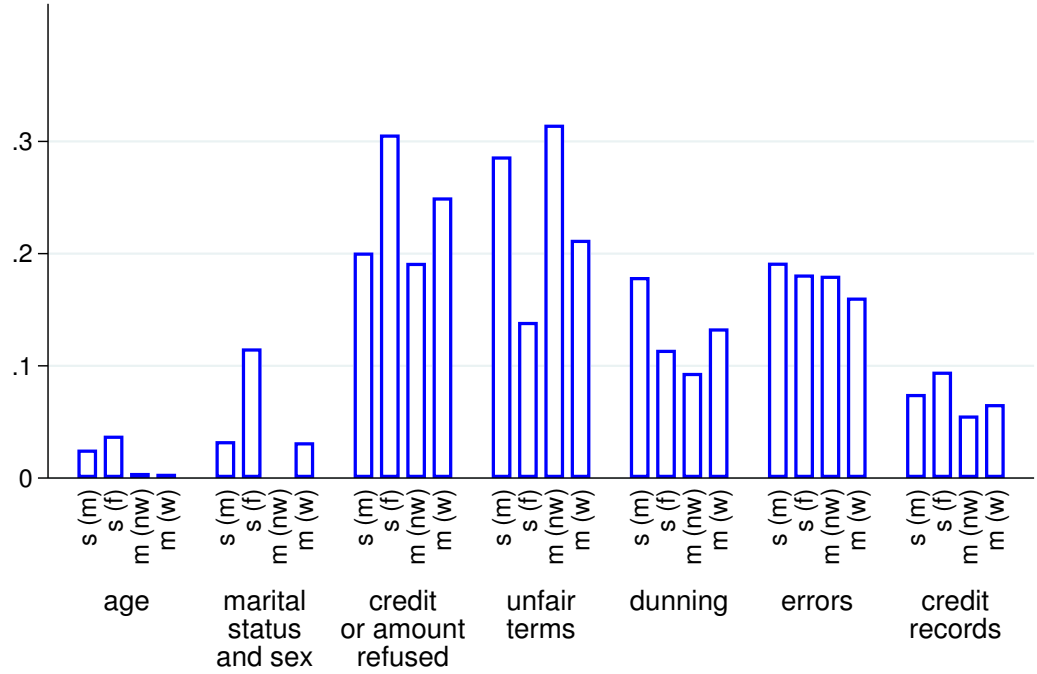
Notes: s(m) = single, male; s(f) = single, female; m(w) = married, wife s; m(nw) = married, wife does not work; 2 mentions possible

When asked whether they had been treated unfairly in their credit transactions, the approval rate of singles is actually *lower* than that of married households, and that of female singles even lower than that of male singles (Table E.2). Among married households, the approval rate is slightly higher for households with a working wife, but the difference is small. Regarding the underlying problems, marital status and sex are again mainly mentioned by single women (Figure E.2). Overall, the share of households mentioning this source of the problem is small. Interestingly, the share of households reporting they were refused all or part of the desired amount is higher for single women than single men, and higher for married households with a working as opposed to a non-working wife.

Table E.2: Have you been treated unfairly in your credit transactions?

	single men	single women	married, wive no work	married, wive works	Total
no	76.67	81.52	75.19	72.44	75.93
yes	23.33	18.48	24.81	27.56	24.07
Total	100.00	100.00	100.00	100.00	100.00

Figure E.2: What was the problem?



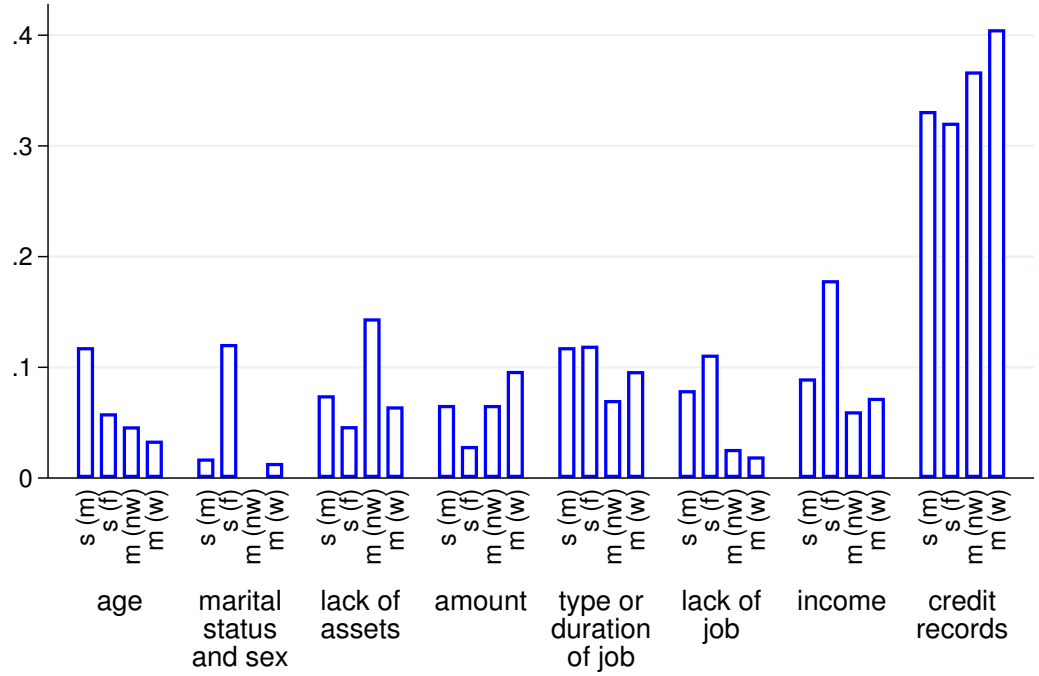
Notes: s(m) = single, male; s(f) = single, female; m(w) = married, wife works; m(nw) = married, wife does not work; 2 mentions possible

Consistently, the share of households reporting they were turned down for credit is higher among households with a working as opposed to a non-working wife (Table E.3). However, it is lower for single women than for single men. Among the reasons, marital status and sex are once more mainly reported by single women, and do not play a big role (Figure E.3). Again, credit records are the biggest problem, this time with the largest response rate among married households with a working wife.

Table E.3: Have you been turned down for credit?

	single men	single women	married, wive no work	married, wive works	Total
no	78.03	82.33	86.98	82.93	83.54
yes	21.97	17.67	13.02	17.07	16.46
Total	100.00	100.00	100.00	100.00	100.00

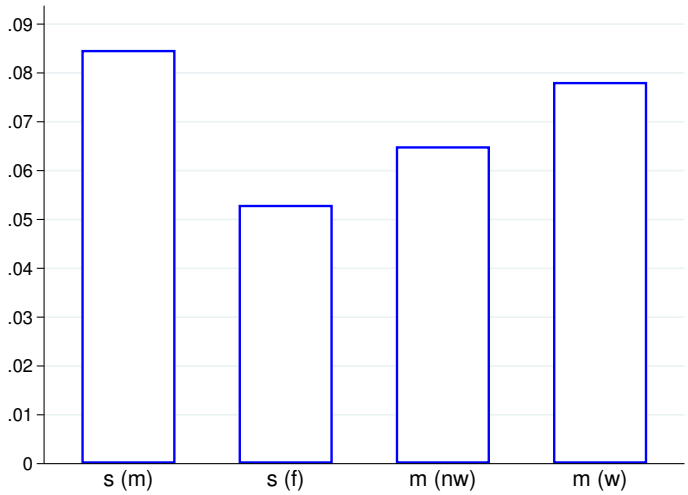
Figure E.3: Why were you turned down?



Notes: s(m) = single, male; s(f) = single, female; m(w) = married, wife works; m(nw) = married, wife does not work; 2 mentions possible

When asked specifically whether they had been unable to get as much credit as they wanted from a particular lender in the past few years, the share of affirmative answers is larger among married households if the wife is working, yet lower than among single men (see Figure E.4). However, as discussed above, this question does not capture whether households have calculated the desired amount based on discriminatory market practices.

Figure E.4: Were you unable to get as much credit as you wanted from a particular lender in the past few years?



Notes: s(m) = single, male; s(f) = single, female; m(w) = married, wife works; m(nw) = married, wife not working