

How do mortgage subsidies affect home ownership? VA home loans and the mid-20th century transformation in US housing markets

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Abstract

The sharpest increase in U.S. home ownership over the last century occurred between 1940 and 1960, driven largely by a decrease in the age at first ownership. To shed light on the contribution of several coincident large-scale government interventions in housing finance, I examine veterans' home loan benefits provided under the postwar GI Bills. I apply a regression discontinuity design to two breaks in the probability of military service by date of birth, for cohorts coming of age at the end of World War II and the Korean War, to estimate the impact of veteran status on home ownership. I find significant, positive effects of veteran status on home ownership in 1960. Consistent with a model in which the impact of easier loan terms declines with age, these effects are larger for younger veterans and diminish in 1970 and 1980 as the cohorts age. Complementary analyses suggest veterans' non-housing benefits and military service itself are unlikely to explain the observed differences in home ownership. My baseline estimates imply that veterans' housing benefits can explain approximately 10 percent of the increase in aggregate home ownership from 1940 to 1960.

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1 Introduction

The primary focus of federal housing policy over the last eighty years has been intervention in mortgage markets. In large part, the goal of these policies is to extend home ownership to marginal home buyers, and many observers have argued that the mortgage policies born of the Great Depression and World War II are responsible for the dramatic transformation in United States housing markets and home ownership in the mid-20th century.¹ But surprisingly, neither the effect of these policies on historical rates of home ownership, nor the set of factors driving changes in housing markets during and after World War II, is well understood. The recent crisis and debate over the government's role in housing finance makes evidence on these questions particularly timely.²

Of the interventions that began in the 1930's and 1940's, the mortgage insurance and guarantees provided through the Federal Housing Administration (FHA) and Veterans Administration (VA) were among the largest in scale. The establishment of these programs coincided with the most striking changes in home ownership in the last century. Between 1940 and 1960, the rate of home ownership increased sharply from 44 to 62 percent, as younger individuals became home owners at unprecedented rates. The profile of home ownership by age was nearly linear in every Census year from 1900 to 1940, but by 1960 had taken the concave shape that persists today.³

This paper provides estimates of the contribution of the VA home loan program to increased rates of home ownership, guided by a life-cycle model of tenure choice. Past work, such as Jackson (1985), Shiller (2005), and Vigdor (2006), has discussed the potential role of the FHA and VA in explaining the observed changes in housing markets over the 20th century.⁴ However, a number of other major changes over the same period could have driven the increase in home ownership. The

¹Examples are Jackson (1985) and Schwartz (2010).

²See, for example, the Obama Administration's plan to wind down Fannie Mae and Freddie Mac, among other things (U.S. Department of the Treasury, 2011).

³Figure 2 depicts the changing age structure of ownership in the United States over the 20th century. Aaron (1972) discusses the particularly large increases in home ownership for younger age groups over this period, and Collins and Margo (2001) note an increase in the concavity of the age-ownership profile in their study of racial differences in home ownership over the 20th century.

⁴A large body of work provides evidence on the impact of borrowing constraints on home purchase in more recent periods. Examples include Linneman and Wachter (1989), Duca and Rosenthal (1994), Haurin, Hendershott and Wachter (1997), and Linneman et al. (1997). Chiuri and Jappelli (2003) compare age-ownership profiles across countries and argue that the terms of mortgage finance, and down-payments in particular, are an important determinant of the distribution of home ownership across age groups.

favorable tax treatment of owner-occupied housing became more important during World War II as the federal income tax covered more of the population (Aaron, 1972; Rosen and Rosen, 1980; Rosen, Rosen and Holtz-Eakin, 1984). Rising real incomes and savings rates during World War II and afterwards, or increased rates of family formation in the period of the baby boom, may have increased demand for housing. Decreased transportation costs in the postwar era (Baum-Snow, 2007) may have increased home ownership by lowering the cost of suburban residence.⁵ Finally, even if changes in housing finance played an important role, the extent to which federal credit aids were themselves a major factor is an open question.

My empirical design attempts to hold these other factors constant, and allows the estimated effects of terms on home finance to vary with a person's age. The conceptual framework underlying the empirical work suggests the importance of taking life-cycle factors into account. I present a simple life-cycle model with tenure choice and down-payment constraints in home finance, and run simulations with loan terms similar to those of VA and non-VA loans. Results from the simulations suggest that for the ages I examine, one should expect to see larger impacts of easier finance on younger individuals, as lower down-payments allow home purchase earlier in the life cycle. In the empirical analysis I use the home loan benefits provided to veterans under the World War II and Korean War GI Bills as variation in the mortgage terms available to an individual.

Because of selection into military service during World War II and the Korean War, direct comparisons of veterans to non-veterans are problematic. However, the smoothness of home ownership rates in age motivates a modified version of the regression discontinuity (RD) approach that Bound and Turner (2002) use in their study of the impact of the education benefits of the GI Bill. They observe that the probability of military service by date of birth fell steeply with the declines in inductions under the draft at the end of World War II and the Korean War. Comparison between, rather than within, cohorts alleviates concerns that differences in later life outcomes are due to pre-existing differences in characteristics between veterans and non-veterans.⁶ The presence of two

⁵This may be the case if, for example, a lower price of land more distant from city centers facilitates construction of larger, single-family detached dwellings, and for agency reasons these tend to be owner-occupied more often than multi-family structures (Glaeser and Shapiro, 2003).

⁶This research design does not address the issue that service itself may have direct impacts on later outcomes, a potential confound I address in Section 5. In related work, Stanley (2003) exploits the official end date of the Korean War, used to define eligibility under the Korean War GI Bill, in an RD approach based on individuals' date of entry

‘breaks’ – one associated with the end of World War II and one with the end of the Korean War – permits RD estimation at two ages in a single year. Testing for discontinuities at each break in each Census from 1960 to 1980, I estimate the impact of veteran status at multiple ages and points in time.

The results of the main empirical analysis are consistent with the prediction that the effects of easier housing finance should decline with age. I find large effects of veteran status on the probability of home ownership in 1960 at both breaks, with greater differences for younger individuals. In 1960, men born at the World War II break were 32 years old, and about 52 percent owned their homes. I estimate an effect of 15 percentage points for men who were induced into military service at the break as a result of their date of birth. Men at the Korean War break were 26 years old in 1960, and about 27 percent were home owners. For these men, the analogous effect was 24 percentage points, larger than the World War II estimate in both percent and percentage point terms. Also consistent with effects that decline with age, I find no evidence for positive effects of veteran status on home ownership at either break in 1970 or 1980, when a person born at either break would have been at least 36 years old.

The GI Bills provided several other benefits as well, such as support for education, and military service itself also may have influenced an individual’s demand for housing. I present several pieces of evidence that suggest that the observed effects of veteran status on home ownership are not due primarily to non-housing benefits or direct impacts of military service. First, I find little evidence that education or income could be driving the home ownership result. There is some evidence of higher income in 1960 for veterans at the Korean War break, but estimates of the impact of veteran status on home ownership remain large and significant even after controlling for income directly.⁷ Second, the housing outcomes of World War I veterans, who received some benefits but no national housing benefits, suggest that ‘service effects’ were not the driving force behind veterans’ higher rates of ownership. World War I veterans were more likely to own their homes than similar non-veterans in 1930, but with effects smaller than those for World War II and Korean War veterans in

into the military. He is thus able to estimate an effect of benefits net of direct effects of service. A lack of data prevents a similar approach to studying the housing benefits of the GI Bill.

⁷If the true effect of veteran status on income is positive for compliers at the break, it is likely that controlling for income induces a downward bias in the estimated effect of veteran status on home ownership.

1960. Finally, a simple ‘service effects’ story would predict increased demand for ownership soon after a veteran’s return, but use of the benefit among World War II veterans diminished little in the decade after the war, and their rates of home purchase responded significantly to changes in the availability and generosity of the home loan benefit.

I use the baseline RD estimates to assess the contribution of VA home loan benefits to the overall increase in home ownership from 1940 to 1960. The estimates suggest that about 70 percent of the increase for men of age 26 and about 30 percent of the increase for men of age 32 can be attributed to VA home loan benefits. I extrapolate from these discontinuity estimates to calculate the share of the overall increase that can be attributed to the VA mortgage program, and find that the VA mortgage program can explain about 10 percent of the overall increase in home ownership from 1940 to 1960.⁸

In addition to shedding light on the factors driving changes in housing markets in the 1940’s and 1950’s, this paper complements recent work on the impacts of veterans’ education benefits (Bound and Turner, 2002; Stanley, 2003) by investigating the effects of other major benefits provided under the GI Bills. A similar paper to this one is Yamashita (2008), who examines discontinuities in home ownership around the World War II break in 1960 and 1980 and find similar results. Boustan and Shertzer (2010) investigate the impact of World War II veteran status on residential location; Vigdor (2006) also examines the VA home loan program, but focuses primarily on its possible effects on house prices.

The next section reviews the broad facts on living arrangements and changes in housing finance over the century that motivate this analysis, along with the necessary details on the VA home loan program. Section 3 presents the conceptual framework that underlies the empirical analysis in Sections 4 and 5. Section 6 uses the estimates from Section 4 to assess the contribution of the GI Bill to changes in home ownership in the postwar period.

⁸To the extent that the VA program increased house prices, as argued by Vigdor (2006), this figure may be an overestimate. However, the effects I estimate are modest in comparison to Vigdor’s estimate of the VA on home ownership. I discuss the differences between our estimates in more detail below.

2 Background

2.1 Trends in housing tenure over the 20th century

In the history of living arrangements in the United States over the 20th century, the period from 1940 to 1960 was distinctive in terms of the large overall increase in home ownership. Figure 1 shows the share of occupied dwelling units that were owner-occupied, the measure of ‘home ownership’ for which the most complete time series data exist.⁹ Home ownership rose from 44 percent in 1940 to 62 percent in 1960, with over half of the overall increase over these two decades taking place by the end of 1945. Since the VA home loan program gave out relatively few loans before the end of World War II, ideally one would be able to measure the contribution of the VA to the increase in home ownership after 1945. My empirical analysis, however, focuses on home ownership at the level of the individual rather than that of the dwelling unit, and therefore provides an estimate of the counterfactual 1960 home ownership rate at the individual level. Since 1940 is the last year before the creation of the VA home loan program for which microdata are available for calculating an individual-level home ownership rate, my discussion emphasizes the change from that year.

In the following descriptive statistics and the analysis below, I restrict the sample to US-born men 18 years old and above, and classify an individual as a home owner if he was the household head or spouse of the head in an owner-occupied dwelling.¹⁰ By this measure, the increase in home ownership was also most striking from 1940 to 1960, increasing from 27 to 53 percent. Aggregate trends in individual-level living arrangements are shown in Appendix Figure A1.

The crucial characteristic of the mid-century increase in home ownership was that it largely

⁹The data from the Decennial Census are available at <http://www.census.gov/hhes/www/housing/census/historic/owner.html>. The figures for 1944, 1945, and 1947 are estimates, from supplements to the October 1944, November 1945, and April 1947 sample surveys for the Monthly Report on the Labor Force (U.S. Bureau of the Census, 1945, 1946, 1947). The figure for 1956 is from the National Housing Inventory (U.S. Bureau of the Census, 1958).

¹⁰The following statistics are based on IPUMS Census microdata (Ruggles et al., 2008). The microdata list a single head and tenure status for each household. In addition to identifying owners in this way, I classify an individual as a renter if he is the head or the spouse of the head in a renter-occupied unit, or is a boarder in a dwelling owned by someone else, and as ‘living with relatives’ if he is otherwise related to the head. The remainder, always under 8 percent, encompasses group quarters, such as military barracks or rooming houses; domestic employees; and other arrangements that could not be classified. Microdata from the 1950 Census of Housing were destroyed after tabulation (U.S. Bureau of the Census, 1984), so in these statistics and the analysis below no information is given on living arrangements in 1950.

represented a change in the age pattern of ownership. This is evident in Figure 2, which shows ownership rates for men 18 and above, by age, in Censuses from 1900 to 1980.¹¹ The age profile of home ownership was stable in every year up to 1940, and nearly linear up to age 60, but from 1960 onwards became strikingly more concave. Home ownership rates for men in their early 30's more than doubled, while home ownership among older age groups increased substantially less in these two decades.¹² The increase in ownership in the 1940's and 1950's thus largely represented earlier purchases among individuals who likely would have purchased later in life. In this respect, the increase in home ownership from 1940 to 1960 stands out from other periods of rising ownership, such as the 1920's, when the age structure of ownership remained largely unchanged.

To connect the aggregate increase to changes in age-specific ownership rates more formally, I present a simple decomposition of the change in the aggregate home ownership rate from 1940 to 1960. This decomposition provides a measure of the share of the aggregate increase that can be explained by changes in the age structure of the population. I decompose the 1940 to 1960 difference of .26 as follows:¹³

$$\overline{own}_{60} - \overline{own}_{40} = \sum_{g=18}^G (w_{g60} - w_{g40}) \overline{own}_{g60} + \sum_{g=18}^G (\overline{own}_{g60} - \overline{own}_{g40}) w_{g40},$$

where g indexes age and w_{gy} is the share of individuals of age g in the population in year y . The first term gives the difference attributable to the change in the age structure of the population; the latter measures the difference due to increases in within-age rates of ownership. This calculation yields a value of .048 for the first term and .209 for the second, suggesting that increased home ownership within age groups was far more important than changing age structure.¹⁴ Furthermore, it suggests that holding the age structure constant at its 1940 distribution, within-age increases

¹¹For visual clarity in interpreting the 1940-60 change, 1990 and 2000 are not shown. In these years, the age profile was somewhat less steep but its basic concavity persisted.

¹²Conditioning on household head status gives, as one might expect, higher home ownership rates for both the youngest and the oldest age groups, and a nearly linear age profile of home ownership well beyond age 60 in 1940 and earlier.

¹³In 1940 I apply sampling weights to calculate averages; the 1960 sample is a flat sample of the population and requires no weighting.

¹⁴It makes little difference to use 1940 ownership and 1960 weights, or the average of 1940 and 1960 for ownership and weights, rather than this form of the decomposition. In both cases the decomposition yields values of about .04 for the term describing changing age structure and .22 for the term describing changing ownership rates.

for individuals 45 and younger could account for over half of the observed aggregate increase from 1940 to 1960.

2.2 Broad changes in finance and the VA home loan guaranty program

The observed decrease in the age at first home ownership suggests that changes in finance played a central role in changes in housing markets between 1940 and 1960. Table 1 shows observed loan terms on the stock of first mortgages in 1950, 1960 and 1990, from the Census Residential Finance Survey, and compares these terms to ‘typical’ loan terms of the 1920’s.¹⁵ It also compares VA loans to those of the Federal Housing Administration (FHA), which provided insurance on somewhat less generous terms than VA loans, and to ‘conventional’ loans that had no government insurance.

Down-payments fell substantially between 1920 and 1960, as reflected in changes in the loan-to-value ratio (LTV). In 1920 a down-payment of 40 to 50 percent would have been needed, but by 1960 the median down-payment for first mortgages was about 20 percent. The lower down-payments were concentrated in the government-insured market: VA-guaranteed loans typically had the lowest down-payments, with a median of about 9 percent, followed by FHA with a median of about 17 percent.

Lower down-payments were accompanied by lengthening loan maturities. Maturities lengthened in all sectors of the market, with VA and FHA providing the longest maturities. As a result, monthly payments remained more or less stable as loan-to-value ratios increased. Government-insured mortgages also typically had lower interest rates than conventional loans. In part, the lower rates reflected interest rate ceilings on government loans, as discussed below.

Terms for all types of loans became easier over time, as is evident in Figure 3, which shows the loan-to-value ratio for mortgages originated in each year from 1946 to 1967. In addition to the general relaxation in terms, by 1960 the difference between the average LTV for VA loans and that for FHA loans had disappeared. Conventional loans also saw a marked increase in LTV.

The easier terms observed for VA mortgages were associated with a home loan guarantee pro-

¹⁵Figures for the 1920’s come from Aaron (1972), and originally from the NBER’s Urban Real Estate Finance Project; Morton (1956) provides a description of the results and sample. As discussed there, the sample may not be fully representative of the population of loans in the 1920’s. A full picture of lending in the 1920’s would also require discussion of junior mortgages and the arrangements offered by Building and Loan associations (Snowden, 2010).

gram that was initially authorized under the Servicemen's Readjustment Act of 1944, better known as the GI Bill. Eligibility for this loan guarantee was one of several benefits extended to veterans, with the broad aim of speeding readjustment to civilian life.¹⁶ The main VA home loan program, under Section 501, was a guarantee to lenders against losses on home loans that had been approved by the VA, up to a specified amount. It was not a loan directly from the government. If a borrower became delinquent, the mortgagee would typically be expected to foreclose and convey the property to the VA, which would compensate the lender for losses incurred. The guarantee thus eliminated much of the risk to the lender, allowing easier terms for borrowers. As of 1945, this guarantee was limited to 50 percent of the outstanding loan amount at any point in the life of the loan, up to a maximum of \$4,000, but the limit was relaxed in later years.¹⁷ Interest rates could not exceed a specified maximum rate, initially 4 percent. At the time, many observers argued that when returns on alternative investments were greater, the interest rate cap severely limited lenders' willingness to provide loans on VA terms, and hence led to unusual volatility in the number and volume of VA loans (Klaman, 1961). I return to this point in Section 5.

Eligibility for the veterans' housing benefit was determined by dates of service: an individual was eligible under the 1944 GI Bill if he or she had served for at least 90 days with some service occurring between September 16, 1940 and the official termination of the war, later determined to be July 25, 1947. The program was initially intended to last only a few years, but was later extended and re-extended several times before becoming permanent. Subsequent GI Bills covered veterans of other periods - the Korean War GI Bill (passed in 1952) covered individuals who served between June 17, 1950 and January 31, 1955, and the 'Cold War' GI Bill (passed in 1966) ultimately covered individuals who began service after January 1955, although slightly less generously.

A large share of veterans used the housing benefit, and loans granted under the VA program represented a substantial portion of the mortgage market in the postwar period. Estimates from the 1977 National Survey of Veterans suggest that of about 17 million male veterans of World War II and the Korean War living at the time, roughly 6.3 million had used a VA loan, and 5.5 million

¹⁶The following discussion of the VA home loan program follows ORC Macro (2004) and Aaron (1972).

¹⁷The median self-reported value of one-unit owner-occupied structures in 1950 was \$7,354: <http://www.census.gov/hhes/www/housing/census/historic/values.html>.

had used a VA loan for their first home (Hammond, 1980). Widespread use of the benefit made VA loans a substantial share of the overall market: over the period from 1946 through 1960, VA loans composed about 16 percent of the total dollar volume of all nonfarm mortgage recordings of \$20,000 or less, and about 12 percent of the total number.¹⁸

Responses from the 1977 Survey of Veterans also suggest that the availability of VA loans induced earlier home purchase, or purchase of a more expensive house, for a large segment of the veteran population.¹⁹ For veterans who reported using a VA loan for their first home, the 1977 survey asked if they would have been able to purchase the home without the VA loan. About 61 percent of World War II and Korean War veterans who had used a VA loan for their first home reported that they would not have had a sufficient down-payment for the house without the VA loan; an additional 6 percent said that they would have purchased a less expensive house. About 30 percent said they could have purchased the home anyway (the remainder gave either multiple answers or no answer).

Given their scale, the VA and FHA programs almost certainly influenced terms in conventional lending. Aaron (1972) argues that the VA and FHA led to more liberal terms in conventional markets by demonstrating that smaller down-payments and longer maturities would not increase risk as much as lenders had anticipated. More concretely, the FHA in particular was credited with standardizing the analysis of mortgage lending risk, and its creation in 1934 with the intent of providing fully amortized, high-LTV mortgages also necessitated the modification of laws in many states that restricted state-regulated financial institutions from investing in mortgages with LTV's of more than 50 or 60 percent (Semer et al., 1976). The indirect effects of the FHA and VA were surely important, but in this paper I focus on the direct effect of the VA.

3 Conceptual framework

A simple life-cycle model of tenure choice clarifies the impact of a reduction in down-payments on home ownership rates of different age groups, providing a more formal basis for understanding the

¹⁸These figures are my calculations using data from Housing and Home Finance Agency (1961). FHA was of comparable magnitude, making up about 13 percent of the total dollar volume between 1946 and 1960.

¹⁹The following estimates are based on the tabulations in Appendix E of Hammond (1980).

differential increases in ownership by age. Past theoretical work, such as Artle and Varaiya (1978), has typically assumed that all individuals prefer to own, either because the same house provides greater utility if owned rather than rented, or because favorable tax treatment or the elimination of a principal-agent problem between the landlord and tenant makes owner-occupied housing less costly than equivalent rental housing. If a down-payment is necessary to obtain financing for the purchase of housing, young people without sufficient assets for a down-payment may depress consumption early in life in order to have greater consumption later. Under these conditions, relaxing the down-payment constraint can induce earlier purchase because the burden of reduced consumption in the beginning phase of the life cycle is alleviated. Broadly speaking, since young individuals with few assets are most likely to face this constraint, they see larger increases in ownership than older individuals who are likely to have already accumulated assets. However, if the required down-payment is not reduced to zero, the largest effects may not be for the youngest individuals, who still need to save for the smaller but positive down-payment. Simulations such as those in Hayashi, Ito and Slemrod (1988) and Sheiner (1995) have calibrated such models to fit recent periods, and have found evidence that these constraints are quantitatively important.²⁰

A similar model and calibration clarifies the predictions of this framework at the ages I examine in the empirical analysis, in the context of the mid-century rise in home ownership. Consider the infinite-horizon optimization problem of an individual with discount rate r , whose per-period utility $U(C_t, H_t)$ is defined over a composite consumption good C_t and housing H_t . All individuals begin life as renters, with no assets, but may purchase a house at $T \in (0, \infty)$ subject to a down-payment constraint. I follow Hayashi, Ito and Slemrod (1988) in assuming that $U(C_t, H_t) = \alpha \log C_t + (1 - \alpha) \log H_t$. For simplicity, I impose the condition that housing is available only in a fixed quantity H_R for renters, and H_O for owners, while capturing the idea that ‘pride of ownership’ may give greater utility from owning a given amount of housing rather than renting it by supposing that for an owner, $H_t = \gamma H_O$, where $\gamma \geq 1$.

An individual has income y_t each period. She may save only for home purchase, at an interest

²⁰Ortalo-Magné and Rady (1999) emphasize the differential effects of reduced down-payments by age groups in a more general model with overlapping generations and supply constraints, with a similar finding that easier terms on housing finance leads to a shift towards ownership at younger ages.

rate ρ , and chooses an amount of savings s_t in each period for which she is a renter. Normalizing the price of the consumption good to 1, the price of a unit of rental housing is R , and the analogous price of owner-occupied housing is P . Finally, ϕ is a constant that converts the amount PH_O into a per-period payment ϕPH_O . As discussed in the previous section, since maturities increased at the same time as down-payments fell, I will assume that changes in down-payments do not affect the per-period payment.

If an individual chooses to buy at some finite T , she solves

$$\max_{\{s_t\}_{t=0}^T, \{C_t\}_{t=0}^{\infty}} \int_0^T e^{-rt} [\alpha \log C_t + (1 - \alpha) \log H_R] dt + \int_T^{\infty} e^{-rt} [\alpha \log C_t + (1 - \alpha) \log (\gamma H_O)] dt$$

subject to

$$y_t = C_t + RH_R + s_t \text{ for } t < T \quad (1)$$

$$y_t = C_t + \phi PH_O \text{ for } t \geq T \quad (2)$$

$$\int_0^T e^{\rho[T-t]} s_t dt = \delta PH_O \quad (3)$$

$$s_t \geq 0 \quad \forall t. \quad (4)$$

I will consider the simple case in which income is constant at y and $\rho = r$. Under these conditions, the savings rate is constant, and reductions in down-payments lead to earlier home purchase. To calibrate the model, I assume that rented and owned housing are identical and deliver a single unit of housing services, or $H_R = H_O = 1$, but that owned housing gives greater utility than the same amount of rented housing, with $\gamma = 1.5$. I set $\alpha = .8$. Other parameters are meant to correspond specifically to housing market conditions in 1960. In particular, I set the annual rent at \$700 and the house price at \$12,000. I assume that the interest rate ρ and the monthly payment conversion factor ϕ are both .05. The latter condition implies that per-period housing costs are lower for an owner than for a renter. Heterogeneity in the simulation comes from variation in income. I draw income from a lognormal distribution with mean 8 (corresponding to an income of \$3,000), standard deviation 1, and a minimum income that allows everyone to afford the \$700 annual rent. Each person then chooses the optimal time of home purchase (or, equivalently,

per-period savings).

The simulation results in Figure 4, shown for down-payments of 10 and 20 percent meant to correspond to VA and FHA terms, confirm that reductions in down-payments are likely to have especially large effects on younger individuals. The age-ownership profiles themselves, tracing the share of a cohort that owns over time, are somewhat more concave than those found in the data. However, the increases in home ownership at each age that result from reducing the down-payment from 20 to 10 percent reflect the differentially large impacts of lower down-payments on younger individuals. Importantly, there are some individuals who never choose to own under certain down-payment regimes, and lower barriers to ownership induce some of these individuals to become owners at some point. It is therefore possible in principle that one would observe long-lasting effects of eligibility for lower down-payments on home ownership. However, the main theoretical result that I will bring forward into the analysis is that at the ages I examine, differences in home ownership between individuals facing different down-payments are likely to be larger when they are younger than when they are older.

4 Effects of Military Service and Benefits on Home Ownership

4.1 Data and Empirical Design

The main results of this analysis are based on IPUMS Census microdata in 1960, 1970, and 1980 (Ruggles et al., 2008). I use the 1960 1 percent sample, an aggregation of the three 1 percent 1970 Form 2 samples, and the 1980 5 percent sample. I restrict the analysis sample to men born in the United States within the relevant bandwidth: for the pilot bandwidth, this includes men born from 1925 to 1936. Other sample restrictions are discussed in Appendix 1.

The lower left panel of Figure 5 helps to illustrate the implementation of the RD approach. Each point represents the share of men in each quarter-of-birth cohort that reported being a veteran in the 1970 Census. Two sharp drops in the probability of service by quarter of birth are visible. These drops were associated with cohorts coming of age for military service just as inductions fell at the end of hostilities in World War II in 1945, and similarly in Korea in 1953. Throughout this

discussion, I will refer to the first break, associated with the decline in inductions in 1945, as the “World War II break” and to the second, corresponding to the decline in 1953, as the “Korean War break.” Ideally, there would be a marginal date of birth at which the probability of induction under the draft drops sharply. In practice, while the declines were fast – in the case of World War II, 10 percentage points for cohorts born within a year of each other – they were not perfectly sharp.²¹

To apply the RD framework, I use two birth dates as cutoffs - January 1, 1928 and January 1, 1934.²² Because these declines are not perfectly sharp, in the estimation I drop the birth cohort that immediately precedes each cutoff and the cohort that immediately follows it: these are represented as open circles in Figure 5.²³ The RD estimate is then the difference between two counterfactuals at each cutoff: one assuming that an individual at the cutoff has the probability of military service predicted based on cohorts immediately preceding him, and one predicting his probability of service based on the cohorts following him. Implementing the RD with housing or other outcomes as the dependent variable, I then follow standard practice in ‘fuzzy’ RD designs and scale the reduced form estimate by the estimate of the discontinuity in veteran status. In practice, the implementation uses a two-stage least squares estimator, in which I use birth before the cutoff as an instrument for veteran status.

The pilot bandwidth for the analysis will be three years on either side of each break.²⁴ In the baseline specification, I follow Imbens and Lemieux (2008) and estimate a local linear regression within this bandwidth:

$$y_{it} = \alpha_t + \beta_t \mathbf{1}(yqob_i < c) + \gamma_t (yqob_i - c) \mathbf{1}(yqob_i < c) + \delta_t (yqob_i - c) \mathbf{1}(yqob_i > c) + \lambda_t' \mathbf{X}_i + \epsilon_{it},$$

²¹For the decline associated with the end of hostilities in Korea, this was likely due in part to a local component of the draft: men were liable to be drafted from age $18\frac{1}{2}$, but there was a general policy of taking older men first, and in particular to exhaust the supply of men 19 and above, in the local draft board area before drafting younger men (U.S. Selective Service System, 1953).

²²Institutional features of the draft provide guidance but not perfect predictions for where the cutoffs should lie. The earlier cutoff corresponds to men who would have not turned 18 until 1946, after the end of hostilities in World War II. Inductions for the Korean War fell sharply during the second quarter of 1953, and the latter cutoff corresponds to men who would have turned 19 a few months before this decline. Varying the cutoffs and comparing the sizes of the corresponding discontinuities in veteran status suggests these dates are reasonable; the main results are qualitatively similar with cutoffs lying one quarter earlier or later.

²³Institutional detail similarly does not provide exact predictions on which cohorts should be considered to have ‘intermediate’ levels of treatment. The main results are also qualitatively similar for different choices on this margin.

²⁴A cross-validation procedure following Imbens and Lemieux (2008), applied to both the first stage and the reduced form, suggests using a bandwidth of either 3 or 4 years. I choose the shorter bandwidth. I discuss results for alternative bandwidths below.

for individual i in year $t \in \{1960, 1970, 1980\}$, where c represents the relevant cutoff, $yqob_i$ his year and quarter of birth, $\mathbf{1}(yqob_i < c)$ indicates that he was born before the cutoff, $\mathbf{1}(yqob_i > c)$ indicates birth after the cutoff, and $(yqob_i - c)$ represents the time in quarters between his date of birth and the cutoff. \mathbf{X}_i is a vector of controls, including fixed effects for the quarter of the year in which an individual was born to control for seasonality effects in education, fixed effects for state of birth, and an indicator for nonwhites. Following Lee and Card (2008), standard errors are clustered at the quarter of birth by Census year level to adjust for coarse measurement of an individual’s date of birth. As a robustness check, I also estimate cubic specifications within the same bandwidth. The cubic results are presented in Appendix 2.²⁵

4.2 Results

Table 2 presents means of key variables for the two cohorts around each break in each Census year, to aid in the interpretation of magnitudes of the effects estimated below. Men at the World War II break were 32 years old at the time of the 1960 Census. Slightly more than half owned their homes in 1960. The share rose to 72 percent in 1970, and to 80 percent in 1980. The men around the Korean War break were 26 in the 1960 Census, and 27 percent owned their homes. This increased to 66 percent in 1970, and to 79 percent in 1980. In the 1960 data, therefore, one observes these cohorts as they transition rapidly into home ownership; subsequent changes between decades reflected a levelling of the age-ownership profile.

Applying the estimation framework discussed above to the two breaks in the probability of reporting that one is a veteran yields the results shown in Table 3, columns (1) and (2), and Figure 5. These are the underlying ‘first-stage’ results used to scale the estimates for housing and other outcomes. Each figure shows the share of each quarter-of-birth cohort that reports being a veteran in each Census year, along with the cutoff at which the discontinuity is estimated, and associated linear trends. The upper left panel of each figure summarizes the corresponding estimates of the discontinuities, for two specifications: the first corresponds to the plots shown, and the second shows estimates when the controls described above are included. All figures shown in this section

²⁵In cubic specifications, I constrain coefficients on the trends to be the same on both sides of the cutoff, which produces more visually reasonable extrapolations than allowing them to vary.

follow a similar format.

In all three Census years, both of the estimated breaks in veteran status are large and highly significant. The size of the estimates, however, varies somewhat across Census years for each break. In the case of World War II, linear trends produce estimates that increase from 11 percentage points in 1960 to 14 in 1980. Cubic trends produce less variable estimates over time, resting at about 9 percentage points. The estimate of the Korean War break lies between about 8 and 11 percentage points in the linear case, but is close in 1960 and 1970.²⁶ Estimates from cubic specifications are presented in Appendix Table A1.

The estimates in Table 4 and Figure 6 suggest that veteran status was associated with large, statistically significant increases in the probability of owning one's home in 1960. For individuals coming of age at the end of World War II, the estimated treatment effect of service and benefits in the linear specification with controls is 15 percentage points. Without controls (not reported in the table), the estimate is slightly lower, at about 12 percentage points. In comparison, the predicted probability of home ownership for a comparable non-veteran at the break in the specification without controls is 45 percent, suggesting that service and benefits increased the rate of ownership at the World War II break by about 27 percent. It is worth noting that these results are robust to local cubic specifications, which give larger IV estimates, mostly due to smaller estimated discontinuities in veteran status. The cubic specifications are presented in Table A2.

For individuals coming of age at the end of the Korean War, the estimated treatment effect in 1960 is substantially larger, at 24 percentage points with or without controls. The IV specification without controls predicts a probability of home ownership for comparable non-veterans of 13 percent at the break, suggesting very large effects of service and benefits in percent terms, nearly tripling the probability of home ownership. Again, these results are robust to cubic specifications, with a similarly higher IV estimate, due largely to smaller first stage estimates.

²⁶The source of the variability in the discontinuities in reported veteran status within a cohort over time is unclear. Under the Census definitions, current members of the armed forces were not considered veterans, and in principle the probability of current service may have been discontinuous at the cutoffs. Columns (3) and (4) of Table 3 show that extending the definition to include either past or present service does little to change the size or pattern of the estimates, suggesting that there may instead be differences in self-reporting of veteran status across Censuses. In practice, the variability in the first stage appears not to be crucial to interpreting the results, since the pattern of results over time is similar in reduced form and IV specifications.

Section 3 suggested that effects of easier terms on housing finance should decline as individuals age and accumulate assets. The smaller estimates in 1960 for the World War II break than for the Korean War break, in both percent and percentage point terms, are consistent with this prediction. Similarly, one should expect to find diminished effects tracing the same cohorts to later Censuses. Indeed, the results for home ownership in 1970 and 1980 give no evidence of significantly higher ownership in either of the later years, at either break. Point estimates are negative, and for the most part indistinguishable from zero.²⁷ Interpreting convergence at the cutoffs over time as declining effects of finance does face the complication that terms on non-VA loans improved by the end of the 1960's, which would likely lead to similar observations in 1970 even without effects of easier finance that vary by age. However, a simple extrapolation of the effects found in 1960 to older ages would also predict small, or zero, effects of the VA by 1970, when individuals at the cutoffs were 36 and older. I discuss such an extrapolation in more detail in Section 6.

Appendix Table A3 explores robustness of these estimates to alternative bandwidths and specifications. Columns (1) and (2) show reduced form and IV estimates for the World War II break for bandwidths ranging from two to five years around the cutoff. The estimated effect of veteran status remains large and statistically significant for all bandwidths, ranging from 12 to 18 percentage points. Columns (5) and (6) suggest somewhat more variability for the Korean War estimate: the 3-year pilot bandwidth gives the smallest estimate of those presented. All estimates are larger than the corresponding World War II estimates, and are highly statistically significant.

The remaining columns of Table A3 present alternative models that do not rely on a cutoff, following the type of specification used in Bound and Turner (2002). In these specifications, I regress the home ownership rate for a quarter-of-birth cohort on the veteran share of the cohort, controlling for seasonality of birth and either linear or quadratic trends. While these specifications have the benefit of including the cohorts with intermediate levels of military service, they are less natural as a baseline specification because they necessarily average any effects over all the ages in the bandwidth, rather than estimating an effect at a clear cutoff. In these specifications a similar

²⁷For each break, the differences between the coefficient for 1960 and those for 1970 and 1980 are statistically significant. The difference between the veteran status coefficients for the World War II and Korean War breaks in 1960 is not significant at conventional levels, which may be a result of the relatively small size of the 1960 sample.

variability is evident across bandwidths. For the World War II break, estimates tend to be smaller and statistically insignificant. For the Korean War break, wider bandwidths tend to give more precise estimates, while shorter bandwidths give estimates that are statistically indistinguishable from zero. However, the basic pattern emphasized above persists: point estimates for the younger cohorts are large, and greater than those for older cohorts.

5 Evaluating alternative explanations

The results presented in Section 4.2 answer the question of what impact the combination of an individual's military service and eligibility for veterans' benefits had on his housing outcomes, but does not necessarily isolate the effect of easier mortgage financing. It is not immediately obvious whether one should expect service or other benefits to have had a positive or negative effect on the probability of home ownership. Military service may have reduced rates of ownership on return to civilian life if separation from the labor market lowered earnings. On the other hand, service may have increased the probability of ownership if temporary separation from civilian life led to higher rates of new household formation, or lower desired mobility, after service was complete – that is, if military service made individuals 'grow up fast.' Education benefits may have increased ownership rates either through higher permanent income or other complementarities with home ownership; other benefits, such as job training, may have also increased earnings. To the extent that higher education benefits reduced desired mobility either before or during college attendance, they could have instead reduced the probability of home ownership at younger ages. In three complementary analyses below, I assess the potential importance of these other factors.

5.1 Possible impacts of other benefits

There are several reasons to think it unlikely that veterans' eligibility for education and training benefits explains the positive effects on home ownership that I find in 1960. Past work on the draft and educational benefits on educational attainment, such as Stanley (2003), has emphasized that the World War II GI Bill was largely compensatory in its effects, making up for the large disruption effects of military service on education. Moreover, for the Korean War estimate the

ownership effects in 1960 are likely too early to be due to Korean War veterans taking advantage of their education benefits. As might be expected, I find that a similar application of the regression discontinuity design estimates a net positive effect of service and benefits on various measures of educational attainment in 1970, in line with the findings of Bound and Turner (2002). Yet the same type of estimate also suggests that high school completion rates were lower for earlier cohorts at the World War II break in all three Census years, and provides no evidence for greater educational attainment for veterans at the Korean War break in 1960. Moreover, even to the extent that education benefits under the GI Bills more than compensated for the disruption of education during military service, the costs of service also included forgone labor market experience, which likely depressed wages (Angrist, 1990).

In the absence of complementarities between education and ownership as a form of housing tenure, the natural argument for a positive effect of education benefits on home ownership in 1960 is through increased income. More broadly, other benefits, such as on-the-job training or preferences in hiring, may have increased income for veterans as well. As a rough summary measure of the possible effects of education or other benefits, it is therefore natural to test for discontinuities in income across cohorts. However, the rapidly changing curvature of the income profile for these age groups makes an application of the RD framework somewhat more problematic. Nevertheless, I test for discontinuities in the log of total personal income, conditional on positive income, and present estimates in Table 5 and Appendix Figure A2.²⁸ There is little evidence based on these specifications that income could be driving the results for the World War II break: linear specifications give negative point estimates that are not significant at conventional levels. For the Korean War break, the linear specification for 1960 does suggest higher income for veterans, although inspection of Figure A2 suggests this may be due to the curvature of the income profile. The statistical significance of the discontinuity in income at the Korean War break is not robust to a cubic specification, presented in Table A4.

To explore further whether or not the documented effects of veteran status on home ownership

²⁸As is evident in Table 2, almost all men at the cutoff earned positive income by 1960. I find no evidence of a discontinuity in the probability of positive income at the World War II break. For the Korea break, there is some evidence of a probability of positive income in 1960 that is greater by about 4 percentage points, but not in later years. The home ownership results in 1960 are robust to controlling for an indicator of positive income.

could be due to increased income through other benefits, I estimate regressions similar to those in Table 4, including $\log(\text{income})$ as a right-hand-side variable. If the true effect of veteran status on income was positive, as was the relationship between income and home ownership, it is likely that including income as an explanatory variable induces downward bias in the estimate of the impact of veteran status on home ownership. However, the estimated effect at the Korean War break, controlling for income, is still quite large, and significant at the 5 percent level: 0.17 (0.081). Consistent with a positive bias due to a negative discontinuity estimate for income at the World War II break, controlling for income at this cutoff gives an estimate slightly higher than the baseline estimate, at 0.165 (0.062). Altogether, the findings for income and education suggest that other benefits were not the primary cause of higher home ownership for veterans.

5.2 Estimating service effects: World War I veterans

No national program of home loan benefits existed for veterans of the First World War. A similar regression discontinuity analysis gives an estimate of the possible direct effects of service in World War I that one may consider in evaluating the relevance of service effects to explaining the observed differences in home ownership at the World War II and Korean War breaks. Due to state and national veterans' benefits that did exist after World War I, the estimates I present are likely an upper bound on possible direct effects of service. These benefits included a generous national bonus and slightly smaller bonuses in 21 states, as well as home loan benefits in four states.²⁹

Given the very different housing market that followed World War II, it is less clear how well this serves as an upper bound for the main period of interest. Using it without modification first assumes, of course, that any direct effects of service on the desire for ownership were similar in the earlier and later periods. Further, given the lower loan-to-value ratios on first loans in the 1920's, it may be that the same increased desire for ownership would have led to smaller increases in realized ownership. The latter concern may be alleviated if one considers the percent, rather than the percentage-point, increase. I will consider both in the analysis below.

²⁹Dillingham (1952) provides a review of the national bonus, which was to be paid out in full in 1945 but which could be used as a security for borrowing as early as 1925; the full amount of the bonus was eventually paid out in 1936. A survey of all state veterans' benefits provided after World War I is given in U.S. House of Representatives (1945).

I use IPUMS data from the 1920 and 1930 Censuses.³⁰ These Censuses do not record year or quarter of birth, only age in years. I calculate an approximate year of birth assuming each individual's birthday fell after the day of the Census. Because the 1920 Census did not ask for veteran status, I report only reduced form estimates for 1920, but I report both reduced form and IV estimates for 1930.³¹

The relatively gradual decline in the veteran share of each cohort, evident in the top left panel of Figure 7, necessitates a more drastic elimination of intermediate points for this analysis. I drop three years, from 1897 to 1899. I also use a substantially wider bandwidth, including birth cohorts from 1890 to 1906, and estimate a cubic specification to fit the curvature of the ownership and veteran profiles in the resulting bandwidth. I constrain coefficients on the polynomial to be the same on both sides of the cutoff, which results in more visually reasonable estimates than allowing them to vary.

Results are presented in Table 6. The estimated discontinuity in veteran status is quite large in 1930, at 35 percentage points. In 1920, when individuals at the break reported being 21, reduced form estimates suggest that there was no difference in home ownership at the break. The IV specification in column (3) shows that in 1930, the estimated impact of being a veteran is about 8 percentage points in a regression with controls. Without controls (not reported in the table), the estimate is similar, at 8.6 percentage points. The predicted level of ownership for non-veterans at the cutoff, in a regression without control variables, is 18 percent, implying an upper bound on the service effect in percent terms of about 47 percent. A linear specification allowing different trends on either side of the break gives a slightly smaller IV estimate of the impact of veteran status on ownership, due to a larger estimated discontinuity in veteran status.

The similarity in ages between the World War I break in 1930 and the World War II break in 1960 - the former were 31, and the latter 32 - suggests a comparison of men of the same ages at two points in time. However, it may also be that stricter terms on mortgages in the 1920's make the

³⁰I do not present estimates for 1940. While there is a large discontinuity in home ownership at the cutoff in that year, it is presumably due in large part to the full payout of the federal bonus: based on aggregate statistics, Dillingham (1952) suggests that much of the money was used to liquidate non-farm mortgage debt. It is possible that the bonus payouts thus allowed veterans to avoid defaulting on home mortgages during the Depression, leading to higher rates of home ownership in 1940.

³¹As shall be seen, the reduced form results in 1920 show little that would merit a two-sample IV procedure.

comparison to the younger cohorts in 1960 more natural, if higher required down-payments made 31 year-olds in 1930 a better comparison to 26 year-olds in 1960. The IV estimate at the World War II break in 1960 is between 12 and 15 percentage points, compared to an 8 percentage point estimate for the World War I break in 1930. If one takes the latter estimate as an upper bound for service effects in World War II, it suggests that the effect of the VA benefits net of service effects was about 4 to 7 percentage points. The estimated effects in percent terms are 27 percent at the World War II break in 1960, and 47 percent at the World War I break in 1930. If these are more comparable than percentage point effects, it suggests that service effects may explain all of the 1960 World War II effect. However, at the Korean War break in 1960, IV estimates imply a 24 percentage point, or 184 percent, effect. Comparing either form of the estimate to those at the World War I break in 1930 would still leave large estimates of home loan eligibility net of service effects: either 16 percentage points, or approximately a 140 percent increase relative to the non-veteran counterfactual rate.

5.3 Further evidence on service effects: timing of purchase

The timing of use of the VA housing benefit, and home purchase for veterans, provides further evidence that the effects on home ownership in 1960 were not solely due to direct effects of service. If service itself led veterans to purchase a house earlier than they would have otherwise, one would likely expect that much of the use of the VA benefit would have occurred soon after individuals returned from war. However, the actual timing of use of the benefit shows nearly as much use of the VA benefit among World War II veterans in the mid-1950's as there was soon after the war, in a pattern that would not necessarily be expected if direct effects of service were the driving force.

Figure 8 shows the number of VA loans closed, by quarter, from 1945 to 1960. While the number peaked soon after World War II and again after the Korean War, the latter peak was probably not due solely to the return of Korean War veterans. I use annual figures on the share of loans made under the World War II entitlement (U.S. Veterans Administration, 1962) to estimate the number of loans to World War II veterans from 1952 onwards. The large share of World War II veterans in the 1955 peak suggests that it is unlikely to have been driven solely by the return of veterans from

the Korean War.

Given the presence of three large spikes in use of the benefit among World War II veterans, a natural question is what drove these fluctuations, if not veteran demand shocks. The bold line in Figure 8 illustrates one explanation that follows much of the literature of the period, of which Klamann (1961) is one example. The interest rate ceiling on VA loans discussed in Section 2.2 meant that as yields on alternative investments increased, the market could adjust only by reducing the supply of funds for VA mortgages or by changing other terms of the loan, such as down-payments. Conventional loans, on the other hand, had no interest rate ceiling, while FHA loans had an interest rate ceiling that was higher than that on VA loans and tended to be less binding.³² The bold line shows the difference between the maximum interest rate for VA loans and the annualized yield on lowest-risk corporate bonds. It is unmistakable that over this period rises and declines in the number of VA loans tracks similar changes in the difference between VA rates and the yield on corporate bonds. Comparison to the loan-to-value ratios for VA loans shown in Figure 3 suggests that years when alternative yields were more appealing relative to the VA rate – that is, when the difference shown was smaller – were also years when loan-to-value ratios on VA loans were lower (and down-payments correspondingly higher).

To the extent that the increases in the number of VA loans reflect the supply of funds rather than demand shocks, it is informative to ask whether periods when VA loans were more available, or available on easier terms, saw differentially greater rates of home purchase by veterans. Data to examine home purchases, or first entry into home ownership, are scarce over this period. I present evidence from the early years of the Survey of Consumer Finances, which began as the Survey of Liquid Assets in 1947, and was carried out annually until 1971. The basic unit of observation in the SCF is the spending unit, defined as a group of related individuals living in the same dwelling who pool their incomes for major items of expense. A married couple is always grouped together, and an individual who does not earn an income over a certain threshold cannot form a separate spending unit. Over the period from 1947 to 1957, which is what I use in this analysis because in

³²In the 1950 Residential Finance Survey, over 99 percent of the stock of VA mortgages had an interest rate of 4%, precisely at the cap, while roughly 25 percent of the stock of FHA mortgages had interest rates below the FHA cap of 4.5%. In 1950, this cap was lowered to 4.25%.

later years veteran status was not recorded, there were about 3,000 spending units interviewed in each year.

Evidence that greater availability of VA loans was associated with differentially large increases in the rate of home purchase is given in Figure 9. The figure shows rates of home purchase among spending units in each year from 1946 to 1956, separately for units with World War II veterans and units with no veterans, as well as the difference between veteran and non-veteran spending units.³³ While it is possible in some years to measure entry into home ownership, as opposed to home purchase, it is not possible to do so for all years or in a consistent way over time. Hence, to focus on the age group most likely to be entering home ownership, I focus on spending units with heads between 25 and 34 years old.³⁴ The lower part of the figure shows the difference between the VA interest rate and corporate bond yields in the same year. Veterans were more likely to purchase than non-veterans in every year, but at a differentially higher rate in years in which one would predict that VA loans were easier to obtain. The regression presented in Table 7 presents a quantitative estimate of this result: the specification presented in column (1) suggests that an increase of 0.1 in the difference is associated with an increase in the rate of house purchase that is greater by 0.006 for veterans, while the average share of spending units buying a house each year is estimated to be roughly 0.05.

While more complicated stories of service effects could explain the observed timing pattern of veteran home purchase, the timing of purchase is more difficult to reconcile with a simple version of a ‘service effects’ story than with the hypothesis that eligibility for housing benefits led to earlier purchase by relaxing borrowing constraints.

³³In this figure I exclude spending units with Korean War veterans, to emphasize effects that are less likely to be due to home purchase immediately after a veteran’s return from war. Including them leads to no obvious difference in the graph. In the associated regression table, I show estimates with and without Korean War veterans, with similar results.

³⁴Unfortunately the measurement of age is quite coarse in the SCF, making it impossible to control for age more finely. The result is that due to the pattern of military service by birth cohort discussed above, in any year the average age of veterans is likely to be different from non-veterans. From patterns of military service by birth cohort, one can infer that for this age group, non-veterans would tend to be older than veterans up until the last two or three years.

6 Discussion: Aggregate effects

The regression discontinuity estimates can be used to calculate the share of the increase in ownership from 1940 to 1960 at ages 26 and 32 that can be explained by military service and veterans' benefits. With some further assumptions, these estimates can also be used in a rough calculation of the share of the overall change from 1940 to 1960 that can be explained by the VA home loan program. To the extent that the VA mortgage program increased prices for all individuals, the estimates that follow are likely an overestimate.

The estimated effect of veteran status at the World War II break, presented in Table 4, is 15 percentage points. In 1940, 19 percent of men 32 years old owned their homes versus 53 percent of individuals 32 years old in 1960; 72 percent of 32 year-old men were veterans in 1960. These figures imply that about 32 percent of the increase for individuals of age 32 can be attributed to service and benefits. Similarly, the estimated effect of veteran status at the Korean War break, for individuals 26 years old, is 24 percentage points. Of 26 year-old men in 1940, 9 percent were home owners, versus 29 percent in 1960. Of 26 year-old men in 1960, 60 percent were veterans. The same calculation suggests that about 72 percent of the increase for 26 year-olds can be attributed to service and benefits.

It is necessary to extrapolate from the estimates at each discontinuity in order to estimate the share of the overall increase in home ownership from 1940 to 1960 that can be explained by the effects of service and benefits. Given only two points, I assume that the *percent* effect declines linearly with age, and use the two estimates to extrapolate to ages around the discontinuity. Because men 22 years and younger in 1960 would have been unlikely to have joined the military by the time necessary to have received benefits under the Korean War GI Bill, I set the predicted effect to zero for ages 22 and below. Home ownership rates for these ages are low enough in 1960 for the choice of cutoff not to be quantitatively significant. The assumption of linearly declining effects in percent terms also implies a zero effect of the VA at ages 34 and above. This is consistent with the finding of no discontinuity in home ownership at the Korean War cutoff in 1970 and later, when these individuals were 36 and older. Thus any overall effects in this calculation are limited to individuals between 23 and 33.

The calculation suggests that VA home loan benefits can explain a substantial share of the aggregate trend in home ownership from 1940 to 1960. Using the observed share veteran and home ownership rates in 1960, along with the extrapolated effects on home ownership, I calculate the increase in aggregate ownership due to the VA as $\sum_{g=23}^{33} w_{g60} \hat{\beta}_g \text{Pr}(\text{vet})_{g60}$, where g indexes ages, w_{g60} gives the share of men 18 and above that were of age g in 1960, and $\hat{\beta}_g$ is the estimated percentage point effect for men of age g . This calculation suggests that the rate of home ownership for men 18 and above would have been about 2.8 percentage points lower in 1960 in the absence of service and benefits, or about 10 percent of the overall increase from 27 to 53 percent.

A point estimate of a 2.8 percentage point difference in the 1960 home ownership rate appears reasonable in the context of veterans' survey responses in the 1977 National Survey of Veterans. The results of the 1977 Survey suggest that there were approximately 3.23 million veterans in 1977 who had used a VA loan for their first home but would not have had a sufficient downpayment for it without their VA eligibility. A plausible interpretation of this figure is that roughly this many individuals would have delayed home ownership if they were ineligible for the VA program. This number is not directly comparable to my RD estimates, which instead represent how many veterans were home owners in 1960 but would not have been without the VA benefit. However, the 1979 Survey of Veterans (SOV-II), while not asking about whether veterans could have purchased without a VA loan, did ask about the year of first home purchase. I calculate the share of veterans from the 1979 survey who used a VA loan for their first home and first bought between 1954 and 1960, assuming that roughly this number of individuals would not have been home owners in 1960 in the absence of VA eligibility. This calculation suggests that the home ownership rate would have been about 2 percentage points lower in the absence of the VA, which is reasonably close to my point estimate of 2.8 percentage points from the main analysis.³⁵ Using instead the share buying

³⁵The details of the calculation are as follows. About 3.233 million veterans of World War II and/or the Korean War, but not of later conflicts, reported in 1977 that they would have had an insufficient down-payment for their first home without the VA loan. Data from the 1979 Survey of Veterans suggests that about 33 percent of that group first purchased a home between 1954 and 1960. For comparison with the counterfactual estimate from my main analysis, I then multiply by the share of World War II and Korean War veterans in 1960 who were US-born, since my calculations from the Census use only native-born men. The resulting estimate of the number of men who were owners in 1960 but who would not have been if they were ineligible for the VA program is 1,037,017, or about 2 percent of the number of native-born men of age 18 and above in 1960 (51,125,748, from the 1960 Census of population).

between 1955 and 1960, the estimate would instead be 1.6 percentage points; using the share buying between 1953 and 1960 it would be 2.3 percentage points.

It is important to note that these estimates are for a specific point in time, and it is likely that if one were able to perform a similar analysis on earlier years, estimates would be higher, given the convergence of terms on other loans to VA terms over the 1950's. On the other hand, effects on the rate of home ownership in later years would probably be lower, due to the aging of the veteran population. It is also worth noting that since terms on all loans were becoming easier over this period, this figure is probably a lower bound for the impact of broader changes in finance.

All of these calculations assume that the estimates of the effect of changing an individual's eligibility can be applied to the thought experiment of changing the eligibility of a large portion of the population. Past work, such as Shiller (2005) and Vigdor (2006), has emphasized that the VA home loan program may have increased house prices, in which case the estimated share given above would be an overestimate.

Vigdor (2006) also provides an estimate of the impact of the VA program on home ownership, calculating that about 20 percent of the increase from 1940 to 1970 was due to veterans' home loan benefits. This result is based on a comparison of veterans to non-veterans that controls for a variety of characteristics, including age. My estimates imply substantially smaller effects, with the difference likely due to characteristics of selection into military service during World War II and Korea. As emphasized in the literature on the education benefits of the GI Bill (Bound and Turner, 2002; Stanley, 2003), non-veterans who were of the right age to have served in World War II were likely strongly negatively selected, and therefore less likely to own in 1970 for other reasons.

7 Conclusion

This paper uses sharp changes in the probability of military service by birth cohort, for men coming of age at the end of hostilities in World War II and the Korean War, in a regression discontinuity design to identify the combined effect of service and veterans' benefits on the probability of home ownership in Census samples from 1960 to 1980. Men more likely to have served by merit of their date of birth had significantly higher rates of home ownership in 1960, with larger effects for younger

individuals. At the same time, the positive effect of service and benefits diminished as the affected cohorts aged. These findings are consistent with the prediction of a standard life-cycle model that relaxing borrowing constraints should have the largest effects on younger individuals.

A simple calculation of the effect of service and benefits on the overall home ownership rate suggests that in the absence of this treatment, the rate of home ownership would have been about 2.8 percentage points lower in 1960 than it was. This suggests that VA housing benefits may explain about 10 percent of the overall change in home ownership for men 18 and above from 1940 to 1960.

An analysis of the impact of the VA program on welfare would begin with the observation that it is likely to have increased consumption early in the life cycle by relaxing liquidity constraints. If home ownership had positive externalities, a hypothesis discussed in detail by DiPasquale and Glaeser (1999), increased rates of home ownership may have had further welfare benefits. Weighing against these potentially positive impacts on welfare are possible distortions induced by moving costs, if, for example, these hinder labor market mobility (Oswald, 1996).

It is noteworthy that despite the emphasis the VA program has received in the literature discussing both the mid-century increase in home ownership and the dramatic rise in house prices around the end of World War II, by 1960 its direct effects on home ownership were probably not much bigger than 10 percent of the overall change since 1940. Although it is likely that the effects of changes in housing finance more generally played a major role, the rate of increase from 1940 to 1945 evident in Figure 1 suggests that further research into changes in housing markets during World War II would be useful.

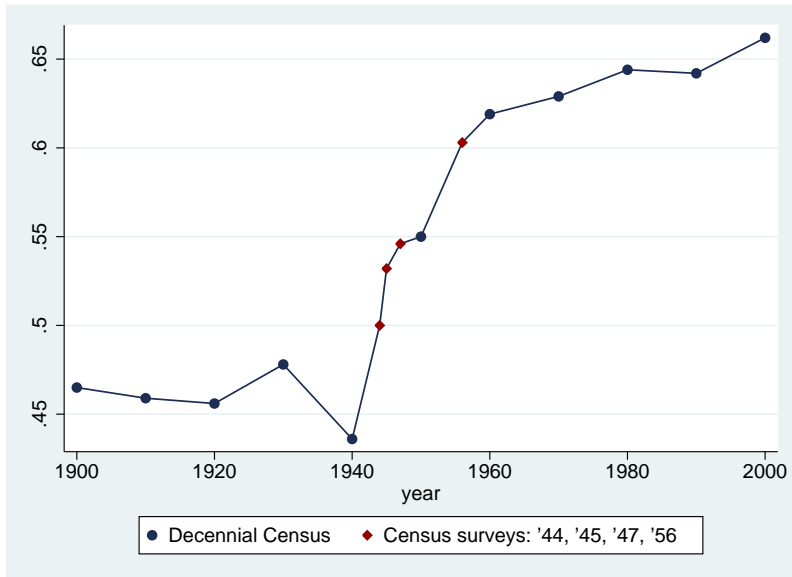
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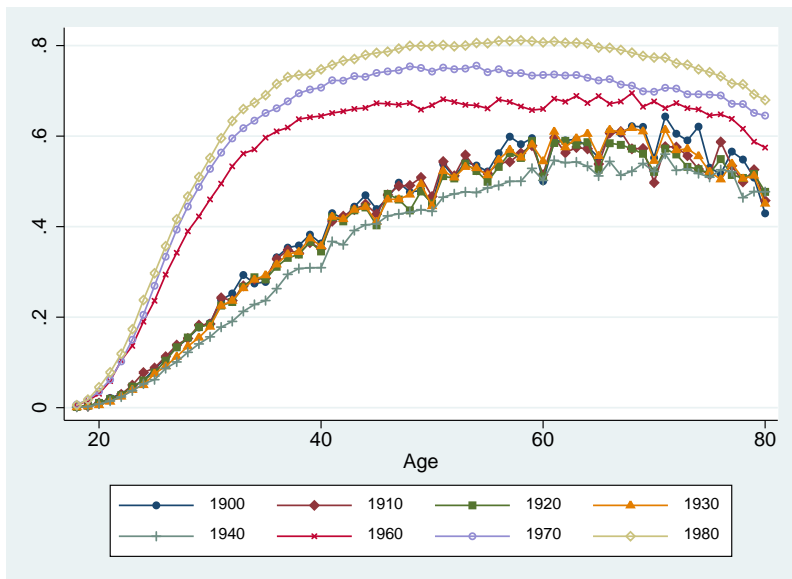
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Figure 1: Rate of owner-occupancy over the 20th century



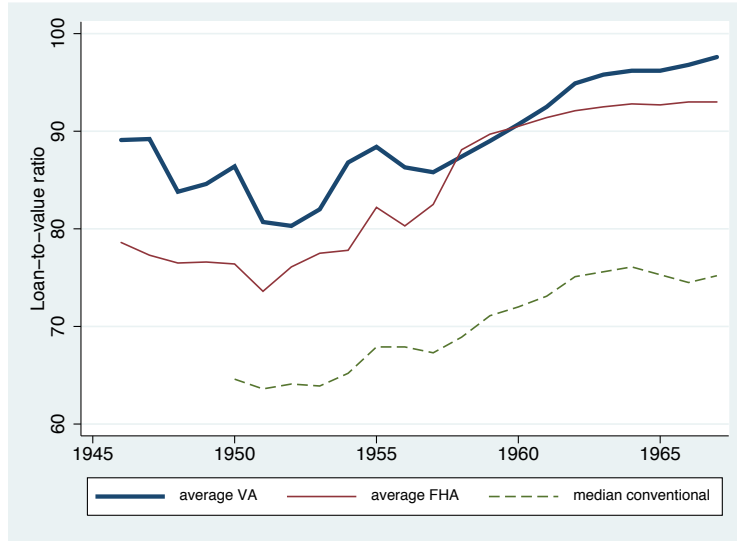
Notes: Figure shows share of occupied dwelling units that are owner-occupied. See text for sources.

Figure 2: Home ownership by age, 1900-1980



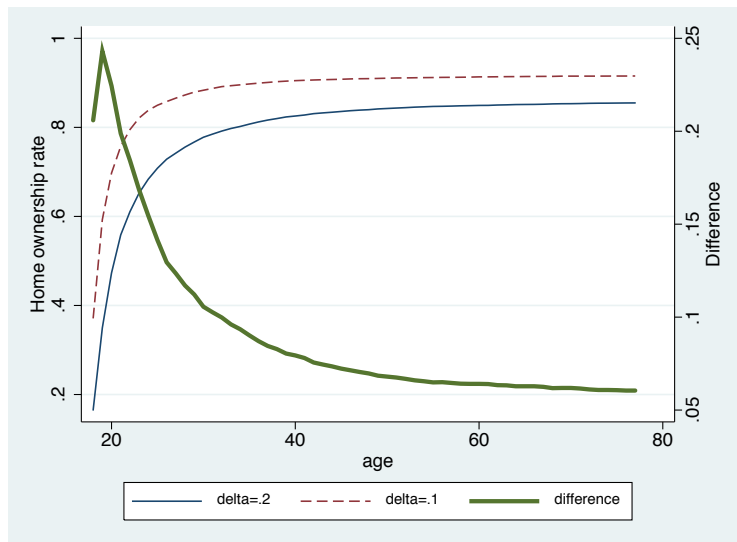
Notes: Figure shows share of men of each age from 18 to 80 who are home owners in each Census year. Lower lines are 1900-1940, upper lines are 1960-1980. Data are from Ruggles et al. (2008). For definitions, see text.

Figure 3: Loan-to-value ratio on new VA and alternative mortgages, 1946-67



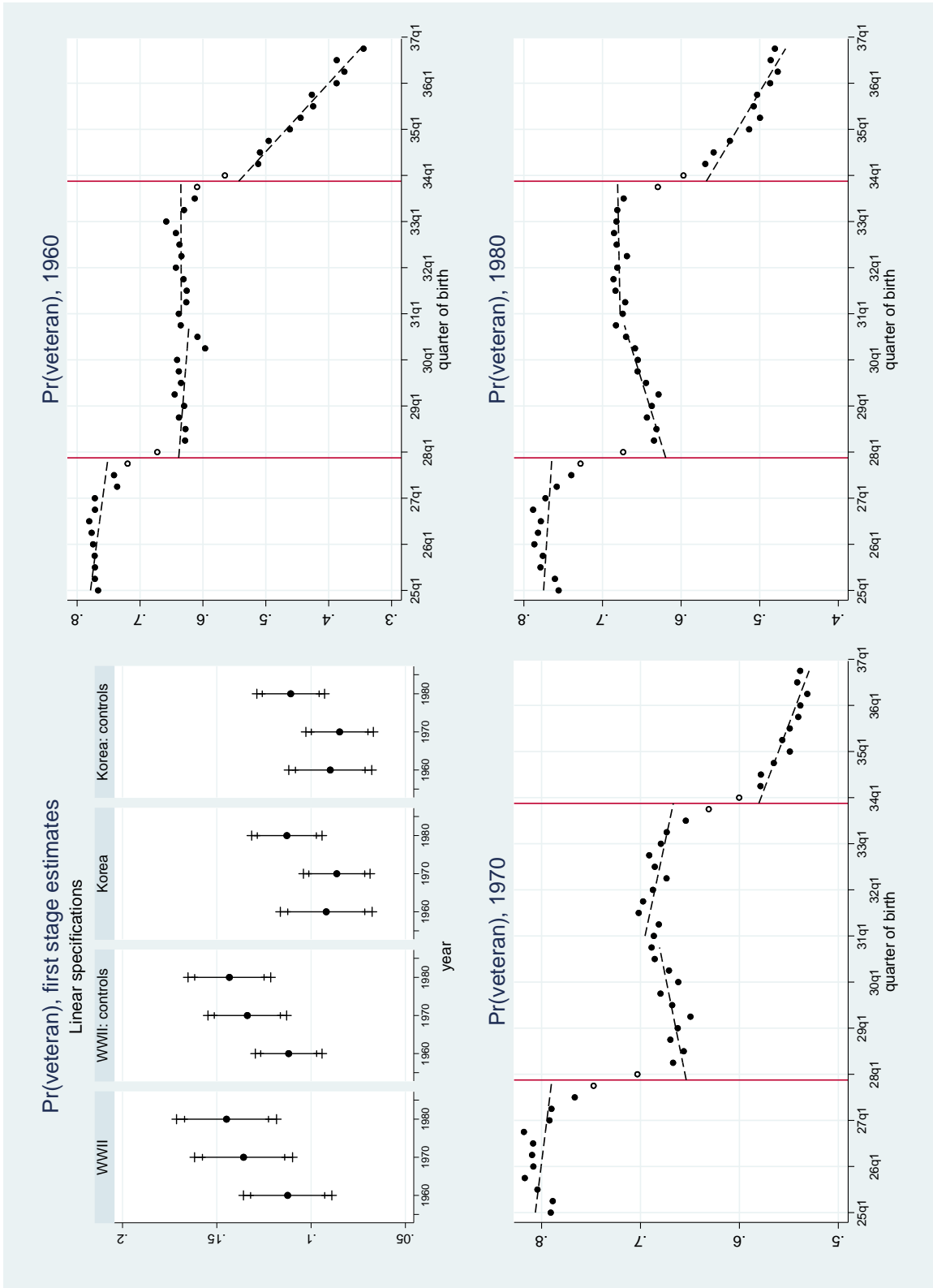
Notes: Figure shows average loan-to-value ratio for new VA and FHA loans in each year, and median loan-to-purchase price ratio for new conventional loans originated by savings and loan associations. Conventional data provided by U.S. Savings and Loan League for 1950-64, and from Federal Home Loan Bank Board for 1965-67. Source: Herzog and Earley (1970).

Figure 4: Simulated home ownership profiles for 10% and 20% down-payments



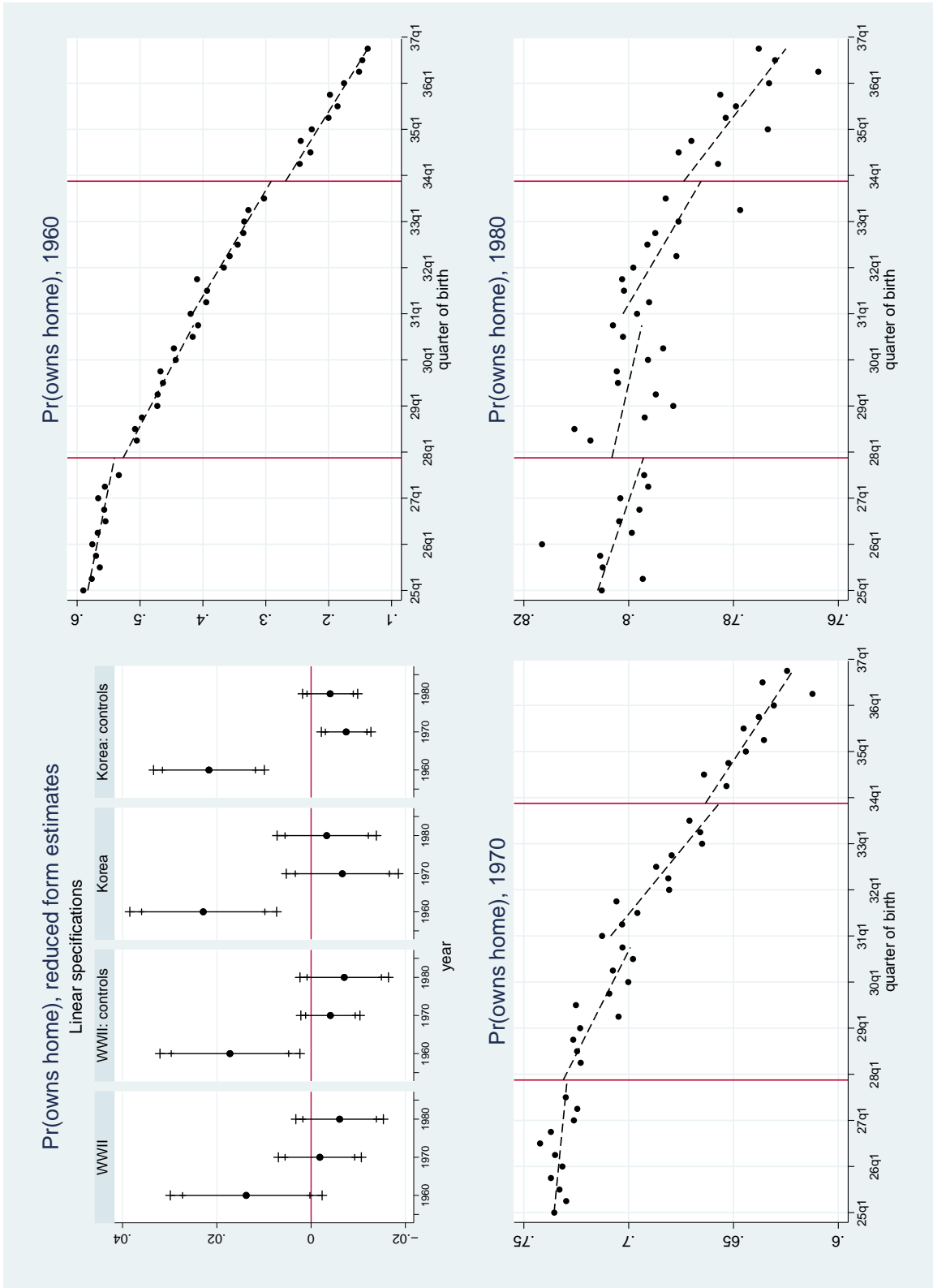
Notes: Figure shows home ownership rates by age calculated in the simulation described in Section 3, for down-payments of 10% ($\delta = .1$) and 20% ($\delta = .2$). Heavy line shows difference between home ownership in low down-payment and high down-payment regime at each age.

Figure 5: Estimated trends and discontinuities in veteran status



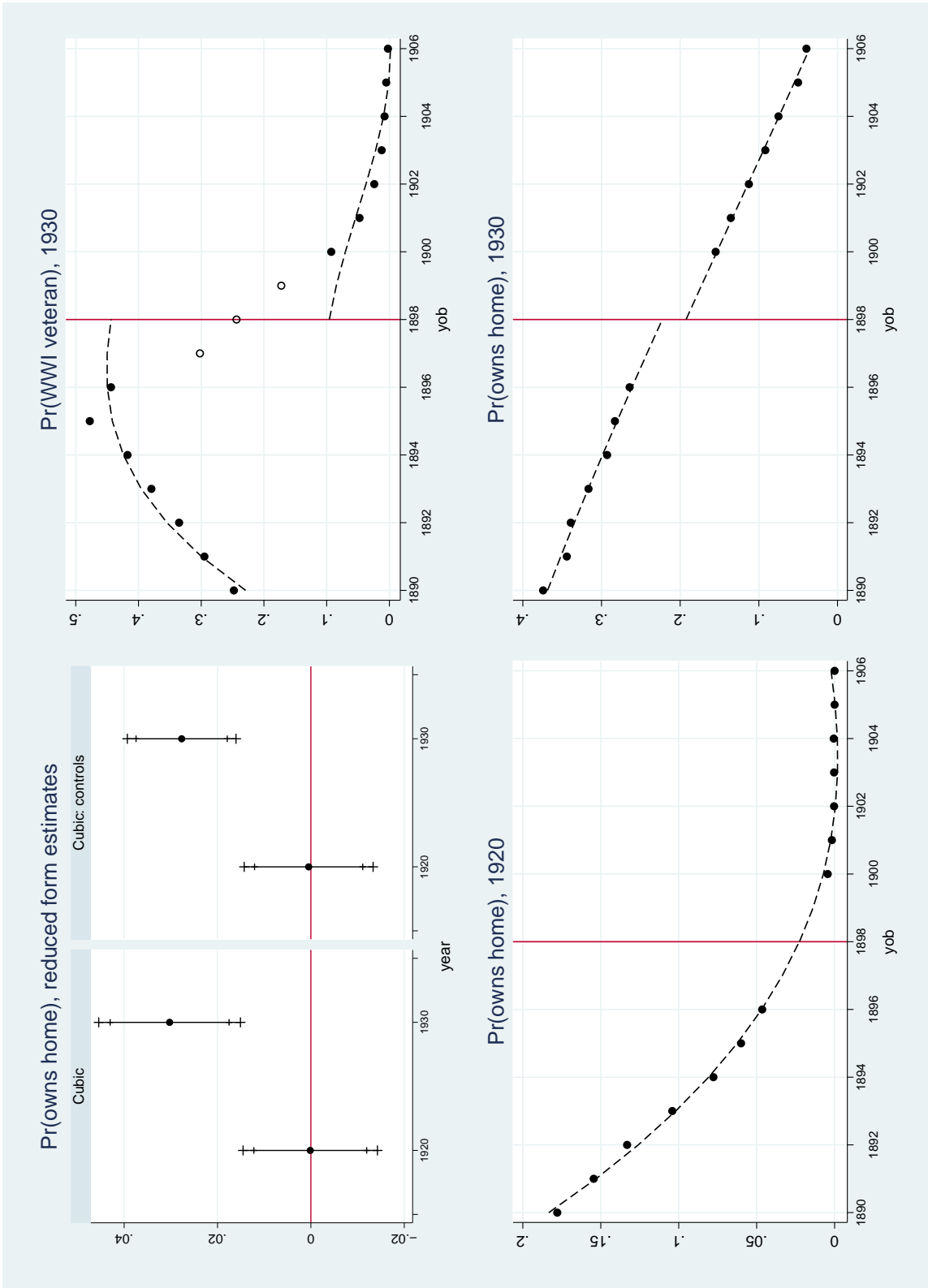
Notes: Upper left panel summarizes point estimates, with 90% and 95% confidence intervals. Second and fourth columns of upper left panel correspond to column (1) of Table 3. First and third columns show estimates without quarter of birth, race, or state of birth fixed effects. For sample restrictions and standard error estimation, see notes to Table 3.

Figure 6: Estimated trends and discontinuities in probability of owning home



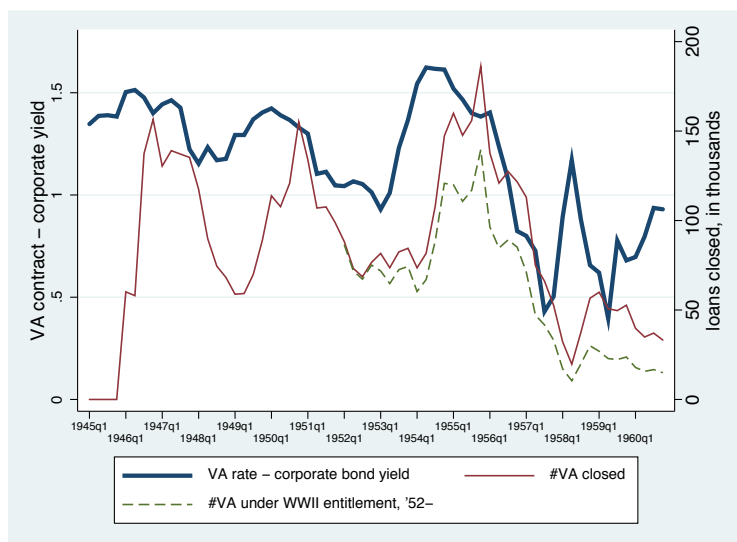
Notes: Upper left panel summarizes point estimates, with 90% and 95% confidence intervals. Second and fourth columns correspond to the linear reduced form specifications in Table 4. First and third columns show estimates without quarter of birth, race, or state of birth fixed effects. For sample restrictions and standard error estimation, see notes to Table 4.

Figure 7: Summary of results for WWI RD analysis



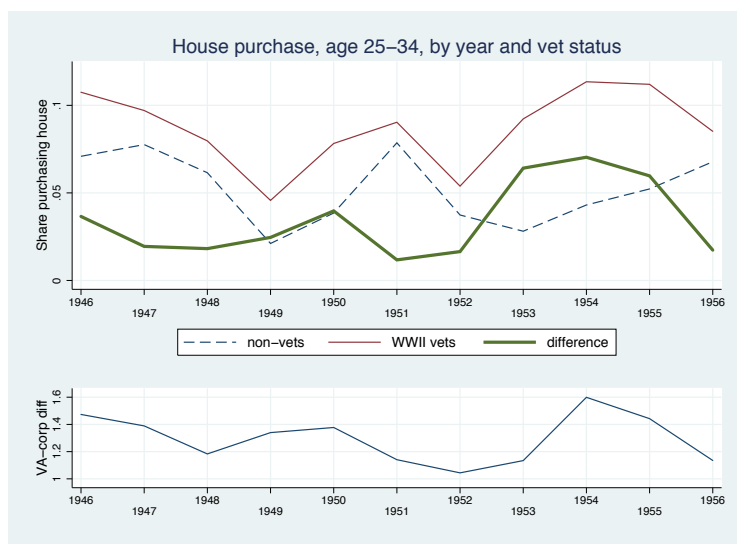
Notes: Upper left panel summarizes point estimates, with 90% and 95% confidence intervals. Second column corresponds to column (2) of Table 6. First column shows estimates without race or state of birth fixed effects. For sample restrictions and standard error estimation, see notes to Table 6.

Figure 8: Number of VA loans closed by quarter and difference between VA and alternative yields



Notes: Figure shows number of VA loans closed each quarter, the estimated number closed under the World War II entitlement for 1952 onwards, and the difference between the maximum VA interest rate and yields on AAA-rated corporate bonds. Data on number of VA loans from Housing and Home Finance Agency (1961), share under WWII entitlement from U.S. Veterans Administration (1962). Corporate bond yields are from NBER series m13035, at <http://www.nber.org/databases/macroeconomy/contents/chapter13.html>.

Figure 9: Differential rates of purchase for vets and non-vets against VA-corporate difference



Notes: Estimated from each year of the Survey of Consumer Finances, 1947 to 1957. Upper graph shows share of spending units reporting having purchased house in the specified year: e.g., in 1950 it is the share of spending units interviewed in 1951 that reported buying home in 1950. Korean War veterans omitted; bold line shows difference in rate between spending units with World War II veterans and those with no veteran. Lower graph shows annual average difference between VA interest rate and corporate bond yields, as discussed in text and previous figure.

Table 1: Loan terms on one-unit owner-occupied properties

	1920	1950	1960	1990
Median LTV (percent)	50 to 60	75	79	86
VA		91	91	
FHA		79	83	
Conventional		66	68	
Median loan term (years)	5 to 11	13	20	30
VA		20	25	
FHA		20	24	
Conventional		11	15	
Median interest rate	6 to 7	5.0	5.1	9.7
VA		4.0	4.5	
FHA		4.5	4.6	
Conventional		5.0	5.6	

Notes: Data for 1920 are ‘typical’ loan terms, from Aaron (1972). Data for 1950-1990 are from the US Census, Residential Finance Survey, and represent the stock of first mortgages. Loan-to-value (LTV) is defined as the amount of the first mortgage loan as a percent of purchase price, for properties acquired by purchase with first mortgage made or assumed at time of purchase.

Table 2: Means of key variables for cohorts immediately around each cutoff

	WWII break			Korean War break		
	1960	1970	1980	1960	1970	1980
Veteran	.696	.725	.701	.587	.615	.613
Currently in military	.033	.015	.002	.050	.038	.007
Owns home	.523	.721	.801	.273	.660	.788
Positive income	.978	.983	.976	.970	.984	.977
Total income positive income (1980 dollars)	14450	21907	21270	11114	20596	21701
N	5394	14894	24601	4507	12973	22581

Notes: Table reports mean of each outcome for men in the sample born in the quarters that immediately precede and follow each cutoff (for the World War II cutoff, these are men born in 1927q4 or 1928q1, and for the Korean War cutoff, born in 1933q4 or 1934q1). For sample restrictions, see Data Appendix. ‘Veteran’ indicates that individual reported being a veteran of any conflict. ‘Currently in military’ indicates that reported employment status was in armed forces; those in military are not classified as veterans. ‘Owns home’ indicates that individual was the head of household or spouse of the head in an owner-occupied dwelling unit. ‘Positive income’ gives share of sample with total personal income greater than zero. Total income, conditional on positive income, is scaled to 1980 dollars using the Consumer Price Index.

Table 3: Estimated discontinuities in probability of military service: local linear regressions

Outcome	(1)	(2)	(3)	(4)
	WWII	veteran Korean War	veteran or in military WWII	in military Korean War
1960	0.1119 (0.0090)***	0.0898 (0.0112)***	0.1085 (0.0099)***	0.0932 (0.0093)***
1970	0.1338 (0.0106)***	0.0849 (0.0091)***	0.1312 (0.0104)***	0.0915 (0.0085)***
1980	0.1433 (0.0112)***	0.1108 (0.0092)***	0.1425 (0.0111)***	0.1101 (0.0091)***
N_{total}	493218	458164	493218	458164
R^2	.731	.616	.741	.638
Bandwidth	1925-1930	1931-1936	1925-1930	1931-1936
DOB cutoff	Jan 1, 1928	Jan 1, 1934	Jan 1, 1928	Jan 1, 1934

Notes: Table reports estimated discontinuities at the cutoffs in probability of reporting one is a veteran (columns 1 and 2) and reporting either past or current service (columns 3 and 4), in combined individual-level Census data from 1960, 1970, and 1980. Sample includes men born in the US within the specified bandwidth, dropping men born in quarters immediately preceding and following cutoff. Local linear specifications allow different trends on either side of cutoff. All parameters are allowed to vary by Census year. Lee-Card standard errors, clustered at the Census-year by birth-cohort level, are in parentheses. All specifications include fixed effects for season (quarter) of birth, race (white/non-white), and state of birth. ***: $p < .01$, **: $p < .05$, *: $p < .1$.

Table 4: Estimated discontinuities in probability of owning home: local linear regressions

Specification	(1)	(2)	(3)	(4)
Break	reduced form WWII	reduced form Korean War	IV WWII	IV Korean War
1960	0.0172 (0.0076)**	0.0217 (0.0060)***	0.1539 (0.0700)**	0.2412 (0.0731)***
1970	-0.0041 (0.0032)	-0.0074 (0.0027)***	-0.0305 (0.0241)	-0.0875 (0.0305)***
1980	-0.0070 (0.0048)	-0.0040 (0.0030)	-0.0490 (0.0350)	-0.0364 (0.0265)
N_{total}	493218	458164	493218	458164
R^2	.762	.735		
Bandwidth	1925-1930	1931-1936	1925-1930	1931-1936
DOB cutoff	Jan 1, 1928	Jan 1, 1934	Jan 1, 1928	Jan 1, 1934

Notes: Table reports estimated reduced form discontinuities at cutoff in probability of being a household head or spouse of head in an owner-occupied dwelling, and IV estimates that scale by the estimate of the corresponding discontinuity in veteran status from Table 3, in combined individual-level Census samples from 1960, 1970, and 1980. Sample includes men born in the US within the specified bandwidth, dropping men born in quarters immediately preceding and following cutoff. Local linear specifications allow different trends on either side of cutoff. All parameters are allowed to vary by Census year. Lee-Card standard errors, clustered at the Census-year by birth-cohort level, are in parentheses. All specifications include fixed effects for season (quarter) of birth, race (white/non-white), and state of birth. ***: $p < .01$, **: $p < .05$, *: $p < .1$.

Table 5: Estimated discontinuities in ln(personal income): local linear regressions

	(1)	(2)	(3)	(4)
Specification	reduced form	reduced form	IV	IV
Break	WWII	Korean War	WWII	Korean War
1960	-0.0159 (0.0088)*	0.0372 (0.0159)**	-0.1411 (0.0764)*	0.4081 (0.1385)***
1970	-0.0053 (0.0067)	-0.0003 (0.0070)	-0.0395 (0.0516)	-0.0033 (0.0809)
1980	-0.0102 (0.0084)	0.0013 (0.0054)	-0.0711 (0.0587)	0.0117 (0.0481)
N_{total}	483068	448518	483068	448518
R^2	.993	.994		
Bandwidth	1925-1930	1931-1936	1925-1930	1931-1936
DOB cutoff	Jan 1, 1928	Jan 1, 1934	Jan 1, 1928	Jan 1, 1934

Notes: Table reports estimated reduced form discontinuities at cutoff in log personal income conditional on positive income, and IV estimates that scale by the estimate of the corresponding discontinuity in veteran status from Table 3, in combined individual-level Census samples from 1960, 1970, and 1980. Sample includes men born in the US within the specified bandwidth, dropping men born in quarters immediately preceding and following cutoff. Local linear specifications allow different trends on either side of cutoff. All parameters are allowed to vary by Census year. Lee-Card standard errors, clustered at the Census-year by birth-cohort level, are in parentheses. All specifications include fixed effects for season (quarter) of birth, race (white/non-white), and state of birth. ***: $p < .01$, **: $p < .05$, *: $p < .1$.

Table 6: Results from World War I RD analysis

Dependent variable	(1) veteran	(2) owns home reduced form	(3) owns home IV
1920 Mean ownership: 0.019		0.0005 (0.0070)	
1930 Mean ownership: 0.225	0.3452 (0.0461)***	0.0277 (0.0059)***	0.0794 (0.0175)***
N_{total}	108926	222875	108926
R^2	0.37	0.25	
Birth cohorts	1890-1906	1890-1906	1890-1906
YOB cutoff	1898	1898	1898

Notes: Table reports estimated reduced form discontinuities at cutoff in probability of being a veteran (1) owning home (2). IV estimates (3) scale by the estimate of the corresponding discontinuity in veteran status. Column (2) combines individual-level Census samples from 1920 and 1930. ‘Mean ownership’ is rate of home ownership for men born in 1898. Sample includes men born in the US in specified cohorts, dropping men born in 1897, 1898, and 1899. Specifications are cubic in year of birth, constraining coefficients on polynomial to be the same on both sides. All parameters are allowed to vary by Census year. Lee-Card standard errors, clustered at the Census-year by birth-cohort level, are in parentheses. All specifications include fixed effects for race (white/non-white) and state of birth. ***: $p < .01$, **: $p < .05$, *: $p < .1$.

Table 7: Differential effects of changes in interest rates on veterans’ house purchase

Dependent variable	(1) bought house last year	(2) bought house last year
Mean over period	0.049	0.049
Vet*difference	0.0642 (0.0210)***	0.0611 (0.0197)***
Vet	-0.0505 (0.0271)*	-0.0472 (0.0255)*
Year fixed effects	Yes	Yes
Controls	Yes	Yes
Korea vets in sample	No	Yes
N	30474	31516
R^2	0.0148	0.0146

Notes: Sample includes spending units with positive income in Survey of Consumer Finances for each year from 1947 to 1957. Dependent variable indicates that spending unit reported having bought a house the previous year. Vet*difference is interaction of indicator for veteran in the spending unit with the average difference between the VA rate and corporate yield. Controls include $\log(\text{income})$. Column (1) omits Korean War veterans from the sample, column (2) includes. Heteroskedasticity-robust standard errors in parentheses. Estimated using SCF sampling weights. ***: $p < .01$, **: $p < .05$, *: $p < .1$.

Appendix 1: Data

The data for all of the empirical analysis, except for Section 5.3, are drawn from IPUMS Census microdata (Ruggles et al., 2008). I use the 1% samples from 1900 to 1960, a combination of the State, Neighborhood, and Metro 1% Form 2 samples from 1970, the 5% State sample from 1980, and the unweighted 1% samples from 1990 and 2000. In all analyses, the sample contains only men born in the United States who were 18 years or older at the time of the Census. In Section 2, in cases where allocation flags are available, I drop any observation whose age, sex, place of birth, group quarters status, or home ownership status was allocated by the Census Bureau. In all other sections, I also drop men whose veteran status was allocated.

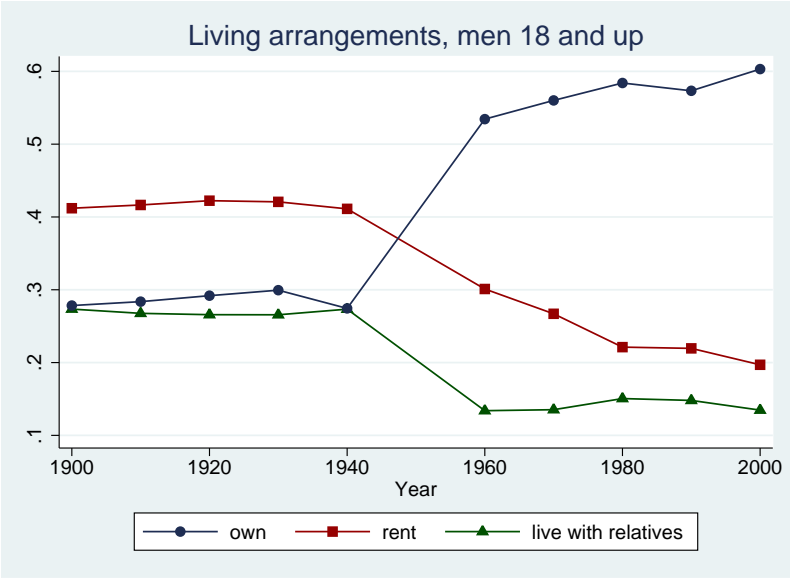
I categorize living arrangements into the mutually exclusive categories of owning, renting, living with relatives, and a residual category. I classify men who were listed as the household head or the spouse of the head in an owner-occupied dwelling as home owners. Renters include household heads, or spouses of heads, in dwellings identified as renter-occupied; I also classify as a renter anyone listed as a roomer, boarder, or lodger. Men ‘living with relatives’ are those who are otherwise related to the household head. The remainder consist mostly of men in group quarters – for example, institutions and military quarters – and household servants.

Data on the timing of veterans’ house purchase in Section 5.3 are drawn from the Survey of Consumer Finances from 1947 to 1957 (Economic Behavior Program, Survey Research Center, University of Michigan, 1973). As discussed in the main text of the paper, the unit of observation in the SCF is a spending unit, defined as a group of related people living in the same dwelling who pool their incomes for major items of expense. For example, an adult son living with his parents would be classified as a separate spending unit if he does not pool his income with that of his parents, but otherwise would be part of the same spending unit. Spending units are further grouped into ‘family units’ of related individuals, with a single ‘primary’ spending unit and other ‘secondary’ spending units. Housing tenure is not reported consistently for spending units living on farms, so these are excluded from the analysis. I keep only spending units whose head was between 25 and 34 years old in the survey year.

There was some variation in questions asked each year, requiring adjustment for consistency over time. For the 1947 sample I define a ‘veteran’ spending unit as one with at least one veteran; from 1948 to 1953 as one whose head reported being a veteran, and from 1954 onwards as one whose head reported being a veteran of World War II (or similarly for the Korean War). I classify a spending unit as purchasing a house in the previous year if it reported buying any real estate in the previous year (1947), buying a house in the previous year (1948), or buying its current home in the previous calendar year (1949 to 1957). Secondary spending units who do not report any information on having bought a home the previous year are classified as not having purchased a home.

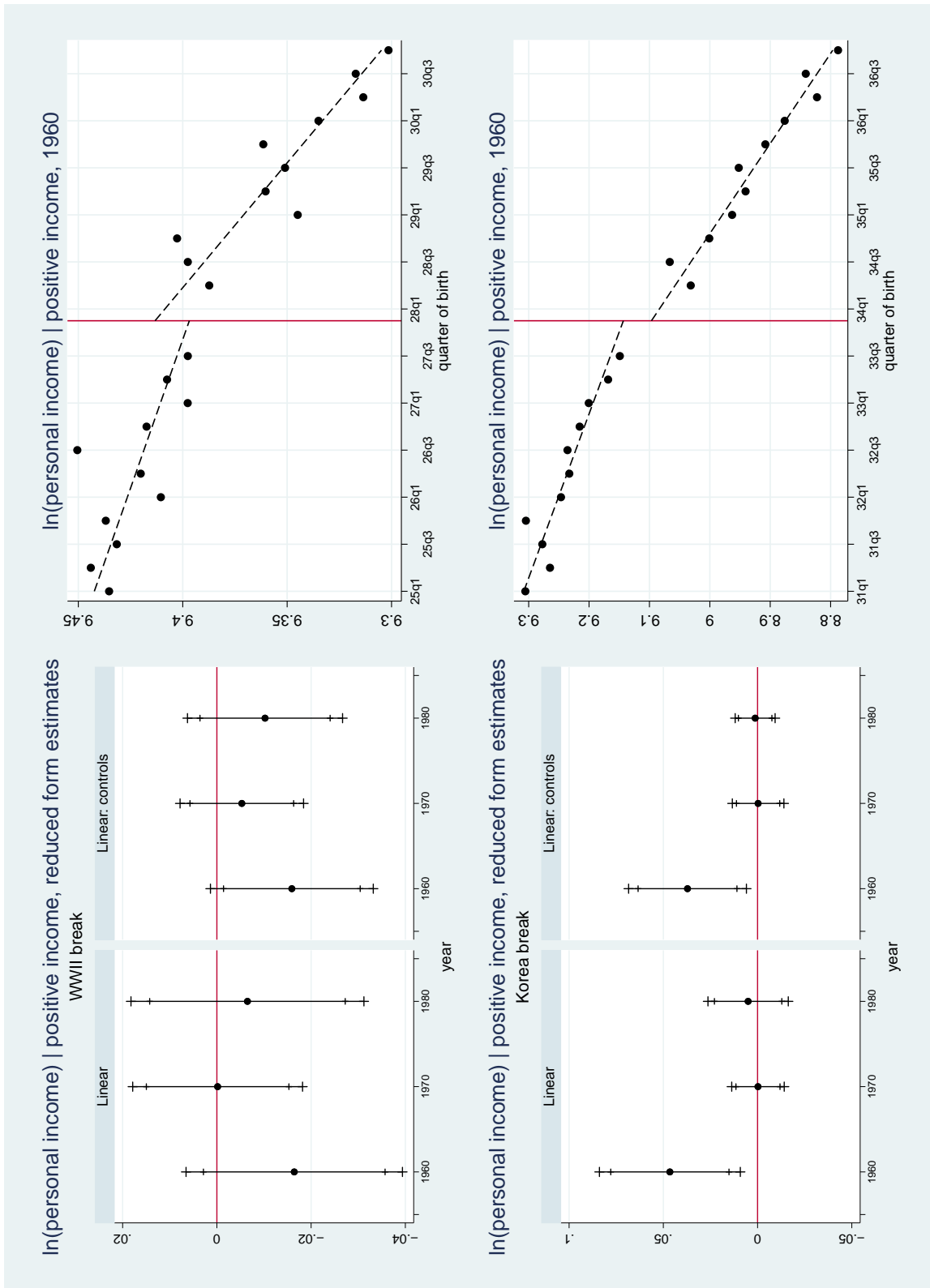
Appendix 2: Additional Tables and Figures

Figure A1: Home ownership at the individual level over the 20th century



Notes: Figure shows share of men 18 and older owning, renting, and living with relatives. Details are given in Appendix 1. Source: IPUMS (Ruggles et al., 2008).

Figure A2: Estimated trends and discontinuities in $\ln(\text{income})$ conditional on positive income



Notes: Left panels summarize point estimates, with 90% and 95% confidence intervals. Second column of each panel corresponds to linear reduced form specifications in Table 5. First column shows estimates without quarter of birth, race, or state of birth fixed effects. For sample restrictions and standard error estimation, see notes to Table 5.

Table A1: Estimated discontinuities in probability of military service: cubic regressions

Outcome	(1)	(2)	(3)	(4)
	WWII	veteran Korean War	veteran or in military WWII	in military Korean War
1960	0.0991 (0.0140)***	0.0719 (0.0109)***	0.0953 (0.0158)***	0.0879 (0.0103)***
1970	0.0974 (0.0148)***	0.0577 (0.0102)***	0.0953 (0.0146)***	0.0649 (0.0084)***
1980	0.0981 (0.0146)***	0.0833 (0.0156)***	0.0975 (0.0146)***	0.0839 (0.0158)***
N_{total}	493218	458164	493218	458164
R^2	.731	.616	.741	.638
Bandwidth	1925-1930	1931-1936	1925-1930	1931-1936
DOB cutoff	Jan 1, 1928	Jan 1, 1934	Jan 1, 1928	Jan 1, 1934

Notes: Specifications correspond to those reported in Table 3 except that trends are cubic, with coefficients on polynomial constrained to be the same on both sides of each break. ***: $p < .01$, **: $p < .05$, *: $p < .1$.

Table A2: Estimated discontinuities in probability of owning home: cubic regressions

Specification Break	(1)	(2)	(3)	(4)
	reduced form WWII	reduced form Korean War	IV WWII	IV Korean War
1960	0.0259 (0.0107)**	0.0306 (0.0082)***	0.2610 (0.1207)**	0.4258 (0.1295)***
1970	-0.0033 (0.0036)	-0.0037 (0.0037)	-0.0341 (0.0382)	-0.0648 (0.0666)
1980	-0.0208 (0.0058)***	-0.0073 (0.0048)	-0.2122 (0.0603)***	-0.0878 (0.0561)
N_{total}	493218	458164	493218	458164
R^2	.762	.735		
Bandwidth	1925-1930	1931-1936	1925-1930	1931-1936
DOB cutoff	Jan 1, 1928	Jan 1, 1934	Jan 1, 1928	Jan 1, 1934

Notes: Specifications correspond to those reported in Table 4 except that trends are cubic, with coefficients on polynomial constrained to be the same on both sides of each break. ***: $p < .01$, **: $p < .05$, *: $p < .1$.

Table A3: Estimates of veteran status on 1960 ownership for alternative bandwidths and specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	WWII	WWII	WWII	WWII	Korean War	Korean War	Korean War	Korean War
2-year	.0190 (.0103)*	.1765 (.1003)*	.0644 (.1205)	.1115 (.1212)	.0338 (.0047)***	.4475 (.0838)***	.1434 (.1295)	.3069 (.1688)*
3-year	.0172 (.0076)**	.1539 (.0700)**	.0843 (.1263)	.0877 (.0736)	.0217 (.0060)***	.2412 (.0731)***	.0533 (.0781)	.1119 (.1097)
4-year	.0178 (.0067)***	.1447 (.0559)***	.0921 (.0925)	.1020 (.0634)	.0291 (.0054)***	.3669 (.0782)***	.0791 (.0466)*	.1706 (.0944)*
5-year	.0159 (.0053)***	.1189 (.0411)***	.0392 (.1020)	.0696 (.0452)	.0323 (.0046)***	.3908 (.0649)***	.0929 (.0342)***	.1481 (.0575)**
Specification	Base reduced form	Base IV	Cohort trend linear	Cohort trend quadratic	Base reduced form	Base IV	Cohort trend linear	Cohort trend quadratic

Notes: Columns (1), (2), (5), and (6) present reduced form and IV estimates of discontinuity in home ownership at each break, as described in Table 4. Bandwidths include the specified number of years around each break; e.g., the 2-year bandwidth for the World War II break includes sample men born from 1926-1929. All base specifications include controls for quarter of birth, race, and state of birth. Cohort trend models collapse data to quarter-of-birth level, include all cohorts in the specified bandwidth, and regress the cohort's rate of home ownership in 1960 on the share veteran in the cohort, including quarter-of-birth fixed effects and either linear or quadratic trends. ***: $p < .01$, **: $p < .05$, *: $p < .1$.

Table A4: Estimated discontinuities in $\ln(\text{personal income})$: cubic regressions

	(1)	(2)	(3)	(4)
Specification	reduced form	reduced form	IV	IV
Break	WWII	Korean War	WWII	Korean War
1960	-0.0007 (0.0098)	0.0203 (0.0217)	-0.0066 (0.0950)*	0.3006 (0.2941)
1970	-0.0211 (0.0091)**	0.0029 (0.0116)	-0.2168 (0.0989)**	0.0483 (0.1861)
1980	-0.0344 (0.0142)**	-0.0154 (0.0062)**	-0.3479 (0.1188)***	-0.1835 (0.0693)***
N_{total}	483068	448518	483068	448518
R^2	.993	.994		
Bandwidth	1925-1930	1931-1936	1925-1930	1931-1936
DOB cutoff	Jan 1, 1928	Jan 1, 1934	Jan 1, 1928	Jan 1, 1934

Notes: Specifications correspond to those reported in Table 5 except that trends are cubic, with coefficients on polynomial constrained to be the same on both sides of each break. ***: $p < .01$, **: $p < .05$, *: $p < .1$.