The Home Mortgage Interest Deduction and Migratory Insurance over the Great Recession*

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Abstract

The home mortgage interest deduction (HMID) encourages homeownership and larger mortgages, which may impede migration when house prices fall. This paper investigates the degree to which the HMID reduced workers' insurance against local variation in the employment effects of the Great Recession via impeded migration to strong local labor markets. Utilizing variation in the HMID at state borders and comparing similar individuals across space, I find that individuals lacked insurance against enduring employment effects of Great Recession local shocks, but I do not find significant evidence that state HMIDs hindered that insurance by impeding migration. I therefore do not find evidence in this context that "dynamic" distortions of the HMID via impeded migration magnified any of its "static" distortions to economic activity. However, estimates are uncertain and leave room for future work.

1 Introduction

The home mortgage interest deduction (HMID) is the single largest U.S. tax expenditure other than the exclusion of employer-provided health insurance. Over 35 million households claim the federal HMID (Brady, Cronin and Houser 2003), and the HMID is estimated to cost the U.S. government over $75 billion in foregone tax revenue in 2016 (U.S. Treasury Department 2015). The HMID reduces households' net cost of debt-financed home purchases, relative to other purchases of goods and services. The tax expenditure can increase home ownership, the size and quality of purchased homes, and the average share of each home purchase financed by debt rather than by down payments (Hendershott and Pryce 2006, Poterba and Sinai 2011). People who own homes with large mortgages may migrate at lower rates when house prices decline because they face larger moving costs: paying off "underwater mortgages" whose balance exceeds the home's current market price (Ferreira, Gyourko and Tracy 2010).

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Analyses of the effects of the HMID on the U.S. economy have typically focused on static effects: its effect on a given year's tax revenue (e.g. Poterba and Sinai 2011, U.S. Treasury Department 2015), distortions between housing and other forms of consumption (Aaron 1972, Rosen 1979, 1985, Mills 1987, Poterba 1984, 1992), and the quantity and price of housing at a given point in time (Hilber and Turner 2014). This paper estimates a dynamic effect of the HMID: the degree to which the HMID impeded adjustment to the Great Recession by impeding migration. The Great Recession had dramatically different effects across space; for example, America's sixth largest city (Phoenix, Arizona) suffered a large decline in employment while America's seventh largest city (San Antonio, Texas) suffered only a small decline. Migration is the primary way that the U.S. labor market adjusts to local employment shocks (Blanchard and Katz 1992, Bound and Holzer 2000), and the option to migrate to stronger labor markets is a primary way that the U.S. economy could have insured the original residents of places like Phoenix against especially adverse employment losses. But by encouraging people to buy houses and to buy houses with larger mortgages, the HMID may have impeded migration and thus impeded adjustment (Molloy, Smith and Wozniak 2011).

I investigate this dynamic distortion channel with a novel empirical strategy. I first estimate the effect of the HMID on migration over the Great Recession using variation in home mortgage interest (HMI) deductibility at the state level. Specifically, I use selected de-identified data from U.S. tax records to examine workers living in 2007 in the 110 local labor markets—defined as Tolbert and Sizer's (1996) Commuting Zones (CZ)—that straddle the borders of two or more states, 66 CZs of which allow for different degrees of HMI deductibility on either side of the border. For example, Arkansas allows HMI deductibility from state personal income taxes while Texas has no broad-based personal income tax, and the Texarkana CZ comprises counties on either side of the Arkansas-Texas border. I further attempt to hold all else equal by comparing very similar workers across borders: those who are the same age, earned the same amount, and worked in the same industry in 2006, just in different locales. I then compare the 2007-2015 migration rates of people who had claimed the federal HMID on the Arkansas side of the border in 2006 to the migration rates of people who claimed the federal HMID on the Texas side of the border in 2006 within firms (and similarly for other CZs). These people had very similar skills and lived in the same CZ and so were subject to similar labor market conditions and had revealed similar preferences for where in the United States to live, but faced very different incentives to purchases houses with large mortgages.

After estimating the effect of state HMIDs on 2007-2015 migration, I then estimate the value of migration in escaping the incidence of especially severe Great Recession local shocks. This analysis utilizes *cross*-CZ variation in the severity of the 2007-2009 recession while continuing to utilize within-industry variation in similar workers' locations to hold all else equal. I investigate the limited extent of "migratory insurance"—which I define as the degree to which

2015 employment differs across workers based on where they were living in 2007—given all existing adjustment mechanisms. I conduct several robustness checks to ensure the validity of the comparisons, as well as correlations that investigate a role for underwater mortgages and the HMID. I then assess the likelihood that extra migration unleashed by a hypothetical removal of the HMID could indeed have improved migratory insurance.

The remainder of the paper is organized as follows. Section 2 presents background on the HMID and details the empirical strategy. Section 3 introduces the tax data. Section 4 presents estimates of the effect of the HMID on migration rates since the Great Recession. Section 5 presents an analogous analysis of mortgage holding, the key HMID effect channel. Section 6 documents the enduring need for migratory insurance in spite of other existing adjustment mechanisms. Section 7 assesses the degree to which the HMID hindered migratory insurance since the Great Recession. Section 8 concludes.

2 The HMID and the Empirical Strategy

This section details the home mortgage interest deduction (HMID) and this paper's empirical strategy based on state-level variation in the HMID and within-industry comparisons.

2.1 Background on the HMID

Since the beginning of the federal income tax, Congress has permitted households to deduct interest payments on personal loans from their federal taxable income. The Tax Reform Act of 1986 eliminated the federal deductibility of many interest payments on consumer loans such as credit card payments but retained the deductibility of interest payments on mortgages with certain mild restrictions. To a first approximation at the federal level, homeowners can deduct interest payments on mortgages on first and second homes that total up to $1 million, as well as interest payments on home equity loans that total up to $100,000 (see IRS Publication 936 for full details). Hence, the vast majority of U.S. homeowners may deduct all of their interest payments from their federal taxable income.

Home mortgage interest (HMI) deductibility at the state level varies considerably (ITEP 2011). Twenty-six states generally follow federal rules for HMI deductibility from state taxable income. Another five states and the District of Columbia follow federal rules but apply stricter limitations to the value and type of mortgage interest payments that can be deducted. Ten states do not allow any HMI deductions. Finally, nine states do not assess a broad-based personal income tax, instead raising revenue from other sources such as sales taxes that do not subsidize HMI. Table 1 lists all states in these categories and their associated top personal income tax rates, an easy-to-compare measure of the relative value of HMI deductibility across

states.

The value of the HMID depends on the personal income tax rate that would otherwise be paid on the income that was deducted. To be concrete using an example that will surface later in the section, consider a married-filing-jointly household in Arkansas that earns $75,000 in gross income in a given year and pays $10,000 in deductible mortgage interest in that year. Arkansas allows the HMID and taxes residents' income above $50,000 at a rate of 7%, so the household saves $\$10,000 \times 7\% = \$700$ in taxes thanks to HMI deductibility.[1] Hence, HMI deductibility is more valuable when tax rates are higher.

2.2 Empirical Strategy

The central question of this paper is whether the HMID reduced Americans' migration-based insurance ("migratory insurance") against local variation in the Great Recession. Empirically identifying the effect of the HMID requires variation in HMI deductibility or the value of HMI deductibility and the ability to compare similar people subject to different deductibility while holding all else equal. Two leading sources of variation are problematic. First, because this paper focuses on a single time period, variation in the value of the HMID over time—such as when personal tax rates change or when inflation rates change as in Glaeser and Shapiro (2003)—is not useful. Second, taxpayers at different income levels are different in numerous ways that may affect migratory insurance over the Great Recession independent of the value of HMI deductibility, so comparing migratory insurance across taxpayers of different income levels would likely be problematic.

Instead, this paper utilizes variation in HMI deductibility across state borders and holds all else equal by comparing workers within industries and firms. As detailed in the previous subsection, some states permit HMI deductibility while other states do not. Figure 1A displays this variation graphically. The states in white do not allow the HMID (either explicitly, or implicitly because they lack broad-based personal income taxes). The states in colors allow the HMID; the colors plot the top state personal tax rate in such states, so the HMID is more valuable in states with darker colors.

Because migration rates can vary across states for reasons other than the HMID, I focus on small geographical areas that are economically connected but straddle state borders. The local area concept I use in this paper is called the Commuting Zone (CZ)—geographic units designed by Tolbert and Sizer (1996) to approximate U.S. local labor markets. Specifically, they used commuting patterns reported in the 1990 Census to divide the united States in 741 areas that

[1] This example calculation ignores the fact that, in the absence of deducting HMI, the household could take the standard deduction of $4,000, so the first $4,000 in itemized deductions do not in fact represent net tax savings. This is an appropriate shortcut for this example because states allow numerous other deductions such as for real estate taxes that could exceed the $4,000 standard deduction on their own.

share strong commuting ties relative to nearby areas. Statistically, they are aggregations of counties; in rural areas, they may include only one or two counties, while in urban areas, they may include several. CZs have been used recently in economics research by Autor, Dorn and Hanson (2013) among others.

I utilize variation within the 66 CZs in the continental United States that straddle the border of two states or more states that differ in HMID deductibility. Figure 1B displays those 66 CZs. They are distributed broadly across the United States. For concreteness, Figure 2 zooms in on the Texarkana CZ, which comprises Texarkana, Arkansas, Texarkana, Texas, and surrounding counties. Arkansas allows HMI deductibility while Texas does not. Using this CZ as an example, this compares 2007-2015 outcomes among people who at the beginning of 2007 (i.e. before the recession) lived in the Texarkana CZ on the Arkansas side of the border, relative to people who at the beginning of 2007 lived in the Texarkana CZ but on the Texas side of the border. By focusing on such within-CZ differences in migration rates, I hope to hold constant numerous factors that may independently influence migration.

Upon estimating the effect of the HMID on migration, I then estimate the effect of migration on adjustment to the Great Recession. As discussed in the introduction and documented below, a striking feature of the Great Recession is that it yielded dramatic variation in employment shocks across space. Migration is the key adjustment mechanism by which workers can escape the incidence of large and enduring local shocks: workers in heavily-shocked places may be able to move to lightly-shocked places and compete for employment there. Since CZ's approximate self-contained local labor markets, I focus on employment shock variation at the CZ level and estimate the degree to which the 2007 residents of heavily-shocked CZ's were able to diffuse their CZ's shocks across workers nationwide by migrating and finding employment in other CZs. To the extent that 2007 location affects 2015 employment and thus that migratory insurance is incomplete, I estimate the degree to which greater migration from a hypothetical removal of the HMID may have enabled greater insurance.

It is instructive to note that, using the kinds of designs I have just described, one cannot estimate the direct effect of the HMID on adjustment to the Great Recession and instead must do so in the two specified stages. The effect of the HMID is identified only from within-CZ differences, while the effect of migration on adjustment to the Great Recession is identified only from cross-CZ differences. These differences stem from the sources of identifying variation. HMI deductibility varies across states, so the best hope of holding all else equal derives from narrow comparisons across state borders, such as within CZs. In contrast, local employment shocks are in principle shocks to entire local labor markets, so there is little credible variation in local employment shocks within CZ's.

3 Data

I implement this paper's empirical design using selected de-identified data from federal income tax records spanning 1999-2015. All analyses were conducted at secure government facilities and on datasets stripped of unmasked personal identifiers. The sample construction is summarized as follows; additional details are listed in the Data Appendix.

3.1 Analysis Samples

I implement the paper's empirical design using selected de-identified data from federal income tax records spanning 1999-2015. I construct five samples as follows. All five samples are balanced panels of individuals.

Random Sample. The main sample comprises a 2% random sample from what I call the full sample. The full sample comprises all American citizens aged 30-49 ("working age") on January 1, 2007, who had not died by December 31, 2015, and who had a valid payee ZIP code on at least one information return that indicates continental U.S. residence in January 2007. The age restriction confines the 1999-2015 employment analysis to those older than schooling age and younger than retirement age. Birth, death, and citizenship data are drawn from Social Security Administration (SSA) records housed alongside tax records.[2] Restricting attention to those alive in 2015 excludes analysis of mortality effects, likely a conservative choice (Sullivan and Von Wachter 2009). I describe geocoded information returns in the next subsection. I randomly sample individuals from the full sample using the last two digits of the individual's masked identification number, yielding the "full analysis sample" of 1,357,974 people working across 722 CZs. [3] Restricting to CZs that straddle a state border leaves me with a "random border analysis sample" of 233,530 workers in 115 CZs. Since only 66 CZs straddle state borders with different HMI deductability on either side, regressions in the border analysis sample derive identifying variation from 66 CZs, not 115.

Retail Chain Sample. The retail chain sample comprises individuals in the full sample whose main employer in 2006 was a retail chain firm and who lived outside of the local area of the retail chain firm's headquarters. It is constructed as follows. For every individual in the full sample with a 2006 W-2 form, I attempt to link the masked employer identification number (EIN) on the individual's highest-paying 2006 W-2 to at least one business return in

[2]Citizenship is recorded as of December 2016. Results are very similar when not conditioning on citizenship status. Conditioning on citizenship reduces the possibility that 2007 residents are employed in other countries but appear non-employed in U.S. tax data.

[3]The sample is smaller than the universe of CZs for three main reasons: the age range restrictions, mismatches between W-2 EIN and business return EIN, and conservative removal of workers at firm headquarters and those not in the continental United States; see the Data Appendix for more details.

the universe of business income tax returns 1999-2007.[4] I use the North American Industry Classification System (NAICS) code on the business income tax return to restrict attention to workers whose 2006 firms operated in the two-digit-NAICS retail trade industries (44 or 45), e.g. Walmart and Safeway.[5] I further exclude employees living in 2007 in the CZ of their employer's headquarters, using the workers' payee ZIP codes across their information returns (see the next subsection) and the filing ZIP code on business income tax returns and mapping these ZIP codes to Commuting Zones (CZs, the local area concept defined in the next subsection). Then to identify CZs in which the 2006 firms operated, I further restrict to firms with at least ten 2006 employees living in each of at least five CZs and restrict to the firms' employees living in 2007 in those CZs.[6] This procedure yields a retail chain sample of 866,038 individuals at 524 retail firms.[7] Then analogously to how I created the random border analysis sample, I create a "retail border analysis sample" comprising 147,334 individuals in 110 CZs. Unlike firms in manufacturing and other industries, retail firms employ workers to perform identical tasks in many different locales. I therefore assume that workers with similar demographics were as good as randomly assigned across 2007 local areas conditional on their 2006 retail firms and the amount they earned at their 2006 firms.

Mass Layoffs Sample. The mass layoffs sample comprises individuals in the full sample who separated from an employer during a mass-layoff event in either 2008 or 2009, after having worked for the employer during the prior three calendar years inclusive of the separation year. It is constructed as follows, closely adhering to the sampling frame of Davis and Von Wachter (2011) except that I define an employer as an EIN-CZ pair rather than an EIN.[8] Using the universe of W-2s and linking W-2 payee (residential) ZIP codes to CZs, I compute annual employment counts at the EIN-CZ level. For an employer to qualify as having a mass-layoff event in year $t \in \{2008, 2009\}$, the employer must satisfy the following conditions: it had at least 50 employees in $t-1$; employment contracted by 30% to 99% from $t-1$ to $t+1$; employment in $t-1$ was no greater than 130% of $t-2$ employment; and $t+2$ employment was less than 90% of $t-1$ employment.[9] The mass layoffs sample comprises all 1,001,543 individuals in the full sample who received a W-2 with positive earnings in years $t-2$ through year t from

[4] Many firms' workers cannot be linked to a business income tax return; see the next subsection.

[5] Accessed data lacked firm names. I do not know which specific firms survived the sample restrictions. These example firms and their industry codes were found on Yahoo Finance.

[6] As in other U.S. administrative data (e.g. Census's Longitudinal Employer Household Dynamics, see Walker 2013), specific establishments of multi-establishment firms are not directly identified in federal tax data.

[7] The sample is smaller than the universe of retail chain workers for four main reasons: the age restriction, the de facto exclusion of workers at independently owned franchises, mismatches between W-2 EIN and business return EIN, and removal of workers at firm headquarters.

[8] An EIN may be a firm or a division of a firm.

[9] The 99% threshold protects against EIN changes yielding erroneous mass-layoff events. The last two criteria exclude temporary employment fluctuations. A firm that initially qualifies as having mass-layoff events in both 2008 and 2009 is assigned a 2008 event only.

a mass-layoff employer but not in $t + 1$.

3.2 Variable Definitions

I now define variables. Year refers to calendar year unless otherwise specified. Variables are available 1999-2015.

1. Outcomes.

2007-2015 migration is defined as a worker possessing a 2015 CZ that is different from her 2007 CZ. *2007 CZ* is the CZ corresponding to the payee (residential) ZIP code that appears most frequently for the individual in 2006 among the approximately thirty types of information returns (filed mandatorily by institutions on behalf of an individual, including W-2s).[10] Information returns are typically issued in January of the following year, so the ZIP code on a individual's 2006 information return typically refers to the individual's location as of January 2007. *2015 CZ* is defined analogously to 2015 CZ, except that if an individual lacks an information return in 2014, I impute CZ using information return ZIP code from the most recently preceding year in which the individual received an information return. *2007 state* denotes the state with most or all of the 2007 CZ's population. A *mover* is someone who migrated between 2007 and 2015.

2007 state deductability of mortgage interest equals zero if the worker's 2007 state (defined analogously to 2007 CZ–i.e corresponding to the worker's payee ZIP code that appears most frequently across the worker's 2006 information returns) does not allow mortgage interest deductability from state personal income taxes or if the state lacks a personal income tax. It equals one if worker's 2007 state allows full deductability of mortgage interest from the state personal income tax. When defined "inclusively", I code partial-deductability states as one; when defined "exclusively", I code partial-deductability states as zero. See Table 1 for deductability by state.[11]

2007 top rate deductability of mortgage interest equals 2007 state deductability of mortgage interest, multiplied by the worker's 2007 state's personal income tax rate. *2006 mortgage holder* is a binary indicator for whether a Form 1098 information return was issued on the worker's behalf by a mortgage servicer in 2006.[12]

Employment in a given year is an indicator for whether an individual has positive Form

[10]Numerous activities trigger information returns including formal and independent contractor employment; SSA or UI benefit receipt; mortgage interest payment; business or other capital income; retirement account distribution; education and health savings account distribution; debt forgiveness; lottery winning; and college attendance. A comparison to external data suggests that 98.2% of the U.S. population appeared on some form submitted to the IRS in 2003 (Mortenson, Cilke, Udell and Zytnick 2009).

[11]For standard errors, I cluster on the 2007 state with most or all of the worker's 2007 CZ's population, following earlier work.

[12]A mortgage servicer is required to file a Form 1098 on behalf of any individual from whom the servicer receives at least $600 in mortgage interest on any one mortgage during the calendar year.

W-2 earnings or Form 1099-MISC independent contractor earnings (both filed mandatorily by the employer) in the year. Employment is thus a measure of having been employed at any time during the year. Note that this annual employment measure differs from the conventional point-in-time (survey reference week) measure used by the Bureau of Labor Statistics.

Earnings in a given year represents labor income and equals the sum of an individual's Form W-2 earnings and Form 1099-MISC independent contractor earnings. All dollar values are measured in 2015 dollars, adjusting for inflation using the headline consumer price index (CPI-U) and are top-coded at $500,000 after inflating. *DI receipt* is an indicator for whether the individual has positive Social Security Disability Insurance income (SSDI) in the year as recorded on Form 1099-SSA information returns filed mandatorily by the Social Security Administration. SSDI is the main disability insurance program in the United States. *UI receipt* is an indicator for whether the individual has positive unemployment insurance benefit income in the year as recorded on Form 1099-G information returns filed mandatorily by state governments.

2. Great Recession Local Shock. Each individual's *Great Recession local shock* equals the percentage-point change in the individual's 2007 CZ's unemployment rate from 2007 to 2009. Annual CZ unemployment rates are computed by aggregating monthly population-weighted county-level unemployment rates from the monthly Bureau of Labor Statistics Local Area Unemployment Statistics series to the CZ-month level, then averaging evenly within CZ-years across months.

3. Covariates. *Age* is defined as of January 1 of the year, using date of birth from SSA records housed alongside tax records. Following Autor, Dorn, Hanson and Song (2014), an individual had *high labor force attachment* if she earned at least $10,382 in 2015 dollars—the compensation for 1,600 hours of work at the 2004 federal minimum wage in 2015 dollars—of earnings in each of the four years 2003-2006. An individual had *no labor force attachment* if she had zero earnings in any year 2003-2006. *Female* is an indicator for being recorded as female in SSA records. *1040 filer* is an indicator for whether the individual appeared as either a primary or secondary filer on a Form 1040 tax return in tax year 2006. *Married* is an indicator for whether the individual was either the primary or secondary filer on a married-filing-jointly or married-filing-separately 1040 return in tax year 2006. *Number of kids* equals the number of children (zero, one, or two-or-more) living with the individual as recorded on the individual's 2006 1040 if the individual was a 1040 filer and zero otherwise. *Mortgage holder* is an indicator for whether a Form 1098 information return was issued on the individual's behalf by a mortgage servicer in 2006.[13] *Birth state* is derived from SSA records and, for immigrants, equals the state of naturalization.

[13]A mortgage servicer is required to file a Form 1098 on behalf of any individual from whom the servicer receives at least $600 in mortgage interest on any one mortgage during the calendar year.

2006 industry equals the four-digit NAICS industry code on the business income tax return of an individual's highest-paying 2006 Form W-2, whenever a match can be made between the masked EIN on the W-2 and the masked EIN on the business income tax return. Four-digit NAICS codes are quite narrow, distinguishing for example between restaurants and bars. As displayed below in summary stats and similar to parallel work (Kline, Petkova, Williams and Zidar 2017, Mogstad, Lamadon and Setzler 2017), almost half of all W-2 earners could not be matched—likely because the employer is a government entity (which does not file an income tax return, covering 15-20% of employment) or because the firm uses a different EIN (e.g. a non-tax-filing subsidiary) to pay workers from the one that appears on the firm's tax return. For the construction of fixed effects, I assign individuals with missing industry to their own exclusive industry; I assign non-W-2-earning contractors to their own exclusive industry; and I assign the non-employed to their own exclusive industry. I show below that results are nearly unchanged when restricting the sample to the non-employed and those with a valid W-2 industry, for whom the correct industry is universally observed.

2006 age-earnings-industry fixed effects are interactions between age (measured in one-year increments), 2006 industry, and sixteen bins of the individual's 2006 earnings (in 2015 dollars inflated by the CPI-U) from the individual's highest-paying employer.[14] *2006 firm* equals the masked employer identification number on the individual's highest-paying 2006 W-2. *2006 age-earnings-firm fixed effects* are constructed analogously to 2006 age-earnings-industry fixed effects. Other controls are used only for robustness checks and are defined when used.

3.3 Summary Statistics

Table 2 reports summary statistics for the five data samples used in both the main analyses and the robustness checks: a random 2% sample of the full population and satisfy the restrictions described above, a random 2% "border" sample that restricts the full population sample to those who live in CZs that straddle two states, the retail chain sample (all non-headquarters workers for identifiable retail chain firms in 2006), the border retail sample, and the mass layoffs sample (all workers who separated from a firm in a 2008 or 2009 mass layoff). By the characteristics described in the table, the border samples and the full analysis samples are broadly similar. Compared to the random sample of the full population, the retail sample is poorer, more female, is less likely to get married, have kids, or own homes. [15] The mass layoffs

[14]The main result below is nearly identical when using Local CPI 2—the more aggressive of the Moretti (2013) local price deflators—to locally deflate 2006 earnings before binning. Chosen to create roughly even-sized bins, the bin minimums are: \$0, \$2,000, \$4,000, \$6,000, \$8,000, \$10,000, \$15,000, \$20,000, \$25,000, \$30,000, \$35,000, \$40,000, \$45,000, \$50,000, \$75,000, and \$100,000.

[15]The mortgage holder shares in the border and full analysis samples are lower than the U.S. adult home ownership rate: the sample is younger and poorer than the U.S. as a whole, the mortgage holder share excludes home owners without a mortgage, and mortgages held only in the name of a worker's spouse or other third

sample, in contrast, is richer and more male than the random sample, but still less likely to get married or have kids.

4 Effect of the HMID on Migration

In this section, I use the state-border empirical strategy in the random 2% border sample to estimate the effect of the HMID on 2007-2015 migration. I first estimate the effect of the HMID on migration using a reduced-form specification that puts no structure on the nature or strength of the mechanism by which a tax subsidy to mortgage interest affects migration. I then apply a series of robustness checks, first applying rich controls to the reduced-form estimates, allowing partial HMID states to be misclassified and allowing mortgage interest tax subsidies to have a linear effect on migration. As a further robustness check, I rerun this analysis on the retail border sample, which has the additional benefit of comparing especially similar workers.

4.1 Main Results

To estimate the effect of the HMID on migration using the state-border empirical strategy, I estimate regressions in the border analysis sample of the form:

$$MIGRATED_i = \beta HMIDSTATE_{s(i2007)} + \mathbf{X}_{i2007c(i2007)}\gamma, \tag{4.1}$$

where $MIGRATED_i$ is an indicator for whether worker i migrated across CZs between 2007 and 2015, $HMID_{s(i2007)}$ is an indicator for whether i was living in 2007 in an HMID-eligible state, and $\mathbf{X}_{i2007r(i,2007)}$ is a vector of individual-level and CZ-level covariates. The coefficient $\hat{\beta}$ is the coefficient of interest: the estimated effect of living in an HMID-eligible state in 2007 on whether the worker migrated 2007-2015.

Table 3A displays the main results: estimated effects of living in an HMID-eligible state in 2007 on 2007-2015 migration, under successively larger sets of controls. HMID-eligible states are defined inclusively: partial deductibility states are classified as allowing HMI deductibility. Column 1 has no controls. Column 2 adds age fixed effects, Column 3 uses fixed effects of age interacted with earnings bins, and Column 4 further interacts these age-earnings with industry fixed effects based on NAICS code. These age-earnings-industry fixed effects in Column 4 represent my preferred specification, and all subsequent columns control for these effects while adding additional controls that one might concerned about, such as gender and marital status.

Column 1 shows that, in the cross section, workers who lived in 2007 in a state that permits HMID deductibility are estimated to have been 2.425 percentage points more likely to have

party are not included here.

migrated 2007-2015. This estimate is statistically significant and has the unexpected sign, which would be consistent with the HMID increasing migratory insurance. The point estimate is fairly insensitive to additional controls, except for CZ size, which is added in Column 9. Controlling for CZ size reduces the coefficient to 1.739, which implies that populous CZs are disproportionally located in states with HMID and that people in populous CZs were more likely to have moved. The additional controls in Table 3A do, however, highlight the weakness of the main result. Several columns, including my preferred estimate in Column 4, are statistically insignificant at the 95% confidence level, meaning that one cannot say with confidence that there is an effect of being in an HMID state on migration. In fact, the data do not reject a negative effect of the HMID on 2007-2009 migration under reasonable specifications.

4.2 Robustness to State Misclassification

The main results in Table 3A classify states as HMI deductible or nondeductible states inclusively: partial deductibility states are classified as allowing HMI deductibility. However, it is possible that the near-zero estimates of Table 3A are attenuated toward zero because of misclassification: perhaps partial deductibility states have such muted effects of home ownership and mortgage leverage that they are effectively the same as non-deductible states. Table 3B therefore defines deductibility exclusively: partial deductibility states are classified as not allowing HMI deductibility and thus lumped in with states that either do not allow HMI deductibility in their personal income tax or do not have a personal income tax at all.

Table 3B shows that the exclusive definition does indeed somewhat alter the point estimates, though no more so than adding controls did in Table 3A. It also points to a cautious interpretaion of the point estimates based on the size of the 95% confidence intervals. The confidence interval on the coefficient in Column 15, for instance, is $[-0.26, 4.52]$, which again means that living in a (full) HMID state could increase migration, decrease migration or have no impact on migration at all.

4.3 Robustness to Linear Specifications

The results of Table 3 use a simple binary classification of HMI deductibility. Despite its simplicity, the binary specification could lack statistical power relative to a specification that allows for larger effects of among states with larger HMI deductibility. Table 4 therefore replicates Table 3 using the continuous measure of HMI deductibility of the worker's 2007 top rate deductibility of mortgage interest.[16]

[16]Though many workers are not in the top state income tax bracket, this measure is simple and readily available.

Table 4 yields point estimates that are intermittently significant at the 95% level. Consistent with Table 3, there is little difference in the estimates in Panel A and Panel B, implying that the classification of partial HMID states is not particularly important.

Figure 3A non-parametrically presents the result in Table 4A Column 4. It is constructed by regressing 2007-2015 migration and 2007 top rate deductibility of mortgage interest on the controls underlying Column 4, computing residuals, adding back their means for interpretation, and plotting means of the 2007-2015 migration residuals within twenty equal-sized bins of the 2007 top rate deductibility residuals. Overlaid is the best-fit line estimated by regressing the 2007-2015 migration residuals on the 2007 top rate deductibility residuals, whose slope of course equals the 0.295 reported in Table 4A Column 4. As one can see from the graph, the marginally significant result under the linear specification does not appear to be masking a visually obvious non-linear relationship, further suggesting that there is indeed no statistically significant relationship between these two variables.

Table 4B Column 15 presents analogous results using the exclusively defined measure of state HMI deductibility. Like Table 4A, Table 4B reports positive estimates are that are still statistically insignificant. Therefore the null results of Table 3 are robust to the linear specifications presented in Table 4.

5 Effect of the HMID on Mortgage Holding

The previous section found no conclusive evidence of the HMID on 2007-2015 migration due to substantial statistical noise. If it had, one would have expected this effect to flow through the mechanism of home ownership. The HMID encourages people to take on mortgages and buy homes, and owning a home in a given area increases the likelihood that people will stay in that area. This section focuses on determining whether the first link in that logical chain holds, looking at whether the people living in states with HMID were indeed more likely to own homes in 2006. As in the previous section, I use a wide range of robustness checks on both the 2% random border sample and the retail border sample in order to present a complete picture of the data.

Table 5 replicates Table 3 for the outcome of owning a mortgage in 2006.[17] Estimates using the inclusive definition of HMI deductibility reveal a near-zero relationship between deductibility and mortgage holding. Depending on controls, the point estimate of this effect was either positive or negative. In the preferred specification, workers living in 2007 in a state offering deductibility of mortgage interest were insignificantly 0.426 percentage points less likely to hold

[17]Recall that although location is measured in 2007 and mortgage holding is measured in 2006, these outcomes are actually simultaneous: both 2007 location and 2006 mortgage holding are measured using 2006 information returns.

a mortgage. The standard error 1.213 is substantial, implying a substantial 95% confidence interval $[-2.88, 2.03]$. Thus subject to statistical uncertainty, I find no evidence that residents of HMI deductible states have higher rates of holding a mortgage.

Table 5B shows similar results when using the exclusive definition of HMI deductibility, though the point estimate for my preferred specification is now positive (although still statistically insignificant). Residents of states with HMI deductibility are 0.266 percentage points more likely to hold a mortgage. However, the standard error remains large at 0.731 percentage points. I therefore fail to find a statistically significant positive relationship between binary HMI deductibility and mortgage holding.

Turning to the continuous measure of HMI deductibility, Table 6 replicates Table 4 for the mortgage holding outcome. Like the previous tables, I continue to find near-zero and statistically insignificant results. Defining HMI deductibility inclusively, Column 4 reports that residents of states with one-percentage-point higher HMI deductibility were 0.043 percentage points less likely to hold a mortgage, with a standard error of 0.164. Defining HMI deductibility exclusively, Column 15 reports that residents of states with one-percentage-point higher HMI deductibility were 0.093 percentage points more likely to hold a mortgage, with a standard error of 0.088. Thus the two panels of Table 6 both find no statistically significant relationship.

Figure 3B non-parametrically presents the result in Table 6A Column 4, using the same method as Figure 3A. Here, one can see that the slightly negative relationship, but the standard error shows that this result is completely statistically insignificant.

Thus across specifications, I find no statistically significant relationship between HMI deductibility and mortgage holding. This sheds light on interpreting the previous section's lack of a statistically significant effect of HMI deductibility on migration. It may indeed be the case that a tax policy that causes people to buy a house or take out a larger mortgage also causes them to migrate less. However, it appears that the HMID may not in fact be such a mortgage-holding-inducing policy.

6 Robustness to Inter-firm Heterogeneity in Workers

Although I have thus far failed to find conclusive effects in either direction of the impact of HMID on migration in response to the Great Recession, it is possible that these effects are masked by inter-firm heterogeneity in workers. It is possible, for instance, that different firms within the same industry hire workers of different average skill level, or that some workers develop specialized skills that make them valuable only to a specific firm, and that that firm is located only in a certain area. To address potential selection issues, I used my retail border analysis sample and repeated the analysis that I did for the random 2% border sample, with the full suite of controls.

The results are displayed in Tables 7 through 10, with Table 7 corresponding to Table 3, Table 8 corresponding to Table 4 and so on. The results are broadly similar, both for the main analysis and the robustness checks. As with the 2% random sample, the point estimates for the coefficients of interest in Tables 7 and 8 are all positive for Panels A and B, though with greater statistical precision that rejects a substantial negative effect. Tables 9 and 10, like Tables 5 and 6 for the 2% random sample, show statistically insignificant point estimates.

Figure 4 is analogous to Figure 3. Figure 4A corresponds to Table 8 Column 5 and Figure 4B corresponds to Tablel 10 Column 5. As with its companion figure, Figure 4A serves to show that there are no non-linearities masking a more significant relationship, and 4B shows a nominally negative, but statistically insignificant relationship.

7 The Enduring Need for Migratory Insurance

The previous sections found no significant negative effect of HMI deductibility on 2007-2015 migration rates. However, these effects were estimated with error, failing to reject the possibility that the effect could be negative and substantial. In particular, I estimated a 95%-confidence upper bound of the reduction in migration rates due to HMI deductibility (on average across states with HMI deductibility versus states without HMI deductibility) equal to 0.22 percentage-points-lower migration rates in the preferred specification (recall Table 3A, Column 4). If migration was exceptionally valuable in avoiding the incidence of local variation in the Great Recession, then the 95%-confidence upper bound effect of HMI deductibility on migratory insurance may yet be large. This section investigates whether there was an enduring need for migratory insurance in the first place, or whether employment rates had converged across space through existing mechanisms.

7.1 Main Effects

Figure 5A plots the time series of estimated effects of living in 2007 in a relatively severely shocked CZ, conditional on the main controls in the full analysis sample. The plotted 2015 data point is this subsection's main result and equals $\hat{\beta}$ estimated in:

$$EMPLOYED_{i2015} = \beta SEVERE_{c(i2007)} + \mathbf{X}_{i2007c(i2007)}\gamma, \tag{7.1}$$

where $EMPLOYED_{i2015}$ is an indicator for whether worker i was employed in 2015, $SEVERE_{c(i2007)}$ is an indicator for whether i was living in 2007 in a relatively severely shocked CZ, and $\mathbf{X}_{i2007r(i,2007)}$ is 2006 age-x-earnings-x-industry fixed effects. For other years t, plotted

data points equal the same coefficient from a regression of $EMPLOYED_{it}$ on the exact same right-hand-side values in the exact same sample. 95% confidence intervals are plotted in vertical lines unadjusted for multiple hypotheses, based on standard errors clustered at the 2007-state level.

The 2015 data point shows that living in 2007 in a relatively severely shocked CZ is estimated to have caused a 0.393 percentage-point reduction in employment rates, relative to those who in 2007 were living in a relatively mildly shocked CZ (see Table 11 Column 4). The estimate is very significantly different from zero. The mean 2015 employment rate in this sample is 79.1%, so this estimated effect is equal to a 0.41% difference in employment rates. The plotted time series of estimated zero effects 1999-2007 constitute placebo tests corroborating the identifying assumption that conditional on controls, severe- CZ status is as good as randomly assigned. Panels B and C of Figure 5 re-enforce the conclusion of a significant and enduring employment impact from Great Recession local shocks. Panel B shows that there is a roughly linear relationship between Great Recession local shocks and relative employment in 2015 net of controls. Panel C repeats the analysis in Panel A for earnings and shows a similar enduring drop.

Table 11 Column 4 displays this main 2015 effect plotted in the Panel A, along with similar effects under different controls. [18] All specifications in columns 1-8 display similarly negative and significant results, regardless of controls. Column 6 shows that the employment impacts were monotonically worse with increasing local shocks, and Columns 9-11 show consistent results using alternate measures of employment impact.

As a robustness check, Table 12 repeats the analysis for the retail sample. These estimates are also uniformly negative and statistically significant. Figure 6A is the retail analog for Figure 5A, and similarly, the 2015 data point corresponds to Table 12 Column 5.[19]

7.2 Robustness

Table 13 presents several robustness checks of the impact of Great Recession local shocks on employment in 2015, with all its implications for HMID and migratory insurance. Taking Table 13 Column 4 as a starting point, Columns 2 through 5 add a suite of individual level controls. Columns 6-9 control for CZ-level characteristics. Column 6 controls an individual's 2007 CZ's size, equal to the CZ's total employment in 2006 as reported in Census's County Business Patterns (CBP). Column 7 controls an individual's 2007 CZ's size growth, equal to the CZ's log change in CBP employment from 2000 to 2006. Column 8 controls for an

[18] See Appendix Table 2 for Great Recession local shock by CZ.

[19] Table 2 showed that the main and retail chain samples differ demographically, and I find impact heterogeneity across demographic groups. I therefore reweight the retail chain sample to match the main sample as in DiNardo, Fortin and Lemieux (1996) along 2007 CZ, gender, five-year age bin, and 2006 earnings bins.

individual's 2007 CZ's share of workers who work outside of the CZ, computed from the 2006-2010 American Community Surveys. Column 9 controls for an individual's 2007 CZ's state's maximum unemployment insurance duration over years 2007-2015. Column 10 controls for the individual's 2007 state's 2015 minimum wage minus that state's 2007 minimum wage. Column 11 restricts the sample to the 2006 non-employed and 2006 workers with a valid industry code (i.e. excluding contractors and W-2 earners without industry). Column 12 further restricts the sample by excluding individuals employed in construction or manufacturing in 2006. Column 13 instruments the individual's Great Recession local shock using the mean of the Great Recession local shock in the individual's birth state. Throughout all of this, the estimates remain negative and significant.

Table 14 provides a finer look at the year-by-year impacts of Great Recession local shocks in 2007. It displays results for migration and various labor market outcomes. These outcomes include those in Column 8, the individual's unemployment insurance benefits, and Column 9, the individual's Social Security Disability Insurance benefits in year t. This pair of outcomes is discussed more in the next subsection. The estimates for migration are positive, but insignificant and the estimates for the basic employment measure are negative and significant. The estimates for other measures vary in significance. Migration rates were slightly higher out of severely shocked CZs than other CZs: 18.2% out of most-shocked-quintile CZs and 16.5% out of least-shocked-quintile CZs. However, Columns 4 and 7 reveal no statistically significant evidence that migration enabled individuals in severely shocked areas to find employment and earnings at higher levels in other CZs. This suggests that any extra migration unleashed by a hypothetical removal of the HMID may not have substantially improved migratory insurance. [20]

7.3 Tests for Worker-Scarring Mechanisms

If living in 2007 in a relatively severely shocked CZ "scarred" workers by reducing their human capital or raising their reservation wages, their employment may be persistently low even if they were to move to a stronger local labor market. That is, the enduring employment impact of 2007 location could be specific to the worker rather than specific to the worker's 2015 location, meaning that migration would not help the worker escape incidence. I therefore test for leading candidates of worker-specific effects; if I find strong effects, then additional migration likely could not have provided substantially more insurance.

A first potential worker-specific channel is disability insurance. Severe Great Recession local shocks may have induced workers to supplement their income with Social Security Disability Insurance ("DI")—a typically permanent location-independent income stream—thereby permanently raising their reservation wages and reducing their employment independent of

[20] Appendix Table 1 replicates Table 14 in the years leading up to the great recession.

current location (Autor and Duggan 2003, Maestas, Mullen and Strand 2013). One can estimate an upper bound on the contribution of DI receipt to the main employment result, under the weak monotonicity assumption that the treatment (living in 2007 in a relatively severely shocked area) did not make anyone in the analysis sample less likely to go on DI. The estimated upper bound on the DI mechanism equals the estimated effect on an indicator for 2015 employment (the main result) minus the estimated effect on an indicator for whether the worker was employed in 2015 *or* was on DI in 2015. Table 15 Column 2 displays the result: living in 2007 in a relatively severely shocked area is estimated to have caused workers to be 0.27 percentage-points less likely to be employed or on DI on 2015. Subtracting this effect from the main -0.393 percentage-point effect on employment, 32.6% of the incrementally non-employed relatively severely shocked natives were on DI by 2015, and thus 32.6% is the estimated upper-bound contribution of transition to DI to the enduring employment impact. To the extent that incremental transition to DI was a *response* to a lack of employment rather than a *cause* of it, transition to DI explains no more than 32.6% of the employment impact and potentially less. The tight upper-bound on the DI contribution is reflected in the statistically zero impact of living in 2007 in a relatively severely shocked area on 2015 DI receipt (Column 1).

A second potential worker-specific channel is more workers being laid off—following a long line of work documenting long-term earnings losses after layoff (Ruhm 1991, Jacobson, LaLonde and Sullivan 1993, Neal 1995, Couch and Placzek 2010). I proxy for layoff using unemployment insurance (UI) receipt.[21] Table 15 Column 6 shows that living in 2007 in a relatively severely shocked area caused workers to be 1.43 percentage points more likely to have received UI by 2015 (i.e. at any point 2007-2015), but this effect is significant, but small relative to the sample-wide mean of 25.6 percentage points. This suggests that higher rates of layoff cannot explain relatively severely shocked natives' lower 2015 employment rates. Column 8 shows that controlling for UI receipt by 2015 barely changes the employment effect estimate. This is of course not quasi-experimental since layoff is endogenous. But if one assumes that the laid-off relatively severely shocked natives were equal or stronger on unobservables than laid-off relatively mildly shocked CZ natives—as would be expected of incremental layoffs in a layoffs-and-lemons model (Gibbons and Katz 1991)—then these columns indicate that higher layoffs do not explain the employment results.

A third potential worker-specific channel is general human capital decay after long non-employment spells. Table 15 column 6 indicates that Great Recession local shocks caused individuals to be more likely to spend at least one year 2007-2014 completely non-employed. Column 10 shows that the individual's employment history 2007-2012 explains nearly the entire 2015 employment impact. Columns 3-5 and Figure 6B reveal similar impacts in the mass

[21] Kawano and LaLumia (2017) show that UI-tax-data-based unemployment rates are close in both level and trend to official Bureau-of-Labor-Statistics unemployment rates 1999-2011 (correlation 0:94).

layoffs sample, which comprises quite similar workers who were laid off into local labor markets that were more likely (severely shocked CZs) or less likely (other CZs) to lead to a long non-employment spell. These results are consistent with the worker-specific channel of general human capital decay.

Overall, the findings rule out some candidate worker-scarring mechanisms, but general human capital decay via prolonged non-employment is consistent with the results. However, this worker-scarring mechanism is not the only mechanism consistent with the results. The results are also consistent with persistently low local labor demand, under which laid-off workers have not experienced human capital decay but have experienced either a decline in their local wages or cannot obtain desired employment at prevailing local wages. Under persistently low local labor demand, more migration could indeed have provided more insurance: the local areas rather than the workers can be thought of as scarred. Further distinguishing mechanisms is a valuable area for future work.

7.4 Heterogeneity of Effects

I close by estimating whether subgroups of workers that had higher migration rates also had attenuated employment effects and thus greater insurance. Figure 7A plots point estimates and 95% confidence intervals for several worker subgroups defined by pre-2007-determined characteristics in the full analysis sample. Each row reports results from estimating equation 7.1 with the main controls on a different subsample: the full analysis sample, by gender, by 2006 earnings bin, by labor force attachment, by 2006 age group, by 2006 marital status, by 2006 number of kids, and by 2006 mortgage holding status. Rates of 2007-2015 migration of the analyzed subsample are listed in the far right of each row. Comparison of subgroup migration rates to subgroup differences presents a surprising result: the effect of 2007 location is not smaller for more mobile subgroups. The finding is most salient for mortgage-holding versus non-mortgage-holding comparison. Mortgage holders had migration rates of only 13% while non-mortgage-holders had 18% migration rates. Yet the two subgroups experienced similar (such that their confidence intervals overlap) 2015 employment effects of living in 2007 in a relatively severely shocked CZ, and if anything, it would appear that the mortgage holders experienced slightly smaller employment effects. These subgroups could of course be different along other dimensions, but this is suggestive evidence that greater migration may not have provided greater insurance against local variation in Great Recession local shocks. Figure 7B plots point estimates and 95% confidence intervals for the same groups, only this time for 2006 earnings. Results are broadly similar.

8 Conclusion

This paper has investigated whether the home mortgage interest deduction (HMID)—the second-largest U.S. tax expenditure—substantially impeded insurance against Great Recession local labor demand shocks by impeding residents' migration. Utilizing a novel empirical design based on variation in home mortgage interest deductibility across state borders and comparing similar workers within firms, I find no significant effect of the HMID on migration 2007-2015. However, the statistical uncertainty permits considerable negative effects if affected residents indeed lacked insurance and if existing migration was indeed a beneficial insurance mechanism. I find substantial under-insurance against local variation in the Great Recession: the 2007 residents of severely affected areas were substantially less like to be employed in 2015 than the 2007 residents of mildly affected areas. However, a direct analysis of the insurance benefit of migration reveals no statistically significant evidence that out-migration from severely affected areas was a beneficial insurance mechanism, though with large standard errors. Hence, it remains possible that the HMID hindered adjustment to the Great Recession by hindering migration, but the analysis failed to find significant evidence of it. The results nevertheless inform future work.

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Data Appendix

This appendix section provides additional data details.

First, the universe of business tax returns used is the universe of C-corporate (Form 1120), S-corporate (Form 1120S), and partnership (Form 1065) tax returns. Businesses that file other types of tax returns employ a small share of U.S. workers.

Second, Form 1099-MISC data on independent contractor employment are missing in 1999. Results are very similar when omitting 1999 data.

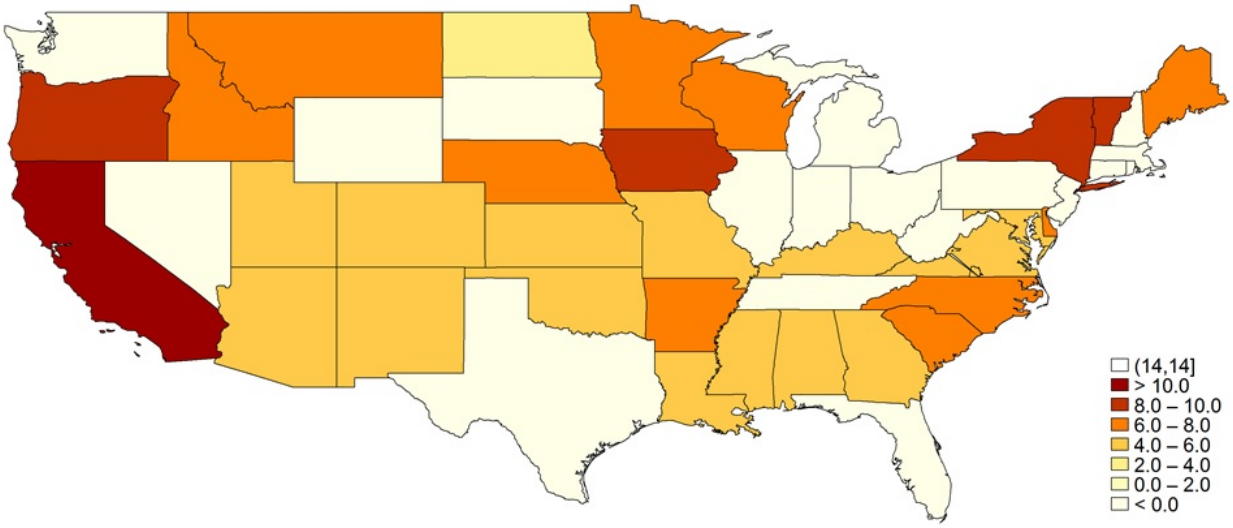
Third, many retail chain firms are missing from the retail border and chain samples, both because of subsidiaries and franchises and also because a (likely small) number of firms outsource their W-2 administration to third-party payroll administration firms that list their own EINs on W-2s. Nevertheless, the retail chain sample includes very large nationwide chains.

Fourth and also specific to the retail border and chain samples, the filing ZIP code on a firm's business income tax return typically but not always refer to the business's headquarters ZIP code. Excluding workers at the business's headquarters is useful because headquarters workers may perform systematically different tasks than workers at other establishments and thus may possess different human capital even conditional on baseline earnings. I therefore conservatively exclude firms' workers living in the CZ with the largest number of the firm's workers living there, as well as the CZ with the largest number of the firm's workers living there as a share of the total number of workers living there.

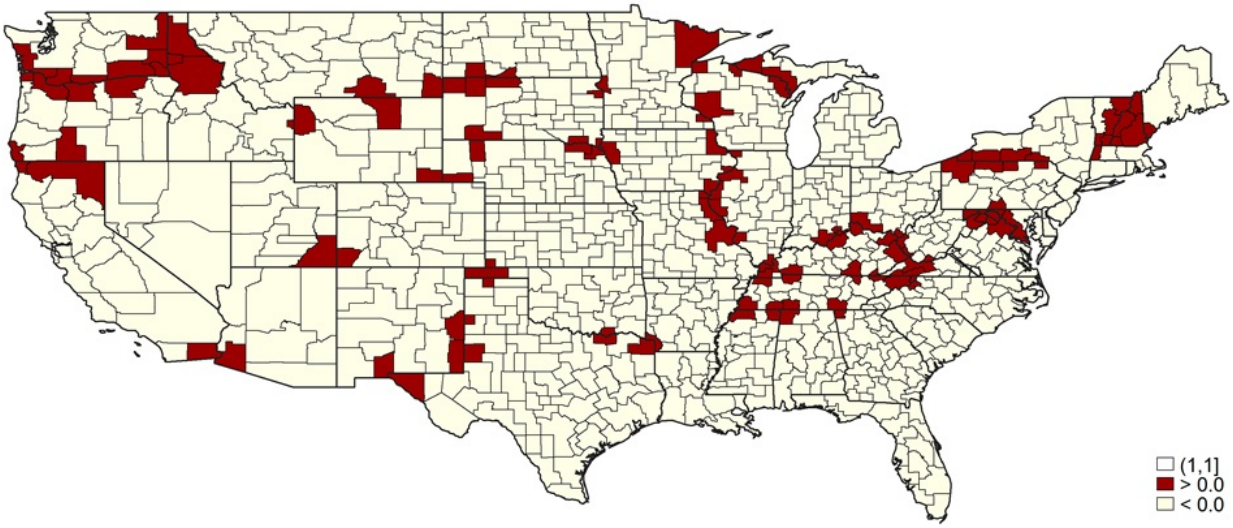
Fifth and also specific to the retail border and chain samples, I consider a firm to have operated in a CZ in 2006 if it employed at least ten stably located workers who lived in the CZ—defined as individuals of any age and citizenship with a W-2 from the firm in all years 2005-2007 and the same residential CZ in all years 2005-2007 based on those W-2s' payee (residential) ZIP codes. It is necessary to define CZ operations using more than one year of W-2 data because W-2 payee ZIP code refers to the worker's ZIP code in January of the year after employment. That feature implies that almost all firms would appear to have operations in every large CZ if one were to use only 2006 W-2s to identify CZ operations, since many workers move to large cities.

Figure 1: HMI Tax Subsidy Rates across U.S. States

A. HMI Tax Subsidy Rates by State

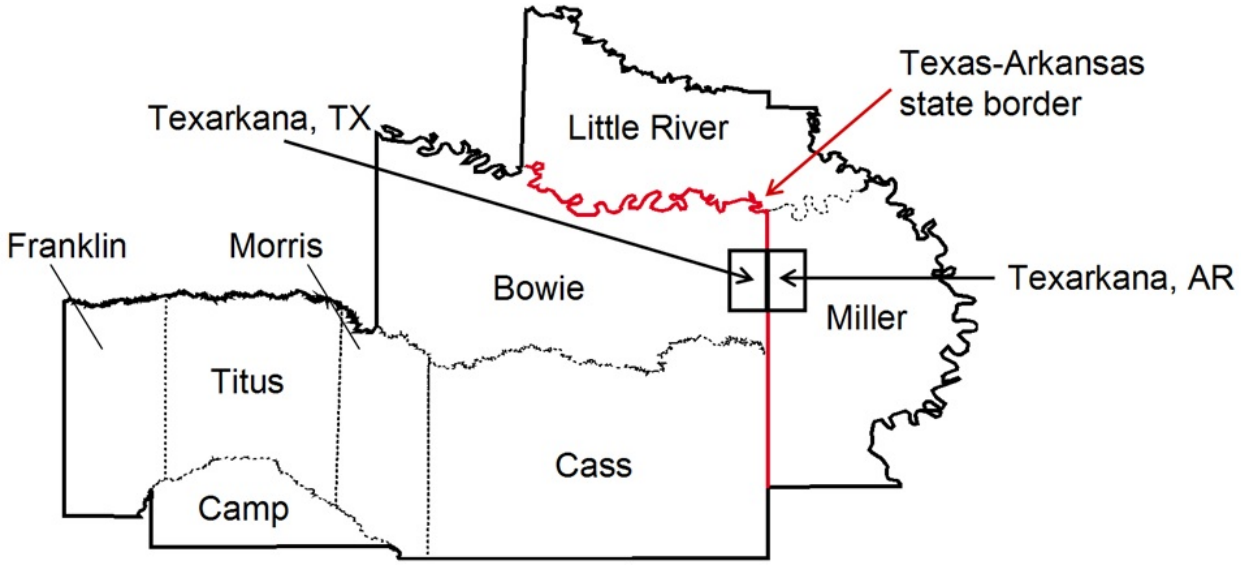


B. CZs that Straddle States with Different HMI Subsidies



Notes: Panel A plots HMI (home mortgage interest) tax subsidy rates by state, equal to zero for states that do not allow HMI deductions or lack a personal income tax, and equal to the top state marginal personal income tax rate for states that do allow HMI deductions. Panel B highlights the 66 Commuting Zones (CZs) that straddle borders between at least two states with different HMI subsidies.

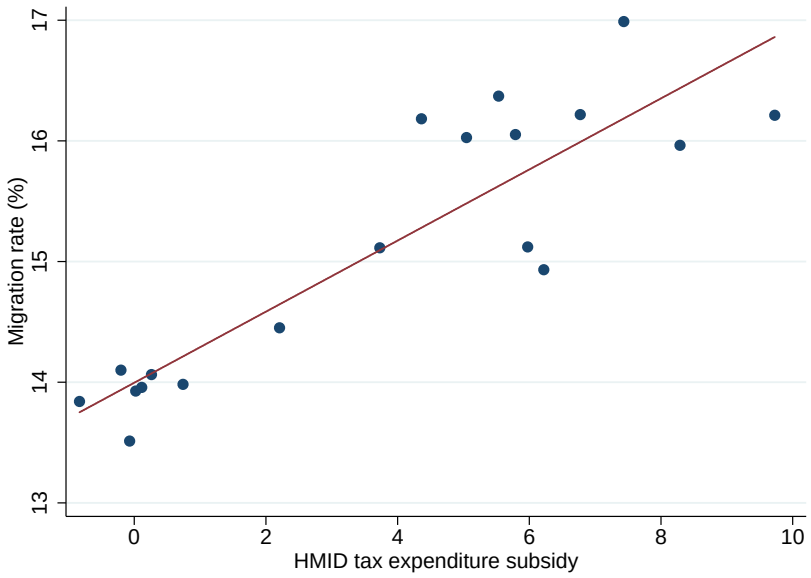
Figure 2: Example of a CZ Utilized in the HMID Cross-Border Design



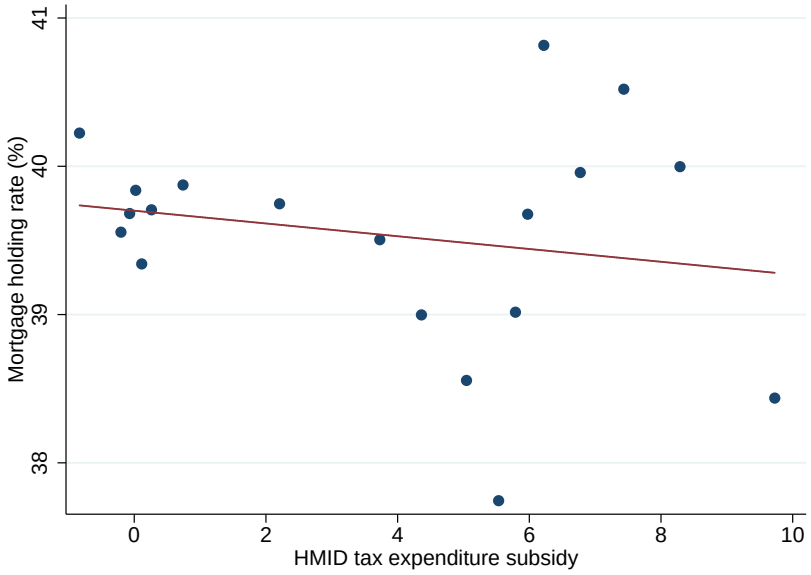
Notes: Commuting Zones (CZs) are collections of counties that correspond to relatively self-contained local labor markets. This paper estimates the effect of the HMI deduction on migration rates by comparing migration rate differences across state borders in the CZs that straddle the border between at least two states that have different HMI subsidy rates. The Texarkana CZ is one such CZ. The main cities in the Texarkana CZ are Texarkana, Texas, and Texarkana, Arkansas. The CZ encompasses these two cities' counties and nearby counties. Arkanasas allows for HMI deductibility from state personal income taxes, while Texas does not have a state personal income tax from which HMI could be deducted.

Figure 3: 2% Random Sample Visualizations

A. 2007-2015 Migration Rates versus HMID Tax Subsidy Rates



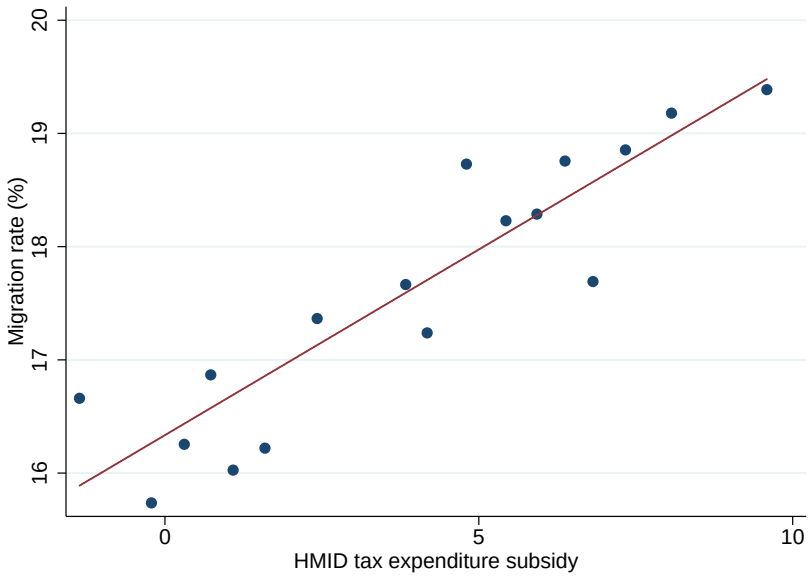
B. 2006 Mortgage Holding versus HMID Tax Subsidy Rates



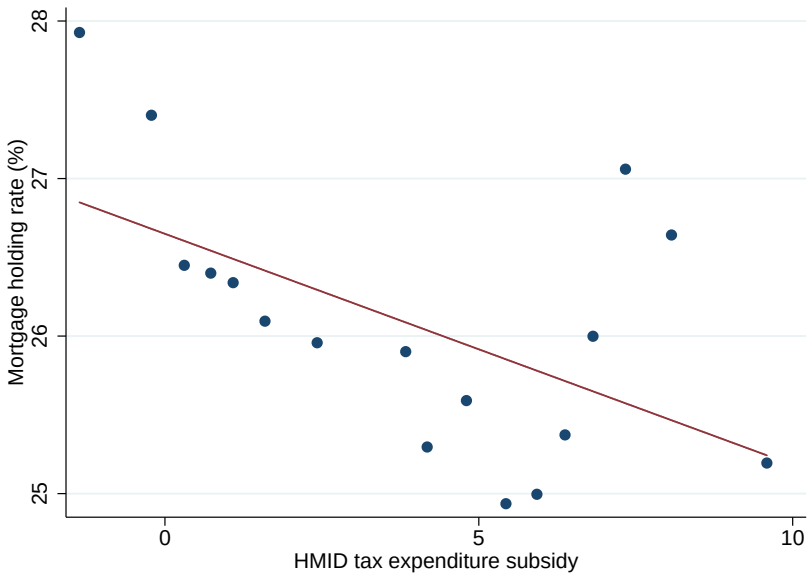
Notes: Panel A non-parametrically depicts the relationship between workers' 2007-2015 migration rates and their 2007 state's HMID tax subsidy. It does so by regressing migration rates and HMID tax subsidy on the main controls, computing residuals, added back their means for interpretation, and plotting means of the migration rate residuals within twenty equal-sized bins of the HMID tax subsidy residuals. Overlaid is the best-fit line (slope 0:295, standard error 0:152). Panel B is the analogous figure showing the relationship between workers' 2006 mortgage holding and their 2007 state's HMID tax subsidy. Overlaid is the best-fit line (slope −0:043, standard error 0:164).

Figure 4: Retail Sample Visualizations

A. 2007-2015 Migration Rates versus HMID Tax Subsidy Rates



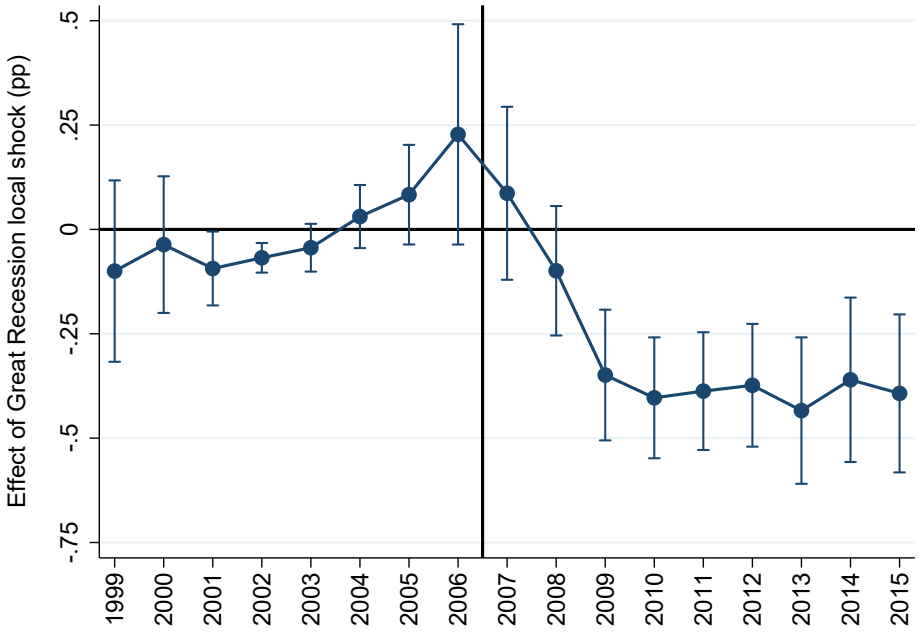
B. 2006 Mortgage Holding versus HMID Tax Subsidy Rates



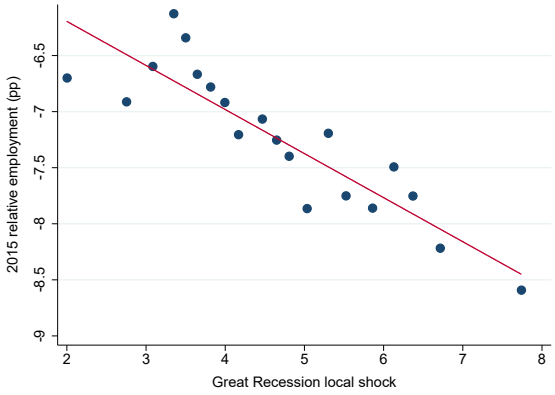
Notes: Panel A non-parametrically depicts the relationship between workers' 2007-2015 migration rates and their 2007 state's HMID tax subsidy. It does so by regressing migration rates and HMID tax subsidy on the main controls, computing residuals, added back their means for interpretation, and plotting means of the migration rate residuals within twenty equal-sized bins of the HMID tax subsidy residuals. Overlaid is the best-fit line (slope 0:328, standard error 0:127). Panel B is the analogous figure showing the relationship between workers' 2006 mortgage holding and their 2007 state's HMID tax subsidy. Overlaid is the best-fit line (slope −0:147, standard error 0:156).

Figure 5: Employment and Earnings Impacts of Great Recession Local Shocks

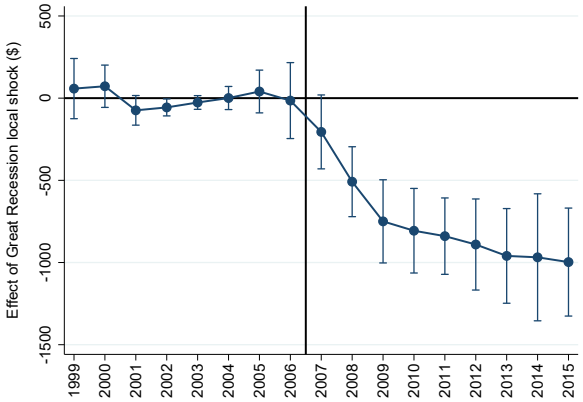
A. Employment Impact of Great Recession Local Shocks



B. Non-Parametric Visualization of the 2015 Impact



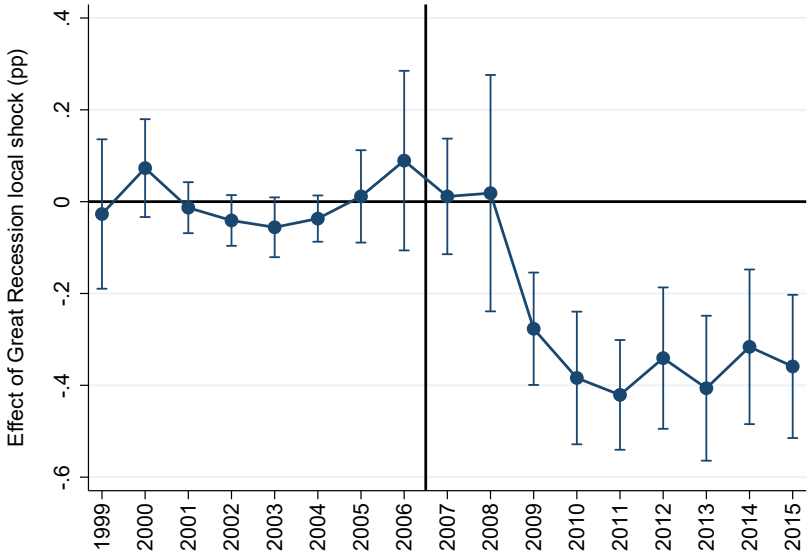
C. Earnings Impact of Great Recession Local Shocks



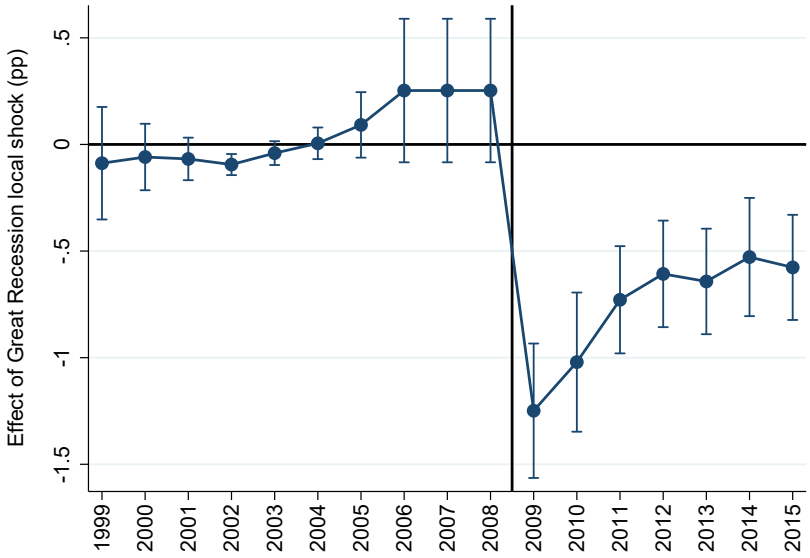
Notes: Panel A plots regression estimates of the effect of Great Recession local shocks on annual relative employment conditional on 2006 age-earnings-industry fixed effects in the main sample (a 2% random sample). Each year t's outcome is year-t relative employment: the individual's year-t employment (binary employment status) minus the individual's mean 1999-2006 annual employment. 95% confidence intervals are plotted around estimates, clustering on 2007 state. For reference, the 2015 data point (the paper's main estimate) implies that a 1-percentage-point higher Great Recession local shock caused individuals to be 0.393 percentage points less likely to be employed in 2015. Panel B non-parametrically depicts the relationship underlying the Panel A 2015 data point. It is produced by regressing Great Recession local shocks on 2006 age-earnings-industry fixed effects, computing residuals, adding back their means for interpretation, and plotting means of the 2015 relative employment within twenty equal-sized bins of the shock residuals. Overlaid is the best-fit line, whose slope is equal to panel A 2015 data point. Panel C replicates panel A for the outcome of year-t relative earnings: the individual's year-t earnings minus the individual's mean 1999-2006 annual earnings.

Figure 6: Employment Impacts in Special Samples

A. Retail Chain Sample

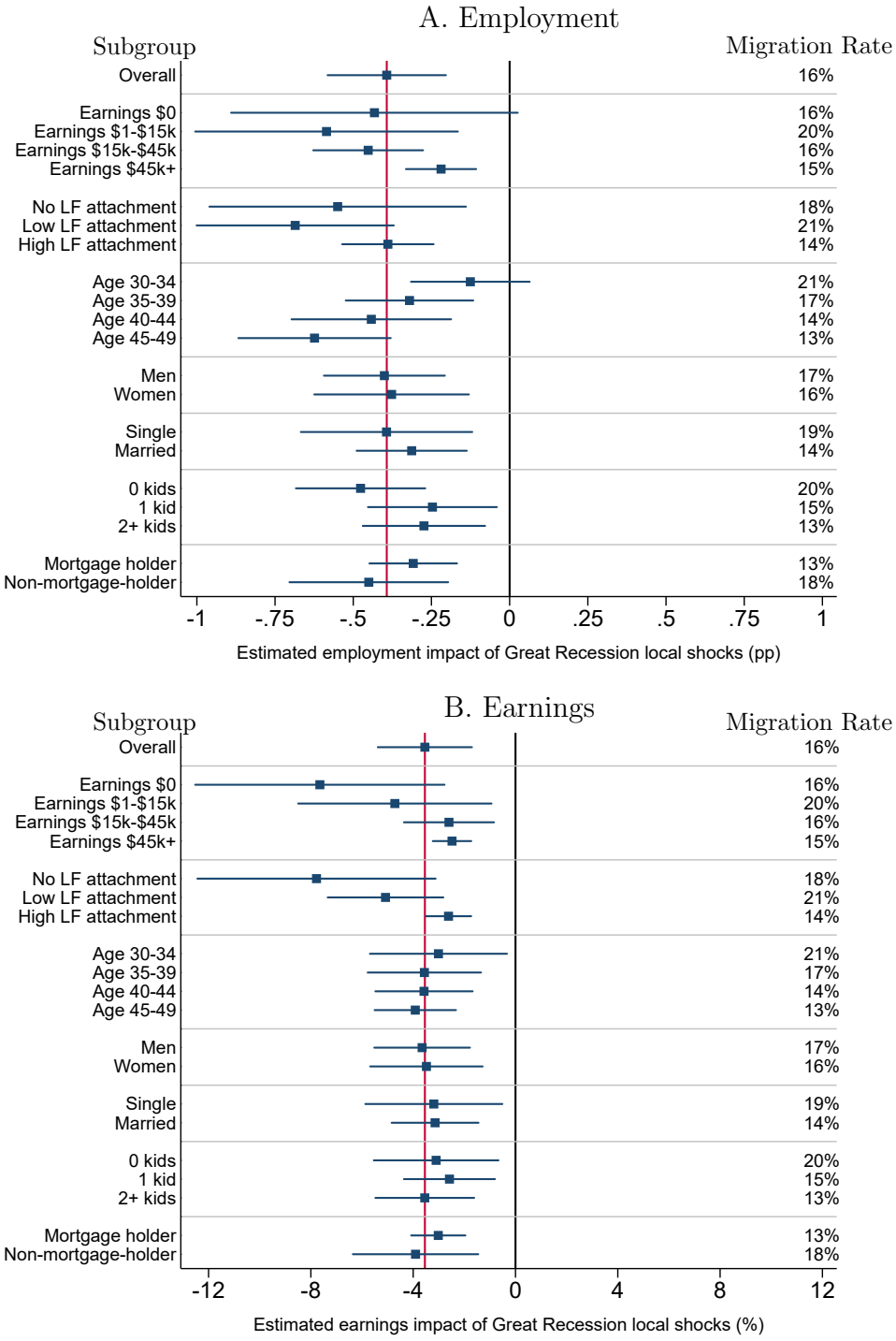


B. Mass Layoffs Sample



Notes: Panel A replicates Figure 5A in the retail chain sample (all non-headquarters workers for identifiable retail chain firms in 2006). Panel B replicates Figure 5A in the mass layoffs sample (all workers who separated from a firm in a 2008 or 2009 mass layoff). See the notes to Figure 5A for specification details.

Figure 7: Impact Heterogeneity



Notes: Panel A plots coefficients and 95% confidence intervals of the impact of Great Recession local shocks on 2015 relative employment—overall (equal to the 2015 data point in Figure 5A) and by subgroup. All estimates derive from the specification underlying the 2015 data point in Figure 5A. Subgroup estimates restrict the sample to the specified subgroup defined by gender, 2006 earnings, 2007 age, 2006 marital status, 2006 number of kids, or 2006 mortgage holding. Non-1040-filers are classified here as single and childless. Standard errors are clustered by 2007 state. Subgroup migration rates are superimposed on the right, where migration is defined as one's 2015 CZ being different from one's 2007 CZ. Panel B replicates panel A for 2015 earnings expressed in multiples of mean annual earnings 1999-2006: 2015 earnings divided by mean annual 1999-2006 earnings. This quantity is top-coded at the 99^{th} percentile, and individuals with zero 1999-2006 earnings are assigned the top code if 2015 earnings were positive and assigned 0 otherwise. The overall estimate is -0.0355 (standard error 0.0094), implying that a 1-percentage-point-higher Great Recession local shock reduced the average individual's 2015 earnings by 3.55% of her pre-recession earnings.

TABLE 1
Home Mortgage Interest Deductability at the State Level

State	Home Mortgage Interest Deductability	Top Personal Income Tax Rate
Alabama	Full	5.00%
Alaska	None	0.00%
Arizona	Full	4.54%
Arkansas	Full	7.00%
California	Partial	12.30%
Colorado	Full	4.63%
Connecticut	None	6.70%
Delaware	Full	6.75%
D.C.	Partial	8.95%
Florida	None	0.00%
Georgia	Full	6.00%
Hawaii	Partial	11.00%
Idaho	Full	7.40%
Illinois	None	5.00%
Indiana	None	3.40%
Iowa	Full	8.98%
Kansas	Full	4.90%
Kentucky	Full	6.00%
Louisiana	Full	6.00%
Maine	Full	8.00%
Maryland	Full	5.75%
Massachusetts	None	5.25%
Michigan	None	4.25%
Minnesota	Full	7.85%
Mississippi	Full	5.00%
Missouri	Full	6.00%
Montana	Full	6.90%
Nebraska	Full	6.84%
Nevada	None	0.00%
New Hampshire	None	0.00%
New Jersey	None	8.97%
New Mexico	Full	4.90%
New York	Partial	8.82%
North Carolina	Full	7.75%
North Dakota	Full	3.99%
Ohio	None	5.93%
Oklahoma	Full	5.25%
Oregon	Full	9.90%
Pennsylvania	None	3.07%
Rhode Island	None	5.99%
South Carolina	Full	7.00%
South Dakota	None	0.00%
Tennessee	None	0.00%
Texas	None	0.00%
Utah	Partial	5.00%
Vermont	Full	8.95%
Virginia	Full	5.75%
Washington	None	0.00%
West Virginia	None	6.50%
Wisconsin	Partial	7.75%
Wyoming	None	0.00%

Notes - For each state, this table specifies whether the state allows full (i.e. equal to the federal level), partial (less than the federal level but still positive), or no deductibility of home mortgage interest. This table also lists each state's top personal income tax rate.

TABLE 2
Summary Statistics

	Random 2% Border Sample		Retail Border Sample		Random 2% Sample		Retail Chain Sample		Mass Layoffs Sample	
	Mean (1)	Std. Dev. (2)	Mean (3)	Std. Dev. (4)	Mean (5)	Std. Dev. (6)	Mean (7)	Std. Dev. (8)	Mean (9)	Std. Dev. (10)
Outcomes (in 2015)										
Employed (%)	80.0	40.0	81.9	38.5	79.1	40.7	81.8	38.5	84.1	36.5
Earnings (2015 $)	47,089	61,180	32,253	41,901	47,587	63,784	33,381	44,557	48,204	62,830
DI receipt (%)	6.7	25.0	7.2	25.9	6.2	24.2	6.9	25.3	6.0	23.8
UI receipt sometime 2007-2014 (%)	25.7	43.7	27.9	44.9	25.6	43.6	28.3	45.0	52.2	50.0
Personal characteristics (in 2006, 2007)										
Female (%)	49.4	50.0	61.2	48.7	49.3	50.0	60.8	48.8	44.5	49.7
Earnings (2015 $)	44,808	52,182	32,219	35,266	45,652	55,122	33,424	36,708	52,511	55,336
Age	40.0	5.7	39.2	5.8	39.9	5.7	39.2	5.8	39.7	5.7
Aged 30-34 (%)	21.9	41.4	26.7	44.2	22.2	41.5	27.0	44.4	23.8	42.6
Aged 35-39 (%)	24.4	43.0	25.0	43.3	24.5	43.0	25.0	43.3	25.0	43.3
Aged 40-44 (%)	26.0	43.9	24.4	42.9	26.0	43.9	24.3	42.9	25.5	43.6
Aged 45-49 (%)	27.6	44.7	24.0	42.7	27.3	44.6	23.6	42.5	25.7	43.7
No Labor Force Attachment (%)					22.7	41.9	15.1	35.8	10.0	29.9
Low Labor Force Attachment (%)					14.9	35.6	24.3	42.9	16.4	37.1
High Labor Force Attachment (%)					62.8	48.4	60.6	48.9	73.6	44.1
Married (%)	91.4	28.0	93.2	25.2	62.8	48.3	52.2	50.0	52.9	49.9
0 kids (%)	3954.0	4889.4	2607.5	4390.5	36.2	48.0	41.8	49.3	40.6	49.1
1 kid (%)	5.3	22.4	100.0	0.0	22.6	41.8	22.9	42.0	23.4	42.3
2+ kids (%)	12.2	32.7	0.0	0.0	41.2	49.2	35.4	47.8	36.0	48.0
1040 filer (%)	25.3	43.5	0.0	0.0	91.2	28.3	93.1	25.3	93.8	24.1
Mortgage holder (%)	0.0	0.2	0.0	0.0	38.3	48.6	25.9	43.8	38.4	48.6
Retail trade (NAICS 44,45) (%)	10.9	31.1	0.0	0.0	5.2	22.3	100.0	0.0	4.7	21.2
Construction/manufacturing (NAICS 23,31-33) (%)	439.1	144.6	442.1	138.9	11.9	32.4	0.0	0.0	17.7	38.2
Other observed industry (%)	0.0	0.0	0.0	0.0	25.9	43.8	0.0	0.0	34.9	47.7
Contractor (%)	0.0	0.0	0.0	0.0	4.2	20.1	0.0	0.0	0.0	0.0
Non-employed (%)	0.0	0.0	0.0	0.0	11.5	31.9	0.0	0.0	0.0	0.0
Great Recession local shock (pp)	0.0	0.0	0.0	0.0	4.6	1.5	4.8	1.5	5.0	1.5
Number of individuals	233,530		147,334		1,357,974		865,954		1,001,543	
Number of 2007 CZs	115		110		722		655		668	

Notes - This table lists summary statistics for the paper's five samples: the random 2% border sample, the retail border sample, the 2% random sample, the retail chain sample (all non-headquarters workers for identifiable retail chain firms in 2006), and the mass layoffs sample (all workers who separated from a firm in a 2008 or 2009 mass layoff). Earnings is the sume of W-2 wage earnings and 1099-MISC independent contractor earnings in the calendar year, in 2015 dollars and top-coded at $500,000. Employed is an indicator for having positive earnings. DI receipt is an indicator for having positive 1099-SSA disability insurance income in the calendar year. UI receipt sometime 2007-2014 is an indicator for having positive 1099-G unemployment insurance benefit income at some point 2007-2014. Age is measured on January 1, 2007. Married is an indicator for filing a married-filing-jointly or married-filing-separately 1040 for tax year 2006. Number of kids is the number of current dependent kids currently living with the worker as listed on the filed 1040. 1040 filer is an indicator for having appeared as a primary or secondary filer on a Form 1040 for tax year 2006. Displayed marriage and number of kids statistics are restricted to 1040 filers; in regressions controlling for marriage or number of kids fixed effects, non-1040-filers are included as a separate group. Mortgage holder is an indicator for having positive mortgage payment listed on a Form 1098 in 2006 (mortgages held only in the name of a worker's spouse or other third party are not included here). Industry categories are based on the North American Industrial Classification System code on the business income tax return based on matching the individual's highest-paying 2006 W2 to the universe of business returns. Almost half of W-2 earners could not be matched and individuals who only had 1099-MISC independent contractor earnings are not matched; in fixed effect regressions, unmatched 2006 W-2 earners, contractors, and the non-employed are assigned to three separate industries. 2007 CZ derives from the worker's January 2007 residential location as reflected most commonly on her 2006 information returns. The Great Recession local shock equals the 2009 unemployment rate in the individual's 2007 CZ minus the 2007 unemployment rate in that CZ as reported by the Bureau of Labor Statistics Local Area Unemployment Statistics.

TABLE 3
Effect of Home Mortgage Interest Deduction on Migration
Binary Indicator of Home Mortgage Interest Deductibility at the State Level in 2% Random Border Sample

A. Inclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual migration between 2007 and 2014										
	(pp) (1)	(pp) (2)	(pp) (3)	(pp) (4)	(pp) (5)	(pp) (6)	(pp) (7)	(pp) (8)	(pp) (9)	(pp) (10)	(pp) (11)
2007 state deductability of mortgage interest	2.425	2.311	2.311	2.210	2.218	2.131	2.169	2.193	1.739	2.253	2.379
	(1.170)	(1.147)	(1.138)	(1.201)	(1.193)	(1.190)	(1.207)	(1.201)	(1.024)	(1.137)	(1.043)
Age FEs		X									
Age-Earnings FEs			X								
Age-Earnings-Industry FEs				X	X	X	X	X	X	X	X
Gender					X						
Number of kids						X					
Married							X				
Home ownership								X			
CZ size									X		
CZ pre-2007 size growth										X	
Cross-CZ commuting											X
N	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530
R^2	0.00	0.01	0.02	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Migration rate (%)	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
Estimate divided by migration rate (%)	16.07	15.31	15.31	14.64	14.69	14.12	14.37	14.53	11.52	14.93	15.76

B. Exclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual migration between 2007 and 2014										
	(pp) (12)	(pp) (13)	(pp) (14)	(pp) (15)	(pp) (16)	(pp) (17)	(pp) (18)	(pp) (19)	(pp) (20)	(pp) (21)	(pp) (22)
2007 state deductability of mortgage interest	2.317	2.219	2.230	2.130	2.143	2.105	2.122	2.140	1.797	2.212	2.301
	(1.159)	(1.136)	(1.126)	(1.181)	(1.172)	(1.177)	(1.190)	(1.185)	(0.887)	(1.091)	(1.005)
Age FEs		X									
Age-Earnings FEs			X								
Age-Earnings-Industry FEs				X	X	X	X	X	X	X	X
Gender					X						
Number of kids						X					
Married							X				
Home ownership								X			
CZ size									X		
CZ pre-2007 size growth										X	
Cross-CZ commuting											X
N	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530
R^2	0.00	0.01	0.02	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Migration rate (%)	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
Estimate divided by migration rate (%)	15.35	14.70	14.77	14.11	14.20	13.94	14.06	14.18	11.90	14.66	15.25

Notes - This table estimates the effect of state deductibility of the home mortgage interest (HMI) deduction on 2007-2014 migration. Panel A categorizes state HMI deductibility inclusively: states that permit only partial deductibility are categorized as allowing deductions when defining the 2007 state deductability of mortgate interest binary indicator. Panel B categorizes state HMI deductibility exclusively: states that permit only partial deductibility are categorized as not allowing deductions. See the text for additional details.

TABLE 4
Effect of Home Mortgage Interest Deduction on Migration
Continuous Measure of Home Mortgage Interest Deductibility at the State Level in 2% Random Border Sample

A. Inclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual migration between 2007 and 2014										
	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2007 top rate deductability of mortgage interest	0.324	0.307	0.305	0.295	0.295	0.278	0.288	0.293	0.225	0.292	0.315
	(0.148)	(0.145)	(0.144)	(0.152)	(0.150)	(0.152)	(0.153)	(0.152)	(0.127)	(0.153)	(0.130)
Age FEs		X									
Age-Earnings FEs			X								
Age-Earnings-Industry FEs				X	X	X	X	X	X	X	X
Gender					X						
Number of kids						X					
Married							X				
Home ownership								X			
CZ size									X		
CZ pre-2007 size growth										X	
Cross-CZ commuting											X
N	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530
R^2	0.00	0.01	0.02	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Migration rate (%)	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
Estimate divided by migration rate (%)	2.15	2.04	2.02	1.95	1.96	1.84	1.91	1.94	1.49	1.93	2.09

B. Exclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual migration between 2007 and 2014										
	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
2007 top rate deductability of mortgage interest	0.321	0.305	0.306	0.296	0.297	0.289	0.295	0.299	0.251	0.305	0.318
	(0.155)	(0.152)	(0.151)	(0.158)	(0.157)	(0.160)	(0.160)	(0.159)	(0.114)	(0.155)	(0.133)
Age FEs		X									
Age-Earnings FEs			X								
Age-Earnings-Industry FEs				X	X	X	X	X	X	X	X
Gender					X						
Number of kids						X					
Married							X				
Home ownership								X			
CZ size									X		
CZ pre-2007 size growth										X	
Cross-CZ commuting											X
N	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530
R^2	0.00	0.01	0.02	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Migration rate (%)	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
Estimate divided by migration rate (%)	2.13	2.02	2.03	1.96	1.97	1.91	1.96	1.98	1.66	2.02	2.10

Notes - This table replicates Table 3 except that it replaces the binary independent variable measuring HMI deductibility with a continuous measure. The continuous measure equals the binary measure times the state's top marginal income tax rate. See the text for additional details.

TABLE 5
Effect of Home Mortgage Interest Deduction on Mortgage Holding
Binary Indicator of Home Mortgage Interest Deductibility at the State Level in 2% Random Border Sample

A. Inclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual mortgage holding in 2006										
	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2007 state deductability of mortgage interest	0.345	0.491	-0.310	-0.426	-0.331	-0.289	-0.316	0.000	-0.837	-0.362	-0.364
	(0.920)	(0.906)	(1.279)	(1.213)	(0.976)	(1.175)	(1.163)	(0.000)	(0.949)	(0.933)	(0.971)
Age FEs		X									
Age-Earnings FEs			X								
Age-Earnings-Industry FEs				X	X	X	X	X	X	X	X
Gender					X						
Number of kids						X					
Married							X				
Home ownership								X			
CZ size									X		
CZ pre-2007 size growth										X	
Cross-CZ commuting											X
N	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530
R^2	0.00	0.01	0.19	0.32	0.36	0.33	0.33	1.00	0.32	0.32	0.32
Migration rate (%)	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5
Estimate divided by migration rate (%)	0.87	1.24	-0.79	-1.08	-0.84	-0.73	-0.80	0.00	-2.12	-0.92	-0.92

B. Exclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual mortgage holding in 2006										
	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
2007 state deductability of mortgage interest	1.149	1.271	0.364	0.266	0.418	0.321	0.301	0.000	-0.059	0.299	0.422
	(1.229)	(1.186)	(0.785)	(0.731)	(0.547)	(0.780)	(0.775)	(0.000)	(0.560)	(0.545)	(0.525)
Age FEs		X									
Age-Earnings FEs			X								
Age-Earnings-Industry FEs				X	X	X	X	X	X	X	X
Gender					X						
Number of kids						X					
Married							X				
Home ownership								X			
CZ size									X		
CZ pre-2007 size growth										X	
Cross-CZ commuting											X
N	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530
R^2	0.00	0.01	0.19	0.32	0.36	0.33	0.33	1.00	0.32	0.32	0.32
Migration rate (%)	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5
Estimate divided by migration rate (%)	2.90	3.22	0.92	0.67	1.06	0.81	0.76	0.00	-0.15	0.76	1.07

Notes - This table replicates Table 3 for the outcome of whether a worker held a mortgage in 2006, defined as the worker having received a Form 1098 in 2006. See Table 3 and the text for additional details.

TABLE 6
Effect of Home Mortgage Interest Deduction on Mortgage Holding
Continuous Measure of Home Mortgage Interest Deductibility at the State Level in 2% Random Border Sample

A. Inclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual mortgage holding in 2006										
	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2007 top rate deductability of mortgage interest	0.015	0.037	-0.027	-0.043	-0.036	-0.017	-0.025	0.000	-0.113	-0.053	-0.027
	(0.097)	(0.097)	(0.171)	(0.164)	(0.140)	(0.155)	(0.153)	(0.000)	(0.140)	(0.138)	(0.135)
Age FEs		X									
Age-Earnings FEs			X								
Age-Earnings-Industry FEs				X	X	X	X	X	X	X	X
Gender					X						
Number of kids						X					
Married							X				
Home ownership								X			
CZ size									X		
CZ pre-2007 size growth										X	
Cross-CZ commuting											X
N	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530
R^2	0.00	0.01	0.19	0.32	0.36	0.33	0.33	1.00	0.32	0.32	0.32
Migration rate (%)	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5
Estimate divided by migration rate (%)	0.04	0.09	-0.07	-0.11	-0.09	-0.04	-0.06	0.00	-0.29	-0.13	-0.07

B. Exclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual mortgage holding in 2006										
	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
2007 top rate deductability of mortgage interest	0.178	0.197	0.108	0.093	0.112	0.104	0.096	0.000	0.035	0.076	0.124
	(0.151)	(0.145)	(0.092)	(0.088)	(0.070)	(0.093)	(0.093)	(0.000)	(0.074)	(0.074)	(0.078)
Age FEs		X									
Age-Earnings FEs			X								
Age-Earnings-Industry FEs				X	X	X	X	X	X	X	X
Gender					X						
Number of kids						X					
Married							X				
Home ownership								X			
CZ size									X		
CZ pre-2007 size growth										X	
Cross-CZ commuting											X
N	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530	233,530
R^2	0.00	0.01	0.19	0.32	0.36	0.33	0.33	1.00	0.32	0.32	0.32
Migration rate (%)	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5
Estimate divided by migration rate (%)	0.45	0.50	0.27	0.23	0.28	0.26	0.24	0.00	0.09	0.19	0.31

Notes - This table replicates Table 4 for the outcome of whether a worker held a mortgage in 2006, defined as the worker having received a Form 1098 in 2006. See Table 4 and the text for additional details.

TABLE 7
Effect of Home Mortgage Interest Deduction on Migration
Binary Indicator of Home Mortgage Interest Deductibility at the State Level in Retail Border Sample

A. Inclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual migration between 2007 and 2014											
	(pp) (1)	(pp) (2)	(pp) (3)	(pp) (4)	(pp) (5)	(pp) (6)	(pp) (7)	(pp) (8)	(pp) (9)	(pp) (10)	(pp) (11)	(pp) (12)
2007 state deductability of mortgage interest	2.917	2.881	2.854	2.884	2.589	2.587	2.445	2.449	2.537	2.475	2.577	2.782
	(0.927)	(0.924)	(0.959)	(1.023)	(0.957)	(0.964)	(0.990)	(0.978)	(0.955)	(0.780)	(0.925)	(0.778)
Age FEs		X										
Age-Earnings FEs			X									
Age-Earnings-Industry FEs				X								
Age-Earnings-Firm FEs					X	X	X	X	X	X	X	X
Gender						X						
Number of kids							X					
Married								X				
Home ownership									X			
CZ size										X		
CZ pre-2007 size growth											X	
Cross-CZ commuting												X
N	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334
R^2	0.00	0.01	0.02	0.06	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Migration rate (%)	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
Estimate divided by migration rate (%)	16.56	16.35	16.20	16.37	14.69	14.68	13.88	13.90	14.40	14.05	14.63	15.79

B. Exclusive Definition of HMI Deductibility States

Outcome:	(6)											
	(pp) (13)	(pp) (14)	(pp) (15)	(pp) (16)	(pp) (17)	(pp) (18)	(pp) (19)	(pp) (20)	(pp) (21)	(pp) (22)	(pp) (23)	(pp) (24)
2007 state deductability of mortgage interest	3.319	3.269	3.222	3.218	2.837	2.847	2.731	2.756	2.813	2.918	2.928	3.084
	(0.992)	(1.001)	(1.026)	(1.072)	(1.006)	(1.013)	(1.031)	(1.024)	(1.000)	(0.879)	(0.933)	(0.860)
Age FEs		X										
Age-Earnings FEs			X									
Age-Earnings-Industry FEs				X								
Age-Earnings-Firm FEs					X	X	X	X	X	X	X	X
Gender						X						
Number of kids							X					
Married								X				
Home ownership									X			
CZ size										X		
CZ pre-2007 size growth											X	
Cross-CZ commuting												X
N	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334
R^2	0.00	0.01	0.02	0.06	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Migration rate (%)	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
Estimate divided by migration rate (%)	18.84	18.55	18.29	18.26	16.10	16.16	15.50	15.64	15.97	16.56	16.62	17.51

Notes - This table replicates Table 3 in the retail border sample. See Table 3 and the text for additional details.

TABLE 8
Effect of Home Mortgage Interest Deduction on Migration
Continuous Measure of Home Mortgage Interest Deductibility at the State Level in Retail Border Sample

A. Inclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual migration between 2007 and 2014											
	(pp) (1)	(pp) (2)	(pp) (3)	(pp) (4)	(pp) (5)	(pp) (6)	(pp) (7)	(pp) (8)	(pp) (9)	(pp) (10)	(pp) (11)	(pp) (12)
2007 top rate deductability of mortgage interest	0.363	0.357	0.360	0.370	0.328	0.327	0.306	0.308	0.322	0.296	0.309	0.351
	(0.128)	(0.126)	(0.129)	(0.135)	(0.127)	(0.128)	(0.134)	(0.132)	(0.128)	(0.099)	(0.132)	(0.105)
Age FEs		X										
Age-Earnings FEs			X									
Age-Earnings-Industry FEs				X								
Age-Earnings-Firm FEs					X	X	X	X	X	X	X	X
Gender						X						
Number of kids							X					
Married								X				
Home ownership									X			
CZ size										X		
CZ pre-2007 size growth											X	
Cross-CZ commuting												X
N	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334
R^2	0.00	0.01	0.02	0.06	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Migration rate (%)	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
Estimate divided by migration rate (%)	2.06	2.03	2.04	2.10	1.86	1.86	1.74	1.75	1.83	1.68	1.76	1.99

B. Exclusive Definition of HMI Deductibility States

Outcome:	(6)											
	(pp) (13)	(pp) (14)	(pp) (15)	(pp) (16)	(pp) (17)	(pp) (18)	(pp) (19)	(pp) (20)	(pp) (21)	(pp) (22)	(pp) (23)	(pp) (24)
2007 top rate deductability of mortgage interest	0.459	0.451	0.450	0.454	0.390	0.391	0.373	0.380	0.388	0.399	0.399	0.421
	(0.145)	(0.146)	(0.146)	(0.149)	(0.145)	(0.146)	(0.151)	(0.149)	(0.145)	(0.127)	(0.145)	(0.124)
Age FEs		X										
Age-Earnings FEs			X									
Age-Earnings-Industry FEs				X								
Age-Earnings-Firm FEs					X	X	X	X	X	X	X	X
Gender						X						
Number of kids							X					
Married								X				
Home ownership									X			
CZ size										X		
CZ pre-2007 size growth											X	
Cross-CZ commuting												X
N	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334
R^2	0.00	0.01	0.02	0.06	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Migration rate (%)	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
Estimate divided by migration rate (%)	2.61	2.56	2.55	2.58	2.21	2.22	2.12	2.15	2.20	2.26	2.26	2.39

Notes - This table replicates Table 4 in the retail border sample. See Table 4 and the text for additional details.

TABLE 9
Effect of Home Mortgage Interest Deduction on Mortgage Holding
Binary Indicator of Home Mortgage Interest Deductibility at the State Level in Retail Border Sample

A. Inclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual mortgage holding in 2006											
	(pp) (1)	(pp) (2)	(pp) (3)	(pp) (4)	(pp) (5)	(pp) (6)	(pp) (7)	(pp) (8)	(pp) (9)	(pp) (10)	(pp) (11)	(pp) (12)
2007 state deductability of mortgage interest	-0.311	-0.268	-0.788	-1.052	-1.204	-1.219	-0.994	-0.948	0.000	-1.412	-1.262	-1.243
	(1.450)	(1.469)	(1.636)	(1.461)	(1.259)	(1.330)	(1.162)	(1.109)	(0.000)	(1.028)	(0.845)	(1.077)
Age FEs		X										
Age-Earnings FEs			X									
Age-Earnings-Industry FEs				X								
Age-Earnings-Firm FEs					X	X	X	X	X	X	X	X
Gender						X						
Number of kids							X					
Married								X				
Home ownership									X			
CZ size										X		
CZ pre-2007 size growth											X	
Cross-CZ commuting												X
N	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334
R^2	0.00	0.01	0.21	0.25	0.42	0.43	0.42	0.42	1.00	0.42	0.42	0.42
Migration rate (%)	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1
Estimate divided by migration rate (%)	-1.19	-1.03	-3.02	-4.04	-4.62	-4.67	-3.81	-3.63	0.00	-5.42	-4.84	-4.77

B. Exclusive Definition of HMI Deductibility States

Outcome:	(6)											
	(pp) (13)	(pp) (14)	(pp) (15)	(pp) (16)	(pp) (17)	(pp) (18)	(pp) (19)	(pp) (20)	(pp) (21)	(pp) (22)	(pp) (23)	(pp) (24)
2007 state deductability of mortgage interest	0.530	0.586	-0.250	-0.495	-0.566	-0.497	-0.411	-0.433	0.000	-0.688	-0.699	-0.535
	(0.971)	(0.997)	(1.104)	(0.951)	(0.793)	(0.808)	(0.753)	(0.759)	(0.000)	(0.791)	(0.522)	(0.664)
Age FEs		X										
Age-Earnings FEs			X									
Age-Earnings-Industry FEs				X								
Age-Earnings-Firm FEs					X	X	X	X	X	X	X	X
Gender						X						
Number of kids							X					
Married								X				
Home ownership									X			
CZ size										X		
CZ pre-2007 size growth											X	
Cross-CZ commuting												X
N	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334
R^2	0.00	0.01	0.21	0.25	0.42	0.43	0.42	0.42	1.00	0.42	0.42	0.42
Migration rate (%)	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1
Estimate divided by migration rate (%)	2.03	2.25	-0.96	-1.90	-2.17	-1.91	-1.58	-1.66	0.00	-2.64	-2.68	-2.05

Notes - This table replicates Table 5 in the retail border sample. See Table 5 and the text for additional details.

TABLE 10
Effect of Home Mortgage Interest Deduction on Mortgage Holding
Continuous Measure of Home Mortgage Interest Deductibility at the State Level in Retail Border Sample

A. Inclusive Definition of HMI Deductibility States

Outcome:	Indicator for individual mortgage holding in 2006											
	(pp) (1)	(pp) (2)	(pp) (3)	(pp) (4)	(pp) (5)	(pp) (6)	(pp) (7)	(pp) (8)	(pp) (9)	(pp) (10)	(pp) (11)	(pp) (12)
2007 top rate deductability of mortgage interest	0.015	0.022	-0.078	-0.119	-0.147	-0.155	-0.115	-0.111	0.000	-0.203	-0.170	-0.142
	(0.200)	(0.201)	(0.206)	(0.182)	(0.156)	(0.167)	(0.144)	(0.136)	(0.000)	(0.142)	(0.124)	(0.132)
Age FEs		X										
Age-Earnings FEs			X									
Age-Earnings-Industry FEs				X								
Age-Earnings-Firm FEs					X	X	X	X	X	X	X	X
Gender						X						
Number of kids							X					
Married								X				
Home ownership									X			
CZ size										X		
CZ pre-2007 size growth											X	
Cross-CZ commuting												X
N	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334
R^2	0.00	0.01	0.21	0.25	0.42	0.43	0.42	0.42	1.00	0.42	0.42	0.42
Migration rate (%)	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1
Estimate divided by migration rate (%)	0.06	0.08	-0.30	-0.46	-0.56	-0.59	-0.44	-0.43	0.00	-0.78	-0.65	-0.54

B. Exclusive Definition of HMI Deductibility States

Outcome:	(6)											
	(pp) (13)	(pp) (14)	(pp) (15)	(pp) (16)	(pp) (17)	(pp) (18)	(pp) (19)	(pp) (20)	(pp) (21)	(pp) (22)	(pp) (23)	(pp) (24)
2007 top rate deductability of mortgage interest	0.175	0.184	0.021	-0.019	-0.033	-0.025	-0.008	-0.018	0.000	-0.078	-0.073	-0.018
	(0.129)	(0.131)	(0.136)	(0.115)	(0.098)	(0.100)	(0.092)	(0.094)	(0.000)	(0.113)	(0.078)	(0.099)
Age FEs		X										
Age-Earnings FEs			X									
Age-Earnings-Industry FEs				X								
Age-Earnings-Firm FEs					X	X	X	X	X	X	X	X
Gender						X						
Number of kids							X					
Married								X				
Home ownership									X			
CZ size										X		
CZ pre-2007 size growth											X	
Cross-CZ commuting												X
N	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334	147,334
R^2	0.00	0.01	0.21	0.25	0.42	0.43	0.42	0.42	1.00	0.42	0.42	0.42
Migration rate (%)	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1
Estimate divided by migration rate (%)	0.67	0.71	0.08	-0.07	-0.13	-0.10	-0.03	-0.07	0.00	-0.30	-0.28	-0.07

Notes - This table replicates Table 6 in the retail border sample. See Table 6 and the text for additional details.

TABLE 11
2015 Impacts of Great Recession Local Shocks

A. 2015 Employment

Outcome relative to pre-2007 mean:	Employed in 2015						
	(pp) (1)	(pp) (2)	(pp) (3)	(pp) (4)	(pp) (5)	(pp) (6)	(pp) (7)
Great Recession local shock	-0.412 (0.112)	-0.425 (0.112)	-0.417 (0.099)	-0.393 (0.097)		-0.366 (0.089)	-0.364 (0.089)
Most severely shocked quintile					-1.746 (0.471)		
Fourth shock quintile					-1.144 (0.434)		
Third shock quintile					-0.793 (0.356)		
Second shock quintile					-0.181 (0.320)		
Age FEs		X					
Age-Earnings FEs			X				
Age-Earnings-Industry FEs				X	X	X	X
Unemployment persistence in 2007 CZ						X	X
Unemployment persistence in 2015 CZ							
N	(6)	(7)	(8)	1,357,974	1,357,974	1,357,974	1,357,974
R^2	0.00	0.00	0.01	0.07	0.07	0.07	0.07
Outcome mean	-7.23	-7.23	-7.23	-7.23	-7.23	-7.23	-7.23
Absolute outcome mean	79.1	79.1	79.1	79.1	79.1	79.1	79.1
Std. dev. of Great Recession local shocks	1.49	1.49	1.49	1.49	1.49	1.49	1.49
Interquartile range of G.R. local shocks	2.31	2.31	2.31	2.31	2.31	2.31	2.44

B. Additional Outcomes and Controls

Outcome relative to pre-2007 mean:	Cumulative employment 2009-2015	Earnings in 2015	Cumulative earnings 2009-2015	Employed in 2015		
	(pp) (8)	($) (9)	($) (10)	(pp) (11)	(pp) (12)	(pp) (13)
Great Recession local shock	-2.700 (0.516)	-997 (168)	-6,212 (919)	-0.364 (0.100)	-0.480 (0.133)	-0.378 (0.112)
Rust CZ × Great Recession local shock					0.067 (0.192)	-0.035 (0.148)
Other CZ × Great Recession local shock					0.094 (0.250)	
Age-Earnings-Industry FEs	X	X	X	X	X	X
Manufacturing share				X		
N	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974
R^2	0.07	0.11	0.13	0.07	0.07	0.07
Outcome mean	-40.5	6,249	27,646	-7.23	-7.23	-7.23
Absolute outcome mean	563.9	47,587	317,011	79.1	79.1	79.1
Std. dev. of Great Recession local shocks	1.49	1.49	1.49	1.49	1.49	1.49
Interquartile range of G.R. local shocks	2.31	2.31	2.31	2.31	2.31	2.31

Notes – All columns except column 5 report coefficient estimates of the effect of Great Recession local shocks on post-recession outcomes in the main sample. Column 5 divides indviduals into quintiles based on their Great Recession local shocks and reports coefficients on indicators of shock quintiles, relative to the least shocked quintile. Age fixed effects are birth year indicators. Earnings fixed effects are indicators for sixteen bins in the individual's 2006 earnings. Industry fixed effects are indicators for the individual's 2006 four-digit NAICS industry. Local unemployment persistence equals the 2015 LAUS unemployment rate minus the 2007 LAUS unemployment rate in either the individual's 2007 CZ or the individual's 2015 CZ. The columns-1-7 outcome is 2015 relative employment: the individual's 2015 employment (indicator for any employment in 2015) minus the individual's mean 1999-2006 employment. The column 8 outcome equals the sum of the individual's 2009-2015 employment minus seven times the individual's mean 1999-2006 employment. The column 9 outcome equals the individual's 2015 earnings minus the individual's mean 1999-2006 earnings. The column 10 outcome equals the sum of the individual's 2009-2015 earnings minus seven times the individual's mean 1999-2006 earnings. Column 11 controls for the 2000 manufacturing share of employment in the individual's 2007 CZ, computed in County Business Patterns. Columns 11 and 12 control for indicators (not shown) and interactions of a rust-CZ indicator and an other-CZ indicator, based on the individual's 2007 CZ. A rust CZ is a CZ with an above-median manufacturing share; an other CZ is a CZ with a below-median manufacturing share and an above median 2006-2009 change in housing net worth from Mian and Sufi (2014). The coefficient for column 11 is -0.358 when controlling for a quartic in the manufacturing share. The absolute outcome mean equals the outcome mean before subtracting the pre-recession mean. Standard errors are clustered by 2007 state. For reference, column 4 indicates that a 1-percentage-point higher Great Recession local shock caused individuals to be 0.393 percentage points less likely to be employed in 2015.

TABLE 12
2015 Impacts of Great Recession Local Shocks – Retail Chain Sample

A. Main Specifications

Outcome relative to pre-2007 mean:	Employed in 2015							
	(pp) (1)	(pp) (2)	(pp) (3)	(pp) (4)	(pp) (5)	(pp) (6)	(pp) (7)	(pp) (8)
Great Recession local shock	-0.414 (0.118)	-0.426 (0.119)	-0.398 (0.102)	-0.407 (0.094)	-0.359 (0.080)		-0.340 (0.063)	-0.339 (0.061)
Most severely shocked quintile						-1.496 (0.308)		
Fourth shock quintile						-1.416 (0.298)		
Third shock quintile						-0.968 (0.288)		
Second shock quintile						-0.366 (0.298)		
Age FEs		X						
Age-Earnings FEs			X					
Age-Earnings-Industry FEs				X				
Age-Earnings-Firm FEs					X	X	X	X
Unemployment persistence in 2007 CZ							X	X
Unemployment persistence in 2015 CZ								
N	865,954	865,954	865,954	865,954	865,954	865,954	865,954	865,954
R^2	0.00	0.00	0.02	0.03	0.07	0.15	0.15	0.15
Outcome mean	-9.80	-9.80	-9.80	-9.80	-9.80	-9.80	-9.80	-9.80
Absolute outcome mean	81.8	81.8	81.8	81.8	81.8	81.8	81.8	81.8
Std. dev. of Great Recession local shocks	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49
Interquartile range of G.R. local shocks	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.44

B. Additional Outcomes and Controls

Outcome relative to pre-2007 mean:	Cumulative employment 2009-2015	Earnings in 2015	Cumulative earnings 2009-2015	Employed in 2015		
	(pp) (9)	($) (10)	($) (11)	(pp) (12)	(pp) (13)	(pp) (14)
Great Recession local shock	-2.504 (0.430)	-422 (134)	-2,777 (606)	-0.365 (0.081)	-0.589 (0.111)	-0.405 (0.095)
Rust CZ × Great Recession local shock					0.258 0.144	0.069 0.115
Other CZ × Great Recession local shock					0.414 0.251	
Age-Earnings-Firm FEs	X	X	X	X	X	X
Manufacturing share				X		
N	865,954	865,954	865,954	865,954	865,954	865,954
R^2	0.15	0.21	0.23	0.15	0.15	0.15
Outcome mean	-51.5	2,356	8,381	-9.80	-9.80	-9.80
Absolute outcome mean	590.0	33,381	225,554	81.8	81.8	81.8
Std. dev. of Great Recession local shocks	1.49	1.49	1.49	1.49	1.49	1.49
Interquartile range of G.R. local shocks	2.31	2.31	2.31	2.31	2.31	2.31

Notes – This table replicates Table 11 in the retail chain sample. See the notes to that table for details. Firm is an indicator for the individual's 2006 firm (a retail chain firm).

TABLE 13
Robustness of the 2015 Employment Impacts

Outcome relative to pre-2007 mean:	Employed in 2015												
	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Great Recession local shock	-0.393	-0.394	-0.344	-0.344	-0.397	-0.439	-0.412	-0.381	-0.404	-0.399	-0.400	-0.397	-0.477
	(0.097)	(0.096)	(0.090)	(0.093)	(0.098)	(0.093)	(0.098)	(0.095)	(0.095)	(0.096)	(0.115)	(0.129)	(0.125)
Main controls	X	X	X	X	X	X	X	X	X	X	X	X	X
Gender		X											
Number of kids			X										
Married				X									
Home ownership					X								
CZ size						X							
CZ pre-2007 size growth							X						
Cross-CZ commuting								X					
Max UI duration 2007-2015									X				
Minimum wage change 2007-2015										X			
Exclude if invalid industry code											X	X	
Exclude if construction/manufacturing												X	
Instrumented with birth state shock													X
N	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	741,165	579,553	1,357,974
R^2	(6)	0.08	(7)	0.08	(8)	0.07	0.07	0.07	0.07	0.07	0.11	0.10	0.07
Outcome mean	-7.23	-7.23	-7.23	-7.23	-7.23	-7.23	-7.23	-7.23	-7.23	-7.23	-7.20	-6.69	-7.23
Absolute outcome mean	79.1	79.1	79.1	79.1	79.1	79.1	79.1	79.1	79.1	79.1	73.9	70.8	79.1
Std. dev. of G.R. local shocks	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49
Interquartile range of G.R. local shocks	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31

Notes – This table adds controls, sample restrictions, or instruments to the specification underlying Table 11 column 4, reprinted here in column 1. Column 2 controls for the individual's gender. Column 3 controls for the individual's 2006 number of kids (fixed effets for 0, 1, or 2+ kids). Column 4 controls for the individual's 2006 marital status. Column 5 controls for individual's 2006 home ownership status. Colums 6-10 control for CZ-level characteristics. Column 6 controls for the individual's 2007 CZ's size, equal to the CZ's total employment in 2006 as reported in Census's County Business Patterns (CBP). Column 7 controls for the individual's 2007 CZ's size growth, equal to the CZ's log change in CBP employment from 2000 to 2006. Column 8 controls for the individual's 2007 CZ's share of workers who work outside of the CZ, computed from the 2006-2010 American Community Surveys. Column 9 controls for the individual's 2007 state's maximum unemployment insurance duration over years 2007-2015. Column 10 controls for the individual's 2007 state's 2015 minimum wage minus that state's 2007 minimum wage. Column 11 excludes 2006 W-2 earners without an industry code and 2006 contractors and thus restricts the sample to those for whom 2006 industry is correctly measured: 2006 W-2 earners with a valid industry code and the 2006 nonemployed. Column 12 further excludes individuals employed in construction or manufacturing in 2006. Column 13 instruments the individual's Great Recession local shock using the mean of the Great Recession local shock in the individual's birth state. Standard errors are clustered by 2007 state.

TABLE 14
Time Series of Adjustment Margins

Outcome (relative or absolute):	Employed	Migrated outside 2007 CZ	Employed in 2007 CZ	Employed outside 2007 CZ	Earnings	Earnings in 2007 CZ	Earnings outside 2007 CZ	UI income	SSDI income
	(pp)	(pp)	(pp)	(pp)	($)	($)	($)	($)	($)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Effect in 2007	0.087	0.000	0.087	0.000	-205	-205	0	14.3	-3.8
	(0.106)		(0.106)		(115)	(115)		(12.2)	(8.9)
Effect in 2008	-0.099	0.036	-0.098	-0.001	-508	-480	-28	36.3	-3.4
	(0.079)	(0.119)	(0.077)	(0.006)	(108)	(108)	(11)	(15.6)	(9.4)
Effect in 2009	-0.349	0.109	-0.321	-0.028	-750	-687	-63	94.0	0.5
	(0.080)	(0.208)	(0.077)	(0.012)	(129)	(127)	(18)	(32.1)	(11.8)
Effect in 2010	-0.403	0.209	-0.367	-0.037	-807	-736	-71	83.9	2.6
	(0.074)	(0.272)	(0.074)	(0.017)	(131)	(125)	(30)	(32.1)	(13.0)
Effect in 2011	-0.387	0.248	-0.339	-0.048	-840	-745	-94	43.1	7.5
	(0.072)	(0.296)	(0.071)	(0.022)	(119)	(105)	(35)	(24.3)	(13.7)
Effect in 2012	-0.373	0.244	-0.324	-0.049	-890	-784	-106	19.9	9.8
	(0.075)	(0.334)	(0.076)	(0.026)	(141)	(117)	(45)	(20.1)	(15.2)
Effect in 2013	-0.434	0.180	-0.365	-0.069	-960	-810	-149	7.7	13.0
	(0.089)	(0.382)	(0.091)	(0.032)	(147)	(108)	(56)	(16.3)	(17.0)
Effect in 2014	-0.360	0.134	-0.322	-0.038	-968	-799	-169	-3.0	15.7
	(0.100)	(0.422)	(0.101)	(0.031)	(197)	(135)	(84)	(9.9)	(17.7)
Effect in 2015	-0.393	0.073	-0.338	-0.055	-997	-786	-211	-5.9	19.6
	(0.097)	(0.456)	(0.100)	(0.042)	(168)	(108)	(101)	(8.9)	(18.8)

Notes – This table expands on the specifications of Table 11 column 4 and column 9, whose results are reprinted here in the bottom rows of columns 1 and 5. Each cell reports the coefficient on the Great Recession local shock variable from a separate regression in which the outcome uses the post-recession year indicated in the row, instead of exclusively using 2015 as in Table 2. Every regression uses the same 1,357,974 observations underlying Table 2. The column 1 outcome of relative employment is defined in Table 2, varying the post-recession year between 2007 and 2015. The column 2 outcome is an indicator for out-migration, equal to the individual's year-t CZ being different from her 2007 CZ. Columns 3 and 4 separate the column 1 outcome for year t into two outcomes: employment in year t in the individual's 2007 CZ and employment in year t outside the individual's 2007 CZ, each minus mean 1999-2006 employment. The column 5 outcome is defined in Table 2. Columns 7 and 8 separate the column 5 outcome analogously to columns 3-4. The column 8 outcome is the individual's unemployment insurance benefits in year t. The column 9 outcome is the individual's Social Security Disability Insurance benefits in year t. Standard errors are clustered by 2007 state. See Appendix Table 1 for pre-trends.

TABLE 15
Additional Outcomes

A. Disability Insurance Receipt in Main Sample

B. Employment Impacts in Mass Layoffs Sample

Outcome:	SSDI receipt in 2015	2015 relative employment-or-SSDI-receipt	2015 relative employment	2015 relative employment	2015 relative employment
	(pp)	(pp)	(pp)	(pp)	(pp)
	(1)	(2)	(3)	(4)	(5)
Great Recession local shock	0.071	-0.265	-0.577	-0.628	-0.605
	(0.145)	(0.099)	(0.126)	(0.118)	(0.125)
Main controls	X	X	X	X	X
Exclude if invalid industry code				X	X
Exclude if construction/manuf.					X
N	1,357,974	1,357,974	1,001,543	573,493	396,377
R^2	0.12	0.09	0.11	0.17	0.15
Outcome mean	6.22	-2.28	-10.12	-10.45	-9.85
Absolute outcome mean	6.22	84.06	84.12	83.11	83.20

C. Layoffs and Nonemployment in Main Sample

Outcome:	UI receipt sometime 2007-2014	2015 relative employment-or-UI-receipt-sometime-2007-2014	2015 relative employment	Relative non-employment 2007-2014	2015 relative employment	2013-2015 relative employment
	(pp)	(pp)	(pp)	(pp)	(pp)	(pp)
	(6)	(7)	(8)	(9)	(10)	(11)
Great Recession local shock	1.431	-0.019	-0.354	0.487	-0.057	-0.285
	(0.418)	(0.121)	(0.099)	(0.122)	(0.111)	(0.101)
UI receipt sometime 2007-2014			-2.734			
			(0.142)			
Main controls	X	X	X	X	X	X
Employment 2007-2012					X	
N	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974
R^2	0.16	0.06	0.08	0.08	0.26	0.07
Outcome mean	25.6	-2.8	-7.2	3.0	-7.2	-1.2
Absolute outcome mean	25.6	83.6	79.1	3.0	79.1	85.2

Notes – The table reports estimates of the specification in Table 11 column 4 with alternative outcomes, samples, and/or controls. Column 1 replicates the main specification using the outcome of an indicator for 2015 receipt of Social Security Disability Insurance. Column 2 replicates the main specification using the outcome of an indicator for 2015 employment or 2015 SSDI receipt, minus the individual's mean employment 1999-2006. Column 3 replicates the main specification and columns 4-5 replicate Table 13 columns 11-12 in the mass layoffs sample. Column 6 replicates the main specification using the outcome of an indicator for unemployment insurance (UI) benefit receipt at some point 2007-2014. Column 7 replicates column 2 but uses UI receipt 2007-2014 in place of 2015 SSDI receipt. Column 8 replicates the main specification, controlling for UI receipt sometime 2007-2014. Column 9 replicates the main specification using the outcome of an indicator for having any year of nonemployment 2007-2014, minus an indicator for having any year of nonemployment 1999-2006. Column 10 replicates the main specification while controlling for indicators of employment in each year 2007-2012. Column 11 replicates the main specification using the outcome of an indicator for employment in any year 2013-2015, minus the individual's mean employment 1999-2006. Standard errors are clustered by 2007 state.

APPENDIX TABLE 1
Adjustment Margins Pre-Trends

Outcome (relative or absolute):	Employed	Migrated outside 2000 CZ	Employed in 2000 CZ	Employed outside 2000 CZ	Earnings	Earnings in 2000 CZ	Earnings outside 2000 CZ	UI income	SSDI income
	(pp)	(pp)	(pp)	(pp)	($)	($)	($)	($)	($)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Effect in 2000	-0.036	0.000	-0.036	0.000	72	72	0	0.6	0.4
	(0.083)		(0.083)		(66)	(66)		(6.2)	(3.9)
Effect in 2001	-0.094	-0.036	-0.093	-0.001	-74	-67	-7	10.6	0.3
	(0.045)	(0.166)	(0.044)	(0.003)	(46)	(42)	(6)	(9.2)	(4.6)
Effect in 2002	-0.068	-0.047	-0.060	-0.008	-56	-47	-9	9.7	0.7
	(0.018)	(0.280)	(0.017)	(0.004)	(26)	(23)	(5)	(15.4)	(5.4)
Effect in 2003	-0.044	-0.005	-0.036	-0.008	-26	-17	-10	10.2	0.6
	(0.029)	(0.361)	(0.031)	(0.007)	(21)	(20)	(6)	(15.9)	(5.8)
Effect in 2004	0.031	0.077	0.030	0.001	1	6	-5	11.0	0.3
	(0.039)	(0.437)	(0.036)	(0.009)	(36)	(30)	(12)	(11.9)	(6.6)
Effect in 2005	0.083	0.151	0.070	0.013	40	42	-1	6.8	-0.1
	(0.061)	(0.526)	(0.053)	(0.010)	(66)	(57)	(22)	(11.5)	(7.3)
Effect in 2006	0.228	0.252	0.189	0.039	-15	1	-16	9.1	0.4
	(0.135)	(0.612)	(0.116)	(0.020)	(118)	(94)	(36)	(13.1)	(9.1)

Notes – This table replicates Table 14 for years 2000-2006 and where each individual's Great Recession local shock equals the 2007-2009 percentage-point unemployment rate change in the individual's *2000* CZ. See the notes to Table 14 for details.

APPENDIX TABLE 2
CZ-Level Means and Estimates

CZ	Mortgage holding rate	Migration rate	2015 employment rate	2015 mean earnings	Residualized shock	Employment effect	Earnings effect	Percentage earnings effect	Alternative employment effect	Alternative earnings effect	Percentage earnings change	Alternative percentage earnings change
100	34.934	11.180	75.990	33,701.93	5.40	-2.71	-1591.9	-15.24	-1.82	-2538.5	11.15	1.61
200	34.886	17.443	73.158	30,354.65	7.00	-2.82	-2221.3	-26.17	-2.32	-4818.1	5.69	-7.39
301	27.682	9.343	65.398	26,237.57	5.89	-4.93	-1881.4	-20.72	-5.82	-3395.6	10.75	5.81
302	38.913	15.027	77.826	41,178.64	5.17	-1.37	-657.3	-12.31	-0.52	-1034.4	12.73	1.66
401	39.444	15.229	79.646	41,551.73	5.52	0.24	623.5	1.16	-0.20	-410.6	14.45	2.18
402	29.195	15.862	74.943	29,813.81	7.89	-4.01	-3451.4	-40.07	-2.08	-4115.2	0.42	-5.67
500	38.540	14.953	79.081	38,866.46	6.11	-0.64	-1827.0	-18.08	0.50	-1554.1	7.96	1.04
601	37.500	16.327	70.918	25,289.45	7.00	-5.44	-5864.3	-47.67	-3.65	-5971.3	-8.07	-11.62
602	32.298	22.671	77.329	27,103.95	5.23	0.55	-1736.3	-15.64	2.65	-2621.1	2.68	-0.61
700	35.556	16.167	74.333	33,756.25	6.67	-5.08	-3825.5	-38.32	-3.44	-3730.8	0.62	-4.11
800	37.182	16.242	76.690	36,041.41	8.39	-3.18	-2816.9	-28.99	-1.92	-2719.5	4.55	-1.98
900	42.845	17.138	80.479	50,136.20	6.45	0.26	-1132.8	-12.76	0.88	-597.0	12.91	1.79
1001	38.393	25.000	74.405	36,232.13	5.11	-2.94	554.7	-25.93	-3.25	-2469.0	16.90	-1.95
1002	36.771	16.147	72.049	29,371.88	7.87	-4.08	-1664.6	-14.79	-3.14	-2489.4	5.38	0.33
1100	40.668	17.109	79.003	38,007.98	8.01	-1.19	-5004.3	-22.45	0.45	-4483.7	-1.03	-7.50
1201	33.333	23.188	71.015	31,773.86	6.08	-1.91	-2063.0	32.57	-2.87	70.5	6.42	8.16
1202	28.516	20.703	74.219	28,322.27	5.78	-3.25	-3591.5	-38.70	-1.27	-6932.9	0.57	-12.63
1203	35.283	19.686	75.416	35,401.41	5.07	-2.52	-2325.0	-13.37	-1.56	-2550.8	8.54	0.79
1204	31.818	21.970	72.727	30,493.29	6.86	-3.16	-1649.6	-17.86	-3.02	-7164.8	7.35	-15.04
1301	29.968	14.196	71.609	28,407.33	7.79	-6.00	-3074.3	-47.81	-4.93	-3886.1	4.00	-2.64
1302	32.553	15.603	75.638	31,431.28	6.12	-3.14	-3958.3	-37.34	-1.25	-4603.0	1.67	-5.91
1400	35.011	23.210	74.730	33,138.24	4.67	-4.11	-2615.3	-29.12	-3.35	-4032.5	8.09	-3.46
1500	36.235	19.369	76.659	38,650.96	5.95	-0.79	-1116.1	-14.07	-0.46	-2405.8	11.39	-0.68
1600	34.004	13.894	79.250	33,887.00	6.80	-1.21	-3969.3	-25.98	0.52	-5318.1	2.01	-7.50
1701	41.714	16.850	80.467	51,477.81	4.83	0.53	-324.3	-5.85	0.34	225.8	14.84	4.45
1702	30.405	15.878	78.378	30,266.29	6.90	-2.04	-3890.4	-43.70	1.69	-3298.0	-2.82	-4.13
1800	32.075	19.707	77.149	34,604.89	4.58	-1.34	502.3	-10.96	-0.82	-2148.3	12.90	-1.41
1900	38.431	23.098	77.569	36,087.00	5.07	-1.81	-1790.5	-16.83	-0.36	-2728.0	9.96	-0.98
2000	39.601	22.794	81.098	43,301.13	3.75	-0.78	234.8	-8.97	0.79	-239.9	15.90	3.59
2100	33.276	21.160	76.792	31,021.75	5.31	0.42	-3068.8	-25.81	1.10	-3525.1	2.79	-3.57
2200	33.183	16.066	78.529	28,581.81	4.94	-1.64	-3550.5	-31.68	1.53	-3801.8	1.37	-4.90
2300	37.132	15.625	81.526	38,249.03	4.07	-0.18	-318.1	-18.81	2.33	391.3	12.44	6.59
2400	40.964	14.919	81.558	48,695.93	4.43	-0.47	-1015.6	-4.34	0.70	-887.5	12.09	0.64
2500	37.074	23.694	81.328	42,796.29	3.85	-0.14	1679.7	4.77	0.98	402.8	19.64	5.59
2600	29.131	15.332	79.557	29,324.41	5.85	0.06	-1139.5	-42.83	2.54	-2633.4	9.82	1.70
2700	35.963	18.469	74.896	35,246.99	2.80	-3.05	-731.3	-33.50	-1.54	-3158.8	11.21	-2.93
2800	27.613	17.160	73.373	33,179.74	3.55	-4.16	1902.1	-39.36	-1.98	532.1	18.81	9.81
2900	33.982	21.401	74.838	36,895.31	2.99	-3.03	638.2	-10.36	-2.36	-1587.3	19.05	2.86
3001	27.545	19.760	76.048	28,728.07	7.04	-1.26	2494.9	35.29	-0.44	-112.5	24.91	9.07
3002	26.531	20.408	70.068	24,490.89	4.08	-8.58	-2629.7	-27.48	-5.33	-4402.8	7.73	-2.80
3003	37.332	13.416	79.372	40,242.86	2.59	-1.18	-197.6	-18.24	-0.07	-1389.9	15.91	1.51
3101	32.553	16.159	77.752	36,948.13	3.94	-1.50	2065.7	-28.69	0.88	425.3	25.43	10.87
3102	33.516	20.330	73.077	31,640.96	3.89	-2.18	-1773.8	-51.62	-3.56	-6881.0	11.47	-9.66
3201	35.294	17.647	70.588	38,192.68	3.72	-7.74	-57.2	-10.19	-3.50	-2586.2	36.43	22.77
3202	27.155	17.241	64.655	23,403.13	3.80	-7.47	-1798.1	-49.10	-7.96	-5945.3	5.33	-9.79
3203	30.383	20.649	74.041	31,708.43	3.77	-4.54	-2359.5	-32.40	-3.11	-2599.8	5.59	-1.62
3300	36.196	14.145	76.507	44,511.75	2.88	-0.98	3162.0	-1.67	0.35	2419.8	23.23	11.60
3400	33.655	12.824	73.907	40,941.56	2.36	-4.10	2170.1	-4.49	-4.13	-417.2	27.34	7.23
3500	37.803	13.533	78.179	44,732.08	2.46	-1.83	1706.8	-2.76	-0.86	399.8	22.41	7.93
3600	30.160	15.615	75.401	32,976.11	2.45	-1.61	-1322.5	-12.35	-1.03	-3798.5	14.99	0.06
3700	31.339	16.451	77.702	39,078.48	2.53	-0.18	1740.7	-1.97	0.88	564.0	25.14	12.10
3800	31.074	11.211	74.549	39,676.41	2.75	-2.25	1705.1	-15.50	-2.24	-1649.9	23.36	2.57
3901	32.692	14.194	79.945	36,072.76	3.20	0.80	1071.0	-1.50	2.61	-160.0	19.94	8.60
4001	32.558	14.729	75.969	36,195.82	3.08	-4.82	-1569.8	-19.00	-2.25	856.6	10.08	8.00
4002	31.515	15.557	78.811	36,859.53	2.71	-1.81	535.5	-11.40	0.50	-541.4	16.98	5.56
4003	27.036	20.847	77.199	35,118.54	2.98	-0.10	1019.9	-12.34	1.52	-1100.7	22.16	9.08
4102	28.892	22.754	75.749	34,151.31	2.70	-4.99	-1071.9	-21.90	-3.06	-2105.4	10.43	1.06
4103	30.000	17.714	79.143	34,774.08	2.68	-1.59	1462.7	-19.80	1.10	551.6	17.24	9.21
4200	38.292	16.159	78.734	43,187.26	2.30	-2.30	-70.8	-13.91	-1.27	-839.0	16.69	3.94
4301	30.612	23.129	78.912	30,270.42	4.95	0.13	1714.2	17.58	2.15	834.6	21.73	13.18
4302	37.118	23.362	72.489	33,534.48	2.16	-4.41	194.9	-18.74	-4.31	-1567.1	14.12	2.45
4401	31.838	10.999	65.991	27,415.66	4.67	-5.26	-2112.8	-32.49	-7.07	-4019.3	7.38	-1.00
4402	35.889	17.129	73.083	32,517.84	4.71	-3.55	-1961.5	-23.53	-2.71	-1748.0	7.10	2.24
4501	25.126	15.578	61.307	23,662.71	3.96	-7.90	-1740.9	-26.67	-8.73	-5859.9	9.94	-1.86
4502	24.839	10.921	57.602	22,266.31	3.27	-9.67	-6198.2	-66.19	-14.35	-10238.8	-11.24	-23.29
4601	37.875	12.807	74.659	27,777.81	5.19	0.64	-931.0	-9.16	-0.50	-3874.6	10.52	-3.71
4602	34.266	10.490	67.133	25,412.81	5.83	-7.31	-1982.7	-53.67	-6.43	-3755.1	5.70	-2.64
4701	24.924	14.286	75.684	30,100.32	4.76	-0.70	296.8	-14.68	-0.48	-1493.0	14.14	4.91
4702	29.250	17.733	75.868	31,403.92	3.92	-2.09	-2282.9	-56.91	-0.93	-3596.1	10.21	-1.22
4800	23.395	23.602	74.741	27,854.33	3.95	-1.73	-783.9	-19.95	-0.96	-3207.4	15.02	1.04
4901	36.588	19.206	76.824	33,095.92	6.24	-1.83	-3990.1	-37.92	0.04	-4643.3	2.83	-5.93
4902	35.501	18.428	77.778	33,433.75	9.20	-0.34	-670.8	18.62	1.81	-2676.3	9.38	-0.80

CZ	Mortgage holding rate	Migration rate	2015 employment rate	2015 mean earnings	Residualized shock	Employment effect	Earnings effect	Percentage earnings effect	Alternative employment effect	Alternative earnings effect	Percentage earnings change	Alternative percentage earnings change
4903	35.784	15.686	72.549	27,682.08	10.67	-4.02	-5289.3	-51.54	-3.77	-5324.3	-8.44	-12.78
5000	35.467	14.690	76.705	31,395.51	4.15	-1.94	-4389.2	-31.06	-0.77	-5455.8	1.19	-8.51
5100	30.074	16.605	67.159	28,334.61	5.97	-7.01	-1600.5	-53.84	-7.98	-3266.6	11.06	2.74
5201	33.579	19.188	71.956	24,757.23	5.44	-4.51	-3778.9	-32.51	-4.03	-3536.2	-6.77	-7.89
5202	39.591	15.846	80.196	44,354.85	4.90	-0.74	-1606.4	-17.81	0.36	-2452.1	12.58	0.53
5300	30.189	19.623	74.528	29,662.44	2.66	-2.12	-2594.3	-39.09	-2.01	-5553.5	7.99	-7.98
5401	36.173	13.893	77.064	36,519.85	6.03	-2.81	-2733.8	-12.16	-1.36	-2981.6	5.42	-1.92
5402	34.500	16.250	73.750	27,900.85	6.70	-4.02	-2901.1	-27.25	-1.79	-3671.2	2.31	-3.53
5500	40.297	21.918	78.653	36,820.51	7.24	-1.47	-2528.4	-18.42	0.69	-1760.9	6.07	0.43
5600	41.731	16.496	79.046	48,502.11	5.23	-0.89	390.3	-2.86	-0.39	127.1	15.00	3.09
5700	38.411	18.046	75.662	36,493.19	6.39	-4.50	-1169.3	-35.66	-3.05	-1765.6	6.62	-2.54
5800	37.316	18.879	77.876	33,576.88	7.45	-1.87	-2092.8	-23.60	0.24	-823.0	7.38	5.41
5900	36.513	27.443	76.779	34,999.20	5.12	-2.54	983.4	-4.03	-0.94	1124.5	17.18	12.35
6000	40.861	13.426	77.417	44,164.83	5.71	-3.15	-1621.1	-11.93	-2.03	-1813.2	10.62	0.04
6100	33.333	15.499	70.984	32,561.95	7.52	-6.24	-1813.9	-36.07	-5.12	-3295.4	6.89	-3.77
6200	38.728	12.254	75.023	35,061.51	6.77	-1.42	297.2	0.75	-1.71	-1276.0	16.14	4.00
6301	37.270	20.472	73.491	27,196.21	7.49	-3.24	-3407.3	-49.76	-1.96	-3921.7	-0.01	-1.86
6302	31.858	19.027	74.336	30,036.58	5.54	-4.17	-4276.7	-46.93	-2.09	-3801.8	1.81	-1.39
6401	38.754	13.420	77.676	39,045.11	5.36	-1.91	-441.2	-21.29	-0.52	-806.3	13.18	3.91
6402	39.858	16.745	74.057	29,198.58	6.67	-2.87	-2875.3	-36.95	-0.16	-3774.2	3.40	-2.68
6501	41.232	31.754	69.194	30,626.30	6.67	-3.12	-4800.2	-36.34	-4.34	-4210.6	-0.55	-4.75
6502	35.067	14.258	75.915	34,256.91	7.17	-1.64	-1992.0	-21.65	-1.00	-2167.6	6.51	-0.73
6600	35.465	17.801	74.931	34,227.23	7.03	-1.92	-2299.1	-15.06	-2.19	-2751.2	5.98	-1.67
6700	40.842	20.063	77.387	42,864.31	6.50	-1.39	-1684.6	-14.22	-0.75	-1702.0	11.02	1.17
6800	34.484	27.180	75.581	35,027.02	6.44	-2.13	-648.4	-10.72	-1.68	-1914.8	12.27	1.18
6900	39.221	24.275	75.574	36,626.19	6.78	-1.92	-4095.6	-20.19	-1.35	-4967.8	1.33	-8.04
7000	39.644	19.413	77.249	45,736.25	6.36	1.94	241.0	12.97	-1.10	-1332.2	16.27	1.09
7100	42.150	22.702	75.983	45,125.02	6.36	0.09	-1290.0	5.83	-1.12	-1919.5	9.27	-1.11
7200	42.173	25.459	77.150	39,133.72	7.07	0.02	-2553.9	-9.50	-0.80	-4221.3	5.74	-8.48
7300	41.617	22.531	76.806	39,151.82	6.14	-1.77	-2757.9	-15.61	-1.04	-2618.6	5.29	-2.32
7400	39.066	23.695	78.741	42,679.62	6.45	0.04	-1340.9	-3.40	-0.07	-2180.9	11.55	-0.85
7500	38.638	26.057	75.376	33,584.33	6.69	-2.97	-3381.2	-28.41	-1.49	-4008.9	2.35	-6.06
7600	39.154	20.906	78.022	42,894.50	5.94	-2.45	-1294.7	-10.10	-1.15	-1497.1	12.31	1.35
7700	34.059	25.972	74.650	29,565.97	5.62	-4.01	-3702.2	-35.42	-1.90	-5350.5	0.62	-7.05
7800	36.584	27.764	74.224	33,442.63	7.58	-2.43	-3756.0	-23.12	-2.17	-5558.1	0.66	-10.07
7900	36.162	25.240	77.491	39,718.42	4.58	-0.65	2473.7	4.14	0.52	1019.7	21.90	9.06
8000	32.135	20.507	75.793	29,966.48	5.46	-3.44	-3725.9	-32.31	-1.80	-4031.0	1.83	-3.27
8100	37.261	17.266	79.674	39,847.69	4.46	-1.26	-1272.4	-19.90	0.46	-1499.7	10.87	1.62
8201	28.912	20.748	73.810	30,165.19	7.69	-2.69	-1580.8	-13.03	-1.75	-1836.9	9.02	3.07
8202	38.603	16.591	78.260	42,701.80	4.96	-1.02	336.9	-10.47	-0.12	-499.0	16.00	2.93
8300	37.091	12.715	77.001	39,220.38	5.35	-2.12	-1003.5	-19.51	-0.71	-378.9	11.11	4.93
8401	37.859	16.718	78.976	39,853.57	3.98	-1.12	732.3	-7.64	0.83	967.9	16.48	9.16
8402	32.558	27.907	79.070	26,846.72	5.61	1.59	-2913.9	-21.12	4.10	-4048.1	1.06	-1.10
8501	25.532	26.950	65.957	28,208.89	8.54	-5.02	-1425.8	-43.83	-5.37	-29.5	13.79	21.71
8502	34.706	16.471	76.471	30,271.05	5.79	-8.42	-3779.6	-73.68	-2.23	-4168.1	5.80	-2.45
8503	31.339	20.804	75.268	32,280.52	5.22	-3.33	-1274.3	-17.47	-2.02	-3107.9	13.90	1.58
8601	30.377	15.849	76.038	31,114.41	6.92	0.97	905.2	5.50	0.61	155.2	19.13	13.16
8602	33.608	25.155	78.557	39,709.49	5.16	0.17	946.6	-4.12	2.44	-2411.7	18.16	0.22
8701	30.698	33.023	74.264	31,869.78	4.14	-4.73	-1391.9	-18.17	-3.77	-3798.0	11.29	-1.79
8702	31.360	17.325	77.412	34,019.50	5.83	-0.85	403.0	-21.61	1.49	-1310.3	15.15	3.25
8800	37.495	25.143	76.835	39,928.45	4.66	-0.94	-2076.0	-17.08	-1.14	-2837.3	9.15	-2.00
8900	38.069	17.359	76.538	38,110.86	4.25	-3.81	-2588.8	-22.01	-2.73	-2506.0	10.04	1.21
9001	33.474	17.684	74.526	29,782.13	5.37	-3.11	-3893.7	-24.90	-2.75	-4220.3	3.57	-4.13
9002	35.714	25.000	73.512	29,189.41	6.93	-6.22	-5322.6	-51.24	-4.66	-6686.5	-2.34	-12.61
9003	34.718	15.727	76.855	28,726.88	6.57	-0.29	-1944.4	-37.57	0.18	-3604.3	5.77	-3.98
9100	42.975	18.210	78.734	51,480.12	5.31	0.32	-1631.1	-2.49	-0.62	-1184.9	12.29	1.51
9200	34.801	18.324	75.284	29,994.22	7.49	-1.51	-3046.5	-31.85	-1.72	-3474.2	4.62	-1.45
9301	36.878	22.700	77.046	37,193.19	4.53	-0.84	-1586.9	-3.70	-0.83	-1193.6	11.17	3.72
9302	33.172	17.676	75.303	31,255.36	6.29	-2.34	-4095.0	-34.28	-1.93	-4927.3	2.12	-6.42
9400	42.405	22.468	77.468	38,889.12	5.99	-0.86	-4716.9	-11.03	-0.01	-4031.3	2.36	-5.40
9500	32.964	18.542	72.742	32,117.41	8.76	-5.82	-2747.8	-36.60	-4.66	-5067.4	4.28	-9.23
9600	39.586	19.695	77.335	38,690.89	6.92	-2.57	-2247.7	-18.51	-1.42	-2038.6	8.12	1.41
9701	33.193	25.140	77.941	36,843.93	4.55	-2.12	-618.4	-14.84	-0.98	-1886.8	14.03	3.58
9702	23.954	17.490	73.384	25,104.18	5.54	-3.05	-5135.2	-27.72	-1.97	-4071.8	-4.56	-4.64
9800	35.169	22.881	78.672	39,826.19	5.86	0.20	1628.9	-17.22	-0.44	-1370.7	19.45	1.13
9900	36.279	22.584	78.553	40,929.33	4.18	-1.93	198.1	-10.87	-0.67	-707.9	15.11	3.55
10000	33.501	30.080	75.151	35,390.84	5.34	-2.58	1437.9	-9.44	-1.99	-215.3	18.41	4.97
10101	41.860	16.279	79.070	31,056.86	5.84	-1.13	-3791.7	-8.18	2.25	-2882.8	1.56	-4.11
10102	36.727	17.455	80.727	37,084.83	5.25	4.73	723.4	11.74	3.76	-4129.4	17.40	-3.25
10200	30.931	21.625	78.506	35,142.19	4.62	-1.76	-2092.9	-23.76	0.47	-3938.6	9.15	-2.05
10301	33.478	19.565	75.217	27,868.26	6.18	-1.56	-2693.1	-33.33	0.92	-854.9	-2.00	1.39
10302	36.904	18.722	77.048	36,136.02	5.72	-2.33	-184.9	-10.29	-1.16	-2106.5	13.43	0.10
10400	32.689	16.048	76.969	33,414.28	3.69	-2.87	1246.0	5.53	-1.67	-448.6	20.16	7.20
10501	34.442	19.240	74.822	30,611.29	4.62	-2.14	-2551.6	-23.70	-0.45	-4259.9	7.25	-4.50

CZ	Mortgage holding rate	Migration rate	2015 employment rate	2015 mean earnings	Residualized shock	Employment effect	Earnings effect	Percentage earnings effect	Alternative employment effect	Alternative earnings effect	Percentage earnings change	Alternative percentage earnings change
10502	31.510	20.573	77.083	32,462.92	4.22	0.69	-950.3	9.19	1.38	-1907.3	14.78	5.47
10600	30.962	16.597	74.477	34,065.88	8.97	-4.41	-1842.7	-32.20	-2.94	-2849.4	6.02	-3.86
10700	39.256	14.791	76.670	44,814.62	6.51	-2.43	122.1	-12.39	-2.14	-1180.8	15.29	1.31
10801	34.297	17.751	74.779	36,217.16	7.88	-4.68	-3070.2	-30.60	-4.61	-4579.1	10.28	-4.18
10802	27.530	17.814	70.040	32,492.85	8.09	-6.31	-467.6	-35.39	-5.85	-2657.7	12.28	-0.03
10900	38.033	26.096	75.274	37,967.34	5.13	-2.88	706.0	-18.01	-2.05	-133.2	16.44	6.69
11001	36.911	14.132	76.447	38,666.05	7.20	-2.15	9.0	-18.63	-1.22	-1717.5	15.95	3.13
11002	31.579	15.205	75.731	32,421.69	10.07	1.29	44.1	-15.37	0.76	-2149.1	11.35	-0.39
11101	41.366	17.324	76.069	38,374.89	6.59	-2.86	-1667.0	-16.70	-2.47	-3603.5	11.22	-2.54
11102	33.058	18.733	76.033	35,671.13	6.09	-2.62	1860.4	-18.32	-1.51	784.3	21.15	8.45
11201	31.442	14.303	70.095	29,157.96	3.85	-2.89	-904.4	-45.30	-3.75	-2940.4	11.94	0.19
11202	23.718	17.949	57.692	24,396.40	4.09	-5.13	-2353.8	-58.87	-13.56	-6499.7	17.93	-1.27
11203	28.804	13.043	62.228	25,074.79	3.00	-9.96	-4940.2	-66.65	-11.32	-6597.2	-1.94	-11.68
11301	46.318	23.981	82.349	53,969.89	3.40	-0.81	-292.8	-6.52	-0.23	-275.8	16.06	0.87
11302	41.253	15.114	81.270	55,916.95	3.82	0.04	1881.4	5.72	0.50	2369.2	18.69	6.01
11303	38.550	19.847	76.336	33,925.67	4.11	-3.59	-5589.5	-36.46	-1.29	-5892.9	-2.83	-11.03
11304	42.563	17.420	81.335	68,761.66	3.06	0.58	3015.2	12.38	-0.70	3044.1	22.40	5.84
11401	42.750	16.761	77.966	38,333.91	4.29	-2.63	501.7	-29.96	0.50	391.6	14.18	6.79
11402	47.566	14.607	83.146	37,709.17	5.37	2.67	-1892.8	-7.00	5.85	-227.9	7.34	5.20
11403	40.876	15.328	79.197	30,036.13	3.90	0.80	-4663.8	4.71	0.75	-5569.6	-0.93	-10.81
11500	42.461	16.565	80.257	39,369.83	6.68	-0.74	-2871.5	-8.38	1.26	-1336.8	6.27	1.70
11600	42.872	12.009	79.137	48,384.06	7.27	-0.59	-2487.3	-4.43	-0.03	492.6	7.50	4.73
11700	42.768	17.599	80.617	46,329.87	4.93	-1.59	-540.5	-14.79	1.06	1386.5	10.65	6.93
11800	42.439	17.724	78.537	35,985.63	4.49	-0.12	1243.6	-14.00	1.93	1742.5	15.80	12.93
11900	40.529	15.312	79.321	40,067.65	5.37	-1.33	-2153.5	-13.05	1.59	-818.7	9.14	5.77
12001	35.496	21.947	74.618	30,039.08	6.71	-1.11	-1373.4	-12.71	0.33	-454.2	8.27	8.80
12002	36.614	19.685	78.346	32,231.07	5.03	-0.25	-3904.5	-19.52	1.56	-2535.7	-0.57	-2.59
12100	41.639	17.140	80.017	42,337.05	4.92	-0.60	-1805.5	-8.64	1.00	209.1	10.06	5.92
12200	43.085	12.147	80.877	43,338.17	5.83	0.19	-2127.6	-5.20	1.89	310.1	6.90	4.11
12301	44.118	16.880	78.645	36,593.87	5.37	-1.63	-3654.7	-12.78	1.36	-1909.5	1.30	-1.18
12302	40.686	17.647	78.922	33,029.91	4.91	-0.06	-1558.7	0.24	2.59	910.0	6.34	8.71
12401	37.640	14.888	77.809	32,137.51	6.45	-2.52	-589.3	-11.97	1.21	123.4	8.52	8.30
12402	40.652	25.870	75.652	29,842.35	5.80	-2.25	-2245.3	6.48	0.22	-1988.7	3.24	2.09
12501	39.598	14.845	81.312	41,643.80	5.50	-0.67	-1929.4	-7.36	1.09	-1064.1	9.16	2.08
12502	37.011	22.776	76.868	32,996.98	8.23	-3.17	-2795.0	-13.91	-1.89	-1942.4	-0.11	-4.43
12600	38.320	16.393	79.713	34,386.66	6.89	-2.08	-3223.5	-23.26	-0.74	-2060.6	4.47	-0.12
12701	40.631	12.659	81.648	49,173.90	4.48	0.14	-280.5	-4.66	1.56	1156.4	13.84	5.91
12702	32.028	15.658	71.530	28,424.43	6.14	-4.96	-3915.9	-46.24	-3.19	-4941.6	3.95	-4.93
12800	40.746	15.746	80.387	37,613.20	5.51	-1.14	-2582.6	-8.17	0.38	-1756.4	4.85	-0.79
12901	40.021	16.580	78.318	40,675.92	4.52	-1.16	-2399.5	-14.66	-0.33	-1698.9	9.58	1.95
12902	37.295	16.393	71.721	26,141.22	6.90	-5.22	-4337.5	-25.56	-4.03	-4500.1	0.20	-3.35
12903	39.152	18.454	77.307	34,444.48	5.76	-1.09	-1820.8	-14.31	-0.53	-1597.3	4.94	-1.65
13000	37.909	23.337	75.924	32,491.31	5.70	-3.16	-2325.1	-19.38	-0.87	-2573.4	6.90	1.27
13101	40.903	10.887	81.593	44,693.30	4.76	0.45	590.6	-7.12	2.02	1136.4	15.44	7.26
13102	35.443	17.300	80.591	32,861.86	6.11	1.87	-3962.5	-33.57	2.11	-2682.1	5.13	0.05
13103	41.311	15.100	83.191	35,078.72	6.91	1.95	-307.8	-15.53	3.84	-631.6	10.98	3.34
13200	35.315	13.054	76.573	35,321.15	4.53	-1.59	-487.0	-11.85	-1.08	-1721.9	15.49	4.72
13300	39.415	14.534	81.359	36,246.71	6.25	-1.35	-3652.8	-17.84	1.35	-2995.9	3.03	-3.11
13400	41.838	12.361	84.628	40,320.62	5.76	0.92	-149.9	-8.09	4.08	940.2	12.62	6.48
13501	40.479	14.563	80.192	42,329.57	6.23	-2.26	-2073.3	-15.57	-0.06	-536.9	7.49	2.69
13502	43.532	13.963	83.573	36,799.56	8.67	1.34	-2386.2	-4.37	3.79	-1599.1	3.61	-0.33
13600	39.362	16.363	80.644	39,810.83	6.38	0.75	-1512.3	-3.56	2.32	-734.5	9.40	2.99
13700	39.496	18.718	79.565	34,917.42	10.87	-0.08	-4068.6	-12.63	0.99	-3259.1	1.49	-2.63
13800	38.710	16.897	81.413	35,790.78	7.73	-0.43	-3142.9	-29.48	0.99	-1007.5	1.71	1.67
13900	40.276	17.491	80.667	37,579.37	8.10	-0.18	-4950.5	-15.13	1.56	-2969.1	-0.24	-2.97
14000	37.907	15.964	79.818	36,053.67	5.39	-1.61	-2135.1	-12.71	0.91	-1514.1	6.18	1.08
14100	41.587	14.885	82.575	41,560.23	6.49	0.53	-1387.3	-14.88	2.53	-140.4	7.87	3.09
14200	41.141	16.030	81.502	47,936.72	4.60	0.41	-1282.1	-7.45	1.45	165.5	12.03	4.38
14300	36.023	16.250	78.523	35,866.56	6.63	-3.08	-4429.2	-1.88	-1.11	-4143.4	4.92	-2.59
14400	38.047	16.667	78.788	35,551.44	5.26	-2.37	-3130.4	-7.80	-0.14	-2727.5	5.60	-0.09
14500	34.431	16.129	81.501	37,571.59	5.62	1.75	-989.6	-8.06	2.60	-997.7	11.51	5.28
14600	38.876	15.613	80.952	38,292.43	3.78	0.42	304.1	-1.85	1.97	280.2	15.30	7.45
14700	38.638	11.744	82.461	40,925.12	4.05	1.13	-1318.4	-15.49	3.17	-867.5	10.61	3.01
14801	37.917	17.917	83.333	34,775.89	4.72	1.12	-2571.5	-23.01	5.22	-3516.8	8.08	-1.63
14802	32.609	14.783	80.870	31,890.20	4.00	0.82	-1000.1	-16.68	3.22	-842.8	9.25	1.83
14900	38.544	15.097	80.475	44,052.99	5.42	0.02	-1911.3	-3.07	0.72	-1290.7	10.72	1.09
15000	37.876	13.357	81.107	39,545.37	5.56	0.37	497.8	-1.10	2.78	1257.6	15.88	10.46
15100	41.566	14.273	82.103	42,431.08	4.62	-1.25	-1956.9	-16.18	2.01	17.8	7.86	3.97
15200	39.641	12.719	81.659	46,656.14	3.67	0.52	43.2	4.15	2.01	1052.2	14.46	6.54
15300	35.054	10.860	78.280	35,749.11	4.48	-0.17	505.3	-2.24	1.23	-255.8	15.62	7.13
15400	37.868	13.605	78.005	31,895.07	5.47	-2.35	-822.8	-12.28	0.29	-1023.1	11.36	5.91
15500	32.616	13.079	78.974	34,201.91	5.61	-1.32	77.8	-1.65	1.87	-919.1	13.19	4.11
15600	33.412	11.806	79.103	37,115.25	3.75	-0.30	2600.5	12.56	1.44	2680.4	22.74	16.67
15700	31.002	14.367	74.480	33,093.01	4.97	-4.11	-1635.2	-25.43	-2.64	-2417.8	9.75	2.05

CZ	Mortgage holding rate	Migration rate	2015 employment rate	2015 mean earnings	Residualized shock	Employment effect	Earnings effect	Percentage earnings effect	Alternative employment effect	Alternative earnings effect	Percentage earnings change	Alternative percentage earnings change
15800	32.215	20.638	72.819	32,308.16	3.70	-4.70	-886.7	-35.21	-4.26	-2159.7	12.45	3.81
15900	40.866	14.455	81.783	49,815.99	3.89	0.28	-199.1	3.95	1.72	1384.5	16.02	7.69
16000	37.961	13.950	78.739	35,153.76	6.29	-2.82	-2165.2	-19.55	0.33	-1566.3	6.63	1.55
16100	38.006	15.442	82.534	39,935.55	3.70	1.16	267.5	14.81	2.29	1205.0	15.54	9.36
16200	35.383	8.091	80.259	36,870.85	3.45	1.36	862.4	-0.04	2.59	419.0	18.02	9.36
16300	38.599	8.954	81.529	47,702.74	3.05	1.42	2829.5	10.63	2.56	2687.3	21.05	9.88
16400	38.474	13.035	80.928	37,208.84	6.35	-0.22	-979.7	-7.57	1.94	-959.3	9.83	2.42
16500	36.225	11.580	80.159	37,011.35	4.13	0.40	1581.9	1.10	2.28	774.6	17.90	8.01
16600	37.840	14.004	78.929	39,852.07	4.18	-1.29	-27.4	-15.19	-0.07	222.8	13.96	6.41
16701	38.676	15.679	75.958	32,570.34	3.97	1.59	748.0	24.87	-1.60	-155.3	18.49	7.93
16702	34.904	12.827	77.400	39,565.65	1.97	-0.17	2715.9	7.69	-0.12	1092.4	25.00	11.30
16703	31.282	12.308	75.385	35,003.46	3.32	-1.87	3112.7	-20.94	-0.73	1013.6	21.95	9.49
16801	33.535	15.559	72.961	33,056.14	2.99	-3.33	-92.1	-23.52	-1.95	-1919.9	15.91	5.86
16802	31.606	13.990	67.358	29,945.66	3.50	-3.51	-510.9	-55.69	-6.38	-5121.9	12.18	-7.57
16901	34.485	12.824	74.485	38,293.74	2.63	-3.35	-1105.9	-4.63	-2.96	-991.1	13.39	5.92
17000	26.821	13.064	58.497	24,573.80	4.21	-12.11	-6115.1	-51.91	-13.56	-8065.7	-3.49	-12.13
17100	32.747	13.802	74.089	35,329.57	3.45	-3.98	-978.6	-32.68	-2.73	-1839.7	15.17	5.62
17200	37.288	17.175	80.000	35,162.60	4.27	-0.79	-2279.1	-13.68	1.14	-2024.6	3.69	-2.92
17300	35.231	14.930	79.699	33,746.66	4.11	-0.30	-1084.4	-16.86	1.45	-1472.3	5.48	-2.56
17400	40.633	14.713	80.411	41,157.79	4.76	-1.13	-1719.1	-12.39	0.24	-1704.9	8.93	-0.84
17501	36.530	11.989	78.279	37,055.87	3.53	-2.70	-21.4	-38.32	0.21	-1219.5	12.36	2.63
17502	42.346	20.172	80.973	45,346.01	4.53	1.00	-3428.8	24.53	1.66	-3601.1	6.50	-3.66
17600	40.834	20.781	79.947	48,162.00	3.76	-0.16	1495.3	2.02	0.72	1372.1	17.92	6.32
17700	37.284	10.576	81.263	41,632.20	3.61	0.82	631.0	-4.11	1.98	601.4	15.52	6.46
17800	33.585	14.221	78.064	35,468.00	3.72	1.33	857.3	6.41	1.71	-568.5	13.00	3.33
17900	35.841	13.274	79.204	37,871.50	3.78	-0.69	-1303.9	-30.35	0.89	-856.4	10.17	3.41
18000	38.199	8.810	81.499	43,790.28	3.52	0.59	860.0	-0.65	1.97	1342.0	15.10	7.43
18100	34.334	15.085	80.478	39,134.10	3.74	1.08	1656.7	3.92	1.90	653.2	18.37	7.33
18201	33.333	13.589	78.746	32,308.81	3.92	-0.64	-545.4	-12.83	1.15	-1191.2	13.09	5.23
18202	39.474	10.526	81.579	36,476.57	8.03	4.85	2410.4	32.96	4.02	-904.2	18.79	1.99
18300	35.097	16.435	78.180	35,937.45	3.70	0.14	-413.9	-4.58	0.54	-1243.7	14.23	5.82
18400	33.530	12.633	77.804	36,069.51	3.48	-0.61	-379.7	-3.03	-0.49	-2221.0	13.16	0.14
18500	32.024	16.306	78.782	34,263.06	3.92	-0.28	797.9	6.76	0.62	-16.0	16.01	7.84
18600	37.273	10.987	82.141	47,161.57	3.13	0.41	1944.6	-0.45	1.89	2500.7	18.42	9.04
18700	38.065	12.814	81.281	40,410.16	4.23	2.11	3842.7	19.61	2.26	3016.0	24.77	13.51
18800	39.846	12.825	79.596	41,088.18	3.83	0.83	167.7	9.80	1.08	-172.1	14.30	5.27
18900	39.961	12.963	82.261	36,751.02	3.82	1.63	27.6	-0.34	2.74	-151.7	13.59	5.72
19000	42.817	14.680	82.276	48,163.76	4.22	0.34	-1006.0	-8.98	1.71	-478.1	11.65	1.61
19100	41.584	11.752	83.203	44,834.45	4.12	1.93	313.5	4.94	2.88	422.5	13.95	4.19
19200	42.009	12.381	83.221	45,537.26	3.96	0.28	184.0	-5.86	2.04	168.4	14.39	3.56
19300	39.910	15.969	80.202	51,091.10	3.64	0.67	-1156.0	8.56	0.30	163.5	12.24	2.80
19400	28.494	14.140	76.188	59,504.25	4.02	0.91	-670.4	22.25	-2.29	-563.5	16.01	2.20
19500	42.769	13.494	77.856	56,571.34	4.76	0.51	-2439.1	15.43	-0.59	-172.4	8.02	0.66
19600	35.709	14.708	77.769	62,417.45	4.60	0.51	-1064.8	13.52	-1.72	-116.7	13.67	1.93
19700	40.691	11.050	79.770	53,662.38	4.08	0.13	313.5	3.04	-0.06	706.4	16.41	4.44
19800	44.621	16.376	82.037	52,038.75	4.89	-0.40	-2207.9	-7.18	0.68	-1392.3	10.09	-0.71
19901	37.742	15.880	79.275	36,111.42	4.76	-0.69	-1938.4	-20.42	1.18	-2576.4	6.65	-3.97
19902	40.746	17.177	79.893	40,140.92	4.21	1.52	-3268.1	-15.13	2.45	-3165.9	1.59	-6.31
19903	22.170	21.226	76.887	26,733.78	2.79	0.97	-1787.2	-12.01	4.02	-1594.3	2.52	-0.69
20001	39.921	16.008	77.734	35,016.26	3.35	-0.34	-863.9	-12.17	1.35	-1424.4	10.80	2.69
20002	35.507	21.014	71.015	24,919.06	3.44	-2.02	-1516.0	-9.16	-1.73	-2294.1	12.18	11.55
20003	38.965	10.627	74.114	30,180.93	3.54	-3.71	-663.8	-32.41	-0.74	-3375.5	10.64	-2.30
20100	40.870	13.442	80.212	39,192.15	3.50	-0.41	-672.8	-20.46	1.65	123.6	10.62	5.16
20200	41.180	13.129	82.649	46,729.50	2.68	2.28	4318.5	19.86	4.66	4481.8	22.93	14.60
20301	38.153	17.068	79.518	34,123.83	3.34	-0.10	447.5	10.91	2.24	-1454.2	14.30	3.95
20302	38.045	18.776	82.208	38,683.05	2.48	1.49	1421.1	-12.64	3.96	1746.1	15.09	7.64
20401	38.849	12.144	80.308	47,763.92	5.40	-0.26	139.2	-4.67	0.50	1290.9	14.64	5.81
20500	38.067	11.386	80.904	62,874.81	3.49	1.70	3392.0	17.85	1.14	4630.4	21.43	10.36
20600	43.137	13.402	82.962	50,766.03	3.02	1.43	-77.2	6.95	3.14	1616.2	12.35	5.54
20700	39.966	17.538	78.921	39,752.66	2.35	-0.79	23.9	-22.34	1.16	887.0	11.24	5.40
20800	37.254	13.489	80.146	43,752.34	3.44	0.06	-299.0	-6.69	0.54	328.2	13.19	4.86
20901	40.339	11.429	80.111	59,676.44	3.53	0.55	45.9	7.19	0.05	1135.0	13.59	3.42
20902	38.015	11.864	80.387	39,259.55	3.37	0.57	1529.1	0.41	2.07	938.4	16.28	6.32
21001	48.205	17.436	80.000	33,756.04	4.12	-0.16	-3313.3	-23.79	4.29	-2632.3	-1.72	-3.95
21002	48.447	19.255	73.913	34,485.98	5.15	-3.47	-1304.9	-29.08	-1.68	-732.1	10.57	14.06
21003	34.711	16.529	80.992	24,288.71	5.36	3.88	-2838.4	6.56	8.23	-1630.1	-1.12	4.42
21004	43.478	19.732	80.602	37,792.54	3.52	-0.19	1114.4	-36.34	3.00	1109.9	15.03	7.38
21101	37.900	16.895	81.963	34,715.02	3.50	3.18	2463.4	-1.65	4.07	1208.7	20.59	10.35
21102	44.040	21.523	84.768	34,721.65	4.02	3.11	-2141.8	-11.70	5.79	-1606.2	6.11	1.71
21201	44.054	20.541	88.649	45,219.05	3.88	5.84	2813.7	42.91	7.46	3198.7	21.38	12.32
21202	46.914	17.284	90.123	46,655.12	2.59	10.50	9954.7	105.55	12.60	9317.9	36.11	29.74
21301	38.796	15.826	86.835	44,187.70	3.10	4.70	5581.2	26.07	6.82	6131.4	27.28	19.18
21302	49.429	20.555	86.460	48,038.87	3.83	5.55	4984.4	34.14	6.55	5115.7	23.48	13.67
21400	47.765	17.208	84.323	47,255.09	3.69	1.80	3444.8	18.55	4.34	5202.8	20.94	14.17

CZ	Mortgage holding rate	Migration rate	2015 employment rate	2015 mean earnings	Residualized shock	Employment effect	Earnings effect	Percentage earnings effect	Alternative employment effect	Alternative earnings effect	Percentage earnings change	Alternative percentage earnings change
21501	46.769	12.094	85.041	59,872.83	3.40	2.14	3082.1	11.27	3.73	5410.6	20.07	12.05
21502	43.627	22.059	78.922	35,779.75	4.00	-2.59	-1210.3	8.29	-0.54	845.1	6.15	4.02
21600	43.349	18.310	81.377	40,600.79	3.81	3.60	5686.0	37.05	4.29	6142.1	27.88	22.30
21701	46.142	15.036	86.714	56,961.25	2.69	3.31	7474.6	15.03	5.44	8930.6	31.01	21.69
21702	39.297	19.489	85.942	39,090.98	2.92	3.21	2007.1	11.39	6.28	2718.7	23.11	14.24
21801	42.901	16.049	83.025	38,961.38	3.92	1.51	2825.4	-9.94	3.32	2352.0	17.96	10.88
21802	39.711	13.718	84.477	34,374.01	3.79	2.54	432.2	20.16	5.26	462.6	12.46	8.53
21900	42.011	19.749	84.381	41,560.57	2.97	1.28	-835.9	-10.85	3.46	486.5	10.05	5.87
22001	43.300	13.200	85.300	42,348.58	2.67	2.84	3716.2	6.40	5.32	3718.3	24.32	14.36
22002	42.857	28.571	82.468	34,571.40	3.40	-0.26	-1201.9	7.45	1.25	-2118.6	4.60	-5.59
22100	41.634	20.177	85.630	51,324.88	2.74	2.18	6462.6	23.03	3.90	6018.5	33.56	19.22
22200	44.713	14.194	87.509	50,016.98	2.66	1.92	1979.3	-6.47	5.17	4376.5	19.71	12.94
22300	37.557	16.031	85.191	41,093.97	4.13	4.29	3768.4	39.60	5.89	4230.3	22.12	12.43
22400	43.715	13.884	85.929	44,222.40	4.74	1.42	-354.4	-11.60	5.11	1785.2	11.27	6.90
22500	44.935	10.915	86.307	45,985.91	3.69	2.49	-699.4	0.45	4.74	729.0	11.55	4.90
22601	44.516	13.255	84.809	43,274.30	3.46	1.69	-2474.2	-12.49	3.63	-688.9	6.99	1.62
22602	41.776	17.434	82.566	34,869.24	4.05	4.44	354.9	-0.48	4.57	306.9	11.58	5.77
22700	43.528	11.974	84.574	41,248.84	4.02	1.14	193.8	-7.58	4.01	1426.1	11.78	7.14
22800	41.627	10.663	84.894	39,784.48	3.01	3.82	-80.3	14.88	5.38	631.4	11.39	5.43
22900	40.750	13.089	83.421	40,361.26	3.02	1.69	925.0	4.90	3.80	1296.5	15.19	8.49
23000	40.625	14.890	84.191	39,868.75	3.51	5.64	786.6	31.34	6.28	355.1	12.63	3.28
23100	42.033	15.992	84.649	50,800.62	2.73	1.46	1284.8	-3.68	3.00	2720.2	16.91	8.06
23200	36.253	13.625	86.375	38,957.62	3.46	4.85	1392.0	3.48	7.52	1312.0	16.39	8.56
23301	33.492	16.152	80.285	33,161.13	5.21	1.16	879.4	-15.24	3.00	785.3	11.77	6.12
23302	35.230	16.630	85.996	37,404.92	4.67	2.66	1164.5	1.88	5.04	2071.2	15.52	9.86
23400	42.603	16.105	85.487	50,102.26	3.97	2.37	-634.2	4.99	4.51	1517.5	15.11	8.00
23500	38.713	17.099	82.901	41,863.66	4.76	1.48	1998.9	-2.30	3.59	3364.0	19.91	15.59
23600	36.860	12.799	80.717	33,399.35	4.55	0.13	363.4	-18.35	2.55	288.9	10.49	4.38
23700	35.849	15.780	82.676	34,354.89	4.78	1.03	-265.0	-28.67	4.66	1.1	11.70	6.71
23801	40.200	14.087	82.572	43,059.60	4.12	1.69	2593.3	2.83	3.27	2433.0	20.92	10.72
23802	37.572	15.607	87.572	36,046.95	3.67	3.56	-2071.9	-9.89	6.76	-1349.3	6.97	1.20
23900	40.438	13.210	82.911	45,847.93	6.09	0.43	704.6	-8.99	2.72	525.4	19.60	7.66
24000	41.940	16.281	81.503	41,992.92	5.21	-0.61	-3174.4	-8.80	0.63	-2229.5	3.64	-2.55
24100	39.385	12.289	82.949	48,731.11	3.81	1.29	-487.8	-1.38	2.46	831.4	12.34	4.70
24200	36.778	16.869	81.003	39,955.93	5.60	1.58	-1997.3	-3.55	1.02	-1562.7	9.55	1.82
24300	40.337	12.125	79.672	55,253.72	5.25	1.28	-1772.0	3.62	-0.15	-355.4	11.93	2.11
24400	40.750	15.159	80.492	40,605.41	7.30	0.30	-2675.7	-2.94	1.20	-2335.6	6.71	-0.78
24500	35.971	28.777	76.978	34,347.42	2.63	-2.98	188.4	-25.39	-1.22	-781.1	17.42	8.05
24600	34.049	12.730	70.245	28,809.14	4.70	-8.24	-4946.5	-51.55	-6.17	-5569.5	-5.49	-12.02
24701	41.946	12.077	81.005	47,115.95	4.56	-0.80	-1127.1	-14.23	0.94	137.6	12.04	4.06
24702	40.462	25.434	71.676	26,228.65	5.04	-5.15	-6676.8	-59.93	-4.72	-9464.2	-9.57	-19.88
24801	34.877	15.531	85.014	34,051.97	3.07	1.61	-469.2	4.86	4.88	-1281.5	11.61	2.61
24802	40.390	14.162	82.948	42,863.64	3.51	-0.83	-464.6	-24.31	2.31	1550.6	13.28	8.66
24900	40.496	15.238	81.250	42,003.69	4.83	-0.19	-662.4	-12.00	1.73	120.4	12.58	5.48
25000	38.621	14.345	81.655	37,911.62	3.84	-0.51	1425.5	-10.24	1.98	1198.4	17.42	8.82
25101	38.492	22.619	76.984	34,796.54	4.32	-1.13	812.2	-39.92	0.12	1734.8	17.72	13.42
25102	40.214	18.231	76.139	28,111.50	4.26	-0.20	-1524.7	-24.08	1.61	-3765.1	4.46	-4.64
25103	36.308	19.692	72.923	27,019.08	2.36	-2.60	-3550.4	1.73	-1.20	-4024.9	-0.25	-2.89
25104	38.693	23.116	71.357	30,766.03	2.80	-3.99	575.8	-55.87	-2.11	-2870.1	20.26	5.53
25105	30.996	23.985	69.004	25,839.94	2.82	-5.15	-2843.0	-6.51	-5.44	-5540.8	1.79	-7.13
25200	37.997	14.138	75.700	36,270.72	4.64	-3.28	-2671.8	-13.97	-2.44	-4000.5	7.96	-1.84
25300	37.888	16.563	75.569	29,496.12	4.71	-1.34	-3905.7	-20.17	-0.40	-4301.8	-1.58	-4.81
25401	38.384	15.488	75.926	37,855.56	4.10	-1.44	494.1	-32.19	-1.04	-391.8	16.84	7.70
25402	36.646	25.466	70.807	34,678.89	3.05	-6.60	-4338.7	-43.70	-4.26	-8962.4	6.02	-11.11
25500	37.768	13.609	84.098	40,194.44	4.50	0.65	-447.8	-13.48	2.71	-869.9	12.94	2.89
25601	34.158	13.736	78.663	32,589.76	3.63	-1.31	-1944.3	-7.87	0.37	-3430.4	9.64	-0.38
25602	31.544	22.819	79.195	32,861.28	3.66	0.20	-1527.6	-40.87	3.81	-1672.2	11.00	6.08
25701	34.276	12.956	75.265	30,924.85	3.13	-5.08	-4475.2	-37.65	-2.06	-4584.3	1.43	-4.01
25702	27.893	15.727	71.217	24,726.21	2.17	-3.65	-697.0	-25.71	-2.70	-2688.7	9.98	1.46
25800	30.100	19.901	70.896	27,082.82	5.02	-5.55	-3192.4	-39.76	-4.73	-4769.9	4.10	-5.58
25900	34.527	12.240	76.674	33,502.68	2.33	-2.38	-1725.8	-37.27	-1.53	-2458.5	12.62	1.96
26001	43.925	14.953	84.112	40,680.07	1.76	1.24	3719.6	8.03	3.35	5293.0	25.52	20.67
26002	43.363	13.122	81.071	41,273.74	3.55	0.25	3923.8	4.44	2.63	3918.3	24.34	15.72
26101	38.760	18.992	82.171	31,482.26	4.85	0.37	-572.3	-5.86	2.97	-425.3	10.77	6.20
26102	39.583	18.229	79.688	29,155.24	3.53	-0.88	-3787.3	-32.52	2.23	-3726.5	1.87	-2.31
26106	36.885	23.770	79.508	35,693.61	2.25	0.95	2966.6	-21.70	1.30	1556.2	24.65	10.92
26107	28.221	23.926	79.755	34,587.48	2.21	3.71	5962.2	22.12	4.73	4330.1	39.84	28.16
26201	38.498	14.217	84.505	50,417.26	1.01	1.75	11045.2	27.24	4.15	10076.6	51.11	34.71
26301	29.703	15.842	75.248	33,274.03	0.39	-7.83	-1575.8	0.62	-3.83	-2721.2	8.82	2.95
26304	39.645	21.893	83.136	45,558.62	0.86	0.98	10721.2	31.59	3.10	8711.8	50.52	29.88
26410	33.094	14.388	83.453	45,861.76	0.87	0.71	10321.6	43.10	3.10	7978.0	46.95	25.46
26412	33.913	24.348	79.130	47,784.98	1.00	-2.78	13326.5	89.53	-1.63	7380.9	70.46	28.08
26501	35.393	18.539	89.326	45,322.12	2.08	8.37	5388.5	4.05	9.81	3073.1	29.60	12.98
26503	45.111	16.270	88.414	51,125.79	2.54	3.84	3947.4	8.37	5.80	3705.6	23.98	10.55

CZ	Mortgage holding rate	Migration rate	2015 employment rate	2015 mean earnings	Residualized shock	Employment effect	Earnings effect	Percentage earnings effect	Alternative employment effect	Alternative earnings effect	Percentage earnings change	Alternative percentage earnings change
26504	35.567	20.619	81.959	40,216.10	3.33	0.93	-1922.5	-29.35	3.30	-2775.9	11.18	0.32
26605	32.780	16.183	83.817	42,913.07	1.48	4.69	3205.5	-3.94	4.62	2927.3	16.93	9.38
26701	43.255	15.418	83.298	37,526.18	3.05	3.65	1514.8	13.92	7.05	3050.5	17.88	17.18
26702	36.885	19.672	81.967	37,942.20	1.02	3.20	5366.7	14.14	5.12	4771.2	34.80	27.34
26703	39.063	13.281	87.500	41,268.45	2.29	5.13	5683.6	88.32	6.25	5115.2	36.25	22.78
26704	36.806	22.454	84.954	47,788.17	1.33	0.73	5812.9	11.89	3.34	4954.1	28.91	16.68
26801	41.019	16.667	89.033	51,292.94	1.78	4.88	8134.5	33.46	7.93	7408.5	36.83	21.46
26803	34.559	11.765	90.441	40,883.52	1.23	8.89	9928.7	21.27	10.76	8057.0	42.00	25.80
26901	44.922	13.477	88.672	39,438.81	2.57	7.42	3017.0	29.06	10.43	3520.7	22.46	16.56
26902	40.000	18.438	79.688	33,853.62	4.20	6.11	609.5	20.46	5.09	463.7	16.12	11.95
27005	31.416	21.239	83.186	33,534.81	2.24	3.32	-805.9	-14.16	5.49	-1120.0	14.19	8.85
27006	41.985	16.794	80.153	39,921.69	2.36	0.01	-2017.0	-51.12	2.99	-1369.9	13.83	4.33
27101	38.660	17.784	88.144	39,500.65	2.62	8.60	3609.5	76.06	10.50	2435.8	26.01	15.78
27102	37.603	19.008	82.231	44,721.81	2.28	0.58	5413.0	4.50	3.31	3930.4	37.82	24.11
27201	40.625	12.891	88.672	43,795.08	2.20	7.13	5042.9	10.84	10.59	5904.7	29.40	23.66
27202	36.709	19.409	83.122	36,647.26	2.09	0.73	1692.0	7.51	4.21	2765.9	17.40	10.82
27301	37.891	14.453	88.281	39,500.39	3.32	7.26	1667.5	23.34	9.86	740.2	17.01	6.50
27302	46.190	13.333	85.238	38,019.73	3.80	3.42	2076.1	6.82	5.93	3028.9	21.28	14.23
27401	33.981	20.388	83.981	32,898.21	1.98	2.48	-721.7	-9.15	6.54	531.3	9.44	8.13
27402	38.710	16.359	83.641	35,839.94	3.48	2.61	-781.1	1.13	4.83	-705.4	14.80	8.56
27501	44.176	13.046	85.469	53,159.91	2.63	1.79	1832.4	2.80	3.58	2293.7	20.36	8.36
27502	37.356	21.264	79.885	30,753.22	2.86	1.52	-368.0	-7.06	3.16	-1647.5	7.90	-3.07
27503	38.889	18.519	83.951	39,389.27	2.04	-0.05	-1317.3	-0.99	3.32	-115.1	10.33	7.58
27504	36.181	16.583	87.437	40,838.98	1.87	5.76	3472.5	0.54	9.01	974.8	26.59	10.68
27601	38.462	20.313	84.014	38,447.22	2.30	2.22	908.8	-3.08	4.77	791.4	15.46	5.65
27701	33.333	20.875	83.838	34,717.33	2.46	7.00	2254.3	4.49	7.50	1411.6	21.54	12.01
27702	41.131	25.146	85.575	42,334.89	2.93	2.54	1608.3	5.14	4.62	1277.1	18.31	6.51
27801	42.460	17.857	84.921	41,057.47	1.49	1.18	-545.5	3.90	4.10	-727.9	10.42	-2.99
27802	41.026	16.484	83.883	36,988.69	1.79	3.50	3160.2	13.75	5.91	2093.5	20.95	11.12
27901	33.152	20.109	82.065	36,255.16	2.29	1.95	3543.3	31.38	3.44	666.4	24.27	10.55
27902	35.652	23.478	84.348	37,021.47	1.99	0.74	3865.8	25.48	6.91	3790.1	21.42	14.97
27903	32.000	18.400	85.333	36,992.92	1.67	2.17	920.9	-5.55	5.67	-358.7	14.70	4.52
28001	39.157	14.458	86.145	45,572.54	2.08	3.74	3609.7	-14.30	6.75	5036.7	23.65	17.82
28002	22.523	20.721	84.685	35,502.13	2.20	11.38	7111.7	3.09	10.81	6584.3	35.59	28.79
28101	39.261	15.360	84.959	45,457.03	1.83	1.71	2084.7	3.38	3.94	2891.8	20.58	12.39
28102	31.953	20.118	88.757	38,876.88	1.85	6.46	3286.1	4.99	9.41	2356.9	21.99	11.40
28201	27.638	20.101	80.905	31,830.97	3.25	2.41	-2873.6	-35.10	5.61	-1972.1	4.05	2.40
28202	40.626	13.992	85.139	49,228.93	1.83	2.98	3104.8	6.23	4.11	3238.5	23.08	11.79
28301	31.973	22.449	80.272	36,768.13	1.86	-0.09	3057.3	43.50	3.25	3590.2	28.72	22.38
28306	41.081	17.297	89.730	42,657.97	1.51	9.03	2677.6	36.41	10.41	2054.5	22.49	11.82
28401	44.461	26.718	78.999	44,177.98	3.69	-1.04	-1184.4	-5.92	-0.25	-165.8	12.19	4.62
28502	38.943	20.025	78.256	35,572.35	3.28	-0.48	-587.6	-20.89	0.73	-1521.4	14.34	5.45
28608	38.258	17.045	86.364	37,792.01	1.54	5.54	2159.2	18.21	8.18	2022.8	15.13	7.56
28609	36.158	21.469	82.486	36,956.79	1.64	1.69	-1339.8	-8.08	4.03	-682.5	12.78	6.95
28702	40.816	31.250	80.740	43,107.98	4.11	1.01	-4169.5	-19.28	2.22	-6486.2	3.11	-11.79
28704	35.246	30.328	87.705	41,589.65	1.87	3.20	6031.1	44.40	4.85	4067.6	33.46	13.96
28800	45.469	23.050	81.206	48,596.63	3.41	0.75	-304.7	5.72	1.27	463.8	13.89	4.79
28900	44.474	17.444	80.870	55,343.48	3.64	0.10	-1223.2	-2.13	0.57	861.1	13.07	4.72
29003	34.973	26.230	81.421	39,174.16	0.99	4.11	2188.4	-36.05	5.18	1001.0	18.97	8.91
29004	31.429	19.429	86.286	31,662.37	2.12	7.28	-314.4	-0.88	10.36	-616.4	10.55	4.23
29005	37.383	20.872	81.620	35,184.88	1.78	0.83	-1185.7	-13.27	3.03	-102.7	11.43	7.05
29006	37.762	19.580	84.615	43,230.73	1.42	2.26	2385.7	-7.41	4.52	339.2	31.03	11.26
29104	39.368	19.540	81.897	40,377.63	2.12	0.16	2186.6	13.50	2.14	1604.5	22.63	12.43
29201	32.432	13.514	87.387	36,218.66	1.53	5.73	2165.4	1.91	10.35	1418.7	22.12	14.52
29203	34.873	32.166	82.643	39,087.20	2.00	0.49	2107.7	3.33	2.93	324.3	23.07	7.50
29204	39.667	18.874	83.301	41,577.52	2.11	1.28	99.4	3.39	3.25	676.2	13.24	5.61
29301	38.392	16.376	80.640	41,982.60	4.07	0.06	-1665.7	-9.37	1.49	-2550.3	12.56	0.20
29302	34.037	21.372	85.488	39,428.14	2.50	3.54	2102.3	4.25	5.88	4223.6	17.65	16.56
29303	32.524	25.243	78.155	35,041.39	2.99	-2.36	-2101.1	-10.03	-0.93	-2930.1	11.43	1.90
29401	35.448	25.746	80.597	34,497.34	3.83	0.13	-2959.8	3.19	2.72	-4958.0	4.06	-7.87
29402	36.145	23.494	80.120	33,874.15	2.04	-2.27	-2845.2	5.16	-0.65	-2770.4	8.08	2.12
29403	30.769	19.527	79.142	35,897.65	3.79	-1.23	575.7	-16.59	1.28	-1868.6	18.88	2.61
29501	32.564	32.794	82.217	39,763.86	3.14	2.68	274.3	7.93	4.10	-525.7	14.66	5.53
29502	41.850	13.613	82.207	49,075.18	3.69	0.61	-316.4	1.99	1.82	789.3	14.37	5.40
29503	35.433	13.386	79.003	35,369.81	4.22	-1.56	-519.1	-7.66	0.24	-811.9	10.58	2.06
29504	32.763	20.782	72.127	27,531.89	3.74	-5.60	-3129.7	-43.75	-4.20	-4527.2	2.54	-5.46
29505	37.241	14.483	80.000	31,597.03	2.68	-3.56	-1031.3	-18.05	-0.49	-1291.7	10.33	3.91
29601	36.737	16.438	81.694	38,505.45	3.03	-0.58	-897.8	-21.48	1.66	-52.4	12.11	5.45
29602	35.673	20.760	73.392	27,951.22	5.51	-5.94	-3269.3	-29.39	-2.15	-3596.9	0.24	-5.14
29700	38.312	16.836	78.568	34,289.42	4.65	0.03	-1158.2	-13.56	1.80	-1891.8	11.25	2.61
29800	33.023	24.186	79.070	30,711.06	4.67	1.44	-1053.1	-26.67	4.17	-605.5	8.60	6.26
29901	32.669	18.486	78.805	32,122.40	3.34	0.16	-1916.2	-24.10	2.06	-2666.3	7.98	1.68
29902	35.938	26.563	78.646	29,042.89	3.07	1.16	-1190.2	-6.48	3.41	-1434.7	13.21	8.37
30000	35.349	18.295	74.109	33,110.96	3.21	-3.53	-510.4	-7.55	-2.77	-1885.1	10.43	1.10

CZ	Mortgage holding rate	Migration rate	2015 employment rate	2015 mean earnings	Residualized shock	Employment effect	Earnings effect	Percentage earnings effect	Alternative employment effect	Alternative earnings effect	Percentage earnings change	Alternative percentage earnings change
30100	31.456	17.087	74.045	32,706.53	3.13	-3.92	-1260.9	-20.89	-2.45	-3032.6	10.41	-1.40
30200	25.501	22.350	72.350	30,847.53	2.19	-3.58	1922.6	-2.05	-3.33	569.9	21.23	10.11
30300	38.421	19.569	78.086	46,951.68	2.69	-1.60	3179.0	-19.22	-0.42	1750.1	23.93	8.92
30401	36.842	25.987	78.947	39,461.67	2.81	0.27	-649.3	-19.68	1.64	-1589.9	12.98	2.54
30402	37.147	14.781	76.923	44,663.35	3.00	-1.23	2770.8	4.58	-1.06	1489.9	23.34	9.83
30403	28.571	24.885	72.350	33,247.76	3.56	-3.43	1335.5	-7.52	-3.52	-1509.8	16.01	2.49
30501	37.864	11.650	86.408	39,591.14	3.22	3.26	-162.9	15.52	5.01	-400.2	19.69	6.19
30502	28.784	21.836	76.427	35,634.69	1.43	0.71	3219.5	-0.10	0.45	855.5	32.65	14.02
30601	35.761	20.475	80.775	40,643.74	3.16	2.58	4308.8	16.31	2.62	2468.6	30.76	15.27
30602	33.766	30.844	77.922	31,484.29	2.98	-1.06	2500.1	-24.91	2.09	1742.1	23.85	18.44
30604	31.016	27.273	76.471	35,022.75	7.76	-0.81	3100.2	-50.71	0.20	-154.5	27.33	9.85
30701	31.891	19.362	73.349	37,334.17	3.16	-1.40	3670.0	4.28	-1.80	899.9	30.48	11.70
30801	29.653	27.760	75.079	43,498.98	4.59	-1.83	6656.3	9.38	-1.25	-1391.1	39.15	5.08
30802	31.652	26.119	81.448	45,614.73	2.11	1.76	7696.8	33.26	2.66	6219.7	40.08	23.00
30901	32.414	33.103	76.552	34,668.99	1.97	-2.09	2545.1	17.12	-0.12	1270.0	25.63	15.07
30903	31.589	24.709	82.074	45,518.21	2.09	2.56	5755.4	34.52	2.66	3623.8	33.72	15.73
30904	25.907	25.389	75.648	52,158.80	3.60	-3.14	7906.5	2.78	-3.57	3801.0	37.89	10.31
30908	21.212	36.869	77.273	33,635.24	1.64	-1.18	2676.8	-30.25	0.93	-231.0	24.47	6.20
31001	36.413	23.913	78.804	39,370.89	1.17	-1.73	1489.9	-15.65	-1.35	-1383.0	18.68	0.38
31004	34.646	25.984	77.165	36,465.83	1.69	1.88	-2205.2	-3.47	0.13	-3682.8	11.46	-1.52
31006	29.000	25.000	80.000	30,096.95	1.84	3.72	-2244.0	-31.06	1.79	-2955.0	10.01	1.91
31007	32.110	37.615	75.229	38,280.69	1.83	-3.90	2540.6	26.21	-1.68	1088.8	26.43	12.60
31101	29.586	20.414	82.101	47,907.34	3.60	3.95	7064.9	42.08	4.57	6253.3	35.36	21.95
31102	33.333	22.876	83.660	49,854.90	2.77	8.56	12496.7	42.45	7.53	10544.9	47.54	28.75
31201	40.052	21.946	82.487	59,752.69	3.38	1.12	3851.3	14.80	1.84	4364.6	24.27	11.34
31202	26.263	35.354	80.303	43,258.04	2.91	3.77	9334.5	45.54	5.21	10350.4	40.42	35.87
31301	36.169	19.861	81.430	47,910.39	2.76	0.66	4961.4	13.90	1.71	3776.8	28.19	12.94
31302	24.390	23.780	81.098	39,222.57	3.39	-1.23	5242.9	10.03	0.85	1614.3	38.06	11.78
31303	29.658	31.179	78.707	34,452.83	2.23	3.11	304.3	6.15	2.51	-1365.1	12.27	-0.07
31401	29.740	24.447	80.462	58,961.32	3.84	0.63	17615.5	54.36	1.67	14530.0	66.77	37.42
31402	18.812	21.782	79.208	43,300.94	5.84	-0.87	10380.0	36.97	0.16	7890.7	51.09	27.85
31503	35.318	20.568	84.844	43,756.83	4.02	5.84	4883.5	19.14	6.25	3551.6	34.38	18.35
31600	32.268	18.922	82.581	39,184.87	4.12	5.47	4131.9	36.55	4.40	1223.9	34.51	12.87
31700	29.921	25.966	81.433	47,452.57	3.11	2.03	8433.3	38.61	2.84	5871.7	43.29	20.32
31800	33.039	28.247	83.859	49,580.92	2.34	2.06	5889.0	18.71	3.27	5813.3	32.90	19.84
31900	35.370	30.123	83.148	60,954.78	3.78	2.43	9900.0	40.22	2.10	8874.3	42.66	21.90
32000	36.214	17.281	79.876	59,767.70	3.43	1.55	6532.8	22.69	0.32	5330.0	31.78	14.64
32100	30.902	23.606	77.176	47,320.59	4.25	-0.24	7395.2	14.97	-0.15	5389.0	37.76	19.70
32201	25.670	27.221	78.843	38,982.35	3.36	1.88	2904.3	23.83	1.84	1916.5	24.65	12.71
32202	26.050	24.090	74.230	44,358.03	3.21	-0.97	7727.6	-15.72	-0.58	3087.6	36.50	15.25
32301	29.149	28.298	82.979	43,772.20	2.83	3.64	7293.2	56.14	3.29	5407.7	40.11	22.53
32304	19.853	30.882	77.941	39,120.13	3.22	0.96	3843.1	9.63	0.76	-2701.6	38.44	9.26
32305	28.662	35.032	78.981	44,056.96	3.92	-1.96	8066.1	13.56	-1.20	4888.1	41.66	19.51
32306	22.917	22.917	87.500	39,962.53	3.10	11.42	9031.0	42.33	8.89	2927.2	51.40	18.36
32401	25.123	31.527	84.236	42,659.08	3.36	3.45	9317.4	55.08	5.67	8168.1	57.10	37.39
32501	28.611	27.373	79.917	39,712.13	2.56	0.44	3768.3	23.08	2.08	2300.9	25.74	11.83
32601	31.616	31.794	83.837	41,073.60	3.40	1.99	3605.2	0.96	4.27	2130.3	26.06	12.71
32701	29.167	26.389	77.315	41,423.05	2.92	-1.15	5520.4	2.38	1.08	3526.3	29.81	17.31
32702	31.606	35.233	87.565	46,150.71	2.70	10.41	9155.4	71.16	10.30	7839.6	45.76	30.83
32801	28.585	23.162	80.974	41,526.24	2.85	1.70	4382.6	4.98	2.37	3658.2	28.29	15.97
32802	28.784	29.777	75.186	44,302.01	2.84	1.72	9692.8	28.02	0.26	6470.6	46.81	25.86
32900	36.724	35.871	77.893	41,913.00	2.33	-3.78	3369.9	-2.24	-1.26	1930.5	24.36	12.25
33000	39.194	22.410	81.804	53,087.49	3.60	1.13	3037.8	18.07	1.51	2982.4	22.28	9.33
33100	38.575	21.053	81.101	58,913.29	3.61	1.78	2015.6	12.62	0.72	2632.4	20.03	7.50
33200	32.739	28.917	76.943	40,330.46	3.36	0.47	4601.3	14.01	-0.07	4305.6	28.37	18.57
33300	31.330	25.932	78.854	43,997.01	3.59	0.53	4751.1	10.15	1.60	4137.3	25.78	15.46
33400	29.351	24.525	79.430	41,956.28	3.71	0.95	5608.4	22.95	2.14	3255.6	29.45	12.62
33500	33.333	20.544	78.348	39,441.55	3.17	-0.51	19.6	2.20	0.18	-1275.3	14.63	2.39
33601	32.946	28.811	77.390	37,724.41	2.01	-2.62	1852.2	2.53	-1.46	65.8	22.72	10.68
33602	34.010	31.980	78.680	37,132.41	2.02	-3.05	101.1	-12.54	-1.38	522.4	19.83	12.32
33700	30.885	18.456	75.706	35,340.38	2.48	-2.86	593.1	-7.58	-1.39	-1180.8	21.01	6.36
33801	31.148	25.820	76.639	38,225.51	2.68	-1.42	4787.9	-8.91	1.73	2238.3	34.52	13.26
33802	26.935	25.387	75.851	30,409.50	2.38	-3.85	-2278.4	-21.37	-1.56	-4877.2	8.34	-6.37
33803	36.634	14.417	79.017	43,981.62	1.96	-0.80	3529.0	0.81	0.59	2335.5	25.30	11.68
33901	22.648	24.390	73.171	29,100.52	2.56	-3.25	-572.6	7.45	-3.52	-3176.7	13.49	1.18
33902	33.873	24.277	80.231	43,811.43	3.13	1.38	2927.9	7.90	1.55	2692.5	22.60	12.48
34001	29.775	19.810	73.310	29,953.84	2.60	-3.96	-1955.3	-26.83	-1.14	-2688.7	7.49	1.96
34002	26.744	20.465	71.163	27,993.75	3.07	-4.24	-1584.1	-18.59	-4.43	-4340.4	7.66	-4.78
34201	22.523	18.018	73.874	28,101.07	1.72	0.12	-2187.3	5.58	-2.17	-5355.7	12.48	-0.88
34202	23.214	16.964	68.750	26,239.57	1.85	-2.31	1814.6	-30.06	-5.11	-1051.1	22.90	12.24
34203	34.028	22.454	82.407	32,612.73	2.10	2.76	2715.3	-3.49	5.12	770.3	21.23	9.16
34301	36.095	25.444	82.249	38,332.07	3.53	0.39	934.9	72.66	4.69	-135.5	17.22	6.18
34303	32.515	20.859	80.982	38,198.60	4.06	-3.60	91.5	-16.38	-0.49	-2410.9	13.69	-6.07
34304	30.052	17.617	77.720	35,511.98	3.84	-2.41	2490.8	-16.45	-0.73	-595.9	26.56	3.71

CZ	Mortgage holding rate	Migration rate	2015 employment rate	2015 mean earnings	Residualized shock	Employment effect	Earnings effect	Percentage earnings effect	Alternative employment effect	Alternative earnings effect	Percentage earnings change	Alternative percentage earnings change
34308	36.082	17.139	84.407	43,910.68	2.52	2.59	2971.0	17.80	5.87	2685.7	20.69	9.26
34402	41.768	24.783	81.976	37,570.21	4.26	2.20	-473.8	-2.02	4.93	-1506.4	13.93	0.91
34403	40.489	19.837	84.783	38,340.08	2.43	4.41	3845.0	21.83	6.10	1865.6	26.16	12.71
34404	33.755	13.924	81.857	36,148.16	3.13	1.86	-363.7	5.14	5.13	-1078.5	12.21	5.87
34503	37.937	20.000	76.667	34,322.04	6.92	0.57	1964.8	13.03	3.23	-61.9	14.37	4.04
34504	38.696	19.275	81.594	37,496.08	3.47	2.70	2130.5	32.40	4.56	1062.2	18.73	8.11
34601	41.948	19.476	83.895	52,456.94	3.51	1.49	619.7	34.36	1.66	-2473.2	22.63	-2.88
34603	42.075	23.631	82.997	48,786.90	3.98	1.01	6074.0	4.07	2.92	2216.1	33.30	8.11
34801	24.554	21.429	72.321	27,676.56	3.69	-3.28	-3628.9	-76.59	-2.64	-5666.3	-0.26	-10.80
34802	36.969	21.332	75.483	38,716.69	3.37	-1.04	-1329.9	-14.45	-1.40	-2626.7	6.23	-3.75
34805	38.125	23.750	78.125	31,543.37	2.34	1.38	142.4	-32.46	1.25	-1017.7	13.27	3.16
34901	39.944	18.690	75.343	40,868.48	4.06	-3.95	-1908.3	-26.03	-3.36	-2646.0	9.42	-1.74
35001	42.704	17.518	76.923	46,000.22	5.91	-0.90	-2508.9	-13.31	-2.15	-3366.5	10.41	-2.50
35002	32.394	23.239	78.169	43,917.52	11.61	0.23	4738.7	12.01	-2.74	3090.6	36.95	18.11
35100	37.878	20.354	75.978	38,716.07	5.27	-1.04	-1210.8	-11.97	-1.78	-3523.8	11.76	-3.33
35201	42.765	23.258	80.279	39,073.81	4.77	1.97	-657.1	6.29	3.52	-3527.6	9.70	-5.14
35300	32.961	20.894	77.989	40,276.26	3.90	-0.43	1644.2	-3.58	-0.02	-675.2	20.36	2.68
35401	33.236	28.477	76.720	33,391.45	5.78	1.69	-748.4	4.23	0.99	-2228.9	8.53	-1.52
35402	28.025	32.484	77.707	30,427.04	4.61	2.22	-753.1	10.31	3.00	-2366.1	8.43	-0.04
35500	19.420	20.097	76.618	28,608.27	6.87	-0.03	-1460.9	-15.67	0.72	-4497.4	11.96	-2.73
35701	41.208	22.735	79.751	34,138.02	4.71	3.25	-468.8	-3.27	4.39	-2051.5	13.94	2.58
35702	42.029	19.565	76.087	30,884.51	3.02	-1.50	-194.7	21.57	-1.43	-1581.1	13.00	4.20
35801	47.772	18.069	79.279	41,644.12	6.40	-0.09	-1929.3	3.84	0.10	-2920.2	10.07	-2.32
35802	36.607	25.893	81.250	31,728.50	5.43	8.85	4430.2	51.22	6.59	2934.5	33.08	23.11
35901	40.000	27.350	79.829	36,274.32	6.45	7.11	1139.6	32.46	4.51	-413.8	18.78	7.84
35902	45.000	27.500	78.500	36,078.78	4.67	4.79	1429.9	37.95	2.96	-855.6	21.43	7.16
36000	44.325	17.109	79.729	48,105.97	4.58	5.73	4477.0	73.01	2.93	2581.2	29.79	13.26
36100	43.513	14.076	80.687	47,099.09	4.60	2.61	2018.2	24.51	1.36	1445.8	23.05	9.59
36200	43.673	17.284	81.790	43,862.00	3.99	3.26	4593.4	17.67	2.51	3631.5	31.03	18.07
36301	45.533	15.958	82.047	39,977.47	4.39	4.46	2063.8	37.80	4.49	1855.1	19.96	9.20
36303	32.468	30.519	76.623	36,705.78	4.84	-4.47	-2763.0	-15.32	-2.14	-7676.0	7.27	-14.34
36401	40.741	31.944	77.778	43,230.62	3.63	-1.43	1163.9	-27.17	-1.92	-2557.3	19.59	-3.67
36402	36.994	18.497	76.301	43,175.64	6.21	-3.91	4378.6	24.27	-4.79	-4582.1	41.07	2.07
36404	36.776	25.441	83.375	46,164.31	4.21	0.34	14.3	-4.43	2.21	-2632.4	18.69	-0.38
36501	35.955	25.655	73.408	36,970.54	5.93	-3.08	149.7	5.67	-2.72	108.7	17.44	9.46
36600	34.186	18.014	72.876	34,790.35	6.59	-2.90	-264.2	-18.29	-3.12	-2085.9	10.21	-0.91
36700	30.486	23.283	67.504	31,239.36	4.86	-4.80	-920.7	-32.42	-5.21	-3228.8	12.42	3.68
36800	34.117	18.625	74.326	32,095.41	7.03	-1.15	-2509.7	-3.75	-1.10	-4428.9	3.00	-6.39
36901	23.889	33.333	65.000	28,528.44	5.27	-5.20	-2182.0	-34.60	-5.49	-5442.1	11.22	-3.44
36902	32.698	22.063	73.968	31,316.13	7.21	-3.05	-2532.6	-22.08	-2.05	-2773.2	2.83	-1.79
37000	36.342	19.458	73.888	39,544.49	6.52	-1.24	-1322.9	-2.27	-2.99	-2740.8	11.19	-1.12
37100	38.033	19.342	73.247	41,249.97	5.84	-2.46	-1803.6	1.91	-5.00	-3795.1	12.23	-3.39
37200	34.264	13.653	74.844	38,360.46	5.86	-1.23	-1218.6	-6.84	-2.45	-3484.1	14.03	-1.32
37300	33.460	20.391	70.581	34,618.79	6.09	-4.07	-2010.8	-11.63	-5.33	-3658.5	9.93	-1.13
37400	38.877	15.456	76.932	47,759.38	5.79	-0.93	-1899.5	-1.06	-1.78	-1694.6	11.31	0.28
37500	35.450	17.483	76.950	69,393.90	5.51	0.28	14.3	12.53	-2.28	1773.9	15.57	5.24
37601	35.862	28.276	77.931	43,481.04	3.17	-1.63	-340.6	-14.55	-2.62	-1562.5	14.95	-2.21
37603	34.906	27.358	69.811	29,600.73	6.74	-4.67	-5570.2	-32.42	-5.07	-4963.3	-6.98	-10.68
37604	36.978	24.279	77.400	42,621.55	6.69	-2.32	-4328.3	-14.28	-1.87	-4303.9	2.99	-6.76
37700	34.053	16.791	73.284	44,114.66	5.10	-0.80	-1838.0	-4.63	-2.41	-1949.3	9.81	0.51
37800	34.416	16.847	77.008	67,395.84	4.95	-0.80	-34.4	1.28	-2.31	1107.3	16.36	4.03
37901	36.138	23.938	75.803	39,494.01	6.84	-1.86	-4142.2	-14.02	-3.09	-6427.4	5.04	-10.81
37903	28.346	28.346	81.102	51,515.13	4.02	2.99	3945.4	30.81	2.75	750.4	25.47	10.72
38000	34.389	18.042	78.262	53,619.90	4.83	0.58	439.8	9.62	-0.97	138.3	16.55	3.12
38100	35.254	18.945	77.539	37,114.40	8.85	-1.37	-1131.1	-14.23	-1.15	-2970.7	17.45	2.84
38200	31.609	18.091	74.930	45,955.54	4.14	0.52	-785.9	4.82	-1.68	-896.0	11.04	0.95
38300	33.449	12.034	75.437	50,383.33	6.10	0.30	-1541.0	2.19	-2.61	-2215.6	12.56	-0.71
38401	46.272	17.481	80.977	36,405.63	4.60	4.06	2247.0	-2.32	3.70	783.3	16.75	5.64
38402	34.191	26.103	80.147	43,819.00	2.81	1.23	4524.2	41.29	1.31	5088.3	32.43	24.70
38501	35.537	15.978	76.033	35,006.38	3.45	2.90	-78.1	28.86	0.85	-966.0	19.02	9.77
38502	33.813	19.664	78.177	36,305.08	2.79	5.40	2922.5	17.01	3.82	669.3	22.02	8.67
38601	42.409	15.312	77.506	39,855.72	4.86	-0.14	183.2	-6.04	0.39	-475.2	14.33	5.25
38602	33.989	23.315	75.000	31,658.38	3.81	0.84	353.2	8.69	2.59	-977.2	14.49	8.45
38700	38.669	22.141	75.572	37,130.19	5.58	-1.39	766.7	-12.38	-1.11	474.0	13.50	6.25
38801	40.650	15.418	78.908	52,141.28	5.80	0.15	2117.2	7.78	-0.43	2481.7	21.40	9.70
38802	33.793	24.138	73.793	35,345.16	3.74	-2.44	1102.8	-14.58	-1.76	873.1	15.99	10.96
38901	36.407	17.825	76.170	39,233.45	6.15	-1.62	-504.1	-4.74	-0.74	-824.1	12.60	4.04
38902	30.830	30.830	71.146	32,666.47	4.90	-5.30	849.4	-10.42	-3.50	201.4	13.89	7.50
39000	36.492	15.827	73.690	34,464.13	2.47	-2.32	-218.2	-7.23	-2.39	-964.6	12.23	3.83
39100	38.144	16.289	77.801	40,466.00	2.33	-0.05	-815.3	2.80	-0.59	-873.6	12.95	3.84
39201	27.044	21.384	76.101	30,857.66	5.47	0.77	1525.4	3.98	2.75	2098.2	9.83	11.52
39203	38.428	22.497	75.673	34,031.20	9.71	-0.77	-3554.9	-0.52	0.10	-3018.4	0.63	-4.62
39302	40.448	20.685	79.578	44,967.58	3.91	2.00	3905.3	26.76	2.93	4509.2	27.77	20.29
39303	34.311	23.167	70.674	31,702.15	3.63	-1.74	-480.1	-16.22	-2.93	-1817.6	5.15	-2.27

CZ	Mortgage holding rate	Migration rate	2015 employment rate	2015 mean earnings	Residualized shock	Employment effect	Earnings effect	Percentage earnings effect	Alternative employment effect	Alternative earnings effect	Percentage earnings change	Alternative percentage earnings change
39400	41.515	13.413	79.233	56,622.36	4.71	-0.10	2370.7	13.54	-0.70	2513.9	21.30	8.44

Notes - This table presents CZ level estimates. Mortgage holding rate is equal to the percentage of workers that held a mortgage in 2006, defined as the worker having received a Form 1098 in 2006. Migration rate is the percentage of workers who migrated between 2007 and 2015, defined as having a different CZ at the beginning of 2007 than at the beginning of 2015. 2015 employment rate is equal to the percentage of workers that recieved either W2 wage or 1099 contractor income in 2015. 2015 wage earnings is equal to the CZ level average of W2 wage earnings plus 1099 contractor income. Residualizerd shock is equal to residuals from a regression of Great Recession local shocks on 2006-age-earnings-industry fixed effects with the overall mean added to the residuals. Employment effect is equal to CZ fixed effects from a regression of 2015 relative employment (2015 employment minus mean 1999-2006 employment) on CZ fixed effects and 2006-age-earnings-industry fixed effects. Earnings effect is equal to CZ fixed effects from a regression of 2015 relative earnings (2015 earnings minus mean 1999-2006 earnings) on CZ fixed effects and 2006-age-earnings-industry fixed effects. Percentage earnings effect are equal to CZ fixed effects from a regression of the individual's percent change in earnings from 1999-2006 to 2015 on CZ fixed effects and 2006-age-earnings-industry fixed effects. Alternative employment effect is equal to CZ fixed effects from a regression of each individual's change in employment status from 2006 to 2015 on CZ fixed effects and 2006-age-earnings-industry fixed effects. Alternative earnings effect is equal to CZ fixed effects from a regression of each individual's change in earnings from 2006 to 2015 on CZ fixed effects and 2006-age-earnings-industry fixed effects. Percentage earnings change is equal to CZ-level mean 2015 earnings divided by CZ-level mean 1999-2006 earnings (%). Alternative percentage earnings change is equal to CZ-level mean 2015 earnings divided by CZ-level mean 2006 earnings (%). This table uses the 2% Random Sample. CZs with fewer than 100 observations in that sample are omitted.