

Web Appendix for

The Great Recession and Credit Trends across Income Groups

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We use data from two different sources—zip-code-level data from the IRS on average adjusted gross income (AGI) per return and individual data from the Federal Reserve Bank of New York (FRBNY) Equifax Consumer Credit Panel (CCP). The CCP/Equifax data consist of detailed Equifax credit-report data for a 5 percent sample of individuals with credit reports and Social Security numbers. The CCP data are quarterly and available since 1999. We use the CCP/Equifax data to compute aggregate measures of credit for households in different zip codes and divide zip codes into income quintiles based on their 2001 average AGI.

Zip-level income statistics are compiled by the Internal Revenue Service and are made available through the Statistics of Income (SOI) Tax Stats publication in select years.¹ In order to be able to track transition of zip codes across income quintiles, we focus on a balanced panel of zip codes that are present in every SOI release between 2001 and 2012. The resulting set of 24,753 zip codes is then partitioned into equal-sized quintiles in each year based on their average AGI in that year. We choose the 2001 quintile values as the basis for our analysis. As reported in Table A1 below, the average AGI in the top quintile zip codes is nearly 3 times higher than the average AGI in the bottom quintile, and the rate of ownership of assets that generate taxable interest payments is more than twice as high.

Since we rely on a static assignment of zip codes to income quintiles, we are concerned about zip code transitions across quintiles during our sample timeframe. We first verify that the

¹ SOI Tax Stats - Individual Income Tax Statistics - ZIP Code Data (SOI) are available at: [http://www.irs.gov/uac/SOI-Tax-Stats-Individual-Income-Tax-Statistics-ZIP-Code-Data-\(SOI\)](http://www.irs.gov/uac/SOI-Tax-Stats-Individual-Income-Tax-Statistics-ZIP-Code-Data-(SOI))

relative average characteristics of quintiles based on the 2001 income did not change appreciably by 2012. The bottom two rows in Table A1 show that the two extreme quintiles vary just as much in their 2012 average AGI and propensities of owning interest-generating assets as they did in 2001. We further drop from the sample those zip codes that moved by more than two income quintiles between 2001 and 2012. This eliminates 4.8 percent of the 4,951 zip codes in the bottom quintile because they have transitioned to quintiles 4 or 5 (top) by 2012, as well as 0.4 percent of the 4,950 zip codes in the top quintiles that fell to quintiles 1 or 2. We also drop zip codes that experienced a substantial change in their geography between the 2000 and 2010 Censuses.² Most of these transitions occurred because of changes in geographic boundaries of zip codes, which evolve over time as the U.S. Postal Service re-optimizes mail delivery routes. In some cases, transitions occur as a result of gentrification of inner-city neighborhoods.

TABLE A1. SELECT STATISTICS FOR ZIP CODES IN THE TOP AND BOTTOM INCOME QUINTILES

Tax year	Income quintile	Average AGI (2012 dollars)	Fraction with reported taxable interest income	Fraction moved up/down by more than 2 categories by 2012
2001	1 (bottom)	\$31,418	30%	4.8%
2001	5 (top)	\$91,186	65%	0.4%
2012	1 (bottom)	\$31,716	16%	
2012	5 (top)	\$101,021	44%	

Notes: The income quintiles are defined on the basis of average 2001 AGI values. Select characteristics of the resulting top and bottom quintiles are shown for 2001 and 2012 and are expressed in constant 2012 dollars. The 2012 calculations are made before dropping zip codes that moved by more than two quintiles.

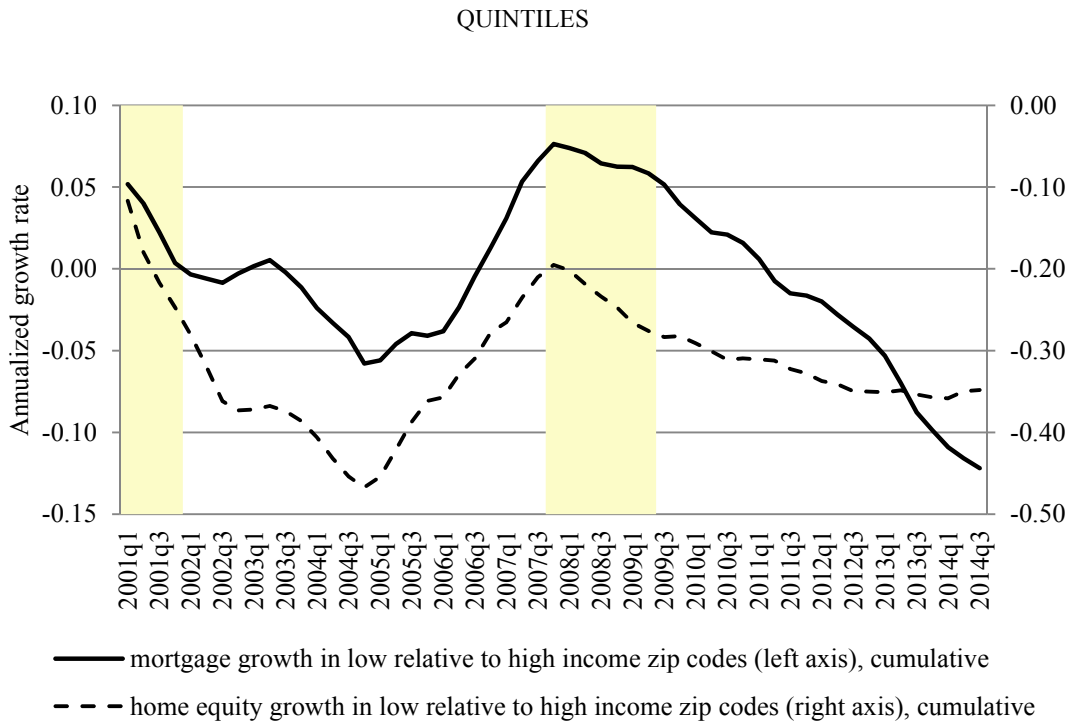
Cumulative growth rate differentials in all credit markets

We augment Figure 3 in the paper with the results for home equity lines of credit. For convenience, we keep only the differentials for home mortgages and lines of credit. The trends in

² We define a substantial change in geography in one of two ways: growth or shrinkage in land area in the top or bottom two percent of the distribution of changes in land area or a top two percent move in the location of the zip code's centroid.

the two housing-based credit markets look remarkably similar, although they differ in levels. With the exception of the housing bubble period (2004-2007), home equity based credit grew faster in highest income zip codes.

FIGURE A1. CUMULATIVE DIFFERENTIALS IN GROWTH RATES, HOUSING MARKETS TOP AND BOTTOM

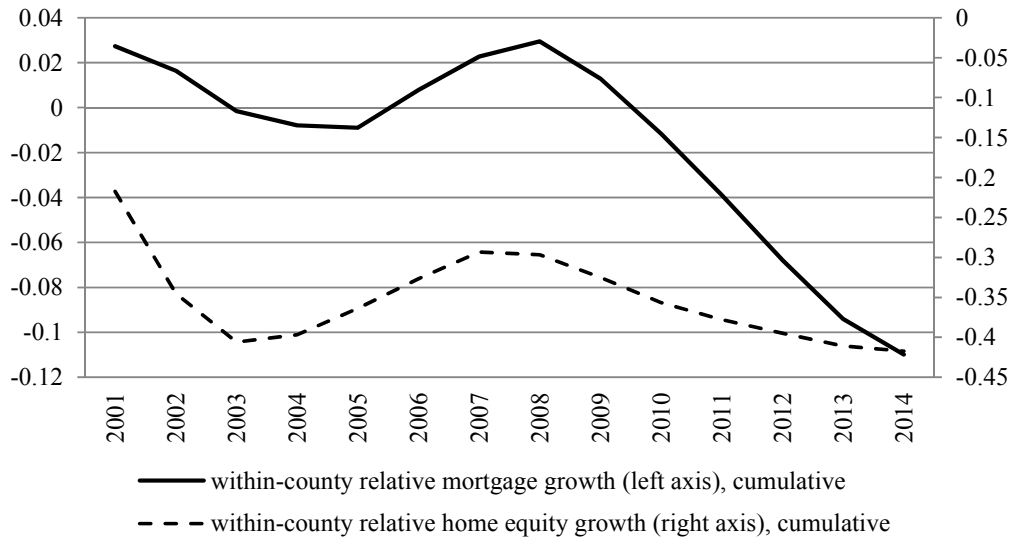


Within-county growth rates

In particular, following Mian and Sufi (2009), we calculate annual growth rates in total indebtedness for each zip code, regress those growth rates on a series of county-year dummies, and explore the patterns of the residual credit growth, by income quintile. Figure A2 shows the result of this exercise for home mortgages, presented as the cumulative growth rate differential. The comparison of this series with the solid line in Figure A1 suggests that much of the growth differential has indeed occurred *within* individual counties. Outstanding mortgage debt in poor zip codes in a given county expanded faster during the housing price boom relative to high-income zip codes in the same county, and collapsed much more rapidly during the Great

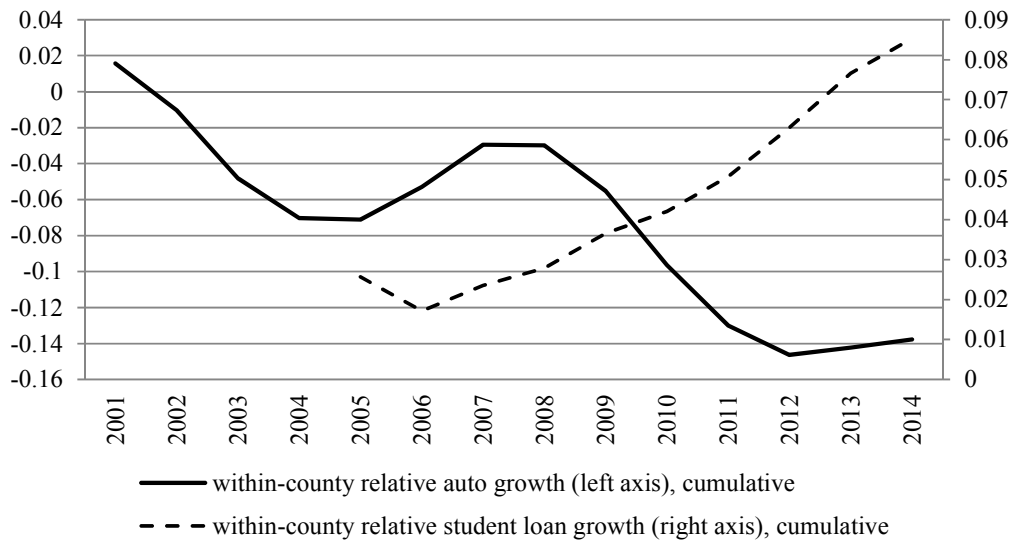
Recession. The results for the home equity (in Figure A2) and auto loans (in Figure A3) lead to similar conclusions. The dashed line in Figure A3 shows the within-county growth differential for student loans. This series exhibits a persistent pattern of outsized relative growth for the bottom quintile zip codes.

FIGURE A2. WITHIN-COUNTY GROWTH RATES DIFFERENTIALS, HOUSING MARKETS



Notes: The figure plots the cumulates the differential growth rates between the top and bottom quintile zip codes in the same county for mortgages (solid line) and home equity lines of credit (dashed line).

FIGURE A3. WITHIN-COUNTY GROWTH RATES DIFFERENTIALS, NON-HOUSING MARKETS



Notes: The figure plots the cumulates the differential growth rates between the top and bottom quintile zip codes in the same county for auto loans (solid line) and student loans (dashed line).

The apparent existence of substantial and systematic income-group heterogeneity in credit trends within individual counties can be illustrated on the example of student loans in Cook County, which includes the City of Chicago and some of its neighboring suburbs. The map in Figure A4 depicts average annual growth rates in zip-level outstanding student loan balances between 2005 and 2014. The income quintile of each zip code is indicated by numbers 1 through 5. While the relationship between income and credit growth is far from uniform, the map shows that many of the high-quintile zip codes exhibited relatively subdued rates of growth. In contrast, many of the poorest inner-city zip codes experienced rapid expansion in student loans, indicated by deeper shading.

FIGURE A4. GROWTH RATES IN STUDENT LOAN BALANCES IN COOK COUNTY, ILLINOIS, 2005-2014.

