Borrower Characteristics and Credit Supply Expansion in the U.S. Residential Mortgage Market, Evidence from 2010 to 2015

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NYU Stern Honors Thesis Presentation, May 4, 2018

Agenda

The Landscape: What are borrowers like in this period?

Greater levels of income result in higher approval rates, all else equal.

Income is more closely associate with origination measures over the six-year period.

Income growth is leads to higher approval rates, causal estimates.

Conclusion.

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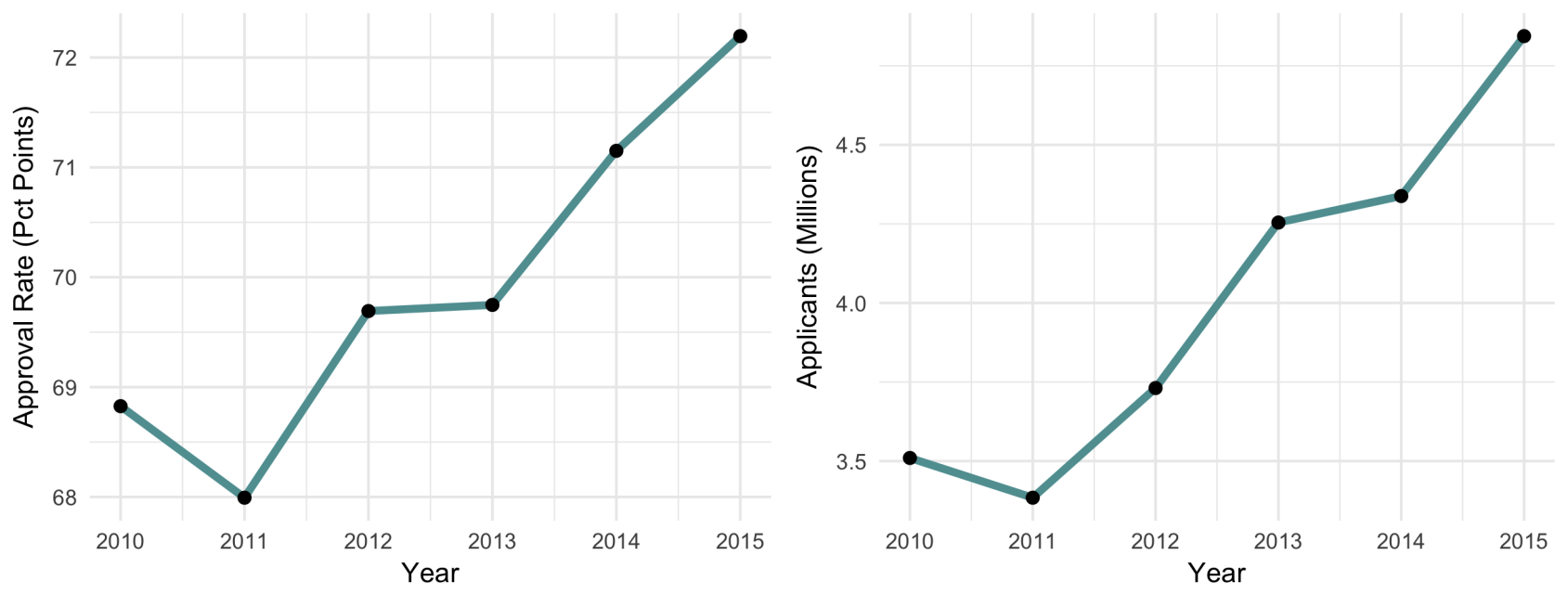
Higher Approval Rates and Demand



Source: HMDA

What are borrowers in 2015 like?

Have a higher income.

Demand marginally more debt for given income level.

Have slightly lower credit scores.

Otherwise have largely similar characteristics as in 2010.

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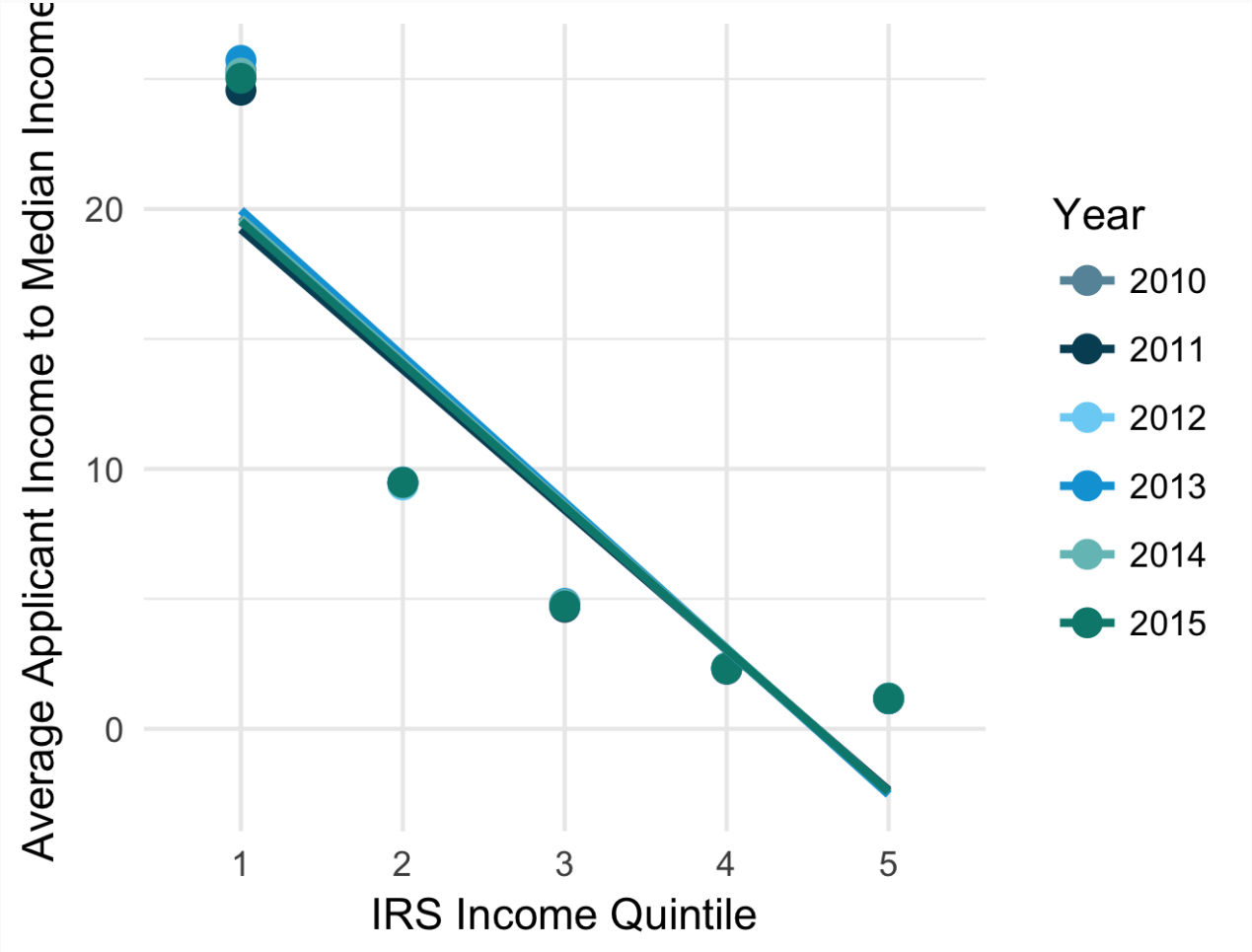
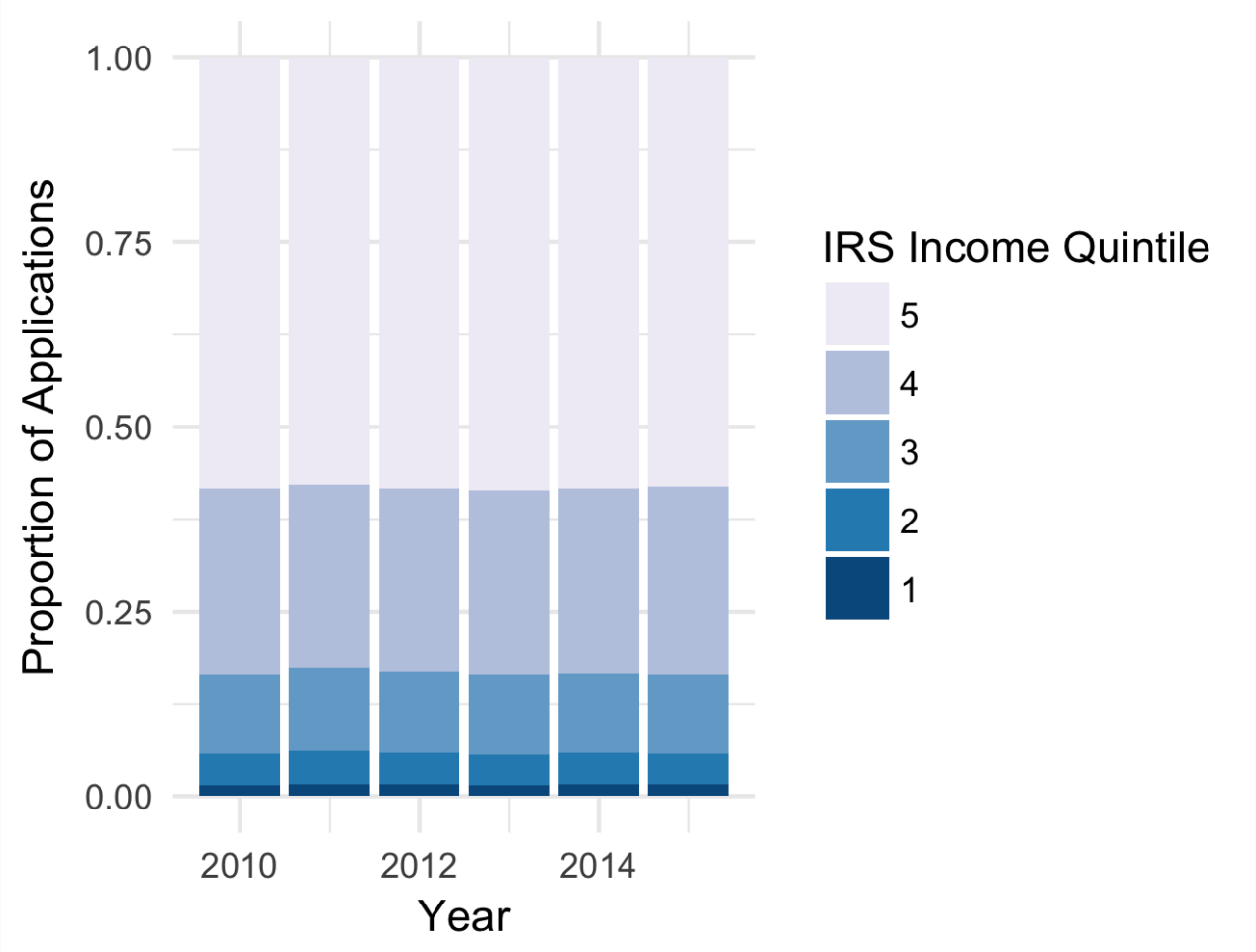
Applicant income relative to median income of ZIP code



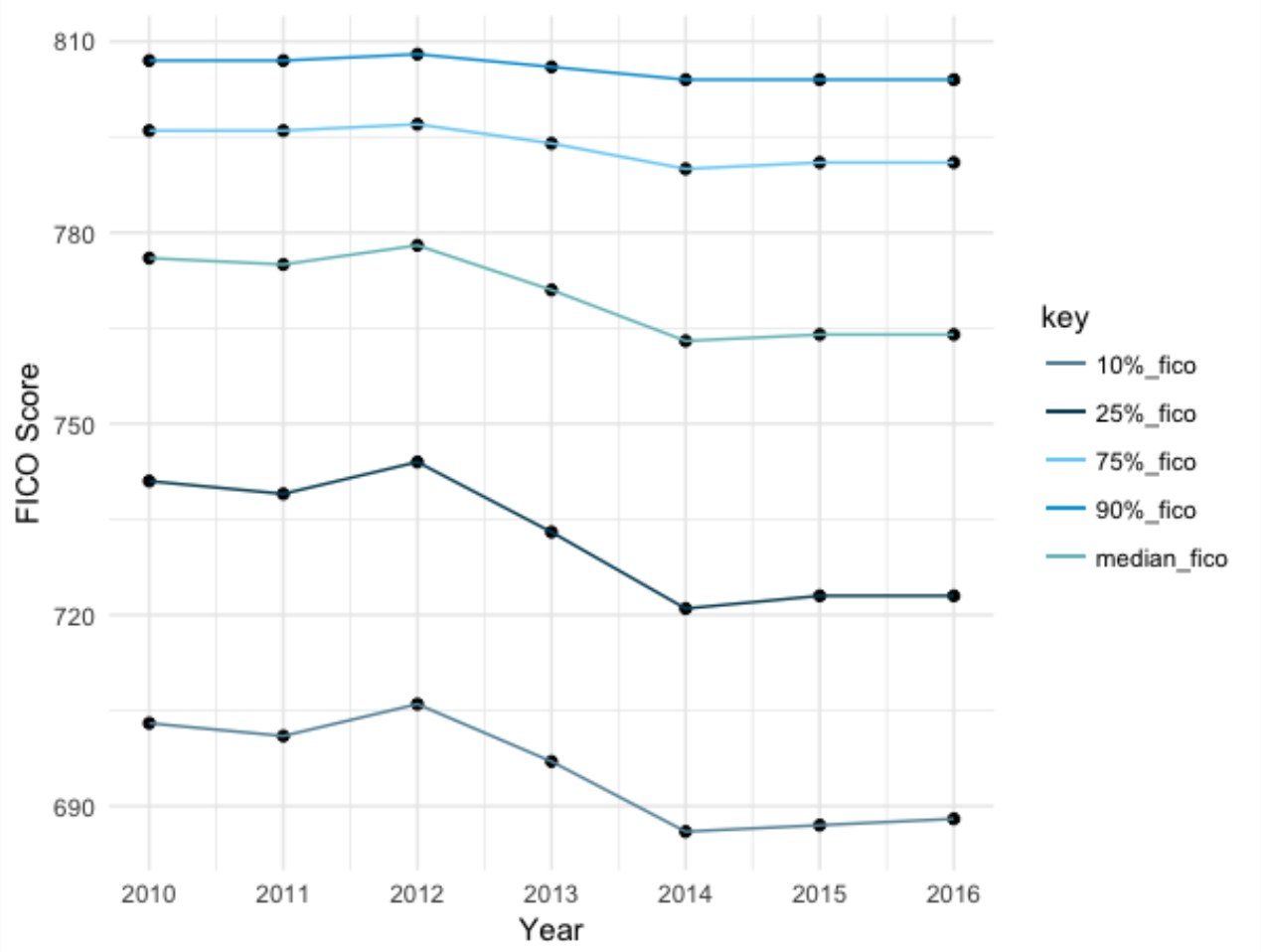
Source: HMDA, IRS

Number of applicants per Income Quintile



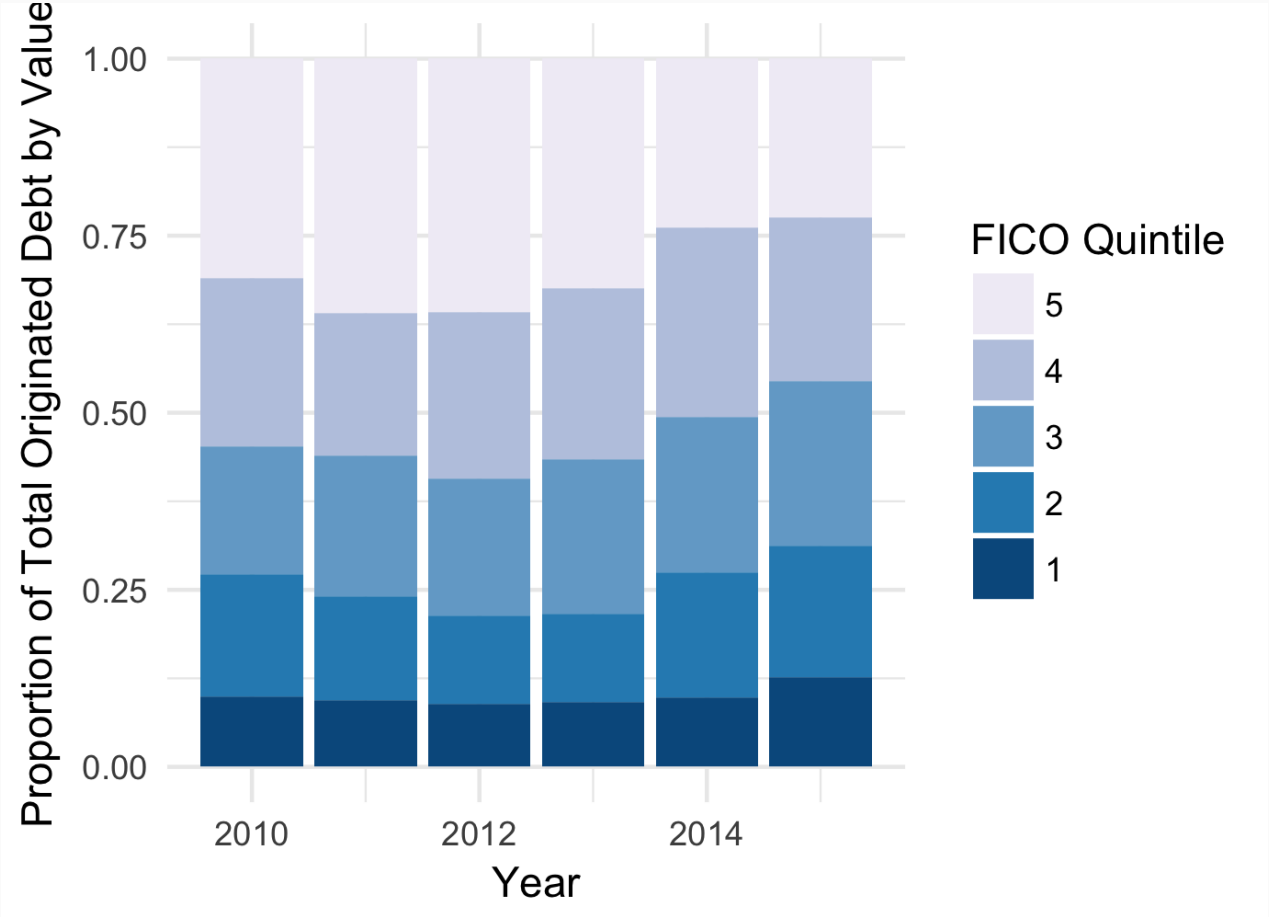
Source: HMDA, IRS

Credit Quality in Fannie/Freddie Mortgages



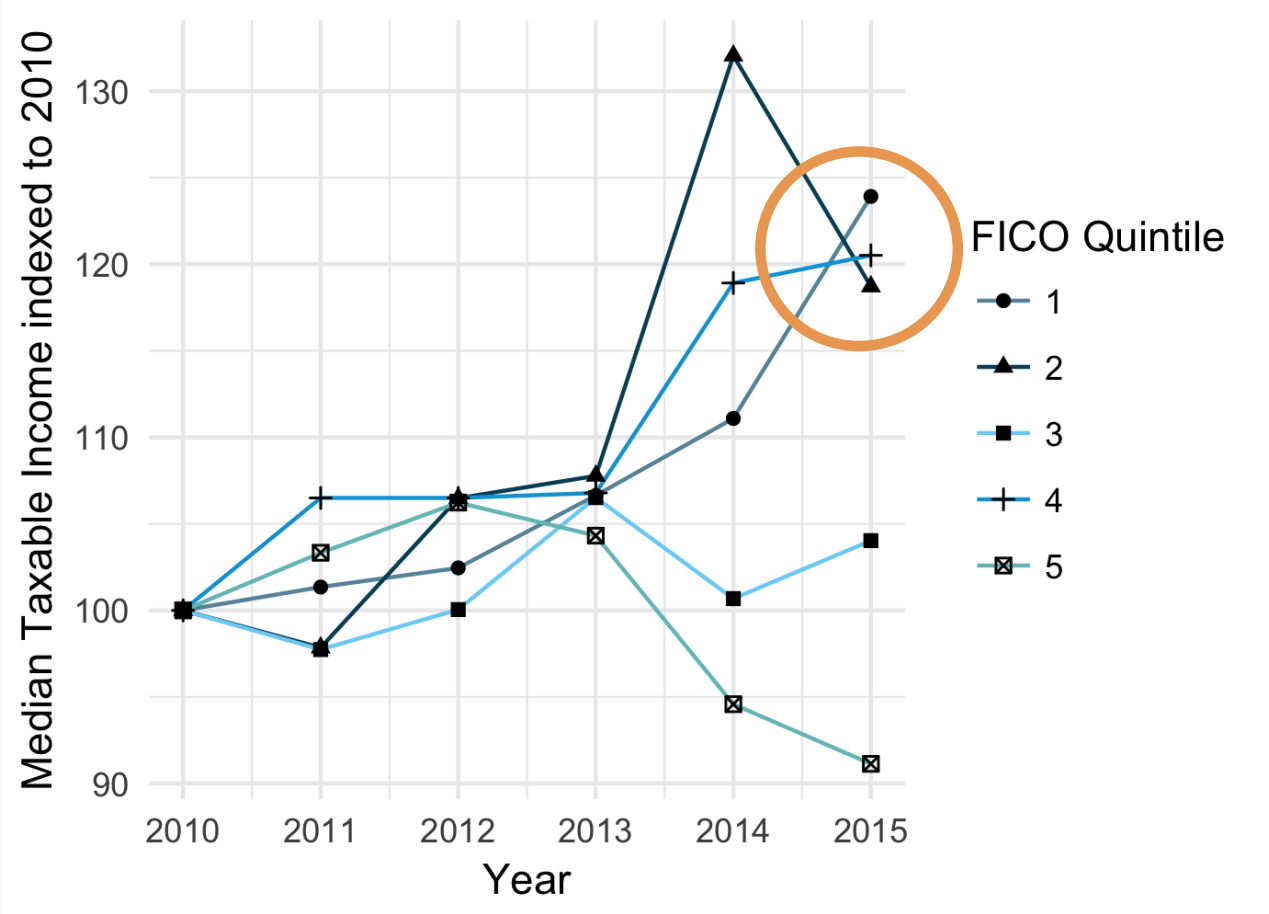
Source: Fannie Mae, Freddie Mac

More debt in low credit score zip codes



Source: HMDA, Fannie Mae, Freddie Mac

Higher income growth in lower credit score regions



Source: HMDA, IRS, Fannie Mae, Freddie Mac

Tract-level panel setup

$$Q_{i,t} = \beta Ln(y)_{i,t,j} + \gamma CLTV_{i,t} + \rho FICO_{i,t} + \phi DTI_{i,t} + FE_t + FE_{county} + \epsilon_{i,t} \quad (1)$$

Where:

- Q: Approval rate
- y_j: Median Income - IRS or Applicant Income
- $CLTV$: Median Combined Loan-to-Value ratio
- $FICO$: Median FICO (Credit) Score
- DTI: Median Debt-to-Income Ratio (Percentage Points)
- FE_t: Year Fixed Effects
- FE_{county}: County Fixed Effects

Cross-Sectional tract level panel

	Applicant Income		Median Taxable Income	
	(1)	(2)	(3)	(4)
Applicant Income	9.927***	10.320***		
	(0.056)	(0.055)		
Median Taxable Income			3.666***	3.535***
			(0.026)	(0.022)
CLTV	0.191***	0.744***	−0.021	0.380***
	(0.013)	(0.008)	(0.013)	(0.008)
FICO	0.154***	0.433***	0.201***	0.456***
	(0.008)	(0.004)	(0.008)	(0.004)
DTI	−0.017	−0.582***	0.056	−0.531***
	(0.035)	(0.012)	(0.035)	(0.012)
County Fixed effects?	Yes	No	Yes	No
N	432,440	432,440	432,404	432,404
R^2	0.282	0.126	0.263	0.109
Adjusted R^2	0.277	0.126	0.258	0.109
Residual Std. Error	13.539 (df = 429316)	14.889 (df = 432430)	13.719 (df = 429281)	15.031 (df = 432394)

Notes:

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

The closer association of income to mortgage origination

	Approval Rate		Median Loan Size		Loans Originated	
	(1)	(2)	(3)	(4)	(5)	(6)
Ln IRS Income	2.671***	2.435***	−0.174	27.190***	7.823***	8.155***
	(0.046)	(0.048)	(0.319)	(0.416)	(0.150)	(0.152)
Ln IRS Income × 2011	1.001***	0.979***	−0.769*	1.149*	−0.089	−0.052
	(0.062)	(0.069)	(0.431)	(0.602)	(0.203)	(0.220)
Ln IRS Income × 2012	1.648***	1.676***	−0.165	8.242***	0.186	1.377***
	(0.066)	(0.073)	(0.460)	(0.641)	(0.216)	(0.234)
Ln IRS Income × 2013	1.360***	1.379***	4.259***	12.007***	1.404***	2.500***
	(0.065)	(0.072)	(0.452)	(0.630)	(0.213)	(0.230)
Ln IRS Income × 2014	1.464***	1.485***	7.865***	15.572***	1.360***	2.477***
	(0.065)	(0.072)	(0.452)	(0.630)	(0.213)	(0.230)
Ln IRS Income × 2015	1.200***	1.195***	11.560***	20.118***	2.695***	3.792***
	(0.065)	(0.072)	(0.455)	(0.634)	(0.214)	(0.232)
Constant		39.908***		−118.630***		−48.078***
		(0.506)		(4.427)		(1.618)
County Fixed effects?	Yes	No	Yes	No	Yes	No
N	432,405	432,405	432,405	432,405	432,405	432,405
R^2	0.263	0.068	0.542	0.092	0.208	0.054
Adjusted R^2	0.258	0.068	0.539	0.092	0.202	0.054
Residual Std. Error	13.718 (df = 429280)	15.370 (df = 432393)	95.953 (df = 429280)	134.611 (df = 432393)	45.159 (df = 429280)	49.179 (df = 432393)

Notes:

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The impact of income growth within a county and ZIP Code

Column 1:

$$Q_i = \beta Ln(y_i) + \gamma FICO + FE_{county} + \epsilon_i \quad (2)$$

Column 2:

$$Q_i = \beta Ln(y_i) + FE_{FICOquintile} + \epsilon_i \quad (3)$$

The Bartik Instrument

Instrument median taxable income across counties using a Bartik Instrument.

$$\tilde{y_{lt}} = Z'_{l,t} G_t \tag{4}$$

where

$Z'_{i,l,t}$: Employment share of industry i in county l at time t-1

$G_{i,t}$: Growth in number of payroll employees in industry i over period t-1 to t.

Bartik Instrument Results

	(1)	(2)	(3)
Ln IRS Income	3.464***	12.107***	12.107***
	(0.070)	(0.468)	(0.468)
FICO	0.409***		
	(0.011)		
County Fixed effects?	Yes	No	No
FICO Score Quintile Fixed effects?	Yes	Yes	Yes
Year Fixed effects?	No	No	Yes
N	18,449	18,449	18,449
R^2	0.193	0.128	0.128
Adjusted R^2	0.193	0.128	0.128
F Statistic	2,199.058*** (df = 2; 18441)	−6,694.030 (df = 1; 18442)	−6,694.030 (df = 1; 18442)

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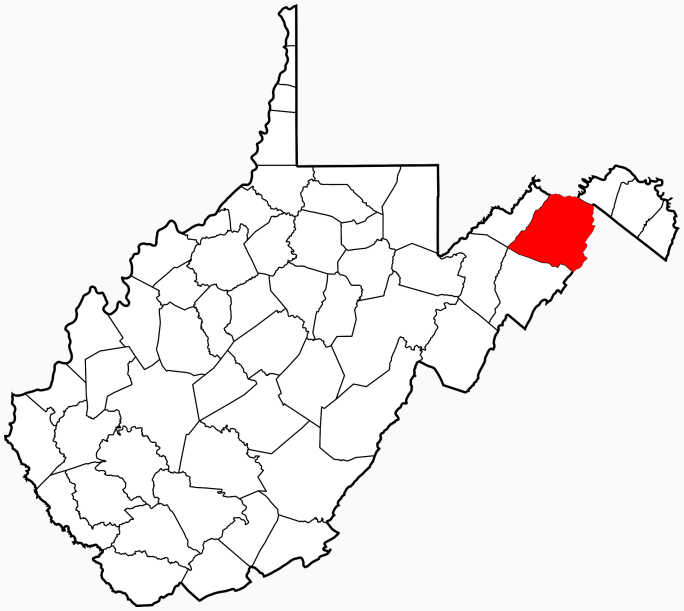
Bartik Instrument Results

Within a county: 10% Increase in Income $\rightarrow$ 0.33% increase in approval rate.

Within a FICO Quintile: 10% Increase in Income $\rightarrow$ 1.15% increase in approval rate.

Hampshire, West Virginia

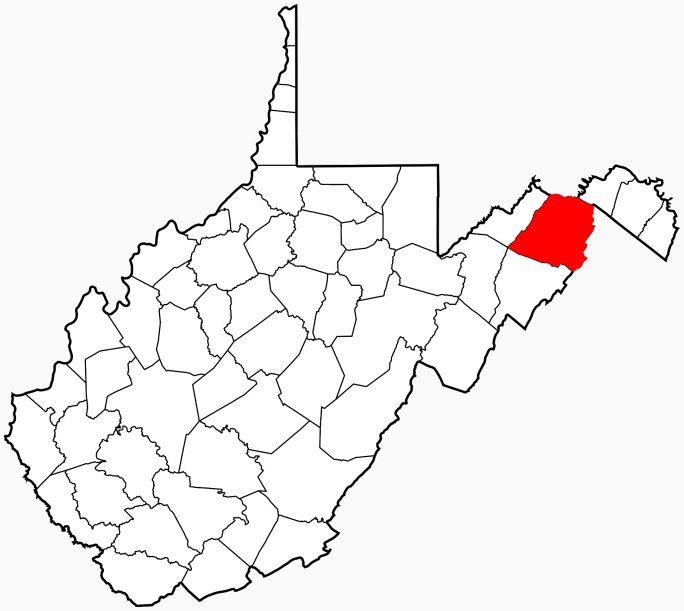


What's Different?

Worse than national average:

Income: **0.8 x WV median**

Hampshire, West Virginia



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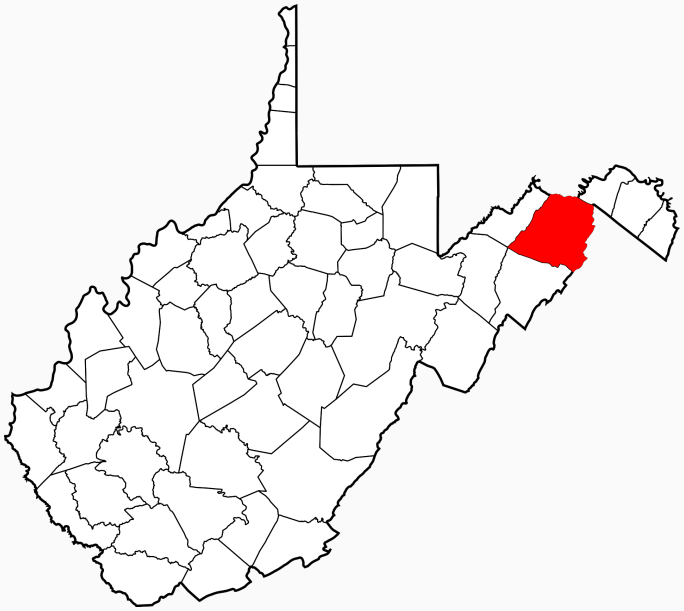

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Better than national average:

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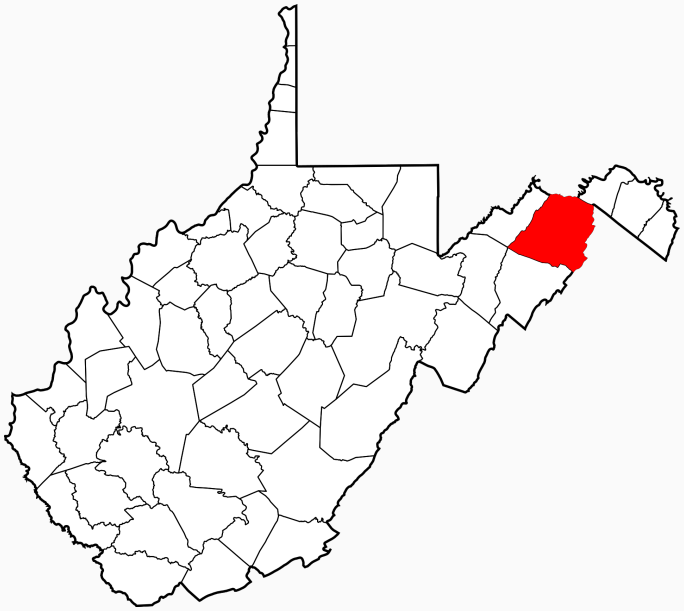

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Jobs and income growth: **15%**

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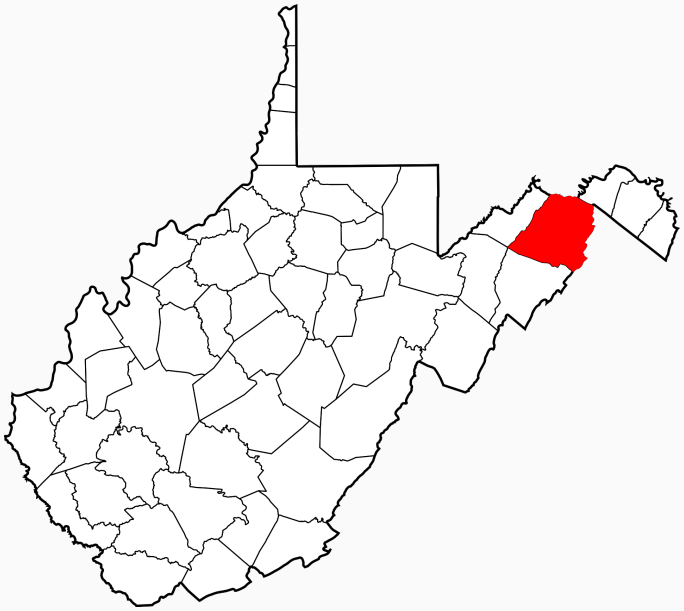

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Home ownership rate change: **6 x national average**

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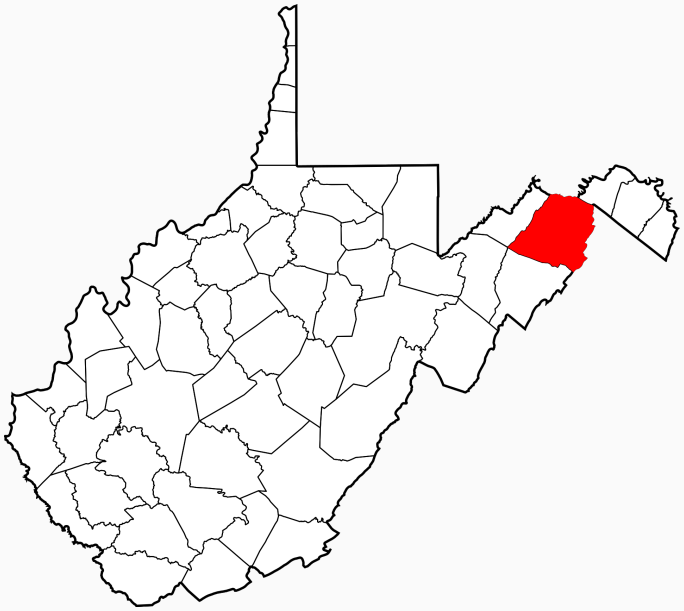

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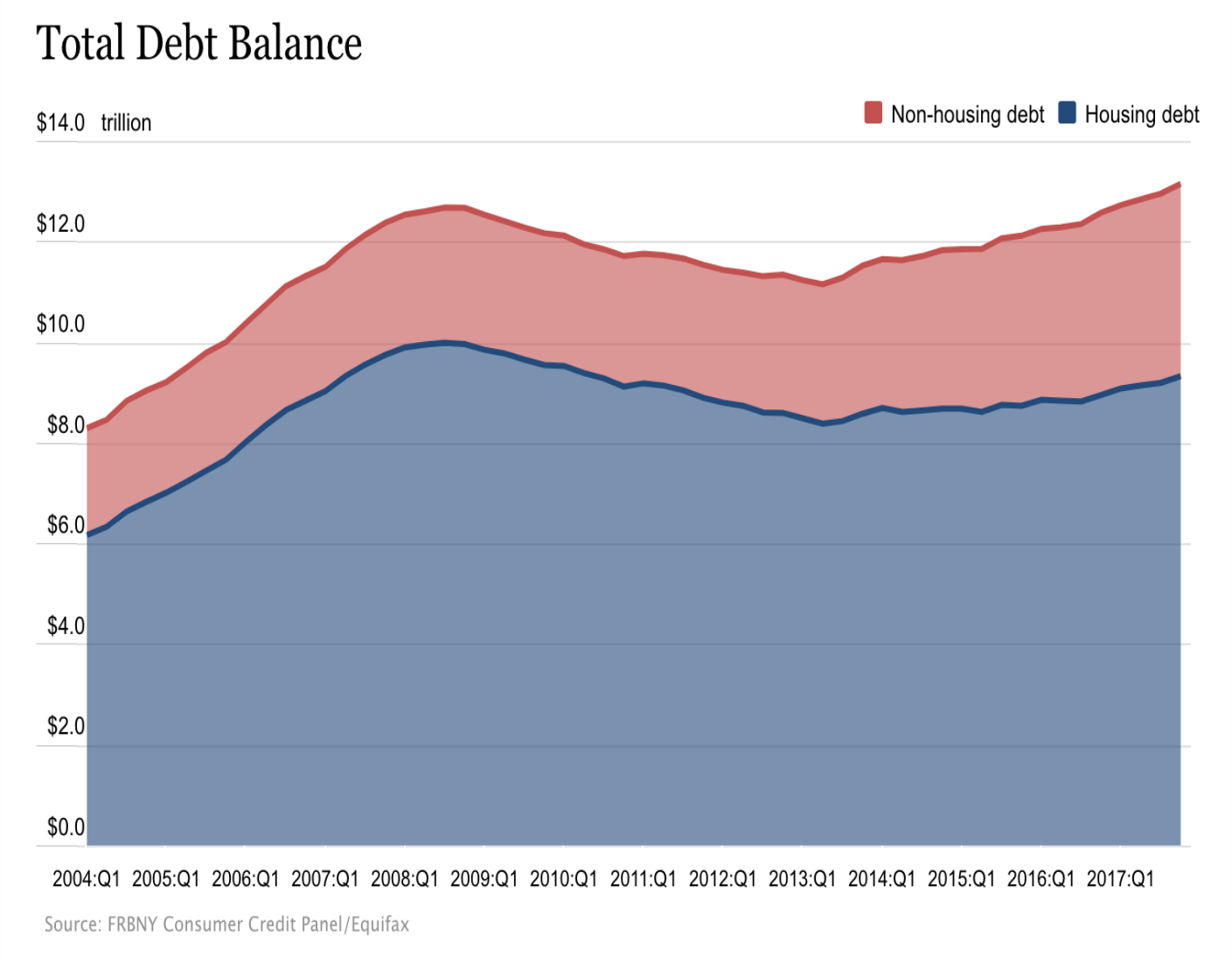
Home ownership rate change: **6 x national average**

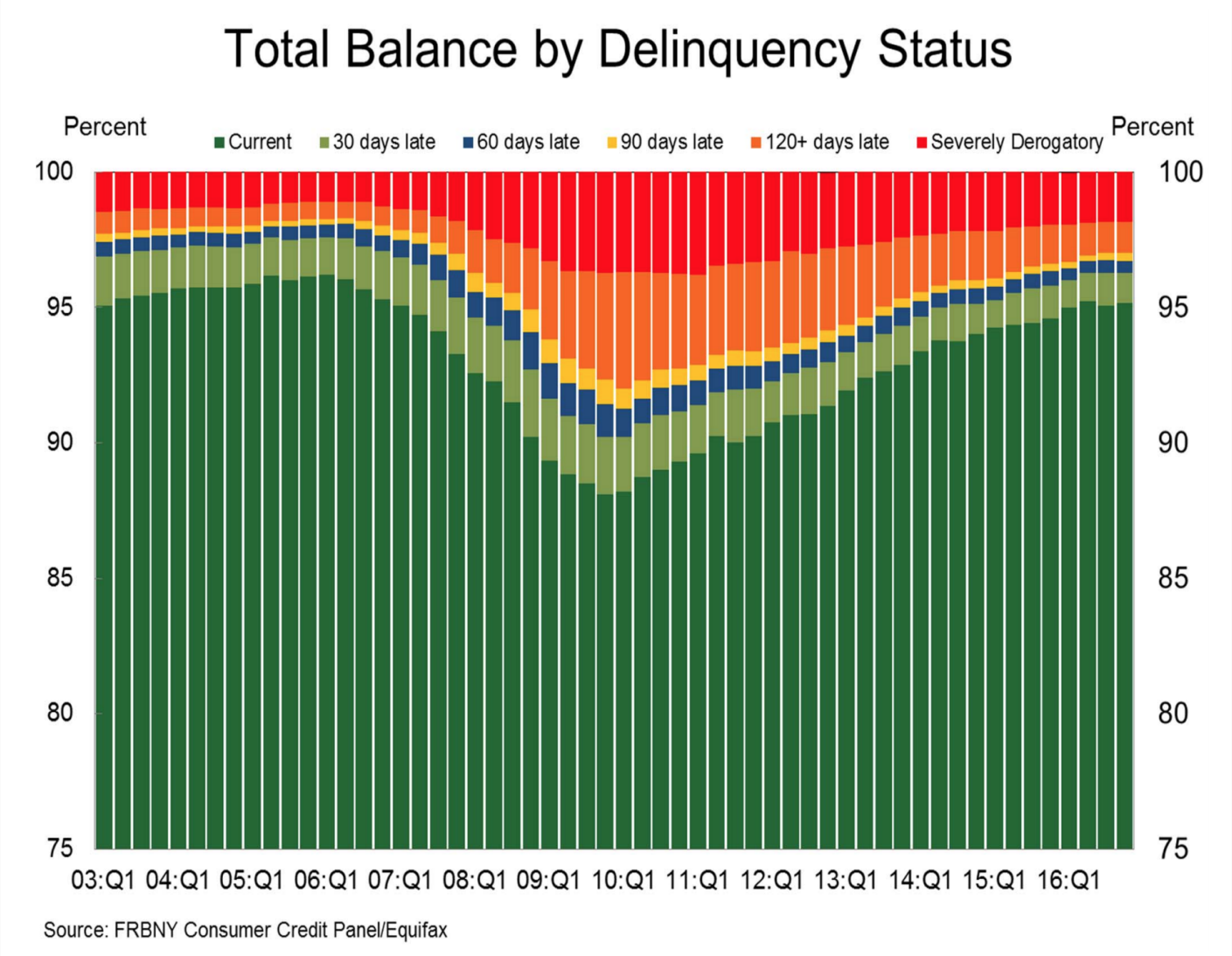
Job growth of major industry **4.8 x national average**

Appendix 1



Source: FRBY Consumer Credit Panel

Appendix 2



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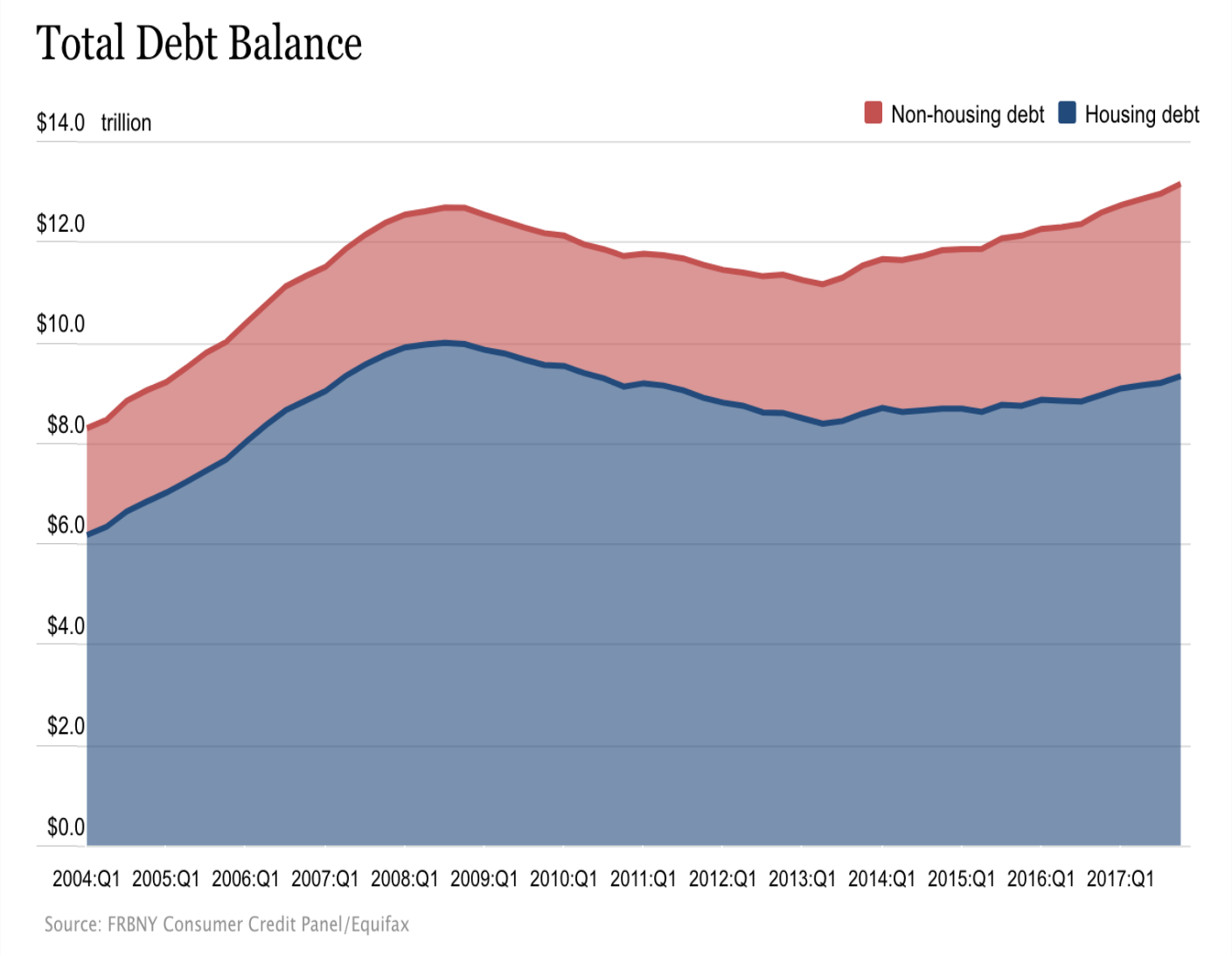

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