

Did Quantitative Easing Increase Income Inequality?

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QE & Inequality

Research Question:

What were the distributional impacts of unconventional monetary policy?

This Paper:

- ▶ Econometric decomposition of changes in U.S. income inequality
- ▶ Examine contribution of *QE channels* pre and post-QE
- ▶ Simple counterfactual exercise to frame likely causal magnitudes

Results:

- ▶ Employment generation is highly egalitarian
- ▶ But outweighed by large disequalizing equity return effects
- ▶ Net effect: QE modestly increased *income* inequality

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Preview of Results

Distributional Decomposition

- ▶ QE Channels explain most distributional changes for 2010-2016
- ▶ $\approx 2/3$ of the increase in the 95/10 ratio
- ▶ More than half of the increased Gini coefficient
- ▶ Main culprit are higher stock returns via k-gains

Counterfactual Analysis

- ▶ *Causal* effect was likely disequalizing
- ▶ Increase in the ratio of 95/10th percentiles of ≈ 1 percentage point
- ▶ Only implausibly large employment effects would yield a reduction in inequality

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Theoretical Channels

Channel	Income component	Expected direction
employment	wages	equalizing
inflation	real debt burden, inflation "tax"	ambiguous
asset prices	capital gains	disequalizing
refinancing	interest burden	ambiguous

- ▶ Net effect is ambiguous a priori → Empirical question!
- ▶ Surprisingly few empirical studies on m-policy and inequality
- ▶ Coibion et al. (2012)
 - ▶ *contractionary m-policy shocks increase inequality*
 - ▶ *suggests employment channel dominates asset price channel*

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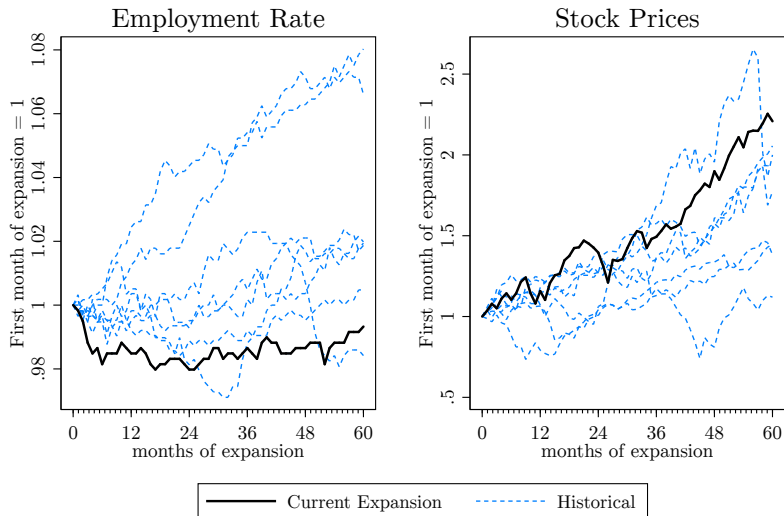
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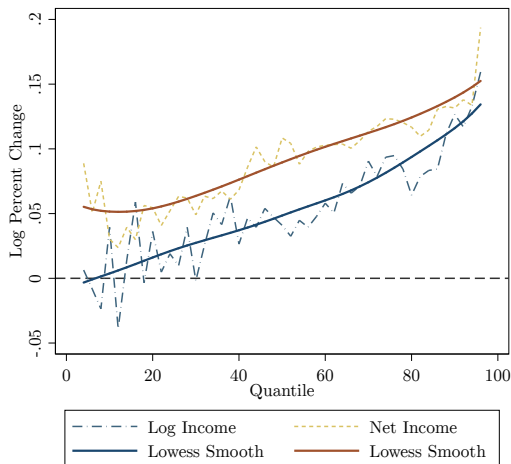
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Economic Expansions Since 1960



Income Growth by Quantile – 2010-2016



Empirical Methodology

Distributional Decomposition

- ▶ Firpo et al. (2008): RIF regression & Oaxaca-Blinder decomposition
- ▶ Contribution of returns and endowments on distributional statistics

RIF Regressions

- ▶ Firpo et al. (2007) – Regression models going “beyond the mean”
- ▶ Estimate direct effect of X on a distributional statistic
- ▶ e.g. what factors explain median income?

Oaxaca-Blinder Decomposition

- ▶ Decompose changes in y between periods into “endowment” and “returns” components
- ▶ e.g. How much of income growth is due to changes in composition of workers?

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RIF Regressions

- ▶ Simple framework to estimate effect of a covariate on a distributional statistic (e.g. quantiles, gini coefficient, etc.)
- ▶ For a statistic ν , replace dependent variable y_i with its “recentered influence function” (RIF)
- ▶ The RIF of y_i for a statistic ν has the nice property that:

$$\mathbb{E}\{RIF(y, \nu)\} = \nu$$

- ▶ Assume conditional mean is linear:

$$\mathbb{E}\{RIF(y, \nu)|X_i\} = \beta X + u$$

- ▶ Calculate the *RIF* and run OLS!

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Oaxaca-Blinder Decomposition

- ▶ Consider the linear regression model:

$$y_{it} = \gamma_t X_{it} + u_{it}$$

- ▶ The change $\Delta = y_{i1} - y_{i0}$ can be decomposed as:

$$\Delta = \underbrace{(\bar{X}_1 - \bar{X}_0)}_{\text{endowments}} \hat{\gamma}_0 + \underbrace{(\hat{\gamma}_1 - \hat{\gamma}_0)}_{\text{coefficients}} \bar{X}_0 + \underbrace{(\bar{X}_1 - \bar{X}_0)}_{\text{interaction}} (\hat{\gamma}_1 - \hat{\gamma}_0)$$

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Empirical Methodology & Data

Decomposition Steps

- 1 Calculate the RIF for a relevant dist. statistic (e.g. median income)
- 2 Estimate the RIF regression to obtain coefficients
- 3 Perform Oaxaca-Blinder decomposition

Survey of Consumer Finances (SCF)

- ▶ Triennial household survey sponsored by the Federal Reserve
- ▶ Best coverage of financial assets and liabilities for U.S.
- ▶ Covers upper tails of the income distribution
- ▶ Will use survey years 2010, 2013, 2016

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Empirical Methodology & Data

Definition of Income

- ▶ Will use “net income”:

$$\text{Net Income} = \text{Total Income} - \text{Debt Service}$$

- ▶ Makes it possible to study impact of refinancing

Total vs. Net Income, 2016 U.S. dollars

	Total Income			Net Income		
	2010	2013	2016	2010	2013	2016
Mean	86,600	89,300	102,300	73,800	78,500	91,100
Median	50,500	48,100	52,700	40,400	40,600	44,600

Functional Forms

$$Wages_{it} = \alpha_t EMP_{it} + \mathbf{X}_{it}\boldsymbol{\tau} + \epsilon_{it}$$

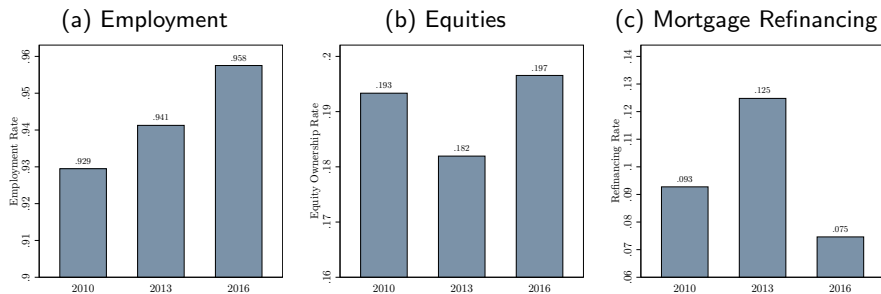
$$Financial\ Income_{it} = \mathbf{A}_{it}\boldsymbol{\beta}_t + \epsilon_{it}$$

$$Debt\ Service_{it} = \gamma_t RF_{it} + \mu_t B_{it} + \nu_{it}$$

- ▶ EMP is an employment dummy and \mathbf{X} are HH characteristics
- ▶ \mathbf{A} are financial asset ownership dummies
- ▶ RF is a dummy for mortgage refinancing

Combine to obtain Net income:

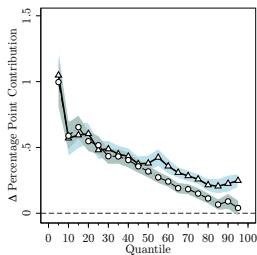
$$Net_{it} = b_{1t}EMP_{it} + \boldsymbol{\tau}\mathbf{X}_{it} + b_{2t}\mathbf{A}_{it} + b_{3t}RF_{it} + b_{5t}B_{it} + e_{it}$$

Mean Endowments: \bar{X}_t 

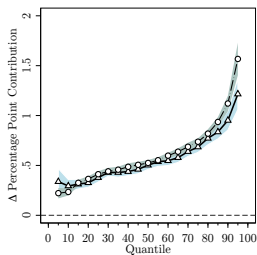
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RIF Coefficients: $\hat{\gamma}_t$

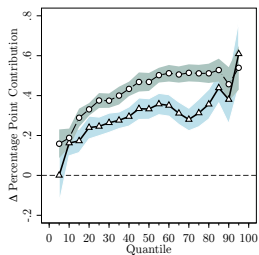
(a) Employment



(b) Equities

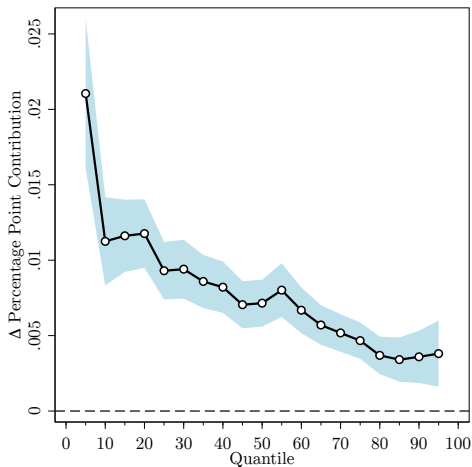


(c) Mortgage Refinancing



$$\Delta = (\bar{X}_1 - \bar{X}_0) \hat{\gamma}_0 + (\hat{\gamma}_1 - \hat{\gamma}_0) \bar{X}_0 + (\bar{X}_1 - \bar{X}_0) (\hat{\gamma}_1 - \hat{\gamma}_0)$$

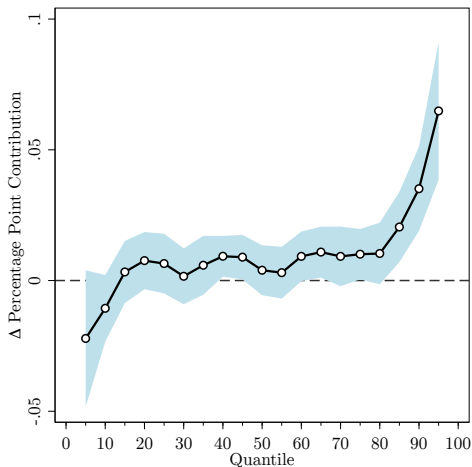
Decomposition Results: Employment

Employment – Endowments Component (Δ_X)

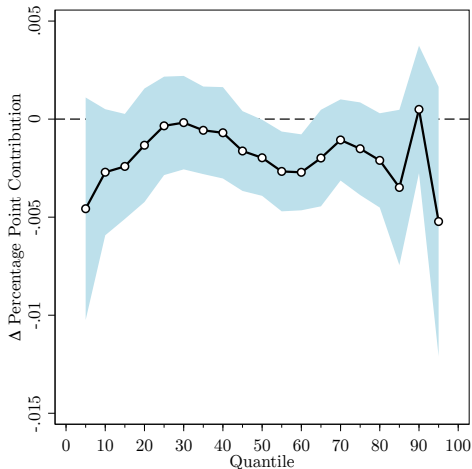
▶ Extras

Decomposition Results: Stock Returns

Stock Returns – Coefficients Component (Δ_γ)

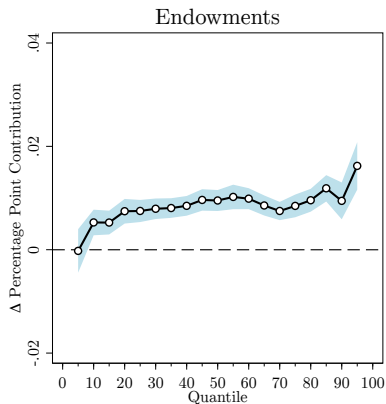
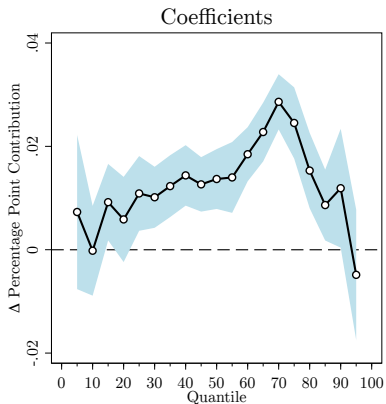


Decomposition Results: Bond Returns

Bonds – Coefficients Component (Δ_γ)

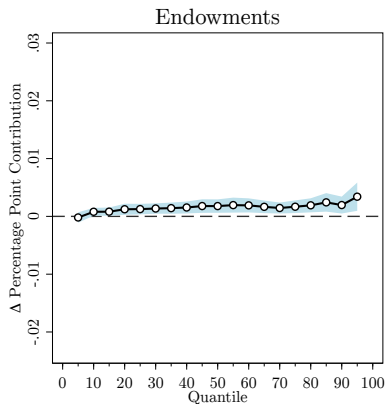
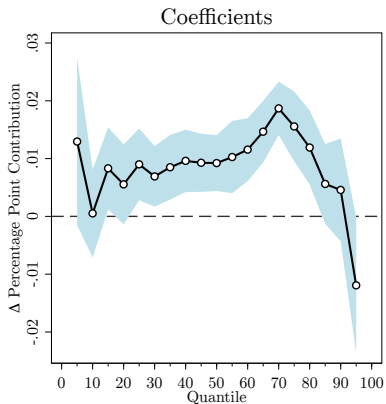
Decomposition Results: Refinancing

Mortgage Refinancing – 2010-2013



Decomposition Results: Refinancing

Mortgage Refinancing – 2010-2016



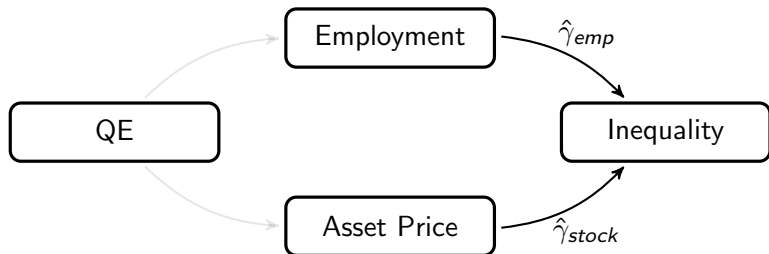
Decomposition Results: Inequality Measures

**Percentage Point Change in Inequality
various measures (2010-2016)**

	95/10	90/10	Gini
Total Change	0.071	0.058	0.028
QE Channels	0.045	0.045	0.016
<i>Employment Channel</i>	-0.008	-0.008	-0.001
<i>Financial Returns</i>	0.062	0.048	0.019
<i>Mortgage Refinancing</i>	-0.009	0.005	-0.002

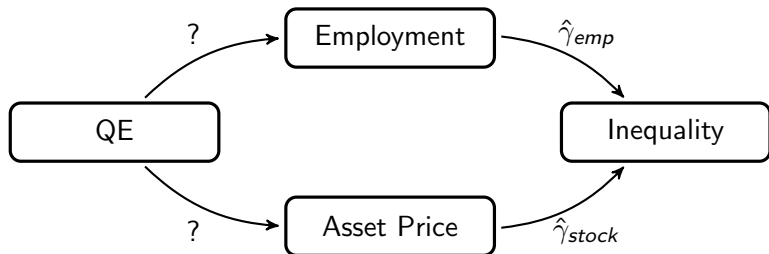
QE Counterfactuals

- ▶ Decompositions do not say anything about causality!
- ▶ Focus on causal estimates of QE on *intermediate channels*
- ▶ Empirical literature:
 - ▶ Effect on employment: 1 - 1.5 percentage points
 - ▶ Stock prices: 2 - 8 percent growth
- ▶ Use components from decomposition results to carry out counterfactual scenarios



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- ▶ What would the contribution of stock returns to inequality look like if we assume QE was responsible for a θ percent growth in stock returns?
- ▶ Counterfactual stock contribution is:

$$\Delta_S = \theta \hat{\gamma}_{0,S} \bar{X}_{0,S}$$

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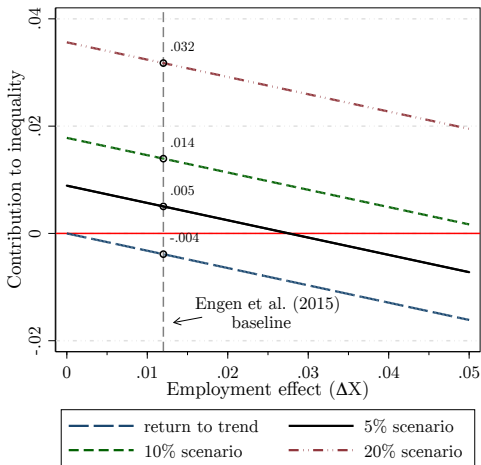
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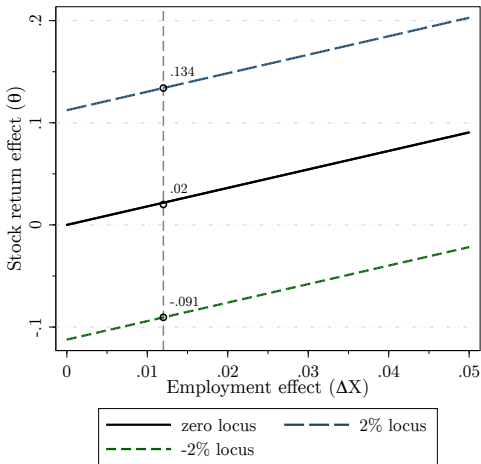
Counterfactual Scenarios

Contribution to 95/10 Ratio – Various Counterfactuals



Stocks & Employment Loci

Stock Return and Employment Effect Tradeoffs



Counterfactual Analysis

Counterfactual Contributions to the 95/10 Ratio

	Employment effect ($\tilde{\Delta}\bar{X}$)			
	1 pp	2 pp	3 pp	4 pp
Equity Return Scenarios (θ)				
0% scenario	-0.3	-0.6	-1.0	-1.3
5% scenario	0.6	0.3	0.0	-0.4
10% scenario	1.5	1.2	0.9	0.6
20% scenario	3.4	3.1	2.8	2.5

Conclusions

Summary of Results

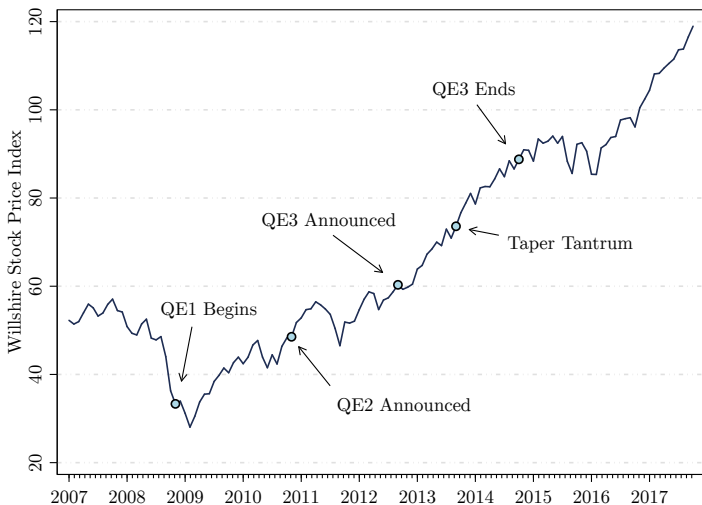
- ▶ QE channels *associated* with large increases in inequality
- ▶ Precise causal framing is more nuanced
- ▶ Counterfactual analysis suggests modest but positive impact

Outstanding Questions

- ▶ Causal magnitudes for other QE channels?
- ▶ Impact of QE on *wealth inequality*?
- ▶ Generality of the results?
- ▶ *QE paradox*?

Thank You

Stock Returns (2007-2017)



Robustness: Evidence from PSID

Decomposition using the PSID (2009-2013)

