Did Quantitative Easing Increase Income Inequality?

Juan A. Montecino
Columbia University

Gerald Epstein
University of Massachusetts
Amherst

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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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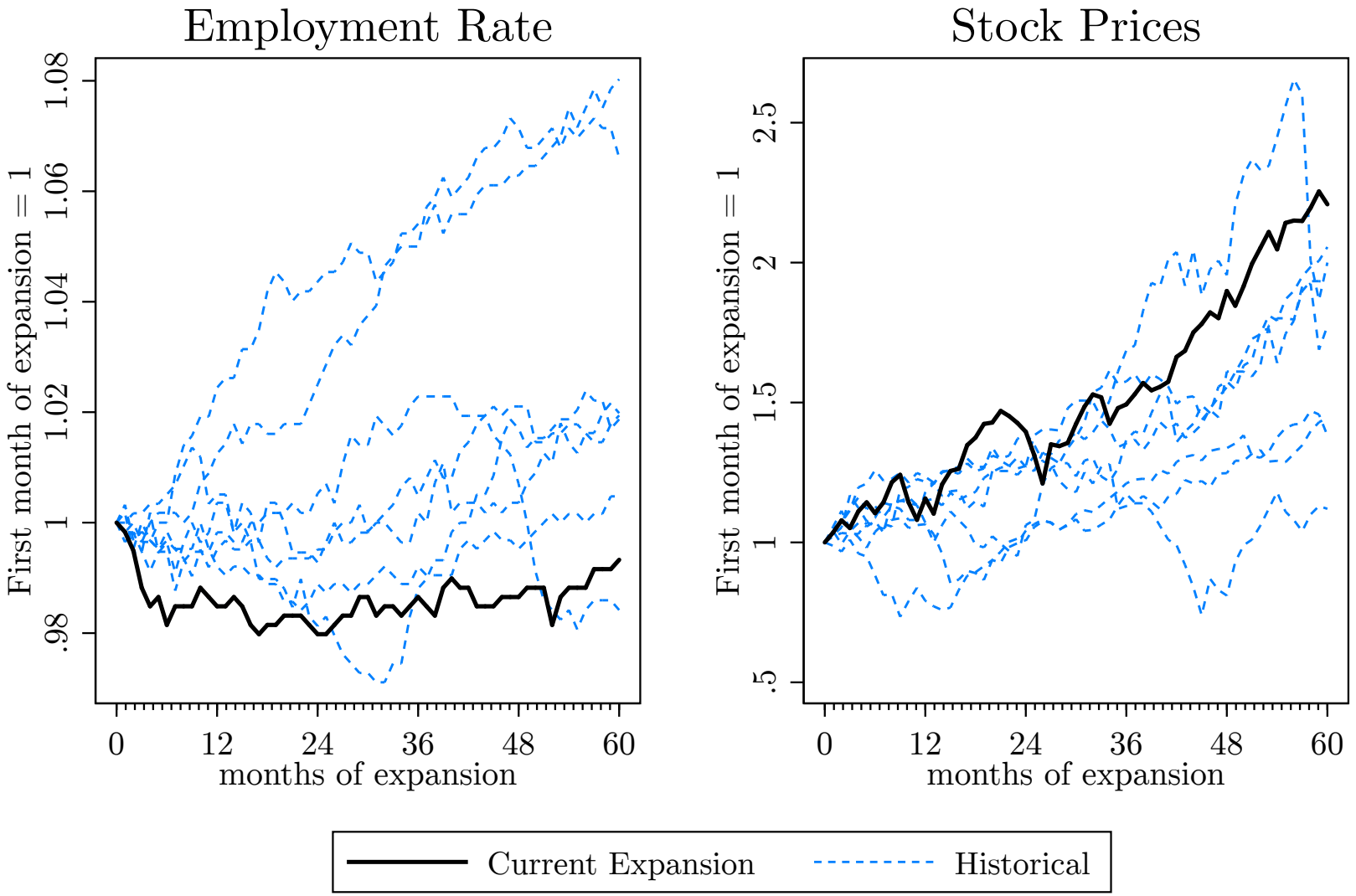
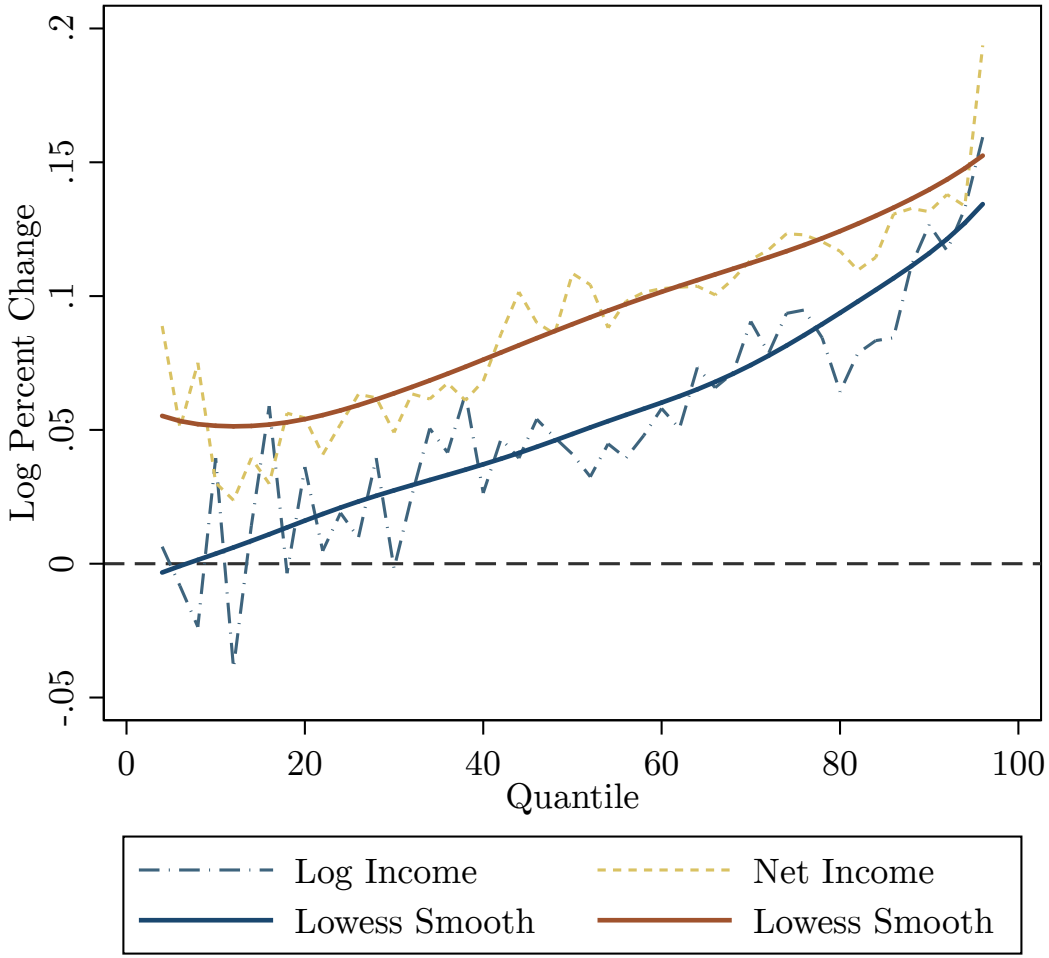
Economic Expansions Since 1960



Income Growth by Quantile – 2010-2016



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 **realized** k-gains

Counterfactual Analysis

- *Causal* effect was likely disequalizing
- Increase in the ratio of 95/10th percentiles of $\approx$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 $\rightarrow$ Empirical question!

Existing Empirical Studies

United States

- Bivens (2015) – QE was *equalizing*
- Coibion et al. (2017) – Studies *conventional* m-policy

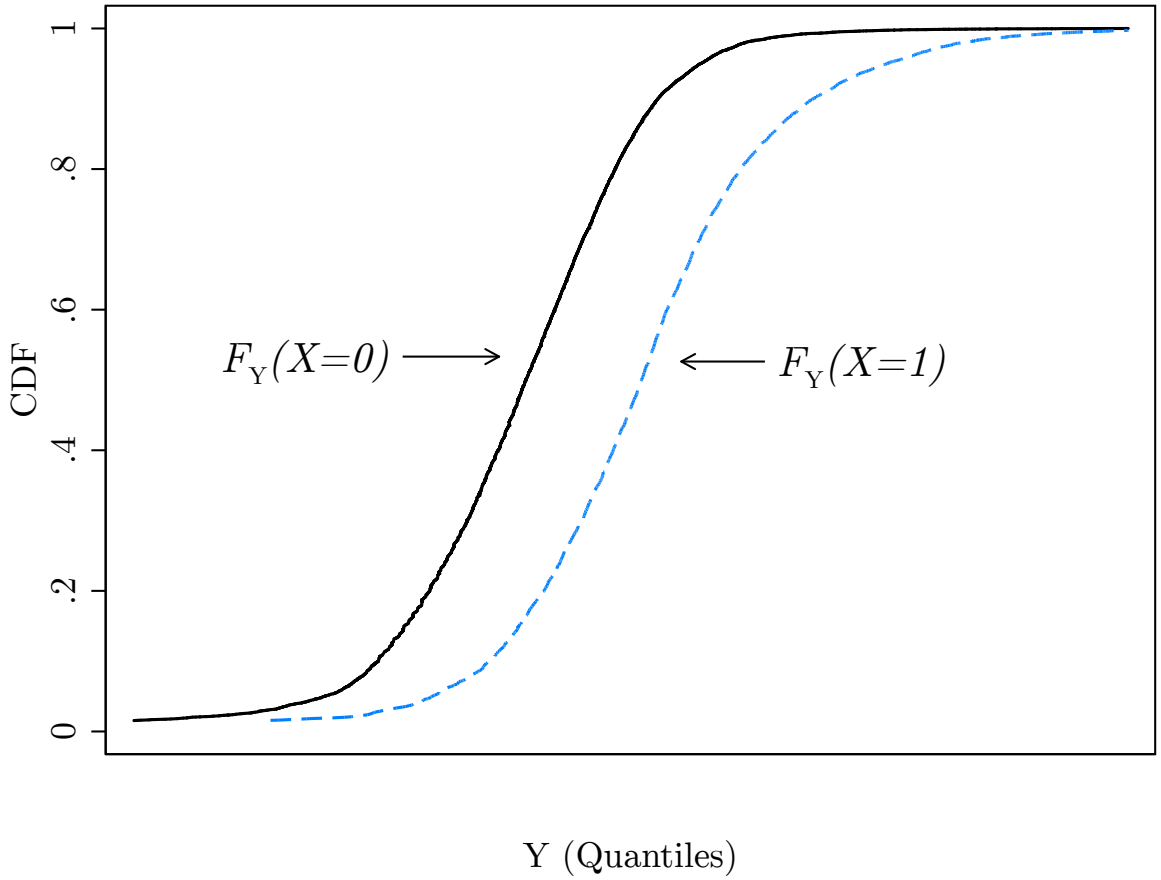
Europe

- Adam and Tzamourani (2016) – *wealth* inequality in the Eurozone
- Lenza and Slacalek (forthcoming) – employment effect dominates

Japan

- Inui et al. (2017) – distributionally neutral, time-varying

Distributional Effects: an example



Suppose, e.g. Y = income & X = stock ownership

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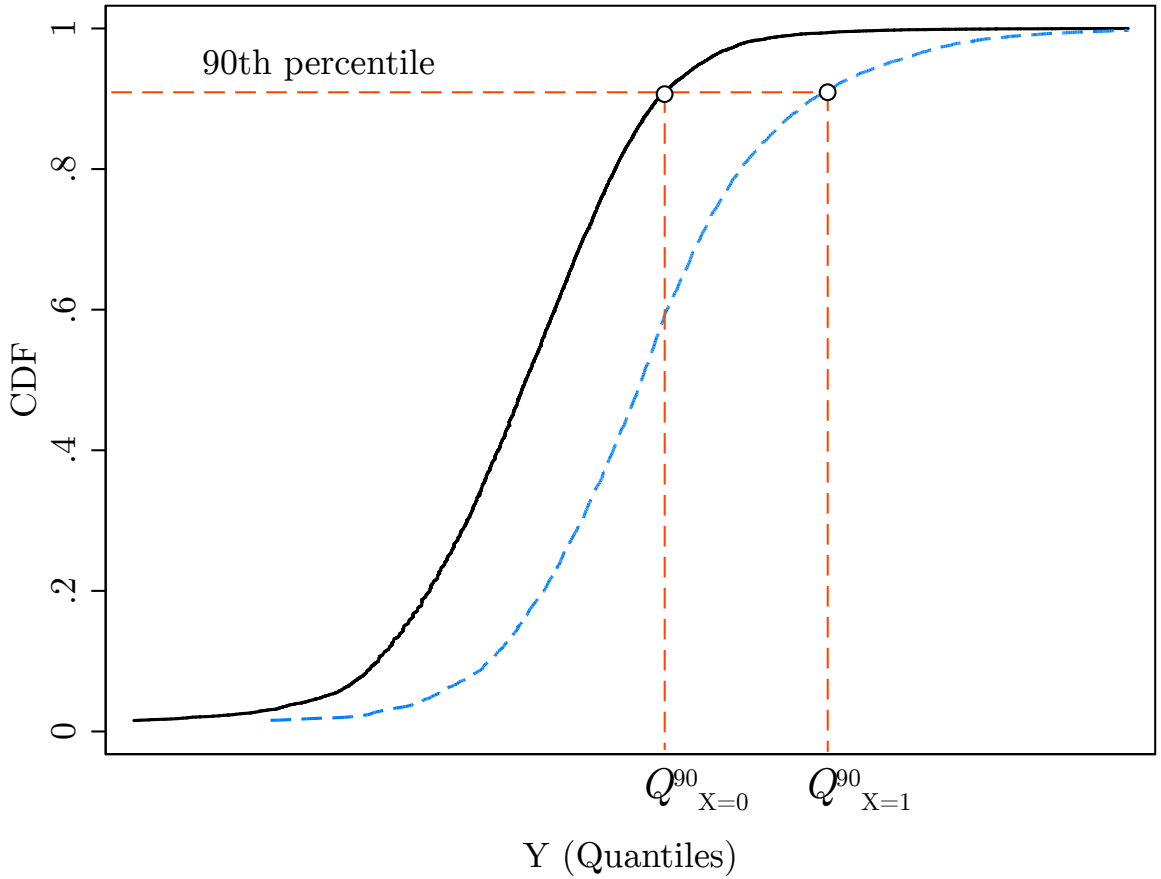
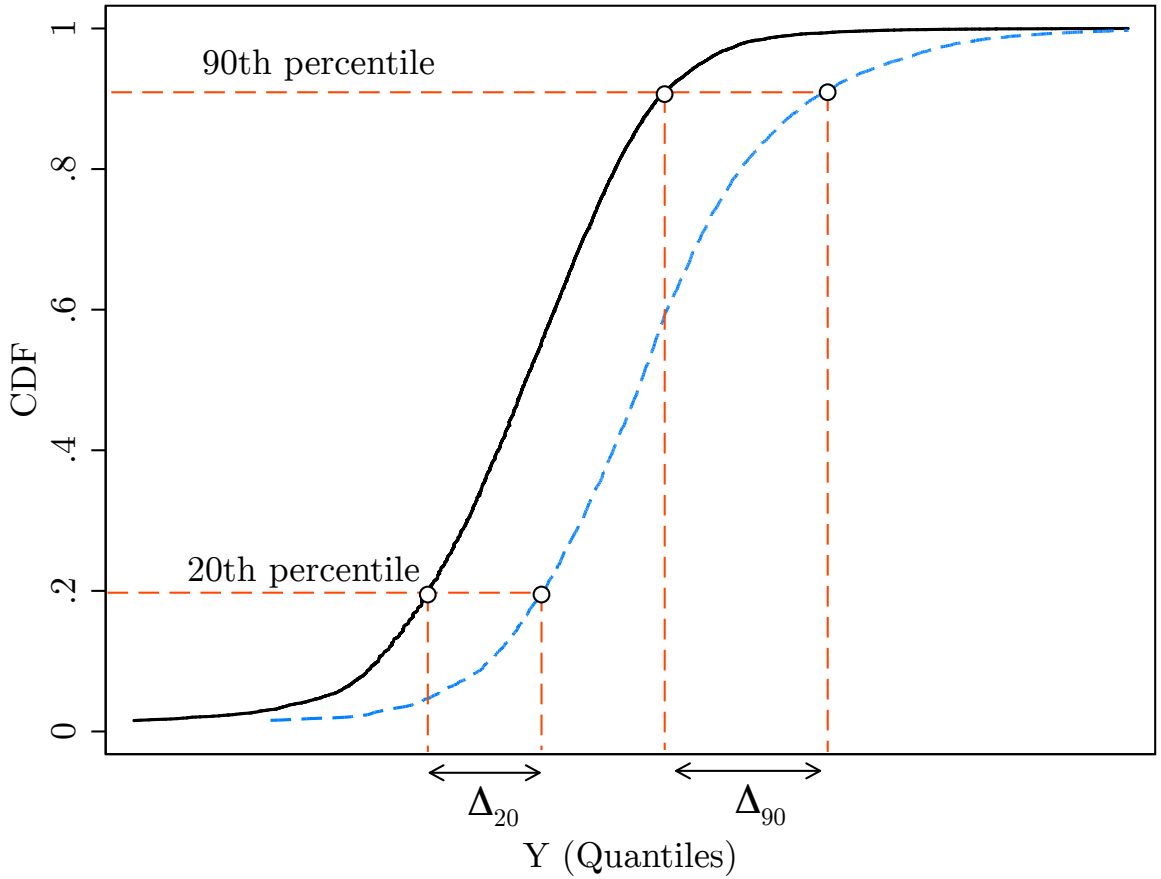


Effect of X on 90th percentile is:

$$\Delta_{90} = Q^{90}_{X=1} - Q^{90}_{X=0}$$

Distributional Effects: an example



Effect of X on 90/20 ratio:

$$\Delta_{90/20} = \Delta_{90} - \Delta_{20}$$

Empirical Methodology

1 Distributional Decomposition

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

2 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?

3 Oaxaca-Blinder Decomposition

- Decompose changes in y into "endowment" and "returns" components
- e.g. How much of income growth is due to changes in the composition of workers?

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Empirical Methodology

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:

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

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Data

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

Some difficulties for inference . . .

- Multiple imputations
- Population weights
- Confidential survey design details
- *Approach:* repeated imputation inference with bootstrapping

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Data

Definition of Income

- Will use "net income":

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

- Makes it possible to study impact of refinancing & debt

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

$$
\begin{aligned}
Wages_{it} &= \alpha_t EMP_{it} + \boldsymbol{X}_{it}\boldsymbol{\tau} + \epsilon_{it} \\
Financial\ Income_{it} &= \mathbf{A}_{it}\beta_t + \varepsilon_{it} \\
Debt\ Service_{it} &= \gamma_t RF_{it} + \mu_t B_{it} + \nu_{it}
\end{aligned}
$$

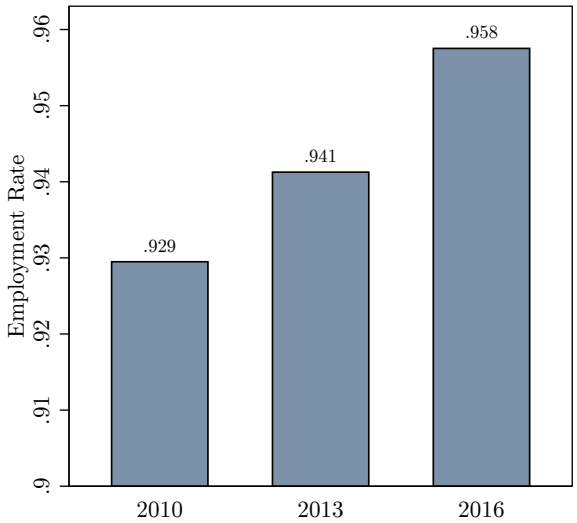
- *EMP* is an employment dummy and **X** are HH characteristics
- **A** are financial asset ownership dummies
- *RF* is a dummy for mortgage refinancing

Combine to obtain Net income:

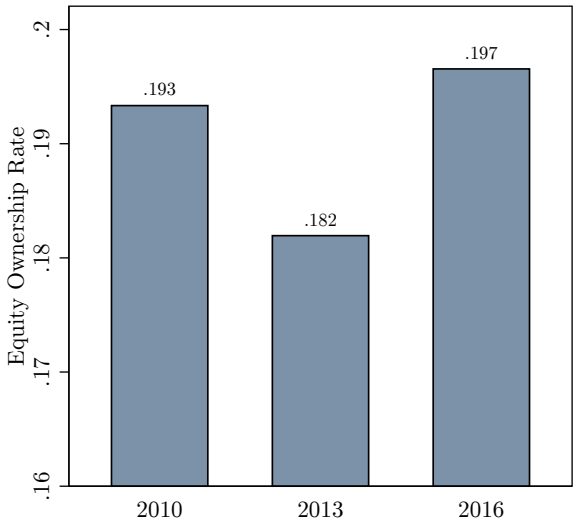
$$
Net_{it} = b_{1t} EMP_{it} + \boldsymbol{\tau}\boldsymbol{X}_{it} + b_{2t} A_{it} + b_{3t} RF_{it} + b_{5t} B_{it} + e_{it}
$$

Mean Endowments: $\bar{X}_t$

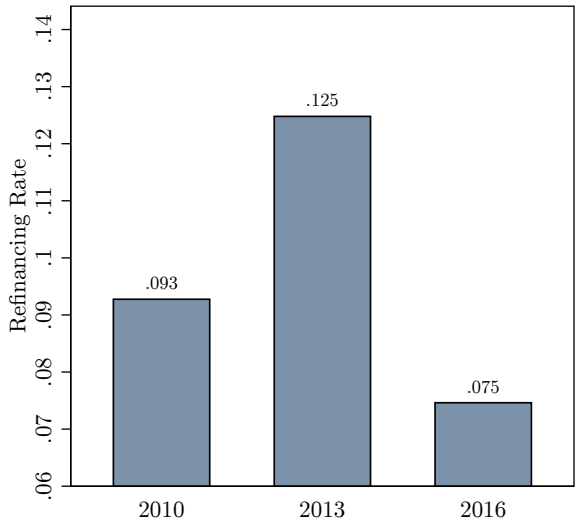
(a) Employment



(b) Equities



(c) Mortgage Refinancing



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

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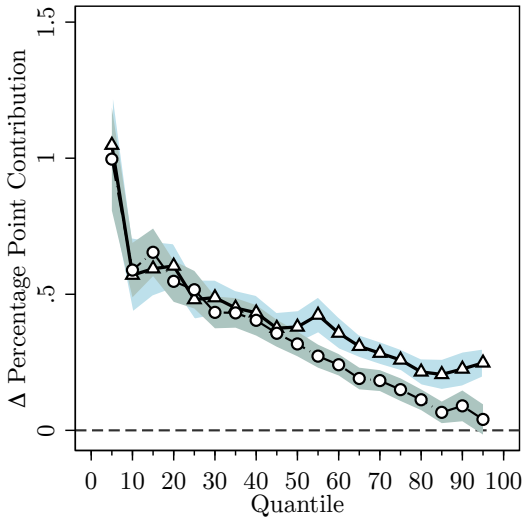

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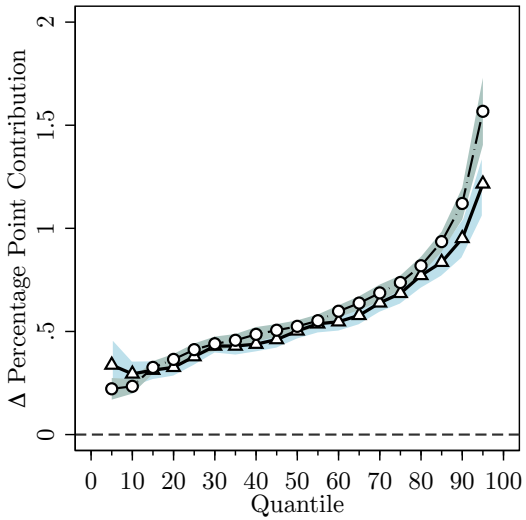

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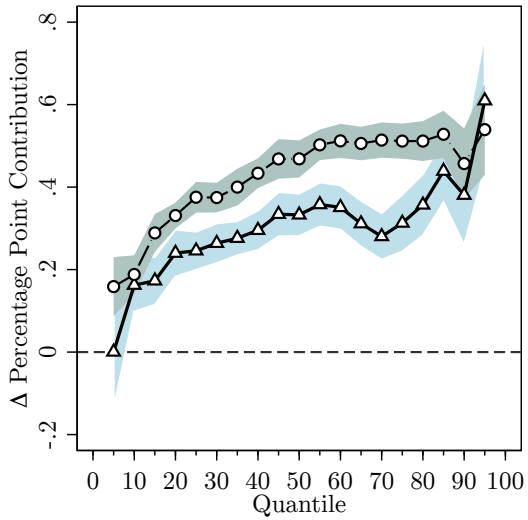

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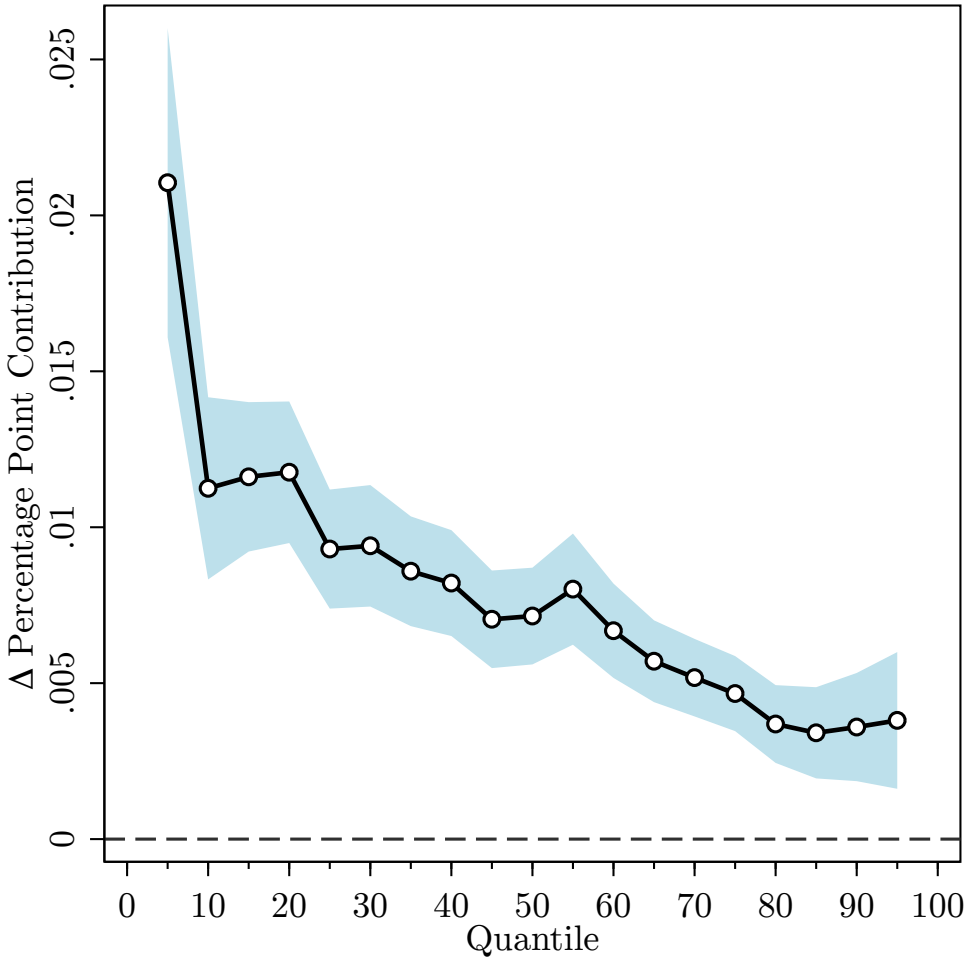
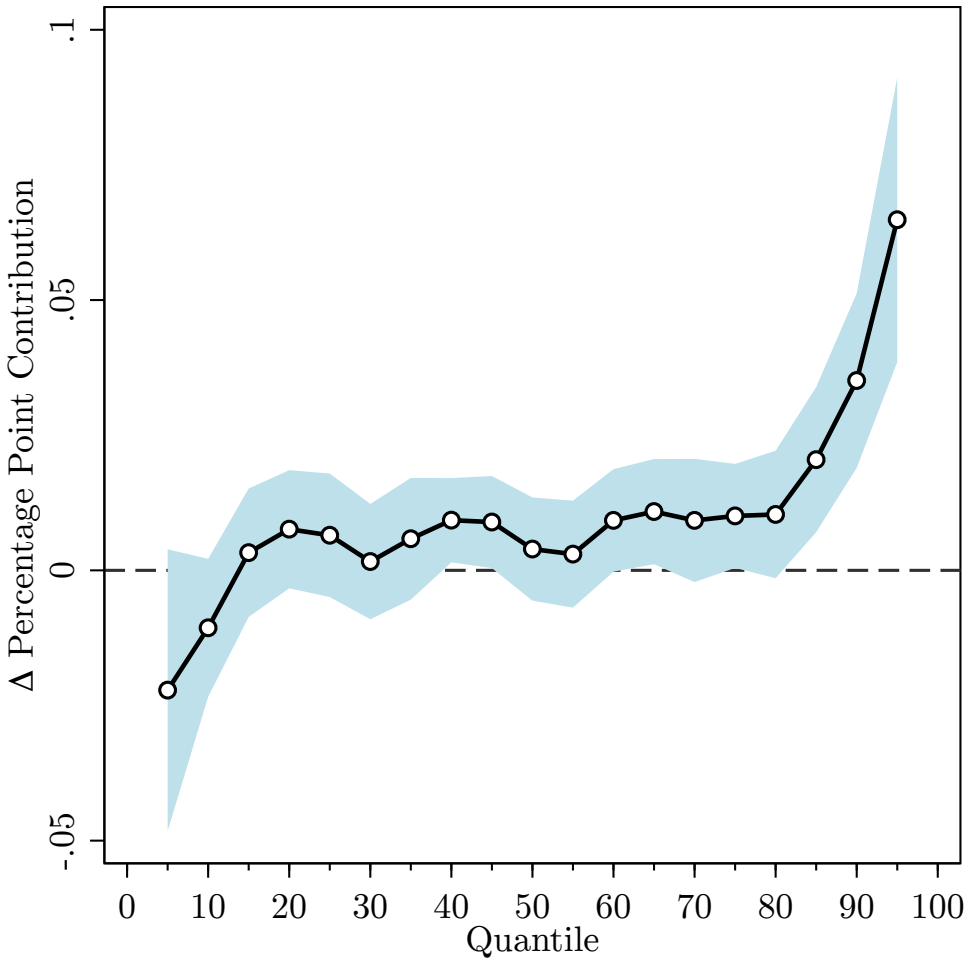
Decomposition Results: Employment

Employment – Endowments Component (Δ_X)

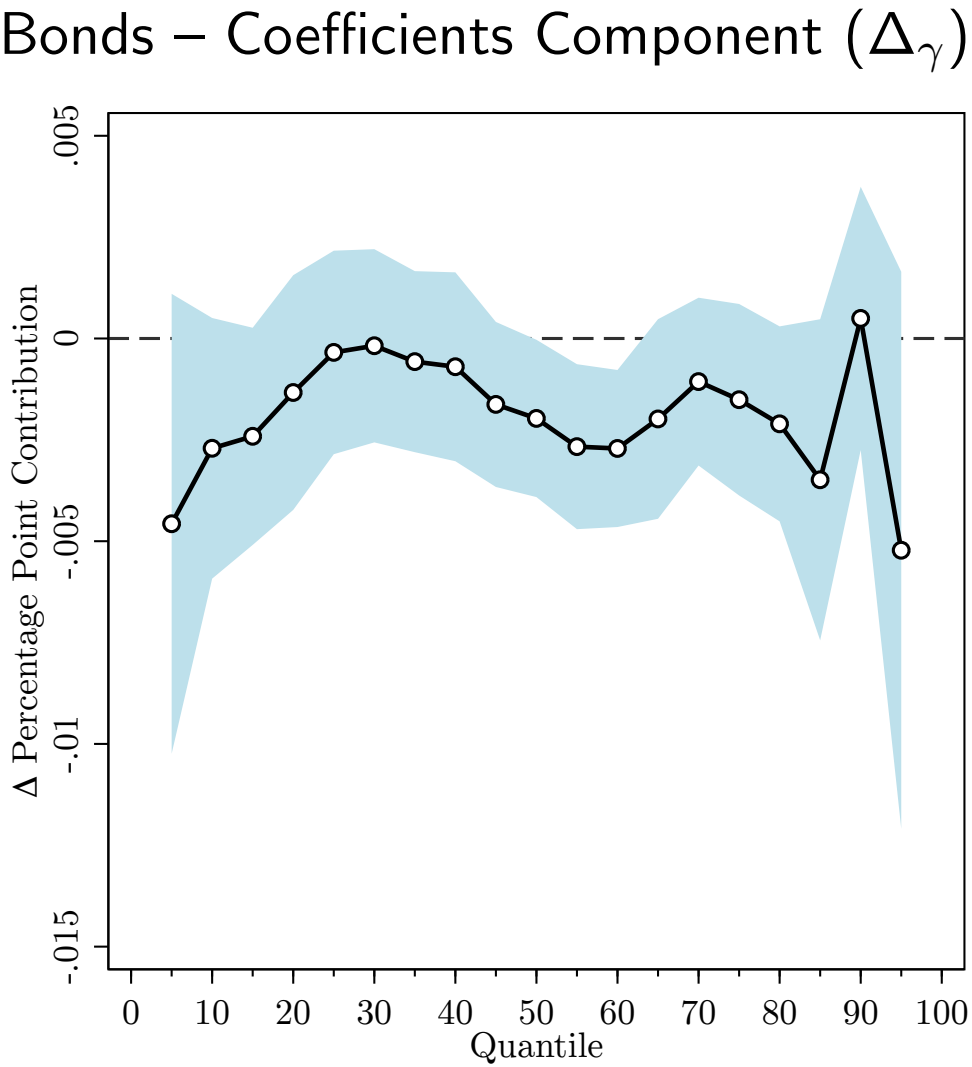


Decomposition Results: Stock Returns

Stock Returns – Coefficients Component (Δ_γ)

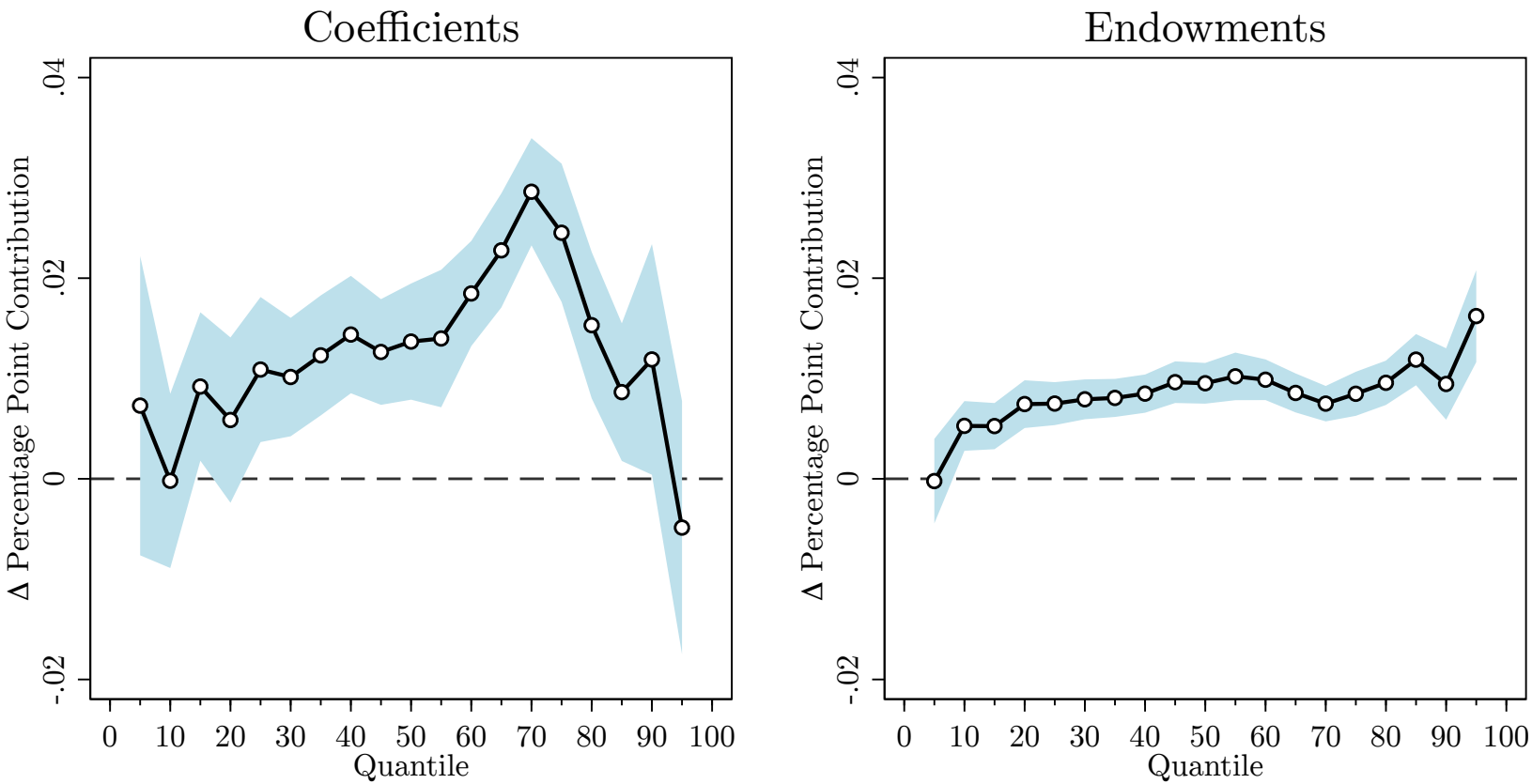


Decomposition Results: Bond Returns



Decomposition Results: Refinancing

Mortgage Refinancing – 2010-2013



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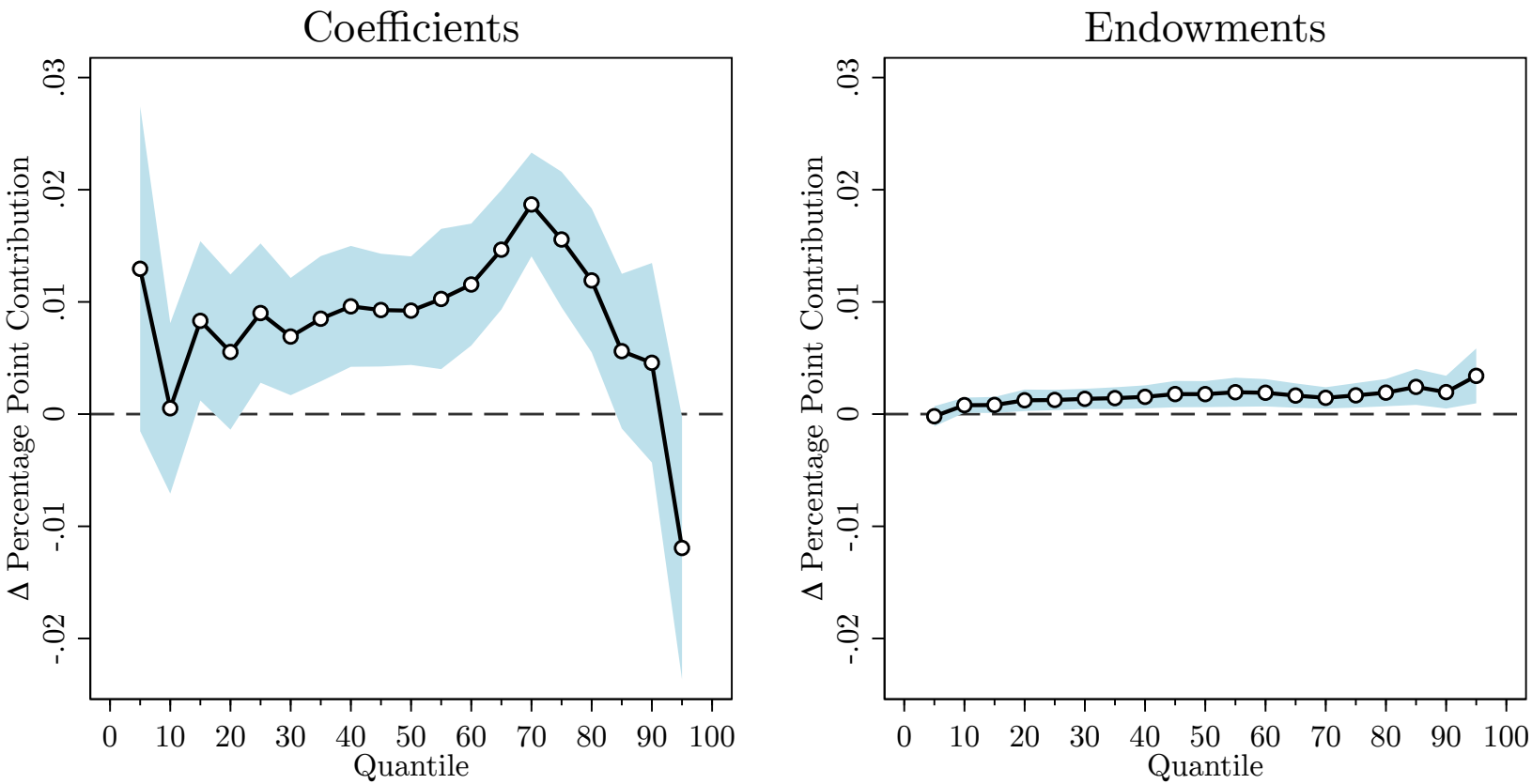


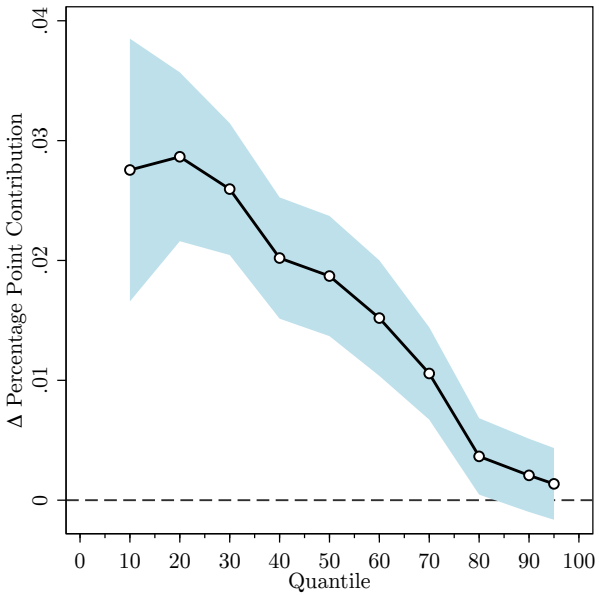
Decomposition Results: Inequality Measures

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

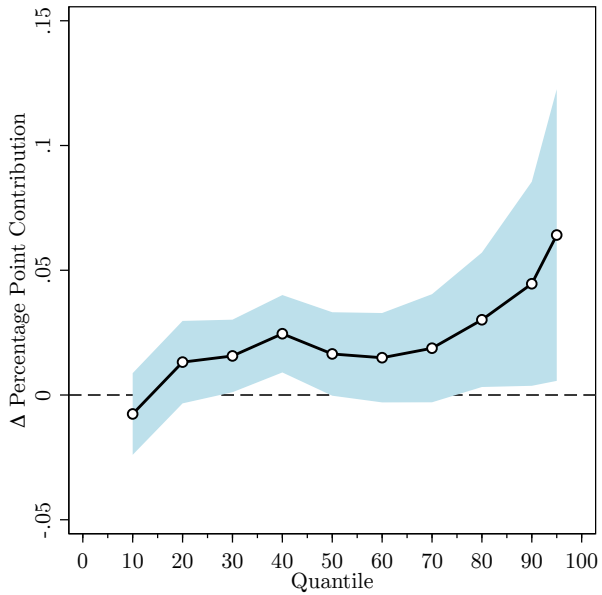
	95/10	90/10	Gini
Total Change	0.071	0.058	0.028
QE Channels	0.045	0.045	0.016
Employment Channel	-0.008	-0.008	-0.001
Financial Returns	0.062	0.048	0.019
Mortgage Refinancing	-0.009	0.005	-0.002

Robustness Checks: Reweighting, Additional Covariates

(a) Employment (Δ_X)



(b) Equities (Δ_γ)

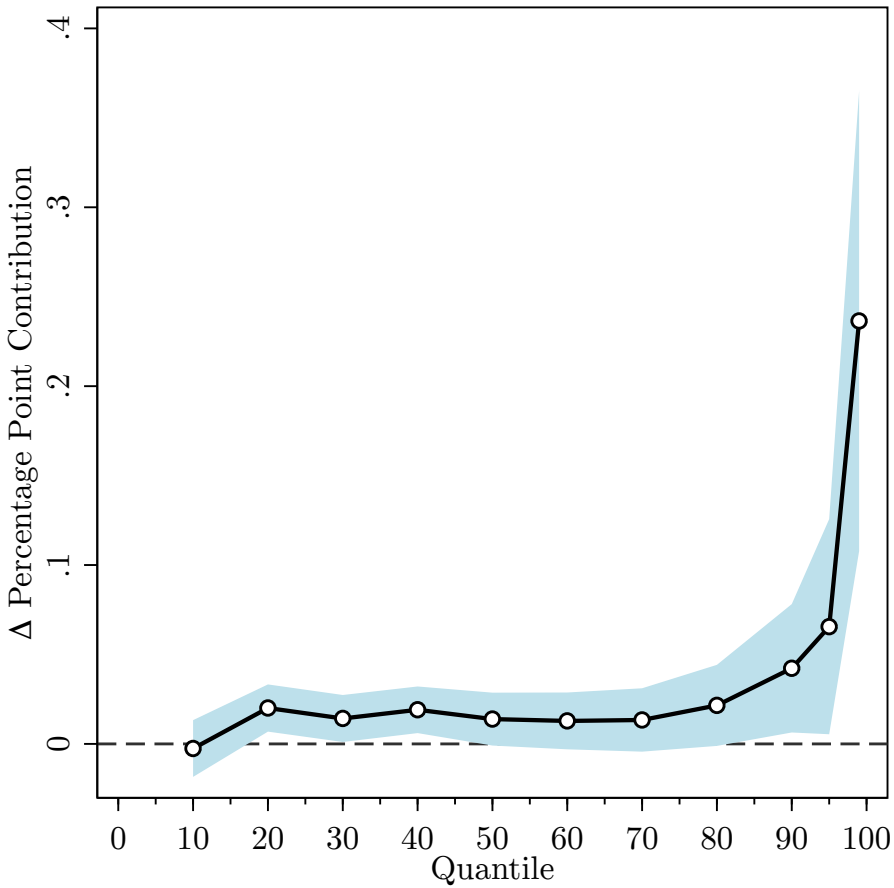


Additional Checks:

- "Over Smoothing"
- Alternative asset categories / definitions
- Data from PSID

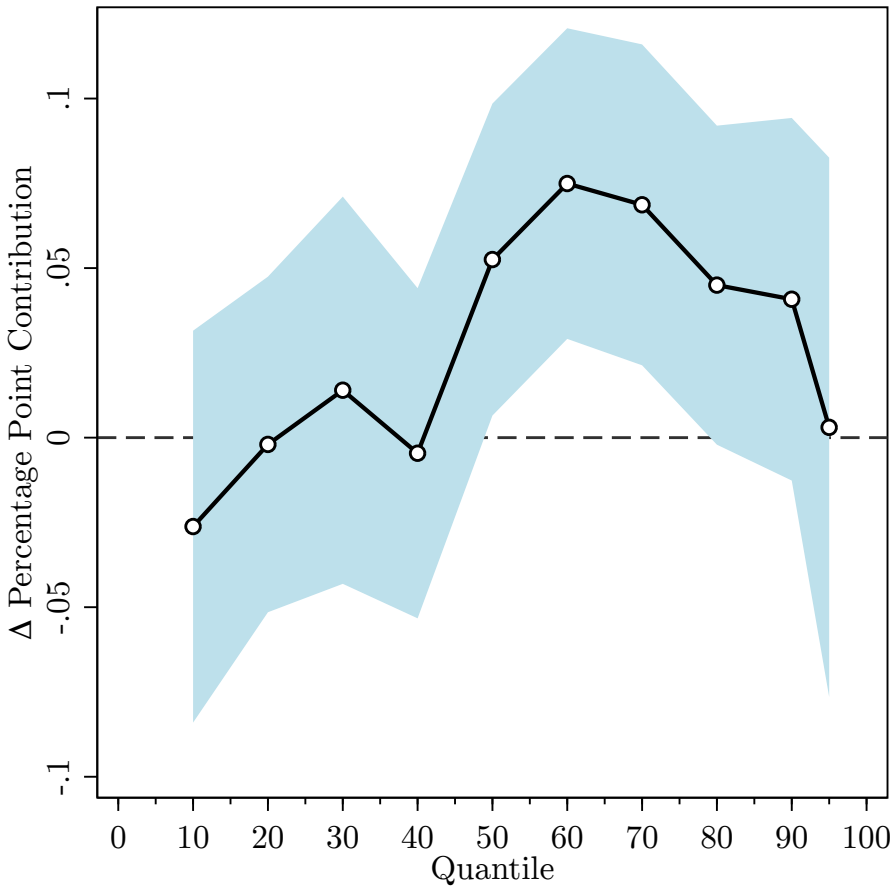
Robustness Checks

Stock returns including 99th percentile



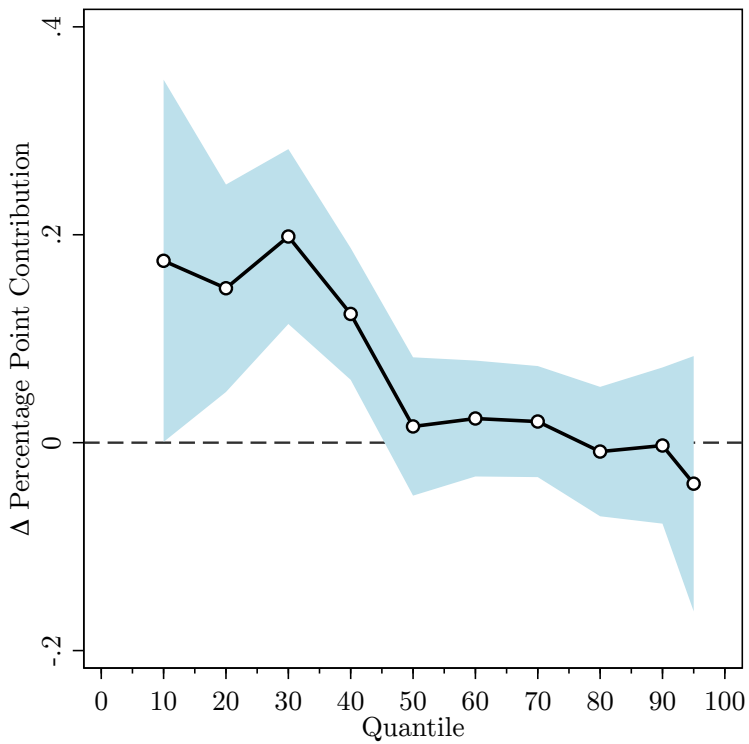
House Prices?

Home ownership – coefficients component (Δ_γ)

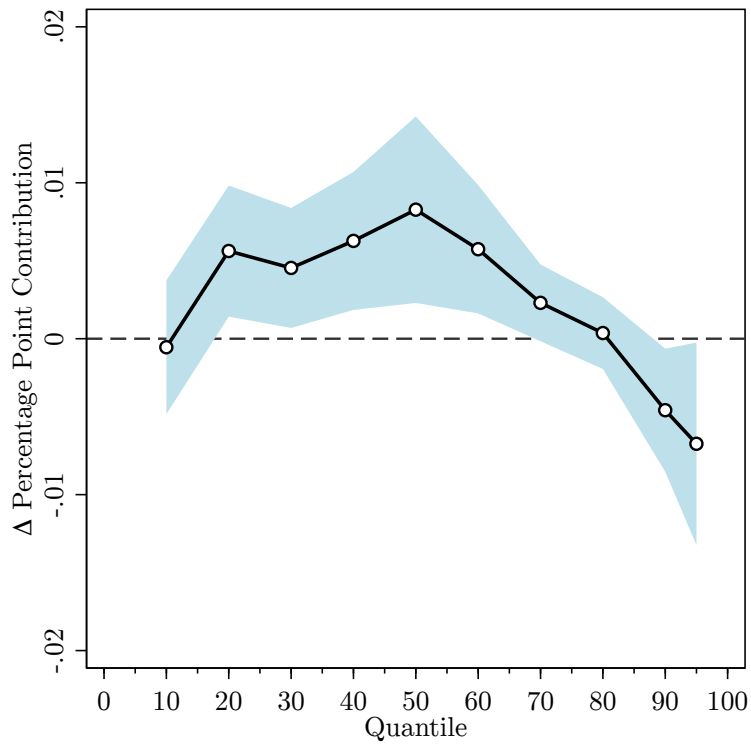


Household Debt

(a) Coefficients component – (Δ_X)

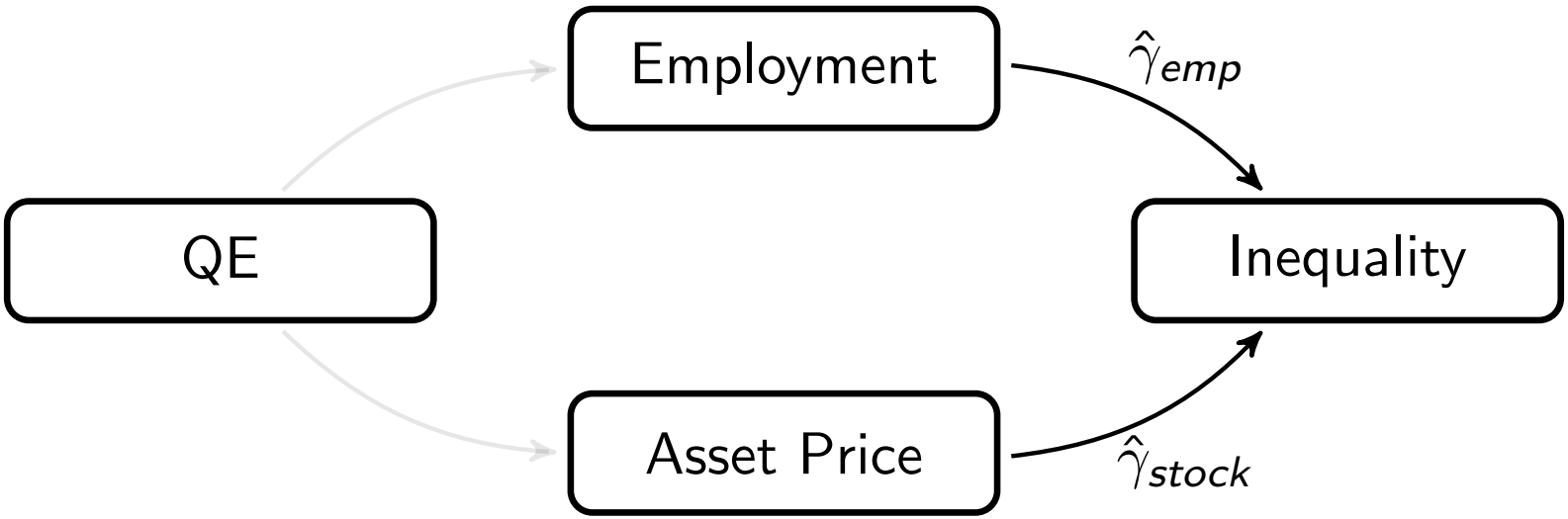


(b) Endowments component – (Δ_γ)

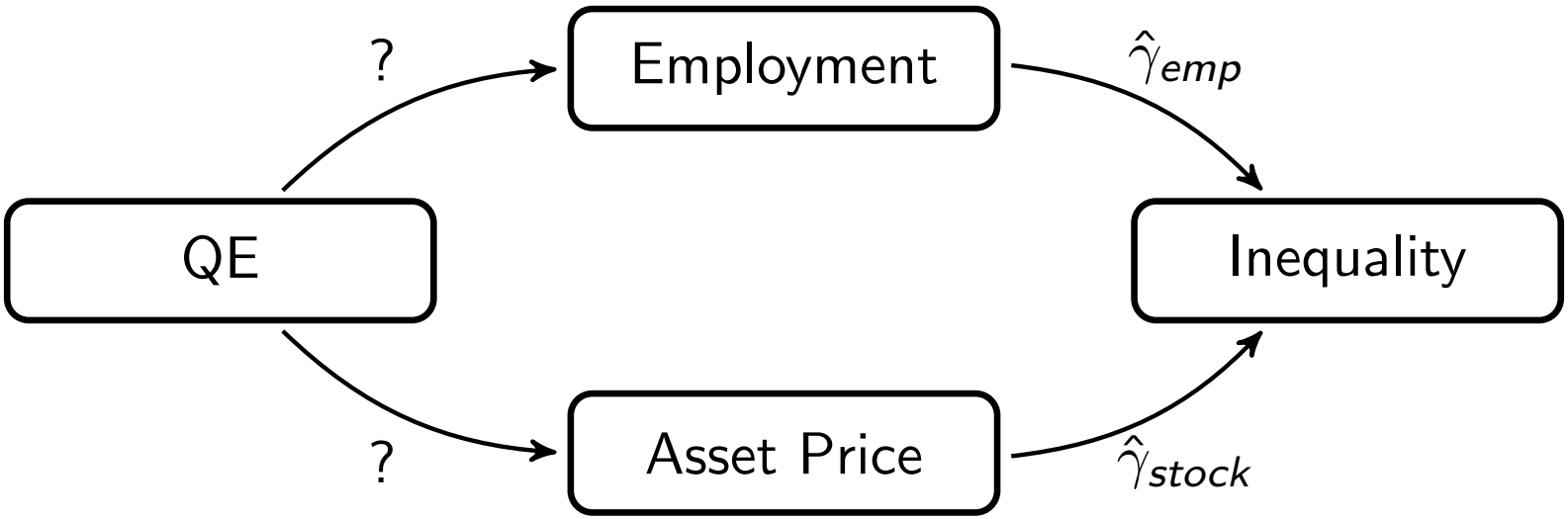


- Falling interest rates have helped bottom half
- Deleveraging in the middle of the distribution

Until now...


Employment
$\hat{\gamma}_{emp}$
QE
Inequality
Asset Price
$\hat{\gamma}_{stock}$

QE Counterfactuals



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

QE Counterfactuals

Equity Returns

- 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:

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

Employment Effect

- What would the contribution to inequality of higher employment look like if we assume QE increased employment by ΔX_E?
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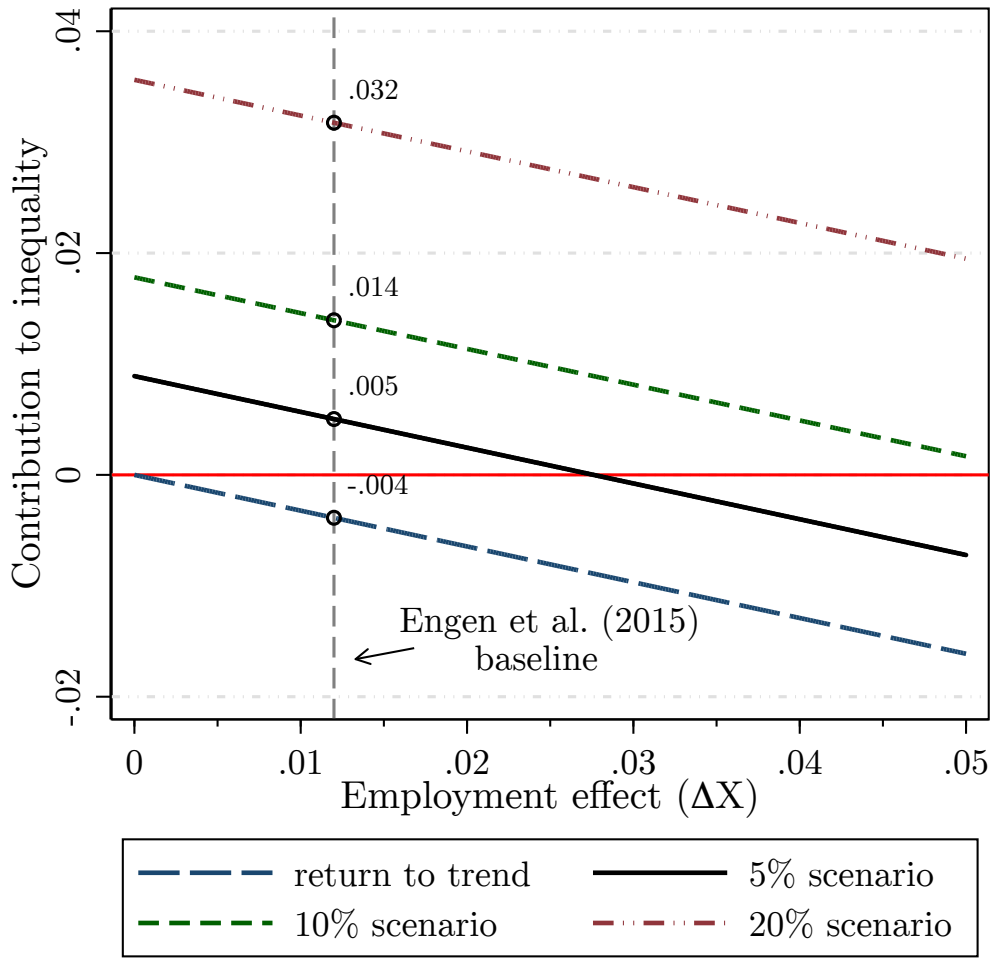
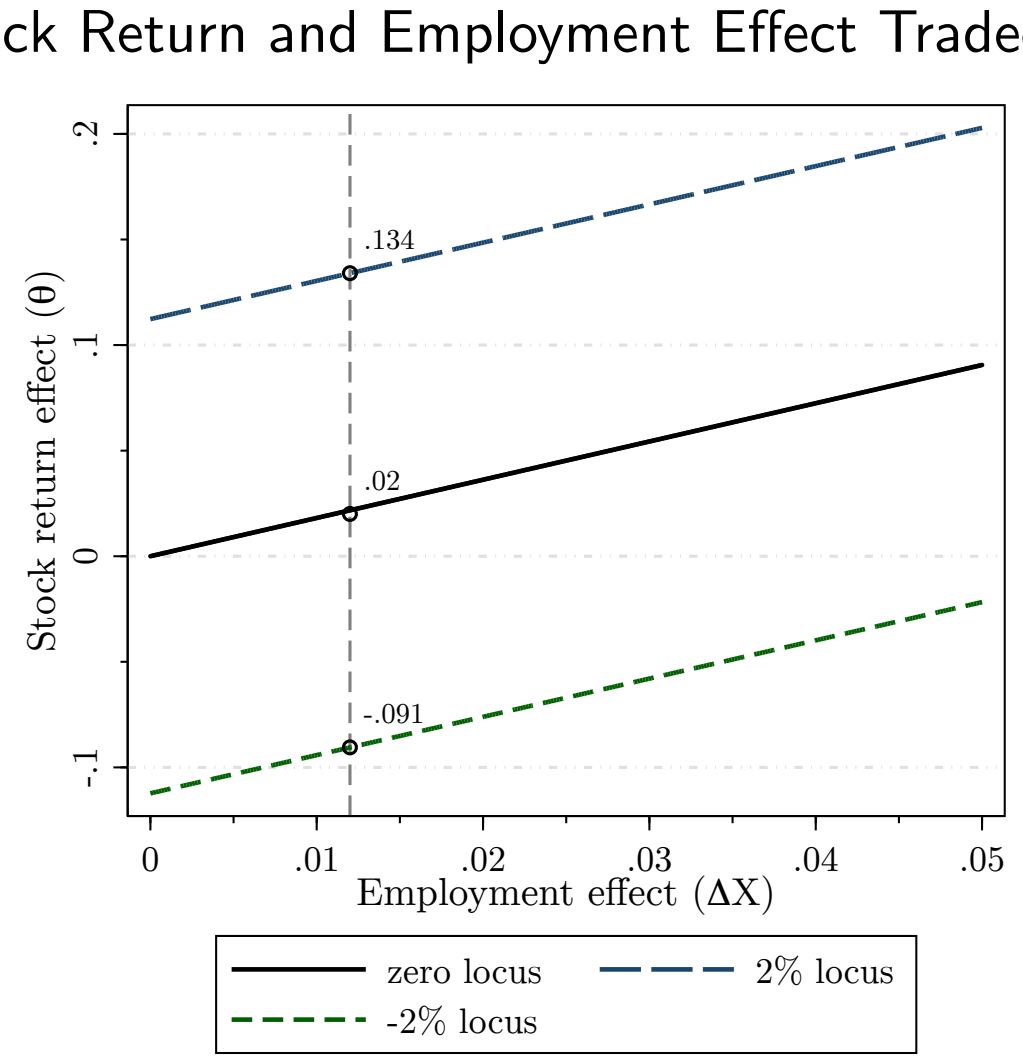
Counterfactual Scenarios

Contribution to 95/10 Ratio – Various Counterfactuals



Stocks & Employment Loci



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

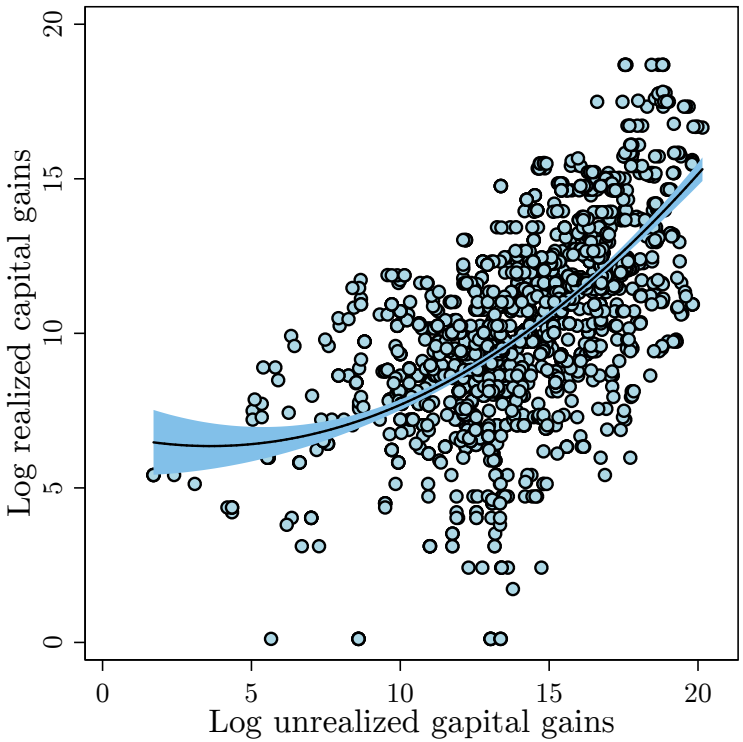
- Causal magnitudes for other QE channels?
- Impact of QE on *wealth inequality*?
- Generality of the results?
- *QE paradox?*

Thank You :)

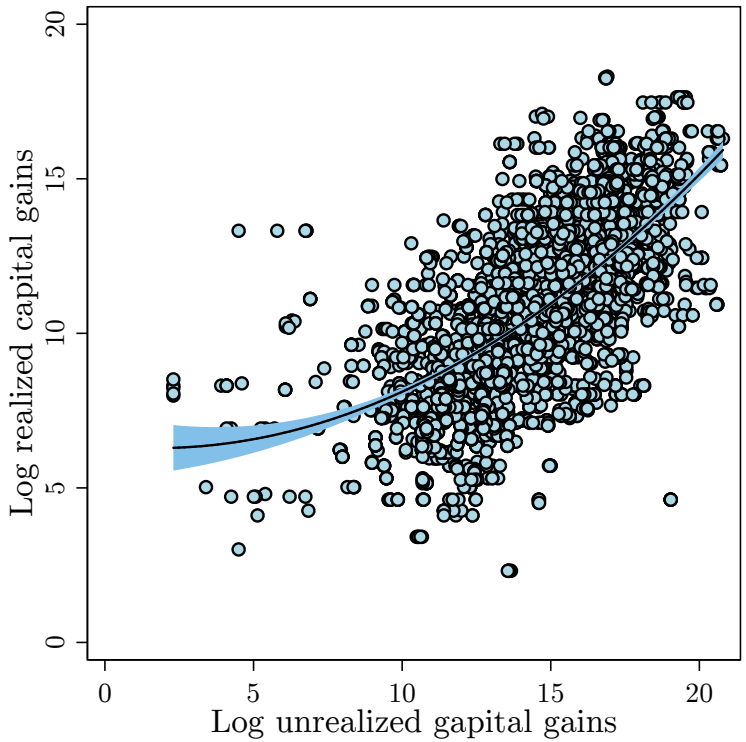
Capital Gains

Stable Relationship between realized and unrealized capital gains

(a) Pre-QE



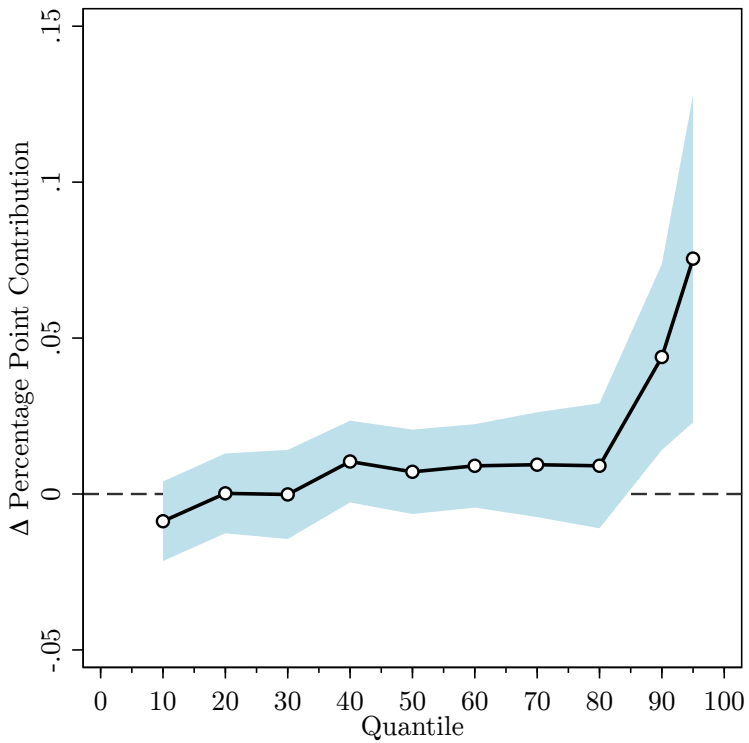
(b) Post-QE



back

Alternative asset indicators

Stock returns – coefficients component (Δ_γ)

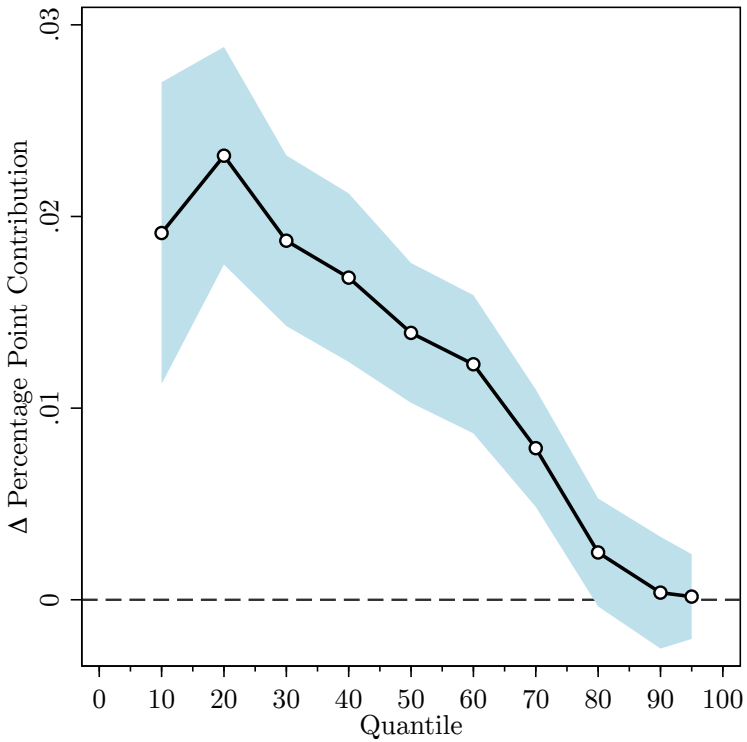


$$\mathbf{A} = \mathbb{1}\{Stocks > p(75)\}$$

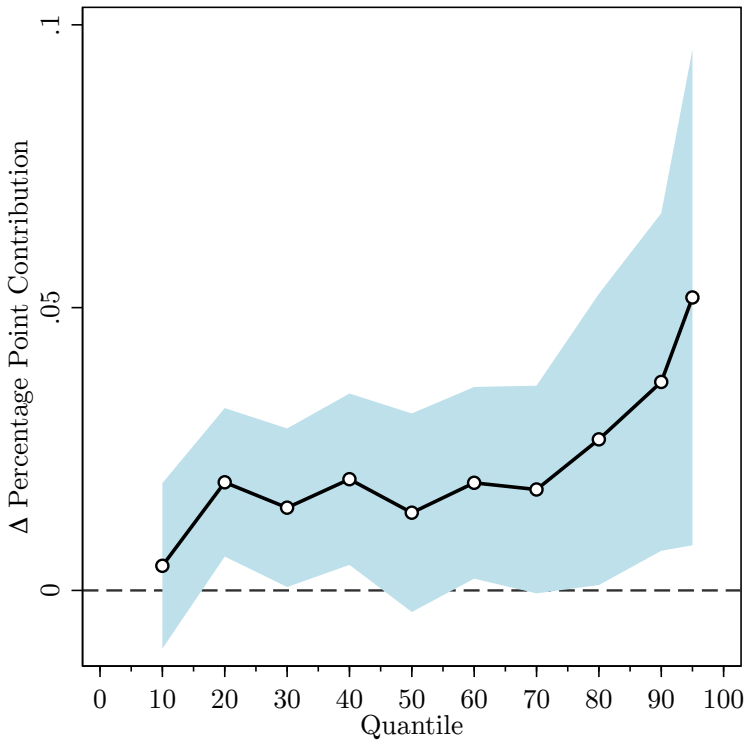
back

Over smoothing

(a) Employment (Δ_X)

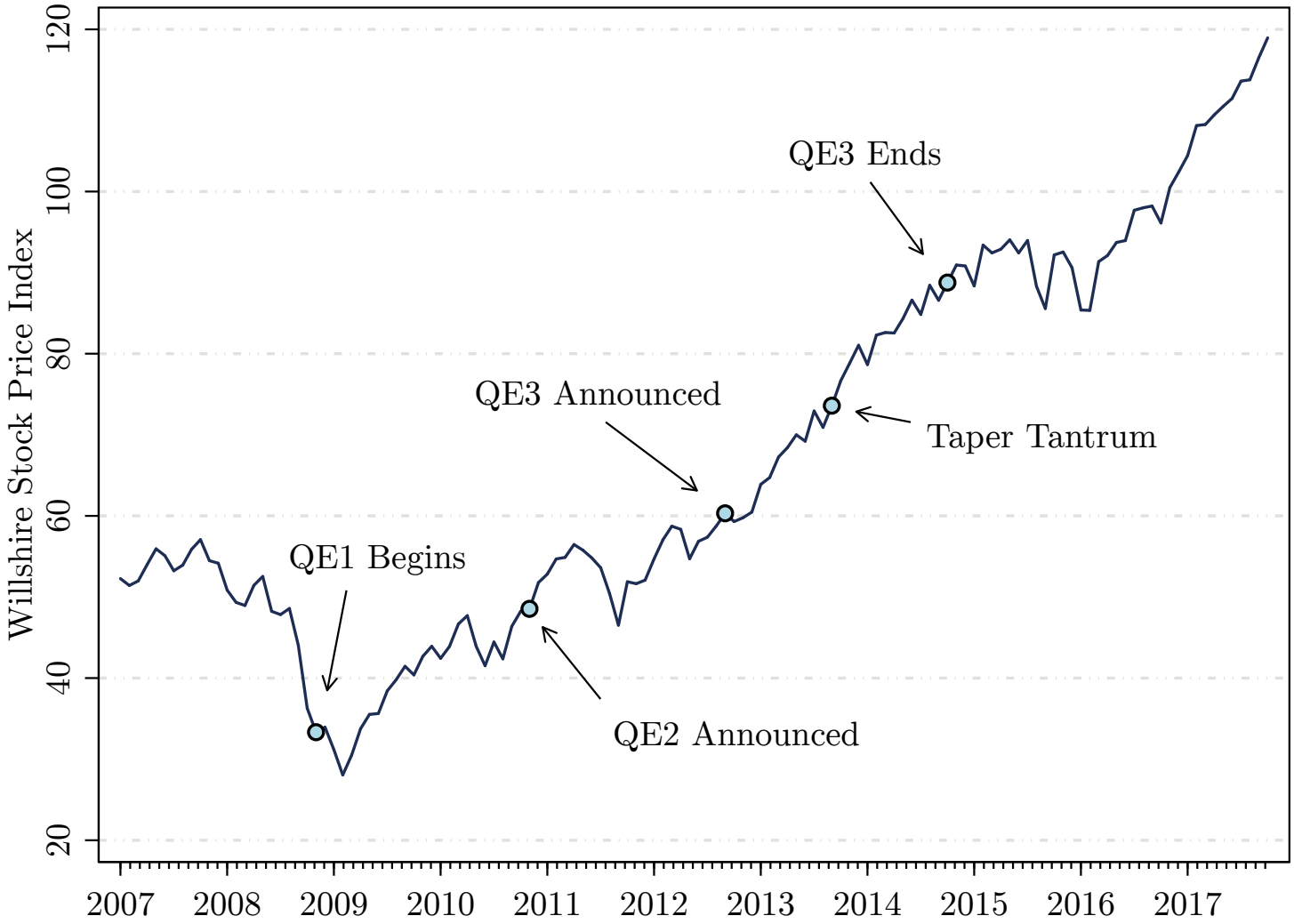


(b) Equities (Δ_γ)



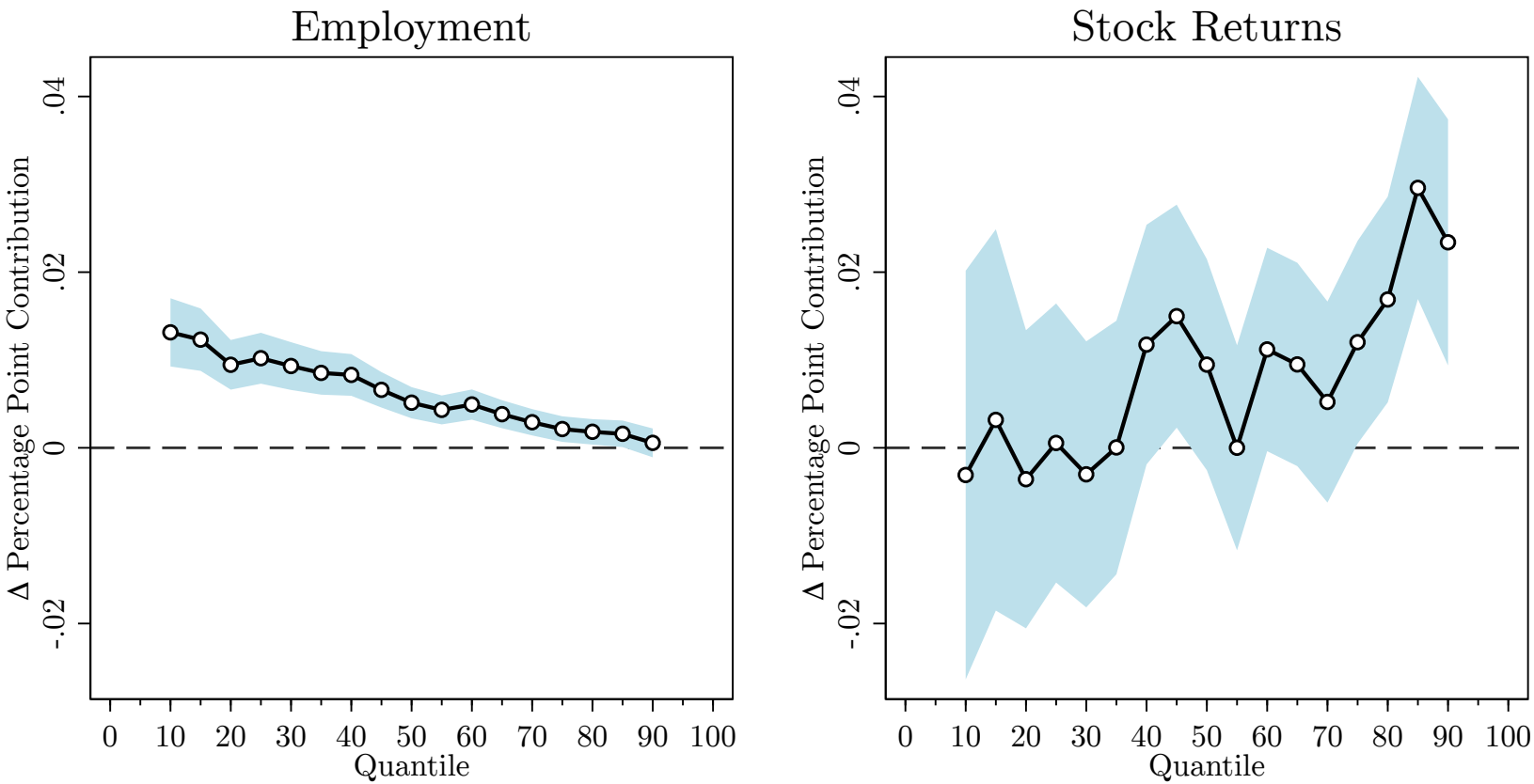
▸ back

Stock Returns (2007-2017)



Robustness: Evidence from PSID

Decomposition using the PSID (2009-2013)



back