Debt Constraints and Employment

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Motivation: US Great Contraction

- Characterized by drop in employment found to be
  - exceptionally large given observed drop in productivity TFP
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  - highly persistent over time

- This paper proposes a new mechanism that can produce such drop

- Within open economy model w/ consumer debt constraints

Our Mechanism

- Based on interplay between labor and consumer credit markets
- Key idea: workers become more productive with employment
  - working in current job raises productivity in all future jobs
- On-the-job HK acquisition implies returns to matching *backloaded*
  - substantial portion of match surplus materializes over time
- Backloading yields value of match surplus sensitive
  - to changes in workers-firms discounting of income/profits
- So tightening of household debt constraints
  - by increasing discounting reduces value of match surplus
  - firms create fewer vacancies and employment falls

Why Are Returns to Matching Backloaded?

- Time profile of returns central to our mechanism
- This backloading naturally arises in our framework
- For a worker: a job provides
  - current wages
  - increment to future wages through human capital formation
- For a firm: posting a vacancy entails
  - a cost today
  - stream of profits later once vacancy is filled

Main Results

- Tightening of debt constraints generates
  - large and persistent drop in employment
  - small drop in wages
- This stickiness of equilibrium wages arises *endogenously*
  - despite wages being continuously renegotiated
  - absence of any decline in aggregate productivity
- Consistent with aggregate/state-level evidence on US

US Great Contraction

- Not only employment largely fell
- But also household debt to income ratio sharply contracted
- Regions w/ larger employment drop also larger fall in debt to income
  - Midrigan and Philippon (2011), Mian and Sufi (2014)
- Combined patterns: comovement consumption vs. employment

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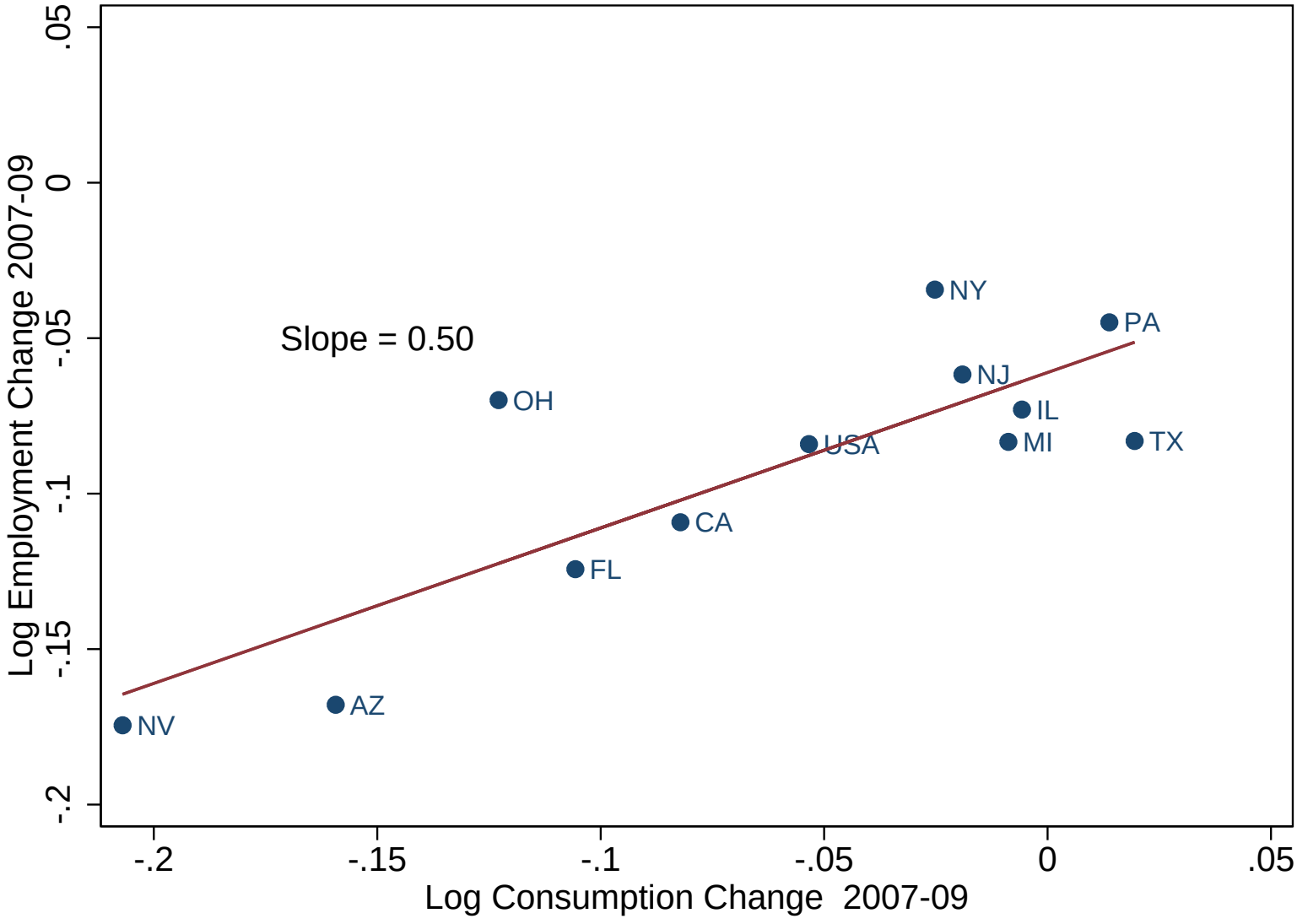
Next: show comovement

Employment vs. Consumption



Significant positive relationship (Midrigan and Philippon (2011))

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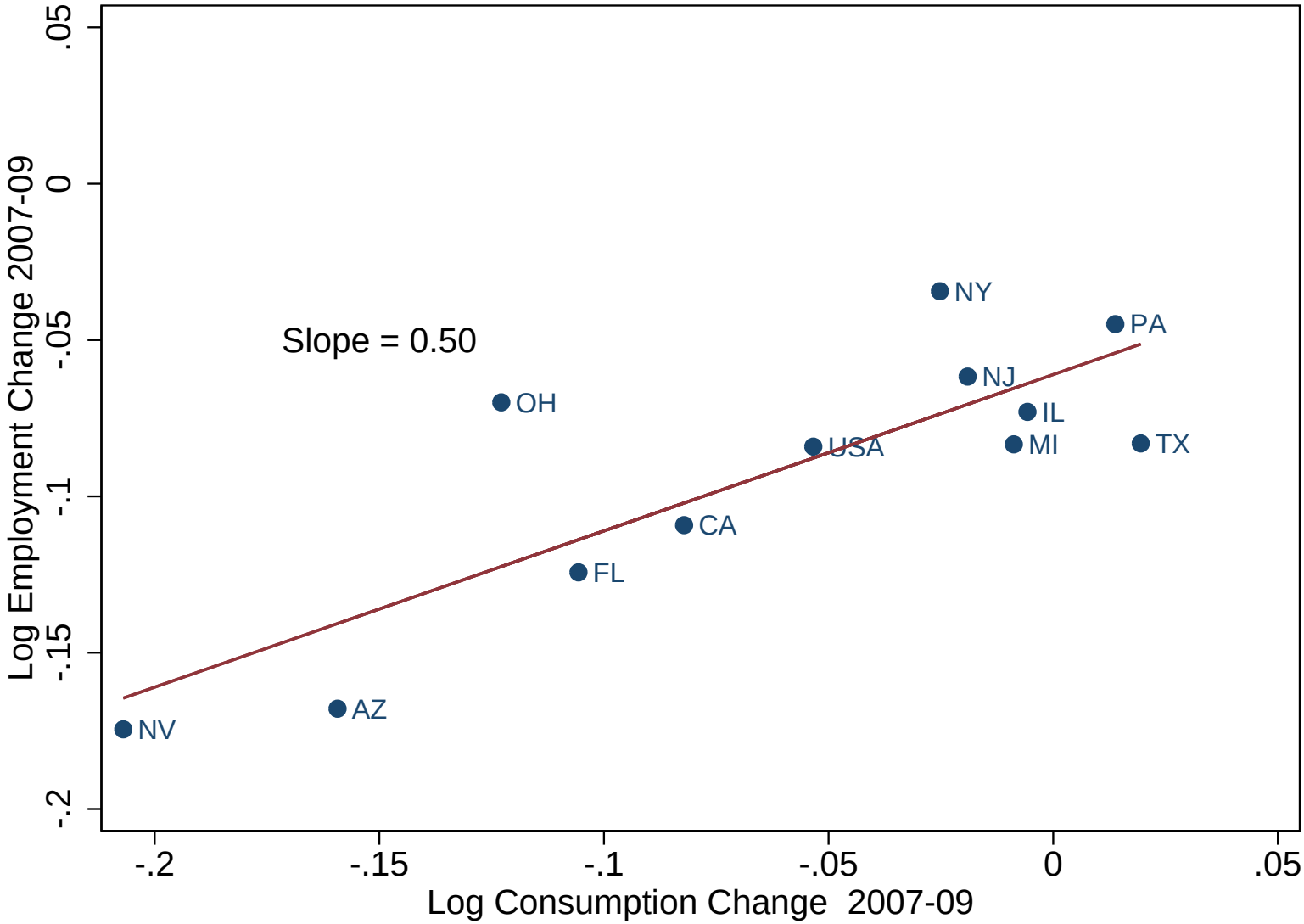

Significant positive relationship: what has produced it?

US Great Contraction: Facts and Analysis

- Mian and Sufi (2014) document three facts
  1. debt constraint tightening associated with house price fall
  2. house price fall associated with regional employment drops
  3. drops much more pronounced in nontradables than tradables

- This paper first to propose general equilibrium model of US economy
  - tightening of household debt resulting from house price fall
  - gives rise to large and persistent decline in employment
  - matches observed cross-sectional correlations (c_t, e_t, hp_t, d_t)
  - matches sectoral reallocation Mian and Sufi document

Overview

- Model US as open economy
- With DMP labor market characterized by
  - risk-averse consumers who can borrow and save
  - on-the-job human capital acquisition ("learning-by-doing")
  - household debt constraints
- Study one-time unanticipated tightening of debt constraints
  - one good economy: economy-wide shock (US recession)
  - traded and non-traded goods economy: state-specific shocks
- Show model reproduces main aggregate-state patterns of recession

Related: Financial Frictions in Open Economies

- Traditional sudden stop model (Mendoza)
  - credit friction on firm side
  - amplify productivity shocks
- Sticky wages (Guerrieri–Lorenzoni, Midrigan–Philippon)
  - credit friction on consumer side
- Sticky wages (Beraja, Hurst and Ospina)
  - wages more sticky in time series than in cross section

One-Good Economy

Two Alternative Versions

- Financial frictions from either
  - debt constraints (no housing)
  - collateral constraints on housing
- Show two versions are equivalent
- Do so to emphasize
  - source of shock not important
  - implied path for intertemporal MRS in consumption is
- Focus on collateral constraint interpretation

Economy

- Continuum of identical families
- Each family consists of continuum of workers
  - owns firms in the economy
  - pools idiosyncratic risk of workers
  - faces debt constraints
- Each worker in family
  - characterized by idiosyncratic shock history s^t w.p. $\pi(s^t)$
  - earns $y(s^t)$ from market or home production
  - survives with probability ϕ

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Next: family maximization problem

Two-Part Family Problem

- Part I: choice of family-wide common consumption
  - subject to debt constraints (version 1)
  - subject to collateral constraints on housing (version 2)

- Part II: choice by workers and family-owned firms
  - of employment or no employment
  - of vacancy creation

Part I: Problem with Debt Constraints

$$\max_{c_t} \sum_{t=0} \beta^t u(c_t)$$

$$c_t + q a_{t+1} = a_t + \int y_{it}\, di + D_t$$

$$a_{t+1} \geqslant -\overline{d}_t$$

- q: world price of one-period bond s.t. $\beta < q$
- y_{it}: income of worker i from wages or home production
- D_t: profits net of vacancy posting costs
- $\overline{d}_t$: debt limit

Part I: Problem with Collateral Constraints

$$\max_{c_t, h_t} \sum_{t=0} \beta^t [u(c_t) + \psi_t v(h_t)]$$

$$c_t + q a_{t+1} + p_t h_{t+1} = a_t + p_t h_t + \int y_{it} di + D_t$$

$$a_{t+1} \geqslant -\chi_t p_t h_{t+1}$$

- h_t: housing with price p_t in fixed supply $H = 1$
- q: world price of one-period bond s.t. $\beta < q$
- y_{it}: income of worker i from wages or home production
- D_t: profits net of vacancy posting costs
- χ_t: maximum loan-to-value ratio

Equivalence Between Economies

- The two versions are equivalent
  - given $\{\overline{d}_t\}$, $\exists$ $\{\psi_t\}$ s.t. allocations coincide
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- Intuition
  - both generate same path for consumption
  - so generate same path for intertemporal MRS
  - intertemporal MRS all that matters for search part

- From now on: economy with collateral constraints

Part I: Problem with Collateral Constraints

$$\max_{c_t, h_t} \sum_{t=0} \beta^t [u(c_t) + \psi_t v(h_t)]$$

$$c_t + q a_{t+1} + p_t h_{t+1} = a_t + p_t h_t + \int y_{it} di + D_t$$

$$a_{t+1} \geqslant -\chi_t p_t h_{t+1}$$

- $Q_{t,t+1} = \beta^t u'(c_{t+1})/u'(c_t)$: family discount factor
- When a credit shock (ψ_t or χ_t) hits and $c_t \downarrow$: $Q_{t,t+1} \downarrow$
- So workers and firms become endogenously more impatient
- $Q_{t,t+1}$ response crucial in propagating credit shock to economy

Part II: Worker and Firm Problem

- Workers: choose employment to maximize PV of income
  - using family's discount factor $Q_{t,t+1}$

$$\max \sum_{t=0} \sum_{s^t} \phi^t Q_{t,t+1} \pi(s^t) y(s^t)$$

  - given idiosyncratic shock history $s^t = (s_0, s_1, \ldots, s_t)$

- s_t: records idiosyncratic events at t (affecting lifetime)
  - birth/death
  - separation/matching
  - human capital shock

- Firms: choose vacancies to maximize PV of profits
  - also discounted using family's discount factor $Q_{t,t+1}$

Human Capital and Output Technologies

- Newborns enter with human capital

$$\log(z) \sim N(0, \sigma_z^2/(1-\rho_z^2))$$

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- On-the-job human capital accumulation/off-the-job depreciation
  - employed worker's z evolves according to $F_e(z'|z)$: drifts up

$$\log z' = (1-\rho_z)\mu_z + \rho_z \log z + \sigma_z \varepsilon'$$

  - non-employed worker's z according to $F_u(z'|z)$: drifts down

$$\log z' = \rho_z \log z + \sigma_z \varepsilon'$$

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$$\log z' = \rho_z \log z + \sigma_z \varepsilon'$$

- Employed consumers: produce z and receive wage $w_t(z)$
- Non-employed consumers: produce b (same w/ output prop'l to z)

Matching Technology

- Matching function: $M(u_t, v_t) = Bu_t^{\eta} v_t^{1-\eta}$
- Market tightness: $\theta_t = v_t / u_t$
- Probability firm finds worker

$$\lambda_{f,t} = \frac{M(u_t, v_t)}{v_t} = B\left(\frac{u_t}{v_t}\right)^{\eta} = B\theta_t^{-\eta}$$

- Probability worker finds firm

$$\lambda_{w,t} = \frac{M(u_t, v_t)}{u_t} = B\left(\frac{v_t}{u_t}\right)^{1-\eta} = B\theta_t^{1-\eta}$$

- Probability match exogenously destroyed: σ

Worker Values

- Employed consumer's value: $W_t(z)$ equals

$$w_t(z) + \phi Q_{t,t+1}(1-\sigma)\int_{z'} \max\left[W_{t+1}(z'), U_{t+1}(z')\right] dF_e(z'|z)$$

$$+\phi Q_{t,t+1}\sigma\int_{z'} U_{t+1}(z')\, dF_e(z'|z)$$

- Unemployed consumer's value: $U_t(z)$ equals

$$b + \phi Q_{t,t+1}\lambda_{w,t}\int_{z'} \max\left[W_{t+1}(z'), U_{t+1}(z')\right] dF_u(z'|z)$$

$$+\phi Q_{t,t+1}(1-\lambda_{w,t})\int_{z'} U_{t+1}(z')\, dF_u(z'|z)$$

- Consumer discount factor $\downarrow$ when debt constraint binds

Firm Value

- Value of a vacancy filled with worker with human capital z

$$J_t(z) = z - w_t(z) + \phi Q_{t,t+1}(1-\sigma)\int_{z'} \max\left[J_{t+1}(z'), 0\right] dF_e(z'|z)$$

- Firm discount factor $\downarrow$ when family debt constraint binds

Equilibrium Wages

- Wages renegotiated period by period
- Determined by generalized Nash bargaining

$$\max_{w_t(z)} \left[W_t(z) - U_t(z) \right]^{\gamma} J_t(z)^{1-\gamma}$$

s.t.

$$\frac{\gamma}{W_t(z) - U_t(z)} = \frac{1-\gamma}{J_t(z)}$$

- γ: worker's bargaining weight
- Similar results with alternating offer bargaining

Free-Entry Condition

- Firms pay κ units of output to post a vacancy
- Due to firm competition, expected value of filling vacancy equals κ
- Let $n_t^u(z)$ measure of unemployed so $\tilde{n}_t^u(z) = \frac{n_t^u(z)}{\int dn_t^u(z)}$

$$\kappa = \phi Q_{t,t+1} \lambda_{f,t} \int_{z'} \max\left[J_{t+1}\left(z'\right), 0\right] dF_u\left(z'|z\right) d\tilde{n}_t^u\left(z\right)$$

- Pins down vacancy to unemployment ratio θ_t
- Provides intuition for how debt tightening affects vacancy creation

Impact of Credit Shock on Vacancy Creation

- When debt constraint binds: $u'(c_t) \uparrow$ implies $Q_{t,t+1} \downarrow$
- Decrease in $Q_{t,t+1}$ depresses firms' incentives to post vacancies
- Since it leads to fall in expected profits from filling vacancy

$$\kappa = \phi Q_{t,t+1} \lambda_{f,t} \int_{z'} \max \left[J_{t+1}\left(z'\right), 0 \right] dF_u\left(z'|z\right) d\tilde{n}_t^u\left(z\right)$$

- Or, equivalently, to rise in cost of posting vacancies (in utils)

$$\kappa u'(c_t) = \beta \phi u'(c_{t+1}) \lambda_{f,t} \int_{z'} \max \left[J_{t+1}\left(z'\right), 0 \right] dF_u\left(z'|z\right) d\tilde{n}_t^u\left(z\right)$$

Impact of Credit Shock on Workers

- Quantitatively: worker side effect much more important than firm
- Workers' value
  - current wages: more
  - increment to human capital: less
- In Nash bargaining
  - workers want higher current wages
  - firms want lower current wages
  - in equilibrium wages endogenously sticky
  - so vacancies contract

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Next: model parameterization via external and internal calibration

Assigned Parameters

- Period 1 quarter ($\beta = 0.94^{1/4}$ and $q = 0.96^{1/4}$)
- Survival rate so consumers in market for 40 years
- Probability of separation: $\sigma = 0.10$ as Shimer (2005)
- Bargaining share and matching elasticity: $\gamma = \eta = 0.5$
- $u(c_t) = c_t^{1-\alpha}/(1-\alpha)$ with $\alpha = 5$ so IES $= 0.2$
  - Attanasio et al. (2002): 0.1 < IES <0.2 (non-stockholders)
  - Vissing and Jorgensen (2002): IES ≈ 0 (non-stockholders)
  - Hall (1988): IES < 0.1

Jointly Calibrated Parameters

more

- Efficiency matching function: B
  - $\rightarrow$ employment-population ratio $= 0.8$ (U.S. age 25-54)
- Home production: b
  - $\rightarrow$ b/median $w = 0.4$ (Shimer (2005))
- Std. dev. of shocks to z: σ_z
  - $\rightarrow$ std. dev. of log wage changes $= 0.21$ (Floden et al. (2001))
- Persistence shocks to z: ρ_z
  - $\rightarrow$ std. dev. of log initial wages $= 0.94$ (PSID)
- Returns to employment: μ_z
  - $\rightarrow$ returns to tenure-experience (Buchinsky et al. (2010))

Returns to Tenure and Experience

- Indirect inference approach to quantify these returns
- That allows for varying degrees of portability of acquired skills
- Using empirical wage model of BFKT (2010) as auxiliary model
- Compute for each model-simulated path, wage predicted by BFKT

$$\widehat{\log(w_{it})} = \widehat{f}(\text{experience}_{it}) + \widehat{g}(\text{tenure}_{it}) + \widehat{\Psi}_{it}(\cdot)$$

- Ψ_{it} summarizes employment history at previous jobs l

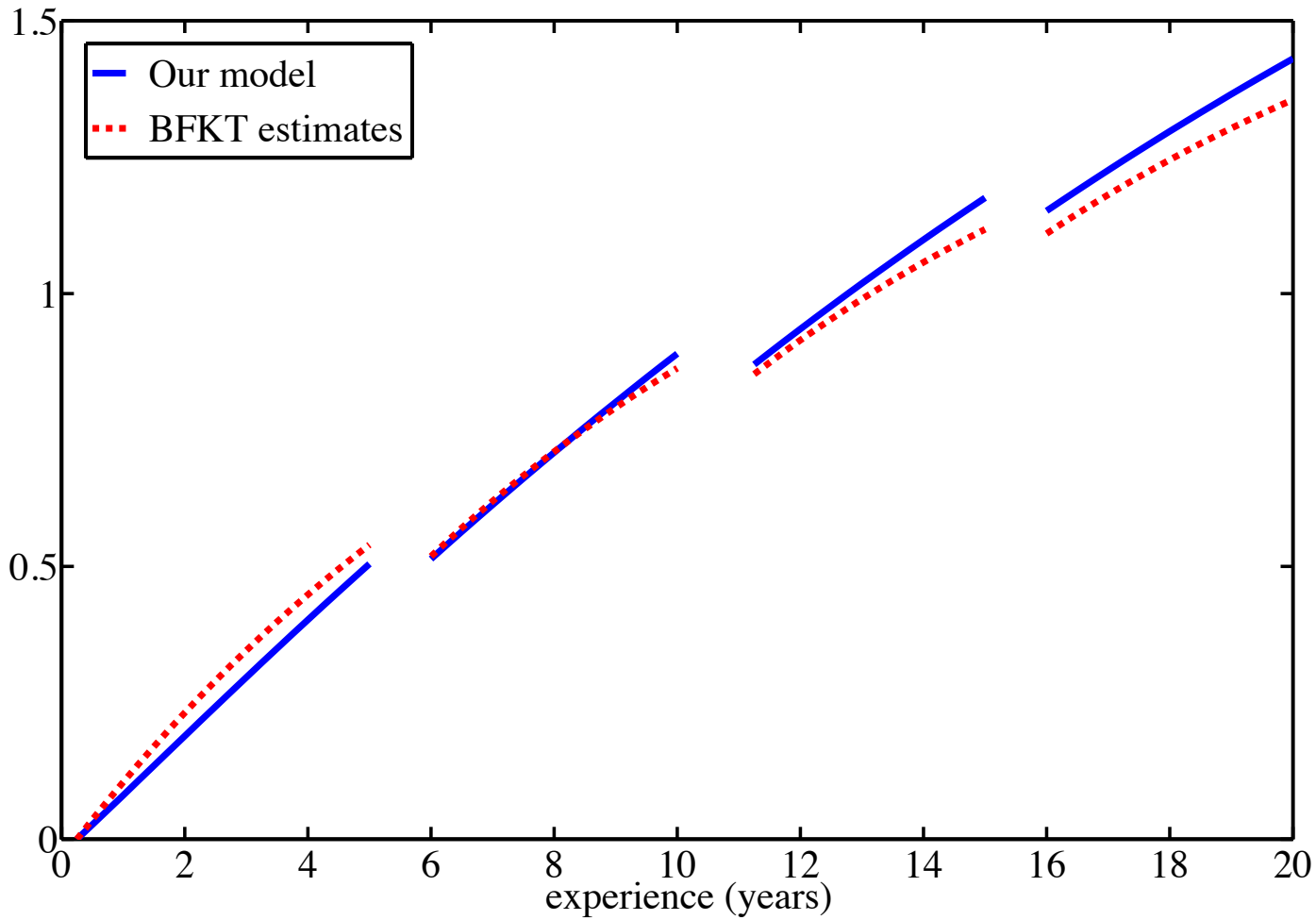
$$\Psi_{it} = \sum_{l=1}^{M_{it}} \sum_{k=1}^{4} \left(\phi_k^0 + \phi_k^s \text{tenure}_i^l + \phi_k^e \text{experience}_i^l\right) d_{ki}^l$$

- Captures different degrees of transferability of HK across matches

Returns to Tenure and Experience

- Minimize distance between
  - $\Delta\widehat{\log(w_{it})}$ predicted by BFKT for simulated experience/tenure
  - $\Delta \log(w_{it})$ implied by our simulated model
- Resulting wage growth: 5.2% per year

Returns: Model vs. BFKT Estimates



Initialize w/ zero exp., mean z_{it} at zero exp. and no shocks

Experiment: Economy-Wide Credit Crunch

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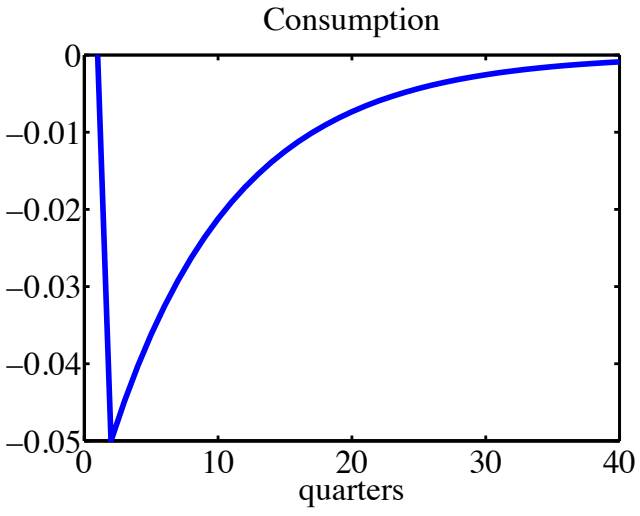
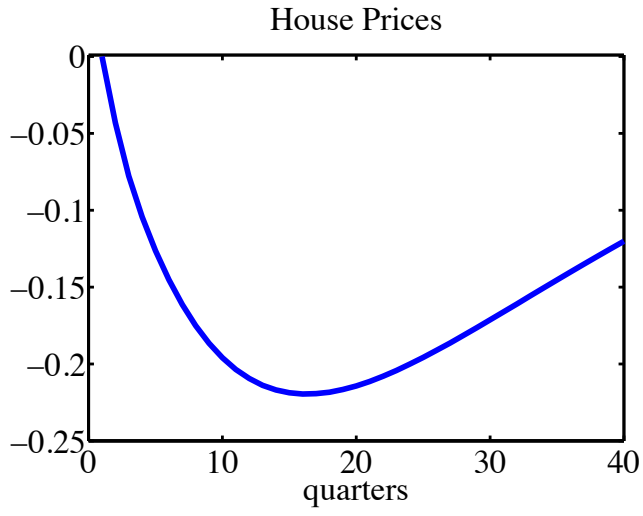
- Assume unanticipated drop in taste for houses ψ_t alternative
- With binding debt constraint: $a_{t+1} = -\chi p_t h_{t+1}$
- Choose path for ψ_t so c_t falls 5% then mean reverts as

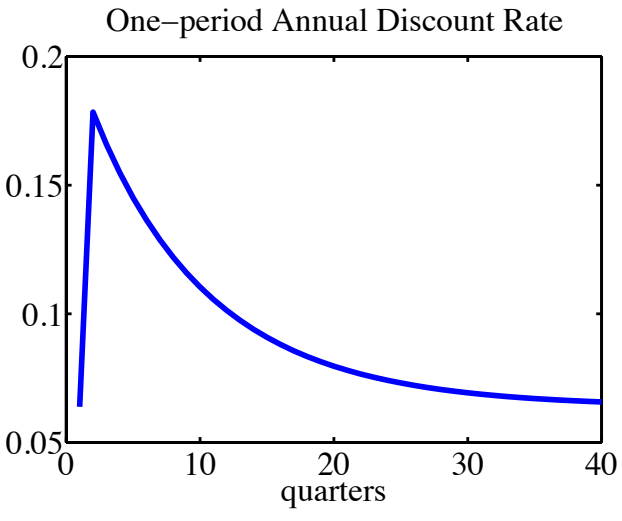
$$\Delta c_t = \rho \Delta c_{t-1}$$

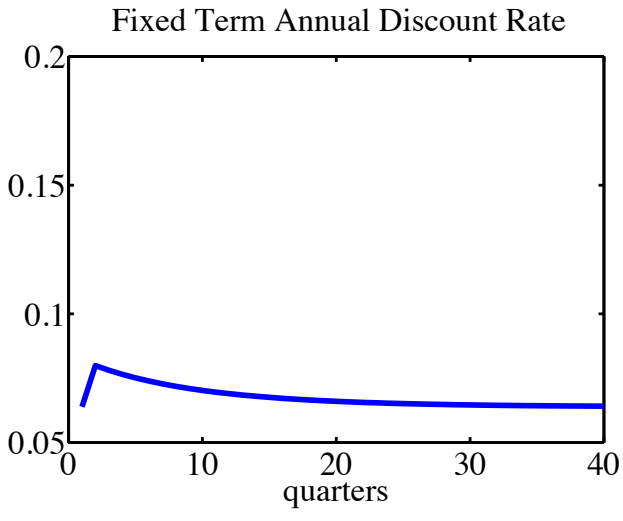
- $\rho = 0.90$ calibrated to match speed of postwar recoveries
- Show impact on consumption, house prices, and employment

Experiment: Economy-Wide Credit Crunch



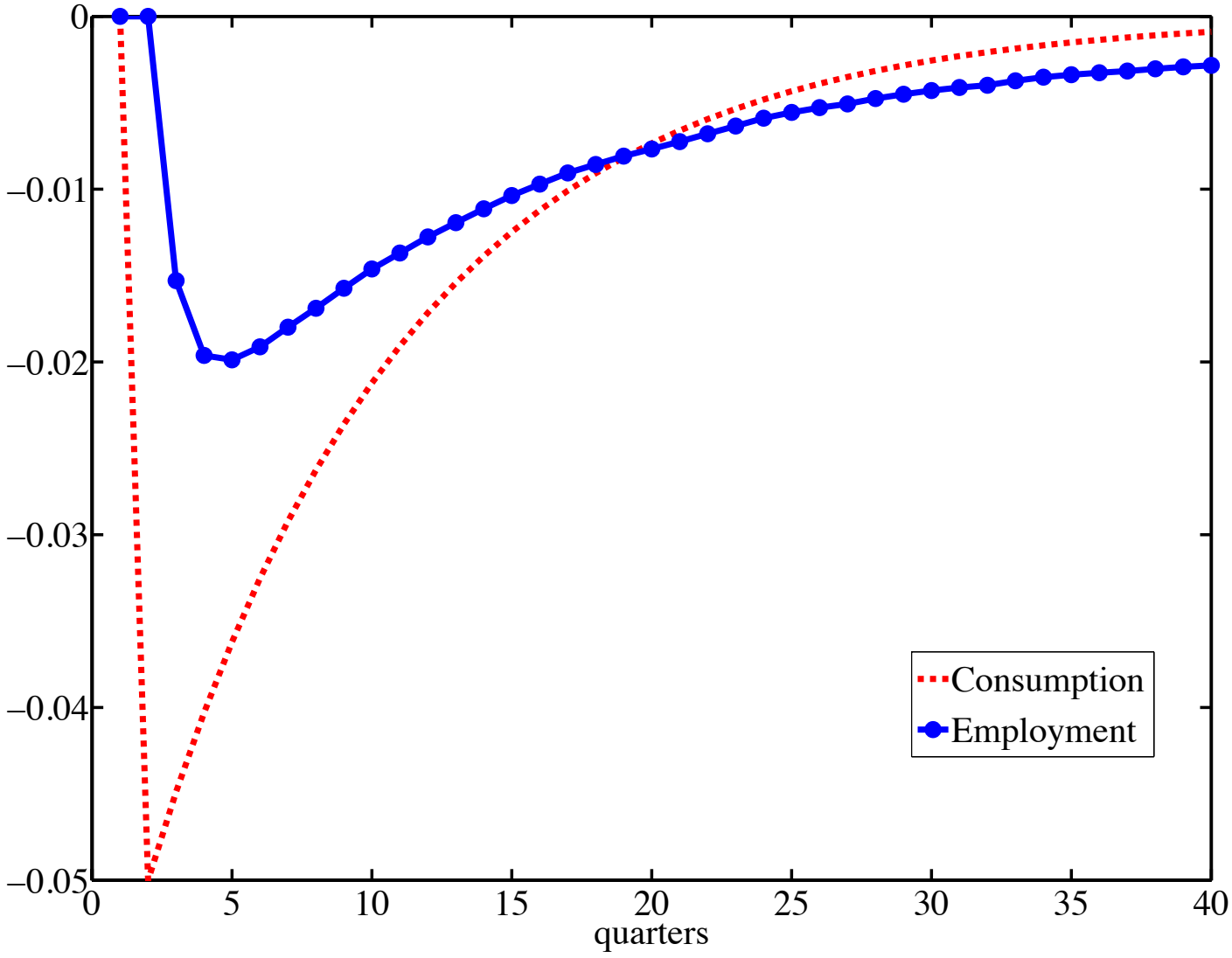






BR panel: change in constant rate giving rise to the same PV

Employment vs. Consumption



Drop in employment half as large as drop in consumption at impact

Employment Response

- Employment drop much more persistent
- Use cumulative impulse responses (CIR)
  - 2 years: $\text{CIR}_\text{E} = 44\%$ of CIR_C
  - 10 years: $\text{CIR}_\text{E} = 69\%$ of CIR_C
  - overall: $\text{CIR}_\text{E} = 92\%$ of CIR_C
- Employment decline of magnitude comparable to c_t drop
- Employment drop mostly accounted for $\downarrow$ in vacancy creation

Decomposition of Employment Response

- Shimer (2012) approach

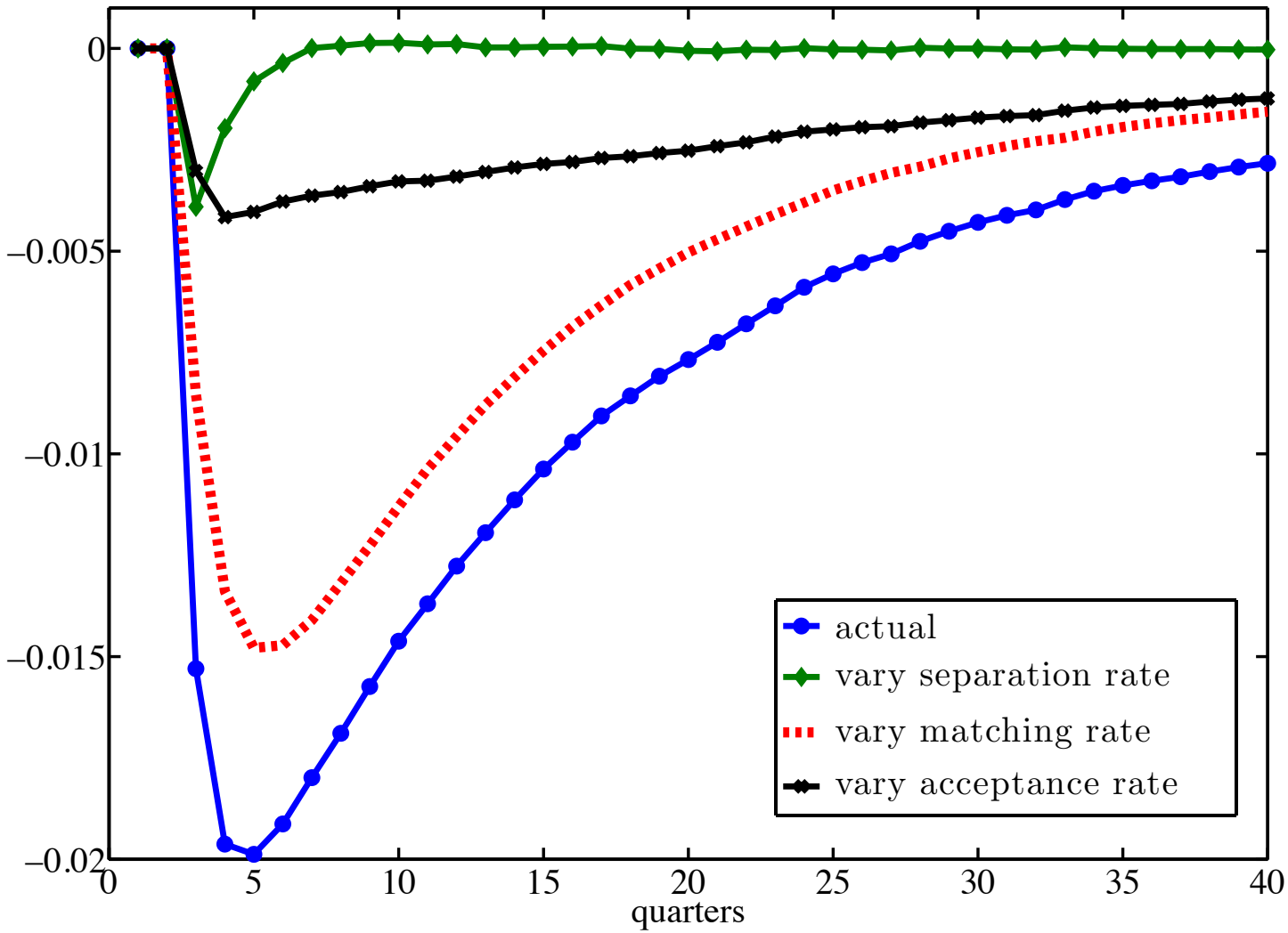
$$E_{t+1} = (1 - s_t)E_t + \lambda_{w,t} x_t (1 - E_t)$$

  - s_t: separation rate
  - $\lambda_{w,t}$: worker matching rate
  - x_t: acceptance rate

- Construct three counterfactual employment series
  - vary s_t, $\lambda_{w,t}$, x_t in isolation
  - leave others at steady state values

- Drop in $\lambda_{w,t}$ most accounts for drop E_t

Decomposition of Employment Response



Why Is Employment Drop Persistent?

- Selection effect
  - as worst matches endogenously dissolved
  - average productivity of unemployed decreases
  - this effect further lowers returns to posting a vacancy
- Credit shock persistent
- Each accounts for about 1/2 of persistence in drop

Key Forces Behind Employment Drop

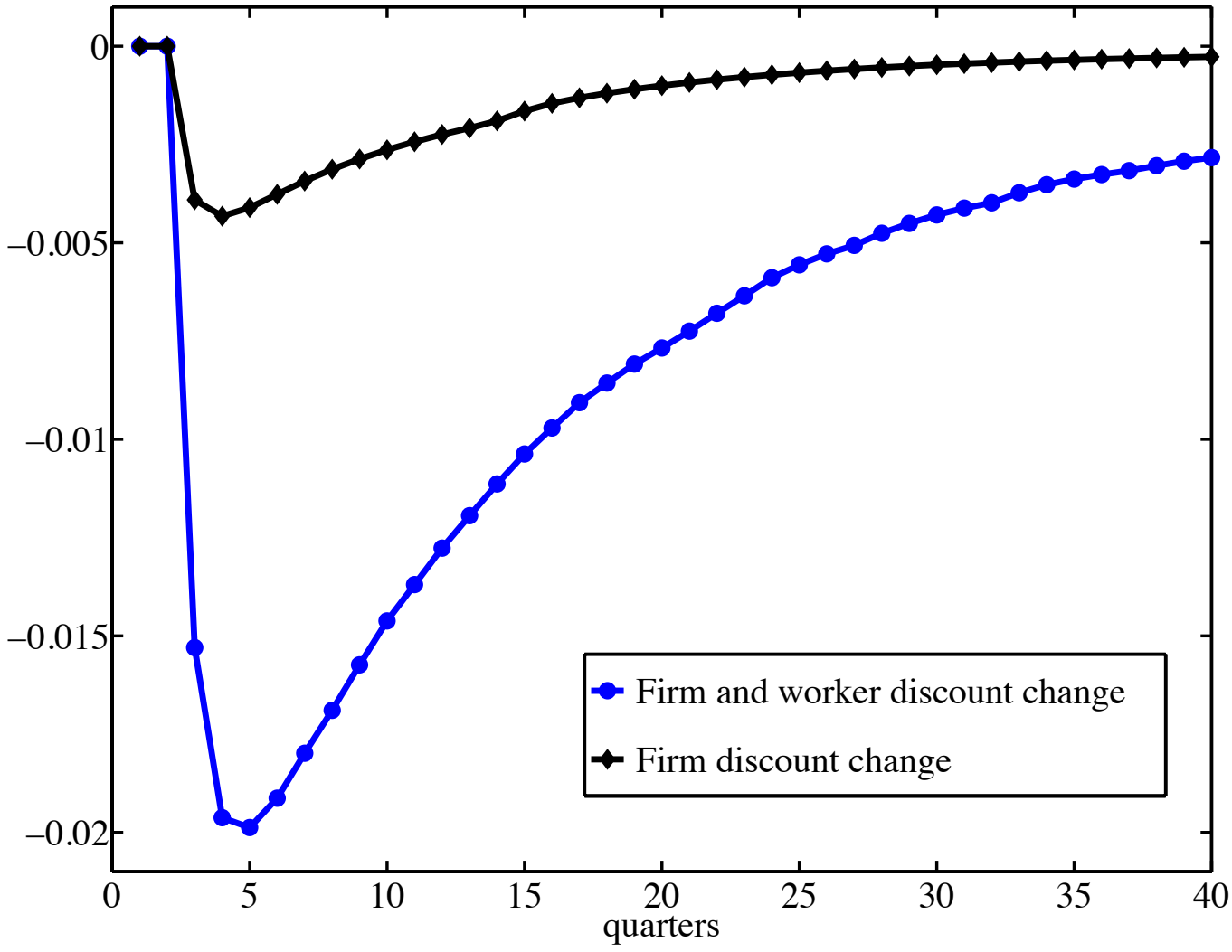
- Endogenous wage stickiness

- Returns to tenure and experience

Key Force I: Endogenous Wage Stickiness

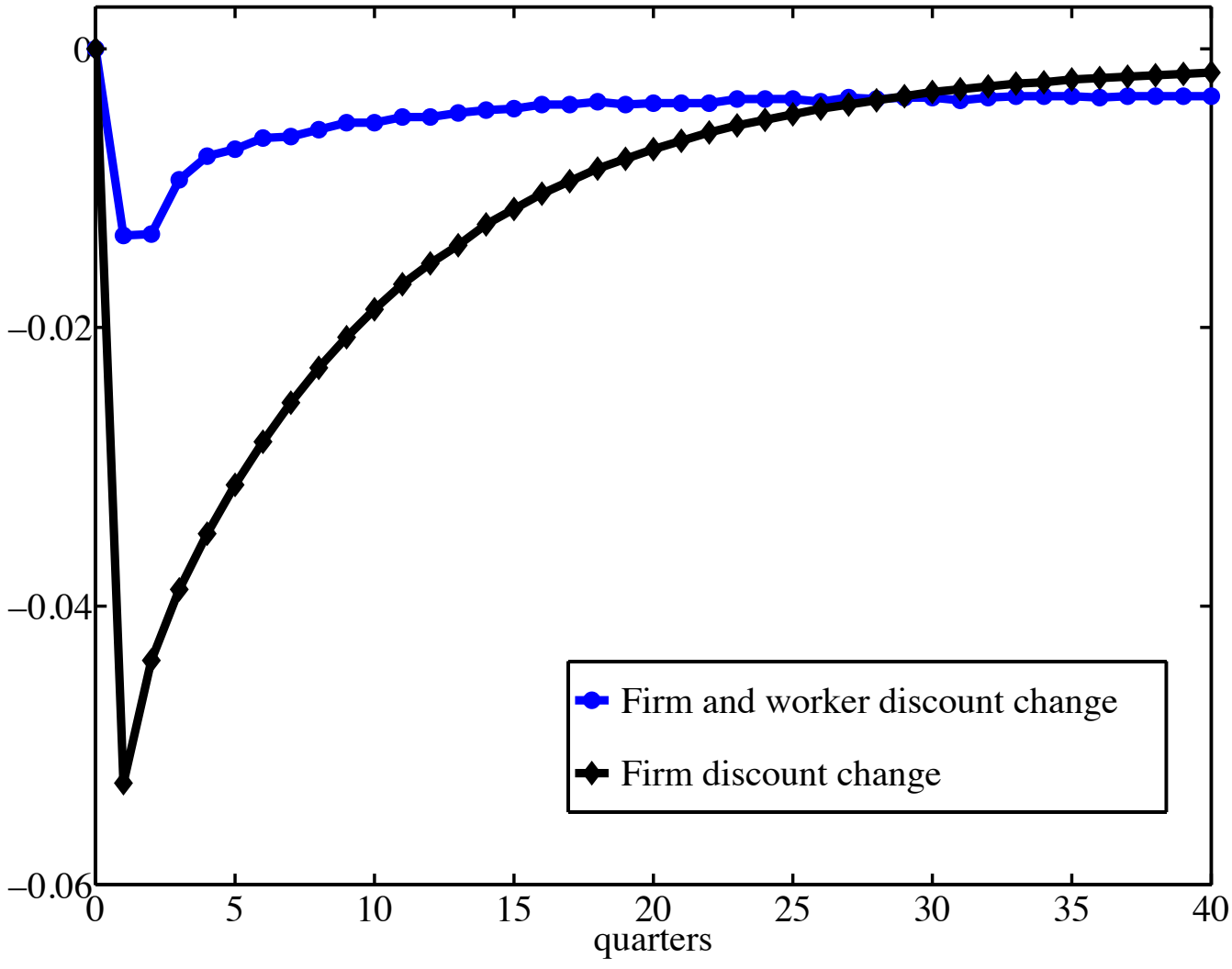
- Wages $\approx$ constant when firms-workers' discount factors decrease
- Unlike most search models that feature 'Shimer' puzzle
  - negative shock leads to large drops in wages
  - no drop in employment
- Our model does *not* feature 'Shimer puzzle'
  - reason: fall in discounting disproportionally hurts workers
  - HK transferable: fall affects their returns over longer horizon
  - as it depresses expected value of wages from *all* future matches
  - so for workers to agree to match, wages cannot fall
- Indeed if only workers' discount factors decreased: wages $\uparrow$
  - if only firms' discount factors decreased: wages $\downarrow$

Employment: Firm and Worker Discounting



Employment falls much more when consumer discount factor changes

Wages: Firm and Worker Discounting

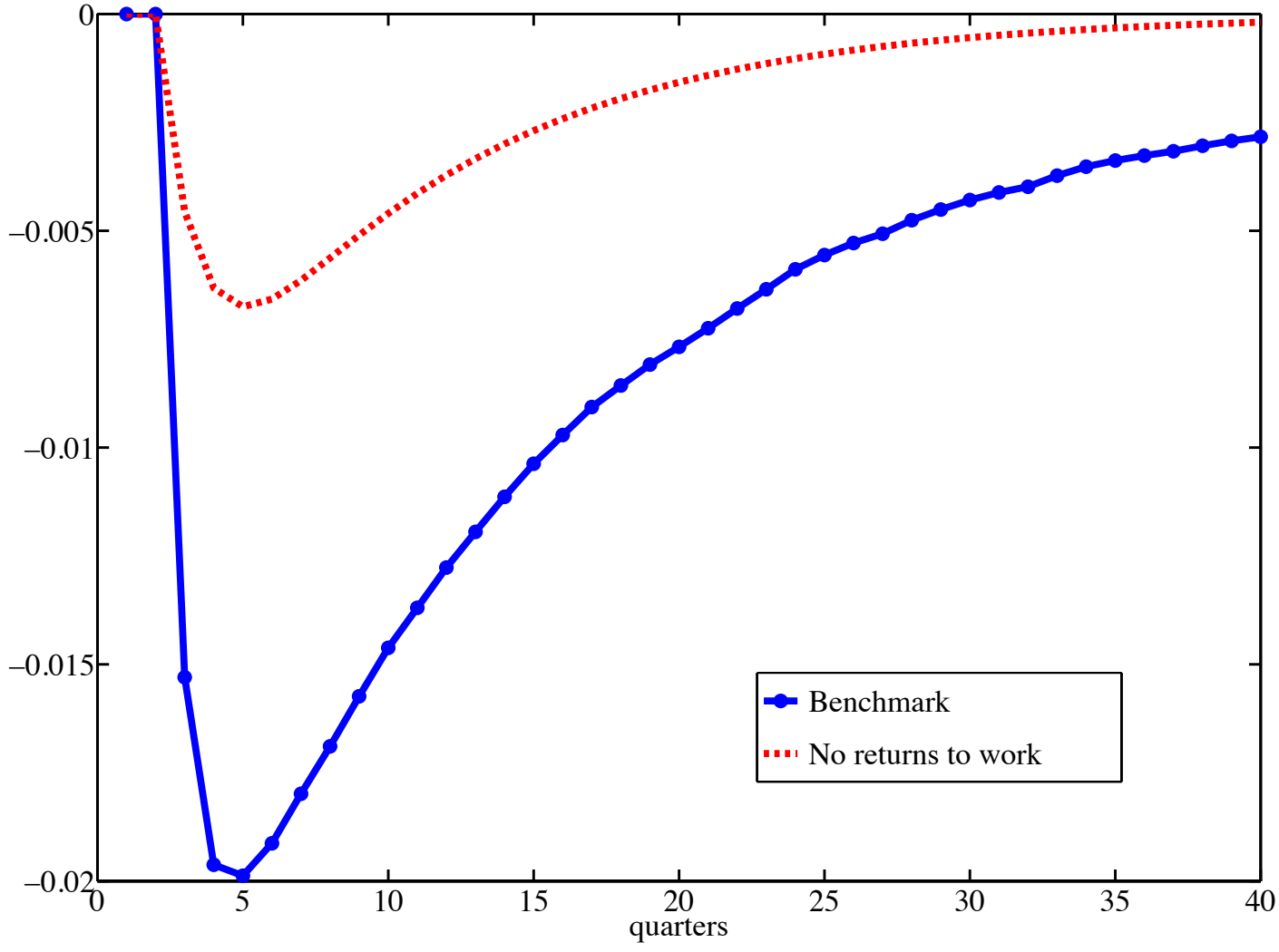


Since wages do not fall much

Key Force II: Returns to Tenure and Experience

- Makes returns from matching backloaded
- Backloading critical to amplifying effect of credit shocks
- Negligible employment effects w/o returns to employment
- Illustrate by making worker output, z, constant

Employment Profile with Varying Returns



Without returns drop would be 1/4 of the drop with such returns

Explains Small Effect of Hall (2014)

- Risk-neutral firms and workers
- Workers produce constant output
- Fixed-term discount rate 10% to 20%: u_t from 5.8% to 5.88%
- So no effect on u_t despite shock *four times* as large as ours
- In our model fixed-term discount rate $\uparrow$ from 6% to 8.5%

Economy with Traded and Non-traded Goods

Consumer Credit Crunch Conjecture

- Commonly thought contraction in consumer credit key to recession
- Mian and Sufi document recession at state level characterized by
  - fall in house prices
  - decline in *nontraded* employment highly correlated with it
  - drop in *traded* employment largely unrelated to it
- Conjecture patterns consistent w/ tightening of consumer borrowing
- Argue *exogenous rigidities* may be needed to account for them
- Can our model account for these patterns?

Economy with Traded and Non-traded Goods

- Suppose each US state produces
  - common traded good
  - state-specific non-traded good
- Labor cannot move across states but can switch sectors
- Study response to state-specific shocks to debt constraints
  - to evaluate model against Mian and Sufi (2014) evidence

Preferences

- Preferences in a state

$$\sum_{t=0}^{\infty} \beta^t [u(c_t) + \psi_t v(h_t)]$$

- c_t: aggregate of state non-traded (N) and of traded (T)

$$c_t = \left[\tau^{\frac{1}{\sigma}} (c_{Nt})^{\frac{\mu-1}{\mu}} + (1-\tau)^{\frac{1}{\sigma}} (c_{Tt})^{\frac{\mu-1}{\mu}} \right]^{\frac{\mu}{\mu-1}}$$

- Traded goods imported from rest of the world at price of 1

- Firms owned internationally (no firm discount effect)

Output and Search Technologies

- Two sectors: traded (T) and non-traded (N) goods
- Produce z units of traded or non-traded goods
- Matching according to sector-specific technologies

$$M_{Tt} = B_T(u_t)^{\eta}\,(v_{Tt})^{1-\eta} \quad \text{and} \quad M_{Nt} = B_N(u_t)^{\eta}\,(v_{Nt})^{1-\eta}$$

- Simultaneous search in both sectors (at most one offer)

Tightening Debt Constraints in a State

- Decreases demand for state non-traded goods
  - price of non-traded falls relative to price of traded goods
- No effect on demand for state traded goods
  - employment in non-traded drops *a lot*
  - employment in traded drops *a little*
  - as observed in the data

Tightening Debt Constraints in a State

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  - as observed in the data
- So model qualitatively matches patterns of Mian and Sufi

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- No effect on demand for state traded goods
  - employment in non-traded drops *a lot*
  - employment in traded drops *a little*
  - as observed in the data
- Will show model also quantitatively replicates observed changes in
  - nontradable employment across states
  - tradable employment across states

  in response to credit tightening (next: quantify these effects)

Additional Parameters

- Calibrate so same steady state predictions as in one-sector
- Preferences weight on non-traded goods so that
  - 2/3 employment in non-traded as in Mian and Sufi (2014)
- Elasticity traded vs. non-traded goods: $\mu = 4$
- Choose B_T, B_N, κ_T and κ_N so that
  - employment to population ratio: 80%
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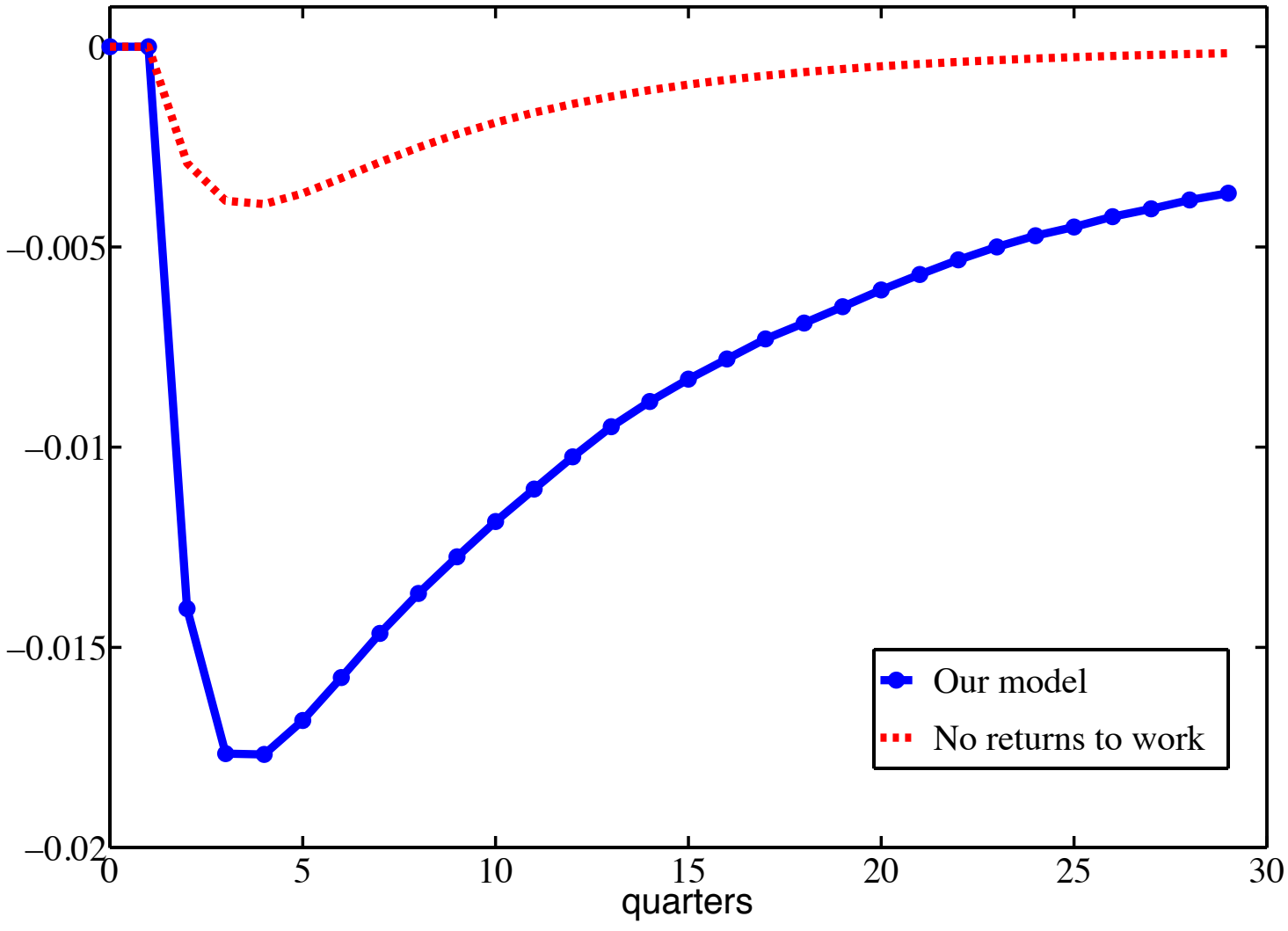
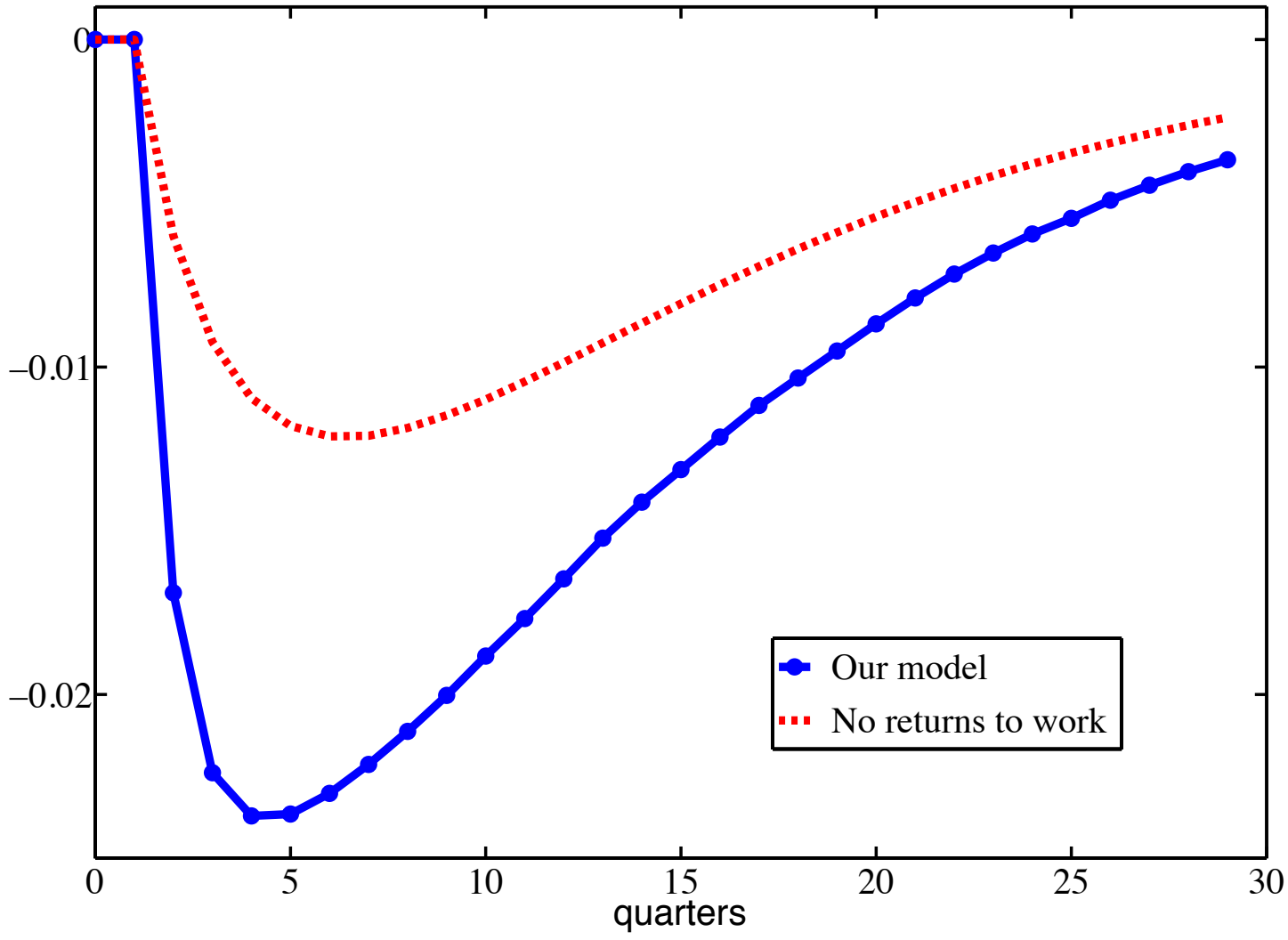
Next: examine effect of fall in housing taste in a state so $c_t \downarrow$ by 5%

Employment



Model not only generates observed contraction in employment

Nontradable Employment



Also implies nontradable employment primarily responsible for decline

Experiment Motivated by Mian and Sufi (2014)

- To assess model ability to account for differential response of
  - nontradable and tradable employment *across* states

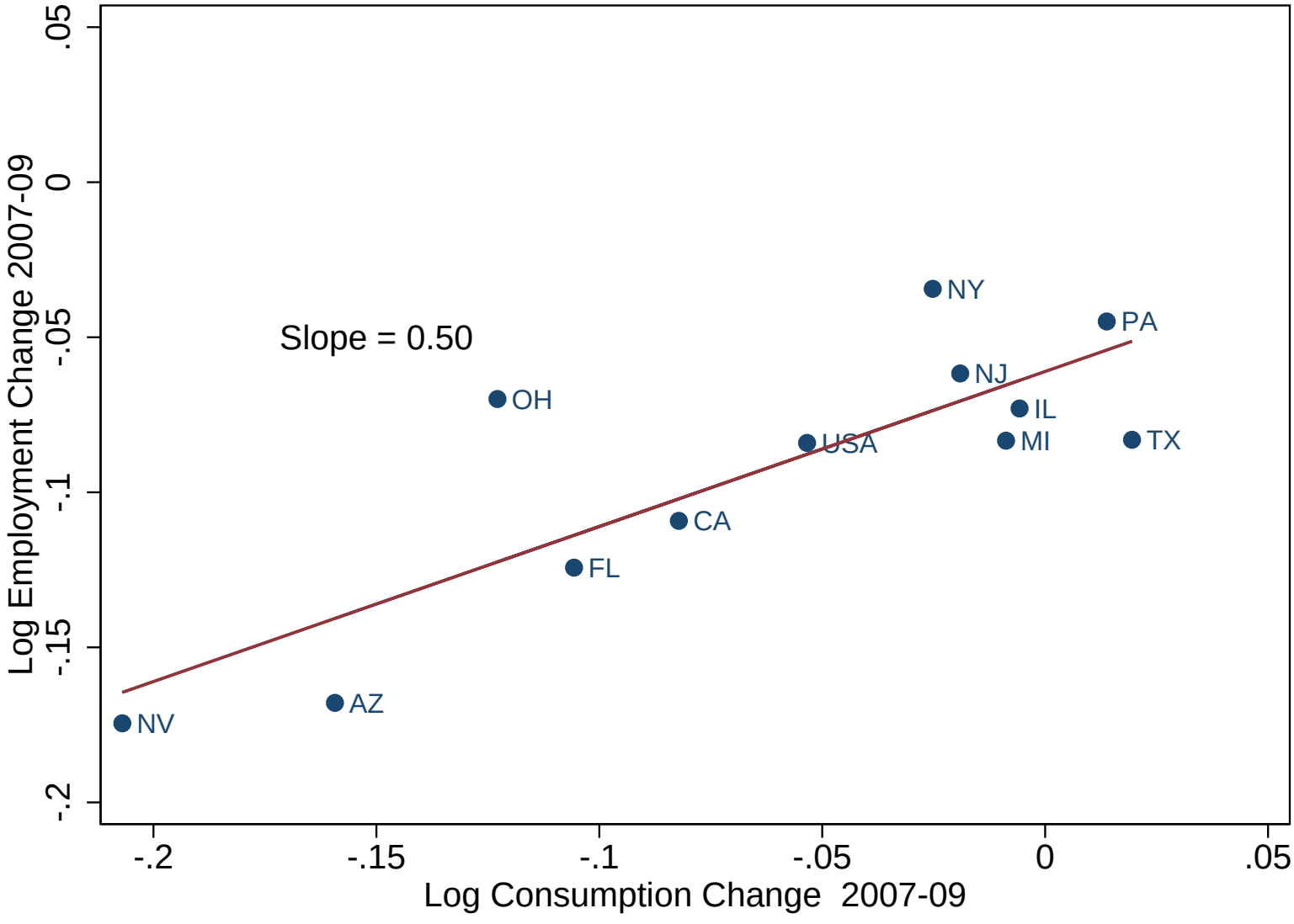
- Assume differential fall in housing taste in 20 states so that
  - State 1: consumption falls 1%

    ...

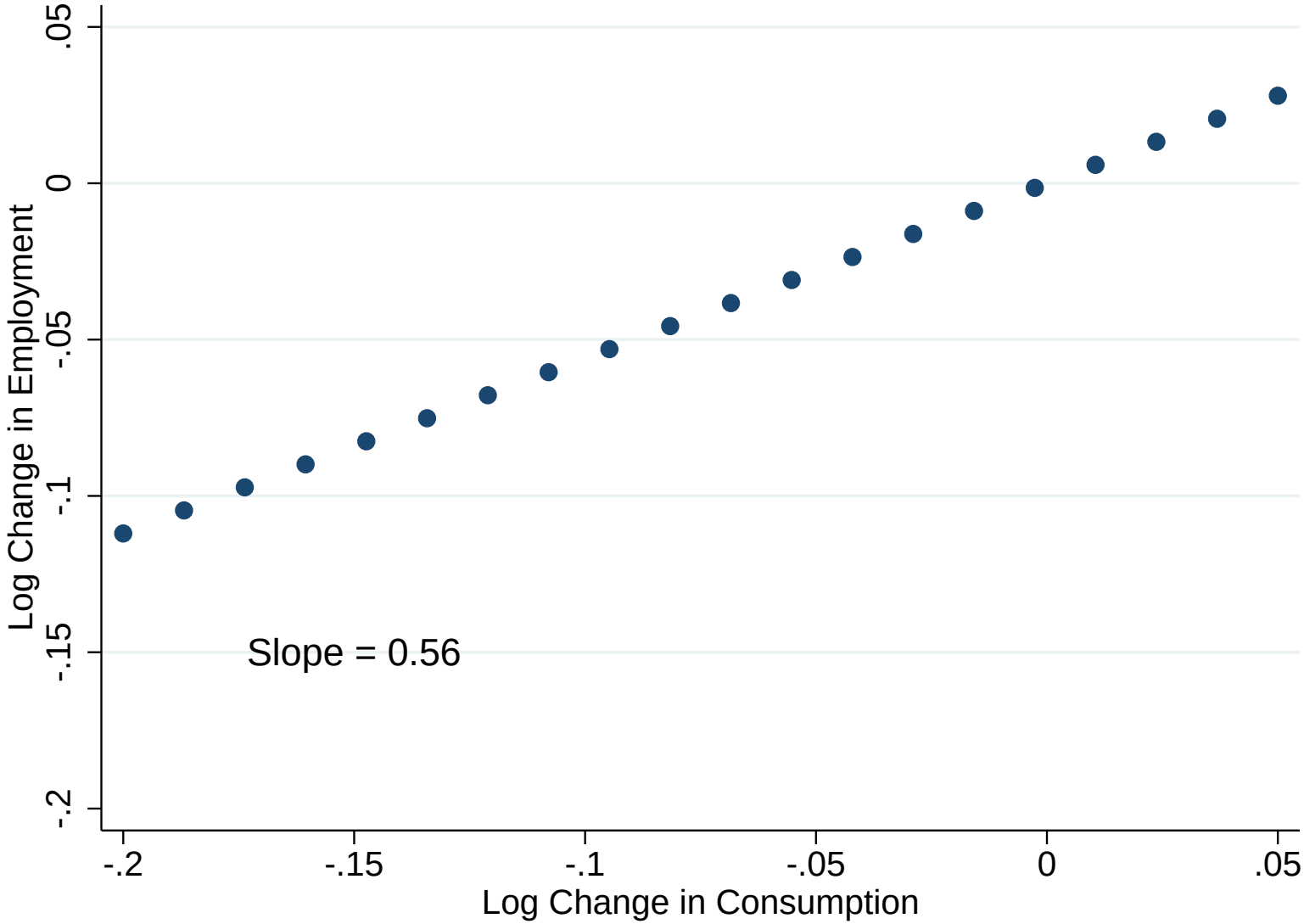
  - State 20: consumption falls 20%

Next: predicted change in employment and consumption?

Employment vs. Consumption: Data

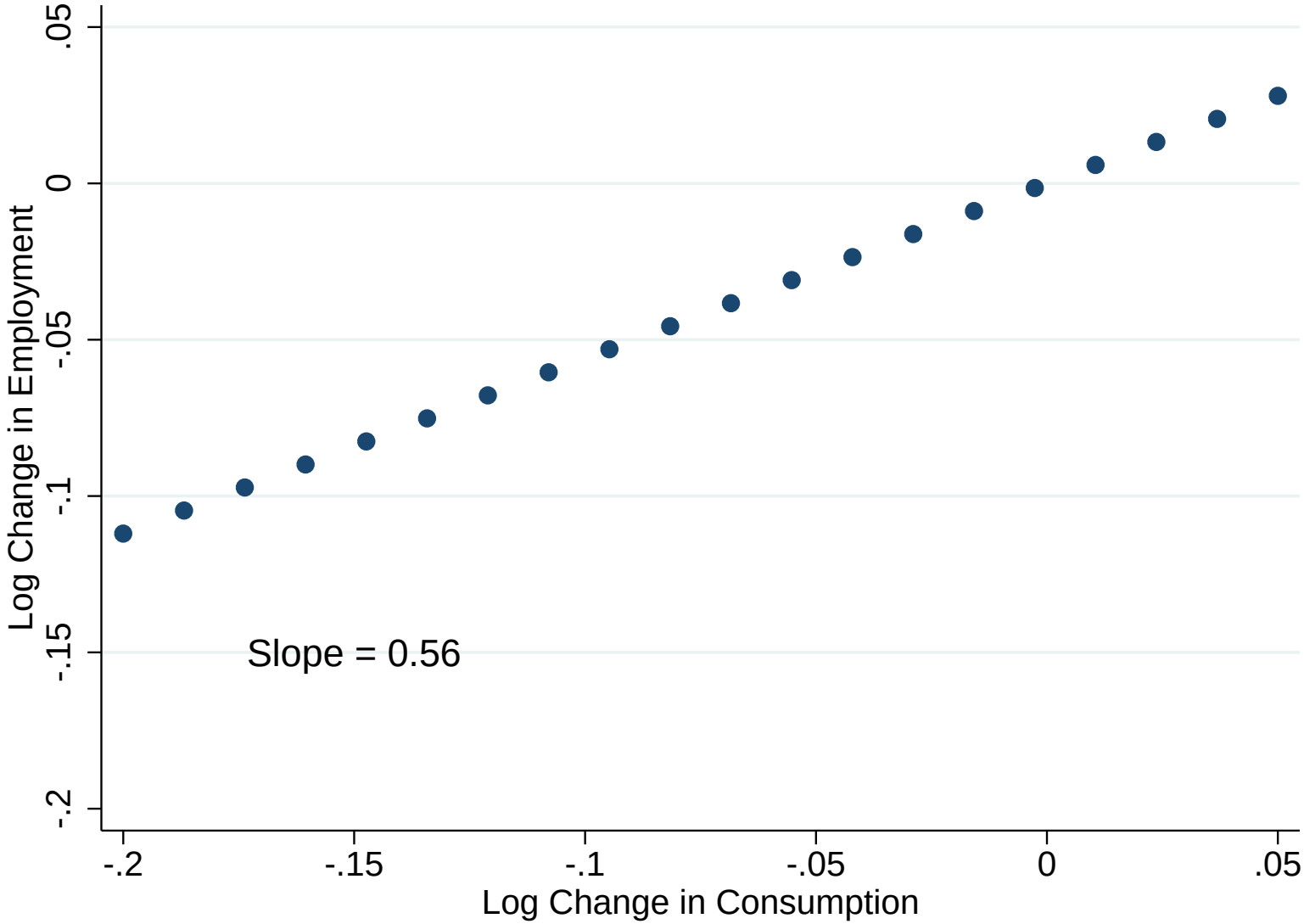


Employment vs. Consumption: Model



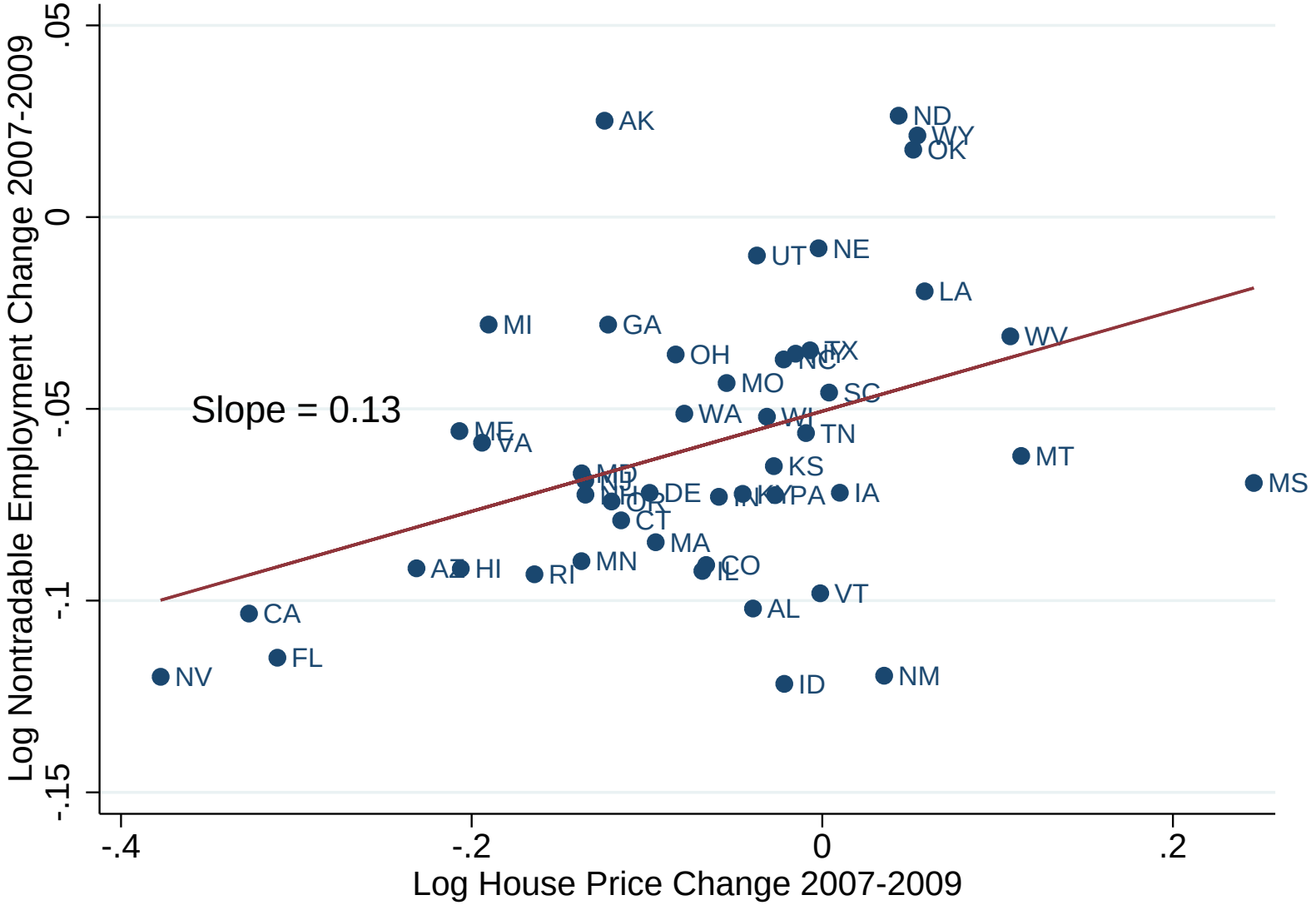
Model captures this comovement fairly well (similar elasticity)

Employment vs. Consumption: Model



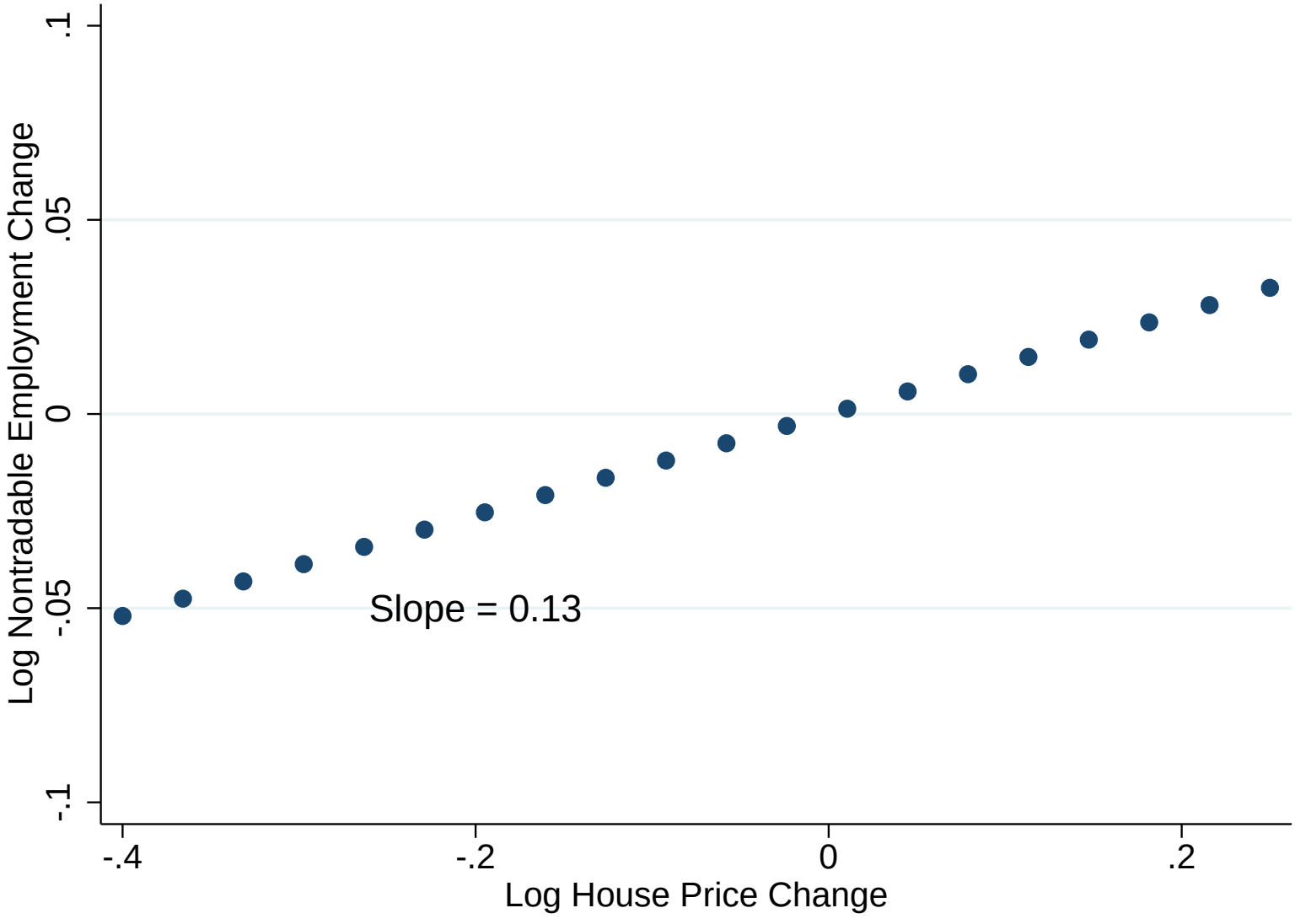
Next: how does employment respond to changes in house prices?

Nontradable Emp. vs. House Prices: Data



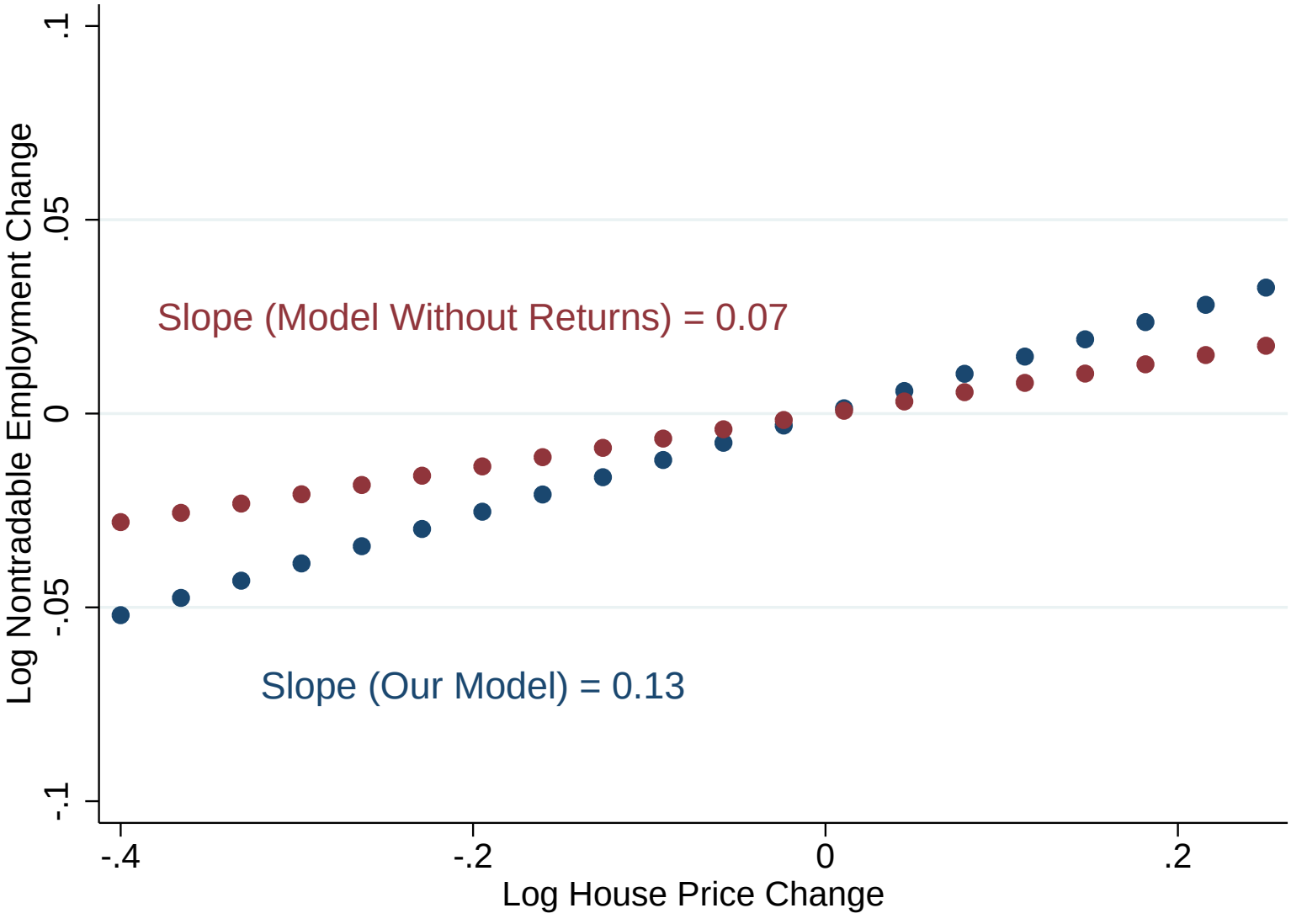
Nontradable emp't fell more in states with greater house price fall

Nontradable Emp. vs. House Prices: Model



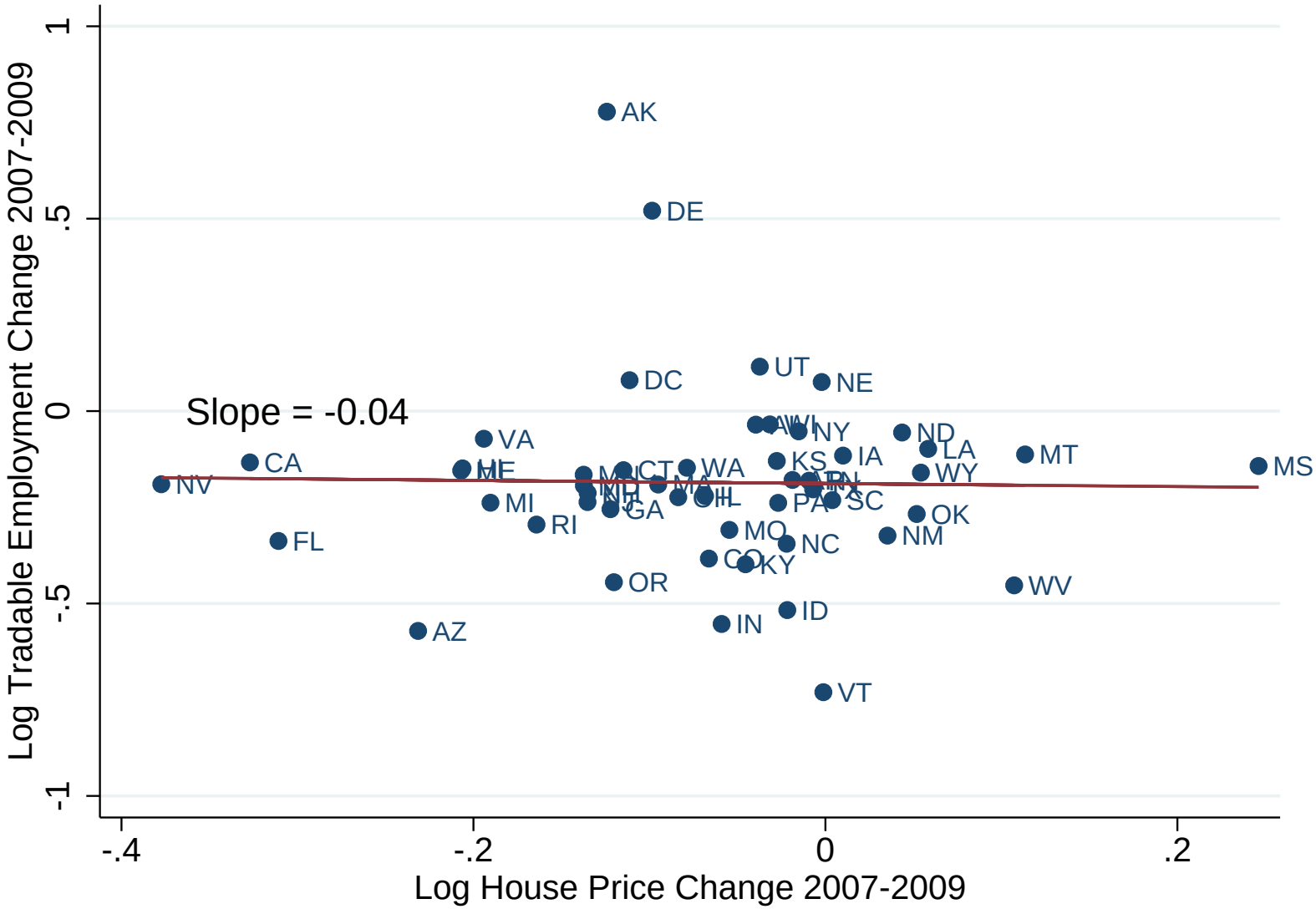
Model reproduces the slope of predicted linear relationship

Nontradable Emp. vs. House Prices: No Returns



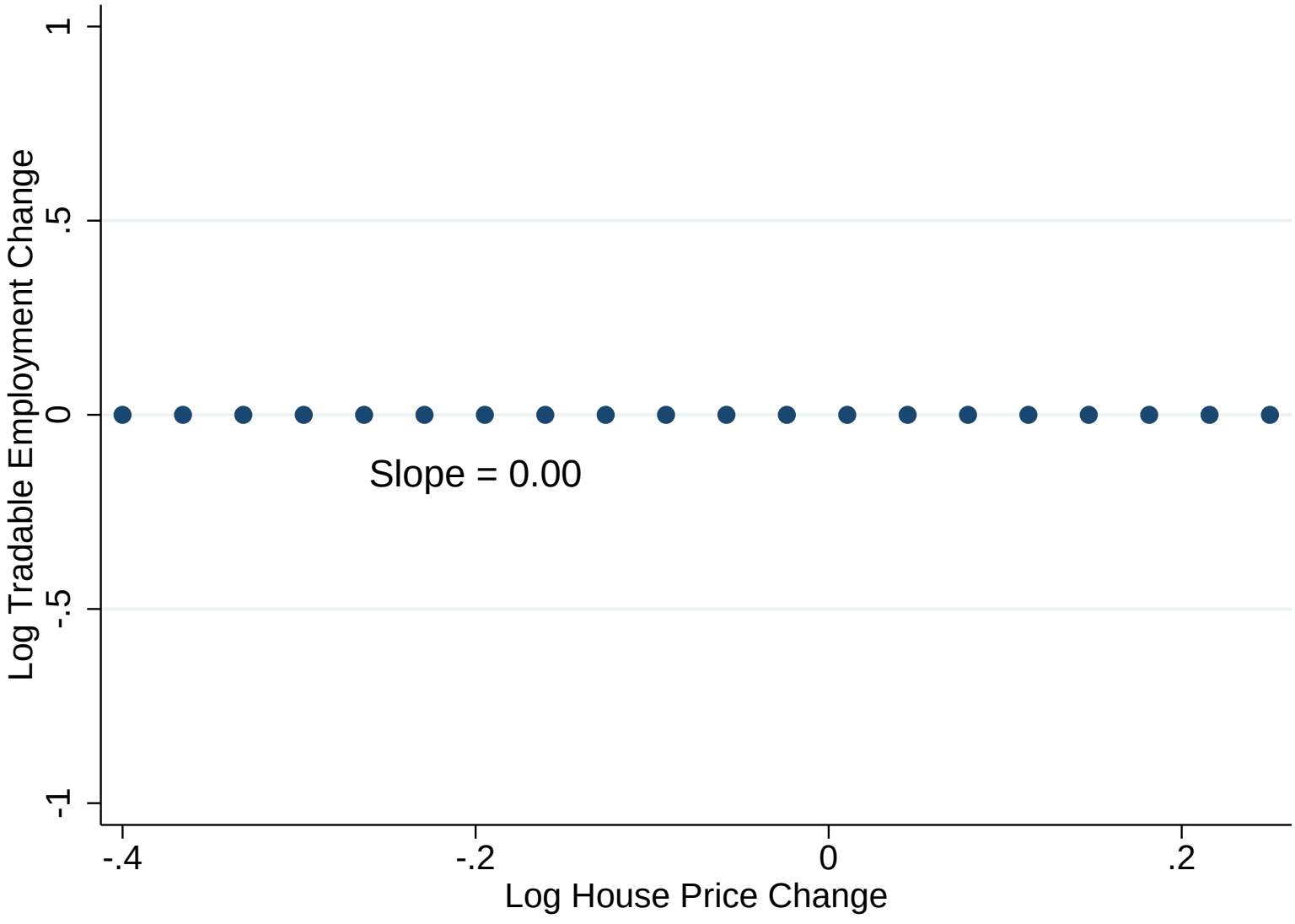
Model would produce smaller sensitivity (0.07 vs. 0.13 in data)

Tradable Employment vs. House Prices: Data



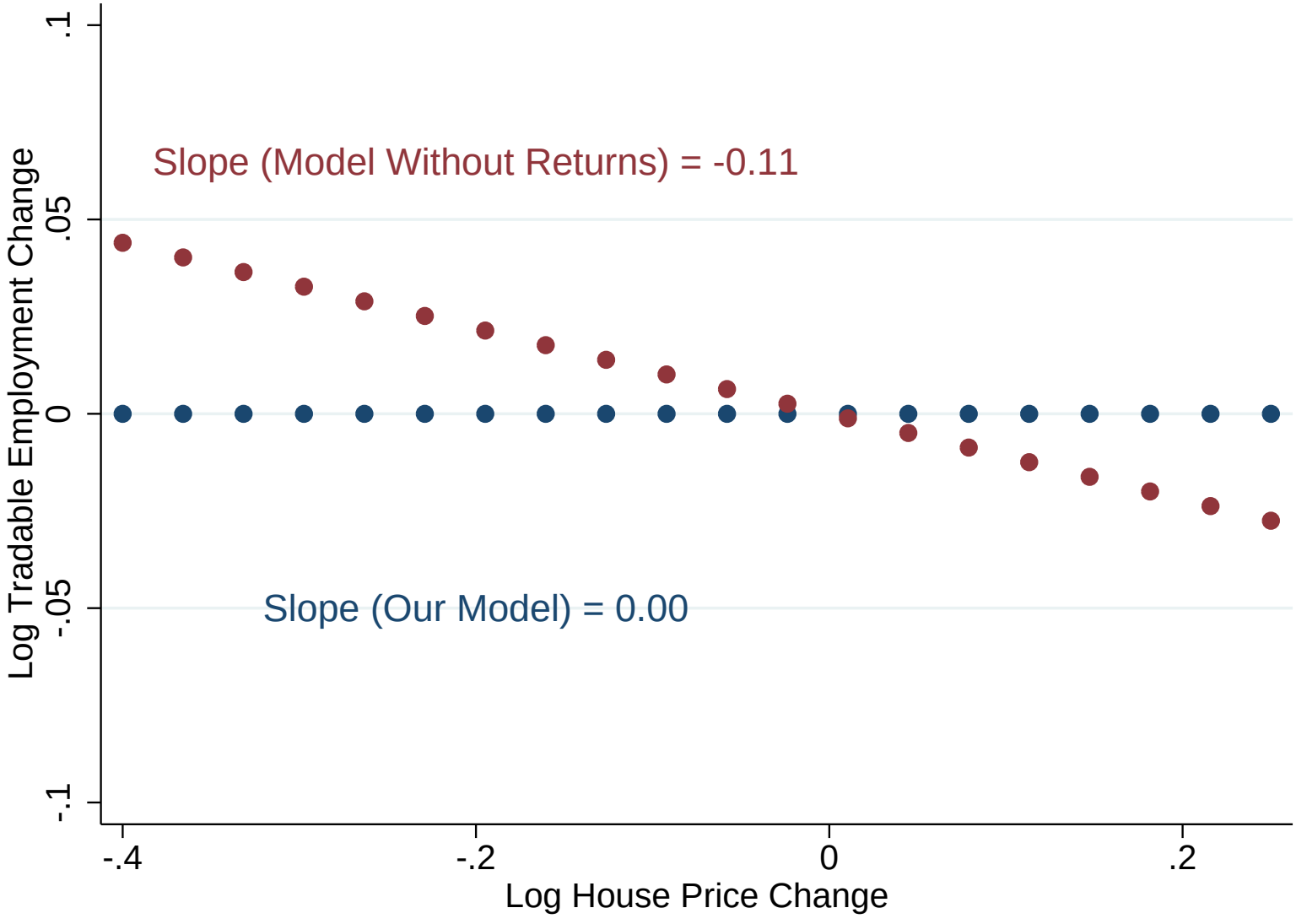
Tradable employment fall unrelated to house price fall

Tradable Employment vs. House Prices: Model



Model matches well the uniform response of tradable employment

Tradable Emp. vs. House Prices: No Returns

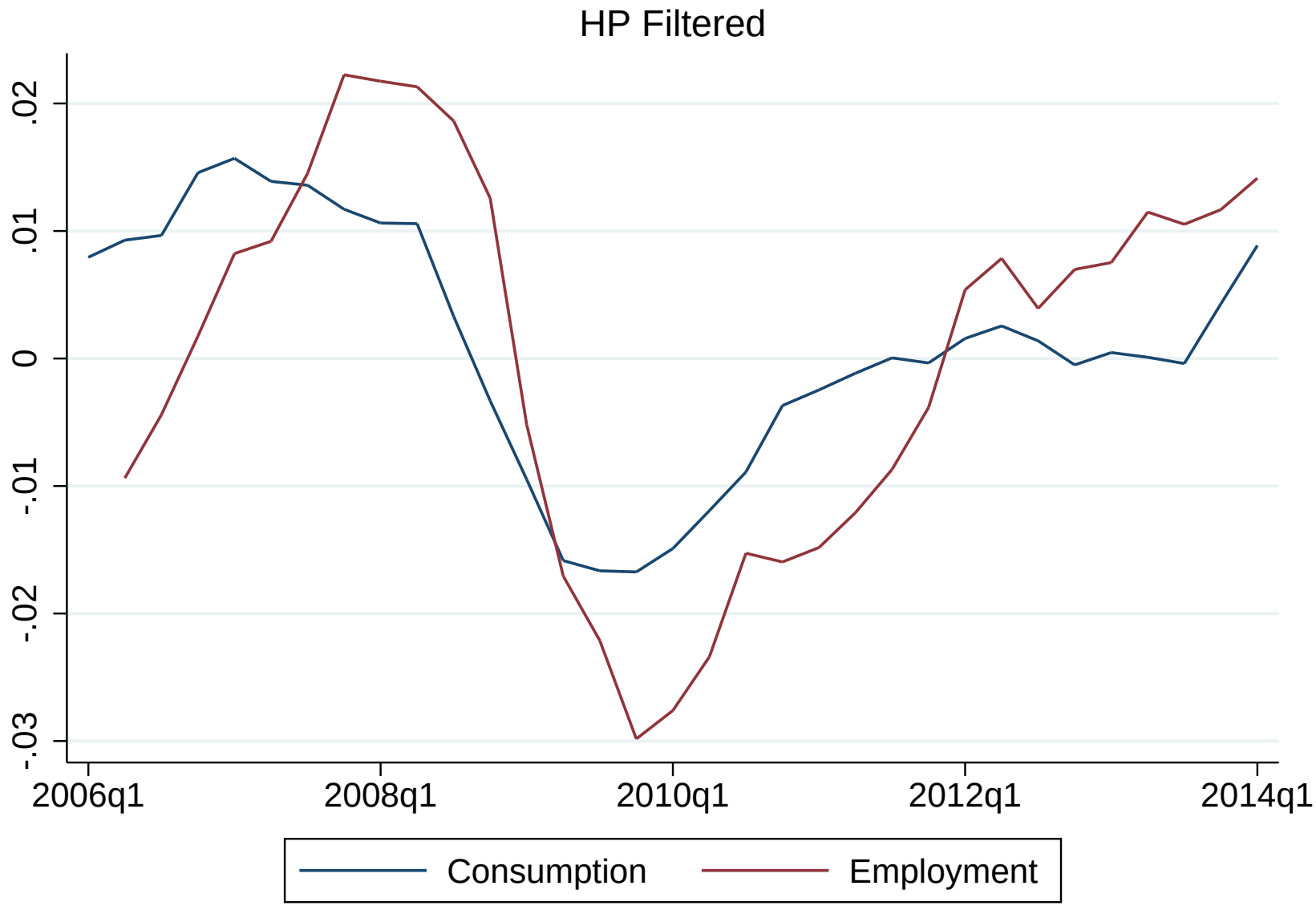


Would be at odds with tradable emp't response (-0.11 vs. 0 in data)

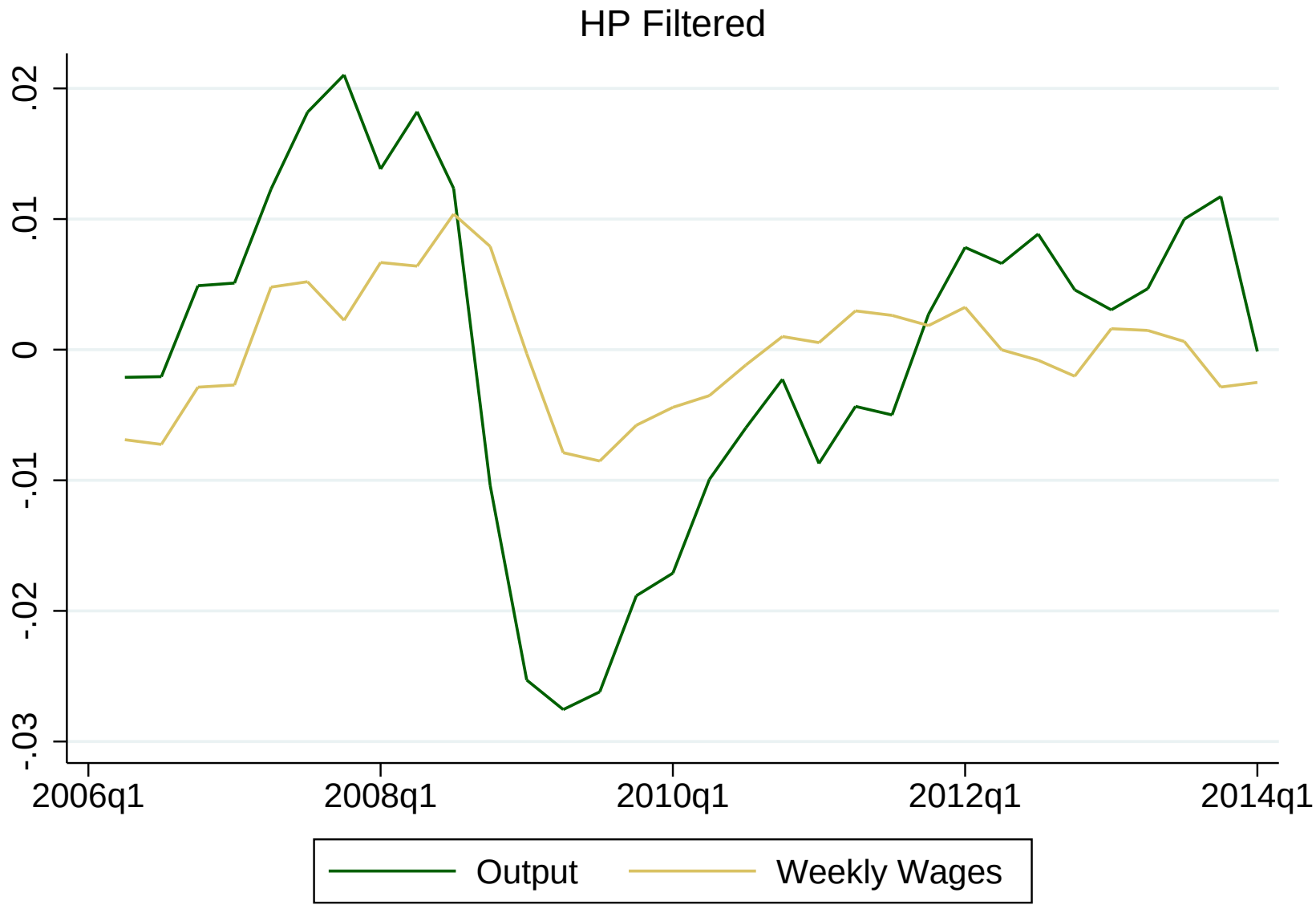
Conclusion

- Key idea
  - when returns to employment are backloaded
  - employment sensitive to changes in debt constraints
- Showed in DMP model this force
  - generates endogenously sticky wages
  - amplifies employment drop due to tighter debt constraints
- Quantitatively promising mechanism to account for
  - aggregate US evidence
  - cross-regional US evidence

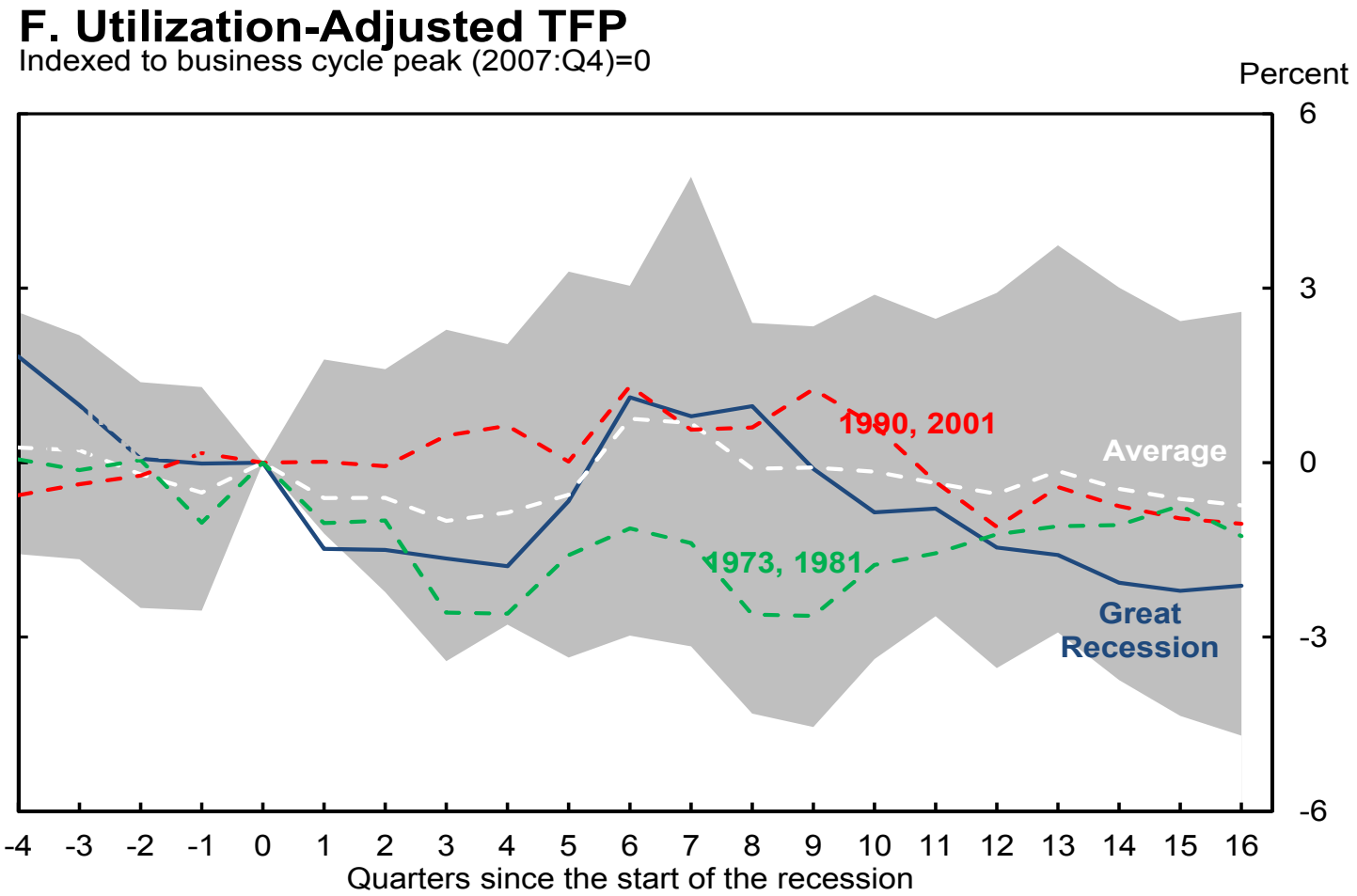
US Great Contraction



US Great Contraction



US Great Contraction



Source: Fernald (2014)

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Further Model Implications

Fraction workers with $w < b$	0.180
Prob. job destroyed endogenously	0.002
Prob. worker matches (λ_w)	0.595
Fraction matches with positive surplus	0.722
Drop in w if unemployed 1 year	0.063

Other implications broadly in accord with the data back

Experiment: Economy-Wide Credit Crunch

- Our experiment
  - reduce taste for houses ψ_t
  - keep LTV parameter χ constant
- Alternative
  - keep taste for houses ψ_t constant
  - reduce LTV parameter χ
- Nearly identical results

Generate Consumption Path From LTV Ratios

- Use budget constraint, $h_t = 1$, binding debt constraint

$$c_t = y_t + \chi p_t - \chi p_{t+1}$$

- And Euler equation

$$\beta\phi\psi v'(1) = p_t u'(c_t) - \beta\phi p_{t+1} u'(c_{t+1}) - \chi p_t \mu_t$$

- With multiplier on debt constraint

$$\mu_t = u'(c_t) - \beta\phi q u'(c_{t+1})$$

- So χ path generates desired c_t path back

Employment Decomposition

- Shimer (2012) approach

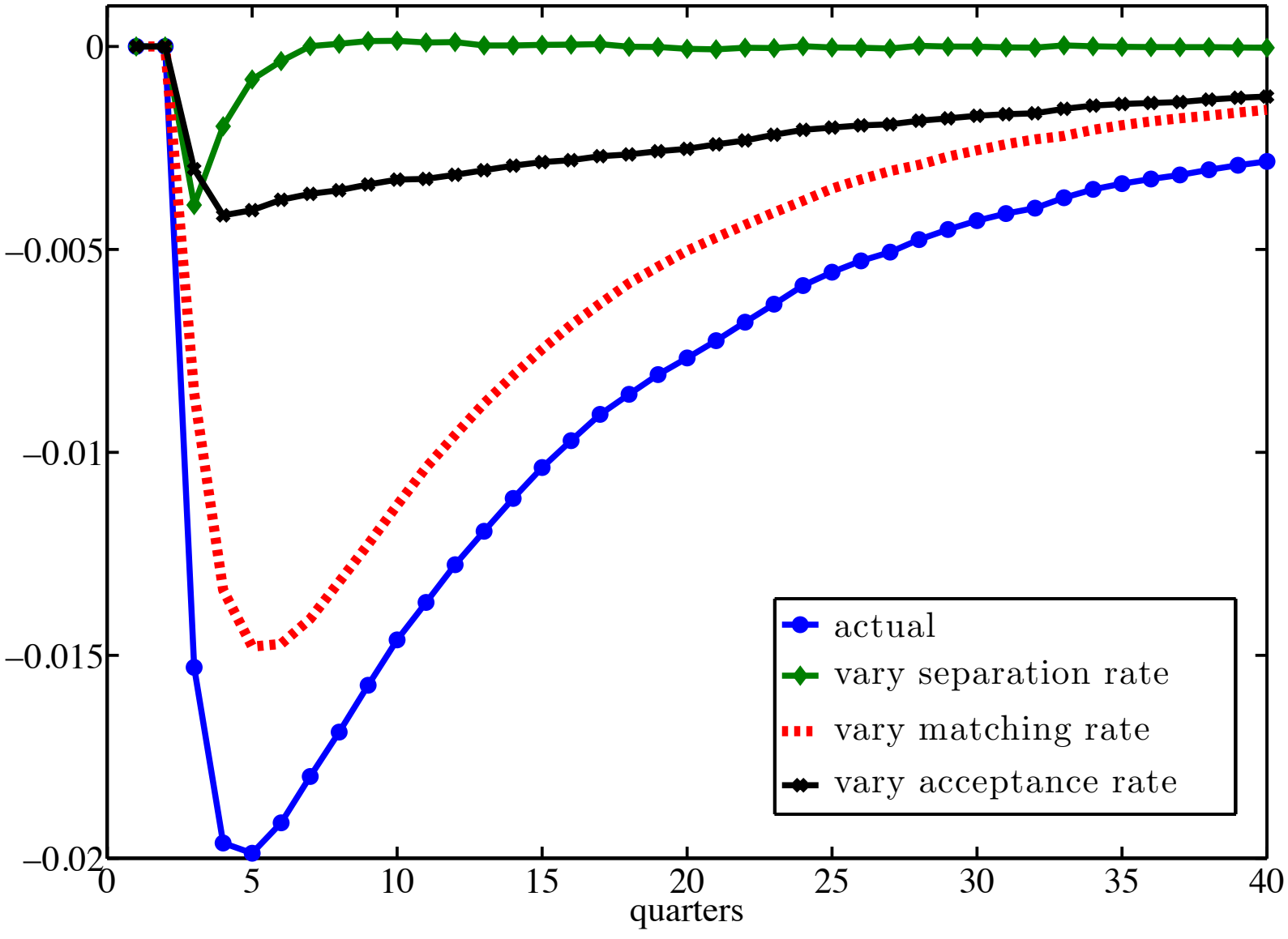
$$E_{t+1} = (1 - s_t)E_t + \lambda_{w,t} x_t (1 - E_t)$$

  - s_t: separation rate
  - $\lambda_{w,t}$: worker matching probability
  - x_t: acceptance rate

- Construct three counterfactual employment series
  - vary s_t, $\lambda_{w,t}$, x_t in isolation
  - leave others at steady state values

- Drop in $\lambda_{w,t}$ accounts most of drop E_t

Employment Decomposition



Results Not Driven by Lower Acceptance

- Illustrate by making home production proportional to z_t
  - $b_t = \lambda z_t$
  - choose λ s.t. home production is 40% of shadow wage
- Unemployed accept all jobs and no endogenous separation
- Employment drop is 3/4 of drop in benchmark

Results Not Driven by Lower Acceptance

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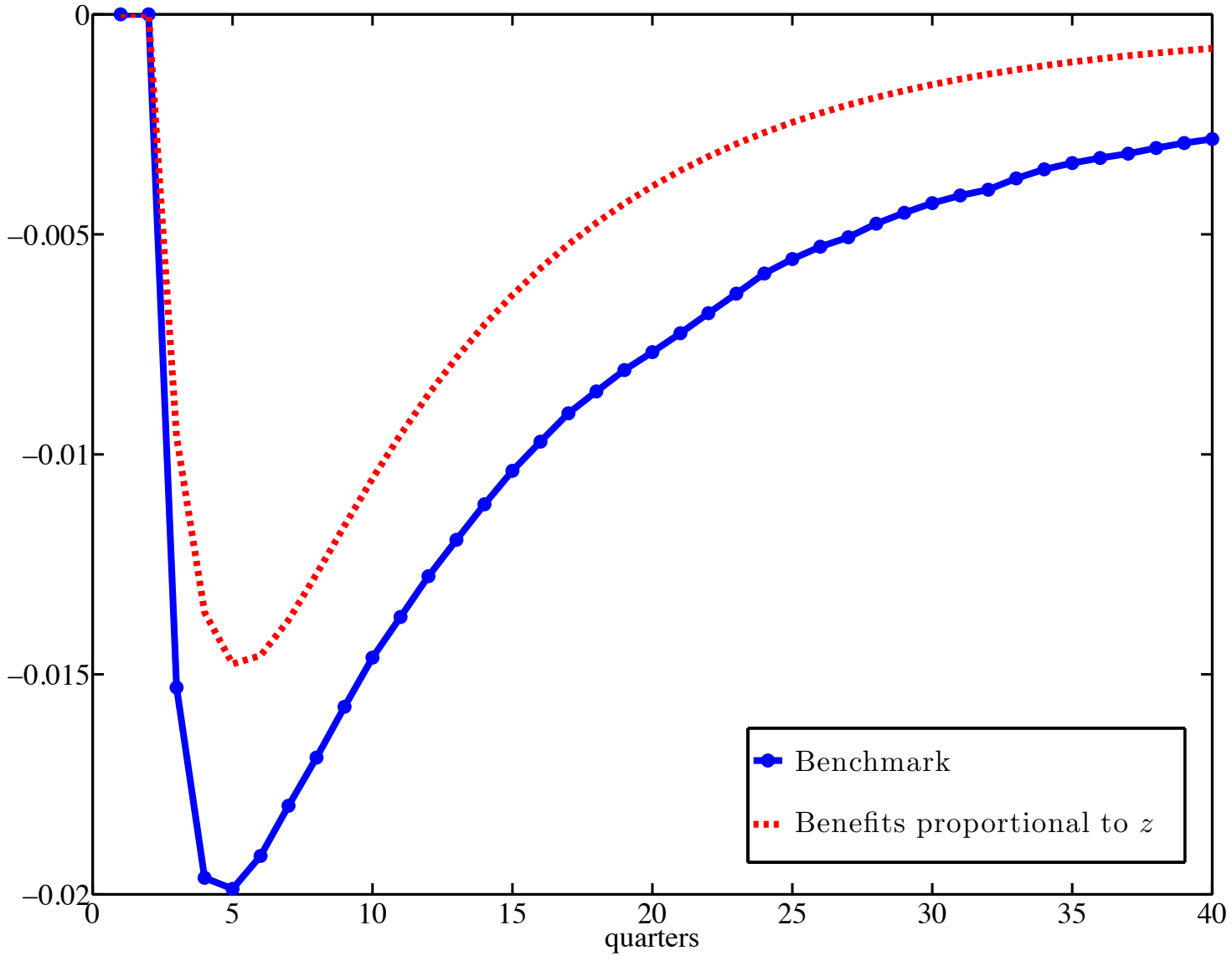
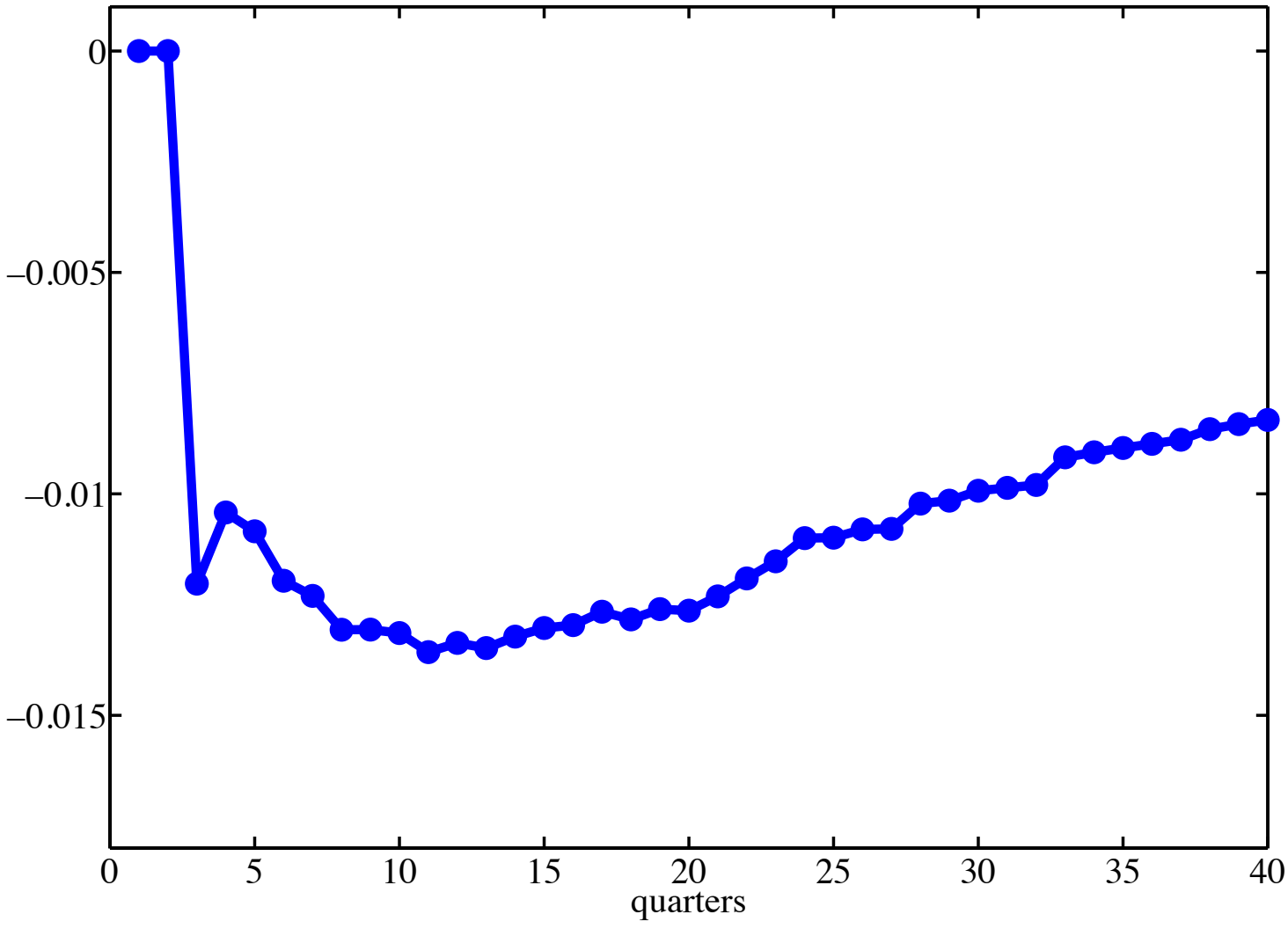


Why Is Employment Drop Persistent?

- Selection effect
  - worst matches endogenously dissolved
  - lower average productivity of unemployed
  - lower returns to posting a vacancy
- Credit shock persistent
- Each accounts for about 1/2 of persistence in drop

Average Productivity of Unemployed



Productivity of unemployed falls as worse matches are dissolved

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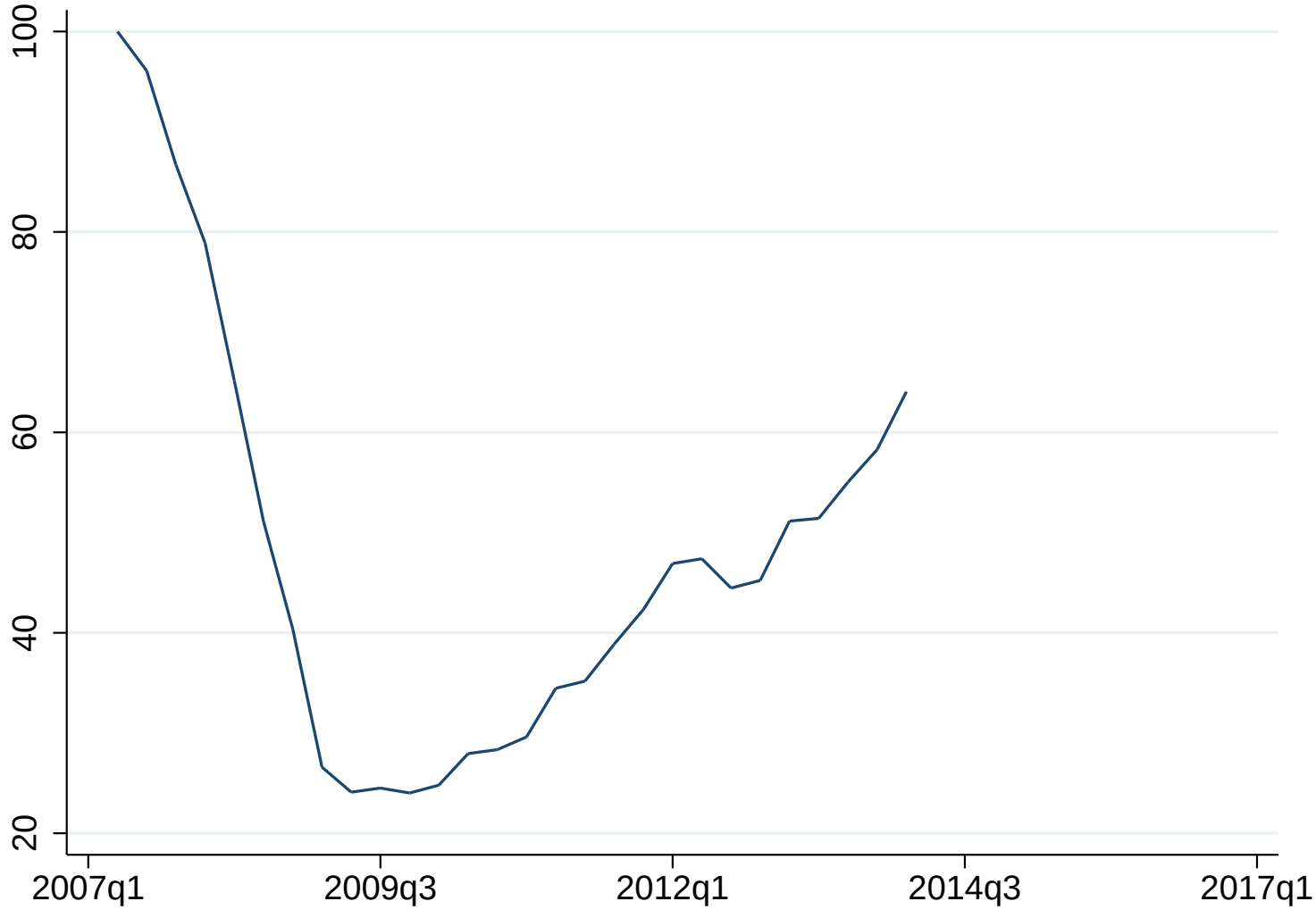
Market Tightness: Data



Vacancies and Unemployment: Data

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