Job Destruction Without Job Creation: Structural Transformation in the Overborrowed America

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Motivation

- Countries, while growing, experience **structural transformation**: the reallocation of activity across sectors ▸ data

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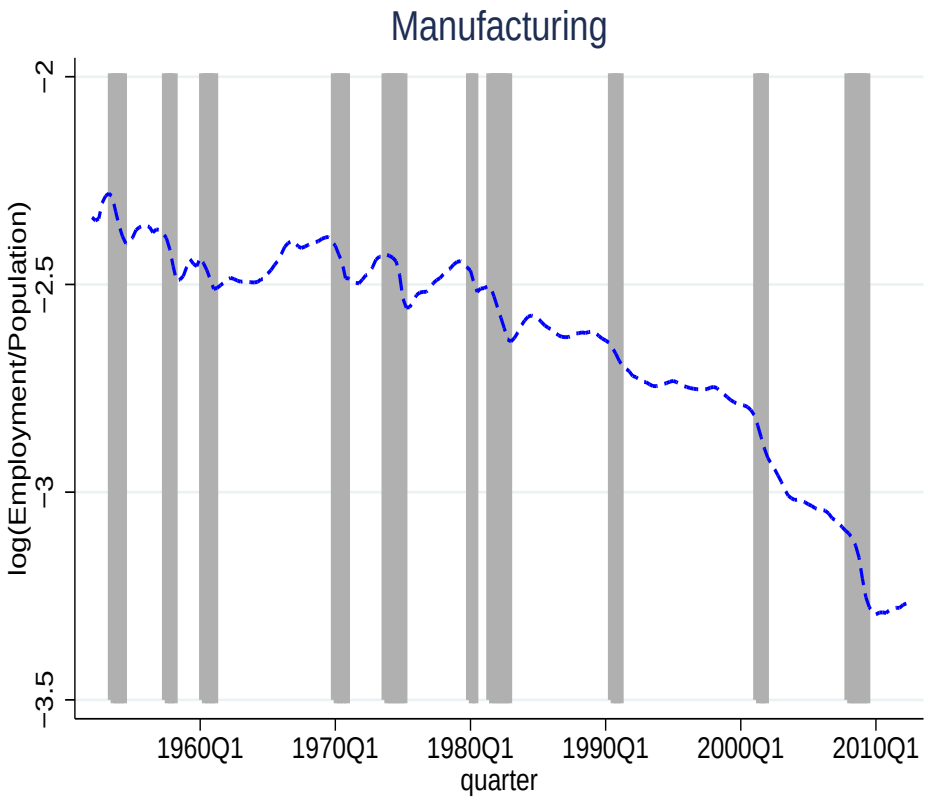
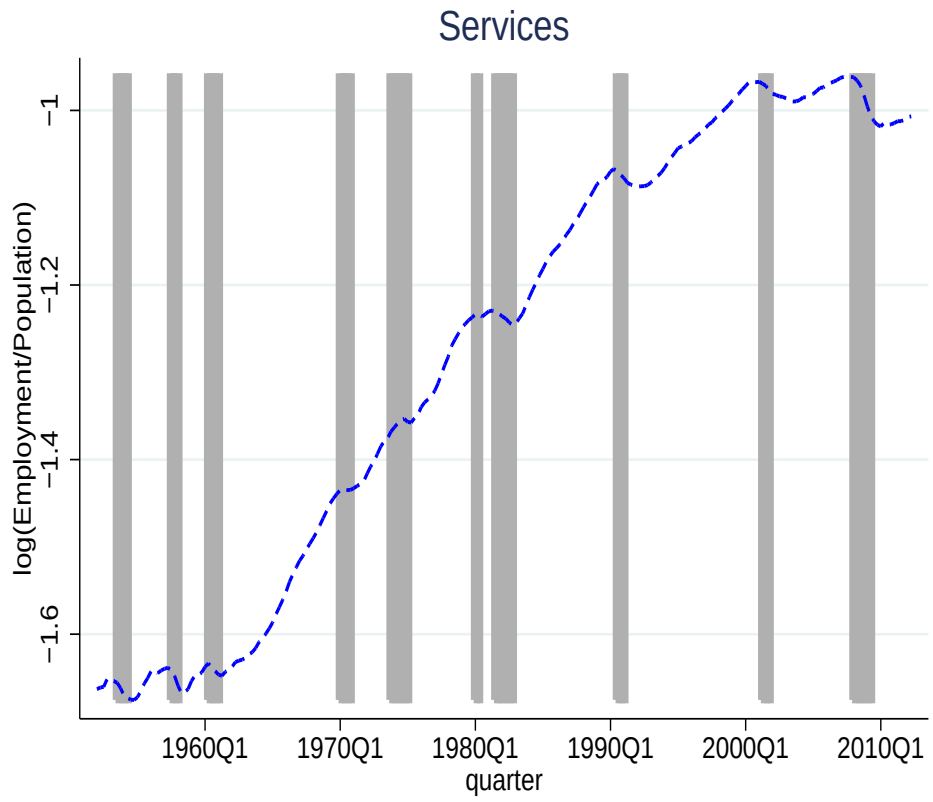
- This process interacts with the business cycle. In the US
  1. job destruction in manufacturing mostly occurs in recessions
  2. job creation in services is concentrated in expansions
- This pattern has changed over time. Since the early '90s:
  1. job destruction in manufacturing has accelerated in recessions (and recoveries)
  2. job creation in services has slowed down in recoveries

Employment in manufacturing and services

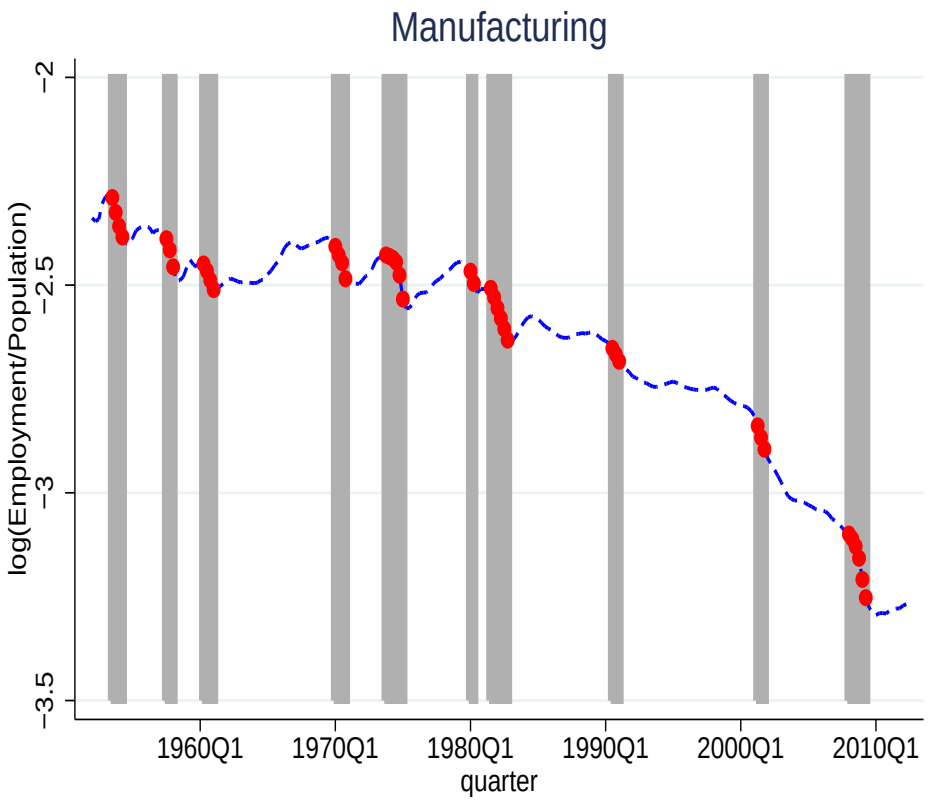


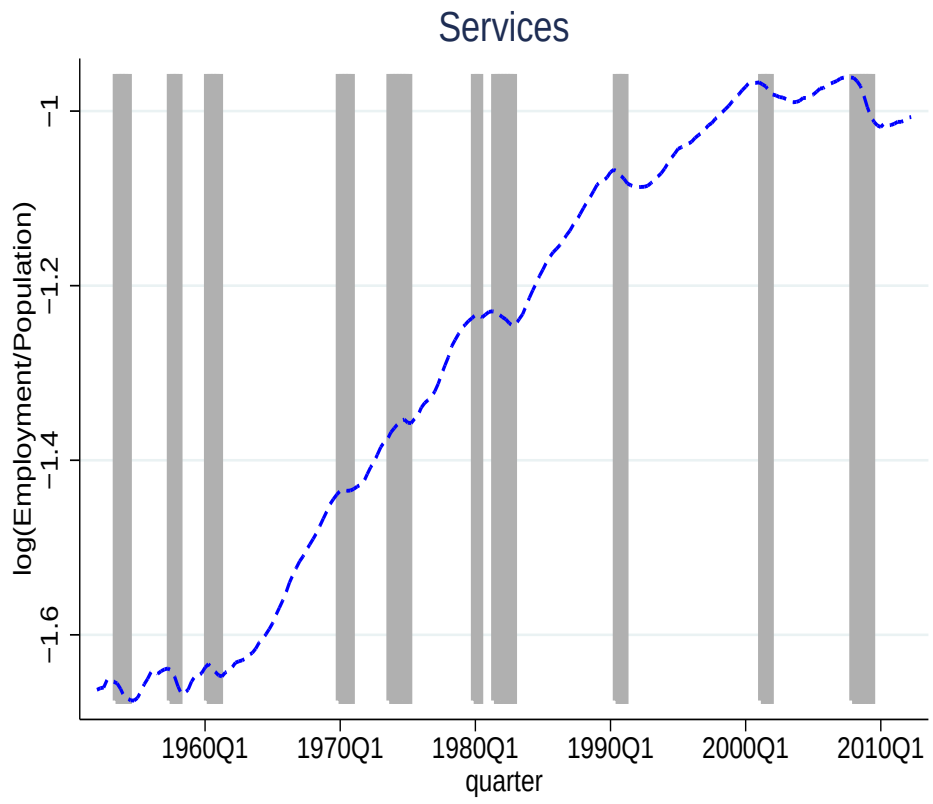


Employment per capita: log-changes

Sample: 1952Q1 - 2012Q4	Overall 242 observations	Recessions 41 obs (17%)	Expansions 201 obs (83%)
Manufacturing	-92.9	-89.4	-3.5
Services	65.6	-10.3	75.9

Employment in manufacturing and services





Employment per capita: 100 × log-change

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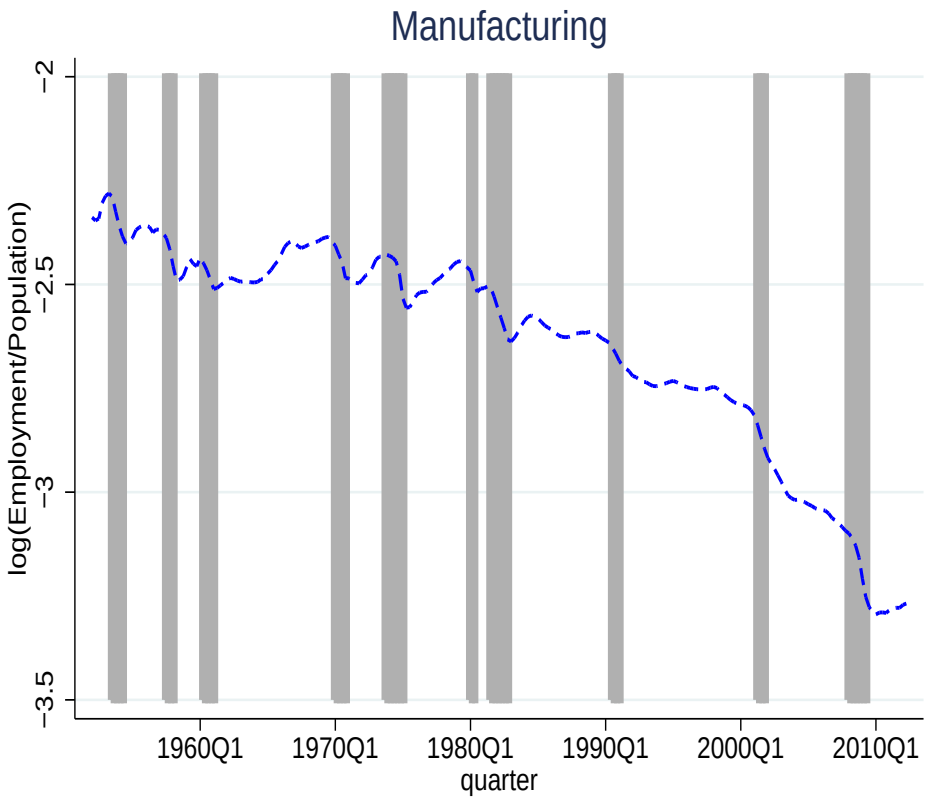

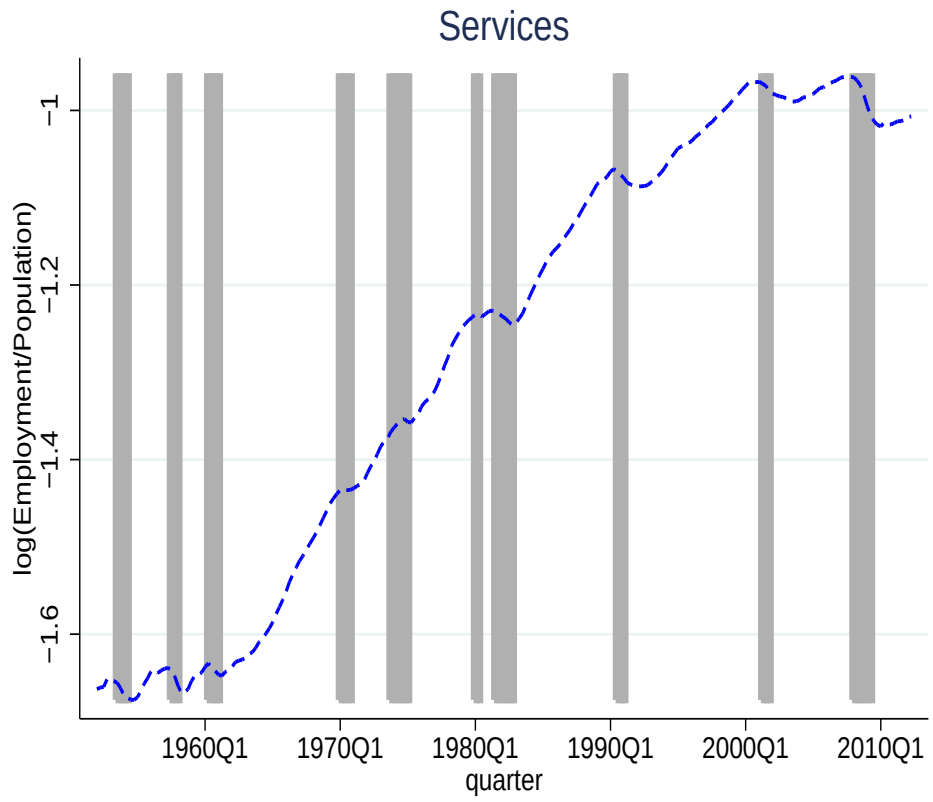

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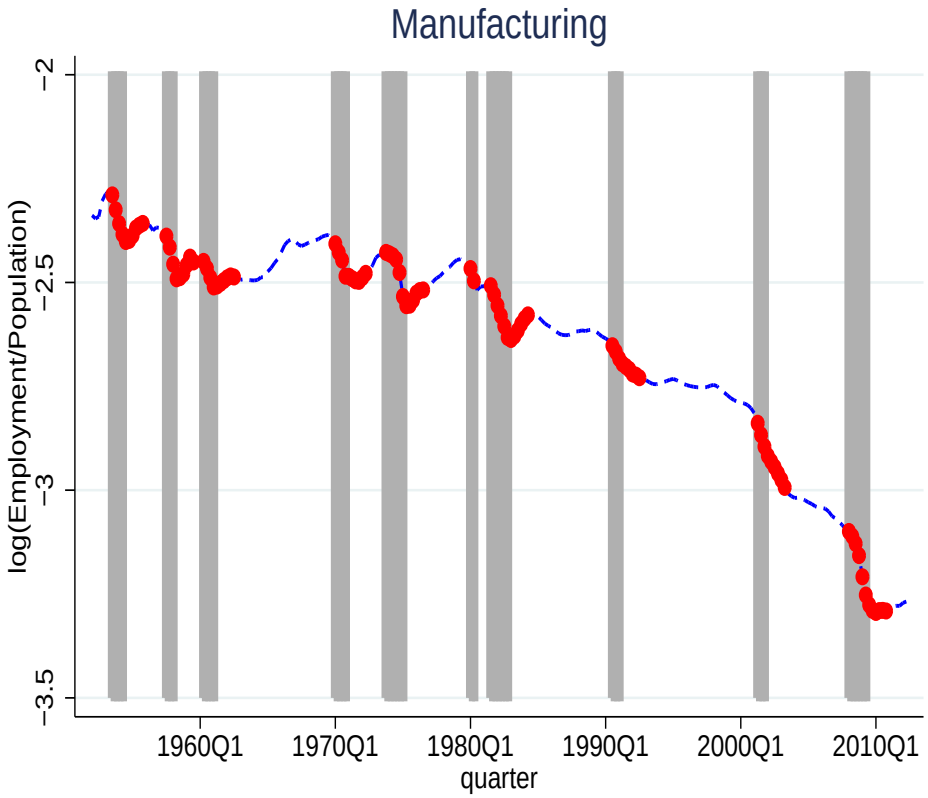

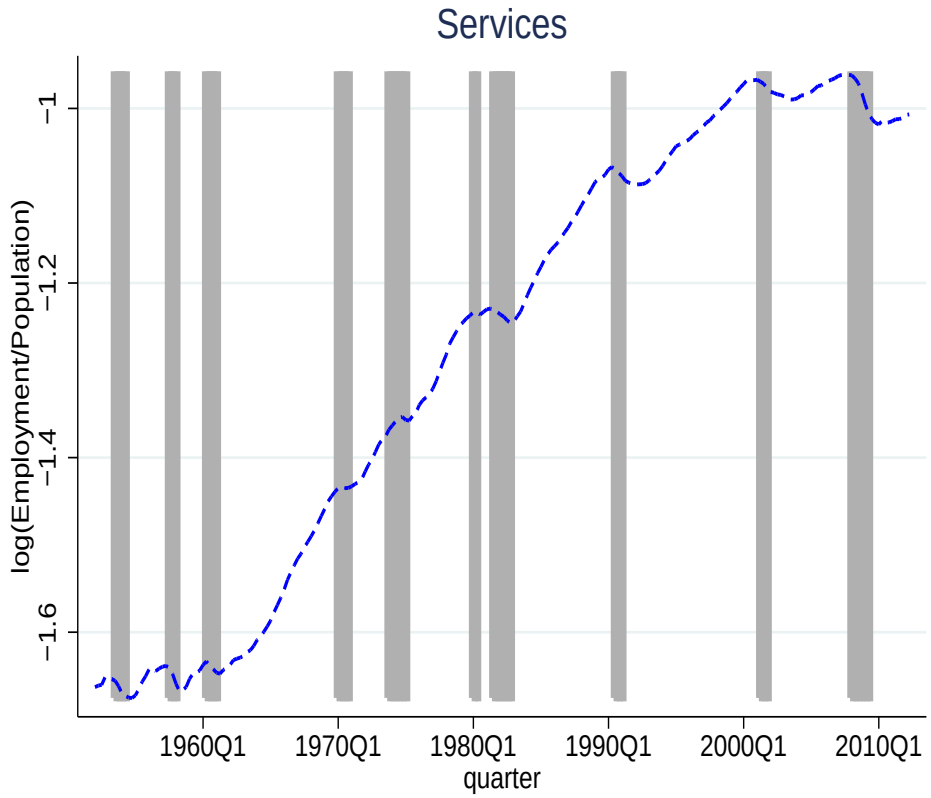

Employment per Capita: average log-changes

Sample:	1952Q1 - 1989Q4			1990Q1 - 2012Q4		
	Average	Recessions	Recoveries	Average	Recessions	Recoveries
Manufacturing	-.1	-2.1	.4	-.3	-2.4	-1.0
Services	.2	-.1	.4	.0	-.5	-.2

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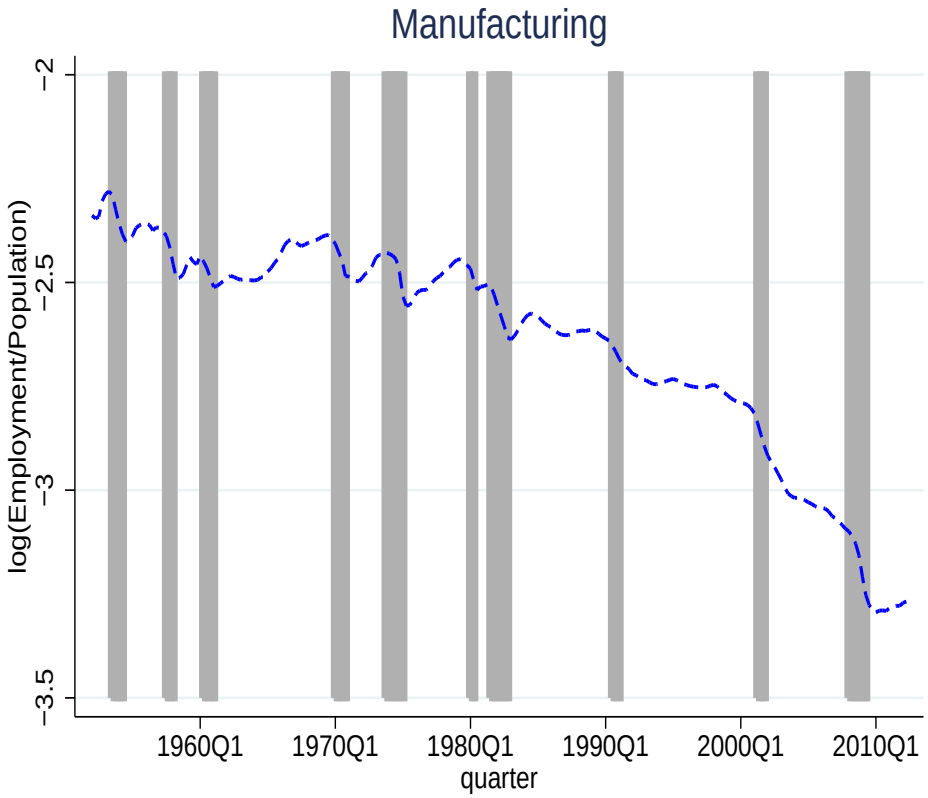

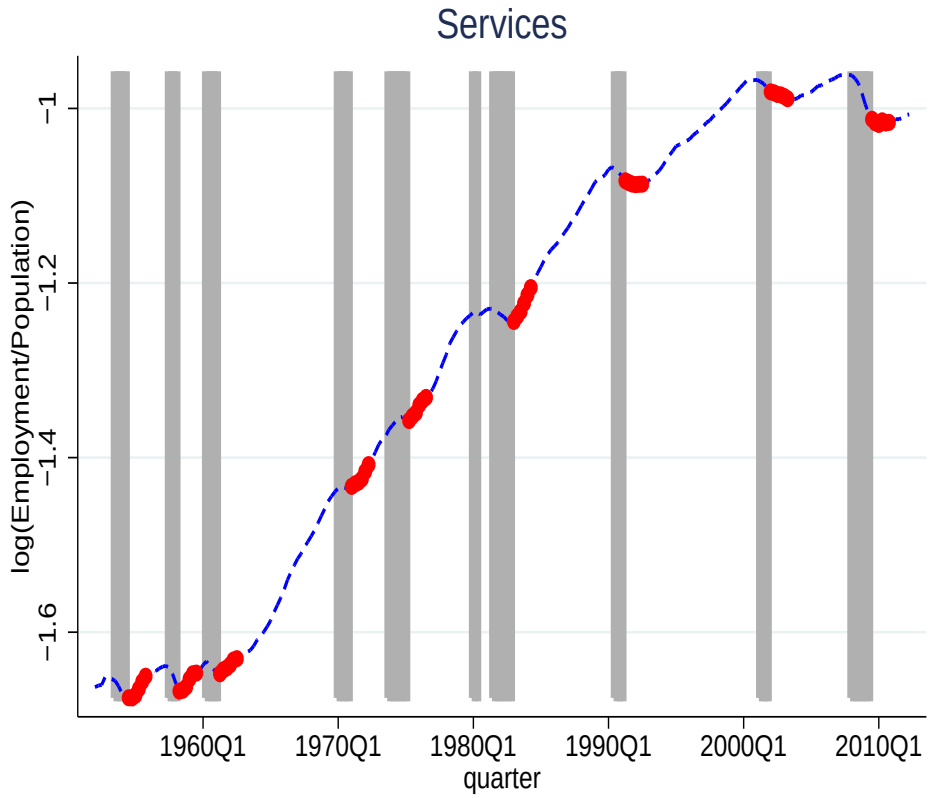

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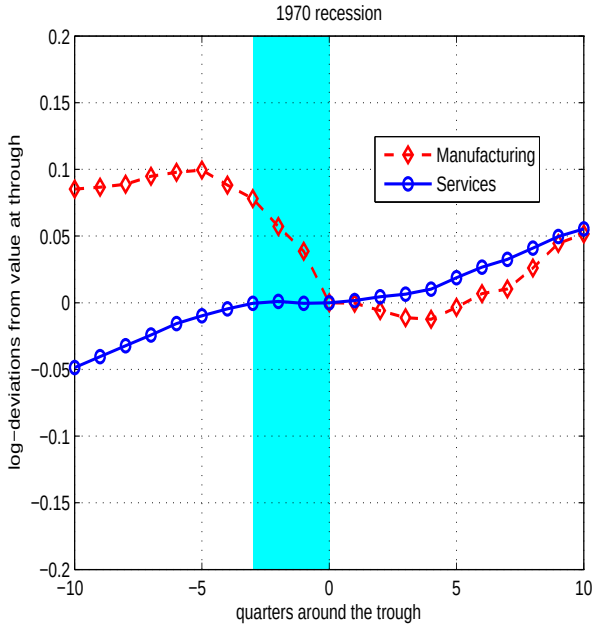

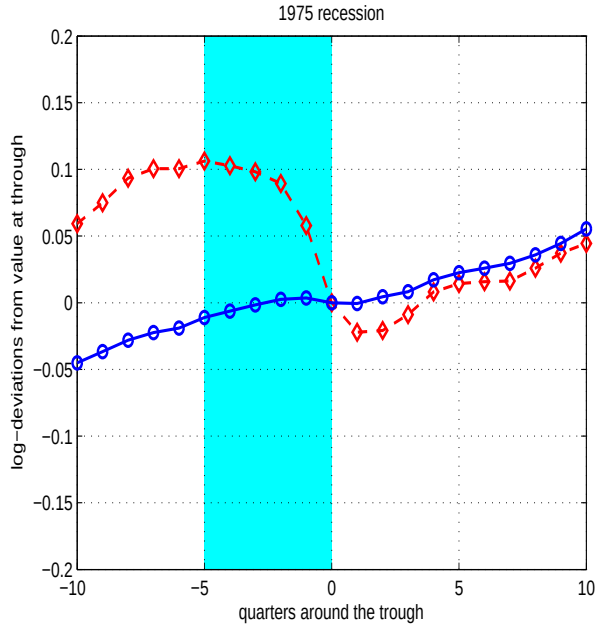

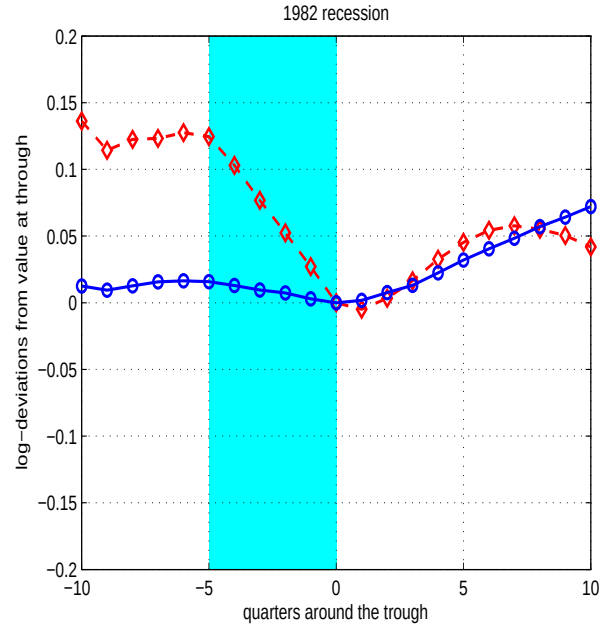

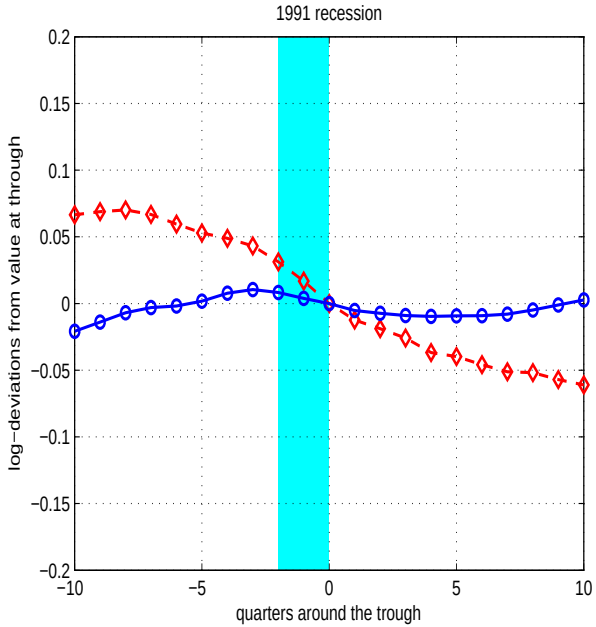

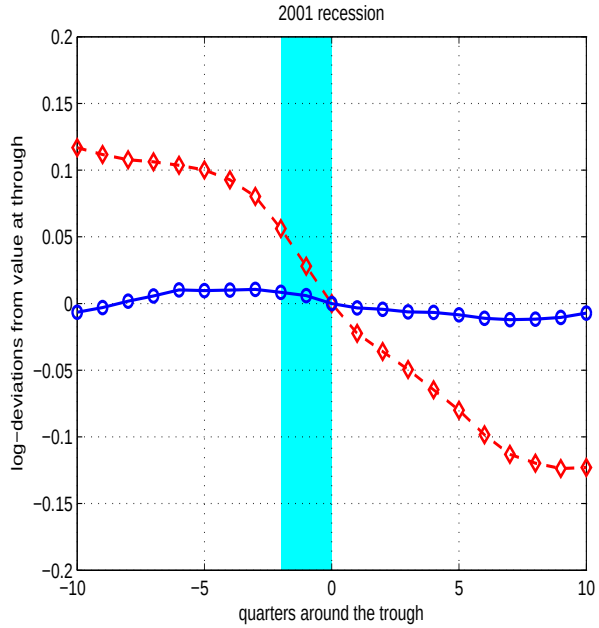

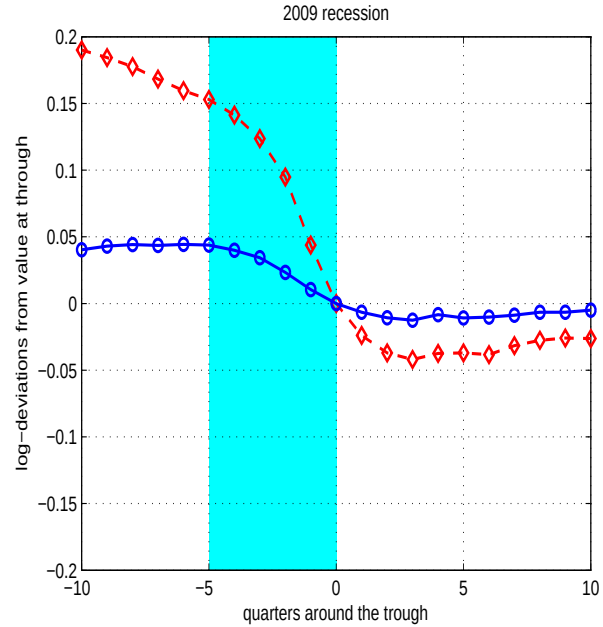

Questions

1. Why does job destruction in manufacturing occur in recessions?
2. Why job destruction in manufacturing has lately accelerated?
3. Has this acceleration caused the slow recovery in services?
4. Was job destruction in manufacturing "too high"?

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This leads to **job destruction** (in manuf.) **without job creation** (in services)

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- What is the optimal policy response?
  1. Conventional demand policies:
     - Directly increase demand through government purchases? Purchases of goods or of services?
     - A role for aggregate demand policies? ▸ Bernanke's view
  2. Subsidize production:
     - of manufacturing industries?
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  3. Subsidize access to debt for households?
- Should these interventions vary over the cycle? Are countercyclical policies justified?

Some preliminary evidence

- Since the 90s, HHs' debt has reached unprecedented levels. ▸ data
- HHs' financial conditions matter for services jobs (more than for manufacturing). ▸ data
- Manufacturing employment leads more employment in services over the last decades. ▸ corr($\Delta E_{M,t}, \Delta E_{S,t+j}$)
- This last pattern has been more pronounced in US states with high HHs' indebtedness. ▸ regressions

Further analysis

- We plan to better identify the causal effect of changes in manufacturing employment on services.
- We borrow from Autor, Dorn and Hanson (2012) the idea that emergence of China is a shock to manufacturing employment with varying effects by US states.
- So we can test whether services employment has responded more to (exogenous) changes in manufacturing employment in US states with higher level of HH debt.

$$\Delta e_{S,i,t} = \beta_0 \Delta e_{M,i,t} * Leverage_{i,t-1} + \beta_1 \Delta e_{M,i,t} + \gamma' X_{i,t} + \varepsilon_{i,t}$$

- HHs' leverage will be instrumented using the Saiz (2011) index of housing supply elasticity, as in Mian and Sufi (2011).

Related literature

The role of demand over the business cycle

- Debate between Keynesian and Real Business Cycle theories.
- Recent contributions modeling demand shocks: demand shocks are due to
  - in Lorenzoni (2009) to expectational errors;
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  - in Monacelli (2006) to changes in the price of collateral that affect financial constraints.
- In our paper, manufacturing employment determines HHs' disposable income, which affects demand when HHs are financially constrained.

Related literature

Structural transformation over the business cycle

- Loungani and Rogerson (1989) have already documented that structural transformation interacts with the business cycle.
- We document that this pattern has changed in the US, and we claim that this is due to HHs' demand.

A simple model to start to think about demand

- Key ingredients:
  - Households are **overborrowed**.
  - Borrowing capacity of HHs depends on their disposable income.
  - Households demand liquidity for financing their expenditures.
  - Search frictions in the labor market (very simplified).
- To start with, I abstract from
  - distinction between manufacturing and services
  - ongoing technological progress.

The decentralized equilibrium

Basic assumptions and technology

- Discrete time, infinite horizon, no uncertainty.
- Continuum of identical infinitely-lived HHs of measure one.
- HHs and firms are risk neutral.
- No capital accumulation.
- Two (substitutes) goods: home goods (H) and market goods (M). Home good is the numeraire.
- Market goods are produced according to

$$\underbrace{M_t}_{\text{Market good}} = A \underbrace{N_t}_{\text{Labor}} \qquad A > 0$$

- Each unemployed worker produces 1 unit of the home good. Moreover, each HH has a flow K of home goods.

The decentralized equilibrium

Search frictions in the labor market

- The labor force is constant and normalized to one
- A vacancy costs c per period, and can be filled with at most one worker
- Matching function

$$N_t = N(s_t, v_t) = s_t^{\alpha} v_t^{1-\alpha} \qquad \alpha \in (0, 1)$$

- All workers search for a job
- Matches at t produce at t
- After production:
  - an employed worker earns wage w (endogenous)
  - an unemployed worker produces 1 unit of home good (which determines his outside option)
- All jobs get destroyed exogenously at the end of each period ($\Lambda = 1$)

The decentralized equilibrium

Households

- Utility function: $U(C_t) = [aH_t^{\eta} + (1-a)M_t^{\eta}]^{\frac{1}{\eta}} \quad \eta \in (0,1), a \in (0,1)$

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- HH borrows from foreign investors, by issuing long-term debt L_t
  - Long-term debt charges real interest rate R, with $BR < 1$ which makes HHs over-borrowed.
  - Debt is repaid through market goods (net exports): $L_t = RL_{t-1} - P_t X_t$

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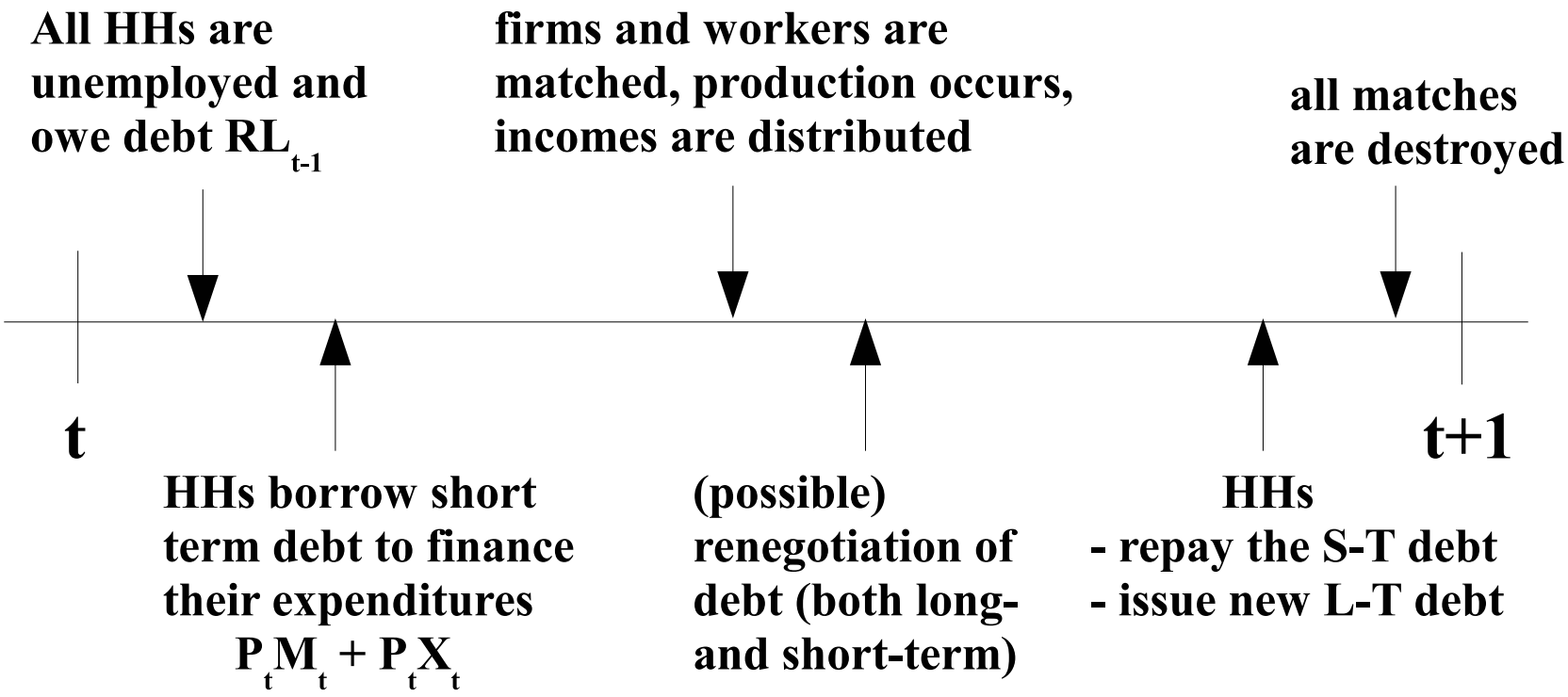
- Market goods require liquidity (you have to pay for the good in order to consume it)
  - HHs buy goods at the beginning of the period, before receiving their income
  - This implies that HHs should finance their needs for liquidity in financial markets (so the two financial needs interact)
  - This liquidity is financed through short-term (infraperiod) loan with interest rate normalized to 0 (for simplicity)

The decentralized equilibrium

Timing of the events



The decentralized equilibrium

The households' borrowing constraint

- Borrowing capacity of HH depends on disposable income

$$\xi(\underbrace{1 + K + (w_t - 1)N_t}_{\text{Disp. Income}}) \geq \underbrace{RL_{t-1}}_{\text{L-T. Debt}} + \underbrace{P_t(M_t + X_t)}_{\text{S-T. Debt}}$$

  where $\xi \in (0, 1)$: fraction of collateralized income

- In equilibrium no HH defaults.
- And this constraint will always be binding (as HHs are impatient).

Optimality conditions in steady-state

Decentralized economy

- We assume that the Hosios condition hold: $\beta = \alpha$
  - thus there are no search externalities in equilibrium
  - the equilibrium outcomes coincide with the ones of a competitive search equilibrium (directed search)

- HH problem:

$$U_M = P(1+\mu)U_H$$

$$\mu = \frac{1-BR}{BR(1+\xi)-1}$$

- Firms' problem:

$$\underbrace{PA-1}_{\text{marginal value of a job}} = \underbrace{\frac{c}{(1-\alpha)q(\theta)}}_{\text{marginal cost of a job}}$$

Optimality conditions in steady-state

Social planner problem

- Generally the social planner chooses quantities and not prices
- But we want to study the social planner problem when the planner faces the same borrowing constraint of the HHs
- And in the borrowing constraint, prices are present
- Thus in this context, the social planner chooses the optimal allocations (H, M, L, and N) subject to the condition that prices, which depend on the borrowing constraint, clear the market of market goods

$$\underbrace{P_t(M_t + X_t)}_{\text{Demand}} = \underbrace{P_t A N_t}_{\text{Supply}}$$

and the condition above implicitly defines $P_t = P(N_t, L_{t-1})$

Optimality conditions in steady-state

Social planner problem

- The Bellman equation of the social planner reads as

$$V(L_{t-1}) = \max_{H_t, M_t, N_t, X_t} U(C_t) + BV(L_t),$$

s.t.

$$K + 1 - N_t + P_t A N_t = H_t + \frac{cN_t}{q(\theta_t)} + P_t(M_t + X_t),$$

$$L_t = RL_{t-1} - P_t X_t,$$

$$U(C_t) = [aH_t^{\eta} + (1-a)M_t^{\eta}]^{\frac{1}{\eta}}$$

where $\theta_t = \theta(N_t)$, and recall that $P_t = P(N_t, L_{t-1})$

Optimality conditions in steady-state

Existence of the externality

- We then compare the condition for optimal job creation in the decentralized economy with the one of the social planner problem, both evaluated at the steady-state
- Decentralized economy:

$$PA - 1 = \frac{c}{(1-\alpha)q(\theta)}$$

- Social planner:

$$PA - 1 + \underbrace{\frac{\partial P}{\partial N}}_{<0} \underbrace{X}_{>0} = \frac{c}{(1-\alpha)q(\theta)}$$

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demand externality

- However, the demand externality here goes in the opposite direction as we wish, due to a terms of trade effect
- In fact, the social planner reduces employment to increase prices, so to repay the debt services to foreign investors with less exports (priced in terms of the market good)

Next steps (currently in progress)

(1) Three-sectors model: manuf. goods, home and market services:

- ▷ study whether the demand externality is stronger for services than for manufacturing;
- ▷ study whether effects vary over the business cycle
- ▷ study how adverse shocks to firms affect HHs' demand and employment in services and manufacturing;
- ▷ modeling explicitly structural transformation, to understand why job destruction in manufacturing accelerates in recessions

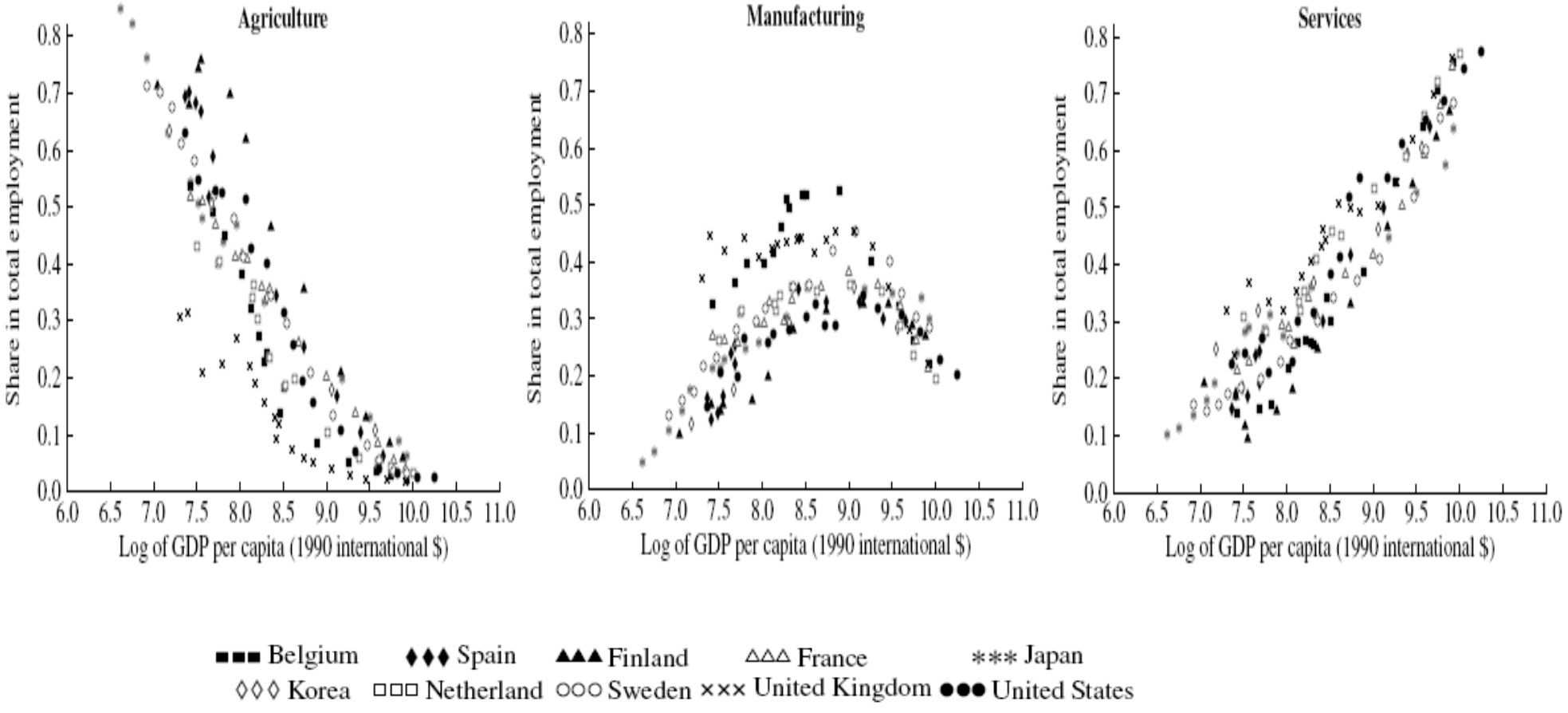
(2) Evaluate the fit of the model to the data,

- ▷ by estimating a conventional DSGE model, possibly exploiting the US states variation (estimation of DSGE models with Panel data)

(3) Policy analysis:

- ▷ evaluate the effectiveness of different cyclical government policies

Structural transformation



Source: Herrendorf, Rogerson and Valentinyi (2011)

go back

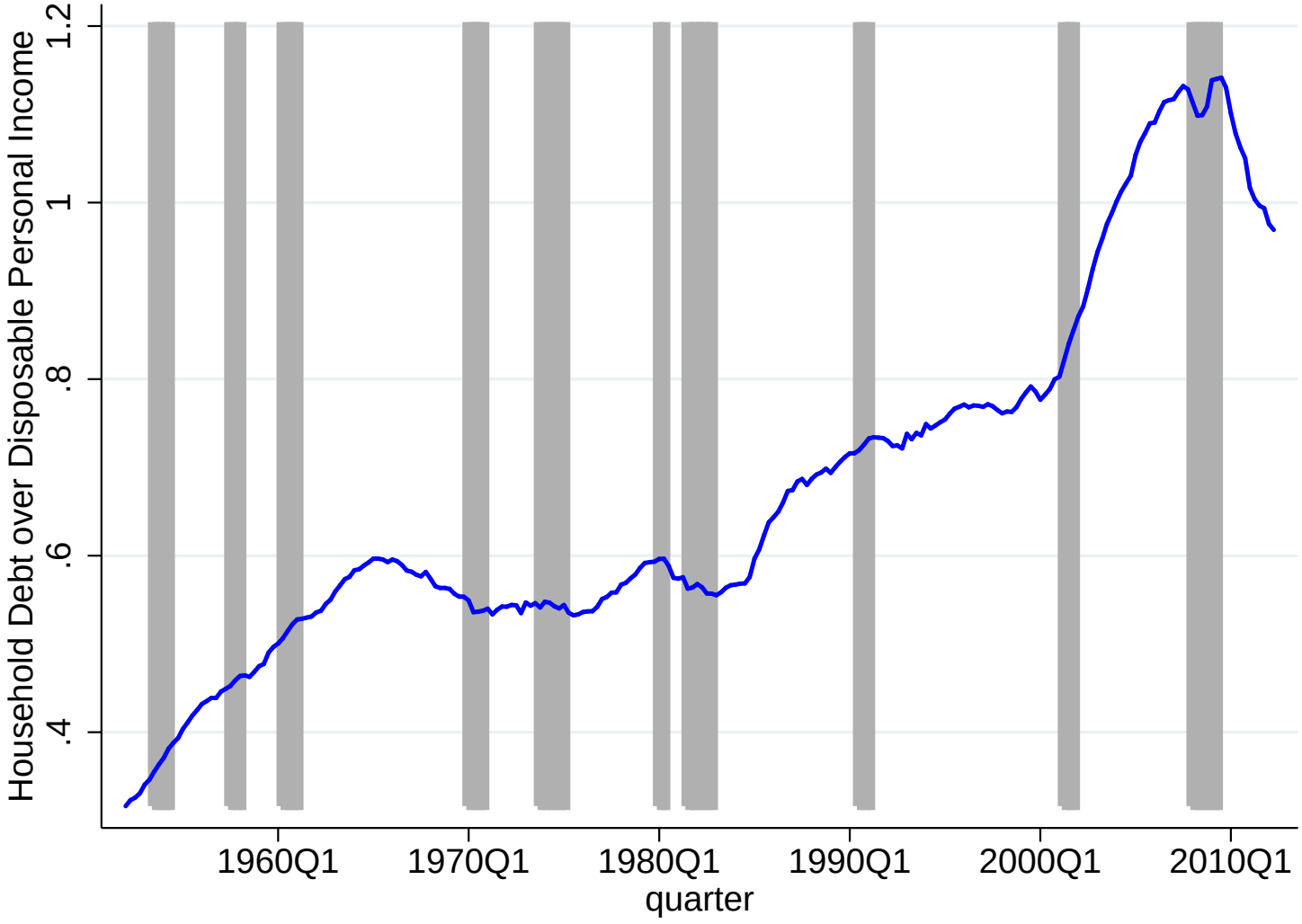
A view for accommodative monetary policies

"Is the current high level of long-term unemployment primarily the result of cyclical factors, such as insufficient aggregate demand, or of structural changes, such as worsening mismatch between workers' skills and employers' requirements? If cyclical factors predominate, then policies that support a broader economic recovery should be effective in addressing long-term unemployment as well; if the causes are structural, then other policy tools will be needed. I will argue today that, while both cyclical and structural forces have doubtless contributed to the increase in long-term unemployed, the continued weakness in aggregate demand is likely the predominant factor. Consequently, the Federal Reserve's accommodative monetary policies, by providing support for demand and for the recovery, should help, over time, to reduce long-term unemployment as well."

Ben S. Bernanke,
in *Recent Developments in the Labor Market*, NABE Meeting March 26, 2012.

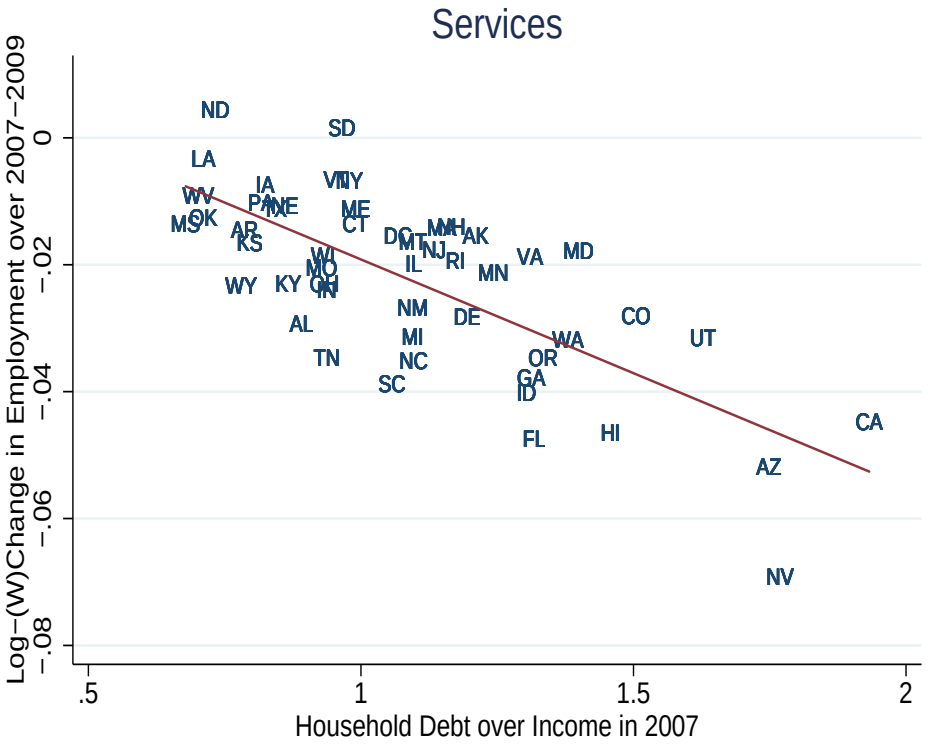
go back

Household debt over income

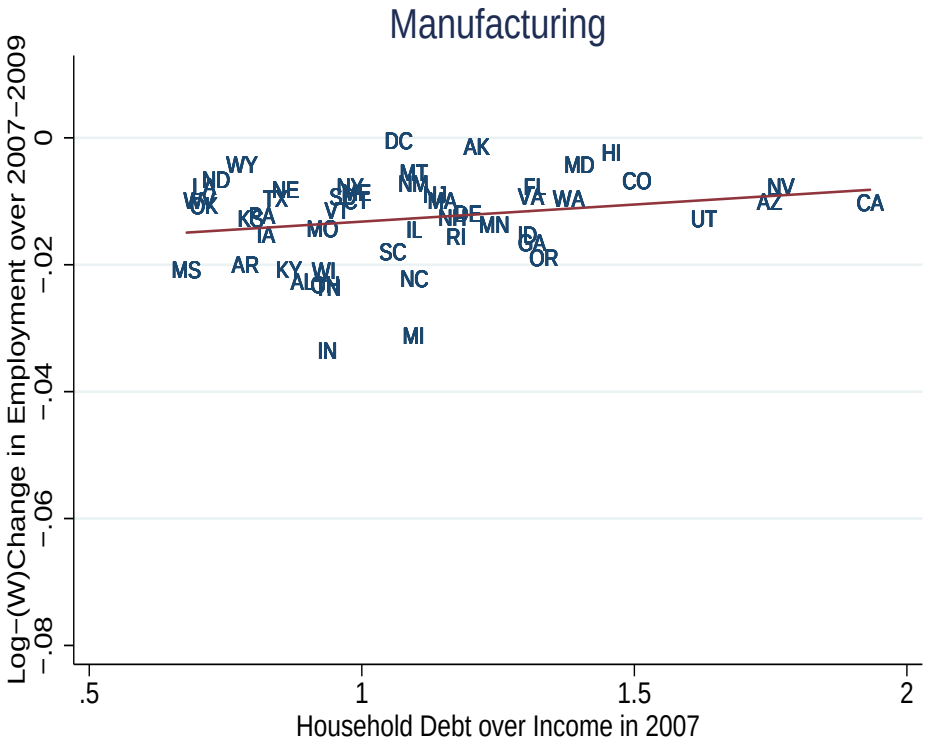


go back

Employment changes and HH indebtedness



Correlation: −.73



Correlation: .22

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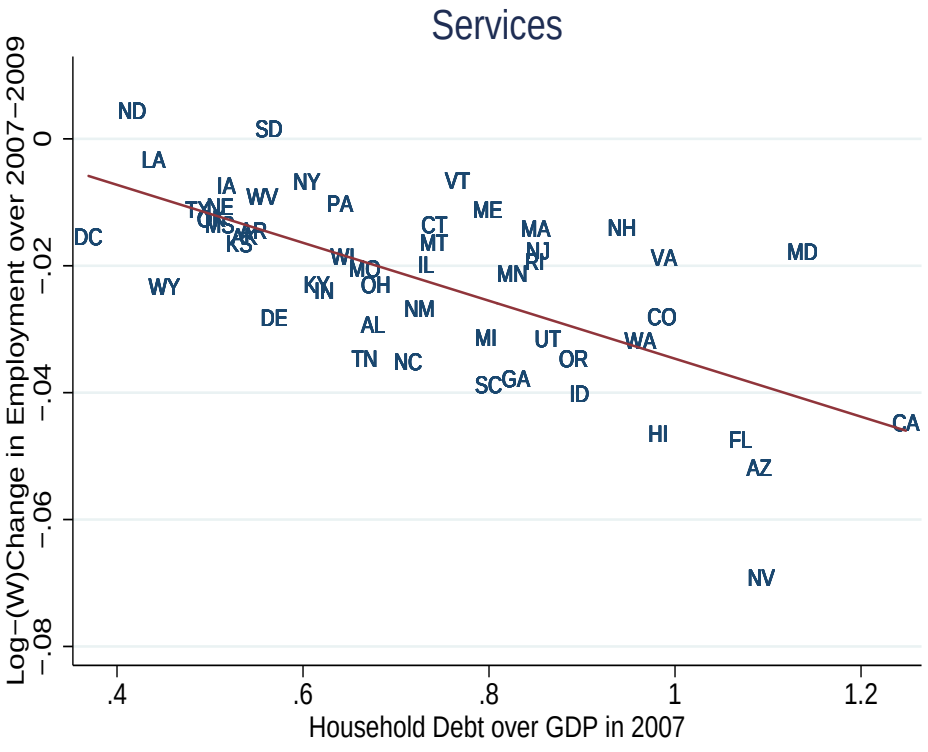
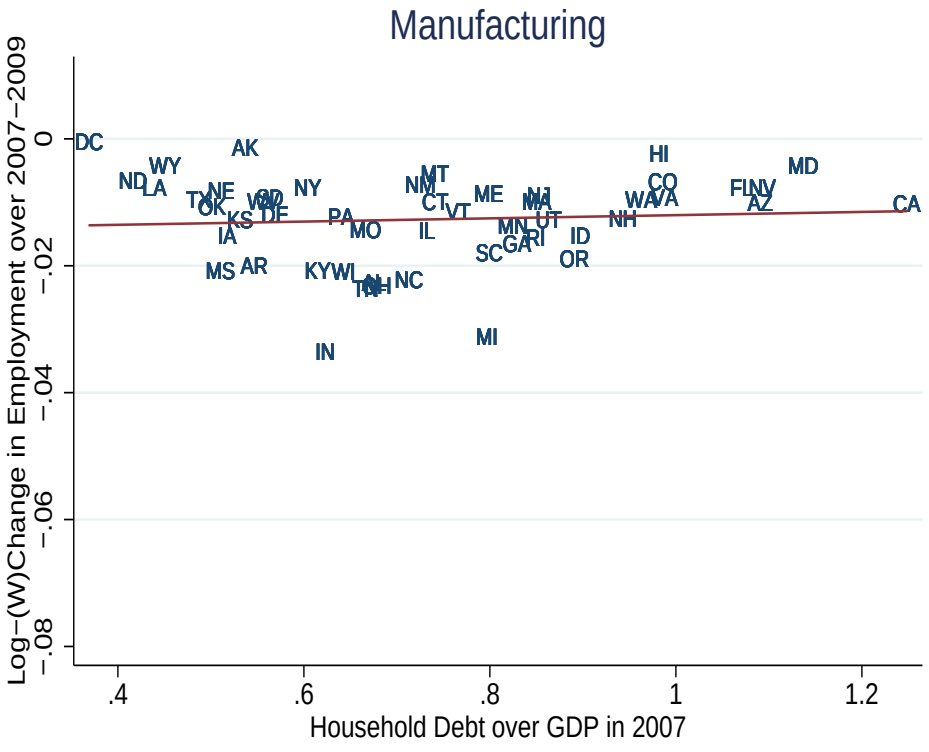


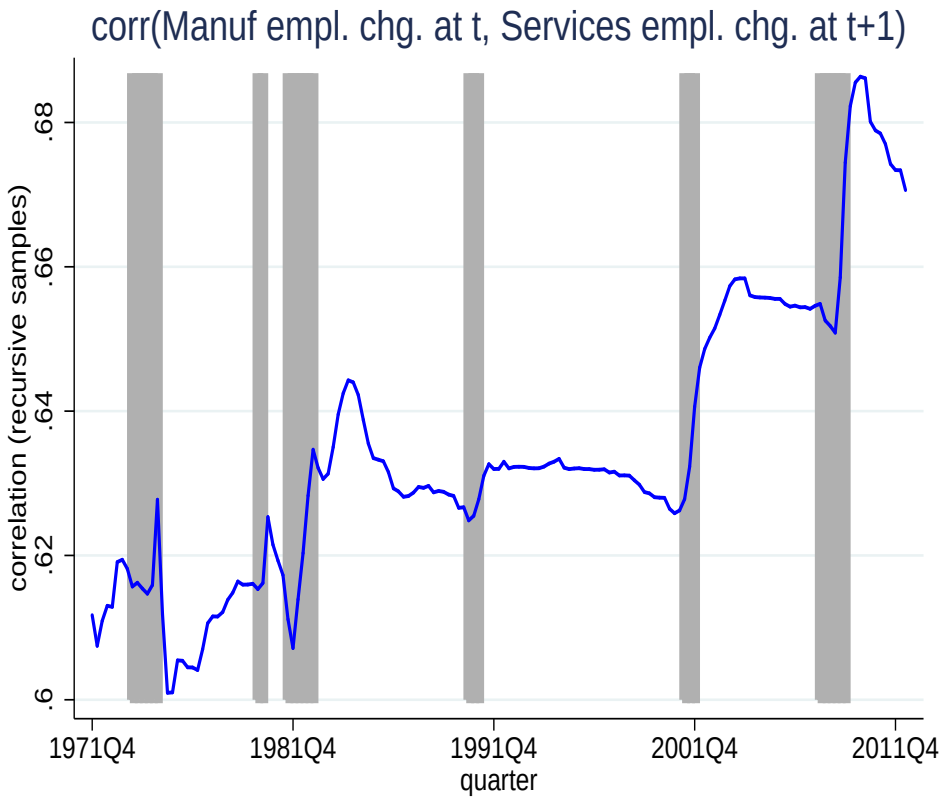
Correlation: −.66

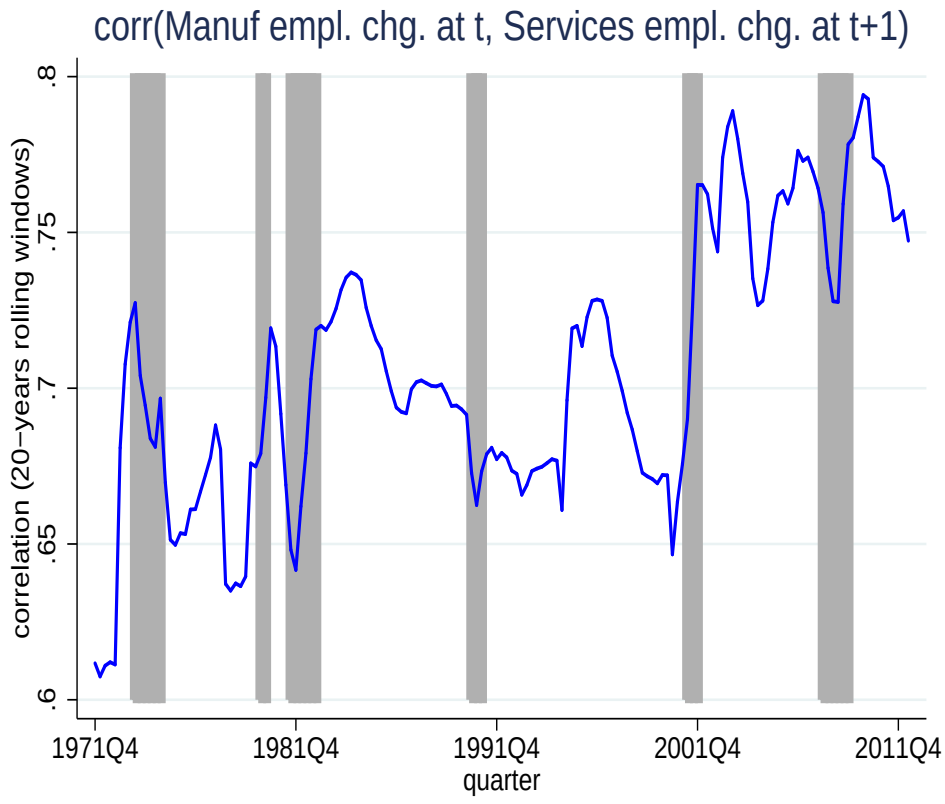


Correlation: .07

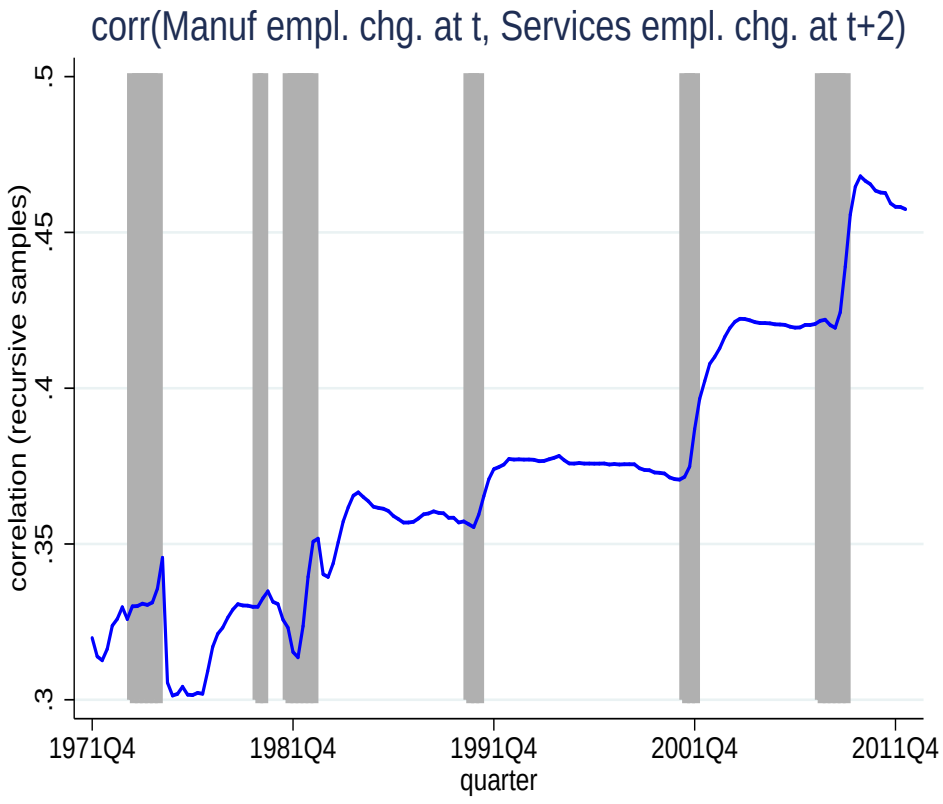
go back

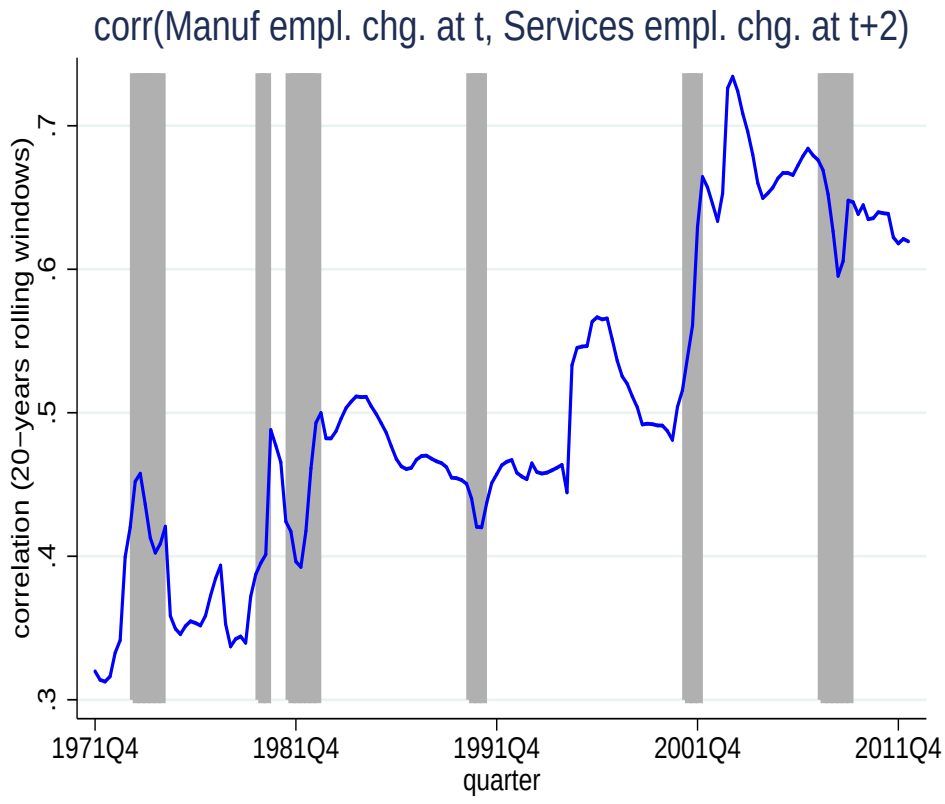
Manuf and services empl. changes: correlations



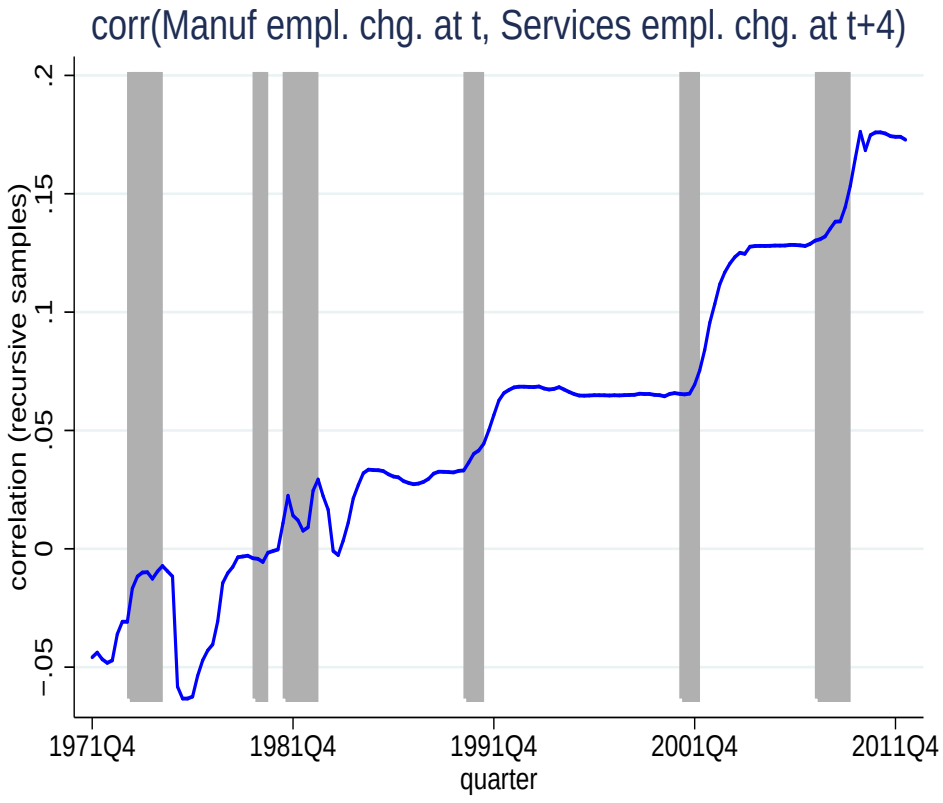


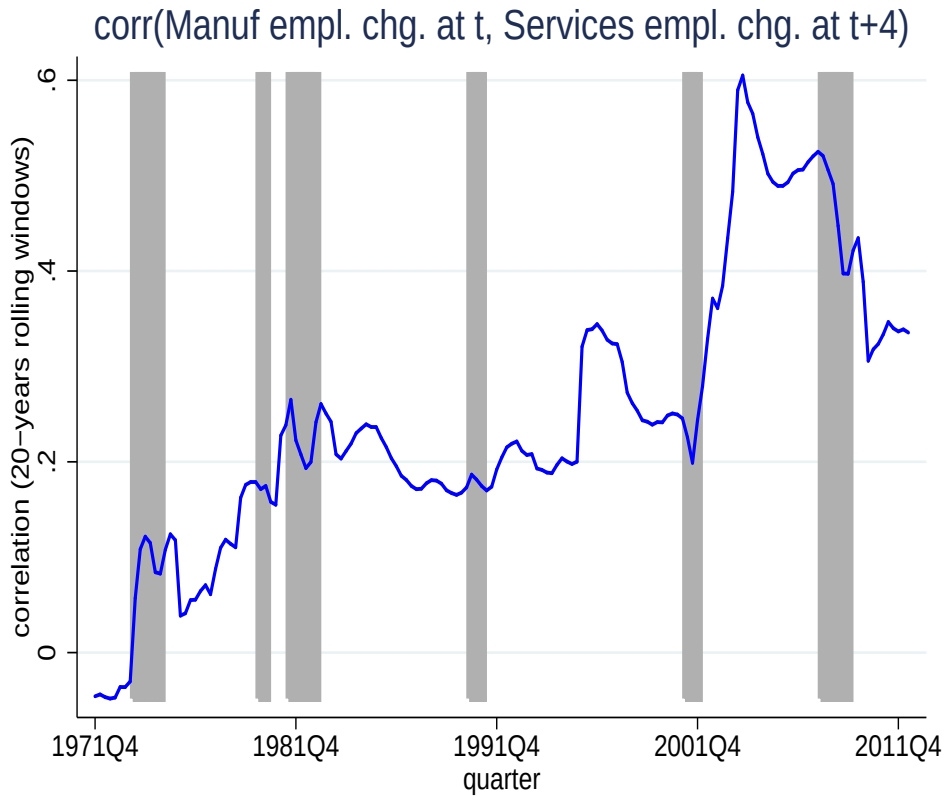
Manuf and services empl. changes: correlations





Manuf and services empl. changes: correlations





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Panel regressions

Preliminary results

$$\Delta e_{S,i,t} = \beta \Delta e_{M,i,t-1} * Leverage_{i,t-1} + \gamma' X_{i,t} + \alpha_i + \varepsilon_{i,t}$$

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
$\Delta e_{M,t-1}$	-.07*	-.07*	-.15**	-.06	-.07	-.14**
	[.04]	[.04]	[.06]	[.04]	[.04]	[.05]
$Leverage_{t-1}$	-.01***	-.01***	-.03***	-.02***	-.02***	-.04***
	[.00]	[.01]	[.01]	[.00]	[.01]	[.02]
$\Delta e_{M,t-1} * Leverage_{t-1}$	.17***	.18***	.16***	.24***	.26***	.22***
	[.04]	[.04]	[.06]	[.06]	[.06]	[.08]
$Share_{S,t-1}$		.08	.39**		.09	.31*
		[.08]	[.18]		[.09]	[.18]
$\Delta e_{S,t-1}$			.42***			.39***
			[.11]			[.10]
Fixed effects	Y	Y	N	Y	Y	N
Obs.	491	491	434	491	491	434
R-squared	0.15	0.15		0.14	0.14	

Note: annual data (1999-2010) for 51 US States. Robust standard errors in parentheses account for clustering at the State level. Regressions *(1)*, *(2)*, *(4)* and *(5)* include State fixed effects; regressions *(3)* and *(6)* are conducted with the Arellano-Bond estimator. Variable *Leverage* is HH Debt over Disposable Personal in columns *(1)*, *(2)* and *(3)*, HH Debt over Gross State Product in columns *(4)*, *(5)* and *(6)*. Coefficients of the constant are not reported. ***,**,*: indicates significance at the 1, 5, and 10 percent level respectively.

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Panel regressions

Preliminary results

$$\Delta e_{S,i,t} = \beta \Delta e_{M,i,t-1} * Leverage_{i,t-1} + \gamma' X_{i,t} + \alpha_i + \varepsilon_{i,t}$$

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
$\Delta e_{M,t-1}$	-.07*	-.07*	-.15**	-.06	-.07	-.14**
	[.04]	[.04]	[.06]	[.04]	[.04]	[.05]
$Leverage_{t-1}$	-.01***	-.01***	-.03***	-.02***	-.02***	-.04***
	[.00]	[.01]	[.01]	[.00]	[.01]	[.02]
$\Delta e_{M,t-1} * Leverage_{t-1}$	**.17*** **	**.18*** **	**.16*** **	**.24*** **	**.26*** **	**.22*** **
	[.04]	[.04]	[.06]	[.06]	[.06]	[.08]
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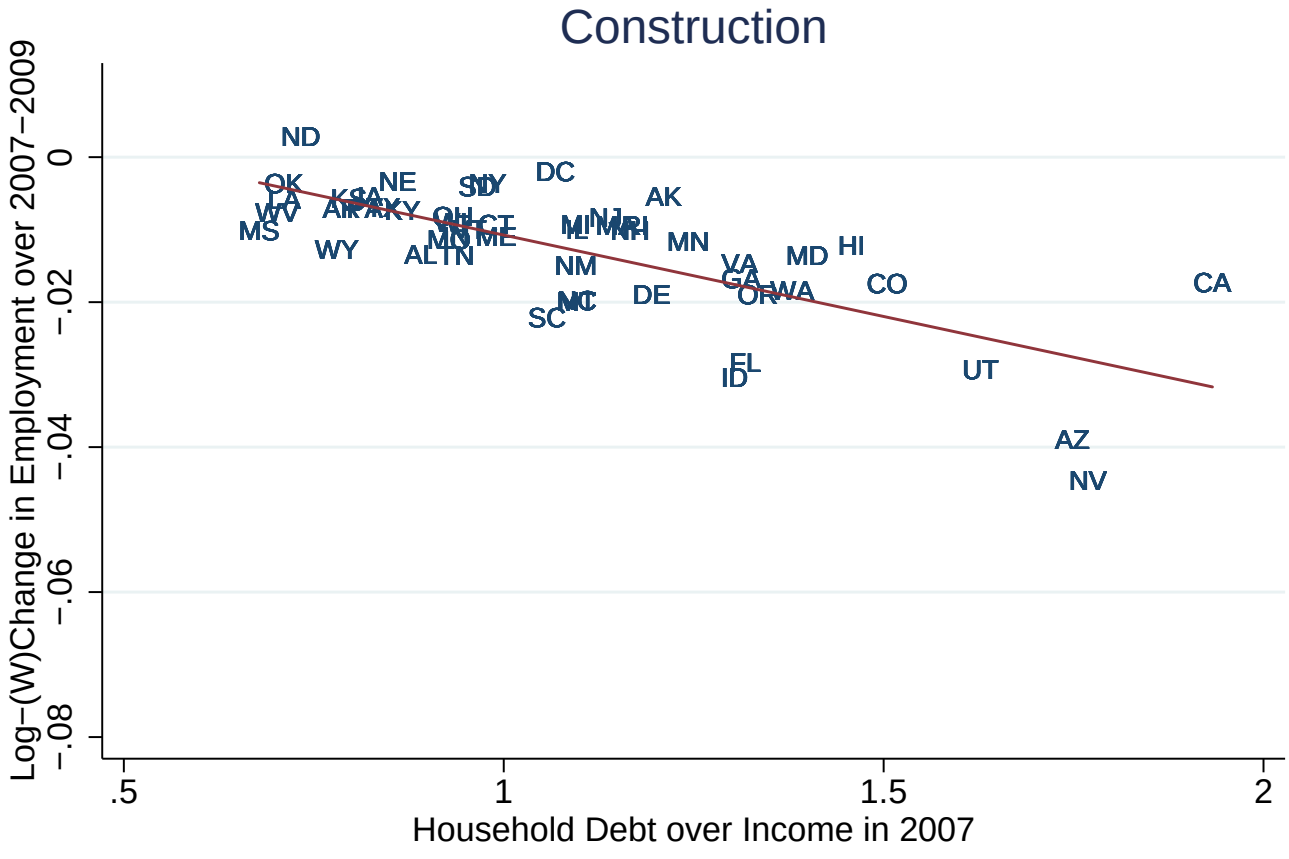
What about construction?

Buildings

- are storable, as manufactured goods,
- but nontradable, as services.



Correlation: −.72