

Dynamism Diminished: The Role of Credit Conditions and Housing Markets

Steven J. Davis and John Haltiwanger

Chicago Booth & NBER U. of Maryland & NBER

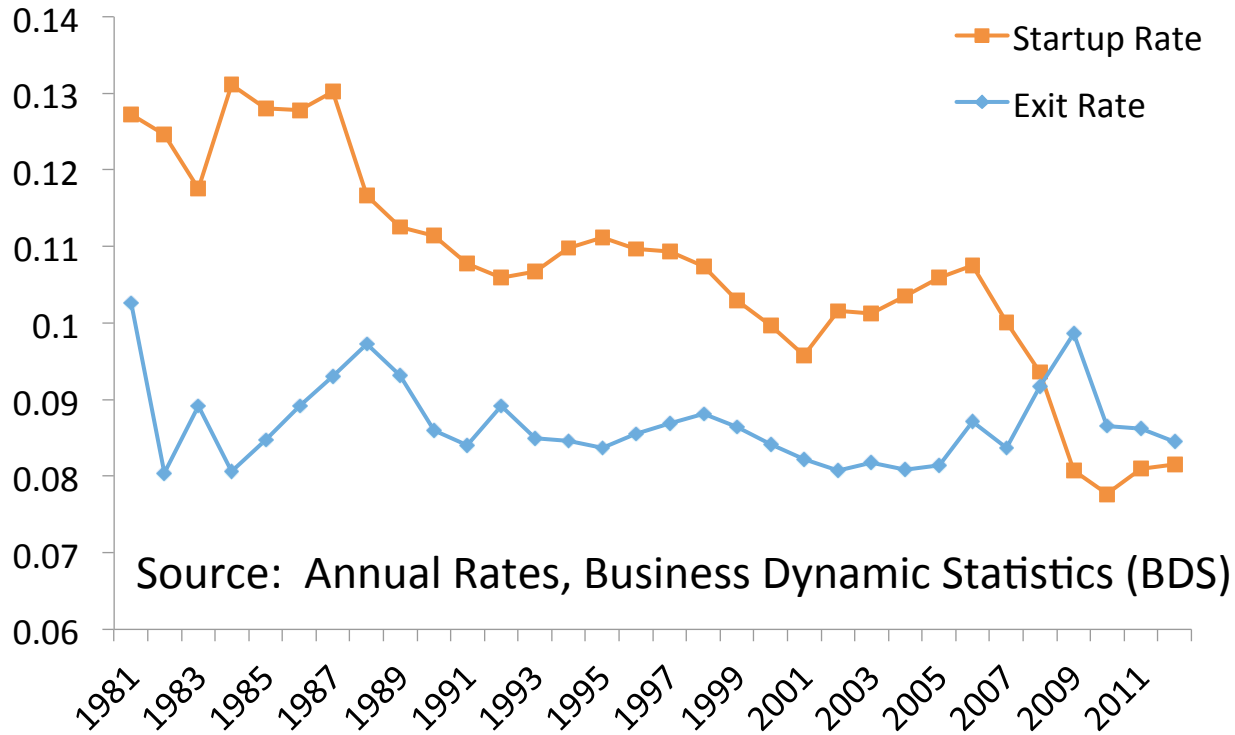
3 January 2016, San Francisco

Econometric Society Session on
“The New Firm Dynamics of Business Cycle Fluctuations”

Overview

1. Longer-term context
 - A. Secular Declines in Business Formation Rates and Young Firm Activity Shares
 - B. Secular Declines in Labor Market Fluidity
 - Large, pervasive declines in Job Reallocation Rates in past 35 years, accelerating after 2000
 - Large, pervasive declines in Worker Reallocation and Churn Rates since 2000
2. Young firms were hit especially hard by the Great Recession
3. Questions: What role for credit conditions in the fortunes of young firms?
What role for the housing market boom and bust?
 - A. Are recent declines in young-firm activity shares simply a continuation of secular developments, coupled with an unusually severe recession, or is more at work?
 - B. Do secular forces interact with cyclical forces in important ways?
4. Our approach: Exploit spatial and industry time-series variation to assess the forces driving the decline of young (and small) firms
 - A. Housing market developments, bank lending conditions, etc.
 - B. Control for other factors, and try to shed light on transmission channels

Firm Startup and Exit Rates in Nonfarm Private Sector, 1981-2012

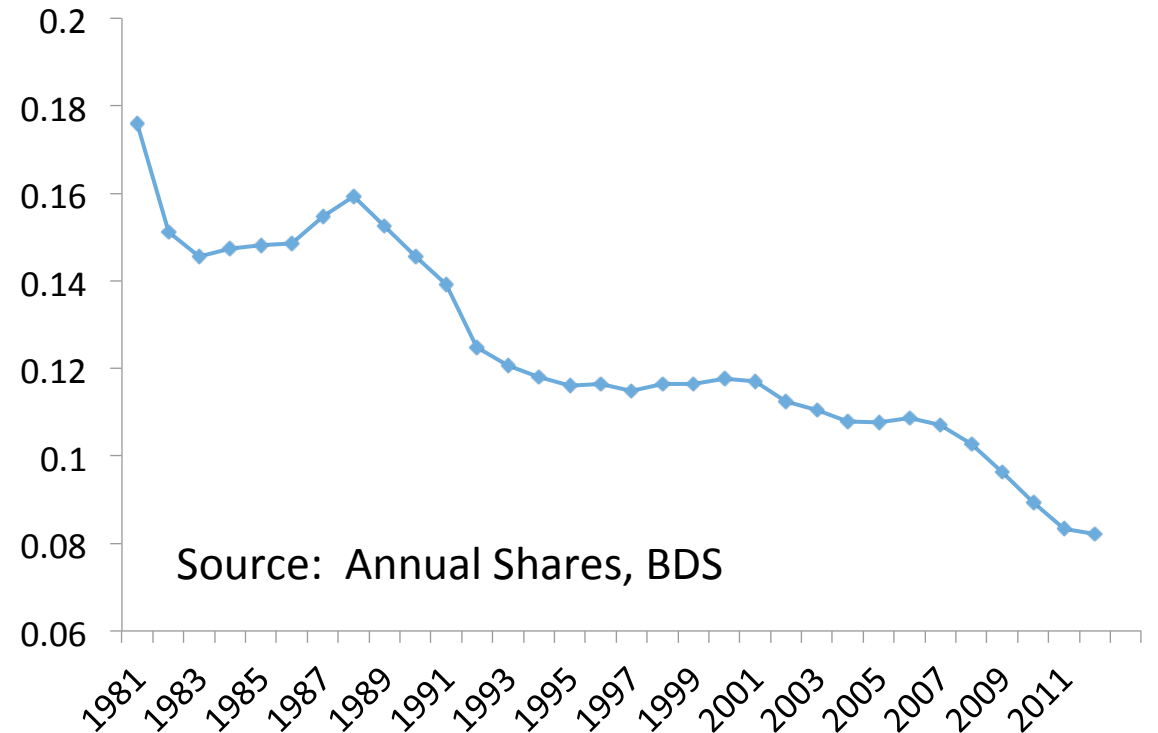


Firm startup rate shows a strong secular decline since the mid 1980s, a further large drop in the Great Recession, and little recovery after the Great Recession.

Changes are calculated from March of the previous year to March of the indicated calendar year.

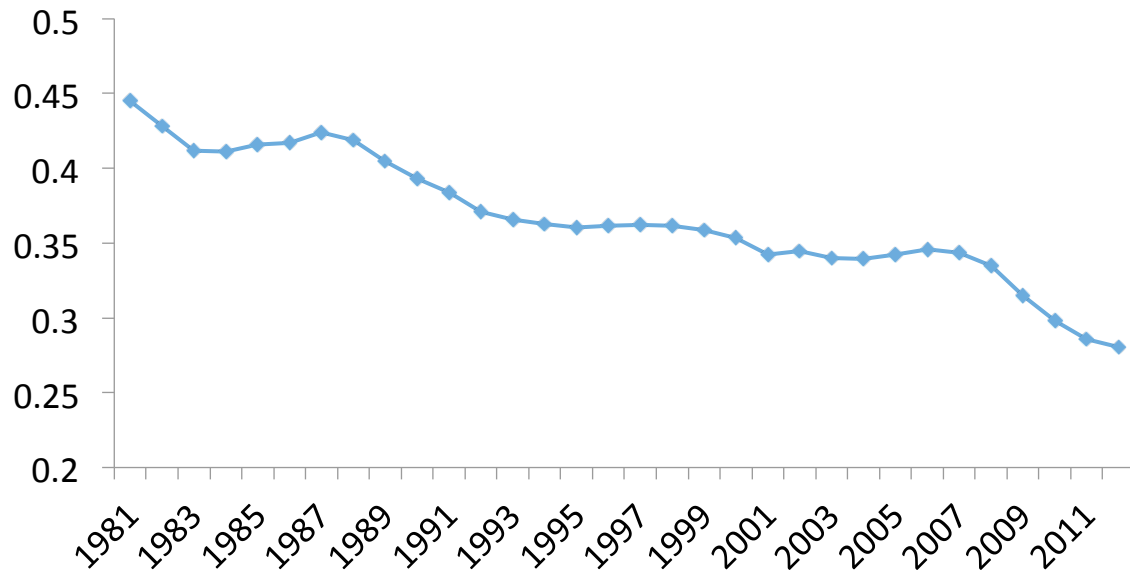
Employment in firms less than five years old fell from 17.6% of private sector employment in 1981 and 15.9% in 1988 to 8.2% in 2012.

Share of Employment in Young (<5) Firms, 1981-2012, Nonfarm Private Sector



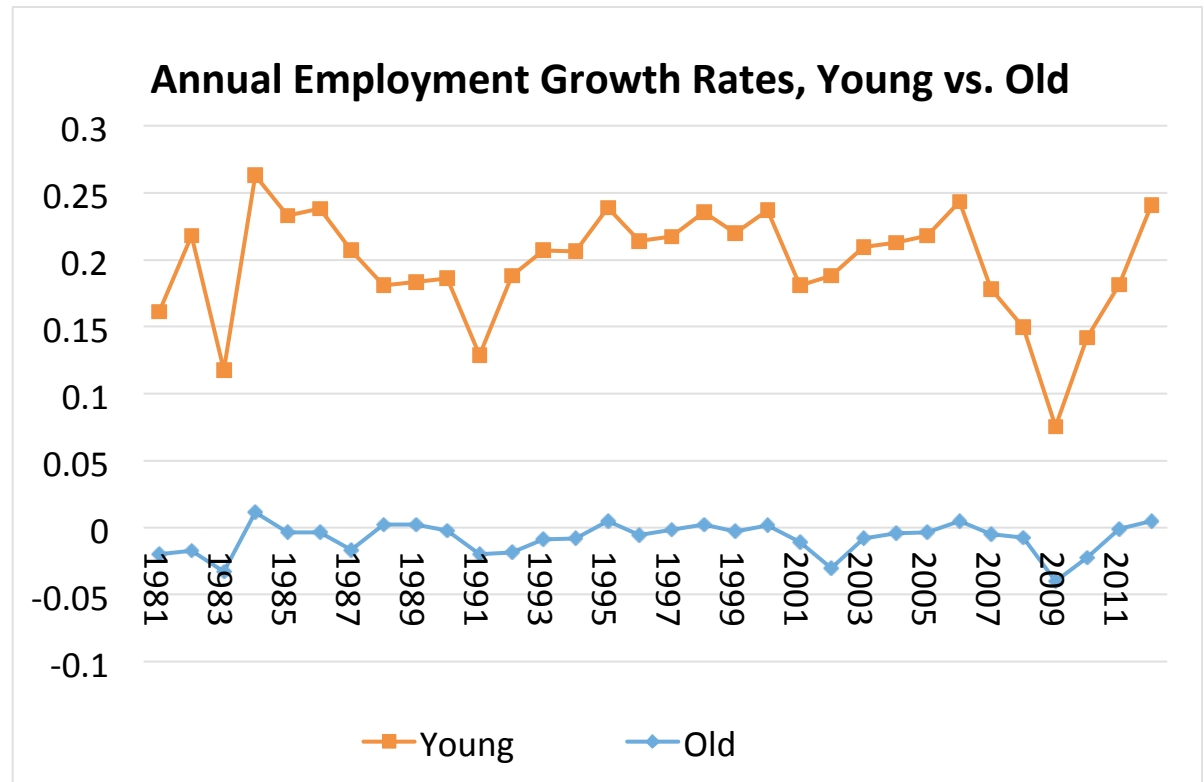
“Young” means < 60 months since the firm first had a paid employee, as of March in the indicated calendar year.

Share of Firms That Are Young (<5 years old),
Unweighted



Share of young firms exhibits secular decline that accelerates in downturns, especially in Great Recession.

Net employment growth rates are more cyclically sensitive for young firms, especially in the Great Recession.



The top line shows the net growth rate (DHS measure) from t-1 to t of firms that are less than 5 years old. See next slide. The bottom line shows the corresponding net growth rate for old firms.

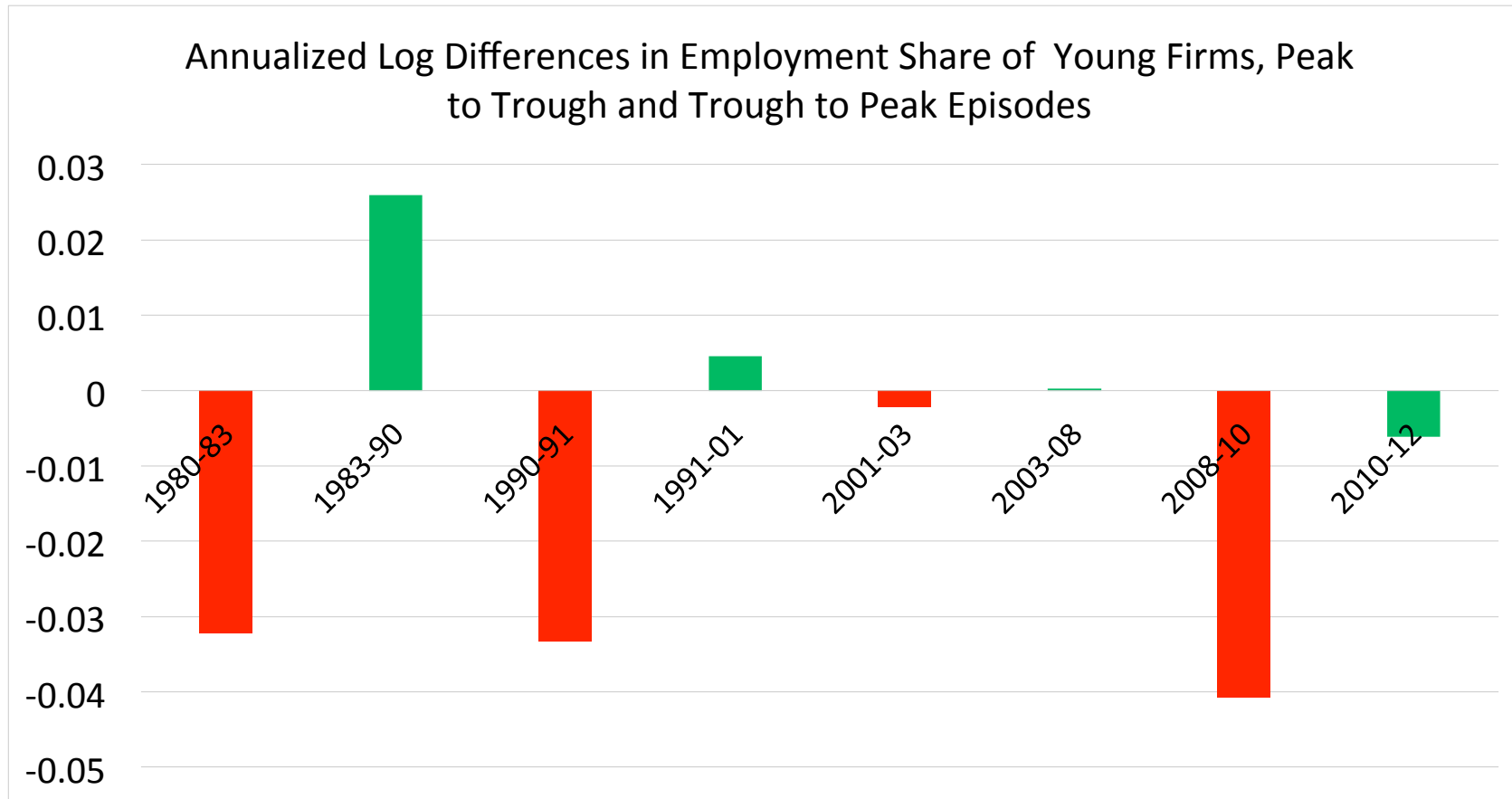
Young Firm Activity: Definitions and Accounting

- Firm age: age of oldest establishment when the firm becomes a legal entity.
- Age<5 means less than 60 months since first paid employee. The current entry cohort is age=0, and the previous four entry cohorts are ages 1, 2, 3, and 4.
- We can write the evolution of employment for firms of age<5 as

$$E_t^{a<5} - E_{t-1}^{a<5} = \left[E_t^0 + \sum_{a=1}^4 (E_t^a - E_{t-1}^{a-1}) \right] - E_{t-1}^4 \equiv NET_t^{a<5} - E_{t-1}^4$$

- This accounting relationship says the employment change from t-1 to t among young firms (Age<5) equals the net change among firms that remain young at t minus employment at firms that age out of the young category. The first term on the right side includes employment at firms that enter in period t (age 0 at t).
- We typically express young firm employment, and its components, as a share of total employment.
- An analogous accounting relationship holds for the evolution of the number of young firms.

The Young Firm Share of Employment Exhibits Pronounced and Time Varying Cyclicality

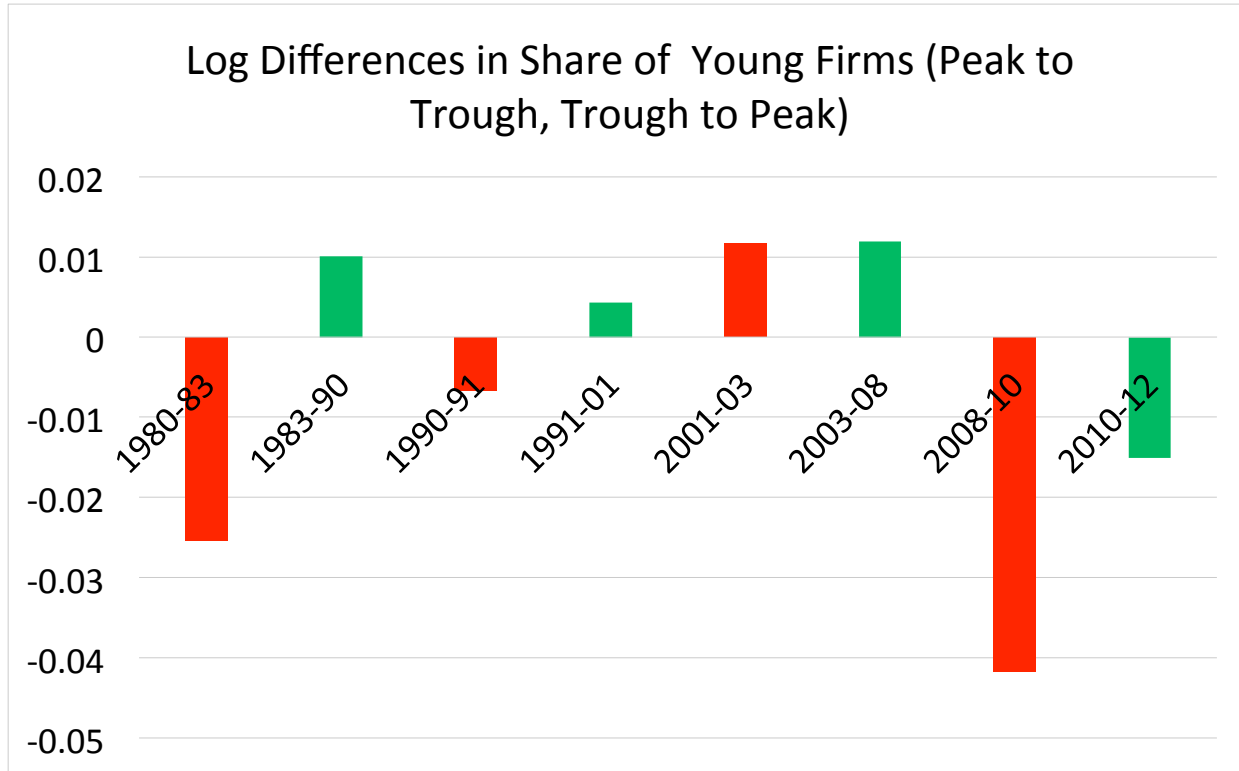


The young firm employment share falls sharply (relative to trend) during contractions. 2001-03 is an exception.

Recovery of the young firm employment share has diminished over time. It goes the “other way” in 2010-12.

For each expansion and contraction episode, the chart shows annualized deviations from the overall mean, which equals -0.022 per year.

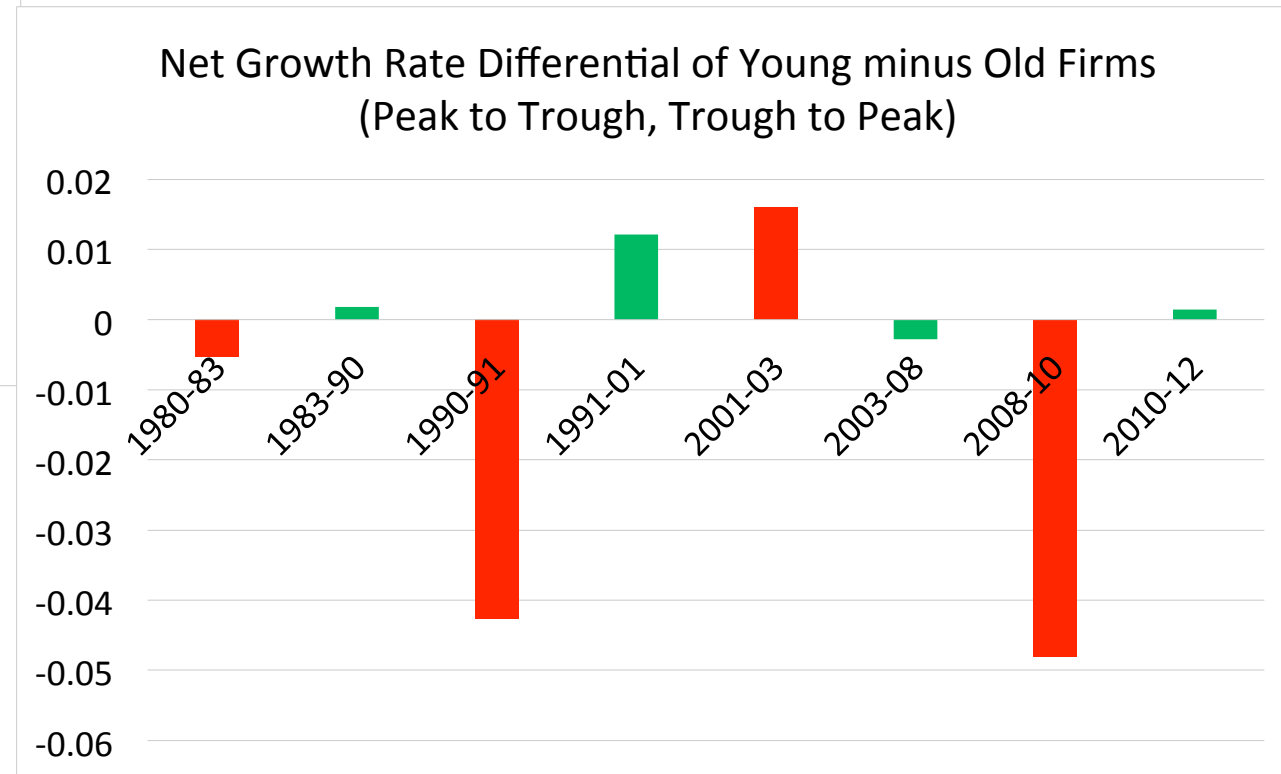
Young Firm Share of Firms and Young-Old Growth Differential Also Exhibit Pronounced and Time Varying Cyclicality



Net employment growth of young fell relative to old, especially in 1990-91 and Great Recession.

Annualized deviations from mean. Mean=-0.016

Early 1980s and Great Recession saw especially big declines in share of young firms



Annualized deviations from mean. Mean=0.208

Greater Sensitivity of Young and Small Firms to Credit Conditions?

- Gertler and Gilchrist (1994) highlight greater responsiveness of small firms to monetary policy and credit shocks.
 - Supporting evidence in Sharpe (1994) and Chari, Christiano, and Kehoe (2013)
- Fort et. al. (2013) find local housing price shocks adversely affect young/small businesses.
 - Robb and Wolken (2002) and Robb and Robinson (2012) highlight role of home equity for young firms. Fairlie and Krashinsky (2012) and Corradin and Popov (2015) find local local housing price gains increase transition rates into self employment.
 - Adelino et al. (2015) find that small businesses experience stronger employment growth (compared to large businesses) in regions with greater housing price appreciation, which they interpret as evidence for the importance of housing collateral in lending to small businesses.
 - Mian and Sufi (2011) highlight a net worth/aggregate demand channel of local housing price shocks on local non-tradables. No direct implication for young and small firms, but these firms may be more sensitive to such shocks for several reasons, as we discuss.
- Greenstone, Mas and Nguyen (2015) show connection between small business bank lending and small business employment growth at local level
 - They use an IV method to identify supply shock contribution.
 - Morgan, Rime and Strahan (2004) argue that banking deregulation made small firms less sensitive to local banking conditions.

Our Approach

- Fort et. al. (2013) and Davis and Haltiwanger (2014) show that spatial and industry variation in job and worker flows and in growth rate differentials by firm size and age provide much scope for analysis and identification.
- We adopt a broadly similar approach, exploiting data sets that offer variation
 - By firm age, firm size and State
 - By firm age, State or SMSA, and industry (NAICS 4-digit).
- Our core data sets derive from administrative records that cover all firms with paid employees. Sampling variability is not an issue.
- Descriptive statistics, panel regressions, and panel VARs

Data on Firm and Labor Market Outcomes

- Two core databases, with different strengths and weaknesses, on outcomes by firm age:
 - Business Dynamic Statistics (BDS):
 - Advantages: All 50 states from 1976 to 2012, with classifications by firm age and size
 - Disadvantages: No industry classifications for firm age and firm size at the state level.
 - The BDS measures net and gross changes from March of the previous year to March of the current year. We retime data from other sources to conform to this timing convention.
 - Quarterly Workforce Indicators (QWI)
 - Advantages: All 50 states by 2004. Some states back to 1990. Balanced panel available from 1998 for about 30 states (our approach). Industry detail (NAICS 4-digit) at state by quarter level.
 - Disadvantage: Firm age or Firm size classifications, not both. Firm age more useful for our purposes, but we cannot compare small-young to small-old.
- State-level unemployment rates from the BLS (LAUS).
 - This BLS program uses CPS, UI claims, CES data and other sources.

Data on Local Market Credit Conditions

- Young businesses finance activity using (e.g., Robb and Robinson, 2012):
 - Personal wealth
 - Home equity/Personal Loans
 - Bank Loans
- We use proxies for and measures of local credit availability:
 - Housing price movements, using data from the Federal Home Loan Finance Agency (FHFA), available monthly at the MSA and State Level for period covered by the BDS
 - Community Reinvestment Act (CRA) data on bank lending to “small” businesses:
 - CRA requires banks with assets >1 billion to report annually on small business loans at county level: # and volume of loans in various categories (<\$100K, <\$250K, <\$1 million); # and volume of loans to businesses with <\$1 million in gross revenue.
 - We use these data to construct local “small” business loan supply shocks.
 - We are exploring the potential usefulness of other data sources, e.g., personal bankruptcy rates by state and quarter.

Housing Price Transmission Channels and Relationship to Credit Conditions

Housing Prices and (Local) Young Firm Activity: Potential Transmission Channels

1. Wealth and Risk Tolerance: Home equity up → greater household willingness to take on risks of new/young business.
2. Liquidity Effect: Households tap home equity to relax liquidity constraints, increasing their ability to finance new/young businesses.
3. Collateral Lending Channel: Banks lend to new/young businesses collateralized by home equity. Higher house prices → greater collateral value.
4. Local Credit Supply Channels: (A) Local banks' lending capacity is affected by local housing market conditions, and new and young firms are relatively dependent on local bank credit. (B) National banks' lending capacities are affected differently by housing booms and busts, and these banks differ in their geographic footprints.
5. Local Outlook and Credit Supply: Banks see local housing prices as indicators of (future) local business conditions, affecting their willingness to lend; and new and young firms are relatively dependent on local bank credit.
6. Nonuniform Consumption Expenditure Responses: Young firms supply goods and services whose demand is relatively sensitive to house price fluctuations.

Empirically, Local Housing Prices Appear to Be a Good Proxy for the Local Financial Conditions Facing Small (and Young?) Businesses

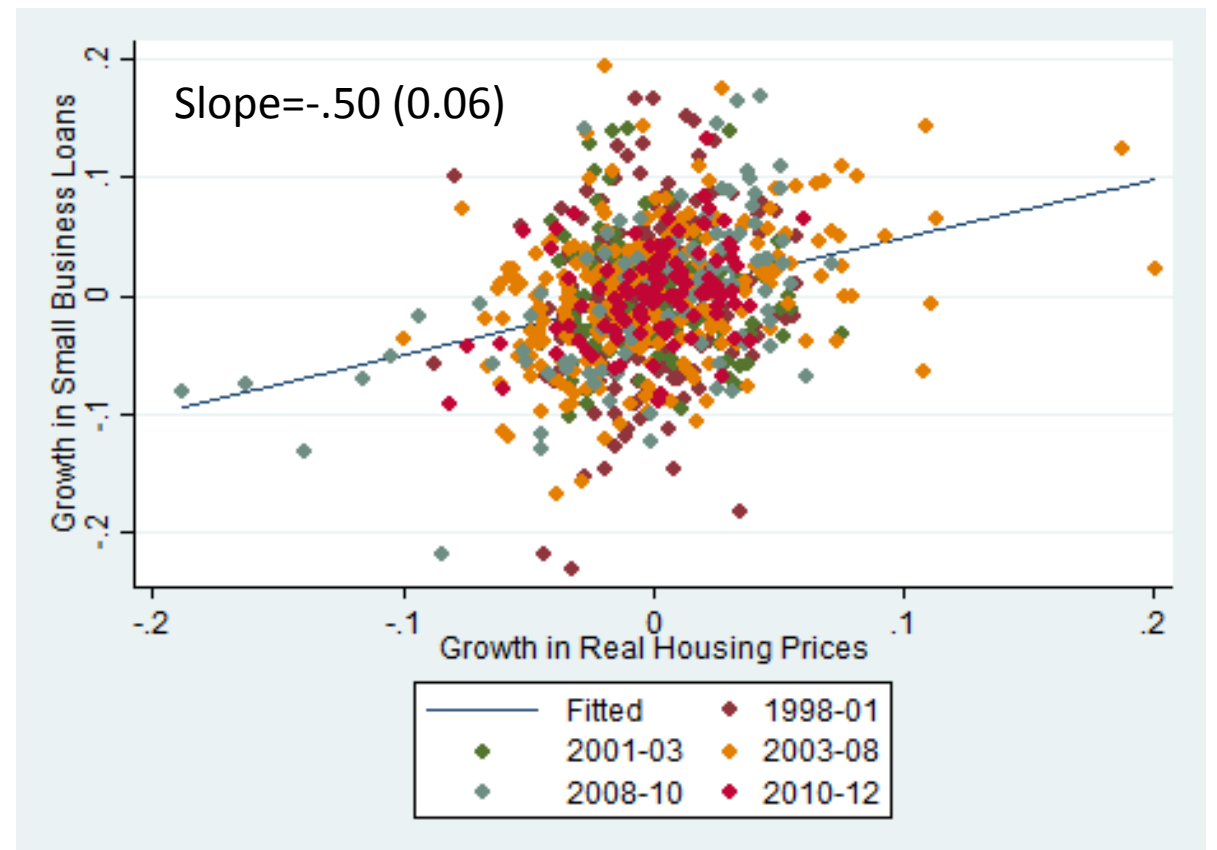
Relationship Between Small Business Loans, Housing Prices, and Unemployment Rates, 1998-2012

	(1)	(2)
	Growth in Small Business Loans	Growth in Real Housing Prices
Change in unemployment	-0.105*** (0.027)	-0.099*** (0.016)
State Effects	Yes	Yes
Year Effects	Yes	Yes
Adjusted R^2	0.944	0.603
Observations	765	765

Standard errors in parentheses
 * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

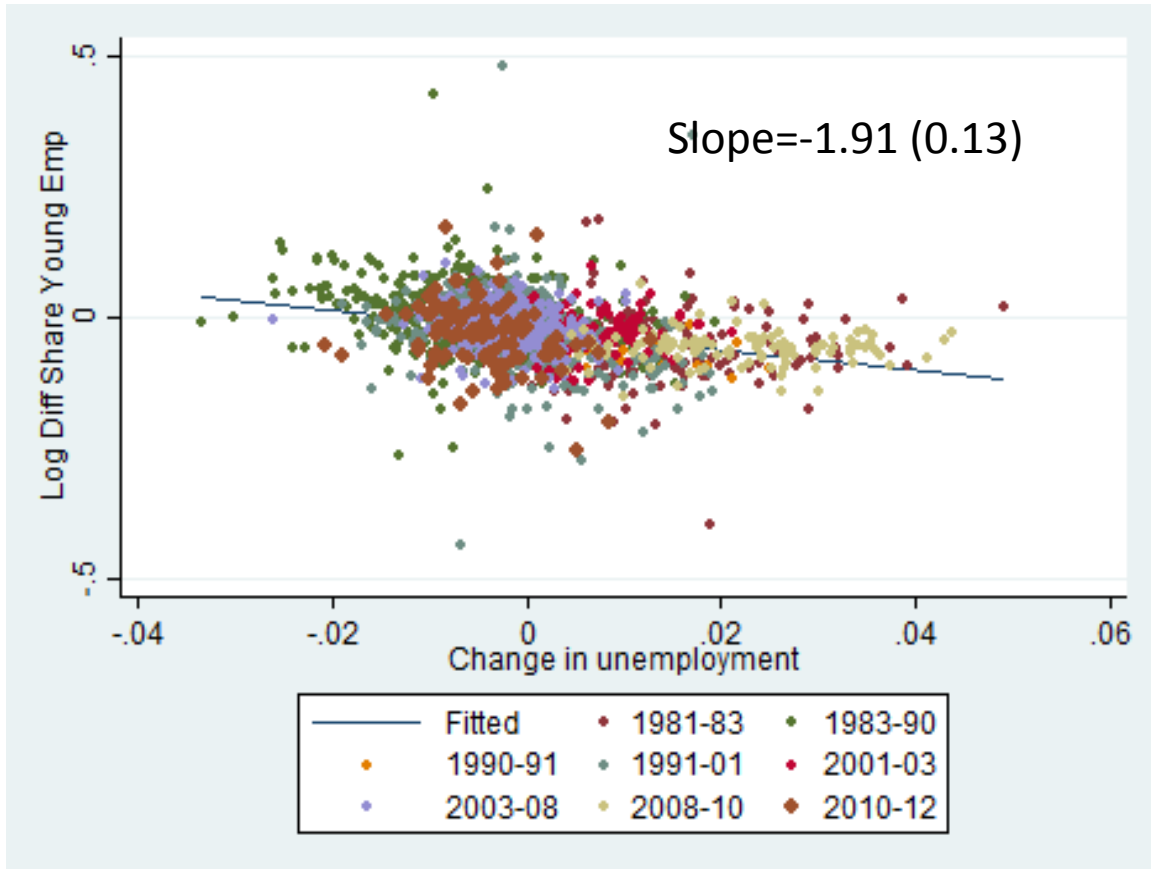
Small Business Loans and Housing Prices are highly sensitive to the local cycle.

Even after sweeping out state, year and local cyclical effects, there is a strong relationship between local housing prices and small business loans. (Scatter plot below uses residuals from the regressions on the left.)



Young Firm Outcomes at the
State-Year Level,
Using Data from 1981 to 2012

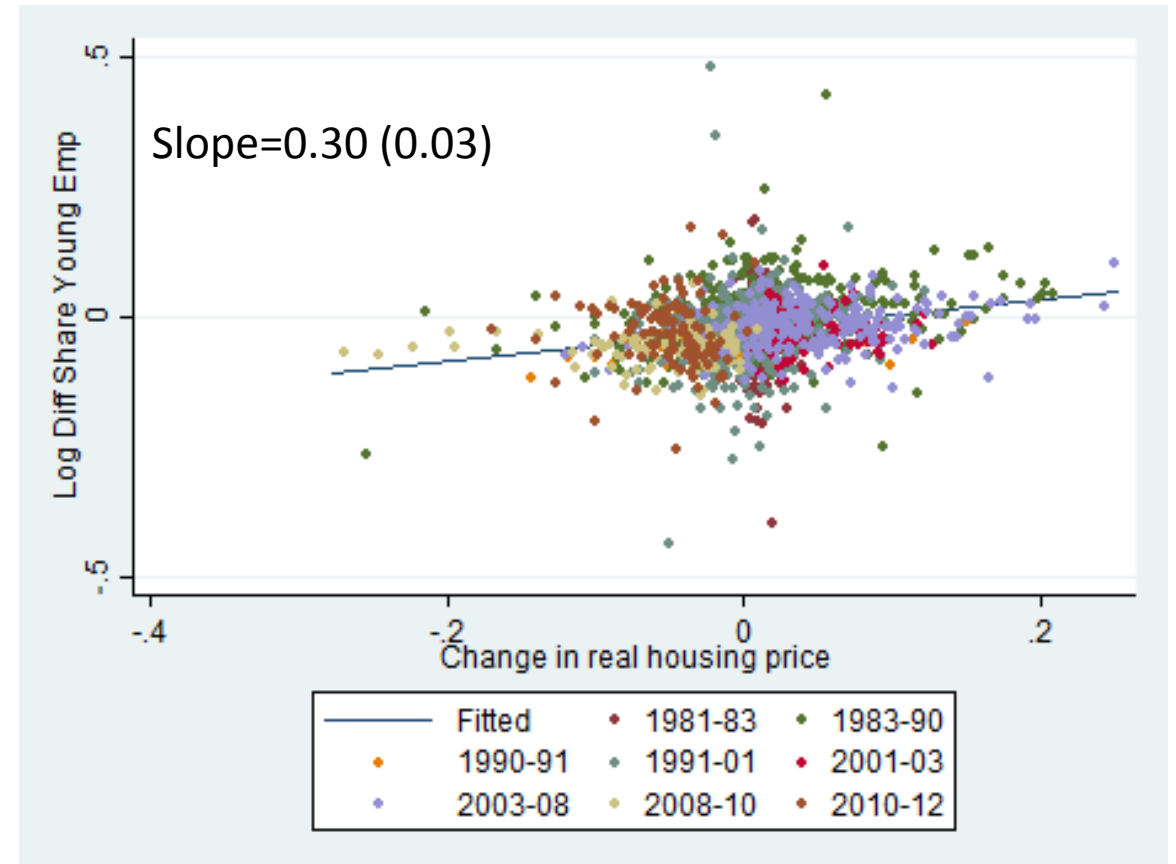
Log Difference in Young Firm Employment Share, Unemployment Rates and Housing Prices in State-by-Year Data from 1981 to 2012



Simple Bivariate Relationships exhibit considerable Variation across states and time.

Employment accounted for by young firms declines when local economic conditions deteriorate (as measured by local unemployment rate).

Employment accounted for by young firms increases when local housing prices increase (as measured by local growth in housing prices).



Panel Regression Analysis

- Panel regressions on state-year data from 1981-2012:
 - Dependent variables:
 - Log first difference of young-firm employment share
 - Log first difference of young firm share of firms
 - Net employment growth rate differential between young and old firms. Estimate young and old separately to facilitate counterfactual analysis.
 - Job creation differential between young and old
 - Job destruction differential between young and old
 - This talk focuses on first dependent variable
- RHS variables:
 - Change in unemployment rate at state-year level
 - Growth in Real Housing Prices at state-year level.
 - Specifications with state effects only and state + year effects
 - Standard errors clustered at state level.

Panel Regressions, State-Year Data from 1981-2012 using the BDS.

Log Difference in Young Employment Share		
	(1)	(2)
	Growth rate of the employment share for young firms	Growth rate of the employment share for young firms
Change in unemployment	-1.559 ^{***}	-0.961 ^{***}
	(0.129)	(0.210)
Growth in real housing price	0.214 ^{***}	0.126 ^{***}
	(0.025)	(0.025)
State Effects	Yes	Yes
Year Effects	No	Yes
Adjusted R^2	0.128	0.305
Observations	1632	1632

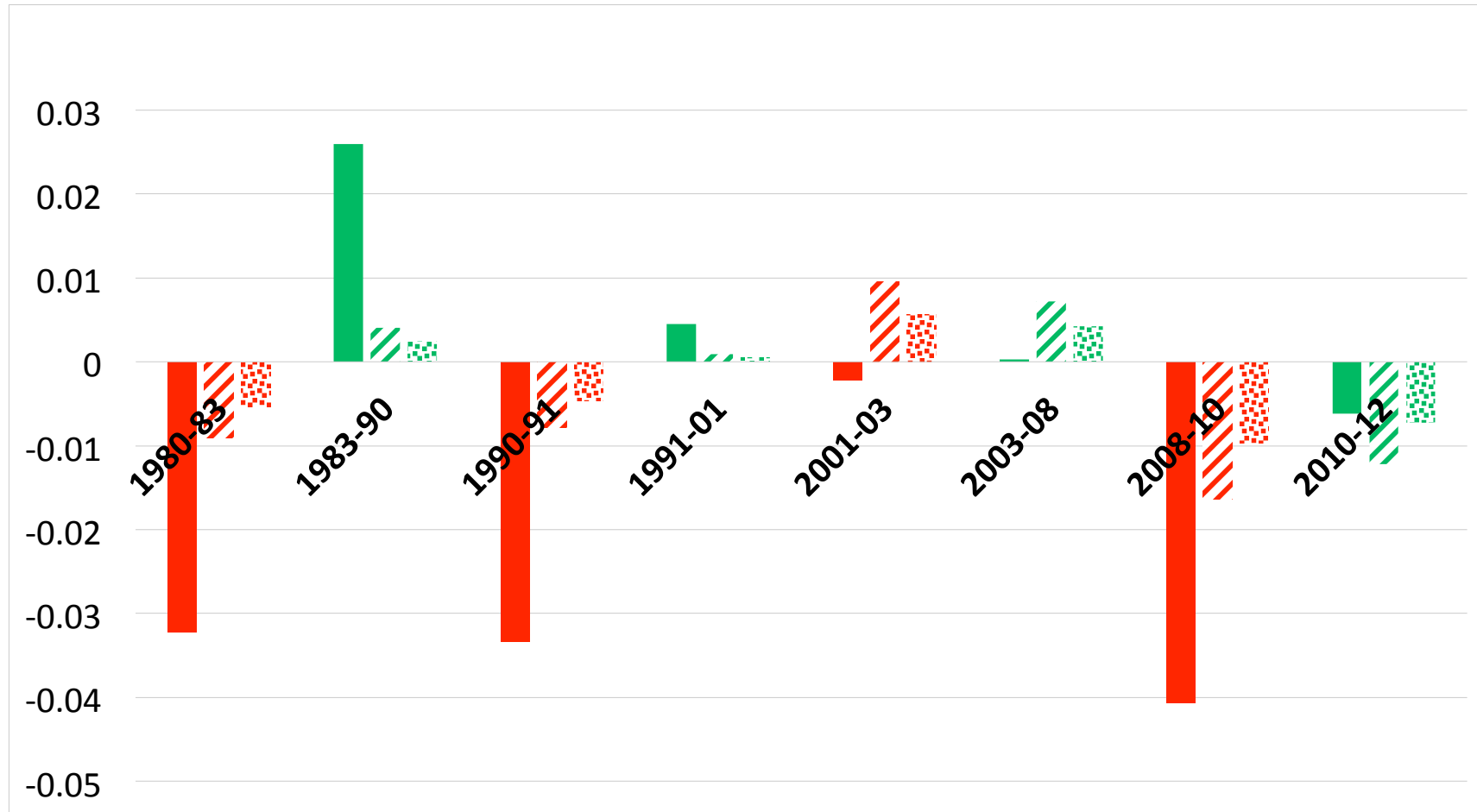
Standard errors in parentheses. Clustered at the State Level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Counterfactual Analysis from Panel Regressions

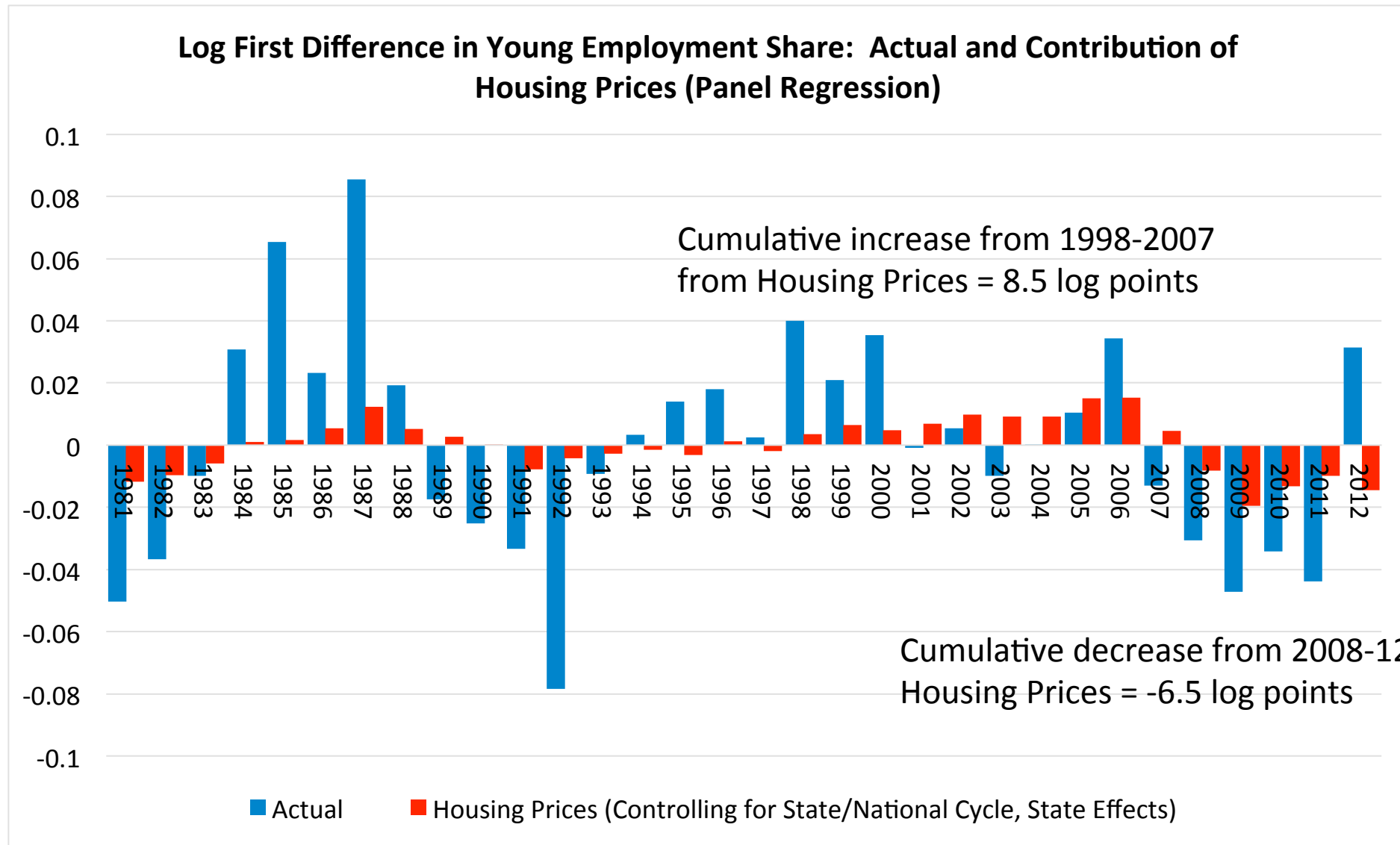
- Use estimated coefficient on housing price change and actual price changes to estimate variation due to housing price changes alone.
- Compare this estimated variation to actual variation.
- Conduct exercise at state-year level. Aggregate using appropriate weights: the state-level young firm share of employment averaged over $t-1$ and t .
- We express both actual and counterfactual as deviations from mean to facilitate comparisons.
- We focus here on variation in the young firm employment share.
- The appendix reports panel regressions and associated counterfactuals for the young firm share of all firms and for the employment growth rate differential between young and old firms. These margins, which are encompassed by the results reported here, are separately important.

Contribution of Housing Price Changes to Log Differences in Young Firm Employment Share by Cycle Episode



Solid Bar is Actual, Striped Bar is Counterfactual (State effects), Dotted Bar is Counterfactual (State and Year Effects). In both counterfactuals, actual housing price is used. Difference reflects coefficient estimates from alternative models. Annualized deviations from overall means depicted. The mean decline is -0.022 log points per year.

Year-By-Year results show that the housing boom attenuated the secular decline in young firm employment share from 1998-2007 and accelerated the decline after 2007.



Recall that the mean change in the young firm employment share is -2.2 log points per year.

Identification

- Panel Regression Diff-in-Diff offers one approach to identification.
 - It relies on variation in young firm activity in response to time-varying local economic conditions, controlling for state or state and year effects.
 - The estimated effect of housing price changes controls for local and national business cycle conditions through the state-level unemployment measure and year effects. Whether this approach successfully identifies exogenous variation in local house prices is unclear.
 - The specification above does not permit dynamic effects, but that's easily remedied. The appendix considers alternative panel regression specifications that allow for dynamic effects. The appendix also considers asymmetric responses to housing price increases and decreases. Results are similar.
- We also consider an alternative Identification strategy:
 - Panel VARs that build on diff-in-diff approach with controls for state and year effects.
 - Panel VARs allow for a richer set of dynamic relationships and identification based on causal ordering of contemporaneous innovations in the VAR system.
 - To identify house price “shocks”, we use a Cholesky decomposition with the house price variable ordered after the local business cycle shock. Again, it's unclear how successfully this approach identifies exogenous shocks to local house prices.

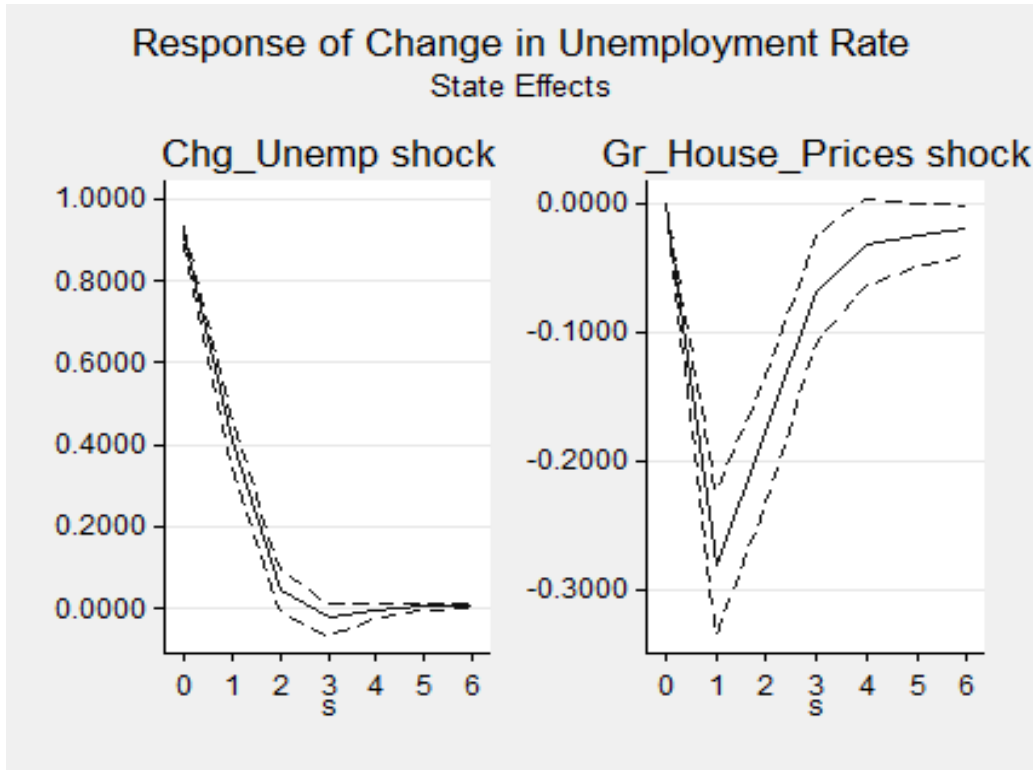
Panel VAR

$$Y_{s,t} = A(L)Y_{st} + State_s + Year_t + \varepsilon_{st}$$

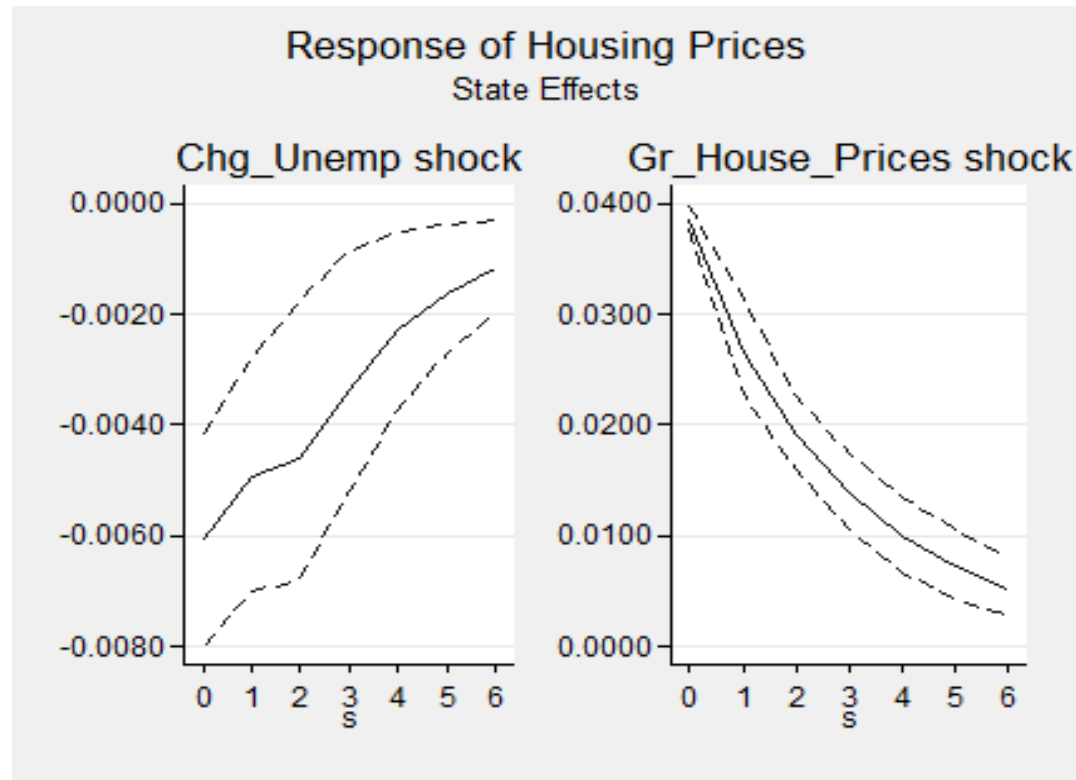
- Y is a vector of covariates (listed below)
- L is a lag operator of length L (in practice two years)
- $A(L)$ is a matrix of lagged coefficients
- $State$ and $Year$ represent vector of state fixed and year fixed effects.
 - One specification includes only state effects, the second includes state and year fixed effects.
- ε_{st} is the residual innovation vector of shocks to each of the covariates.
- Convert to orthogonalized MA representation using Cholesky decomposition with ordering
 - Change in State-Level Unemployment Rate
 - State-level Housing Price Growth
 - Young Firm Outcome Indicators (e.g., First Difference in Log Young Employment Share)
- Focus on the responses to the first two innovations:
 - First: State-specific cycle shock;
 - Second: State-specific housing price shock orthogonal to first innovation (purged of contemporaneous response of housing prices to national and local cyclical shocks).

Remarks on Panel VAR (1981-2012 analysis)

- Even without year effects, housing price shocks represent component of housing price growth orthogonal to all lagged variables and to contemporaneous national and local business cycle shocks.
- Controlling for year effects implies that all national shocks (cyclical or secular) are controlled for.
- Three different types of indicators of young business activity are considered for third (or block of third) variables:
 - Log first difference of young firm employment share (our focus here)
 - Log first difference of young firm share of firms (appendix)
 - Young-old net employment growth rate differential (appendix)
- We sweep out state effects, so that we use only within-state variation.



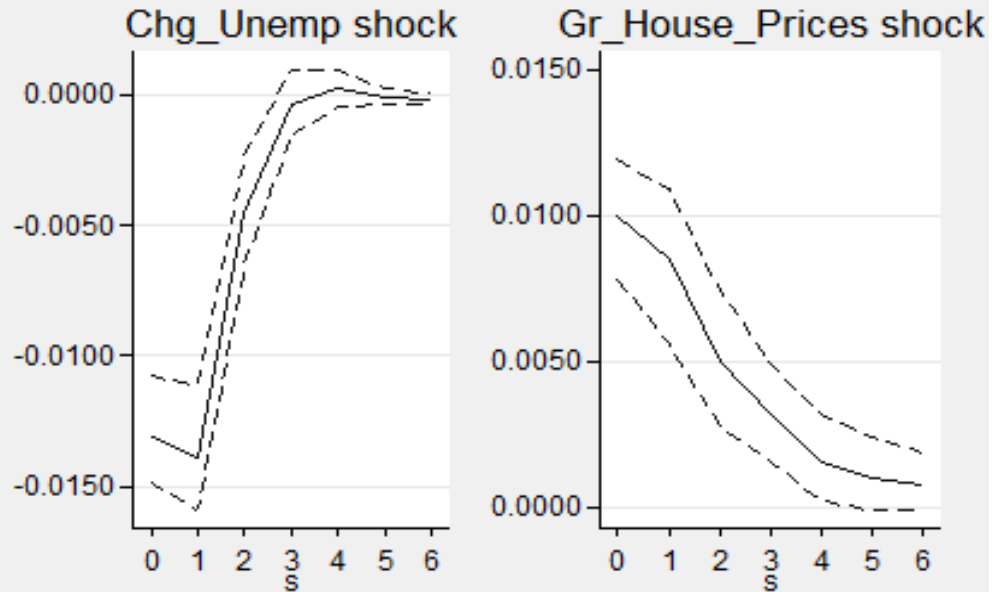
Housing prices fall in response to local unemployment shock, as seen in the chart below on the left. However, there remains substantial residual orthogonal variation in housing prices when we place the local unemployment rate first in the causal ordering, as seen in the chart below on the right.



Solid lines depict Impulse Response Functions (shocks to one standard deviation orthogonalized innovations). Confidence interval (dashed lines) at 5th and 95th percentiles.

Response of Log Diff Young Employment Share

State Effects

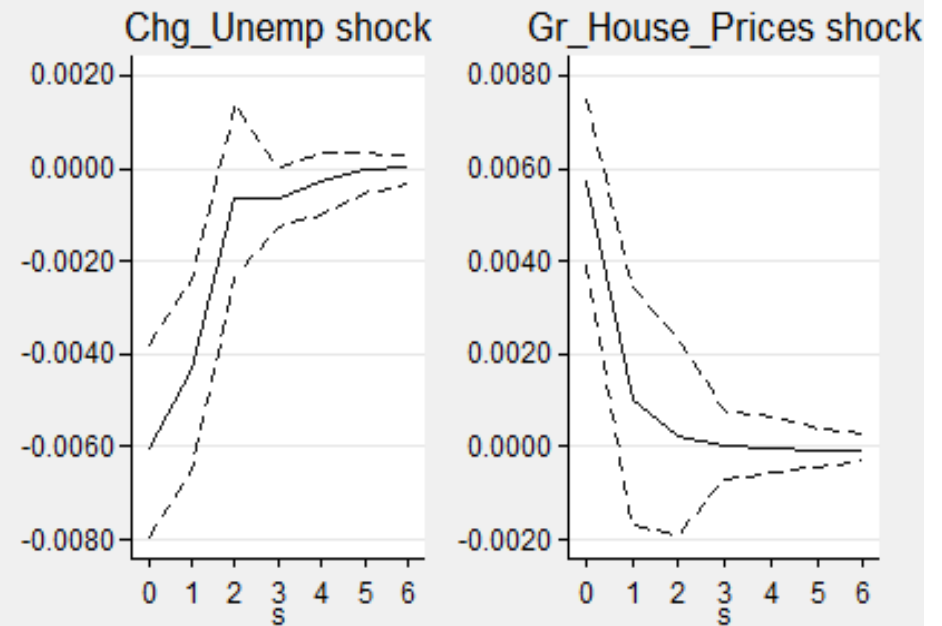


In response to adverse cyclical shock, employment at young businesses falls relative to total employment.

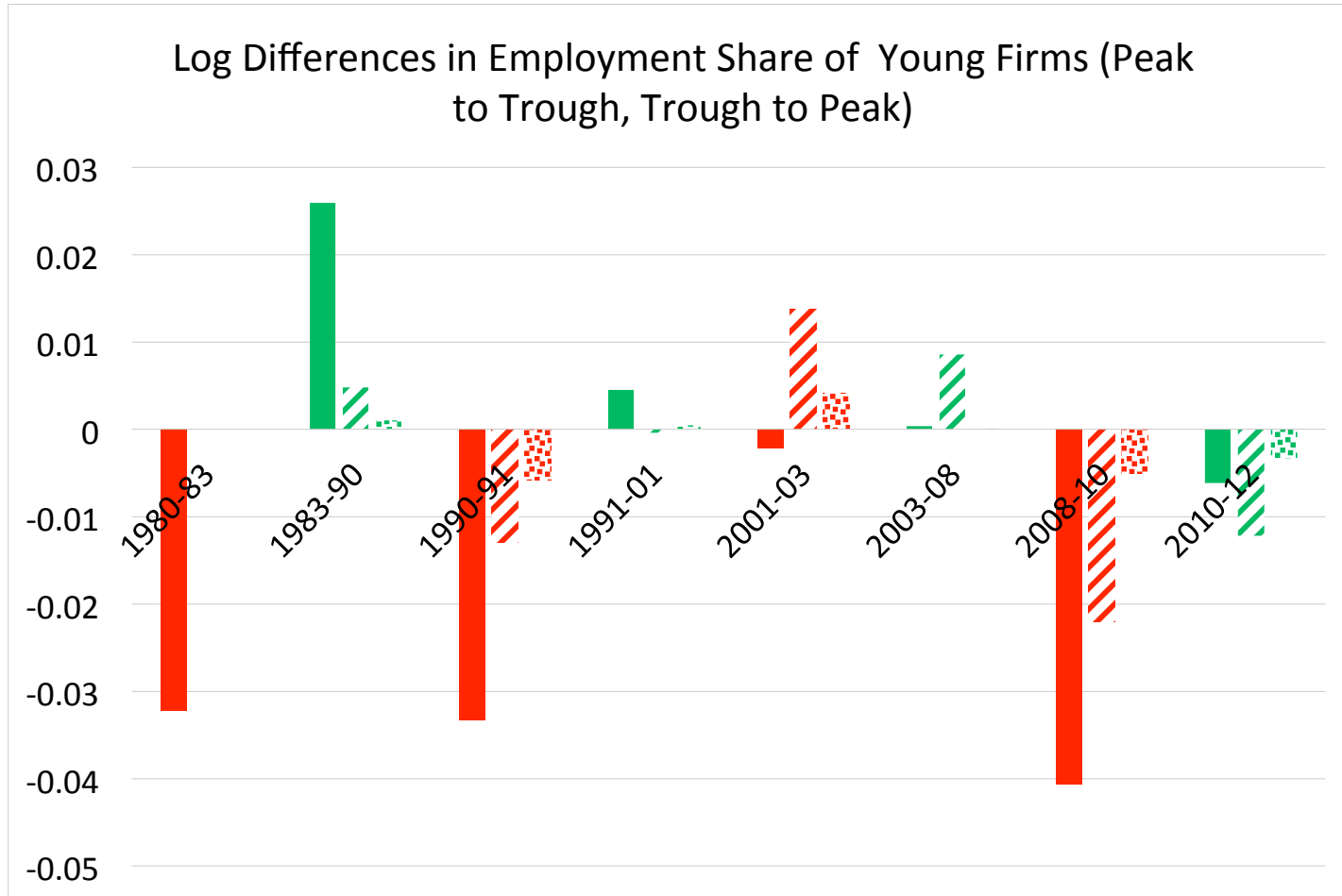
In response to orthogonal increase in housing prices, employment at young businesses rises relative to total employment

Response of Log Diff Young Employment Share

State and Year Effects



Counterfactuals from Panel VAR Analysis. We feed through the model-implied housing price shock sequences at the state level and aggregate up to the national level. (Aggregation is the same as in the panel regression analysis.)



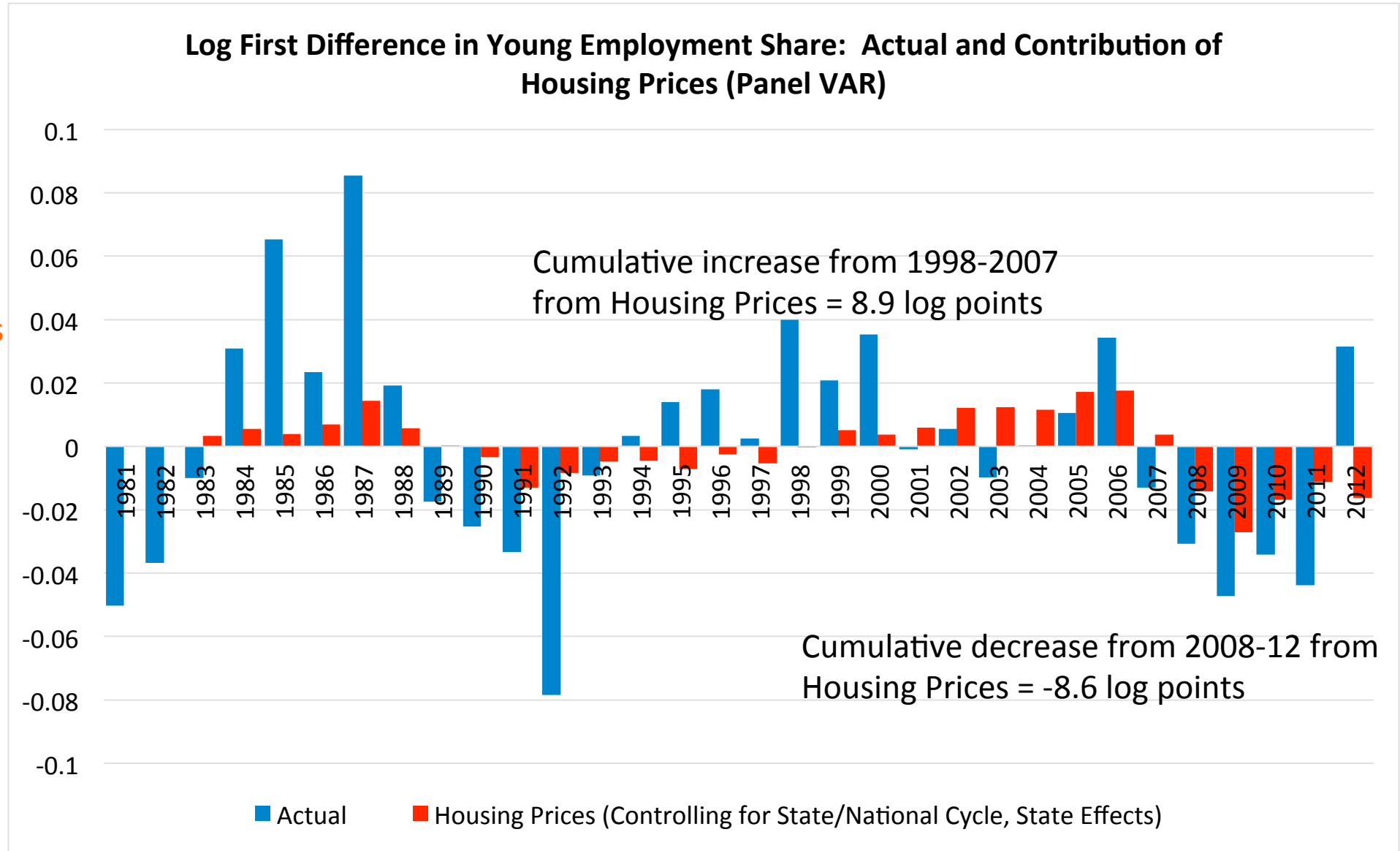
Despite the rather different methodologies, these results are similar to the ones obtained from the panel regressions. When we allow for lagged effects in the panel regressions, the results are even more similar.

Solid Bar is Actual, Striped Bar is Counterfactual (State effects), Dotted Bar is Counterfactual (State and Year Effects). In both counterfactuals, we feed through the sequences of housing price shocks implied by the model with state effects only. However, we use impulse response functions from different panel VAR models – one with state effects only, and one with state and year effects.

Note: The panel VAR does not yield counterfactuals for 1980-83.

Year-By-Year Patterns of Panel VAR results similar to Panel Regressions

Despite the rather different methodologies, these results are quite similar to the ones obtained from the panel regressions. The panel VARs yield somewhat larger effects for housing price shocks, especially in the bust period.



Young Firm Outcomes at the
State-Year Level,
Using Data from 1998 to 2012 with
Small Business Bank Loan Supply Shocks

Local Small Business Bank Loan Supply Shocks

- Q_{ijt} = Real value of business loan originations to firms with less than \$1 million in revenue by bank (or BHC) j in state i during year t .
- For each pair of years, $t-1$ and t , run the following regression, weighting each bank j by its $t-1$ share of small business lending in state i :

$$\Delta \ln(Q_{ijt}) = State_{it} + Bank_{jt} + \varepsilon_{ijt}$$

- Now construct the small business bank loan supply shock for state i in year t as the weighted sum of the *Bank* terms from the regression:

$$SBL_{it} = \sum_j Sh_{ij, t-1} Bank_{jt},$$

where $Sh_{ij, t-1}$ is bank j 's small business bank lending share in state i at t .

Local Small Business Bank Loan Supply Shocks

- Our approach to constructing shocks to the local supply of small business bank loans follows Greenstone, Mas and Nguyen (2015). It exploits the fact that BHC's differ in financial fortunes, propensity for small business lending, and geographic footprint.
- Unlike Greenstone et al., we investigate the effects of these shocks on young firm activity shares in the local economy. The vast majority of young firms are small.
- For descriptive evidence on the decline of bank lending to small businesses in recent years, and its relationship to the decline of smaller banks, see Lux and Greene (2015).
- FDIC Call report data show that the number and volume of nonfarm, non-residential bank loans less than \$1 million in origination value fell by 27% from June 2008 to June 2013.
- For a summary of arguments that the Dodd-Frank Act and other regulatory responses to the Great Recession contributed to the reduction in bank lending to small businesses, see the short pieces by Shane (2013, 2015). Aspects of Shane's argument apply with equal or greater force to young business credit availability.

Log Difference in Young Employment Share

	(1)	(2)
	Growth rate of the employment share for young firms	Growth rate of the employment share for young firms
Change in unemployment	-1.013*** (0.162)	-1.014*** (0.171)
Change in real housing price	0.095*** (0.028)	0.095*** (0.034)
Change in small business loans supply (bhc,DHS,loan_gr_1)	0.040*** (0.009)	0.042*** (0.010)
State Effects	No	Yes
Adjusted R^2	0.137	0.093
Observations	765	765

Standard errors in parentheses

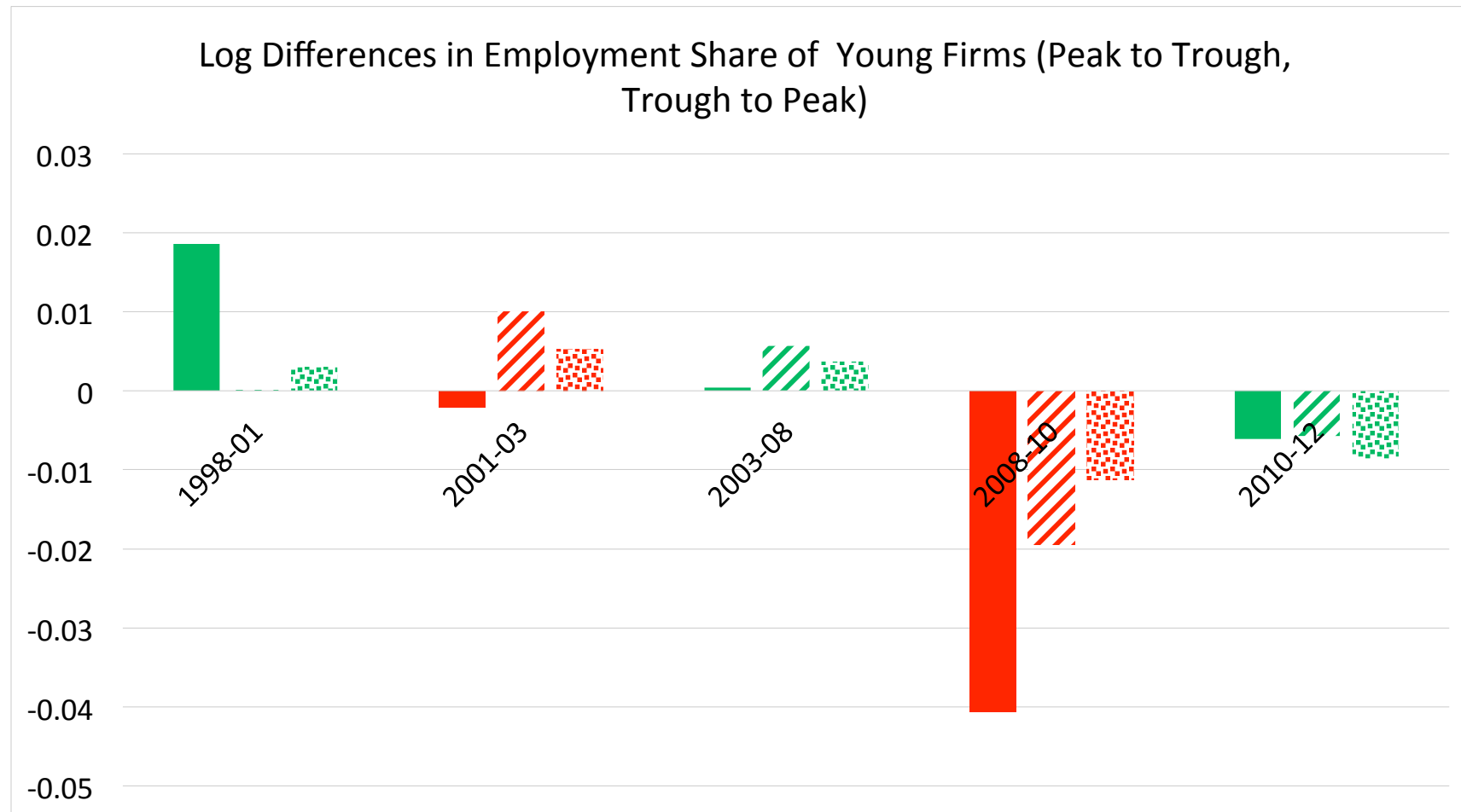
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Same BDS state-year and house price data as before, but the sample now runs from 1998 to 2012 to conform to the availability of the bank lending data.

Negative shocks to small business bank loan supply reduce the young firm employment share. The elasticity of young firm employment shares with respect to the bank loan supply shock is -0.04 and is highly statistically significant.

This is our first-pass effort to estimate the effects of local bank loan supply shocks. There is room to improve our measure of local loan supply shocks, and we need to introduce controls for the national cycle. We will also explore whether loan supply effects differ before, during and after the GFC.

Contribution of Housing Price Changes and Small Business Bank Loan Supply Shocks to Log Differences in Young Firm Employment Share by Cycle Episode



These results suggest that negative bank loan supply shocks materially reduced young firm activity shares in 2008-2010, adding 0.8 percentage points per year to the drop during this period.

The results also suggest that positive bank loan supply shocks contributed somewhat to the relatively favorable performance of young firms in 2001-03. Otherwise, loan supply shocks had trivial effects on young firm activity, according to these preliminary results.

Sold Bar is Actual, Striped Bar is Counterfactual (Housing Prices + Loan Supply), Dotted Bar is Counterfactual (Housing Prices Only). In both counterfactuals, state effects only used in a model with state-level change in unemployment as a control. Difference reflects coefficient estimates from alternative models. Annualized deviations from overall means depicted. The mean decline is -0.022 log points per year

Some Next Steps

- Was young firm activity more sensitive to bank loan supply shocks during or after the Great Recession than before?
- Exploit QWI data to explore the local shock responses of young firm activity shares by industry: tradables vs. non-tradables, Mian-Sufi classification, capital intensity, reliance on bank credit, etc.
- Related, exploit cross-state differences in the young firm/small firm share of retail trade activity as an interaction variable governing the local retail response to housing price movements. Mian-Sufi local consumption demand channel implies that these structural characteristics of the retail trade sector are irrelevant, but they matter according to some alternative transmission channels.
- Use BDS data to distinguish responses of young establishments operated by mature firms from the response of young firms.
- Use ILBD tabs to investigate the effects of house price and bank loan supply shocks on formation and growth of non-employer businesses by industry
- Consider population age distribution as a control variable and a potential driver of local house price variation. Add more controls for local demand conditions.
- Can we say anything about how shock responsiveness of young firms depends on the “hospitality” of the local economy to young/small firms?

References

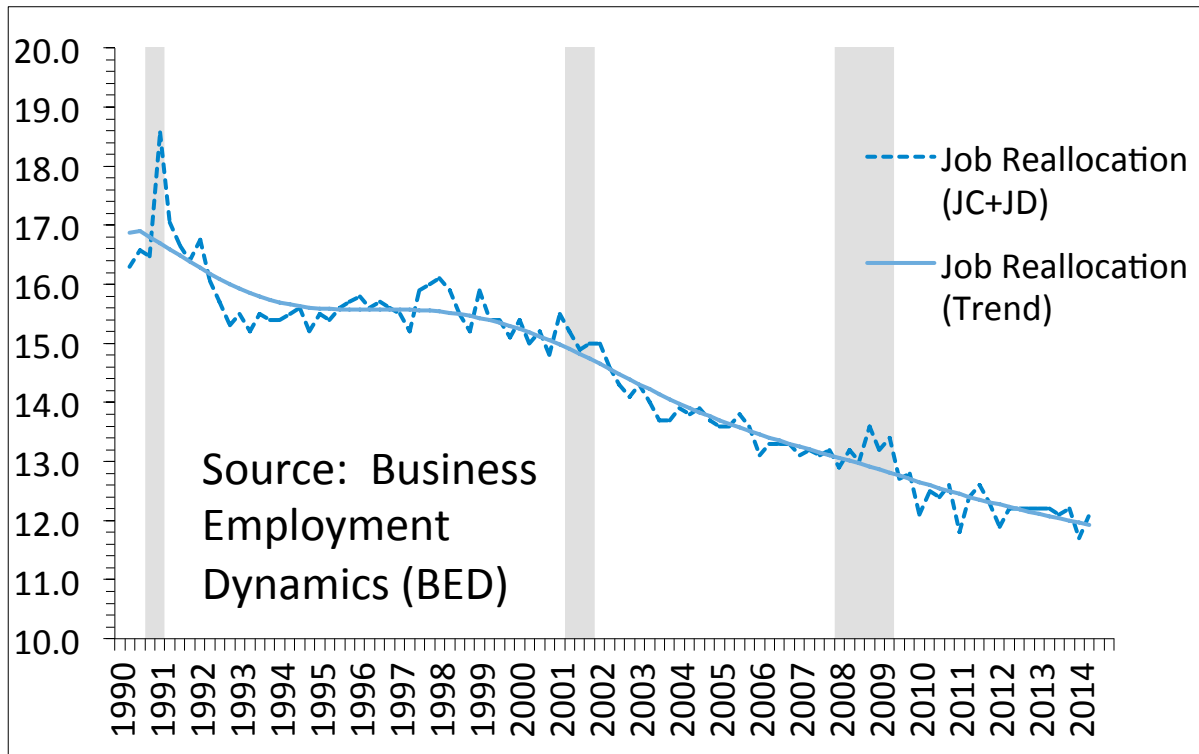
- Abowd, John M., Bryce Stephens, Lars Vilhuber, Fredrik Andersson, Kevin L. McKinney, Marc Roemer, and Simon Woodcock, "The LEHD Infrastructure Files and the Creation of the Quarterly Workforce Indicators" in T. Dunne, J.B. Jensen and M.J. Roberts, eds., *Producer Dynamics: New Evidence from Micro Data* (Chicago: University of Chicago Press for the National Bureau of Economic Research, 2009), pp. 149-230, available online at <http://www.nber.org/chapters/c0485>.
- Adelino, Manuel, Antoinette Schoar and Felipe Severino, 2015. "House Prices, Collateral, and Self-Employment," *Journal of Financial Economics*, 117, no. 2 (August), 288-306.
- Chaney, Thomas, David Sraer and David Thesmar, 2012. "The Collateral Channel: How Real Estate Shocks Affect Corporate Investment," *American Economic Review*, 102, no. 6 (October), 2381-2409.
- Chari, VV, Lawrence J. Christiano, and Patrick Kehoe, 2013. "The Gertler-Gilchrist Evidence on Small and Large Firm Sales," working paper, July.
- Chodorow-Reich, Gabriel, 2014. "The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008-09 Financial Crisis," *Quarterly Journal of Economics*, 129, no. 1, 1-59.
- Corradin, Stefano and Alexander Popov, 2015. "House Prices, Home Equity, and Entrepreneurship," *Review of Financial Studies*, forthcoming.
- Crews, Clyde Wayne, Jr., 2015. *10,000 Commandments, 2015 Edition: An Annual Snapshot of the Federal Regulatory State*, Competitive Enterprise Institute.
- Davis, Steven J., 2015. "Regulatory Complexity and Policy Uncertainty: Headwinds of Our Own Making," working paper, October.
- Davis, Steven J., Jason Faberman and John Haltiwanger, 2012. "Labor Market Flows in the Cross Section and over Time," *Journal of Monetary Economics*, January.
- Davis, Steven J., R. Jason Faberman, John Haltiwanger, Ron Jarmin, and Javier Miranda, 2010. "Business Volatility, Job Destruction, and Unemployment." *American Economic Journal: Macroeconomics*, 2, no. 1 (April), 259-287.
- Davis, Steven J. and John Haltiwanger, 2014. "Labor Market Fluidity and Economic Performance," in *Re-Evaluating Labor Market Dynamics*, Federal Reserve Bank of Kansas City. Also available at NBER Working Paper No. 20479.

- Davis, Steven J., John Haltiwanger, Ron Jarmin, and Javier Miranda, 2007. "Volatility and Dispersion in Business Growth Rates: Publicly Traded versus Privately Held Firms." *NBER Macroeconomics Annual*, 2006.
- Decker, Ryan, John Haltiwanger, Ron S. Jarmin and Javier Miranda, 2014a. "The Role of Entrepreneurship in US Job Creation and Economic Dynamism," *Journal of Economic Perspectives*, 28 no. 3 (Summer), 3-24.
- Decker, Ryan, John Haltiwanger, Ron S. Jarmin and Javier Miranda, 2014b. "The Secular Decline of Business Dynamism in the United States," working paper, University of Maryland (June).
- Dawson, John W. and John J. Seater, 2013. "Federal Regulation and Aggregate Economic Growth," *Journal of Economic Growth*, 18, 137-177.
- Fairlie, Robert W. and Harry A. Krashinsky, 2012. "Liquidity Constraints, Household Wealth, and Entrepreneurship Revisited," *Review of Income and Wealth*, 58, no. 2 (June),
- Fort, Teresa C., John Haltiwanger, Ron S. Jarmin and Javier Miranda, 2013. "How Firms Respond to Business Cycles: The Role of Firm Age and Firm Size," *IMF Economic Review*, 520-559.
- Gertler, Mark and Simon Gilchrist, 1994. "Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms," *Quarterly Journal of Economics*, 109, no. 2 (May), 309-340.
- Greenstone, Michael, Alexandre Mas and Hoai-Luu Nguyen, 2015. "Do Credit Market Shocks Affect the Real Economy? Quasi-Experimental Evidence from the Great Recession and 'Normal' Times," working paper, September.
- Haltiwanger, John, Ian Hathaway, and Javier Miranda, 2014. "Declining Dynamism in the U.S. High-Technology Sector," Ewing Marion Kauffman Foundation (February).
- Haltiwanger, John, Stefano Scarpetta and Helena Schweiger, 2014. "Cross Country Differences in Job Reallocation: The Role of Industry, Firm Size and Regulations," *Labour Economics*, 26, 11-25.
- Hyatt, Henry R. and James R. Spletzer, 2013. "The Recent Decline in Employment Dynamics," *IZA Journal of Labor Economics*, 2, no. 5 (September).
- Jarmin, Ron S., Shawn Klimek, and Javier Miranda, 2009. "The Role of Retail Chains: National, Regional and Industry Results," in *Producer Dynamics: New Evidence from Micro Data*, edited by Timothy J. Dunne, J. Bradford Jensen and Mark J. Roberts. Chicago: The University of Chicago Press.
- Jensen, Thais Laerkholm, Soren Leth-Petersen and Raman Nanda, 2014. "Housing Collateral, Credit Constraints and Entrepreneurship: Evidence from a Mortgage Reform," NBER Working Paper No. 20583.

- Kerr, Sari, William R. Kerr and Ramana Nanda, 2015. "House Money and Entrepreneurship," NBER Working Paper No. 21458.
- Lux, Marshall and Robert Greene, 2015. "The State and Fate of Community Banking," Harvard Kennedy School, M-RCBG Associate Working Paper Series, No. 37.
- Mian, Atif and Amir Sufi, 2011. "House Prices, Home Equity-Based Borrowing, and the U.S. Household Leverage Crisis," *American Economic Review*, 101 (August), 2132-2156.
- Morgan, Donald P., Bertrand Rime and Philip E. Strahan, 2004. "Bank Integration and State Business Cycles," *Quarterly Journal of Economics*, 119, no. 4 (November), 1555-1584.
- Robb, Alicia M. and David T. Robinson, 2012. "The Capital Structure Decision of New Firms," *Review of Financial Studies*.
- Robb, Alicia M. and John D. Wolken, 2002. "Firm, Owner and Financing Characteristics: Differences between Female- and Male-Owned Small Businesses," Finance and Economics Discussion Series, Federal Reserve Board, Washington, D.C., Working paper 2002-18.
- Shane, Scott, 2013. "Collateral Damage for Small Business Credit," *Bloomberg Business*, 13 September at <http://www.bloomberg.com/bw/articles/2013-09-13/collateral-damage-for-small-business-credit>.
- Shane, Scott, 2015. "How the Decline in Community Banks Hurts Small Business," *Entrepreneur*, 2 April at <http://www.entrepreneur.com/article/244573>.
- Wallison, Peter J., 2015. "The Slow Recovery Explained," 28 September, AEI.org.

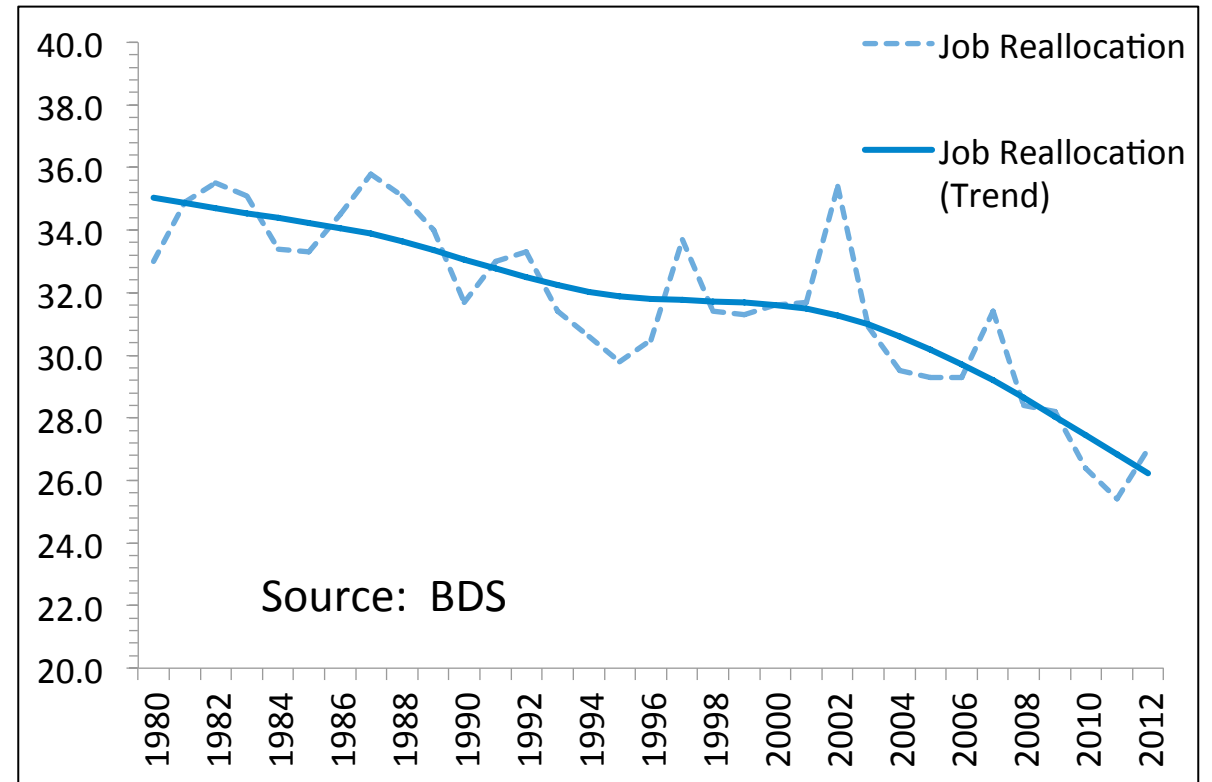
Additional Slides

Job Reallocation Rate, U.S. Private Nonfarm (Quarterly)



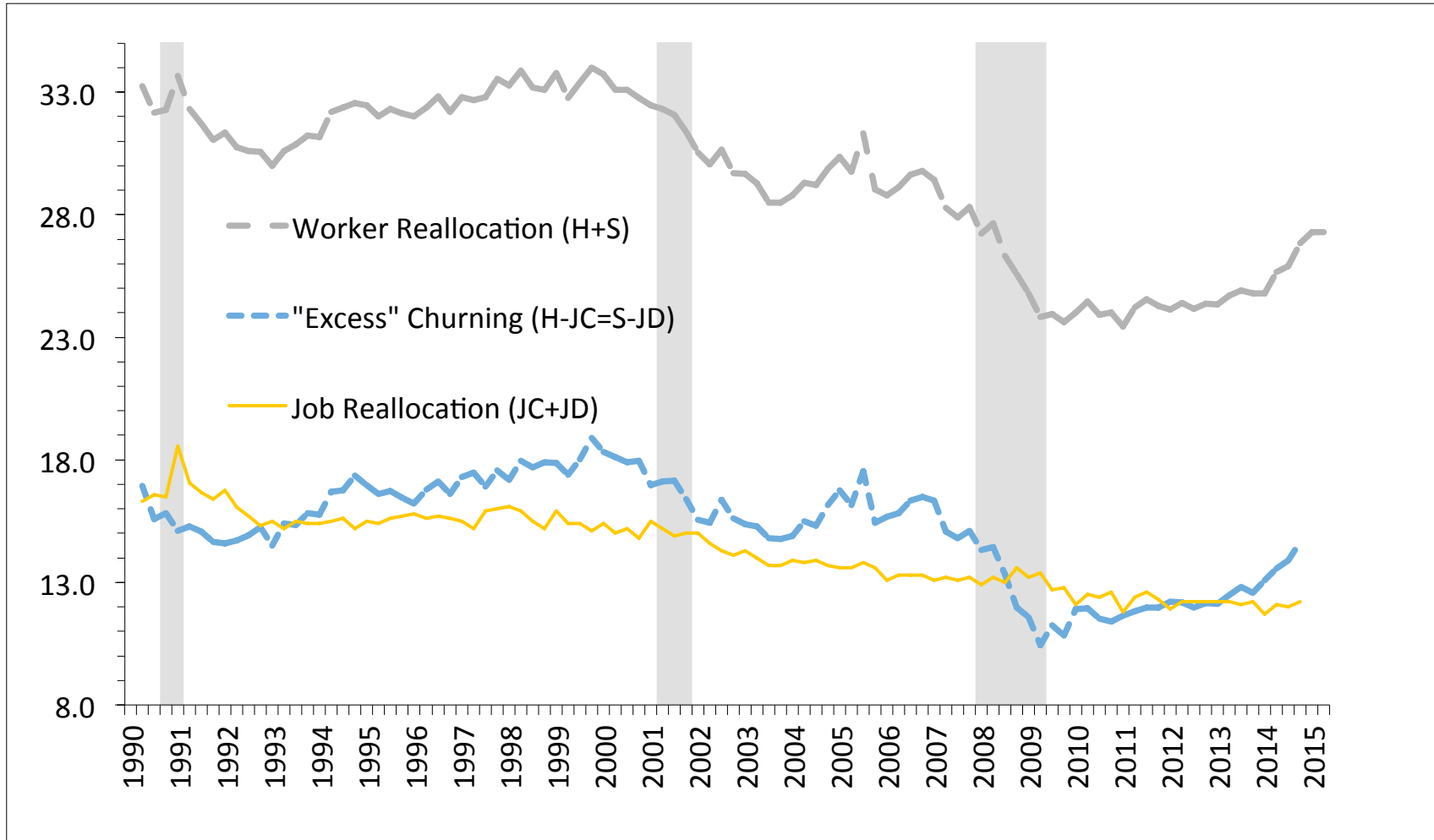
The secular decline in the pace of job reallocation accelerated after 2000 and continued after the Great Recession.

Job Reallocation Rate, U.S. Private Nonfarm (Annual)



Hodrick-Prescott Trends

Quarterly Rates of Worker Reallocation, Job Reallocation & Churn, As a Percent of Employment, U.S. Nonfarm Private Sector, 1990-2014



Source: BED and Job Openings and Labor Turns Survey (JOLTS) data using methods developed in Davis, Faberman and Haltiwanger (JME, 2012). Our methods adjust for undercounts of hires and separations in JOLTS data induced by weaknesses in the JOLTS sample design.

$$\text{Worker Reallocation} = \text{Job Reallocation} + \text{Churn}$$

(Hires + Separations) (Creation + Destruction)

Are Reduced Business Dynamism And Labor Market Fluidity Cause for Concern?

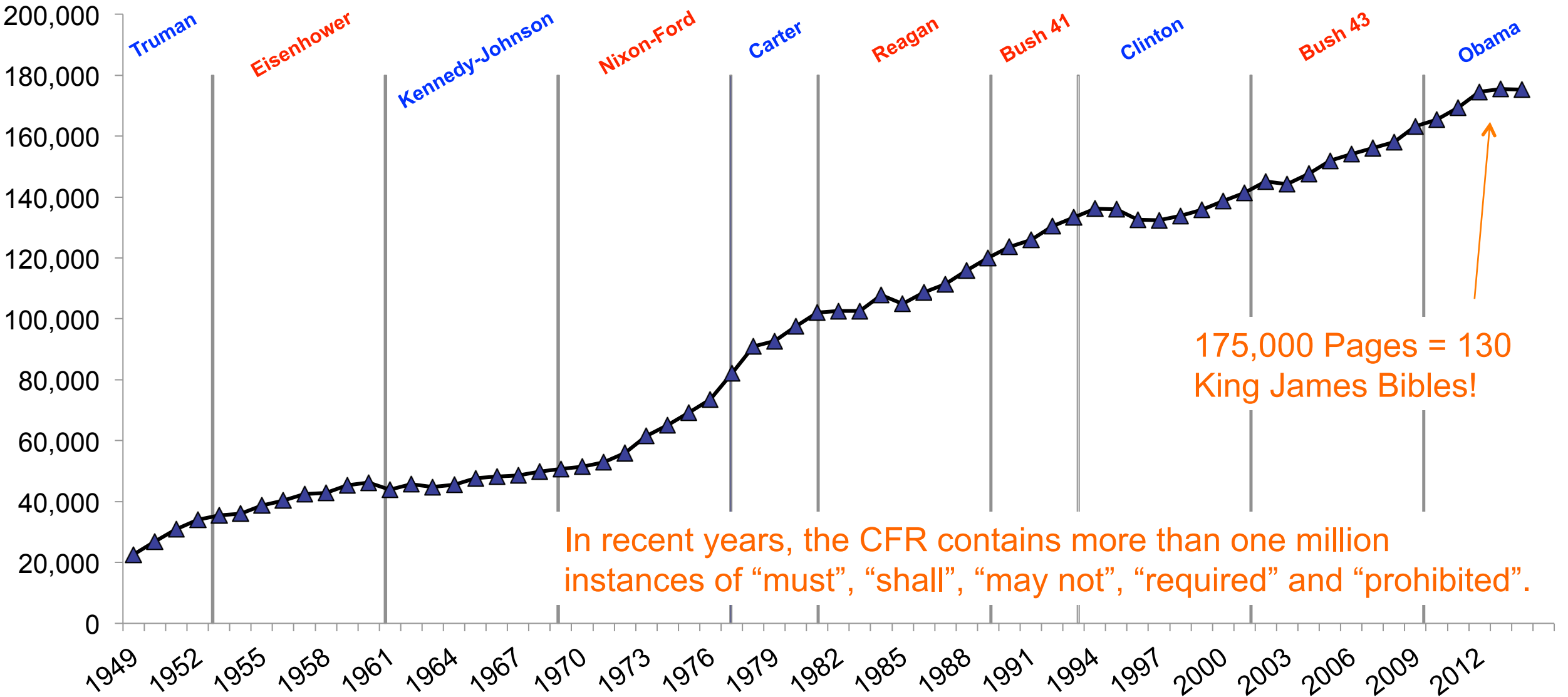
1. Beneficial and benign aspects of reduced fluidity:

- A. Less job reallocation means fewer layoffs and smaller unemployment inflows. This effect is large – see Davis et al. (AEJ Macro, 2010).
- B. Reduced fluidity is partly a by-product of developments that raised productivity and improved welfare: The shift away from small, independent stores to big box retailers (e.g., Wal-Mart) raised productivity, lowered prices, and increased product selection, while bringing lower reallocation.

2. Reasons for concern:

- A. Reallocation plays a key role in prominent theories of innovation and growth.
- B. Factor reallocation flows are an important source of medium-term productivity growth according to many empirical studies.
- C. Fluidity facilitates job mobility, wage growth and career advancement.
- D. Fluidity promotes high employment, especially among young and less educated – see Davis and Haltiwanger (2014)
- E. Increasing prevalence of policies that directly curtail dynamism and fluidity: Erosion of employment-at-will, occupational licensing, laws that create protected worker classes
- F. General increase in regularity complexity raises the fixed costs of compliance, which likely fall more heavily on younger and smaller businesses.

Figure 1: *Code of Federal Regulations* Page Count, 1949-2014



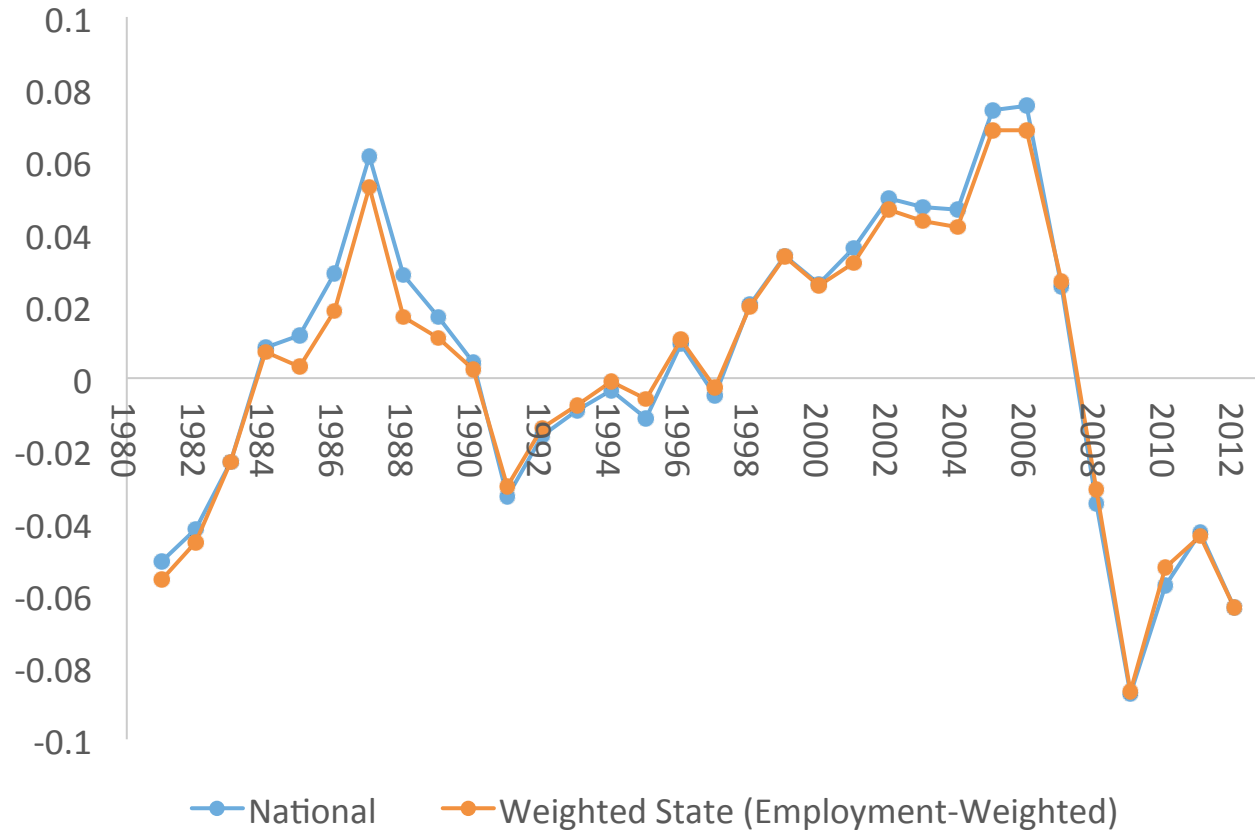
In recent years, the CFR contains more than one million instances of “must”, “shall”, “may not”, “required” and “prohibited”.

175,000 Pages = 130 King James Bibles!

Source: Figure 14 in Crews (2015) for data from 2001 to 2014, spliced to data for earlier years from Dawson and Seater (2013), who consider a somewhat narrower set of regulation “titles”. Reproduced from Davis (2015).

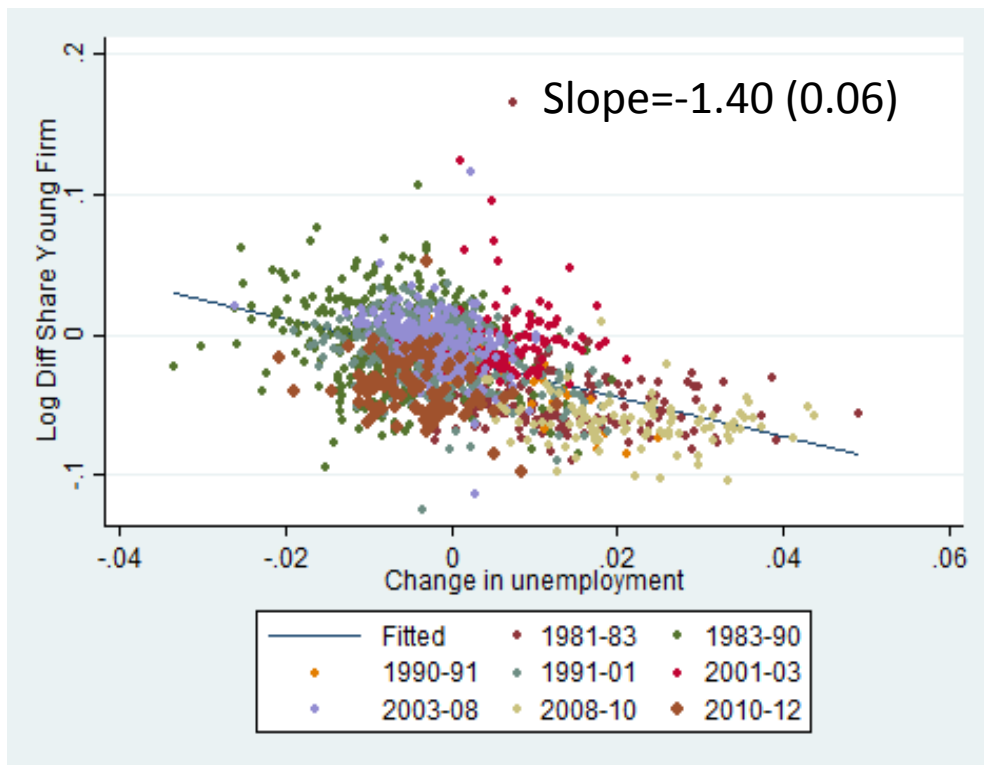
Growth in Real Housing Prices (National and Employment-Weighted State)

Growth in Real Housing Prices (1981-2012)

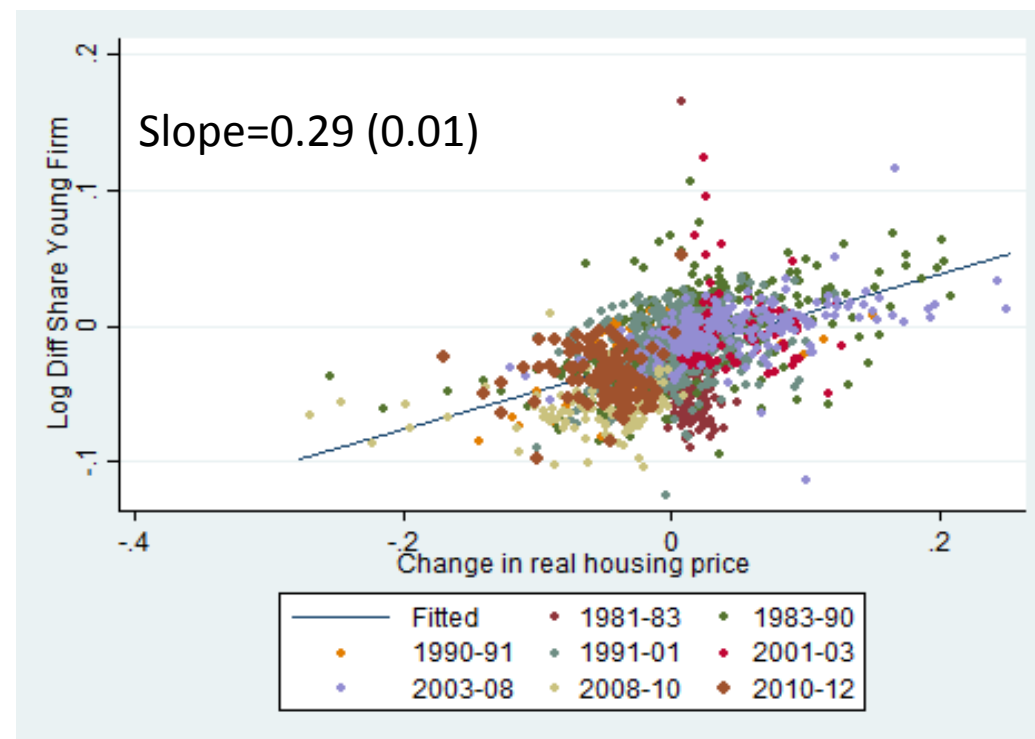


Our counterfactual exercises use Employment-weighted predictions of State-level outcomes from the contribution Of housing prices. This figure shows the Employment-weighted state-level growth rate In housing prices is virtually identical to the National growth of real housing prices.

Log Difference in Share of Young Firms, Unemployment Rates and Housing Prices in State-by-Year Data from 1981 to 2012

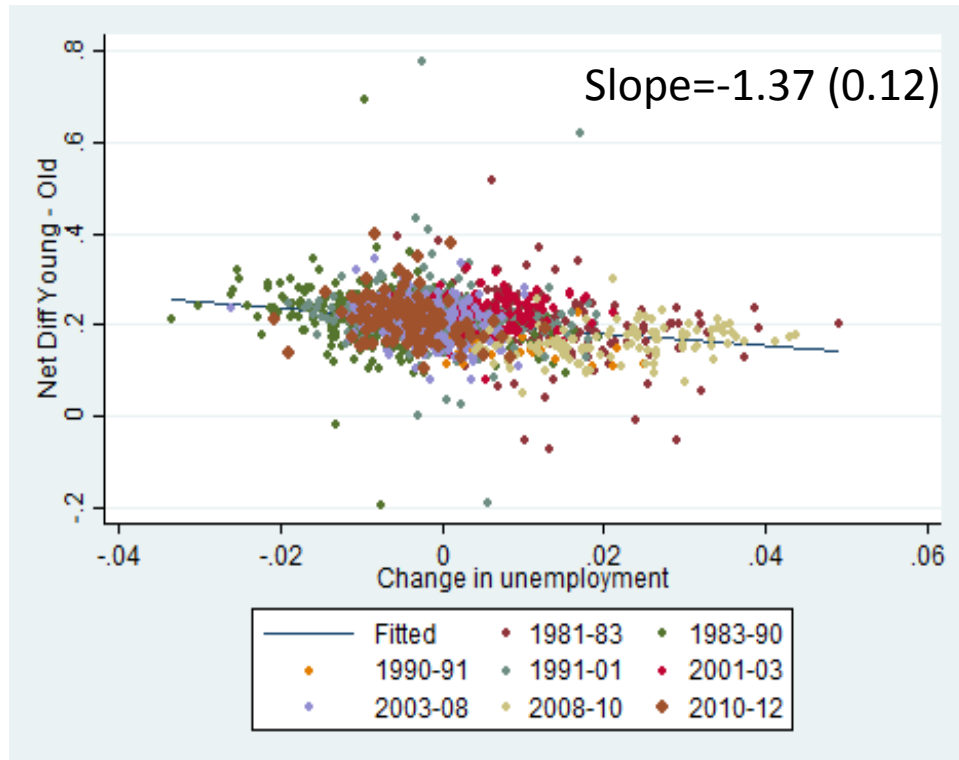


Share of young firms increases when local housing prices increase (as measured by local housing prices).



Share of young firms declines when local economic conditions deteriorate (as measured by local unemployment rate).

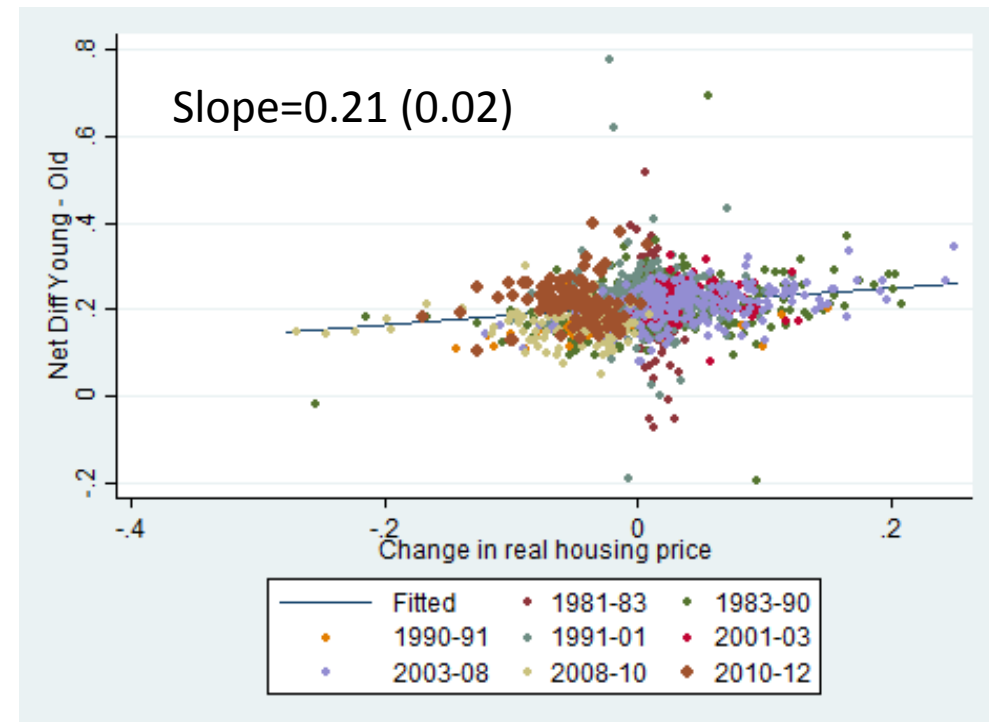
Net Growth Rate Differential Young minus Old Firms, Unemployment Rates and Housing Prices in State-by-Year Data from 1981 to 2012



Simple Bivariate Relationships

Net Growth Rate Differential declines when local economic conditions deteriorate (as measured by local unemployment rate).

Net Growth Rate Differential increases when local housing prices increase (as measured by local growth in housing prices).



Panel Regressions using the BDS at the state, year level for 1981-2012.

Log Difference in Young Firm Share

	(1)	(2)
	Growth rate of the share for young firms	Growth rate of the share for young firms
Change in unemployment	-1.014 ^{***}	-0.854 ^{***}
	(0.068)	(0.114)
Growth in real housing price	0.233 ^{***}	0.147 ^{***}
	(0.020)	(0.019)
State Effects	Yes	Yes
Year Effects	No	Yes
Adjusted R^2	0.429	0.642
Observations	1632	1632

Standard errors in parentheses. Clustered at the state level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Panel Regressions using the BDS at the state, year level for 1981-2012.

Young and Old Net Growth

	(1)	(2)	(3)	(4)
	DHS net growth rate young	DHS net growth rate young	DHS net growth rate old	DHS net growth rate old
Change in unemployment	-2.609*** (0.160)	-2.472*** (0.276)	-1.463*** (0.054)	-1.357*** (0.109)
Growth in real housing price	0.213*** (0.028)	0.189*** (0.026)	0.074*** (0.009)	0.099*** (0.010)
State Effects	Yes	Yes	Yes	Yes
Year Effects	No	Yes	No	Yes
Adjusted R^2	0.261	0.421	0.449	0.587
Observations	1632	1632	1632	1632

Standard errors in parentheses. Clustered at State Level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

We estimate the net growth rates by firm age separately for young and old since this facilitates computing our Counterfactual results. Net differential from Cyclical and Housing Prices Is the same whether estimating Separate regressions or Using Net Differential as LHS variable.

Difference in Young-Old Net Growth

	(1)	(2)
	DHS net growth rate differential young - old	DHS net growth rate differential young - old
Change in unemployment	-1.146 ^{***}	-1.115 ^{***}
	(0.129)	(0.208)
Growth in real housing price	0.139 ^{***}	0.090 ^{***}
	(0.027)	(0.025)
State Effects	Yes	Yes
Year Effects	No	Yes
Adjusted R^2	0.074	0.245
Observations	1632	1632

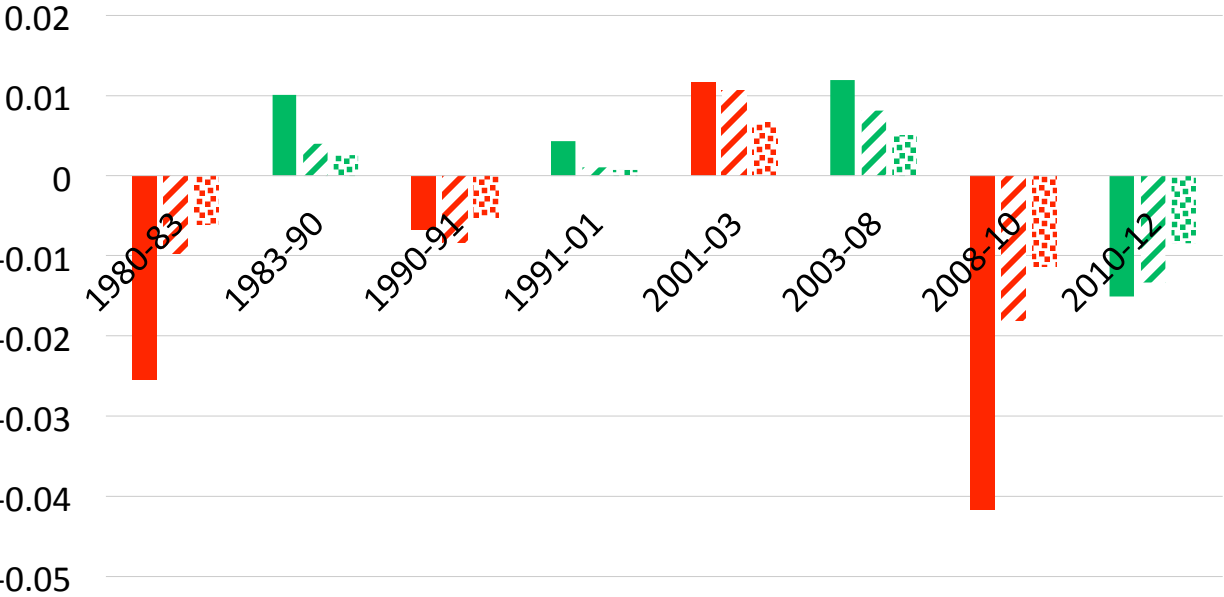
Estimated coefficients using Differential Net Growth are identical to those implied by prior slide and all statistically significant.

Standard errors in parentheses Clustered at State Level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

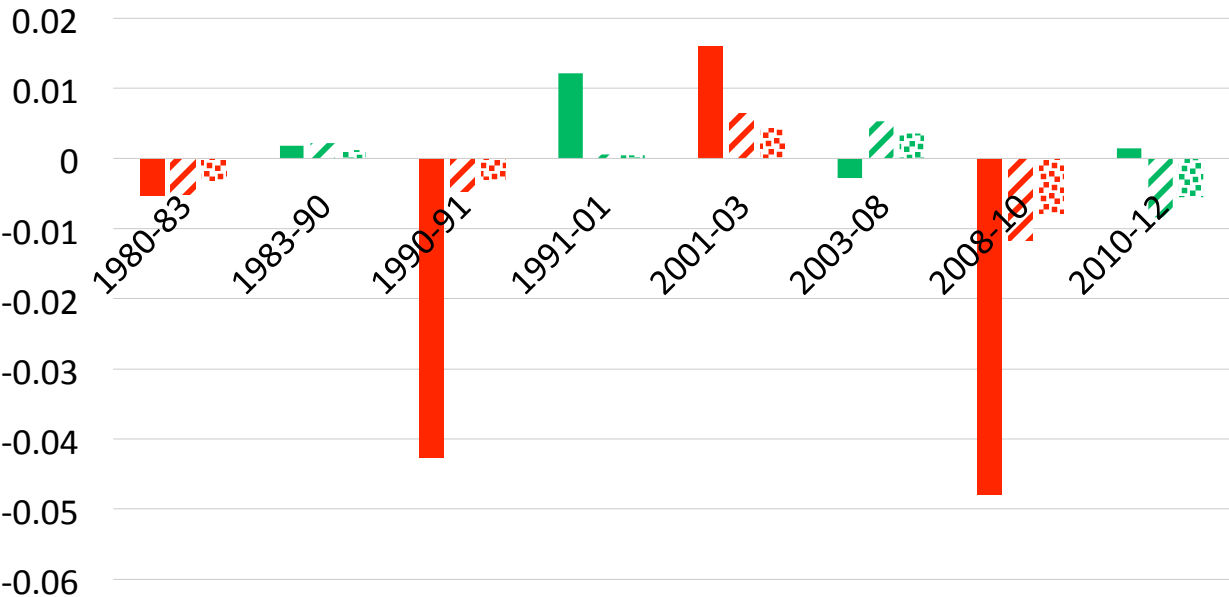
Contribution of Housing Price Variation to First Differences of Log Young Firm Share and Net Differentials Between Young and Old

Log Differences in Share of Young Firms (Peak to Trough, Trough to Peak)

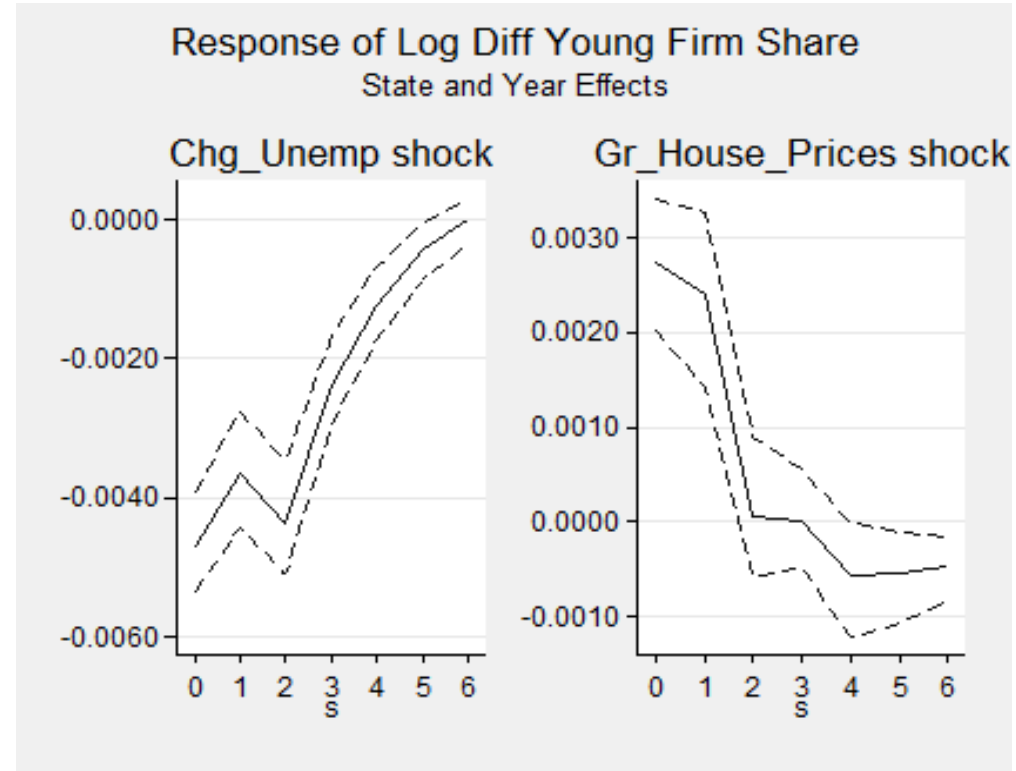
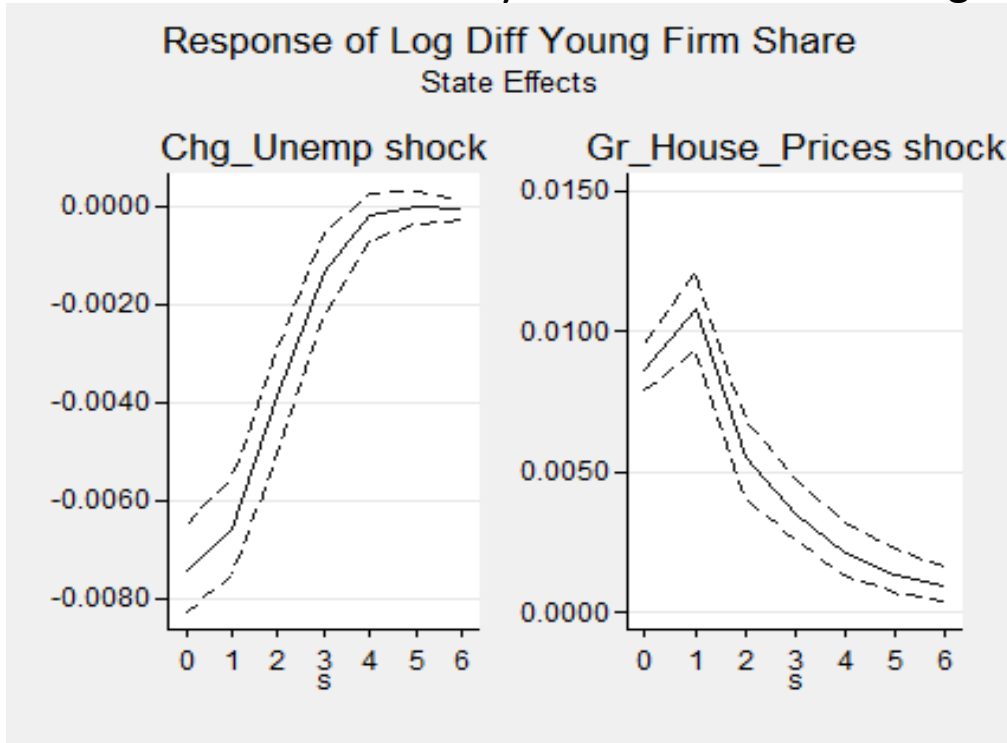


Solid Bar is Actual, Striped Bar is Counterfactual (State effects), Dotted Bar is Counterfactual (State and Year Effects). In both counterfactuals, actual housing price is used. Difference reflects coefficient estimates from alternative models. Annualized deviations from overall means depicted.

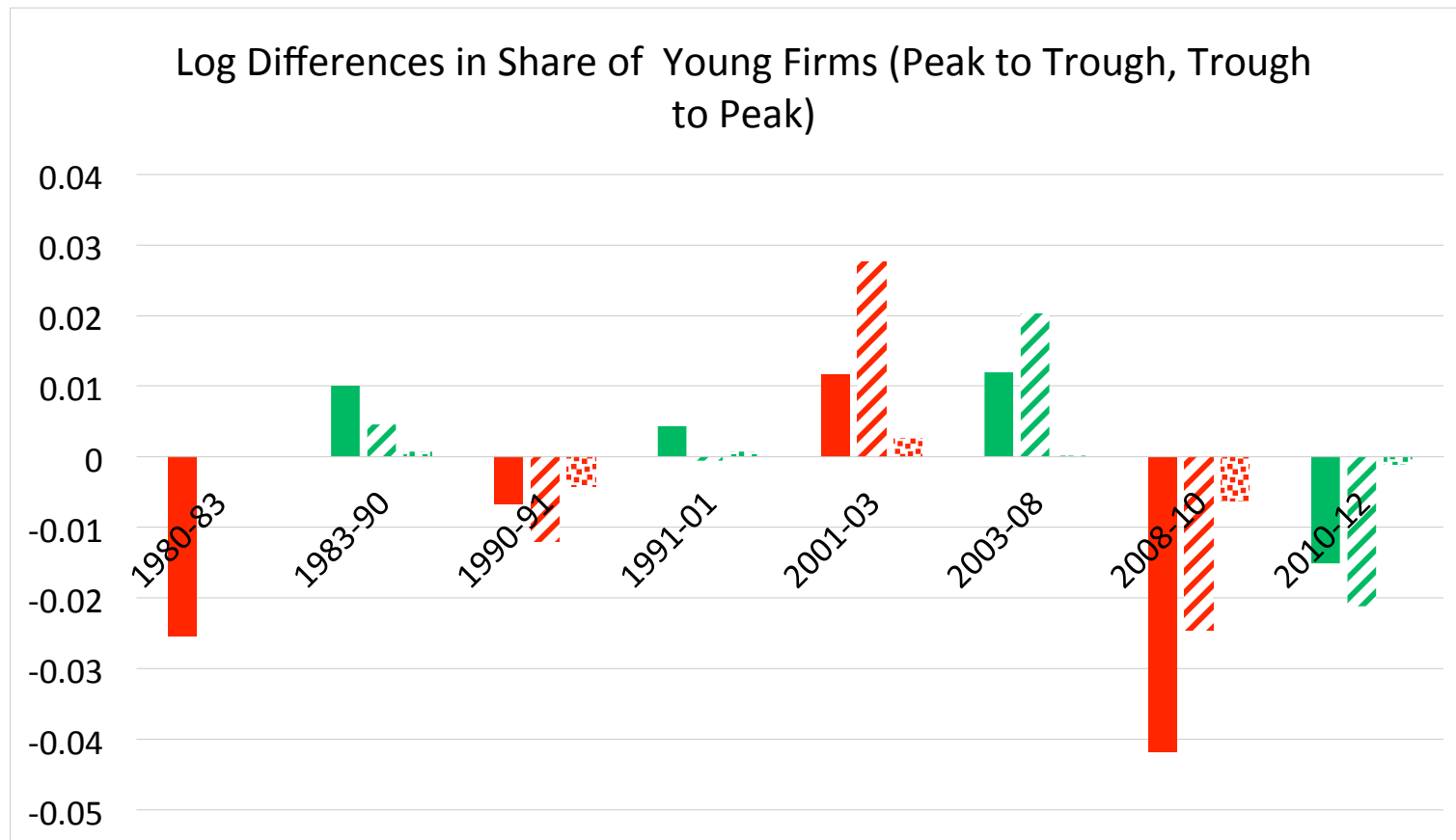
Net Growth Rate Differential of Young minus Old Firms (Peak to Trough, Trough to Peak)



Panel VAR Analysis on Alternative Margins (Log First Difference of Young Firm Share)



Counterfactuals from Panel VAR Analysis



Solid Bar is Actual, Striped Bar is Counterfactual (State effects), Dotted Bar is Counterfactual (State and Year Effects). In both counterfactuals, housing price shocks from model with state effects used. Difference reflects using impulse response functions from alternative models.

Note that panel VAR does not yield counterfactuals for 1980-83.

Panel VAR with Net Growth Rates of Young and Old Firms (4 variable Panel VAR)

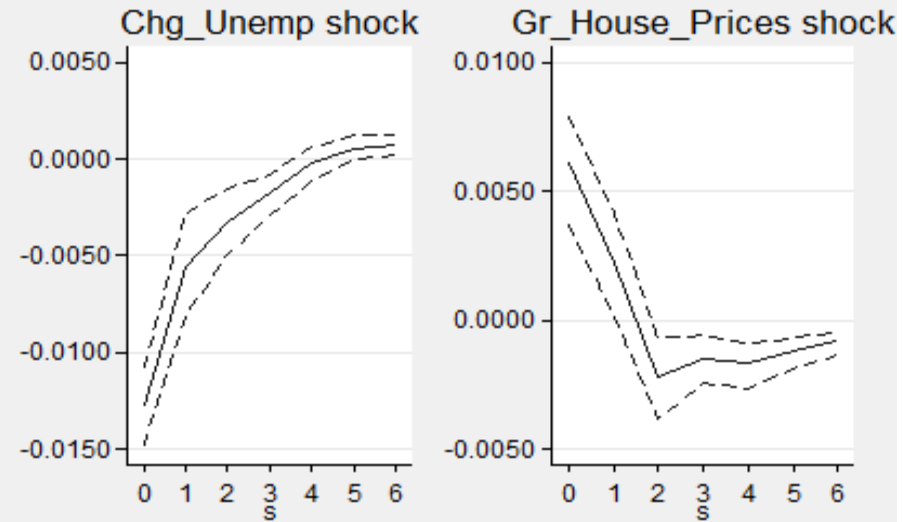
Response of Net Growth Young Firms

State Effects



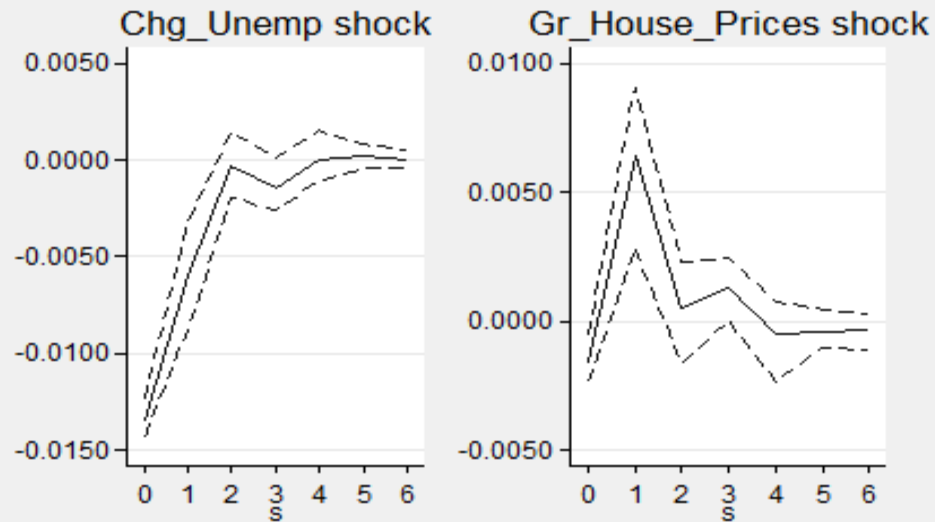
Response of Net Growth Young Firms

State and Year Effects



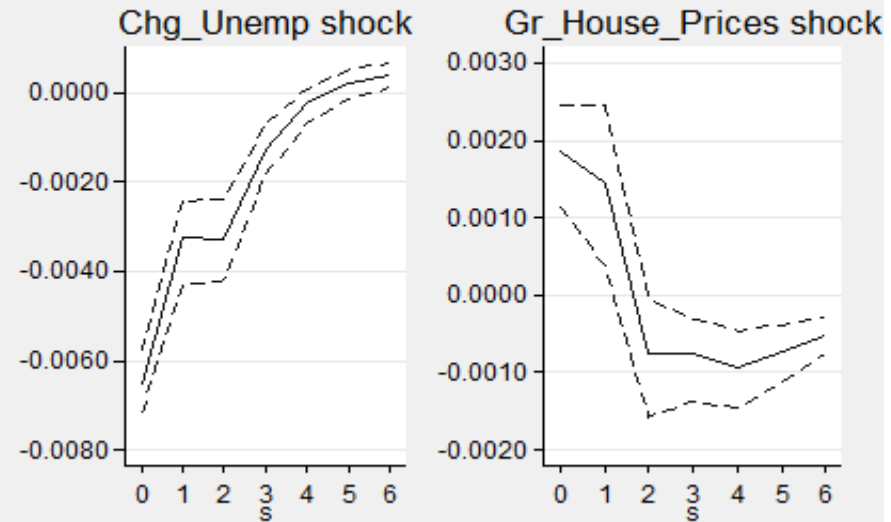
Response of Net Growth Old Firms

State Effects

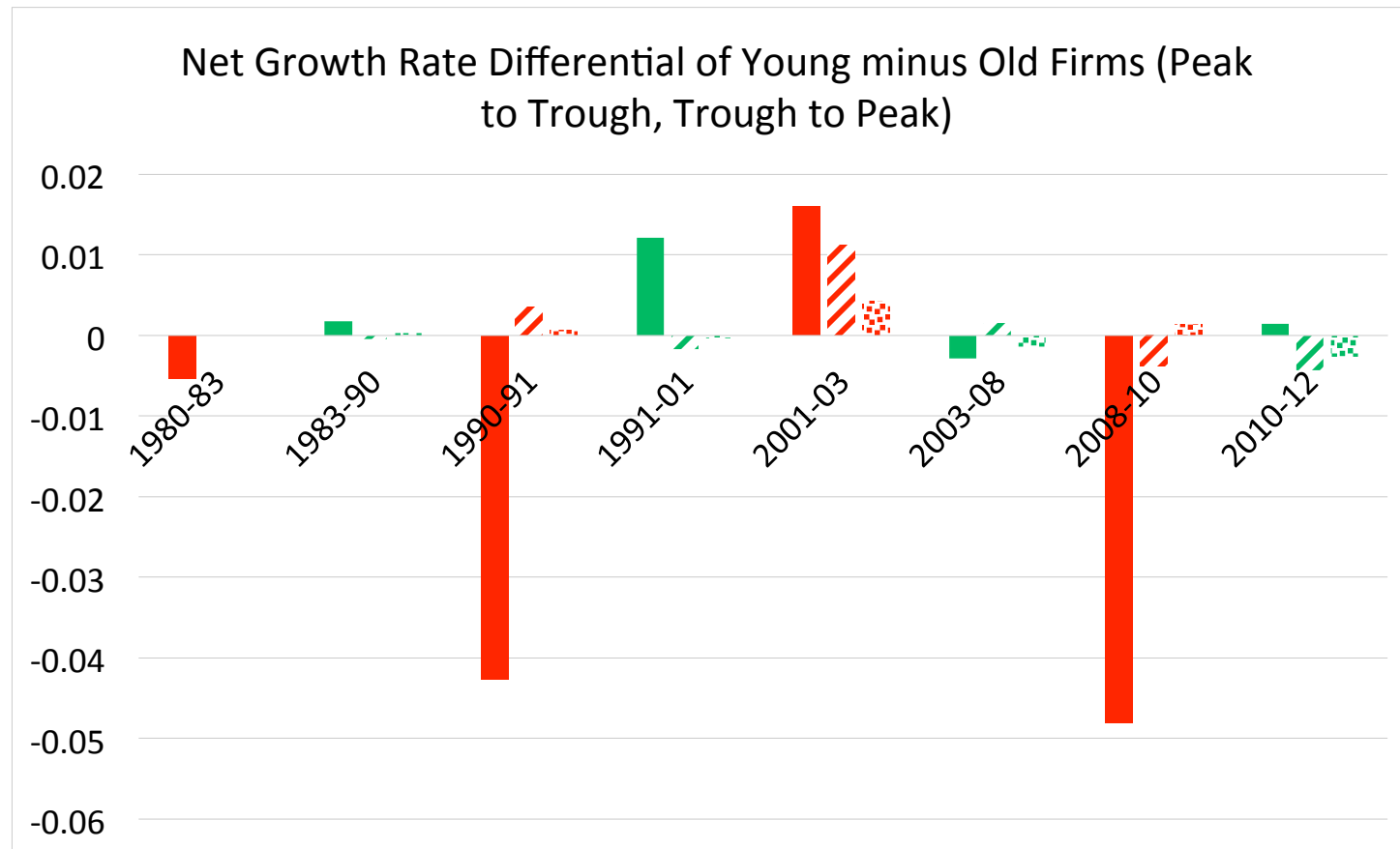


Response of Net Growth Old Firms

State and Year Effects



Counterfactuals from Panel VAR Analysis



Solid Bar is Actual, Striped Bar is Counterfactual (State effects), Dotted Bar is Counterfactual (State and Year Effects). In both counterfactuals, housing price shocks from model with state effects used. Difference reflects using impulse response functions from alternative models.

Note that panel VAR does not yield counterfactuals for 1980-83.

Robustness Checks

- Allowing for asymmetric responses to changes in unemployment and growth in housing prices.
- Allowing for lag effects in panel regressions – does this bring us closer to VAR results?

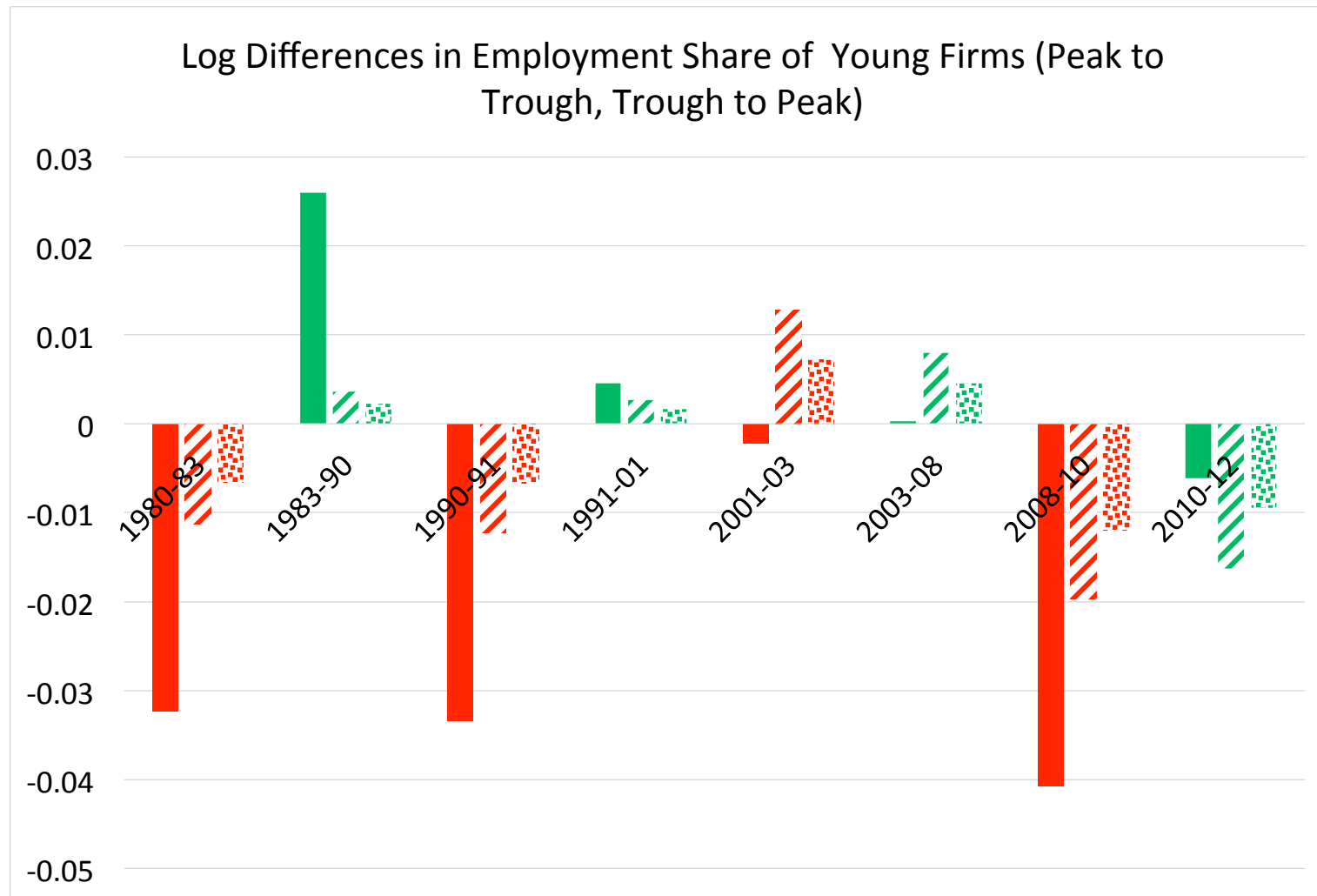
Log Difference in Young Employment Share

	(1)	(2)
	Growth rate of the employment share for young firms	Growth rate of the employment share for young firms
Change in unemployment	-2.149***	-1.193**
	(0.377)	(0.453)
Indicator for Change in unemployment > 0	-0.015***	-0.004
	(0.004)	0.004
(Change in unemployment) * (Ind Chg UR > 0)	1.822***	0.627
	(0.423)	(0.597)
Change in real housing price	0.176**	0.131*
	(0.078)	(0.077)
Indicator Change in real housing price > 0	0.014***	0.006*
	(0.004)	(0.003)
(Growth in real housing price) * (Ind HP > 0)	-0.055	-0.058
	(0.120)	(0.118)
State Effects	Yes	Yes
Year Effects	No	Yes
Adjusted R ²	0.148	0.305
Observations	1632	1632

Standard errors in parentheses. Clustered at State Level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Counterfactuals Allowing for Asymmetric Responses



Solid Bar is Actual, Striped Bar is Counterfactual (State effects), Dotted Bar is Counterfactual (State and Year Effects). In both counterfactuals, actual housing price is used. Difference reflects coefficient estimates from alternative models. Annualized deviations from overall means depicted.

Log Difference in Young Employment Share

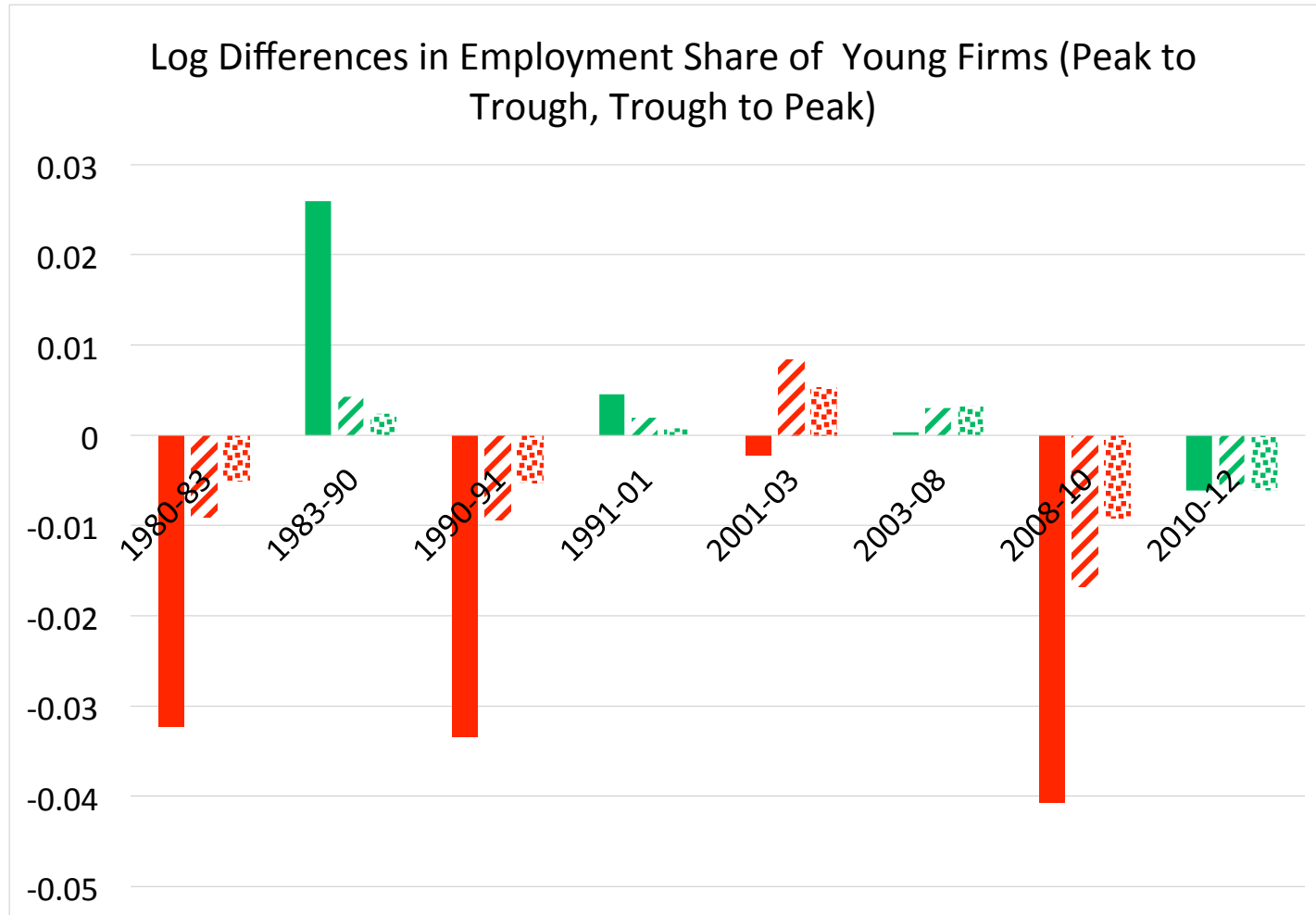
	(1) Growth rate of the employment share for young firms	(2) Growth rate of the employment share for young firms
Change in unemployment	-1.132*** (0.163)	-0.778*** (0.270)
Change in real housing price	0.236*** (0.026)	0.143*** (0.034)
Change in unemployment (1-yr lag)	-0.877*** (0.131)	-0.153 (0.191)
Growth in real housing price (1-yr lag)	0.001 (0.030)	-0.024 (0.031)
Change in unemployment (2-yr lag)	0.262 (0.168)	0.045 (0.199)
Growth in real housing price (2-yr lag)	-0.099** (0.040)	-0.008 (0.029)
State Effects	Yes	Yes
Year Effects	No	Yes
Adjusted R^2	0.145	0.302
Observations	1632	1632

Standard errors in parentheses. Clustered at the State Level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Unlike Panel VAR we don't lose 1981 and 1982 since lagged Change in unemployment rate and Growth rate in housing prices available Pre 1981.

Counterfactuals from Panel Regressions Permitting Lags



Solid Bar is Actual, Striped Bar is Counterfactual (State effects), Dotted Bar is Counterfactual (State and Year Effects). In both counterfactuals, actual housing price is used. Difference reflects coefficient estimates from alternative models. Annualized deviations from overall means depicted.

Log Difference in Young Employment Share

	(1)	(2)
	Growth rate of the employment share for young firms	Growth rate of the employment share for young firms
Change in unemployment	-1.001*** (0.167)	-1.013*** (0.175)
Change in real housing price	0.093*** (0.029)	0.094*** (0.034)
Change in small business loans supply (bhc,ln)	0.034*** (0.007)	0.034*** (0.008)
State Effects	No	Yes
Adjusted R^2	0.138	0.093
Observations	765	765

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

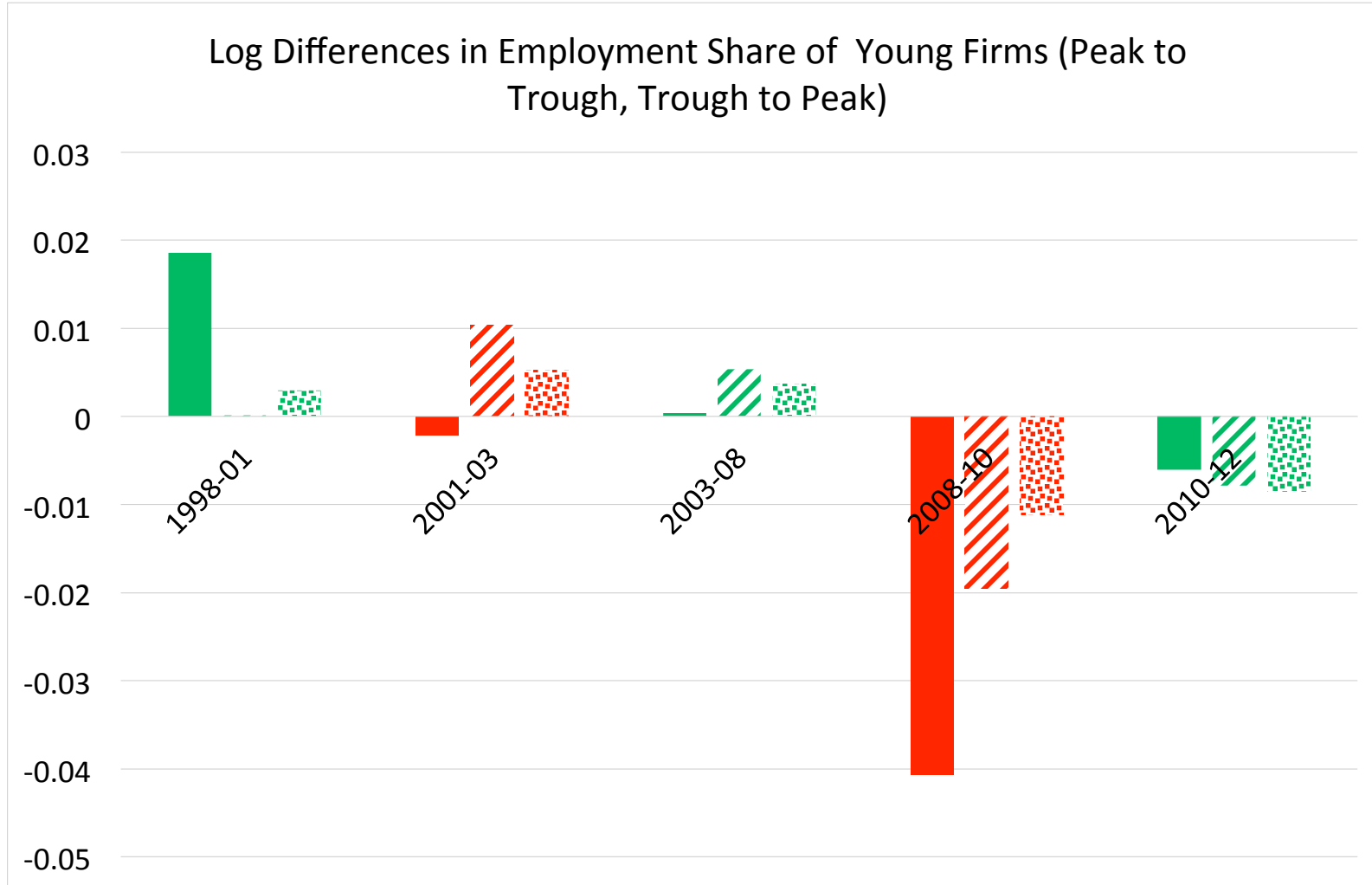
Alternative Loan Supply: Growth in Real Loans < \$1million

Same BDS state-year and house price data as before, but the sample now runs from 1998 to 2012 to conform to the availability of the bank lending data.

Negative shocks to small business bank loan supply reduce the young firm employment share. The elasticity of young firm employment shares with respect to the bank loan supply shock is -0.08 and is highly statistically significant.

This is our first-pass effort to estimate the effects of local bank loan supply shocks. There is room to improve our measure of local loan supply shocks, and we need to introduce controls for the national cycle. We will also explore whether loan supply effects differ before, during and after the GFC.

Contribution of Housing Price Changes and Small Business Bank Loan Supply Shocks to Log Differences in Young Firm Employment Share by Cycle Episode



These results suggest that negative bank loan supply shocks materially reduced young firm activity shares in 2008-2010, adding 0.8 percentage points per year to the drop during this period.

The results also suggest that positive bank loan supply shocks contributed somewhat to the relatively favorable performance of young firms in 2001-03. Otherwise, loan supply shocks had trivial effects on young firm activity, according to these preliminary results.

Sold Bar is Actual, Striped Bar is Counterfactual (Housing Prices + Loan Supply), Dotted Bar is Counterfactual (Housing Prices Only). In both counterfactuals, state effects only used in a model with state-level change in unemployment as a control. Difference reflects coefficient estimates from alternative models. Annualized deviations from overall means depicted. The mean decline is -0.022 log points per ⁵⁷