



How Firms Respond to Business Cycles: The Role of the Firm Age and Firm Size

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by

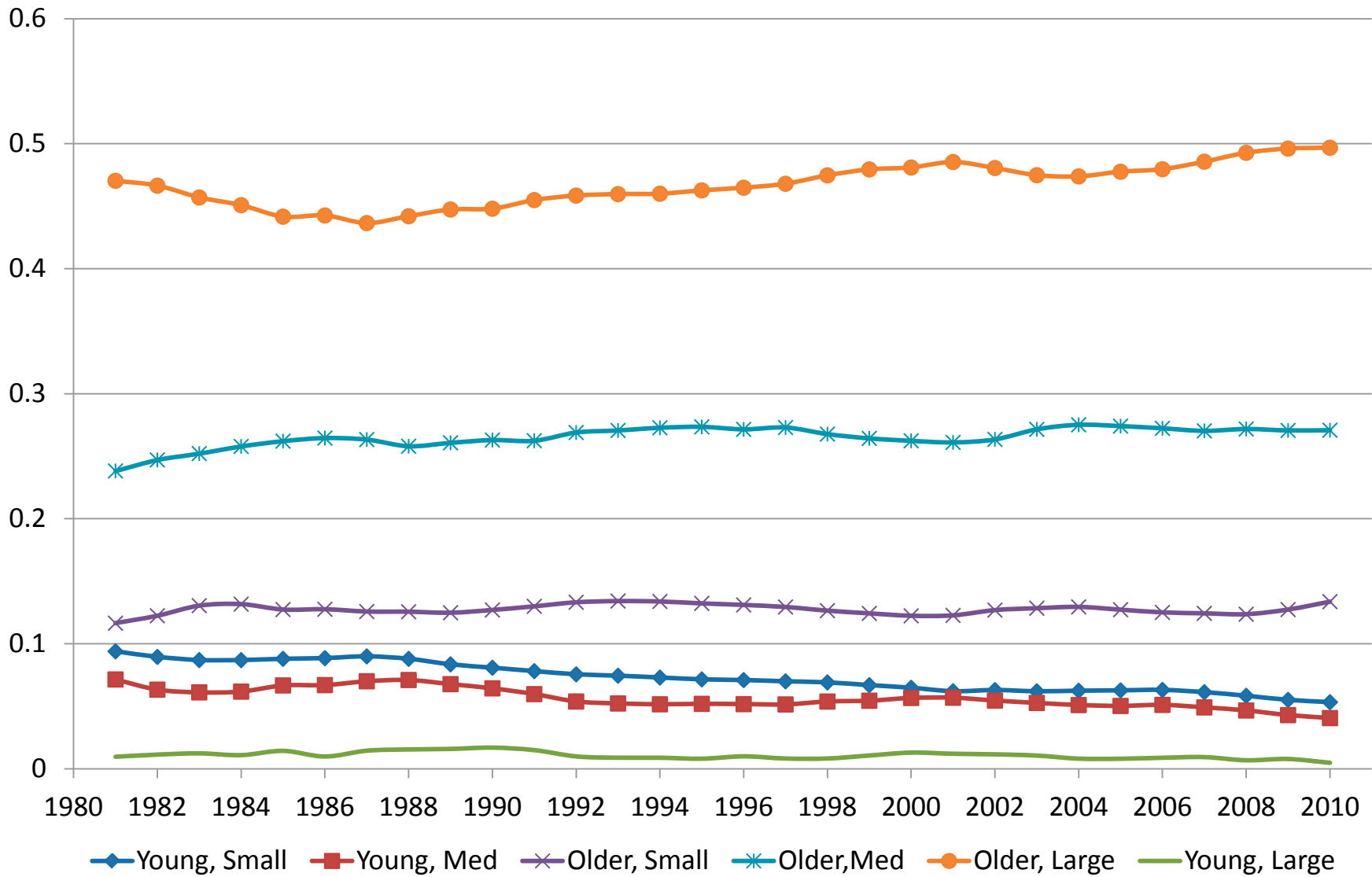
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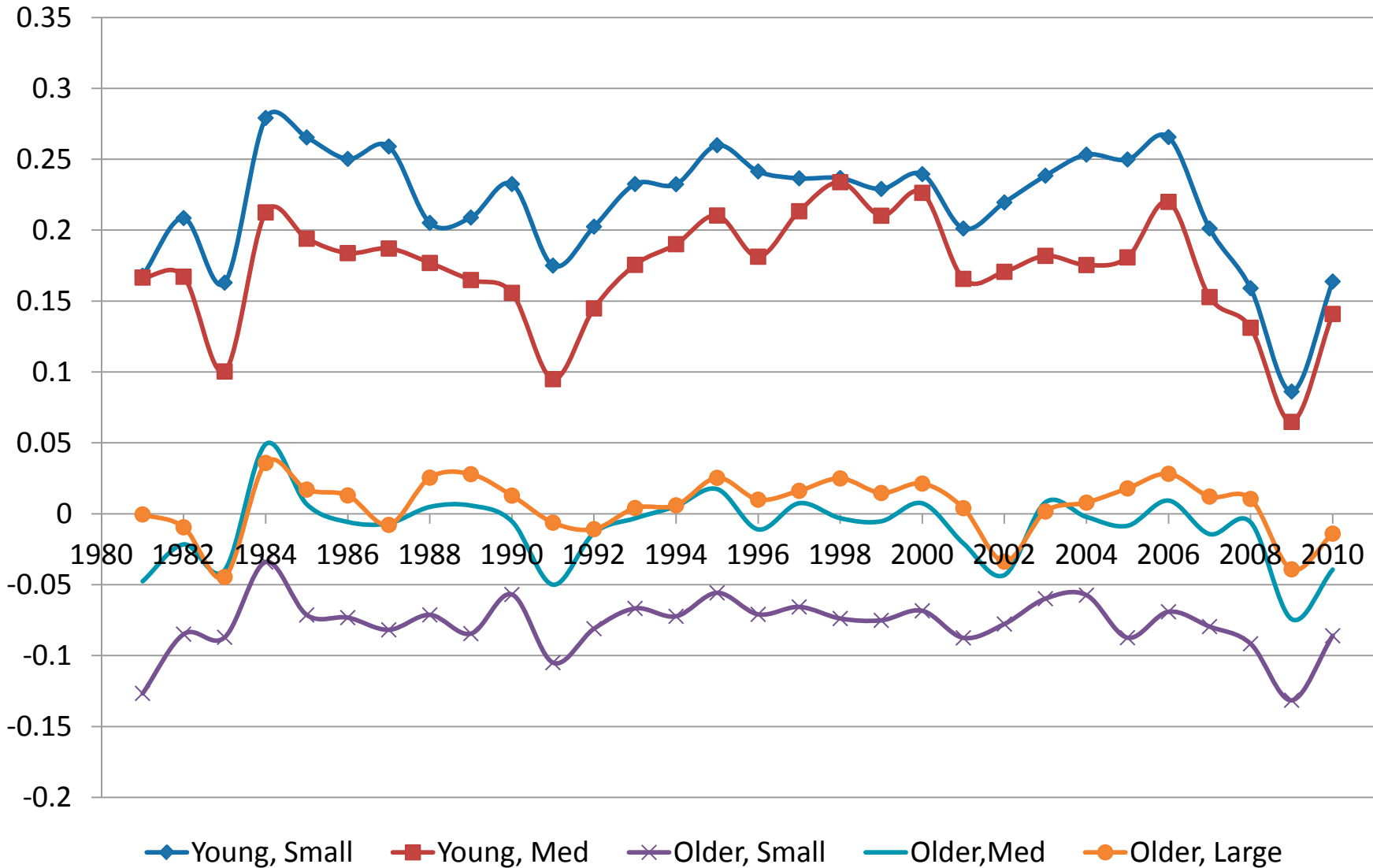
Overview

- Main Theme: Important to Distinguish Between Firm Age and Firm Size for Cyclical Dynamics
 - Most of focus in literature has been on firm size.
 - Debate about sensitivity to different types of shocks
 - Firm age and firm size related but not the same
 - Young firms are small but many mature, small firms.
 - They have very different dynamics.
- Young firms (which are small and medium size) hit especially hard in Great Recession.
 - Why?
 - Our answer: Collapse of Housing Prices an Important Contributor
 - Young firms hit especially hard in states with especially large declines in housing prices.
 - Estimate a panel VAR at state*year level to isolate local housing price effects from local cyclical shocks.
 - Consistent with home equity/financing channel for young businesses but other mechanisms may be at work as well.

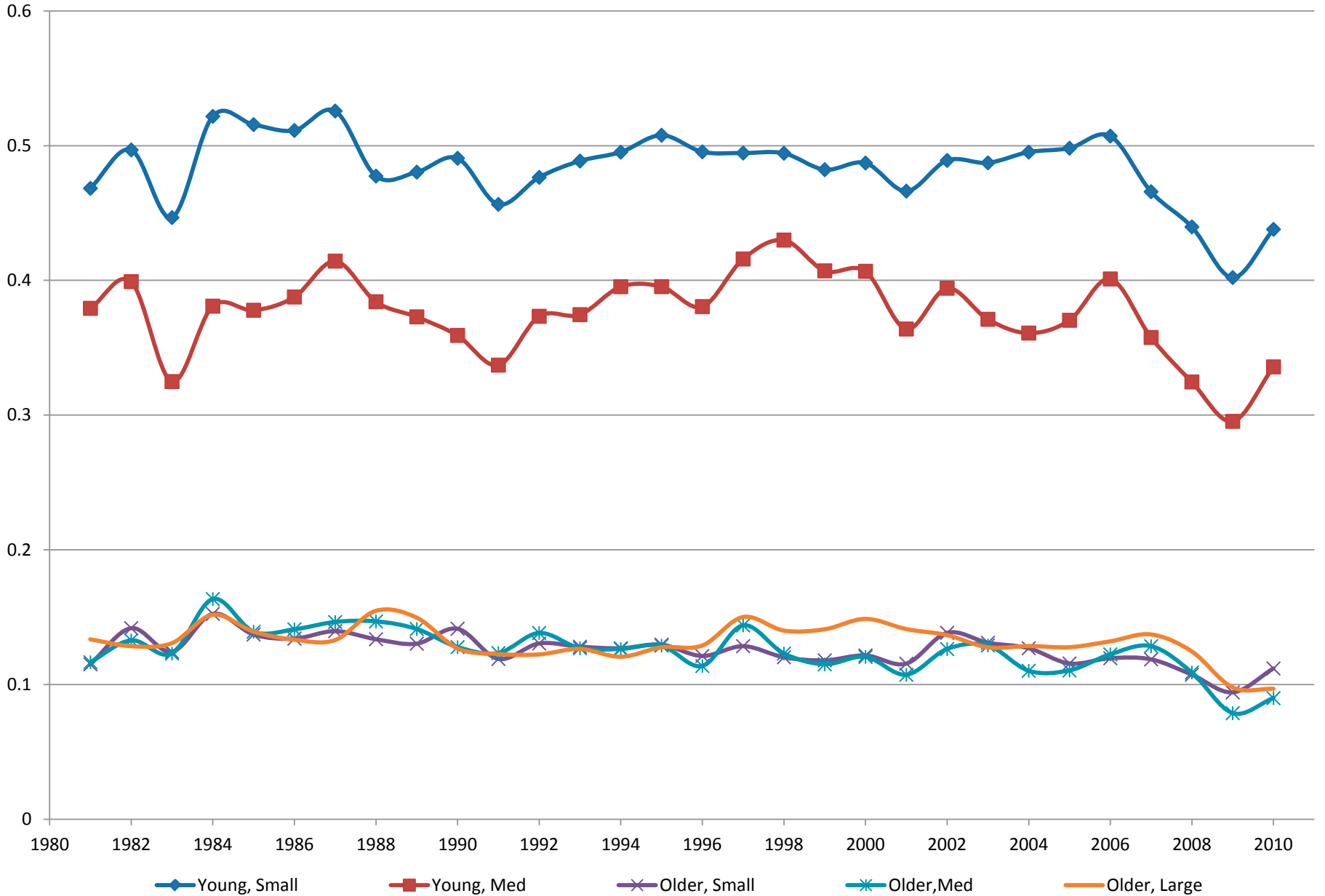
Share of Employment by Firm Age and Firm Size



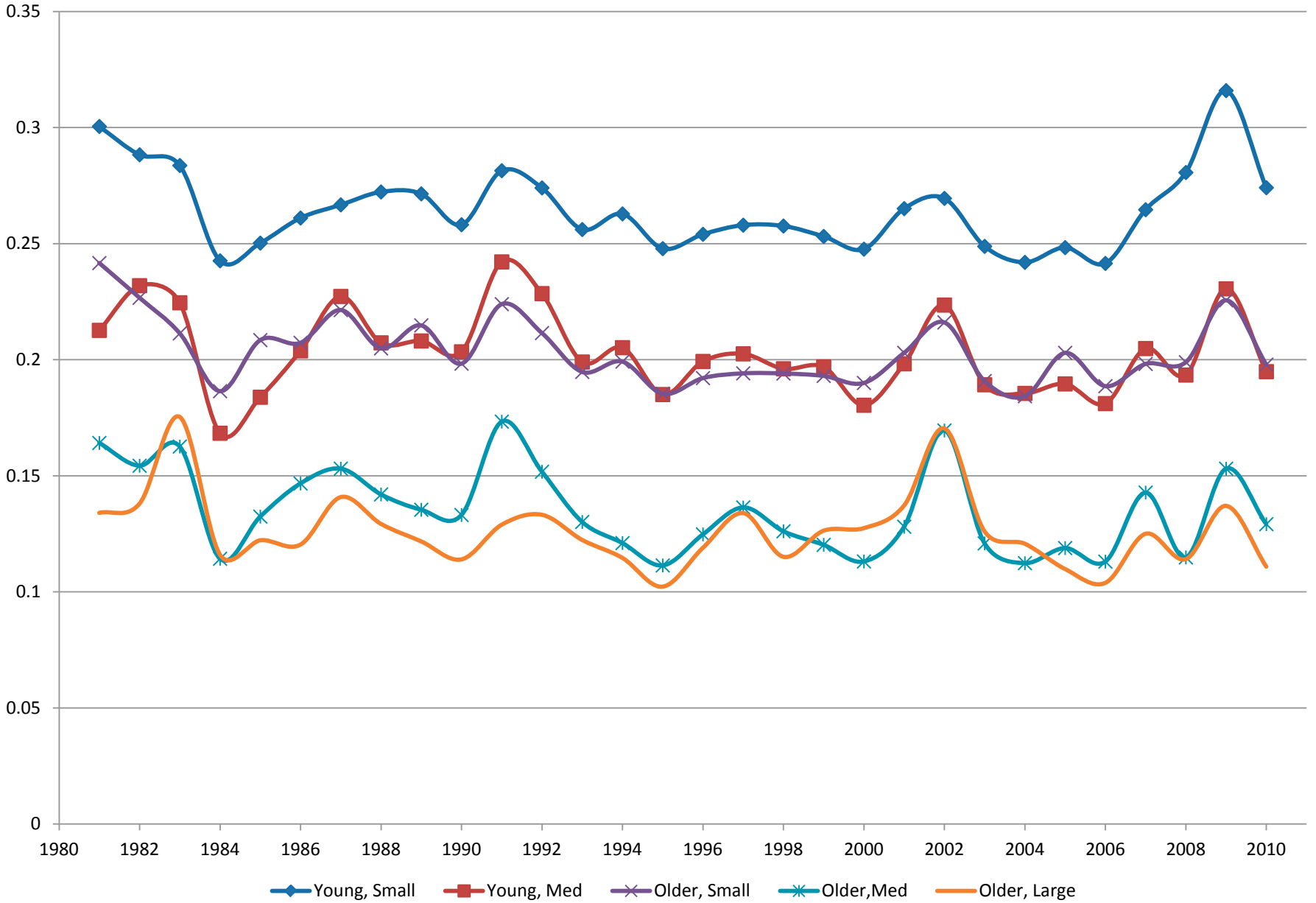
Net Growth Rates by Firm Age and Firm Size



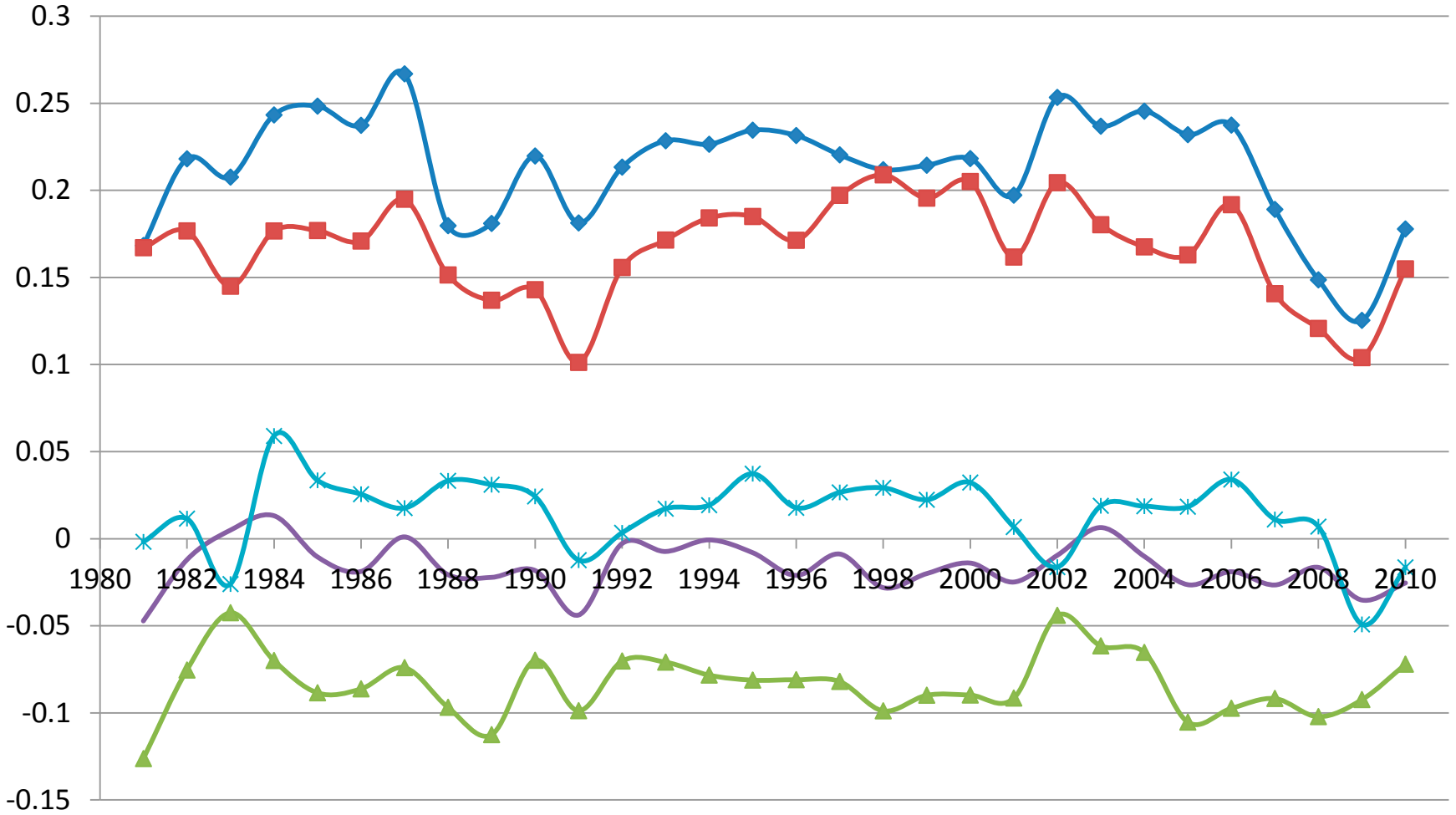
Job Creation Rates by Firm Age and Firm Size



Job Destruction Rates by Firm Age and Firm Size



Differences in Net Growth Rates



- ◆ Young, Small-Large, Older
 ■ Young, Med-Large, Older
 ▲ Older, Small-Older, Large
- Older, Med - Older, Large
 ✱ Economy_Net

Table 2 Correlations Between Cyclical Indicators and Net Differential Employment Growth Rates

	Change in Unemp Rate		Net Emp. Growth Rate		Real GDP Growth		HP Filtered Unemp Rate	
	1981-2010	1981-2006	1981-2010	1981-2006	1981-2010	1981-2006	1981-2010	1981-2006
	Young/Small-Older/Large	-0.452	-0.292	0.551	0.279	0.527	0.305	0.239
	(0.012)	(0.148)	(0.002)	(0.168)	(0.003)	(0.130)	(0.203)	(0.292)
Young/Medium-Older/Large	-0.342	-0.263	0.507	0.329	0.475	0.344	0.125	-0.057
	(0.064)	(0.194)	(0.004)	(0.101)	(0.008)	(0.085)	(0.512)	(0.782)
Older/Small-Older/Large	0.283	0.342	0.146	-0.258	-0.171	-0.242	0.608	0.620
	(0.130)	(0.087)	(0.441)	(0.204)	(0.367)	(0.233)	(0.000)	(0.001)
Older/Medium-Older/Large	-0.218	-0.075	0.403	0.267	0.313	0.162	0.391	0.551
	(0.247)	(0.715)	(0.027)	(0.188)	(0.092)	(0.429)	(0.033)	(0.004)
Note: P-values in parentheses.								

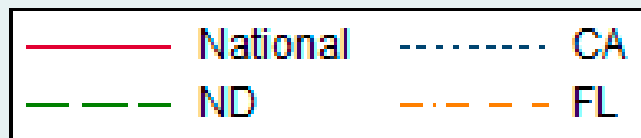
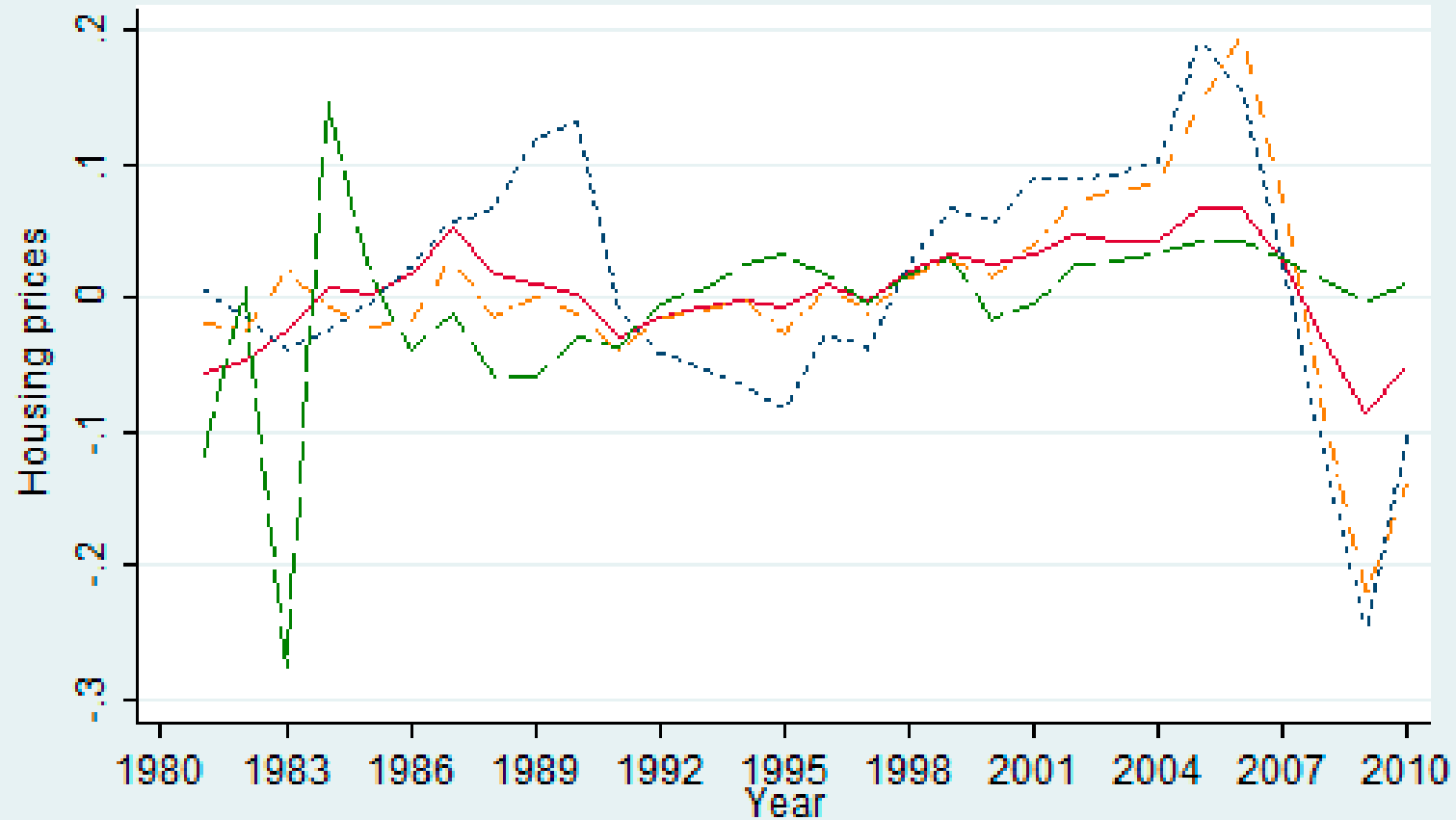
Only 30 observations from 1981-2010 and 26 observations from 1981-2006

Bivariate Regressions of Net Differentials on Cyclical Indicators at State-Year Level (Controlling for State and Year Fixed Effects)

	Young/Small- Large/Old	Young/Medium- Large/Old	Old/Small-Large/Old	Old/Medium- Large/Old
Chg in Unemp. Rt	-2.207***	-1.432***	-0.570***	-0.479***
	(0.212)	(0.248)	(0.142)	(0.140)
HP Filtered Unemp.	-2.406***	-0.914*	-0.885***	-0.456*
	(0.347)	(0.401)	(0.227)	(0.225)
Net Emp Gr. Rt	0.559***	0.224***	-0.241***	-0.209***
	(0.058)	(0.068)	(0.038)	(0.038)
Real GDP Gr. Rt.	0.338***	0.158***	0.029	0.036
	(0.040)	(0.047)	(0.027)	(0.026)
Real Pers. Inc. Gr Rt.	0.658***	0.391***	0.114*	0.068
	(0.066)	(0.078)	(0.044)	(0.044)

Note: 1530 observations

Growth in Real Housing Prices

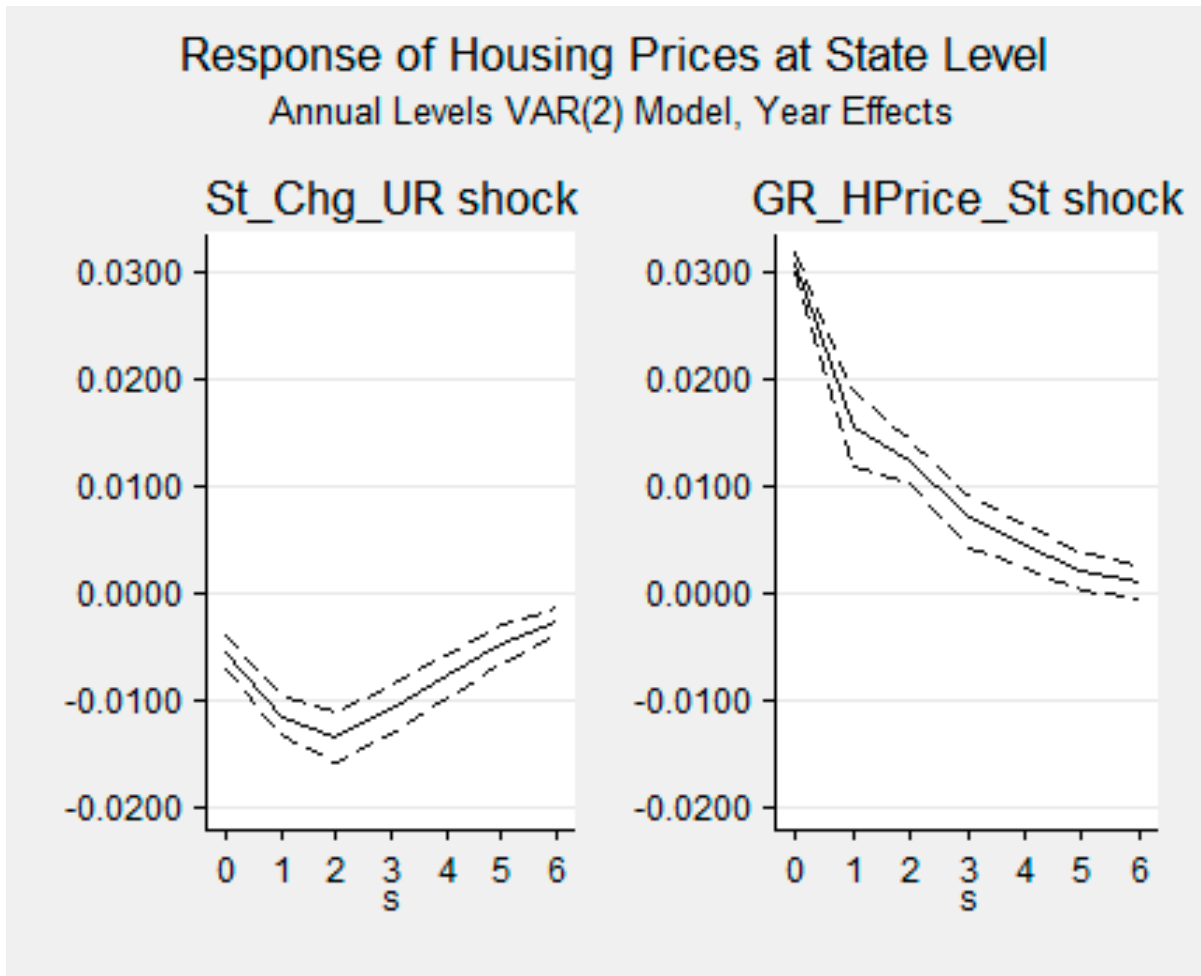


Panel VAR

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

- Y is a vector of covariates
- L is a lag operator of length L (in practice two years)
- $A(L)$ is a matrix of lagged coefficients
- $State$ and $Year$ represent state fixed and year fixed effects.
- ε 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
 - Net Growth Differential Young/Small-Older/Large
 - Net Growth Differential Young/Medium-Older/Large
 - Net Growth Differential Older/Small-Older/Large
 - Net Growth Differential Older/Medium-Older/Large
- Focus on the responses to the first two innovations:
 - First: state-specific cyclical shock;
 - Second: housing price shock orthogonal to first innovation (purged of endogenous response of housing prices).
 - Ordering of remaining variables is not relevant for impact of first two variables.

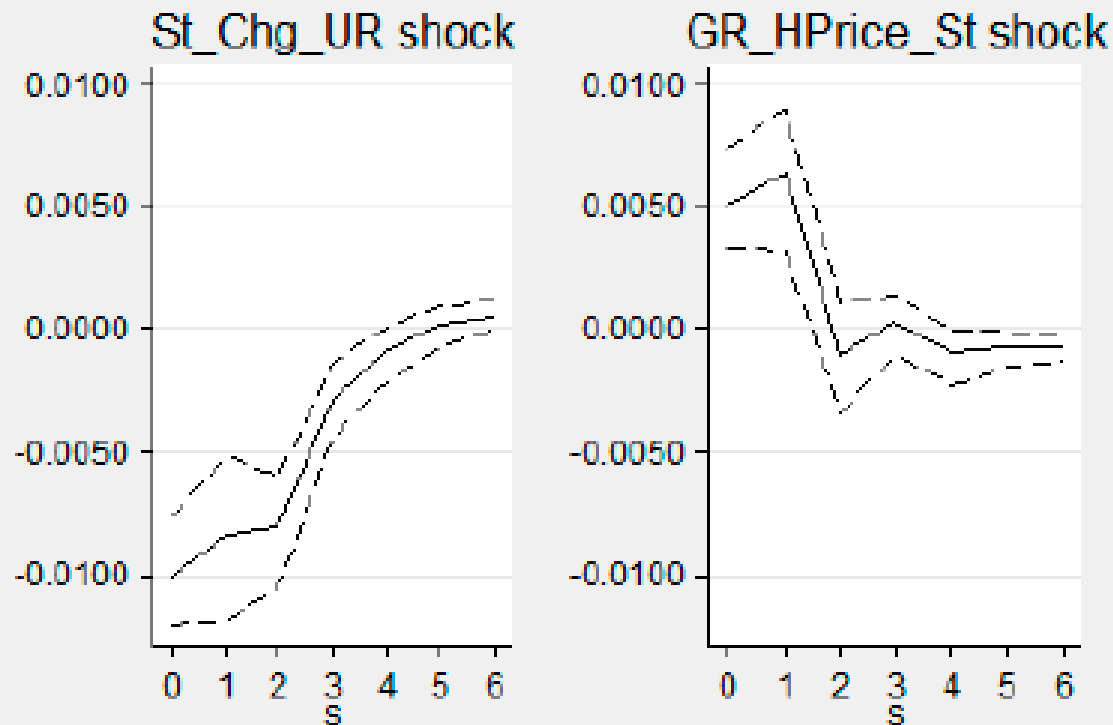
State-Specific Housing Price Dynamics



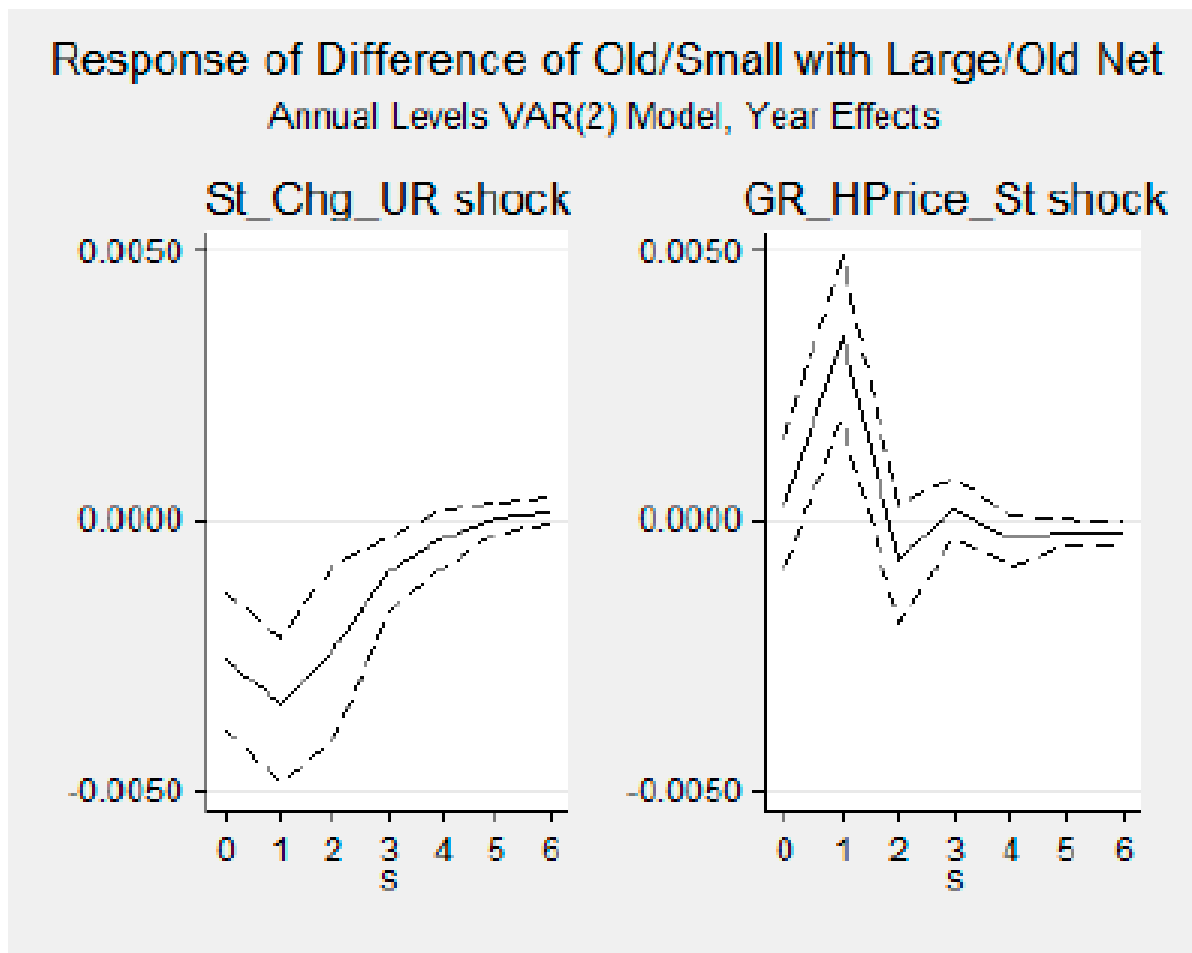
Impact on Net Growth Young/Small relative to Large/Old for State-Specific Shocks

Response of Difference of Young/Small with Large/Old Net

Annual Levels VAR(2) Model, Year Effects

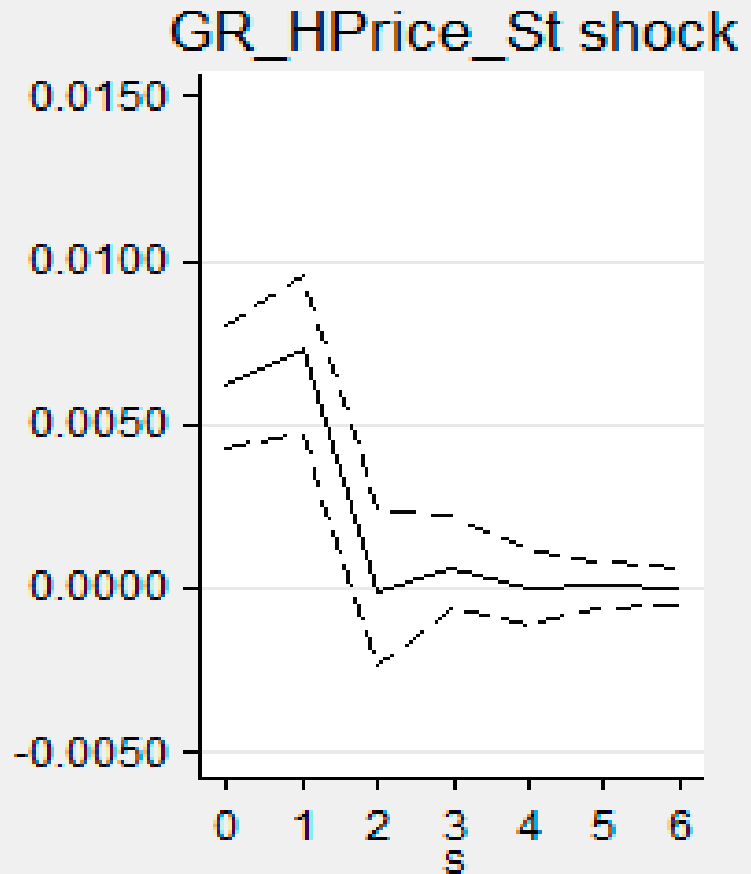
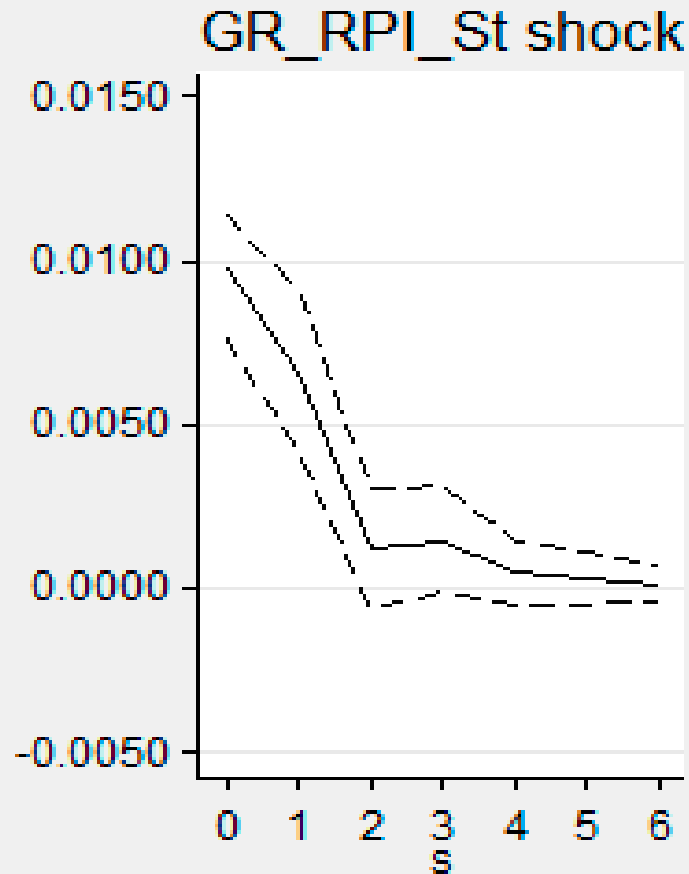


Impact on Net Growth Old/Small relative to Large/Old for State-Specific Shocks



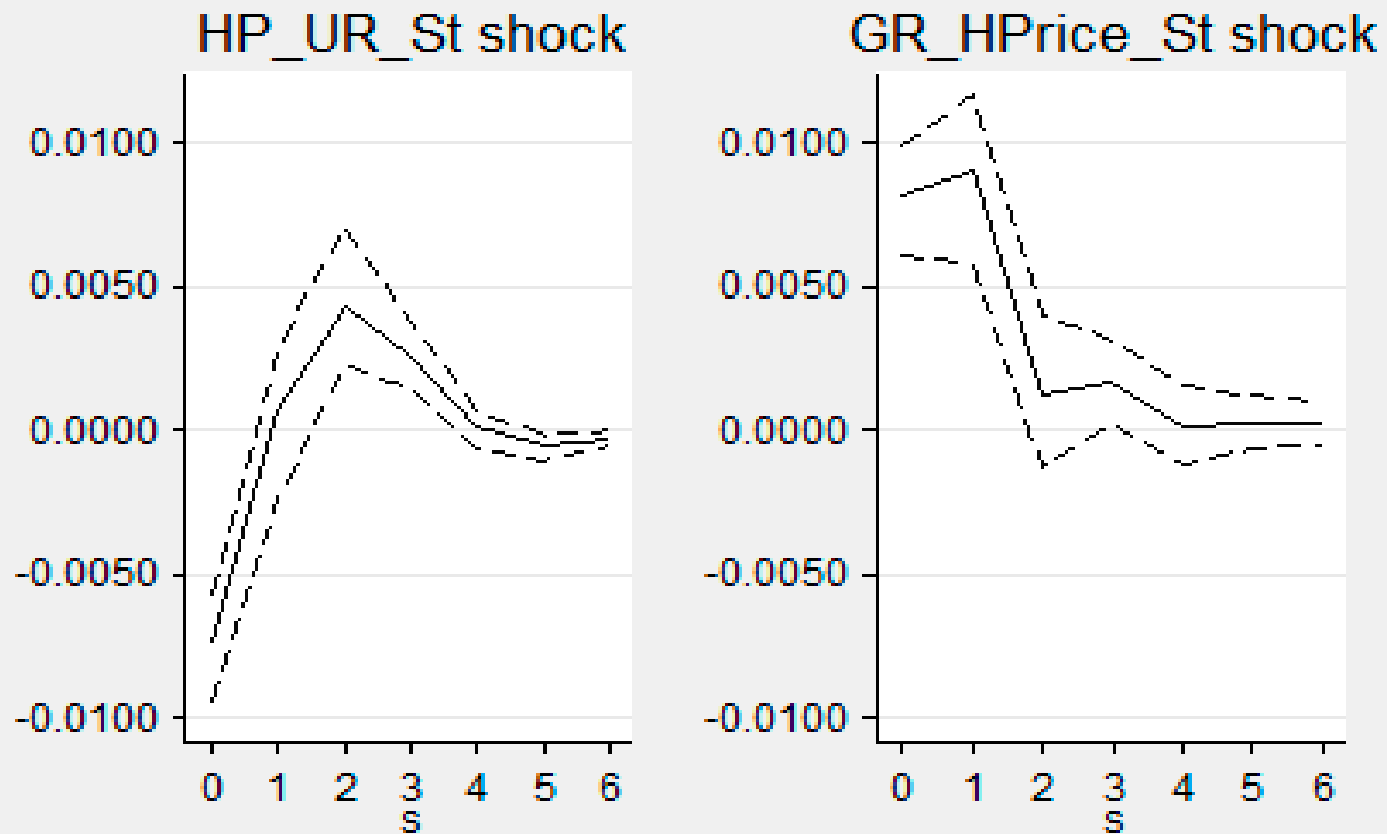
Results Robust to Alternative Indicators

Response of Difference of Young/Small with Large/Old Net
Annual Levels VAR(2) Model, Year Effects



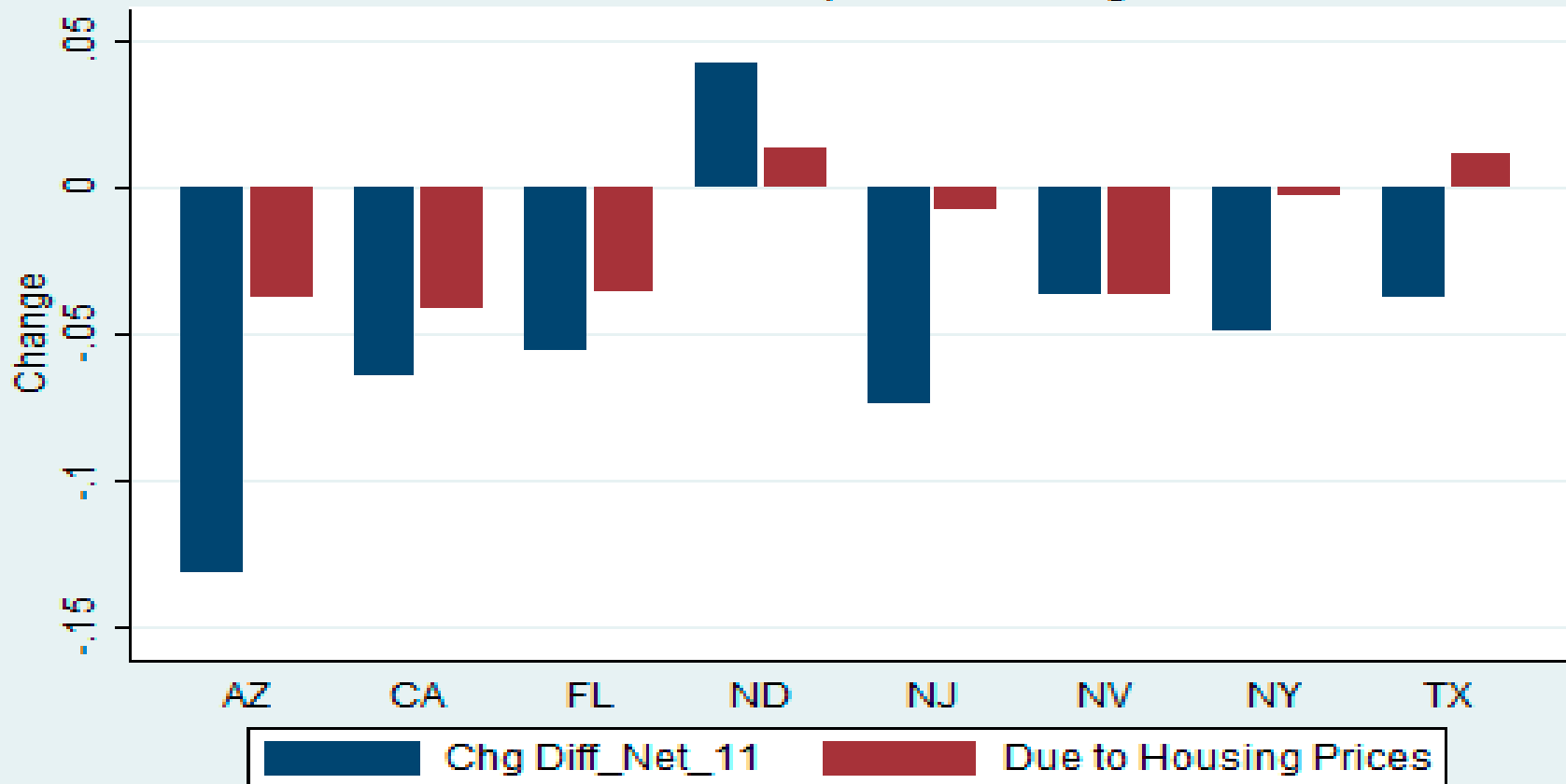
Results Robust to Alternative Indicators (even to using HP filtered Unemployment Rate)

Response of Difference of Young/Small with Large/Old Net
Annual Levels VAR(2) Model, Year Effects



States with Large Housing Price Declines Have Large Changes in Net Differential for Young/Small

Change in Diff_Net_Rate_11 from 2007 to 2009
Actual and Due to State-Specific Housing Price Growth



Mechanisms?

- Possible channel: home equity financing of young businesses.
- Alternative possible mechanisms:
 - Do results reflect sectoral composition effects?
 - Mian and Sufi (2012) emphasize impact of housing price shocks on local non-tradables.
 - Results on local cyclical shocks hold *within* all sectors
 - Results on housing price shocks hold *within* Retail, FIRE, Construction and Services.
 - If alternative channel, must explain why differential response of young/small vs. large/mature within sectors.

Summary and Next Steps

- Robust findings that young firms are more sensitive to cyclical and housing price shocks.
 - Exploited geographic variation over time to identify effects.
- Given large national adverse impact on young in Great Recession and slow recovery, these findings important for understanding this period .
- More to do to discern actual mechanism(s) at play
 - Likely will need more data:
 - E.g., direct evidence on home equity, startup/young business financing by sector.

Extra Slides

Literature

- Large literature focusing on role of firm size in cyclical sensitivity:
 - 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 (2007)
 - Moscarini and Postel-Vinay (2012) find that net differential between small and large firms widens when unemployment is above trend – motivated by poaching model.
- Business finance
 - Fazzari, Hubbard and Peterson (1988), Gertler and Hubbard (1988), Mishkin (2008), Mach and Wolken (2003), Robb and Wolken (2003), Robb and Robinson (2010)
 - Many papers use size as proxy for access but suggest age is important.
 - Robb and Wolken and Robb and Robinson highlight the role of home equity for young businesses
- Housing prices and impact on local economy
 - Mian and Sufi (2010, 2011a, 2011b)

Key Correlations

- Correlation of Net Employment Growth with:
 - Change in Unemployment Rate = -0.84
 - Real GDP Growth Rate = 0.90
 - HP-Filtered Unemployment Rate = -0.23
- Correlation of Real Housing Price Growth with:
 - Change in Unemployment Rate = -0.56
 - Real GDP Growth Rate = 0.56
 - HP-Filtered Unemployment Rate = -0.10

Table 3 Descriptive Regressions at State Level (Controlling for State and Year Fixed Effects) – Using State-Level Change in Unemployment Rate as Cyclical Indicator

Bivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
Chg_UR_st	-2.207 ^{***}	-1.432 ^{***}	-0.570 ^{***}	-0.479 ^{***}
	(0.212)	(0.248)	(0.142)	(0.140)

Multivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
Chg_UR_st	-1.916 ^{***}	-1.347 ^{***}	-0.484 ^{***}	-0.437 ^{**}
	(0.213)	(0.253)	(0.144)	(0.143)
GR_HPrice_st	0.183 ^{***}	0.054	0.054 ^{**}	0.026
	(0.027)	(0.032)	(0.018)	(0.018)
<i>N</i>	1530	1530	1530	1530

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.00$. Note 11=Young/Small, 21=Young/Medium, 12=Old/Small, 22=Old/Medium. All net differentials are with respect to Old/Large.

Table 4 Descriptive Regressions at State Level (Controlling for State and Year Fixed Effects) – Using HP Filtered State-Level Unemployment Rate as Cyclical Indicator

Bivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
HP_UR_st	-2.406 ^{***}	-0.914 [*]	-0.885 ^{***}	-0.456 [*]
	(0.347)	(0.401)	(0.227)	(0.225)

Multivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
HP_UR_st	-1.731 ^{***}	-0.657	-0.708 ^{**}	-0.353
	(0.355)	(0.417)	(0.236)	(0.234)
GR_HPrice_st	0.195 ^{***}	0.074 [*]	0.051 ^{**}	0.030
	(0.028)	(0.033)	(0.019)	(0.019)
<i>N</i>	1530	1530	1530	1530

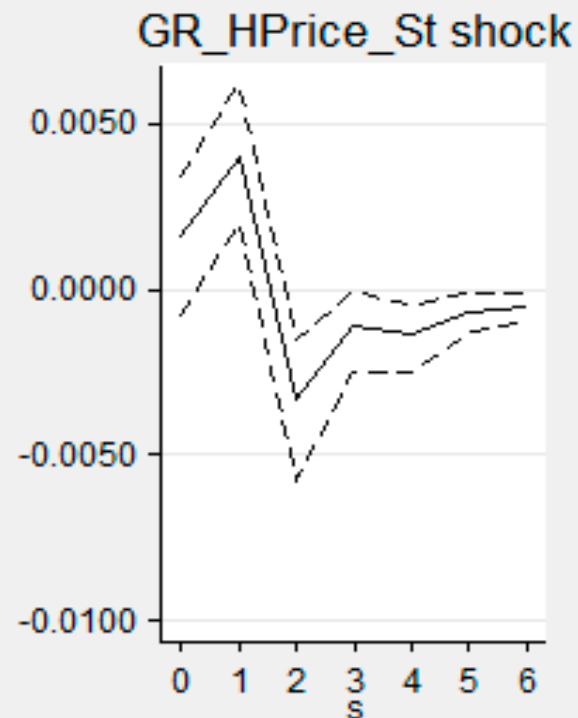
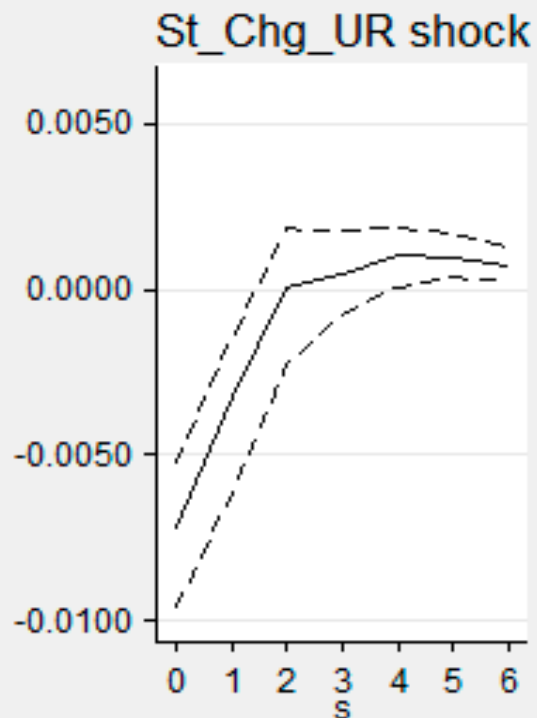
Standard errors in parentheses

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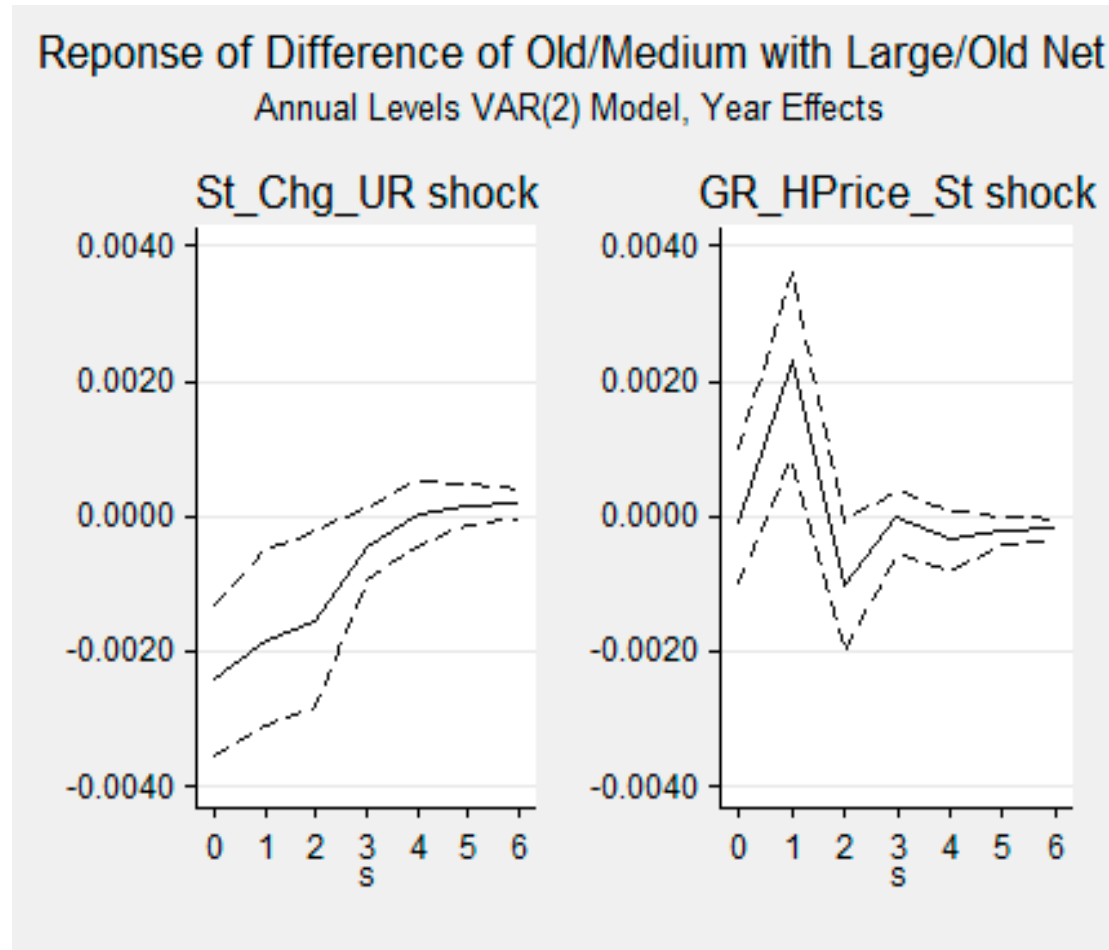
All net differentials are with respect to Old/Large.

Impact on Net Growth Young/Medium relative to Large/Old for State-Specific Shocks

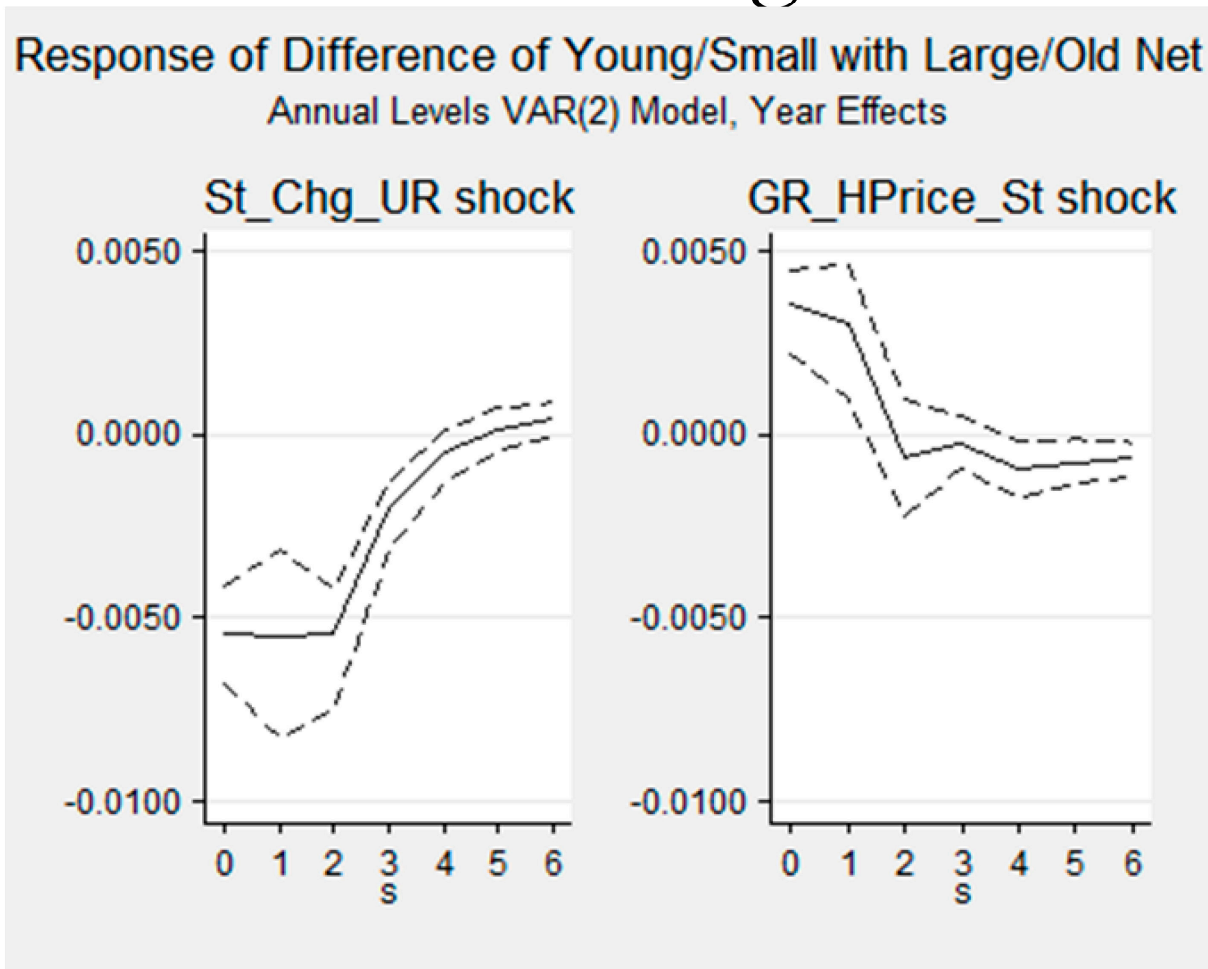
Reponse of Difference of Young/Medium with Large/Old Net
Annual Levels VAR(2) Model, Year Effects



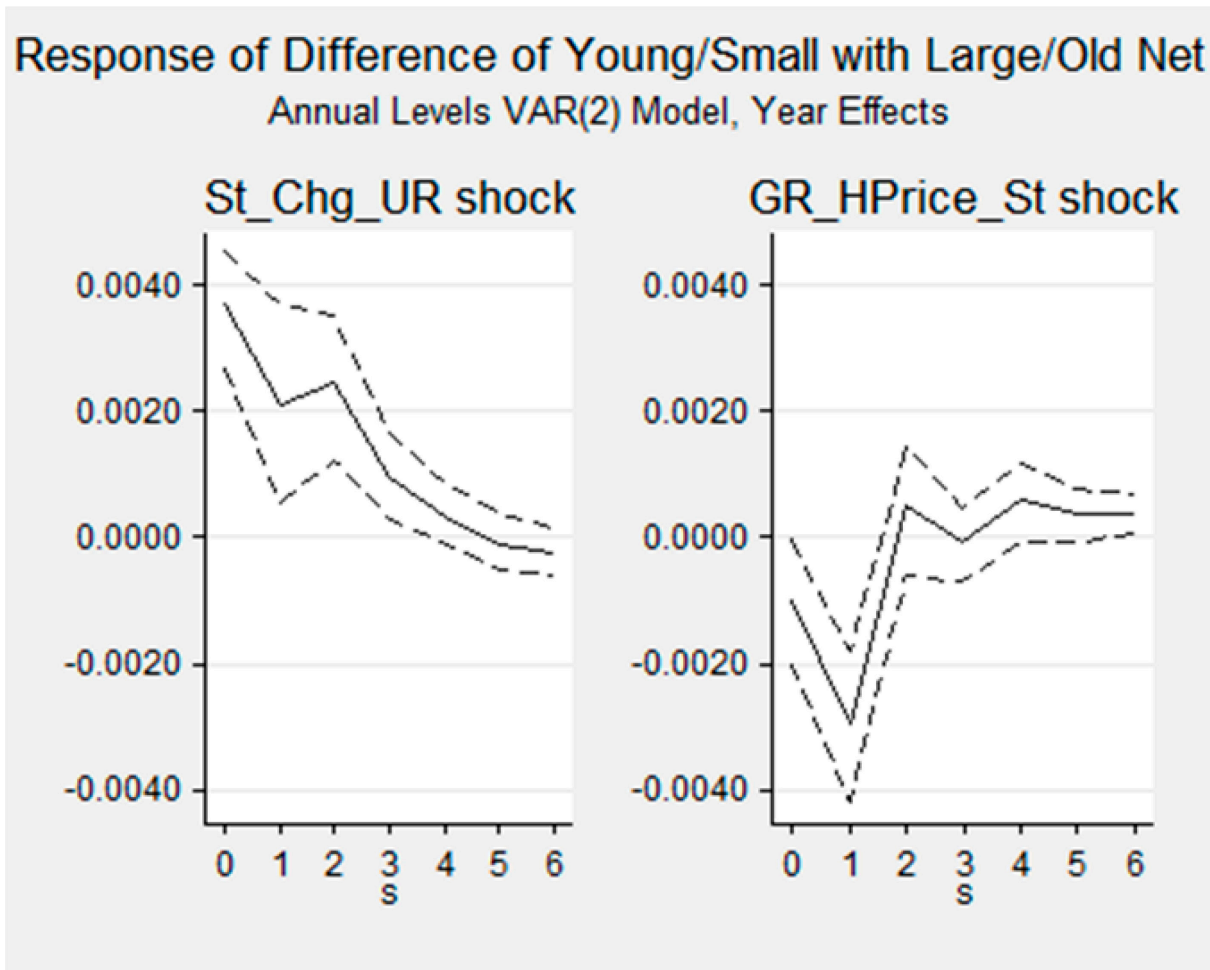
Impact on Net Growth Old/Medium relative to Large/Old for State-Specific Shocks



Impact on Job Creation Young/Small relative to Large/Old



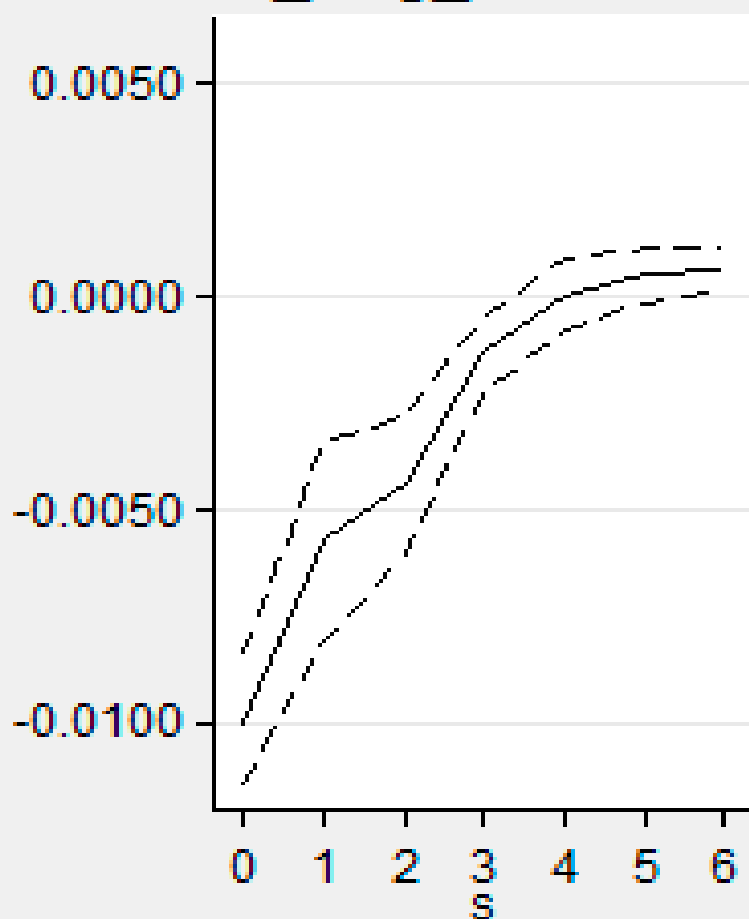
Impact on Job Destruction Young/Small relative to Large/Old



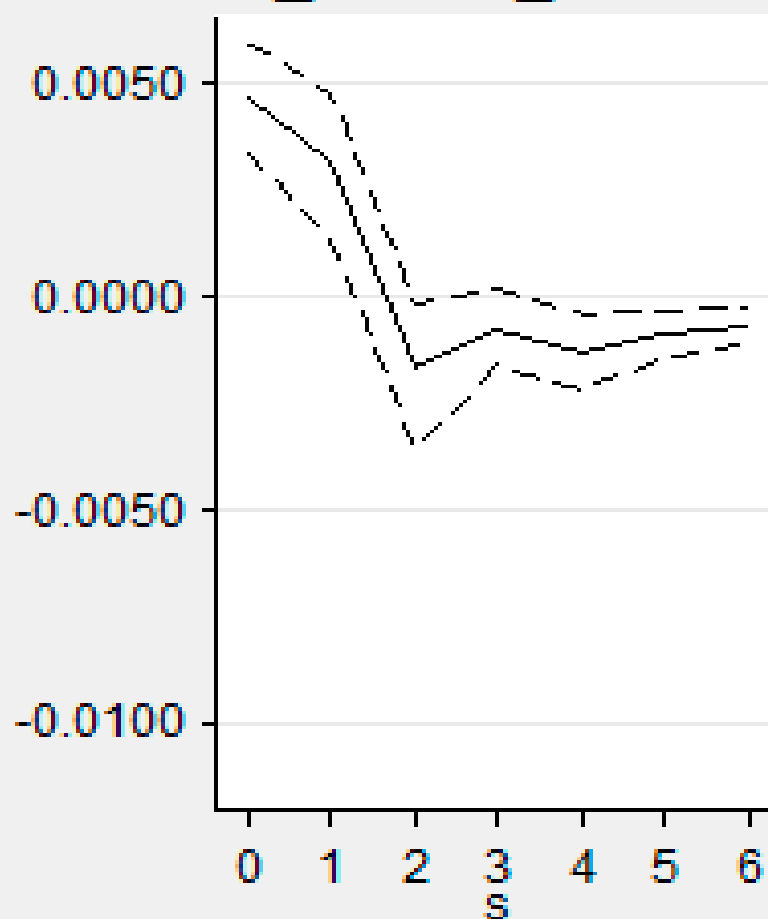
Response of Difference of Young with Old Net

Annual Levels VAR(2) Model, Year Effects

St_Chg_UR shock

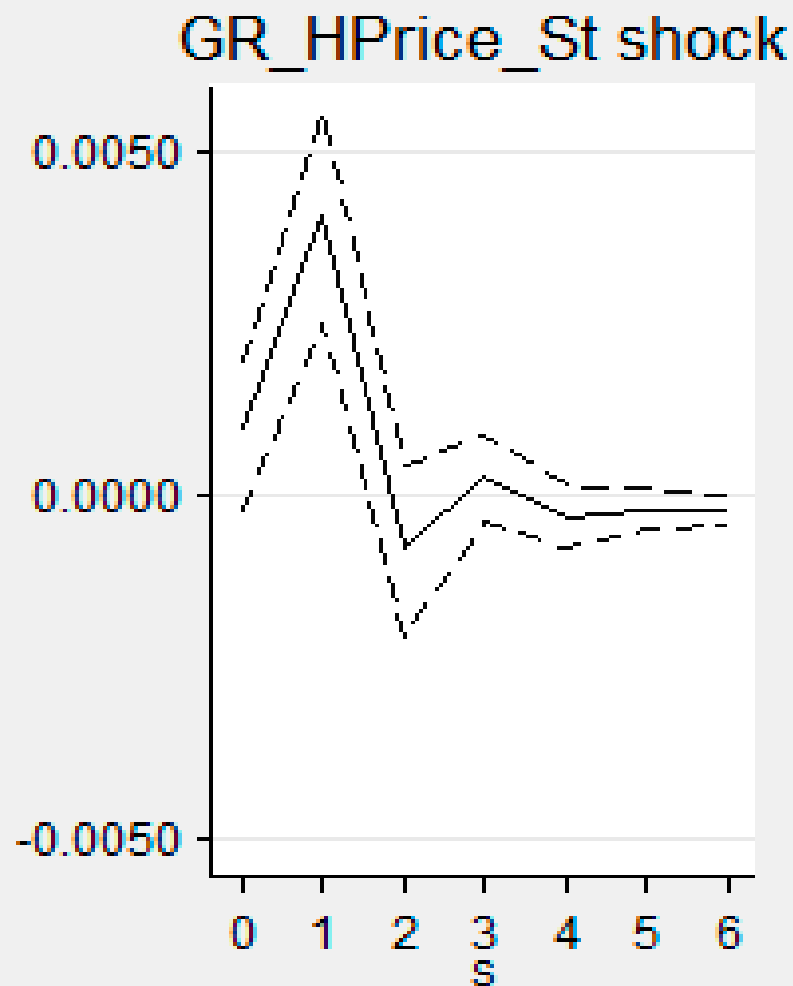
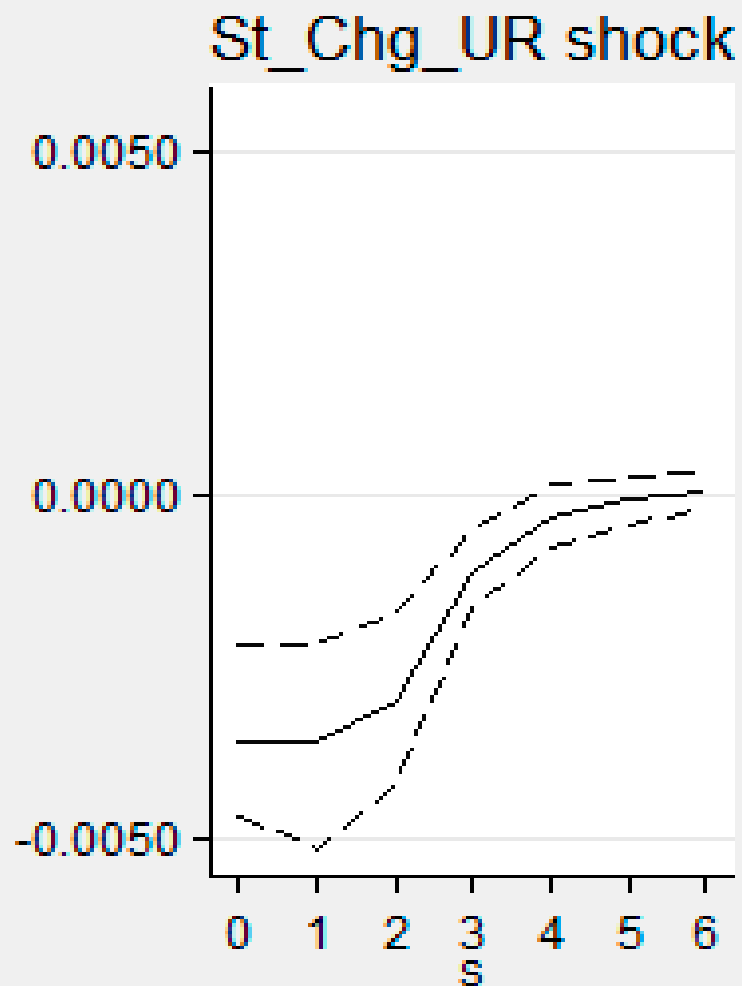


GR_HPrice_St shock



Response of Difference of Small/Medium with LargeNet

Annual Levels VAR(2) Model, Year Effects



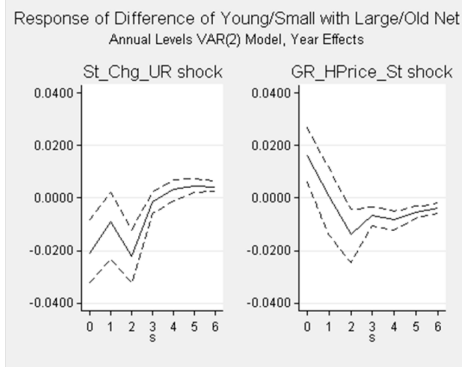
Contribution of Local Shocks to Two-Year Change in Net Differential for Young/Small-Old/Large (Pooling over all states and years)

	(1)
	Change in Net Differential for Young/Small-Old/Large
Predicted Change from Local Housing Prices	1.099 ^{***} (0.236)
Predicted Change from Local Cyclical Shock	0.900 ^{***} (0.157)
<i>N</i>	1326

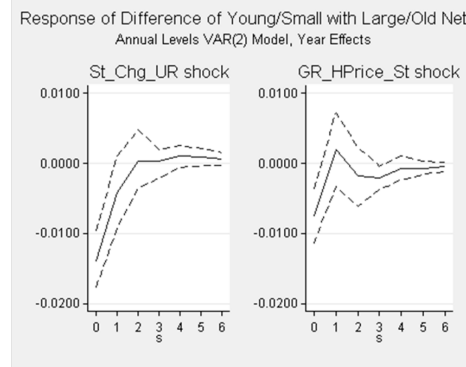
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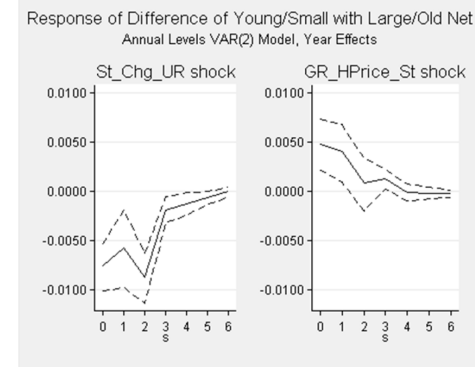
Differential Responses of Young/Small by Sector



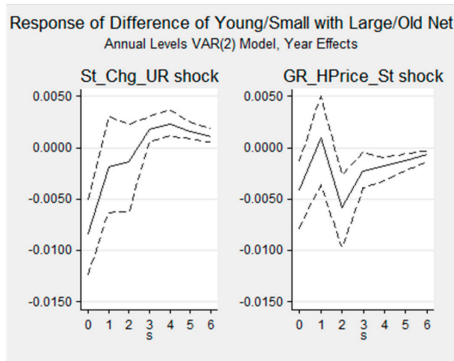
Construction



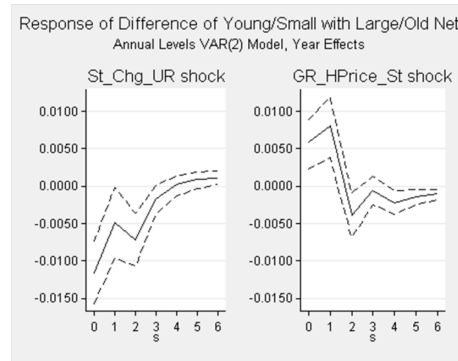
Manufacturing



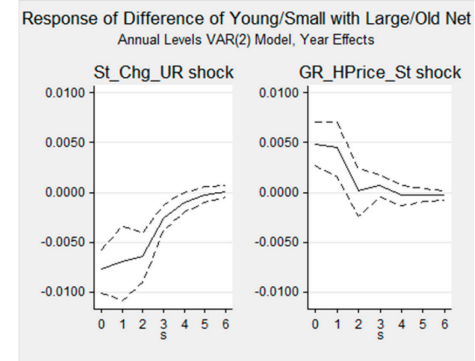
Retail Trade



Wholesale Trade



FIRE



Services

The Role of Housing Prices for Young Firms?

- Mian and Sufi (2010, 2011a, 2011b) relevant here.
 - They find that the impact of state-specific housing prices greater for non-tradeables.
 - Pooled sector results could have been driven by this if young/small disproportionately in tradeables.
 - But our results hold within sectors so not just a between effect.
 - Not for all sectors. Our greater sensitivity for non-tradeables but also Construction, Services, and FIRE.
- Must be a reason that young are more sensitive even within non-tradeables.
 - Is it credit channel? Maybe but need direct evidence that home equity more relevant in some sectors.
 - Is sectoral variation in results due to variation in entry costs?