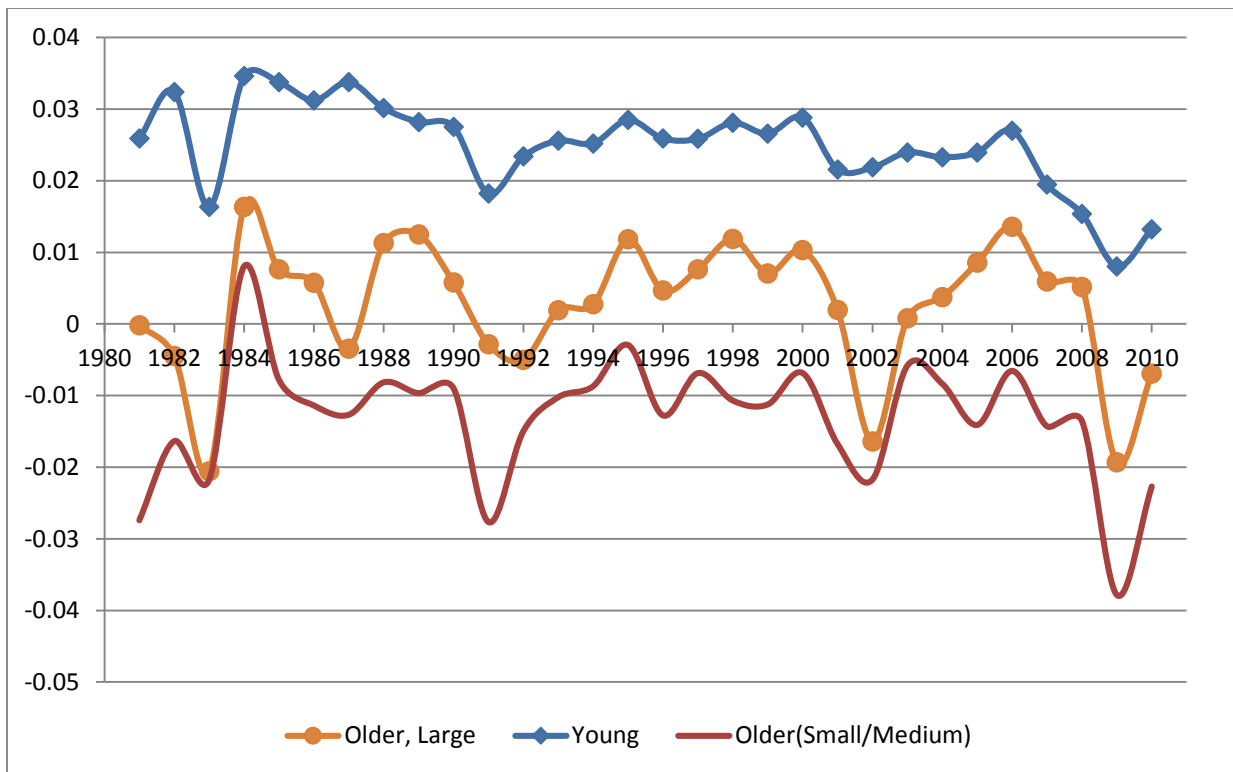


Robustness and Sensitivity Appendix

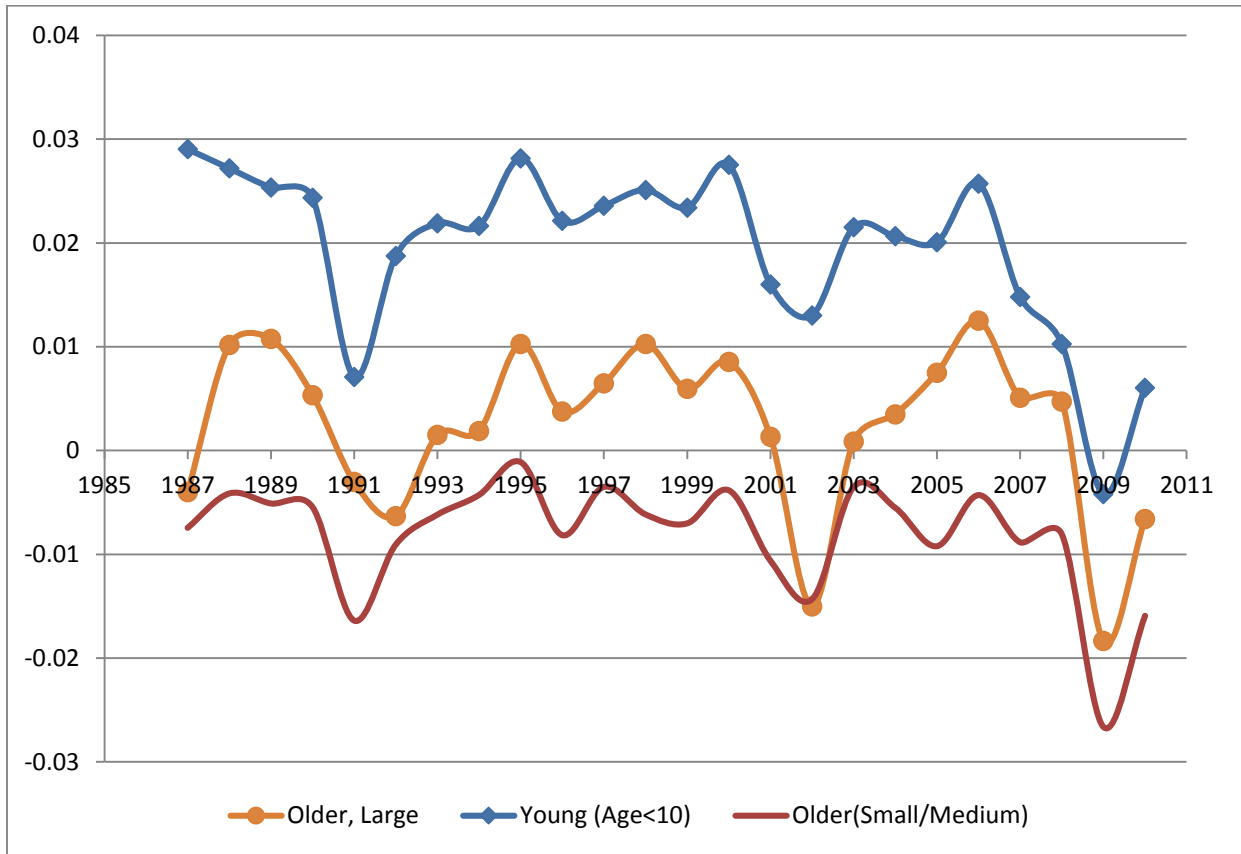
This appendix provides robustness and sensitivity analysis for the paper “How Firms Respond to Business Cycles: The Role of Firm Age and Firm Size” by Teresa Fort, John Haltiwanger, Ron Jarmin and Javier Miranda. The figures and tables are discussed in the main text of that paper (mostly in footnotes) but are provided here for the sake of brevity.

Figure A.1.1 Components of Net Employment Growth by Broad Firm Size and Age Classes



Note: These components are defined as the ratio of net employment for the reported group divided by economy-wide employment (using the DHS denominator). This implies that the components sum to aggregate net employment growth. Each component is equivalent to the net growth rate of the reported group multiplied by the employment share for the group. Young is for firms less than five years old, Small/Medium is less than 500 employees. Older, Large is for firms 5 or more years old and with 500 or more employees.

Figure A.1.2 Components of Net Employment Growth by Broad Firm Size and Age Classes where Young is Defined as Firms Less than 10 Years Old



Note: These components are defined as the ratio of net employment for the reported group divided by economy-wide employment (using the DHS denominator). This implies that the components sum to aggregate net employment growth. Each component is equivalent to the net growth rate of the reported group multiplied by the employment share for the group. Note that size groups are defined as in main text (Small < 20, Medium 20 to 499, Large 500+) but young represents firms 10 years or less years old.

Figure A.2.1 Using State Net Employment Growth as Cyclical Indicator



Figure A.2.2 Using Net Employment Growth Rate for Cyclical Shock

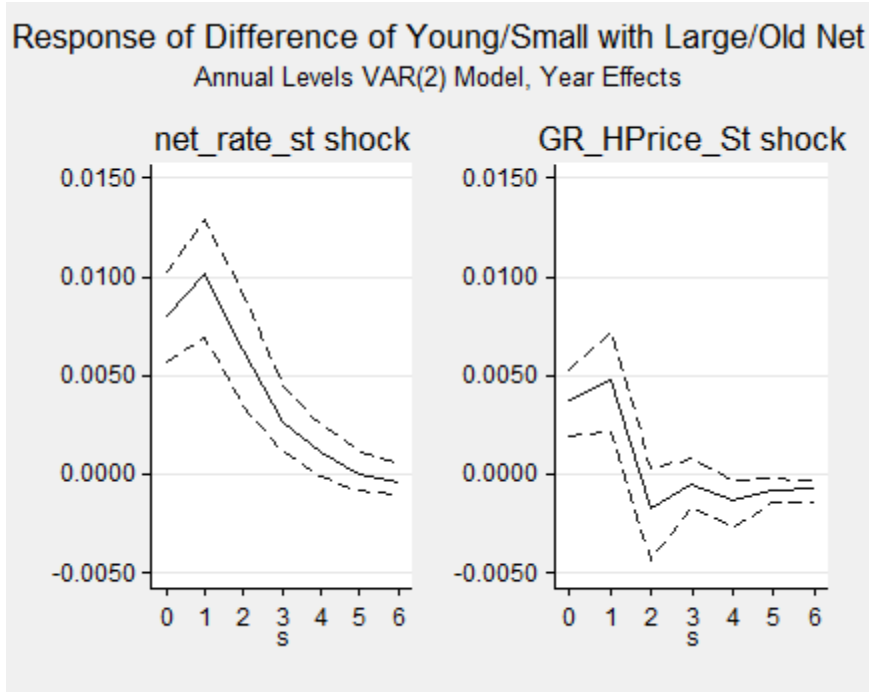


Figure A.2.3 Using Net Employment Growth Rate for Cyclical Shock

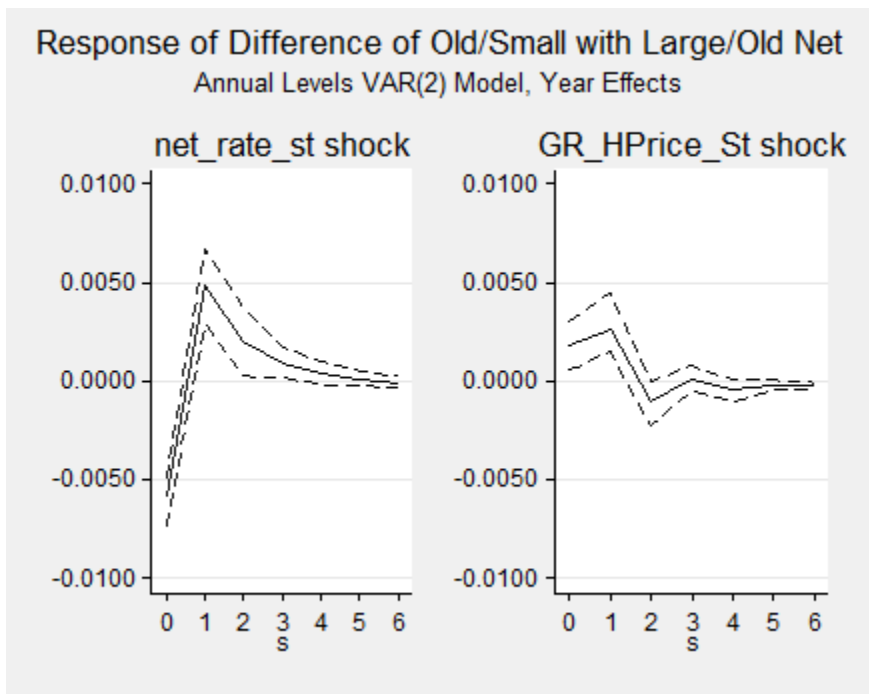


Figure A.2.4 Using HP-filtered State Unemployment Rate

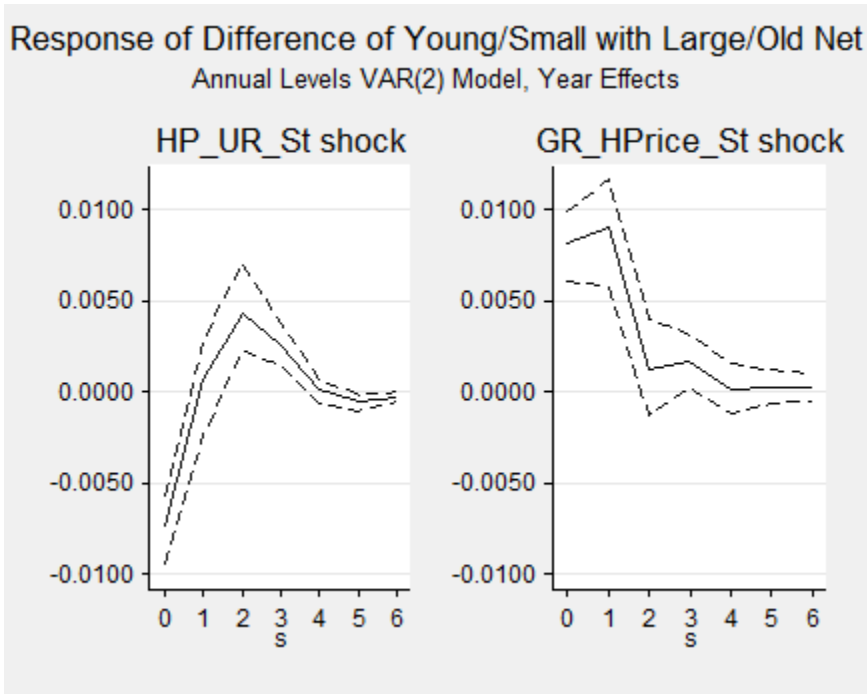


Figure A.2.5 Using HP-filtered State Unemployment Rate

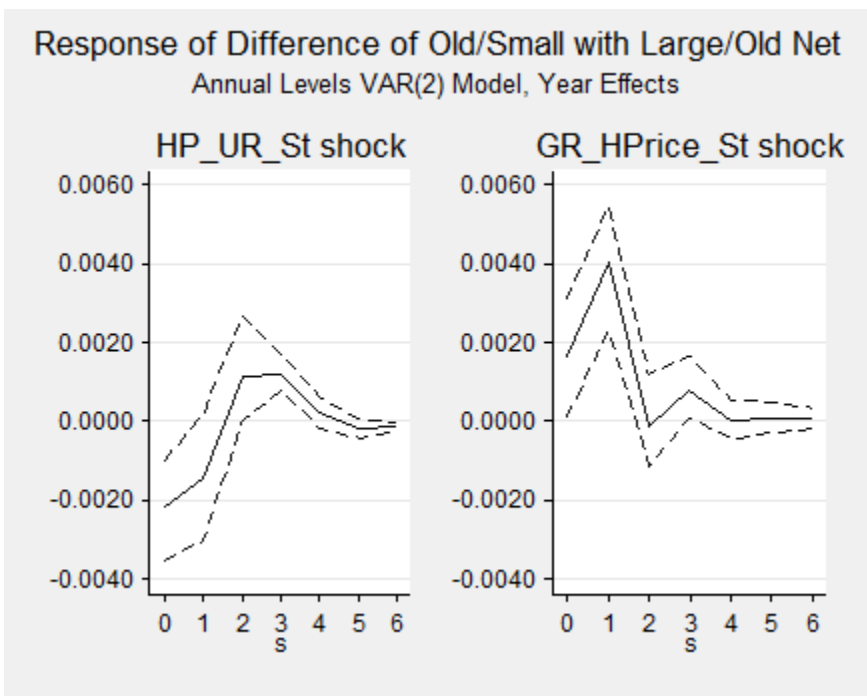


Figure A.2.6.a Putting State Housing Prices Last in Causal Ordering

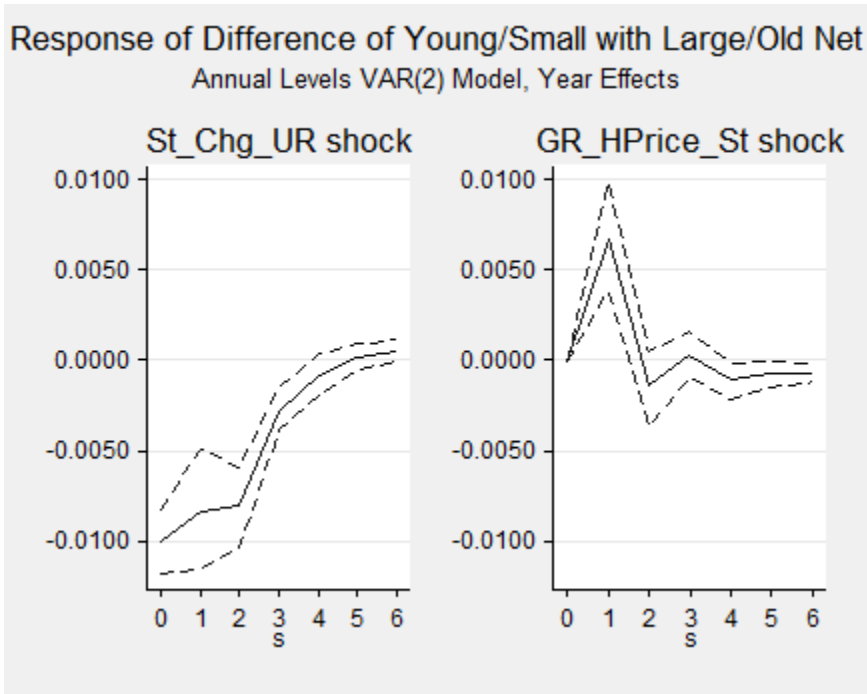


Figure A.2.6.b Putting State Housing Prices Last in Causal Ordering

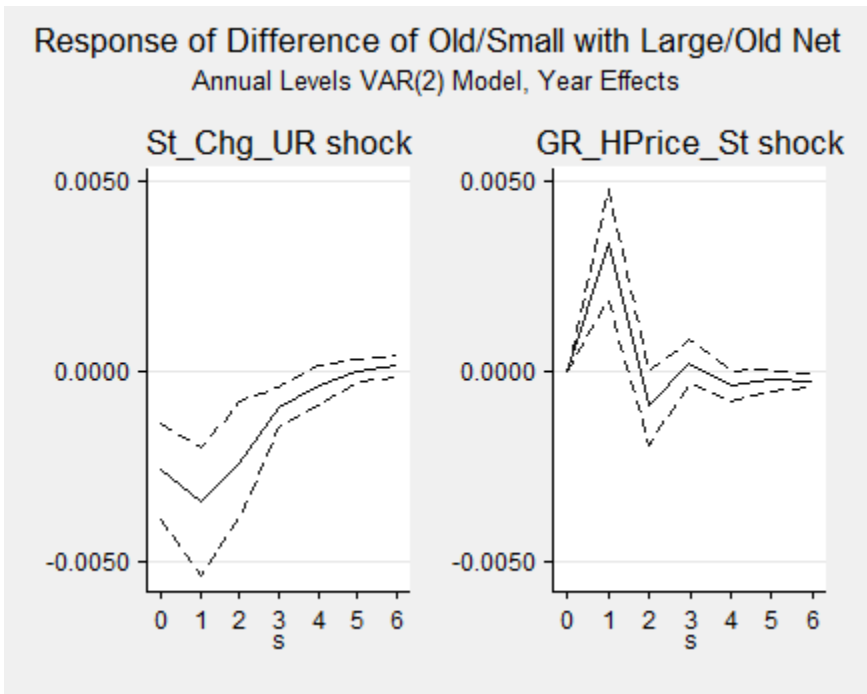


Figure A.2.7 Using Initial Size

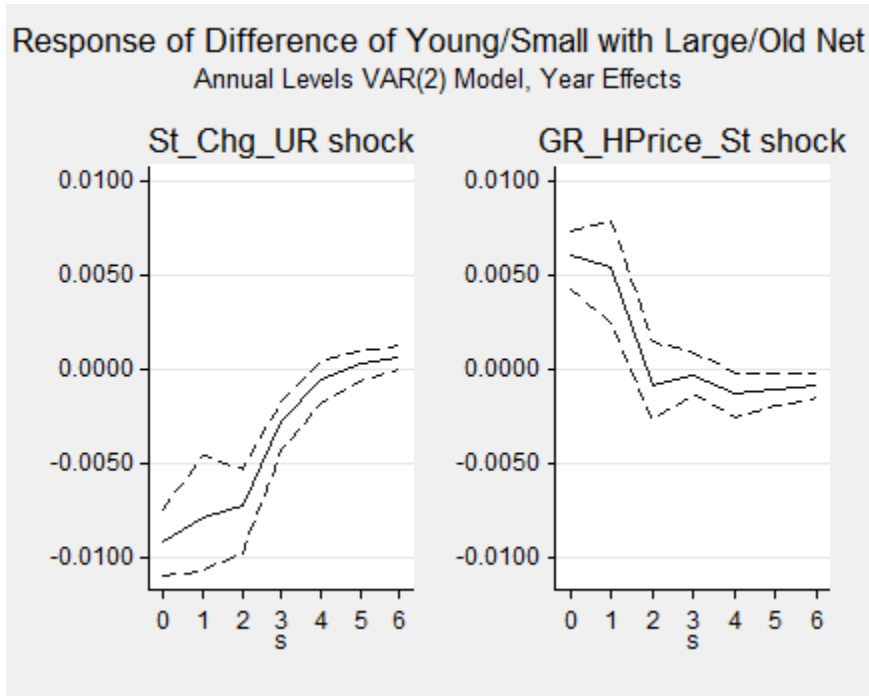
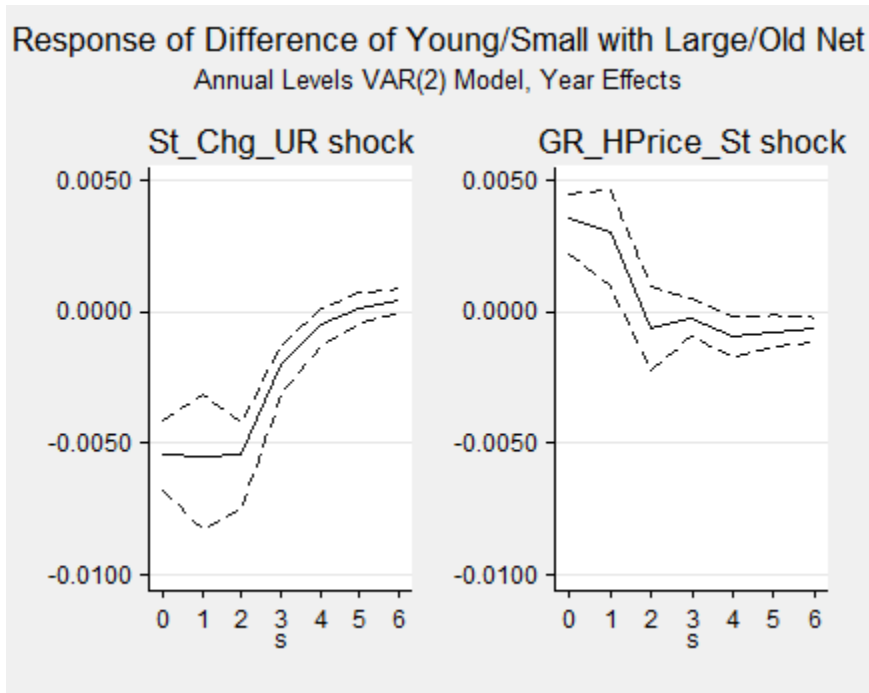


Figure A.2.8 Job Creation Differential Response for Young/Small



Notes: See Notes to Figure 5.1

Figure A.2.9 Job Destruction Differential Response for Young/Small

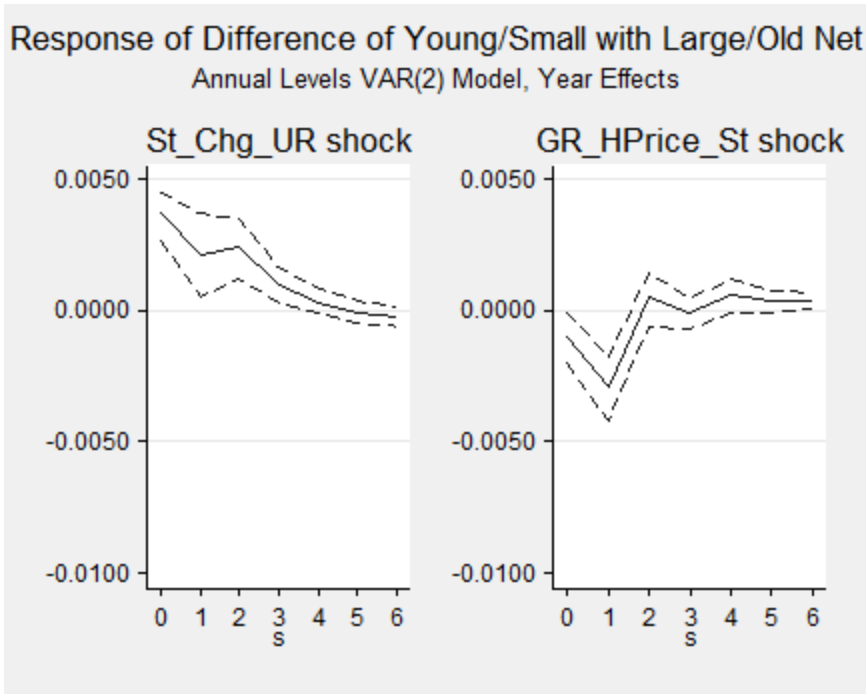


Figure A.2.10 Job Creation Differential Response for Young/Medium

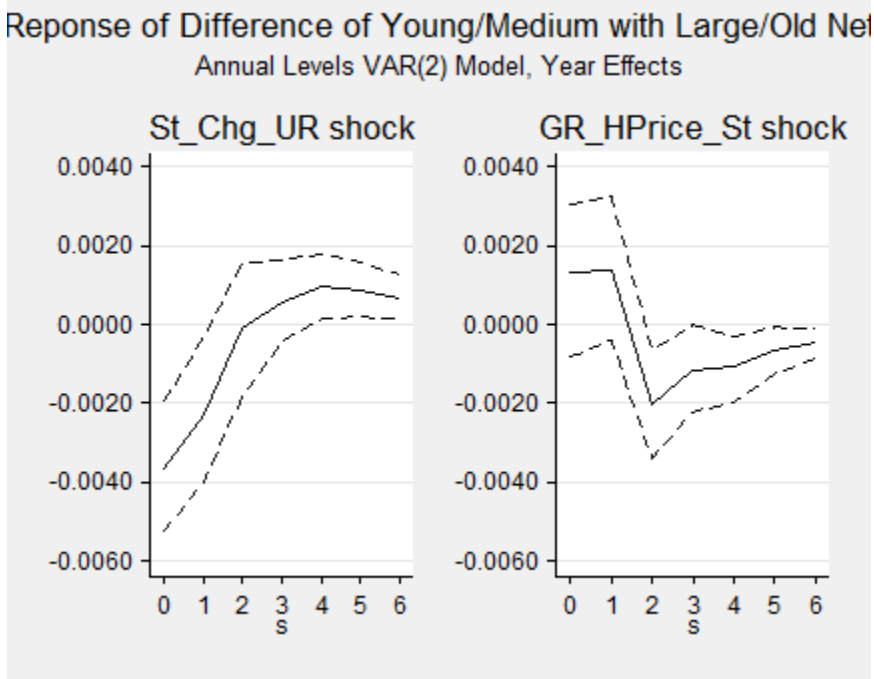


Figure A.2.11 Job Destruction Differential Response for Young/Medium

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

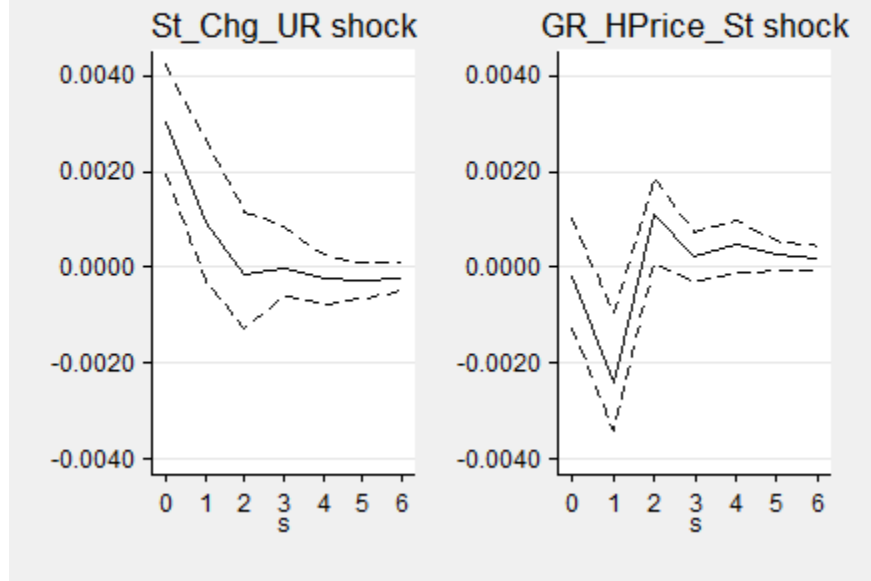


Figure A.2.12 Using only Firm Age, Net Differential Response for Young (<5) Minus Old (5+)

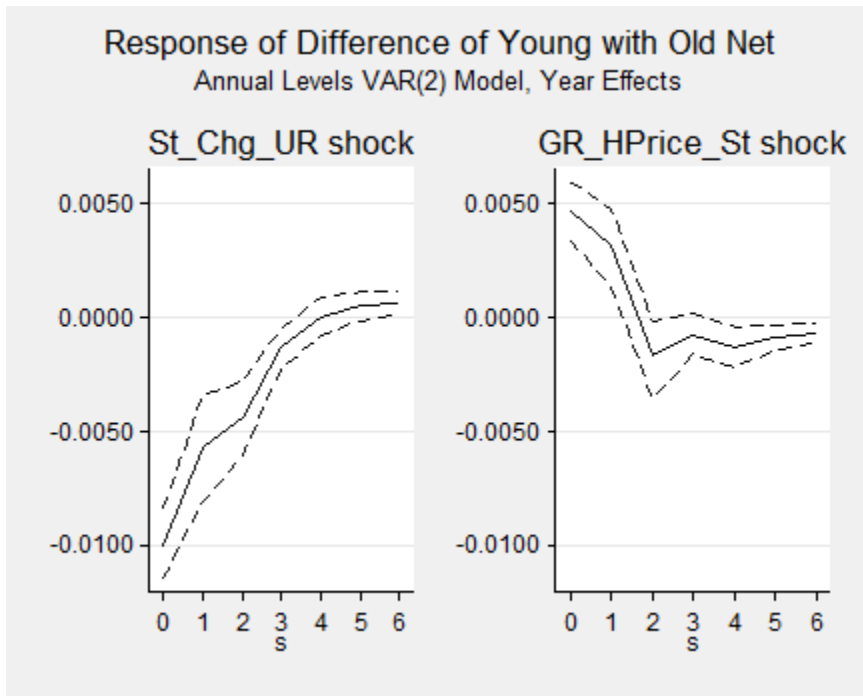


Figure A.2.13 Using only Firm Size, Net Differential Response for Small/Medium (<500) Minus Large (500+)

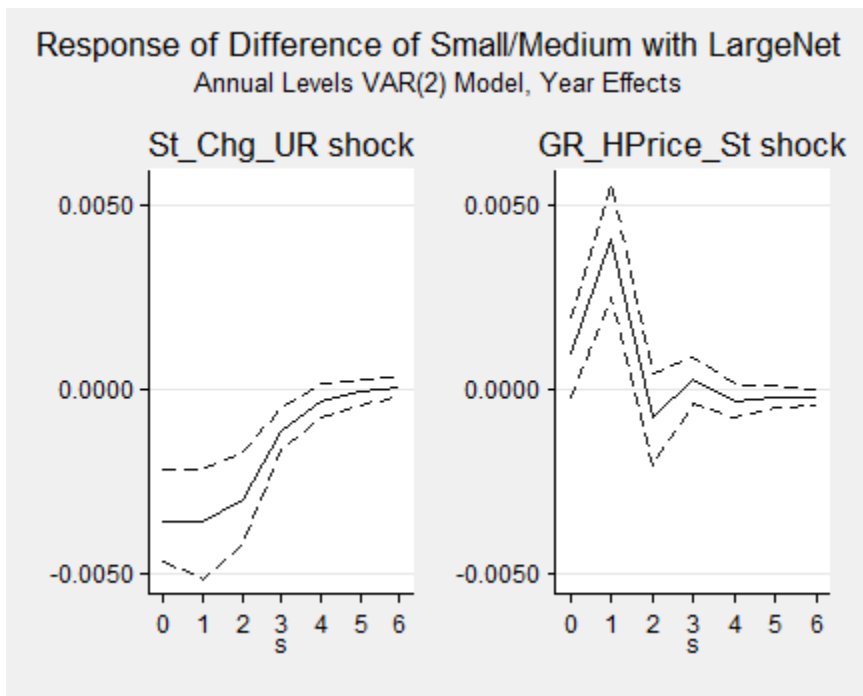


Figure A.2.14 Using Real GDP Growth Rates

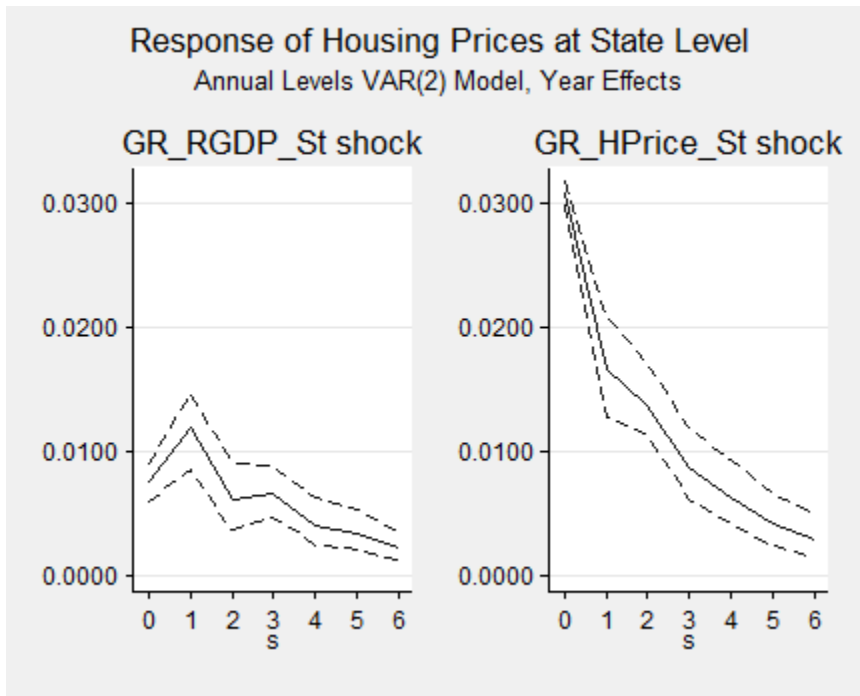


Figure A.2.15 Using Real GDP Growth Rates

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

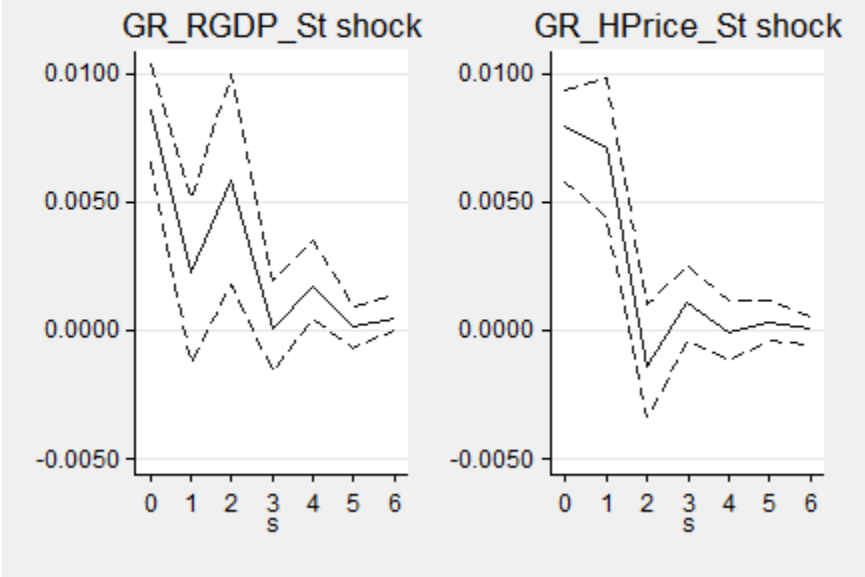


Figure A.2.16 Using Real GDP Growth Rates

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

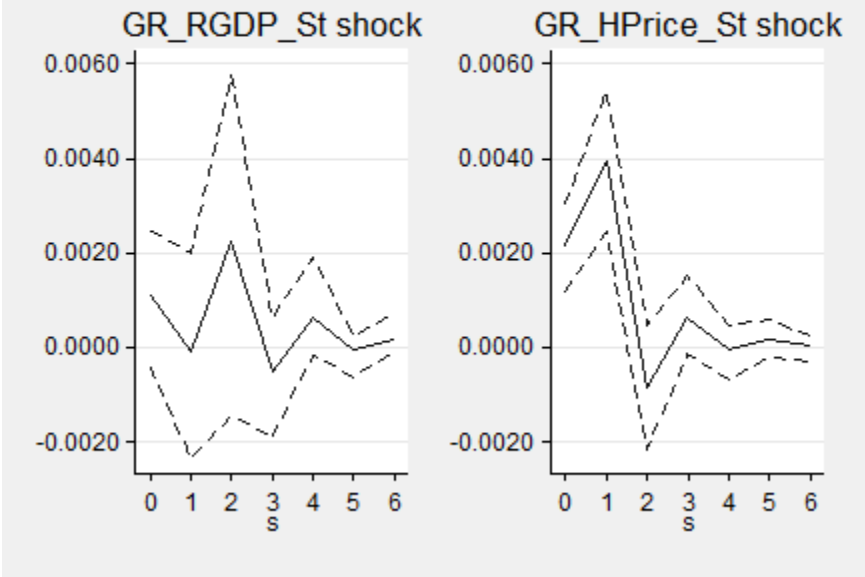


Figure A.2.17 Using Real Personal Income Growth Rates

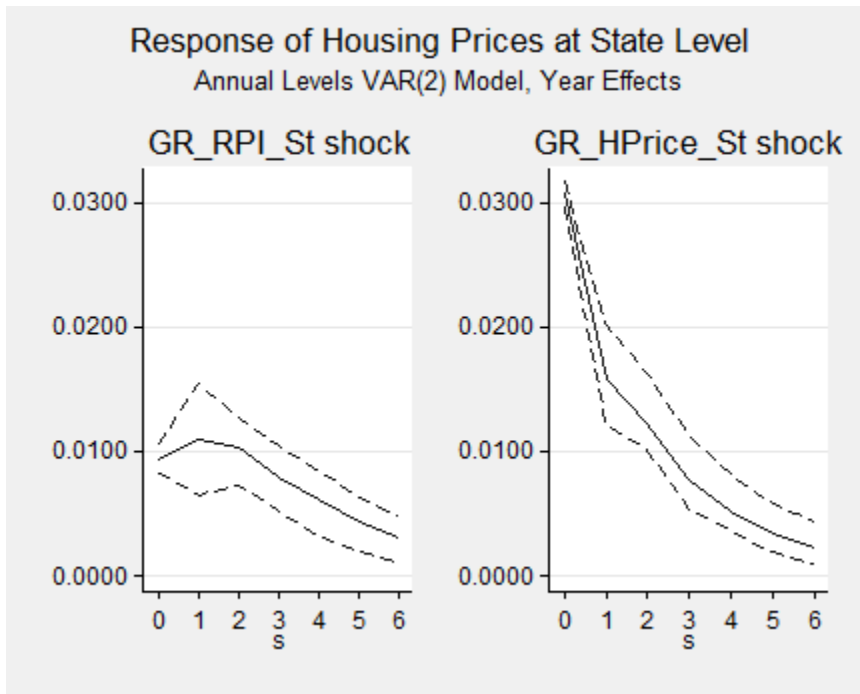


Figure A.2.18 Using Real Personal Income Growth Rates

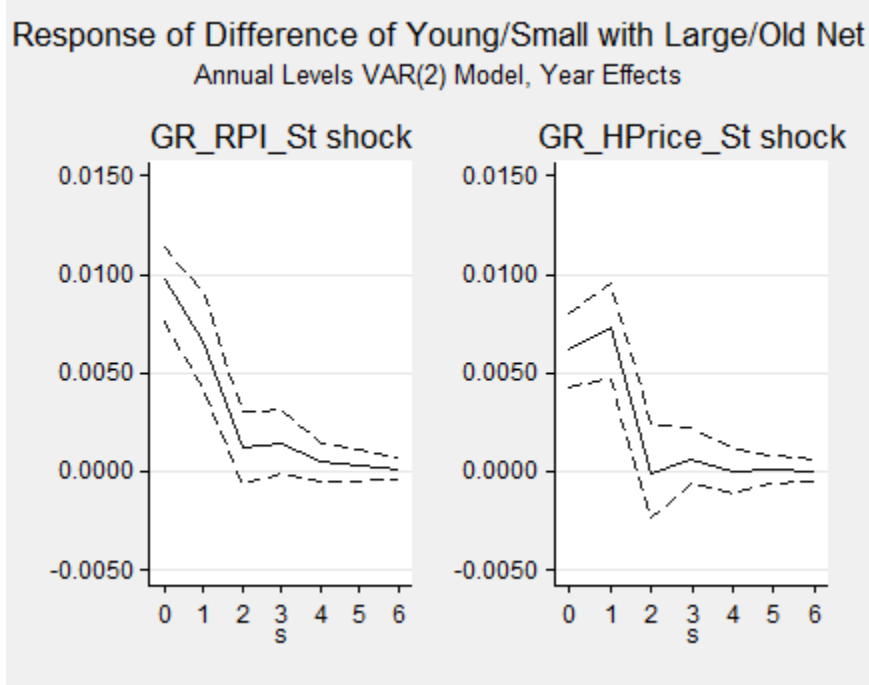


Figure A.2.19 Using Growth Rates in Real Personal Income

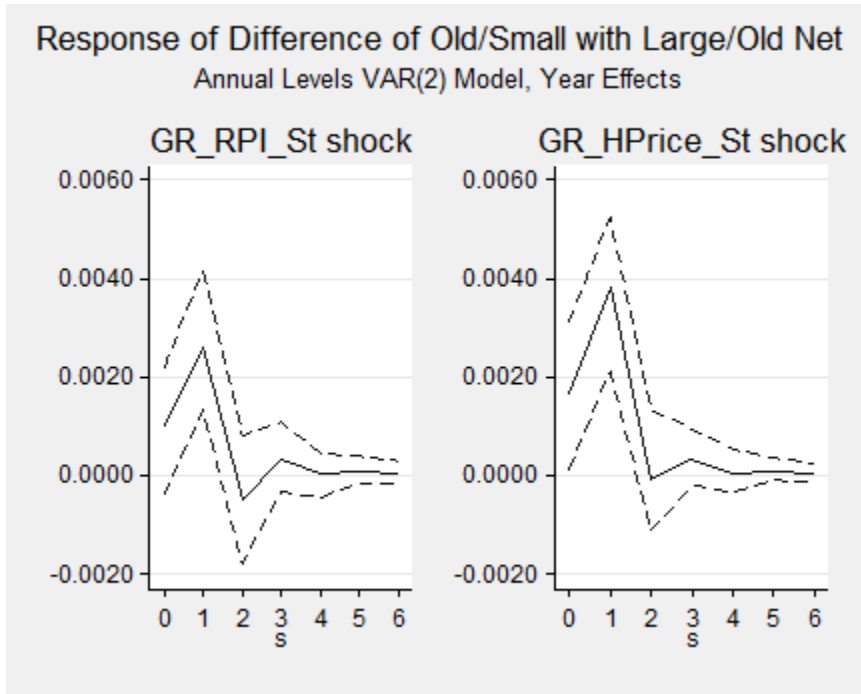


Table A.1. Descriptive Regressions at the National Level Using Real GDP

	(1)	(2)	(3)	(4)	(5)	(6)
	Net_Rate_All	net_rate_11	net_rate_21	net_rate_12	net_rate_22	net_rate_32
Real GDP Growth	0.821***	1.087***	0.880**	0.480*	0.820***	0.710***
	(0.108)	(0.269)	(0.285)	(0.179)	(0.158)	(0.130)
Int_Rt_Sprd	-0.481*	-0.317	-1.037*	-0.227	-0.603*	-0.475*
	(0.185)	(0.460)	(0.487)	(0.306)	(0.271)	(0.222)
GR_HPrice_st	0.023	0.466**	0.308*	0.117	0.038	-0.024
	(0.052)	(0.130)	(0.137)	(0.086)	(0.076)	(0.063)
N	30	30	30	30	30	30

Standard errors in parentheses. The Int_Rt_Spread variable is based on the difference between Moody's AAA Corporate Yield and the Merrill Lynch High Yield Red 100. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.2 Correlations Between Cyclical Indicators and Net Differential Employment Growth Rates (Using Initial Size)									
	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	-0.448	-0.302	0.557	0.272	0.548	0.345	0.268	0.232	
	(0.013)	(0.134)	(0.001)	(0.180)	(0.002)	(0.085)	(0.152)	(0.255)	
Young/Medium-Older/Large	-0.322	-0.247	0.453	0.249	0.327	0.306	0.121	-0.051	
	(0.083)	(0.224)	(0.012)	(0.220)	(0.078)	(0.129)	(0.523)	(0.805)	
Older/Small-Older/Large	0.163	0.312	0.037	-0.237	0.030	-0.185	0.564	0.594	
	(0.389)	(0.121)	(0.845)	(0.244)	(0.875)	(0.365)	(0.001)	(0.001)	
Older/Medium-Older/Large	-0.21	-0.085	0.395	0.243	0.437	0.187	0.415	0.544	
	(0.266)	(0.680)	(0.031)	(0.233)	(0.016)	0.361	(0.023)	(0.004)	
Note: P-values in parentheses.									

Table A.3 Descriptive Regressions at State Level, Using the Net Employment Growth Rate at state level as the cyclical indicator (Controlling for State and Year Fixed Effects)

Bivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
net_rate_st	0.559***	0.224***	-0.241***	-0.209***
	(0.058)	(0.068)	(0.038)	(0.038)

Multivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
net_rate_st	0.444***	0.182*	-0.320***	-0.263***
	(0.061)	(0.072)	(0.040)	(0.040)
GR_HPrice_st	0.165***	0.061	0.115***	0.078***
	(0.028)	(0.034)	(0.019)	(0.019)
<i>N</i>	1530	1530	1530	1530

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note 11=Young/Small, 21=Young/Medium, 12=Old/Small, 22=Old/Medium. All net differentials are with respect to Old/Large.

Table A.4 Descriptive Regressions at State Level, Using the Change in Unemployment Rate at state level as the cyclical indicator (Controlling for State Fixed Effects Only)

Bivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
Chg_UR_st	-1.719***	-1.046***	0.219*	-0.409***
	(0.135)	(0.147)	(0.088)	(0.074)

Multivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
Chg_UR_st	-1.131***	-0.699***	0.421***	-0.303***
	(0.138)	(0.156)	(0.093)	(0.079)
GR_HPrice_st	0.309***	0.182***	0.106***	0.055***
	(0.026)	(0.030)	(0.018)	(0.015)
<i>N</i>	1530	1530	1530	1530

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note 11=Young/Small, 21=Young/Medium, 12=Old/Small, 22=Old/Medium. All net differentials are with respect to Old/Large.

Table A.5 Descriptive Regressions at State Level (Controlling for State and Year Fixed Effects) – Using State-Level Change in Unemployment Rate as Cyclical Indicator and Initial Firm Size

Bivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
Chg_UR_st	-2.168***	-1.530***	-0.600***	-0.659***
	(0.195)	(0.271)	(0.136)	(0.137)

Multivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
Chg_UR_st	-1.846***	-1.496***	-0.495***	-0.596***
	(0.195)	(0.277)	(0.139)	(0.140)
GR_HPrice_st	0.203***	0.022	0.066***	0.039*
	(0.025)	(0.035)	(0.018)	(0.018)
<i>N</i>	1530	1530	1530	1530

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note 11=Young/Small, 21=Young/Medium, 12=Old/Small, 22=Old/Medium. All net differentials are with respect to Old/Large.

Table A.6 Descriptive Regressions at State Level, Using the Real GDP Growth Rate at state level as the cyclical indicator (Controlling for State and Year Fixed Effects)

Bivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
GR_GDP_st	0.338***	0.158***	0.029	0.036
	(0.040)	(0.047)	(0.027)	(0.026)

Multivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
GR_GDP_st	0.246***	0.127*	-0.008	0.018
	(0.042)	(0.050)	(0.028)	(0.028)
GR_HPrice_st	0.171***	0.057	0.068***	0.033
	(0.029)	(0.034)	(0.019)	(0.019)
<i>N</i>	1530	1530	1530	1530

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note 11=Young/Small, 21=Young/Medium, 12=Old/Small, 22=Old/Medium. All net differentials are with respect to Old/Large.

Table A.7 Descriptive Regressions at State Level, Using the Real Personal Income Growth Rate at state level as the cyclical indicator (Controlling for State and Year Fixed Effects)

Bivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
GR_RPI_st	0.658***	0.391***	0.114*	0.068
	(0.066)	(0.078)	(0.044)	(0.044)

Multivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
GR_RPI_st	0.499***	0.375***	0.045	0.030
	(0.076)	(0.089)	(0.051)	(0.050)
GR_HPrice_st	0.133***	0.014	0.057**	0.032
	(0.031)	(0.036)	(0.021)	(0.020)
<i>N</i>	1530	1530	1530	1530

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note 11=Young/Small, 21=Young/Medium, 12=Old/Small, 22=Old/Medium. All net differentials are with respect to Old/Large.

Table A.8 Descriptive Regressions at State Level (Controlling for State and Year Fixed Effects) – Using State-Level Change in Unemployment Rate as Cyclical Indicator, Post-2006 data excluded

Bivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
Chg_UR_st	-2.145***	-1.389***	-0.405*	-0.384*
	(0.241)	(0.275)	(0.161)	(0.157)

Multivariate

	(1)	(2)	(3)	(4)
	diff_net_rate_11	diff_net_rate_21	diff_net_rate_12	diff_net_rate_22
Chg_UR_st	-1.928***	-1.330***	-0.356*	-0.370*
	(0.240)	(0.278)	(0.162)	(0.159)
GR_HPrice_st	0.196***	0.054	0.044*	0.013
	(0.031)	(0.036)	(0.021)	(0.020)
<i>N</i>	1326	1326	1326	1326

The dependent variable is the differential net employment growth rate for the group specified. All net differentials are with respect to Old/Large. Ch_UR_st is the state unemployment growth rate; GR_HPrice_st is the growth rate of the state's real FHFA housing price index. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note 11=Young/Small, 21=Young/Medium, 12=Old/Small, 22=Old/Medium.