EXTERNAL FACTORS IN THE PERFORMANCE OF FIRM VALUE

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Road Map

- Motivation and Hypotheses
- Measures of Firm Value
- Test Sample – S&P500
- Construction of Shocks
- Impact Innovations Regressions
    - Extreme Innovations Regressions
- Dynamics via Local Projections
- Summary

Motivation

What are the economic determinants of a firm's market value?

Belo, Gala, Salomao and Vitorino (2020) use a structural model, firm-level data of U.S. firms:

Labor: 14% to 22% of firms' market value,

Physical Capital: 30% to 40% ...

Knowledge Capital: 20% to 43% …

Brand Capital: 6% to 25% …

All internal factors…

Based upon the Neoclassical Theory of the Firm…

Motivation

Focus on **external factors**

Denote a value generating function:

$$V_{i,j,t} = V\left(\overbrace{\boldsymbol{X}_{i,j,t}}^{Internal} \ , \ \overbrace{\boldsymbol{Z}_{j,t}}^{External} \right)$$

Focus of three external factors:

Real, Risk and Market Structure

Motivation and Hypotheses

Consider $V(\,.\,,.\,)\ HD = 1$, and an **aggregate real factor,** for example aggregate capital. Then,

$$V_{i,j,t} = V\left(\boldsymbol{x}_{i,j,t}, \overline{\boldsymbol{x}}_t\right)$$

$$\overbrace{\Longrightarrow}^{Gen.\,Comp.\,Eq}$$

$$V_{i,j,t} = G(\,\boldsymbol{X}_t),$$

$$where\ G\ is\ HD = 1.$$

The Neoclassical case allows scale effects, Romer (1986, 1990): **Real Factors**

$$corr\ (V_{i,j,t}, \boldsymbol{z\_real}_t) > 0.$$

Motivation

However, it does not explain the expansion or contraction (boundaries) of the firm. Explanations for the expansion of the boundaries of the firm:

Transactions Costs and Incomplete Contracts; Williamson (1975, 1979, 1985): Make an investment, then if value is created, continue relationship, if value is not created, split relationship.

Property Rights: Hart and Moore (1990), Hart (1995): Ownership is a source of power (when there are transaction costs and incomplete contracts)

Motivation and Hypotheses

Unanticipated innovations/shocks (unforeseen events) ⇒ ownership determines control over the usage of the emerging asset ⇒ creates shareholder value

Empirical implication:

Unanticipated innovations/shocks impact market value

$$corr\ (V_{i,j,t}, \boldsymbol{u\_shocks}_t) \neq 0$$

Motivation and Hypotheses

Aggregate risk factors: Acharya, Almeida and Campello (2013) -- firms that face high aggregate risk have less opportunities to diversify idiosyncratic risks (because of less favorable financing opportunities) and decreased firm overall value

$$corr\ (V_{i,j,t}, \boldsymbol{z\_risk}_t) < 0.$$

Motivation and Hypotheses

Market Structure Factors impact on firm value: Ball and Mankiw (2021)

"The excess of (scaled) firm value (Q) over 1 equals the present value of pure profits from existing firms per unit." Given discount rates, market power raises rents and profitability and creates value.

Consider an **aggregate (market) structure factor,** $\boldsymbol{z\_mkts}_t$, for example, a measure of concentration. Then,

$$corr\ (V_{i,j,t}, \boldsymbol{z\_mkts}_t) > 0$$
$$\Leftrightarrow\ more\ rents, more\ value.$$

Motivation and Hypotheses

Lafontaine and Slade (2006): Expansion/contractions of firm boundaries correlated with aggregate measures of risk/uncertainty;

Upstream/downstream integration mitigates the risks faced by the firm and the consequent barriers to value creation.

Consider an **aggregate risk factor,** $\boldsymbol{z\_risk}_t$, for example, a market volatility index. Then,

$$corr\ (V_{i,j,t}, \boldsymbol{z\_risk}_t) \approx 0$$
$$\Leftrightarrow Expansions/Contractions$$

Motivation and Hypotheses

Additional Hypotheses:

Consequence of previous two: Consider an **aggregate risk factor,** $\boldsymbol{z\_risk}_t$. Then**,**

$$corr\ (V_{i,j,t}, \boldsymbol{z\_risk}_t) \neq 0 \iff$$
$$Upstream/downstream\ integration \iff$$
$$corr\ (V_{i,j,t}, \boldsymbol{z\_mkts\_risk}_t) \neq 0,$$

mitigates the risk diversification effect.

Motivation and Hypotheses

Additional Hypotheses:

Potential network effects: An **aggregate (market) structure factor** interacts with a **real factor**, for example, growth of output, inducing a spillover effect to firm value. Then,

$$corr\ (V_{i,j,t}, \boldsymbol{z\_mkts\_real}_t) \neq 0$$

Motivation and Hypotheses

Additional Hypotheses:

Bubbles – Herd Behavior in Firm Valuations? Shiller (2016)
Irrational Exuberance (dot com bubble, real estate bubble…)

$$Extreme\ Firm\ Valuations,$$
$$Lower\ dispersion\ valuations \Leftrightarrow$$
$$corr\ (extreme\_V_{i,j,t}, \boldsymbol{cs\_dispersion\_valuations}_t) < 0$$

Potential Bubble-Herd Behavior in Firm Value

$$Extreme\ Firm\ Valuations,$$
$$Higher\ dispersion\ valuations \Leftrightarrow$$
$$corr\ (extreme\_V_{i,j,t}, \boldsymbol{cs\_dispersion\_valuations}_t) > 0$$

Potential Rational Valuations

Motivation and Hypotheses

Dynamics:

Three external factors: Real, Risk and Market Structure

Which are more important?

Use Dynamics-Local Projections to infer the Forecast Error Variance Decomposition (FEVD) of contributions of sources of innovations to firm value.

Main Findings

External Factors explain, on average, from 19% to 28% of the FEV of firm value. Real and Risk shocks are equally relevant and most relevant. Market Structure shocks are least relevant.

Real effects and potential network spillovers: Aggregate Growth of GDP and interacted with Aggregate Firm Listings positively correlated with firm value (sensitive to TFP).

Risk Effects: All risk innovations impact negatively on Firm Value. Extreme upside unanticipated risk events more important for impact on firm value.

Market Structure Innovations have negligible direct impact on firm value

Potential evidence of gains from risk diversification in the expansion of firm boundaries. And Market Structure and Risk Innovations mitigate risk diversification of firm boundary expansion.

Evidence of potential bubble-herd behavior in firm valuations: For upside extreme valuations, not downside and not driven by stock returns.

Measures of Firm Value

Brainard and Tobin (1968), Tobin (1969), Hayashi (1982):

$$Q = \frac{market\ capitalization + total\ liabilities}{total\ assets}$$

Macro: Q, sufficient statistic for investment decisions; Fazzari, Hubbard, Petersen (1988), Gutiérrez, Philippon (2019)

Finance: Q, measure of firm market value (scaled); widely used and widely criticized; *Dybvig and Warachka (2010)*.

Measures of Firm Value

Brainard and Tobin (1968), Tobin (1969), Hayashi (1982):

$$Q = \frac{market\ capitalization + total\ liabilities}{total\ assets}$$

Simple Alternative: *Dybvig and Warachka (2010), Bartlett and Partnoy (2018)*

$$V = market\ capitalization + total\ liabilities*$$

Test Sample: S&P 500

Bloomberg data for firm and industry level

Quarterly unbalanced panel data from 1990Q1 to 2019Q4

60,108; time x firm observations*

Maximum time range is 120 periods.

1363 unique firms; 500 (502 and 505) at each period

147 industries categorized by the Level 3 Bloomberg Industry Classification System (BICS) compatible with SIC, NAICS.

Test Sample: S&P 500

S&P 500 index is a market value-weighted index

Components selected by committee; assess the company's merit using some primary criteria

Market capitalization must be greater than or equal to US$XX.X billion (representation of the industries in the economy of the United States, GICS)

Annual dollar value traded to float-adjusted market capitalization is greater than 1.0 (float, financial viability)

Minimum monthly trading volume of YYY,YYY shares in each of the six months leading up to the evaluation date (liquidity)

Must be publicly listed on either the New York Stock Exchange (including NYSE Arca or NYSE American) or NASDAQ (NASDAQ Global Select Market, NASDAQ Select Market or the NASDAQ Capital Market).

The company should be from the U.S. (domicile)

There is some arbitrariness in the committee selection of companies…

Test Sample: S&P 500

Siegel, Credit Suisse report (2017):

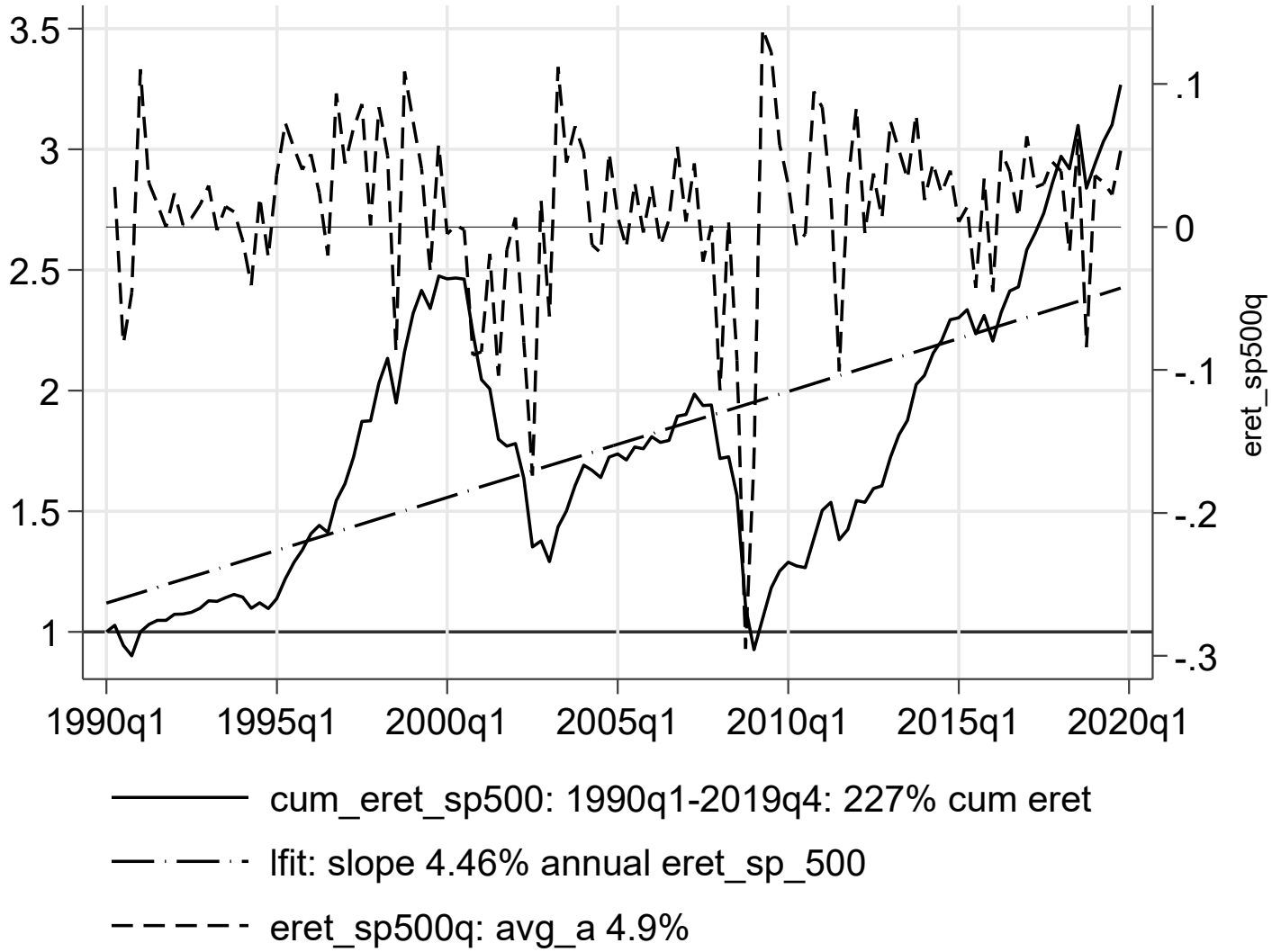
From 1958 to 2016: Average annual turnover rate: 4.2% approximately 20 changes per year.

Turnover in the S&P 500: mostly correlated with M&A activity, second to innovation [Other factors, including capital availability, stock prices, and the institutional concerns, influence M&A waves].

S&P 500 committee trading strategy: It buys high and sells low.

Contrarians to the index do better: Investors who bought the stocks that the committee removed from the S&P 500 (that still traded) and who sold short the stocks entering the S&P 500 would have earned a tidy excess return.

Test Sample: S&P 500 1990Q1 to 2019Q4



Test Sample: S&P 500 1990Q1 to 2019Q4

y_q/rank	co	indus1	totct	n_firms_undustry
1990q3			6760	
1	International Business Machines Corp	IT Services		6
2	Exxon Mobil Corp	Integrated Oils		8
3	General Electric Co	Electrical Power Equipment		2
4	Altria Group Inc	Tobacco		2
5	AT&T Corp	Telecom Carriers		11
Median				6
1997q4			9113	
1	General Electric Co	Electrical Power Equipment		2
2	Coca-Cola Co/The	Beverages		8
3	Microsoft Corp	Infrastructure Software		4
4	Exxon Mobil Corp	Integrated Oils		8
5	Merck & Co Inc	Large Pharma		7
Median				7
2019q4			5799	
1	Apple Inc	Communications Equipment		7
2	Microsoft Corp	Infrastructure Software		7
3	Alphabet Inc	Internet Media		5
4	Amazon.com Inc	E-Commerce Discretionary		2
5	Facebook Inc	Internet Media		5
Median				5

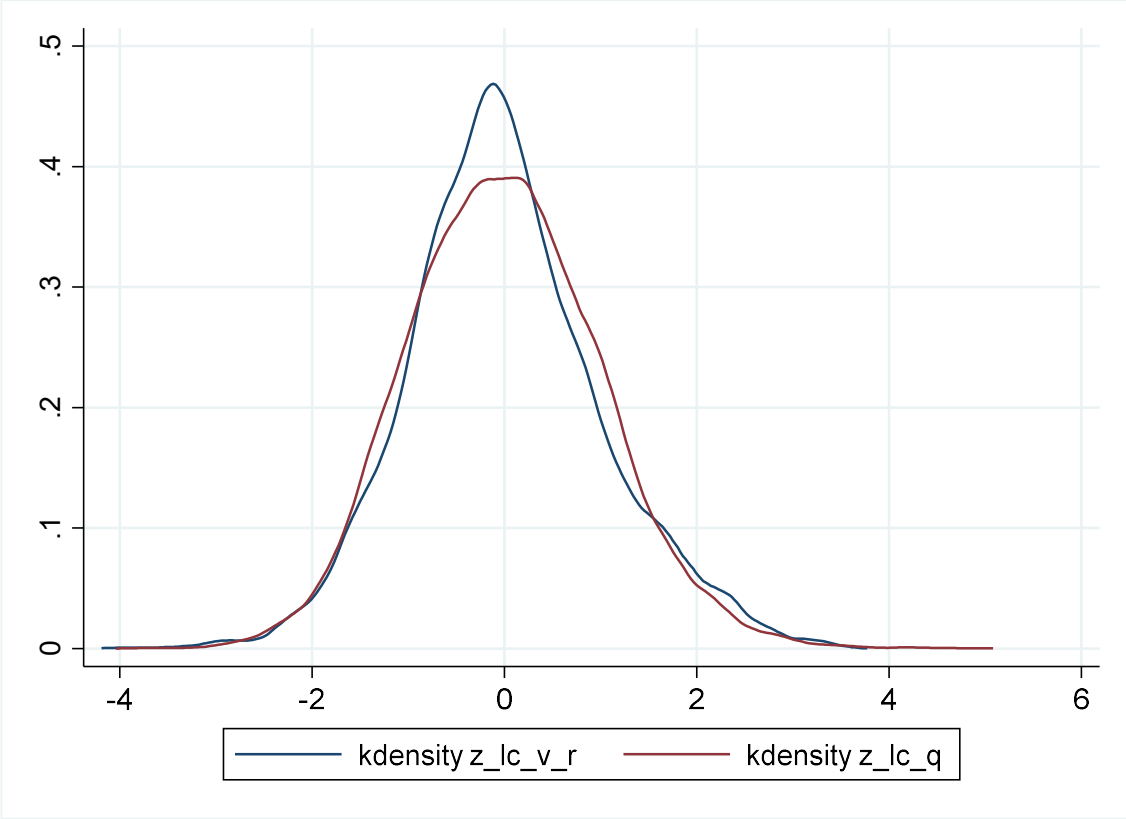
Test Sample: S&P 500

1999Q1 to 2019Q4

M&A-Spin-Off Turnover

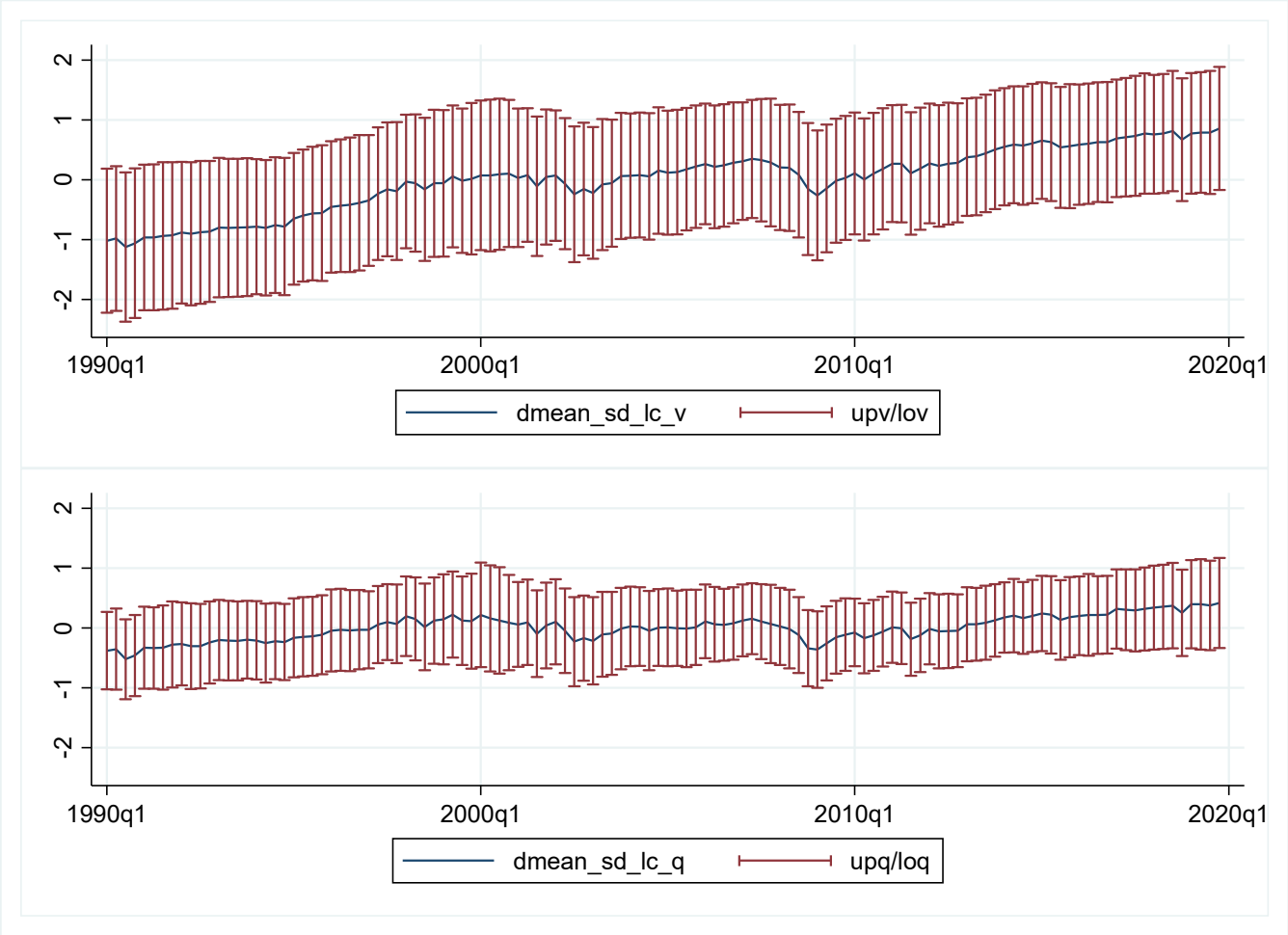
Test Sample: S&P 500
1990Q1 to 2019Q4

Measures of Firm Value



variable	mean	sd	skewness	kurtosis	N
lc_v_r	23.44632	1.200786	.2639592	3.42551	49470
lc_q	1.493385	.6994945	.2078473	3.226643	49467

Test Sample: S&P 500
1990Q1 to 2019Q4
Measures of Firm Value



Construction of Shocks: Unanticipated Innovations

Ramey (2011, 2016), Stock and Watson (2018), Baek and Lee (2021).

Use a reduced form VAR. Let the vector of observable aggregate external variables be

$$\boldsymbol{Z} = [\, Z_{1t}, \dots, Z_{8t}]'$$

and the vector of reduced form innovations be

$$\boldsymbol{\epsilon} = [\, \epsilon_{1t}, \dots, \epsilon_{8t}]'$$

with variance-covariance matrix $\boldsymbol{\Omega} \neq \boldsymbol{I}$. A reduced form VAR is then,

$$\emptyset(L)\boldsymbol{Z} = \boldsymbol{\epsilon}$$

where $\emptyset(L)$ is a finite polynomial in the lag operator.

Using an information criteria, find the optimal lag length, then estimate $\widehat{\emptyset(L)}$. Predict the residuals, equation-by-equation,

$$\hat{\boldsymbol{\epsilon}} = [\, \widehat{\epsilon_{1t}}, \dots, \widehat{\epsilon_{8t}}]',$$

$\hat{\boldsymbol{\epsilon}}$ are the estimated unanticipated innovations used in the analysis.

Categories of Innovations

Real Innovations:

Z_{1t} = Growth of Real U.S. GDP (FRED)

Z_{2t} = Gross Fixed Capital Formation (U.S. Real) (FRED)

Risk Innovations:

Z_{3t} = VIX (SP500 expected volatility based on call and put 30-day options)

Z_{t4} = Fama-French Profitability factor [difference between the returns of firms with robust (high) and weak (low) operating profitability]

Z_{5t} Realized volatility: cross sectional standard deviation of market value of S&P500 firms in the sample period

Categories of Innovations

Market Structure Innovations:

Z_{6t} = Concentration Herfindahl-Hirschman Index (HHI): Firm i and industry j,

$$HHI_{j,t} = \sum_{i=1}^{N} s_{ij,t}^2 = \sum_{i=1}^{N} (\frac{r_{ij,t}}{R_{j,t}})^2$$

where $HHI_{j,t} \in [0,1]$ is the (normalized) measure for market concentration of industry *j* at time *t*, and $s_{i,t}^2$ is the squared value of the market share of the *i*th firm in industry *j* at time *t*.

Z_{7t} = Market Share: market share of firm i in industry j, calculated as

$$s_{i,j,t} = \frac{r_{i,t}}{R_{j,t}} = \frac{Firm\ Revenue_{i,j,t}}{Industry\ Revenue_{j,t}}.$$

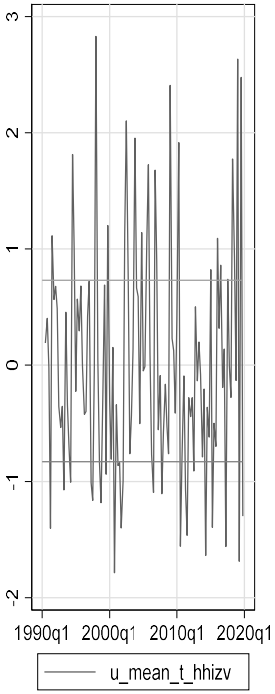
Z_{8t} = Total Number of Listed Firms in the U.S.: Total Market Count Index from the Center for Research in Security Prices (CRSP). This index includes operating companies that are listed on Nasdaq, NYSE, and AMEX. Excludes limited partnerships, closed-end funds, REITS, and ETFs.

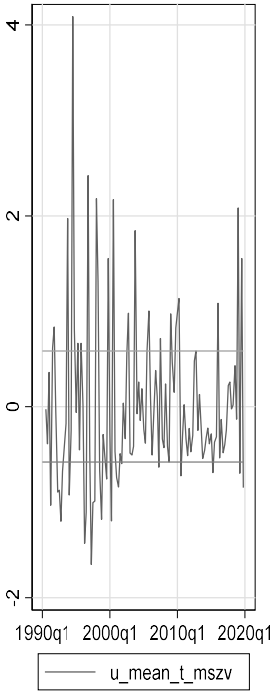
Innovations
Descriptive Statistics

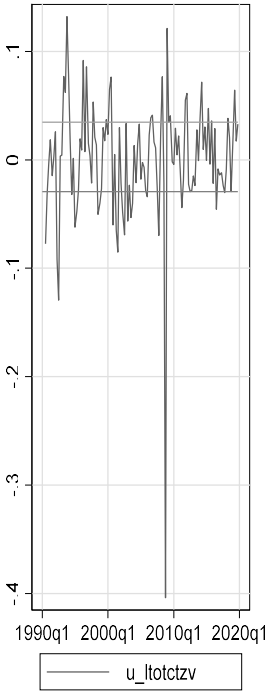
variable	sd	skewness	kurtosis	N
u_lrgdpgrzv	0.842	-0.975	6.584	118
u_lgfcfzv	0.042	-0.378	4.356	118
u_lvixzv	0.560	1.594	7.717	118
u_rmwzv	0.939	0.359	5.875	118
u_cs_sd_lc_vzv	0.254	0.392	3.683	118
u_mean_t_hhizv	0.992	0.659	3.193	118
u_mean_t_mszv	0.880	1.514	6.564	118
u_ltotctzv	0.058	-2.825	22.109	118

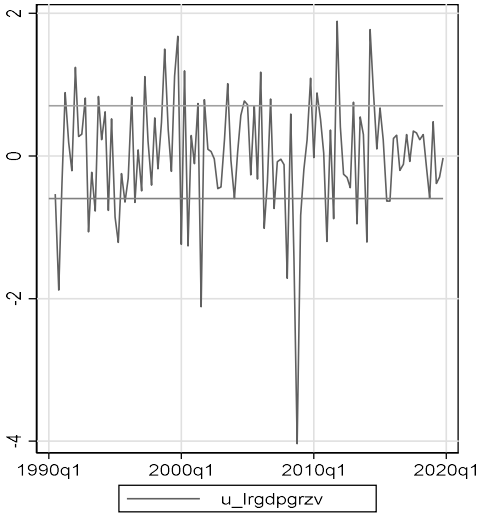
Leptokurtic

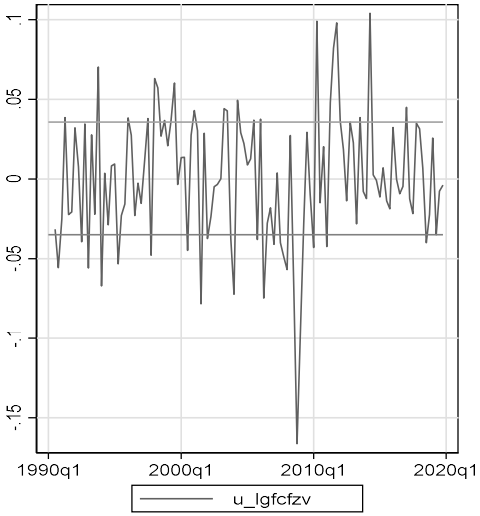
Innovations Time Plots

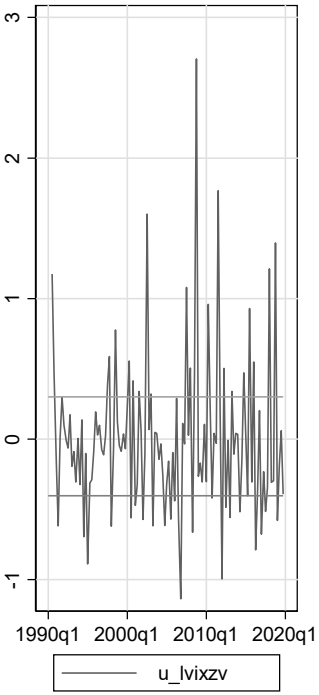


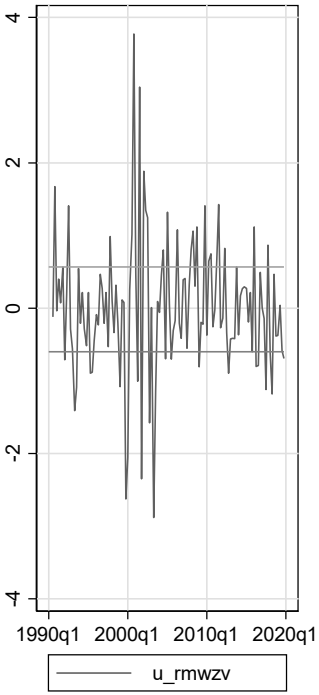


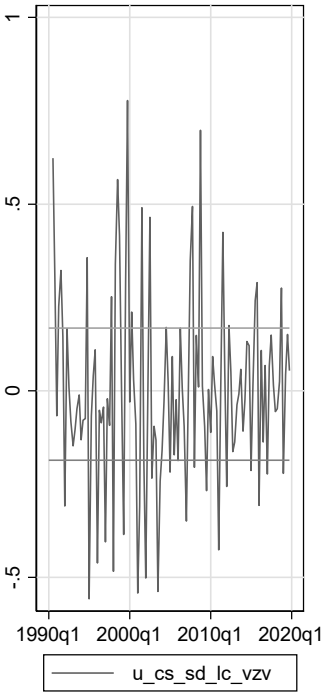












Controls: Descriptive Statistics

Internal Factors and other External Factors

variable	skewness	kurtosis	N
z_net_debtequity	60.30	5103.92	56855
z_eps	7.32	5238.67	56286
z_intang	6.83	76.85	38339
z_other_intang	3.60	266.24	30129
z_altman	47.21	2677.08	43129
z_liquidity_curr_ratio	4.32	40.13	48845
z_EBIT	4.67	127.90	52849
eret_co_madjsp	-3.49	74.92	55366
lnfirms	-0.29	2.72	17640
lavg_size	-0.03	3.79	17640
dtfp	-0.00	3.79	120
dlp	0.41	3.92	120
finprem	3.36	19.45	120

Impact Innovations Regressions

$$logV_{i,j,t}$$

$$= \beta_o + \boldsymbol{\beta}\ \boldsymbol{u\_shock'}_t + \sum_p \rho_p\ logV_{i,j,t-p}$$

$$+ \sum_k \sum_q \pi_{k,q}\ X_{k,i,j,t-q} + \boldsymbol{\lambda}\left(\boldsymbol{Firm'}_{i,j}\right)$$

$$+ \boldsymbol{\varphi}\ (\boldsymbol{Year}, \boldsymbol{Quarter})' + \delta\ log(\widehat{assets})_{i,j,t} + v_{i,j,t}$$

where internal IV for $log(assets)_{i,j,t}$ are four quarters lagged values. If $V = Q$, no IV.

Weight: $\log(avg\_size_{j,t})$; standard errors clustered by t

Impact Innovations: Real

	(1)	(2)
	lc_v_r	lc_v_r
lc_assetsz	-0.00709*	-0.00685*
u_lrgdpgrzv	0.0223**	
	[.0290]	
u_lgfcfzv		0.163
N	20105	20105
First-Stag~F	3147.0	3151.6
Hansen-J	0.707	0.749
p-val	0.872	0.862

* p<0.05, ** p<0.01, *** p<0.001

Impact Innovations: Risk

	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
lc_assetsz	-0.00709*	-0.00727*	-0.00738**
u_lvixzv	-0.0616***		
	[-.0434]		
u_rmwzv		-0.0202**	
		[-.0235]	
u_cs_sd_~vzv			-0.196***
			[-.0695]
N	20105	20105	20105
First-Stag~F	3150.0	3160.1	3144.1
Hansen-J	0.343	0.426	1.344
p-val	0.952	0.935	0.719

* p<0.05, ** p<0.01, *** p<0.001

Impact Innovations: Structure

	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
lc_assetsz	-0.00667*	-0.00679*	-0.00671*
u_mean_t_h~v	-0.00441		
u_mean_t_m~v		0.00129	
u_ltotctzv			0.177
N	20105	20105	20105
First-Stag~F	3169.6	3164.7	3147.0
Hansen-J	0.783	0.690	0.582
p-val	0.854	0.876	0.901

* p<0.05, ** p<0.01, *** p<0.001

M&A-Spin-Off Turnover and Risk Innovations

Sample 2005q1-2019q4; Industry fixed effects.

	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
lc_assetsz	-0.0179***	-0.0177***	-0.0178***
maso_dummy	0.0200	0.0205	0.0201
maso_dummy_vixv	0.00360		
u_lvixzv	-0.0515***		
maso_dummy_rmwv		-0.00279	
u_rmwzv		-0.00407	
maso_dummy_csv			0.0224
u_cs_sd_lc_vzv			-0.177***
N	15164	15164	15164
First-Stage F	7483.9	7476.0	7494.1
Hansen-J	0.500	1.132	1.363
p-val	0.919	0.769	0.714

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Structure Innovations and Growth Innovations

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
lc_assetsz	-0.0171***	-0.0172***	-0.0172***
u_lrgdpgrzv	0.0237***	0.0214***	0.0190***
u_mean_t_hhizv	-0.00634		
growth_hhiv	-0.000278		
u_mean_t_mszv		0.000649	
growth_msv		-0.0114	
u_ltotctzv			0.400**
growth_ltcv			0.163***
N	20113	20113	20113
First-Stage F	8517.7	8504.8	8486.9
Hansen-J	1.077	0.924	0.509
p-val	0.783	0.820	0.917

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Structure Innovations and Risk Innovations

	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
lc_assetsz	-0.00698**	-0.00710**	-0.00728**
vix_hhiv	-0.00388		
vix_msv		-0.00849	
vix_ltcv			-0.00837+
N	20105	20105	20105
First-Stage F	3166.1	3164.3	3147.7
Hansen-J	0.402	0.337	0.294
p-val	0.940	0.953	0.961
lc_assetsz	-0.00713**	-0.00731**	-0.00743***
rmw_hhiv	0.000794		
rmw_msv		0.00624	
rmw_ltcv			-0.0172**
N	20105	20105	20105
First-Stage F	3175.1	3165.2	3157.1
Hansen-J	0.488	0.453	0.349
p-val	0.921	0.929	0.951
lc_assetsz	-0.00720**	-0.00730**	-0.00751***
cs_hhiv	-0.00733		
cs_msv		-0.0203	
cs_ltcv			-0.0450***
N	20105	20105	20105
First-Stage F	3150.1	3158.7	3136.8
Hansen-J	1.696	1.404	0.873
p-val	0.638	0.705	0.832

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Results I: Impact Innovations

GDP Growth shocks: $corr\ (V_{i,j,t}, \boldsymbol{u\_grGDP}_t) > 0$

All Risk Shocks: $corr\ (V_{i,j,t}, \boldsymbol{z\_risk}_t) < 0$

All Structure Shocks: $corr\ (V_{i,j,t}, \boldsymbol{z\_mkts}_t) \approx 0$

M&A-Spin-Off Turnover and Risk Factors: $corr\ (V_{i,j,t}, \boldsymbol{maso\_z\_risk}_t)$ $\approx$ 0 (Evidence of profitability, future and realized volatility risk diversification with expansions)

Aggregate Firm Listings and Growth Innovations (Potential Network spillovers): $corr\ (V_{i,j,t}, \boldsymbol{u\_grGDP}_t\boldsymbol{\_u\_ltct}_t) > 0$ (Sensitive to TFP)

Aggregate Firm Listings and Risk Innovations: $corr\ (V_{i,j,t}, \boldsymbol{u\_risk_t})$<0 (Mitigate risk diversification of firm boundary expansion; but not concentration and market share)

Impact Innovations Regressions: Extremes

$$logV_{i,j,t}$$

$$= \beta_o + \boldsymbol{\beta}\,(\boldsymbol{DU}, \boldsymbol{DL})'_t + \sum_p \rho_p\, logV_{i,j,t-p}$$

$$+ \sum_k \sum_q \pi_{k,q}\, X_{k,i,j,t-q} + \boldsymbol{\lambda}\left(\boldsymbol{Firm}'_{i,j}\right)$$

$$+ \boldsymbol{\varphi}\,(\boldsymbol{Year}, \boldsymbol{Quarter})' + \delta\, log(\widehat{assets})_{i,j,t} + v_{i,j,t}$$

where internal IV for $log(assets)_{i,j,t}$ are four quarters lagged values. If $V = Q$, no IV.

Weighted: $\log\left(avgsize_{j,t}\right)$; standard errors clustered at t;

$$DU = 1\ if\ u\_* > p(80)$$

$$DL = 1\ if\ u\_* < p(20)$$

Real Innovations – Extremes

	(1)	(2)
	lc_v_r	lc_v_r
lc_assetsz	-0.00696**	-0.00679**
DU_y	0.000685	
DL_y	-0.0443***	
DU_gf		0.00469
DL_gf		-0.00368
N	20105	20105
First-Stage F	3142.7	3157.5
Hansen-J	0.614	0.730
p-val	0.893	0.866

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Risk Innovations – Extremes

	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
lc_assetsz	-0.00750***	-0.00712**	-0.00785***
DU_v	-0.0618***		
DL_v	0.0240**		
DU_p		-0.0343***	
DL_p		0.0143	
DU_sd			-0.0716***
DL_sd			-0.0138
N	20105	20105	20105
First-Stage F	3149.5	3157.8	3140.5
Hansen-J	0.279	0.454	0.712
p-val	0.964	0.929	0.870

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Structure Innovations – Extremes

	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
lc_assetsz	-0.00682**	-0.00669**	-0.00672**
DU_h	0.00617		
DL_h	0.00467		
DU_ms		-0.0168	
DL_ms		0.0242	
DU_lt			0.0183
DL_lt			-0.0499**
N	20105	20105	20105
First-Stage F	3158.0	3163.1	3144.4
Hansen-J	0.712	0.715	0.479
p-val	0.870	0.870	0.924

+ p<0.10, * p<.05, ** p<.025, *** p<.01

M&A-Spin-Off Turnover and Risk Innovations: Extremes

Sample 2005q1-2019q4; Industry fixed effects.

	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
lc_assetsz	-0.0178***	-0.0177***	-0.0176***
maso_dummy	0.0216	0.0263+	0.0230+
DU_v	-0.0490***		
maso_dummy_DU~x	0.00107		
DL_v	0.0164		
maso_dummy_DL~x	-0.00757		
DU_p		-0.0214	
maso_dummy_DUp		-0.0126+	
DL_p		-0.00945	
maso_dummy_DLp		-0.0169	
DU_sd			-0.0185
maso_dummy_DUsd			-0.0167+
DL_sd			0.0145
maso_dummy_DLsd			0.00382
N	15164	15164	15164
First-Stage F	7449.5	7381.4	7465.3
Hansen-J	0.431	1.152	1.192
p-val	0.934	0.765	0.755

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Structure and Real Innovations: Extremes

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
lc_assetsz	-0.0169***	-0.0170***	-0.0170***
DU_y	0.000392	0.0126	-0.00893
DL_y	-0.0200	-0.0331**	-0.0501***
DU_h	0.0206		
DL_h	0.0119		
DUyDUh	0.0284		
DLyDLh	-0.142***		
DUyDLh	0.0146		
DLyDUh	-0.0578		
DU_ms		0.000752	
DL_ms		0.00786	
DUyDUms		-0.0840	
DLyDLms		-0.0191	
DUyDLms		0.0374	
DLyDUms		-0.0846	
DU_lt			0.0268
DL_lt			-0.0722***
DUyDUlt			-0.0195
DLyDLlt			0.0182
DUyDLlt			0.0704+
DLyDUlt			-0.0173
N	20113	20113	20113
First-Stage F	8511.3	8504.8	8497.1
Hansen-J	1.292	1.208	0.674
p-val	0.731	0.751	0.879

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Structure and Risk Innovations: Extremes

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
VIX			
DUvDLh	-0.0862**		
DLvDLms		-0.113***	
DUvDLlt			-0.0715***
N	20105	20105	20105
First-Stage F	3147.3	3149.8	3144.5
Hansen-J	0.162	0.529	0.211
p-val	0.983	0.913	0.976
RMW			
DUpDLms		0.107***	
DLpDUms		-0.130***	
DLpDLlt			0.0984**
N	20105	20105	20105
First-Stage F	3157.1	3168.0	3133.5
Hansen-J	0.416	0.452	0.818
p-val	0.937	0.929	0.845
SD			
DUsdDUms		0.110***	
DLsdDUms		0.0610**	
DLsdDLlt			0.112***
N	20105	20105	20105
First-Stage F	3146.8	3156.4	3142.7
Hansen-J	0.574	0.659	1.103
p-val	0.902	0.883	0.776

** p<.025, *** p<.01

Structure and Risk Innovations: Extremes

	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
VIX			
DUvDLh	-0.0862**		
DLvDLms		-0.113***	
DUvDLlt			-0.0715***
N	20105	20105	20105
First-Stage F	3147.3	3149.8	3144.5
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** p<.025, *** p<.01

Herd Behavior and Firm Value: Extreme Valuations

	(1)	(2)	(3)	(4)	(5)	(6)
	cs_sd_lc_v	cs_sd_lc_q	cs_sd_lc_v	cs_sd_lc_q	cs_sd_lc_v	cs_sd_lc_q
lc_assetsz	0.0000113		-0.000178+		-0.000136	
lc_asset~2	0.000193		0.000135		0.00000501	
DU_vr	-0.000892**					
DL_vr	0.00322***					
DU_vq		-0.000707***				
DL_vq		0.00198***				
DU_ermsp			0.00237	0.000172		
DL_ermsp			0.0133***	0.0115***		
DU_ermd					0.00454	0.00415***
DL_ermd					0.0158***	0.0164***
_cons		0.712***		0.741***		0.705***
N	20162	20779	20162	20779	20162	20779
First-St~F	939.9		960.6		961.5	
Hansen-J	2.195		0.683		3.003	
p-val	0.901		0.995		0.809	
ar2						
F		1635.8		2685.4		5491.9

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Results II: Extremes

Evidence of potential bubble-herd behavior in firm valuations: For upside extreme valuations, not downside extreme valuations and not driven by stock returns.

Extreme GDP Growth Innovations, only extreme downside risk: $corr\ (V_{i,j,t}, \boldsymbol{u\_grGDP\_DL}_t) > 0$

Extreme Risk Innovations, only extreme upside risk: $corr\ (V_{i,j,t}, \boldsymbol{z\_risk\_DU}_t) < 0$

Extreme Structure Innovations: only extreme downside risk for Aggregate Firm Listings: $corr\ (V_{i,j,t}, \boldsymbol{u\_ltct\_DL}_t) < 0$

M&A-Spin-Off Turnover and Extreme Risk: $corr\ (V_{i,j,t}, \boldsymbol{maso\_z\_risk\_D}_t) \approx 0$ (Evidence of profitability, future volatility and realized risk diversification with expansions, only marginal effects of profitability and realized volatility)

Extreme aggregate market structure and aggregate risk innovations: Diversify Concentration; Not Aggregate Firm Listings, not Market Share

Dynamics – Local Projections

Local projections dynamic regressions, Jorda (2005), Plagborg-Møller and Wolf, (2021), Lee, Plagborg-Møller and Wolf, (2021):

$$logV_{i,j,t+h}$$

$$= \alpha^h + \beta^h u\_shock_t + \sum_p \rho_p^h logV_{i,j,t-p} + \sum_k \sum_q \pi_{k,q} X_{k,i,j,t-q}$$

$$+ \sum_m \sum_q \boldsymbol{\beta_m^h u\_shock'_{t-q}} + \boldsymbol{\lambda}\left(\boldsymbol{Firm'}_{i,j}\right) + \boldsymbol{\varphi}\left(\boldsymbol{Year}, \boldsymbol{Quarter}\right)'$$

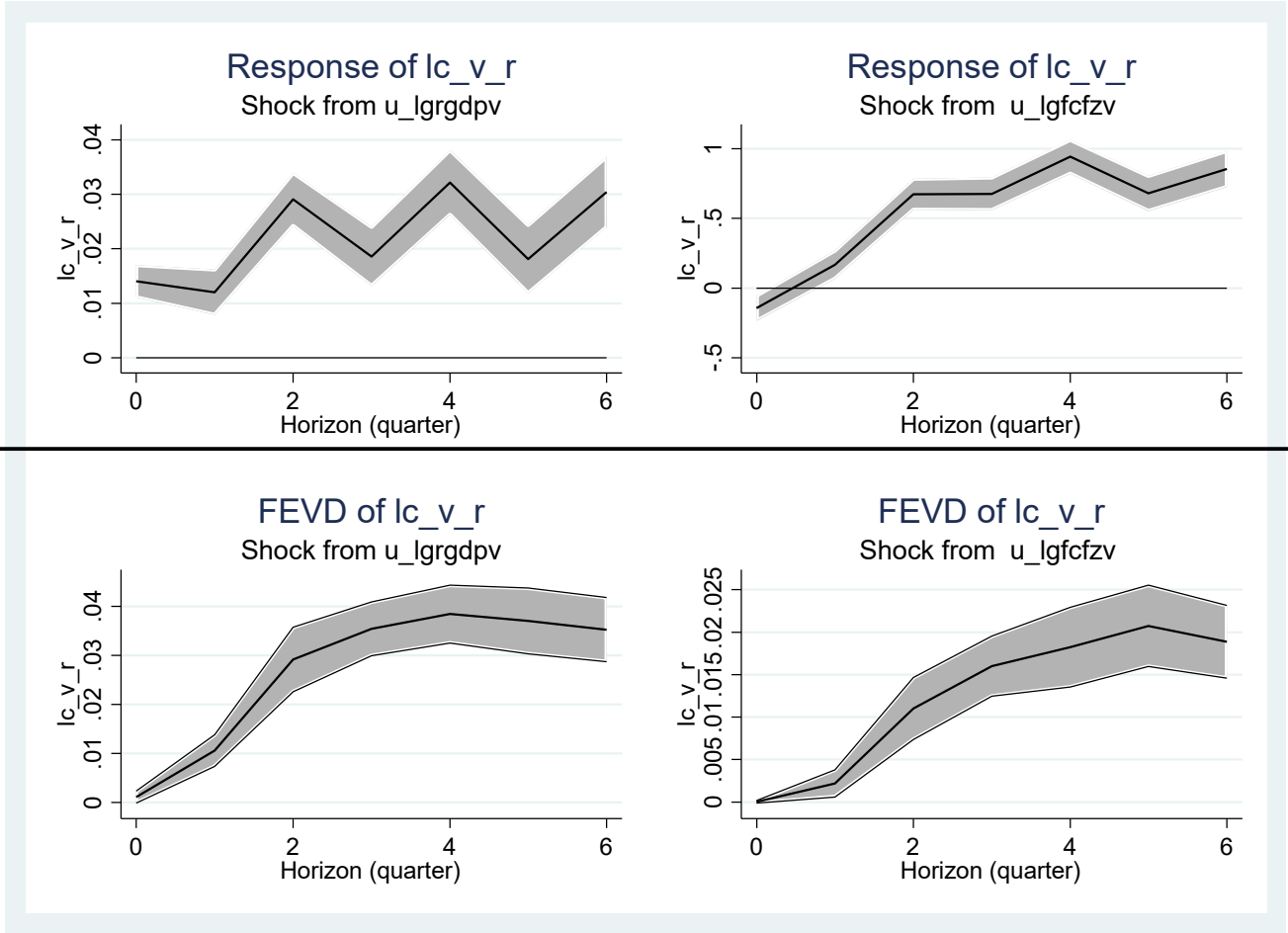
$$+ \varepsilon_{i,j,t+h},$$

where $\log(assets)_{i,j,t}$, $\log(avgsize)_{j,t}$, included in X.

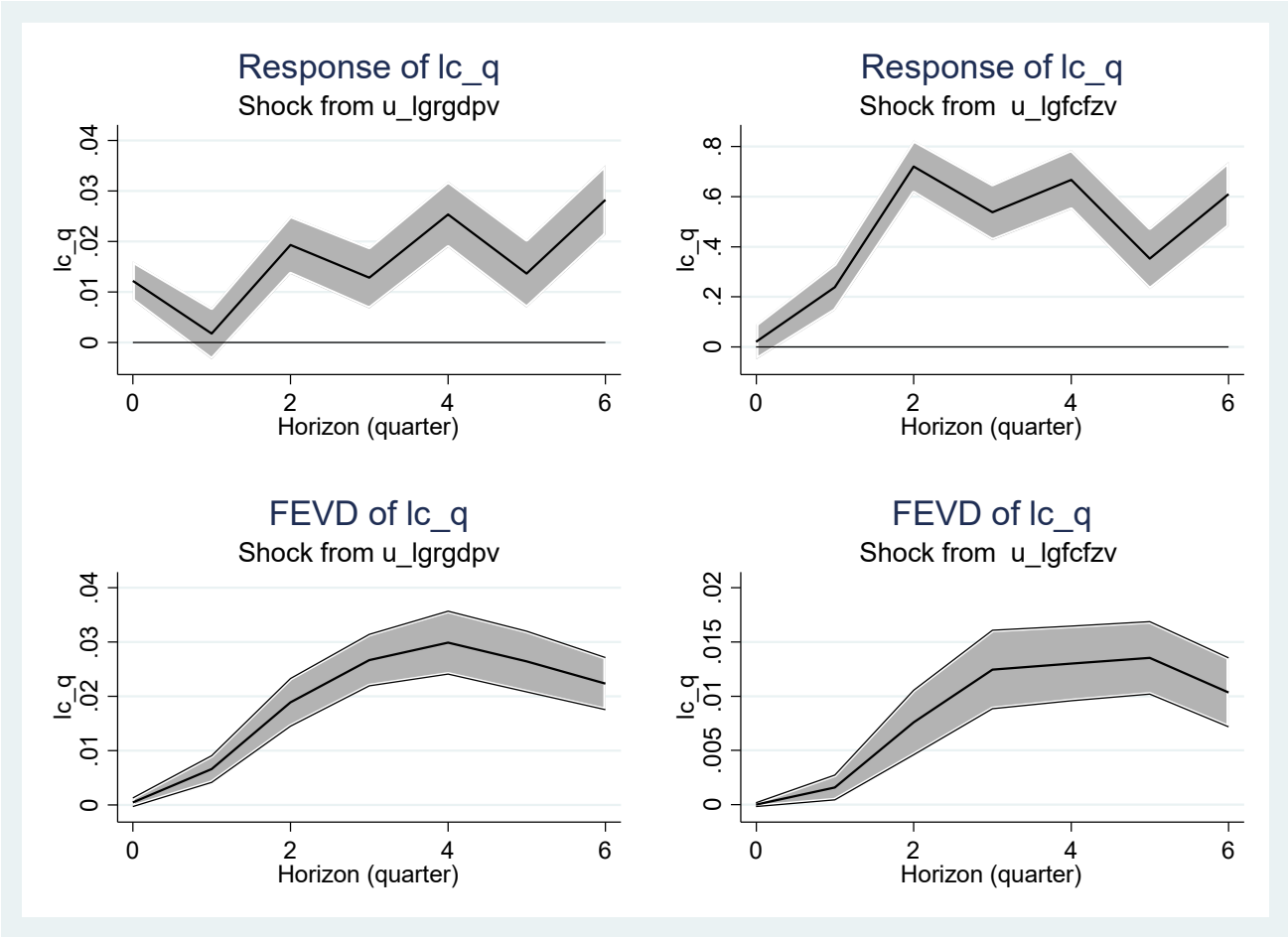
IRF: Impulse responses to a shock, u_shock_t can be traced by β^h for *h* = 0, 1, …, 6 (6 quarters horizon).

FEVD: Respective forecast error variance decompositions (FEVD) of innovations calculated using Gorodnichenko and Lee (2020), R^2 method.

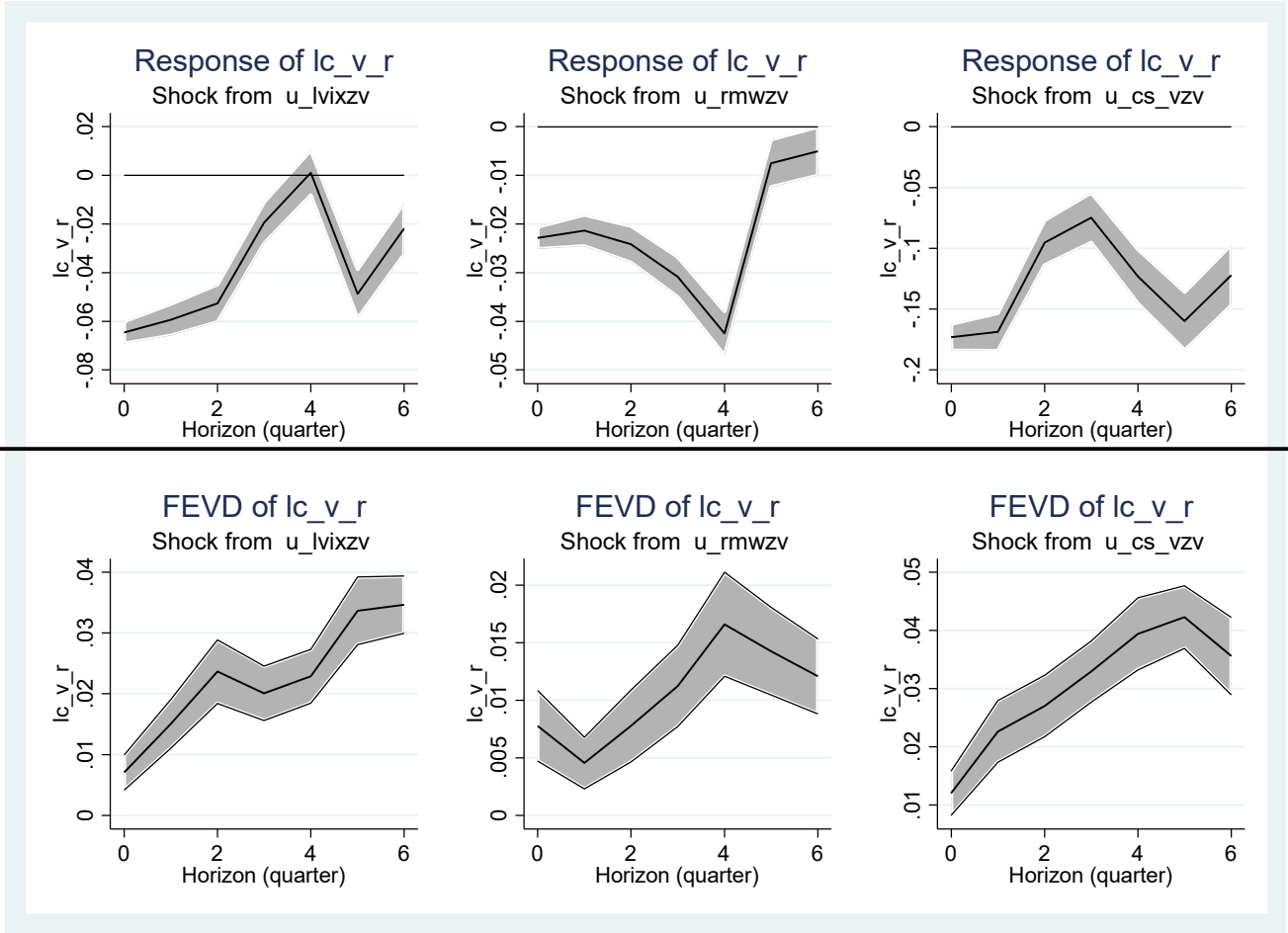
Dynamics: Real Innovations - V



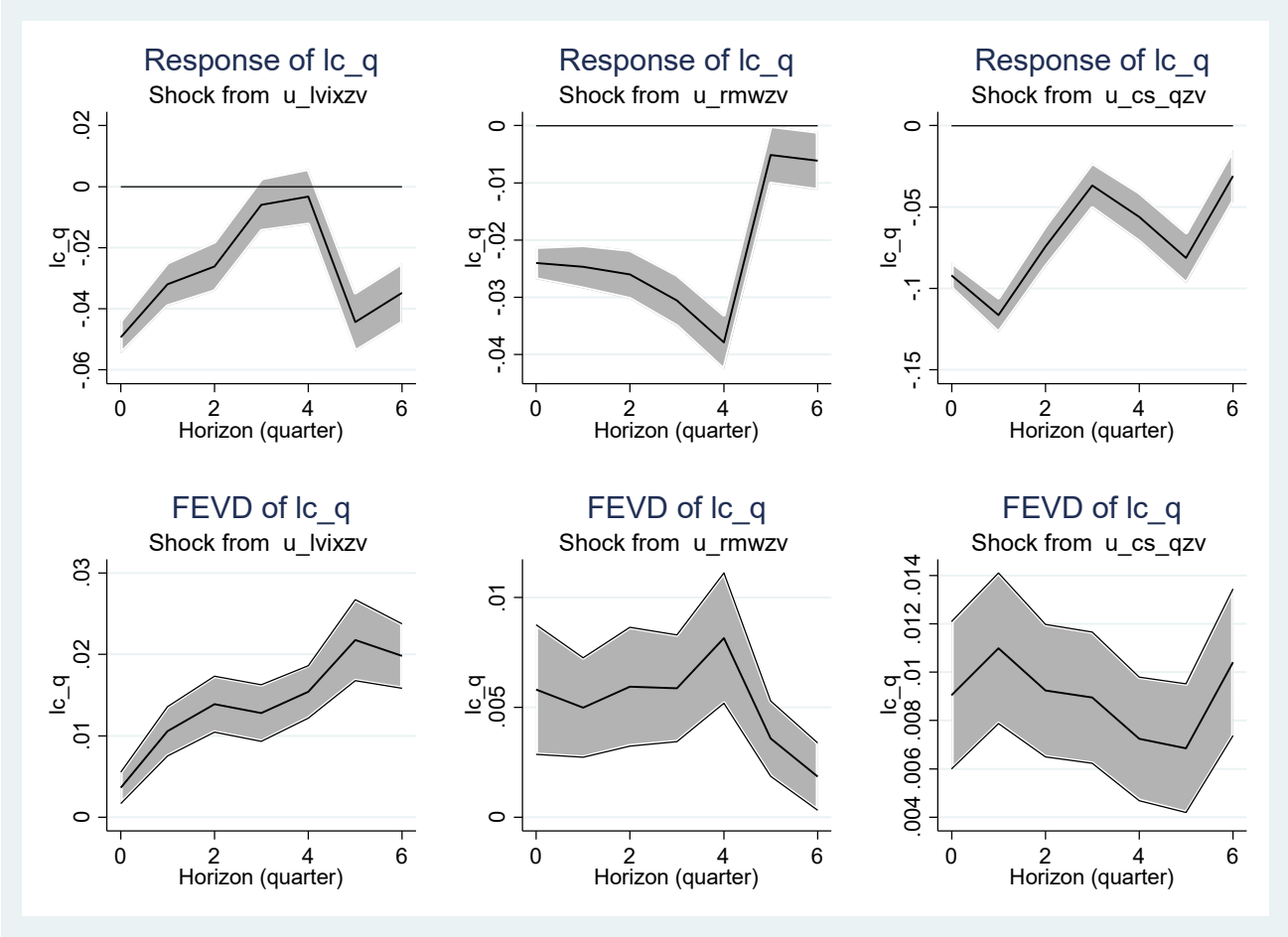
Dynamics: Real Innovations - Q



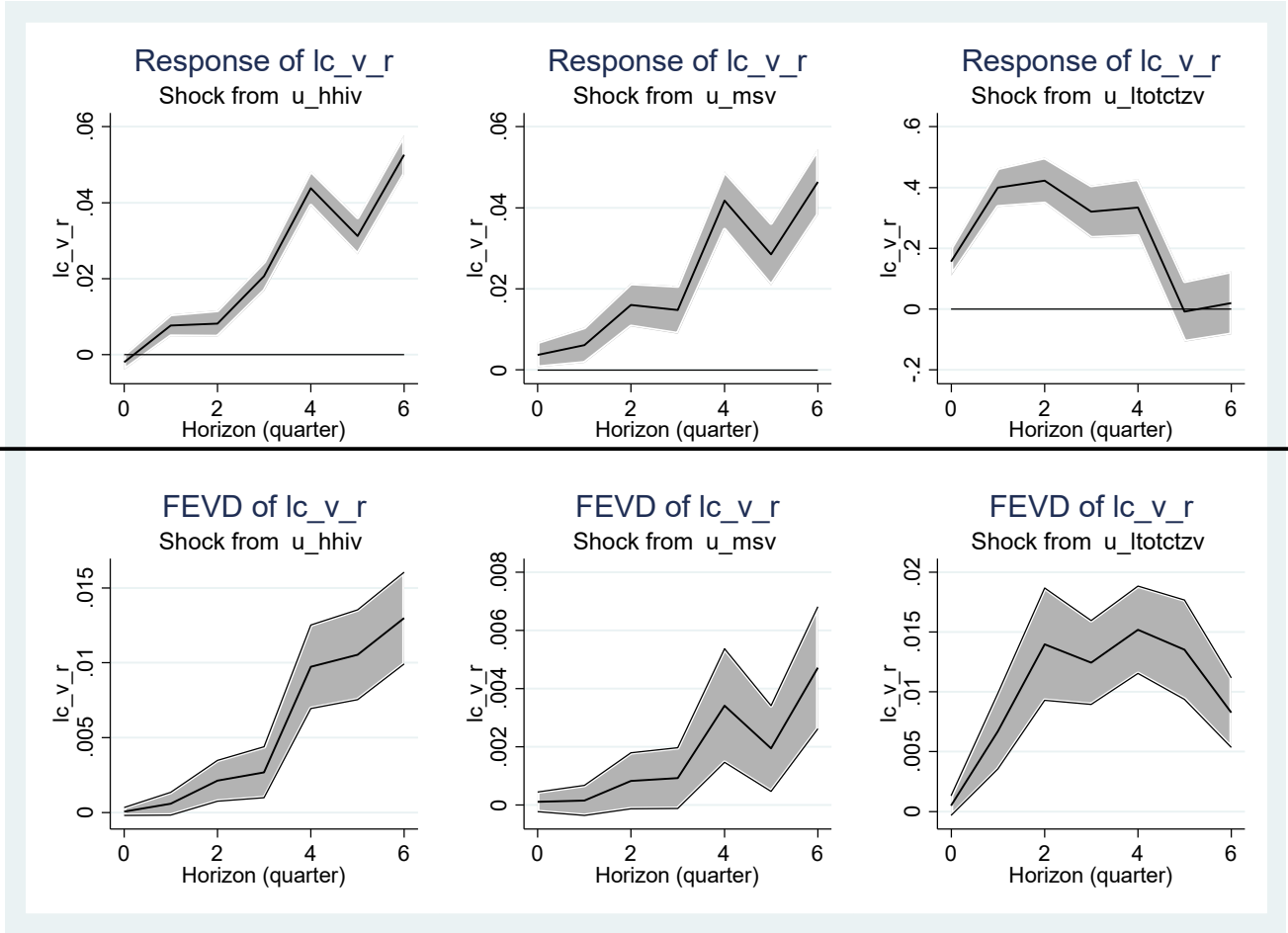
Dynamics: Risk Innovations - V



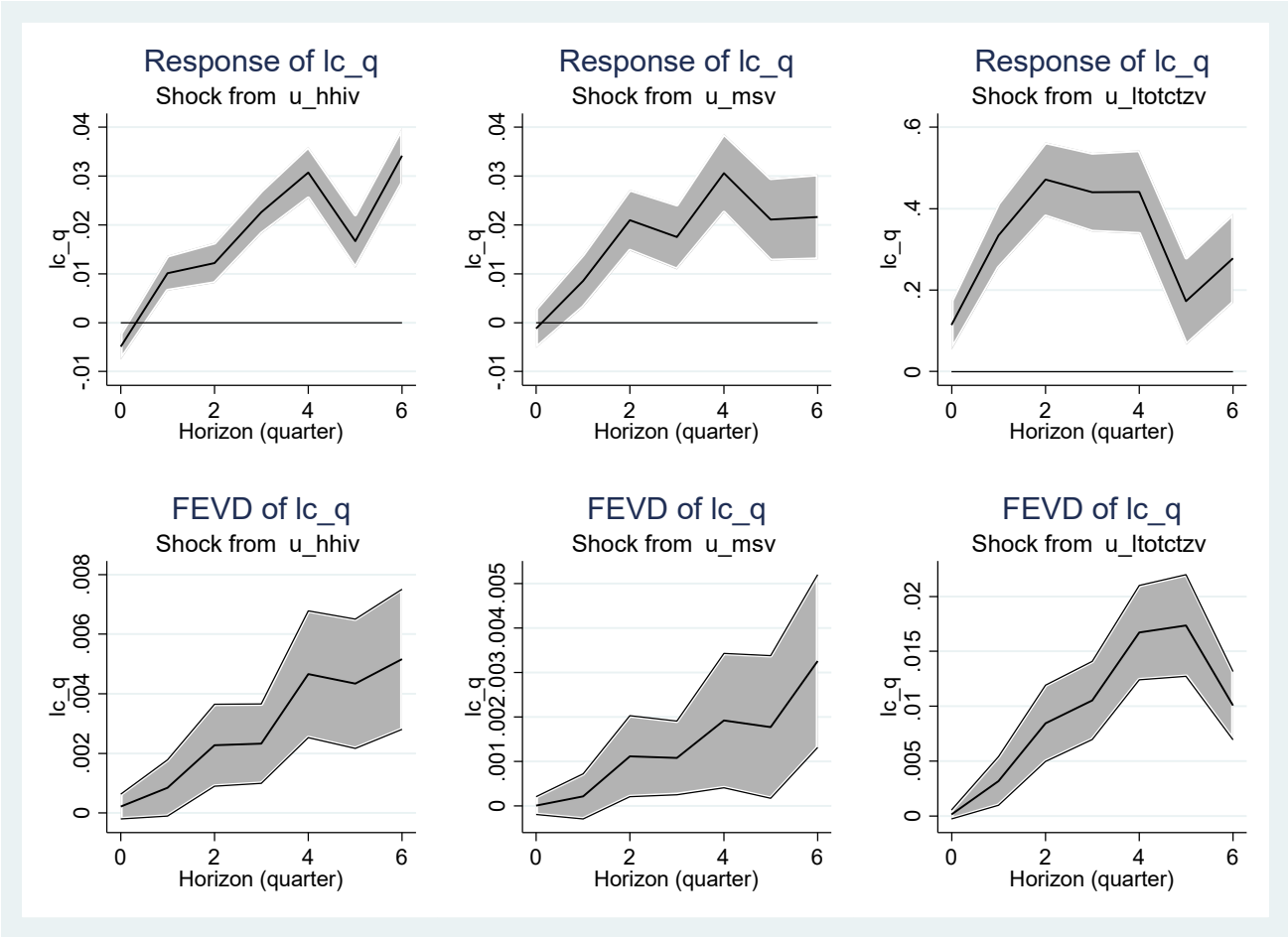
Dynamics: Risk Innovations - Q



Dynamics: Structure Innovations - V



Dynamics: Structure Innovations - Q



Results III: Dynamics - FEVD Relative Importance

	FEVD		
Average Per Quarter (Cummulated 6 quarters)			
Variable	lc_v_r	lc_q	
Shock	Sum(u_*v)	Sum(u_*v)	
Real	13.1%	9.5%	
Risk	14.5%	6.6%	
Structure	0.5%	3.2%	
Total	28.0%	19.2%	

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Total	28.0%	19.2%	

Real and Risk shocks are equally relevant and most relevant

Market Structure shocks are least relevant, effect driven by Aggregate Firm Listings

External Factors explain, on average, from 19% (Q)

to 28% (V) of the FEV of firm value

Summary

External Factors could be important, and complementary to internal factors in determining Firm Value.

Summary

Impact effects:

Real effects and potential network spillovers: Aggregate Growth of GDP and interacted with Aggregate Firm Listings positively correlated with firm value. Extreme downside unanticipated events more important for impact on firm value.

Risk Effects: All risk innovations impact negatively on Firm Value. Extreme upside unanticipated risk events more important for impact on firm value.

Potential evidence of gains from risk diversification in the expansion of firm boundaries: No risk factors relevant for M&A-S-O turnover; only marginally relevant at extreme innovations.

Market Structure Innovations have negligible direct impact on firm value. Downside unanticipated events of Aggregate Firm Listings more important for impact on firm value.

Market Structure and Risk Innovations: Mitigate risk diversification of firm boundary expansion. At extremes: Diversify Concentration; Not Aggregate Firm Listings, not Market Share.

Evidence of potential bubble-herd behavior in firm valuations: For upside extreme valuations, not downside and not driven by stock returns.

Summary

Dynamics (Local Projections):

External Factors explain, on average, from 19% to 28% of the FEV of firm value

Real and Risk shocks are equally relevant and most relevant

Market Structure shocks are least relevant, effects driven by Aggregate Firm Listings.

Moving Forward

V or Q?

Real Innovations effects depend on Total Factor Productivity and Labor Factor Productivity as RHS variables; more sensitive in the dynamics but not in the FEVD…

Better data on M&A and Spin-offs…

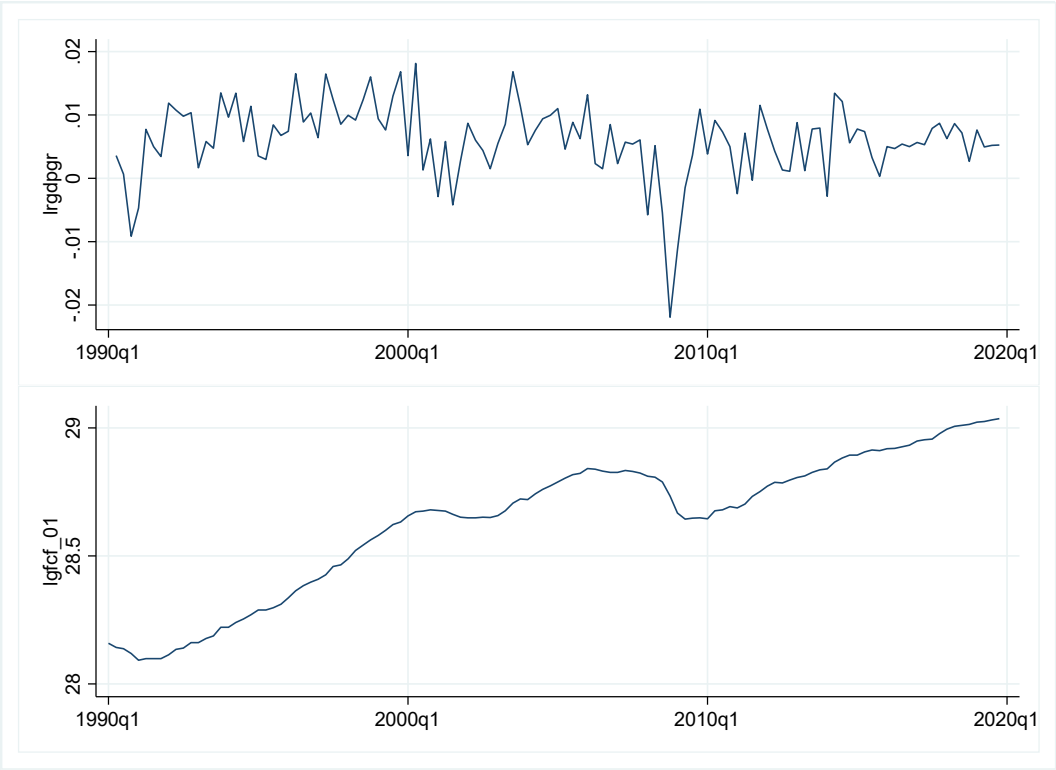
More evidence on bubbles-herd behavior of valuations…

Thank You!

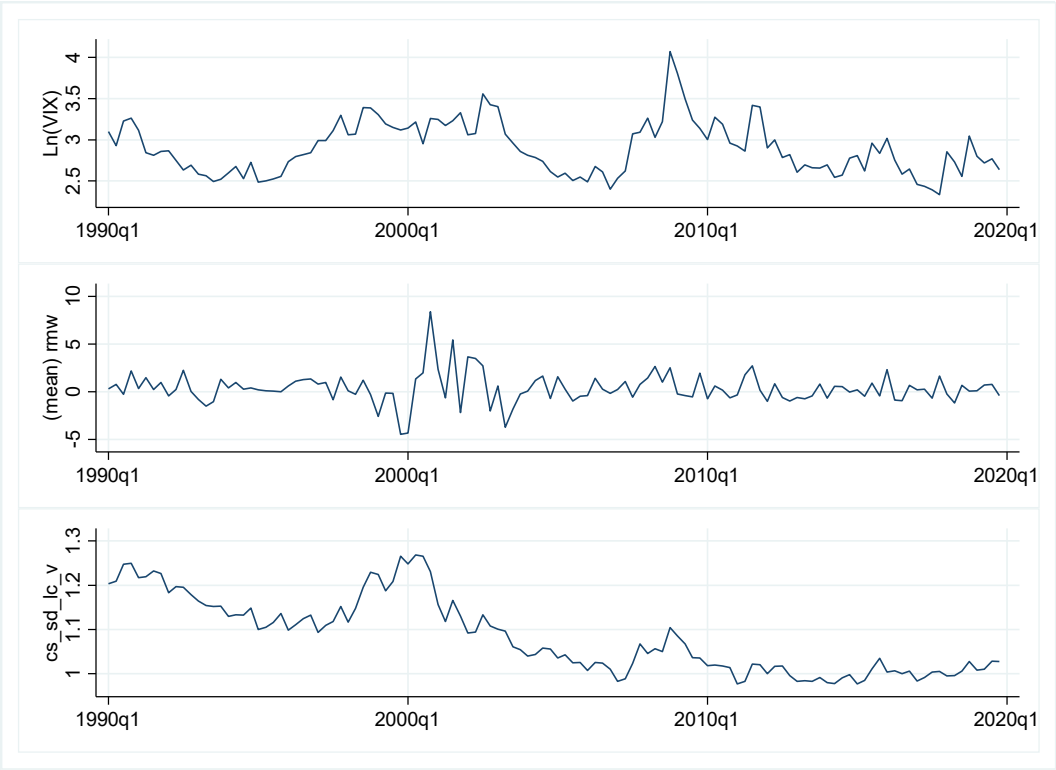
Questions, comments and suggestions welcome

Marcelo.bianconi@tufts.edu

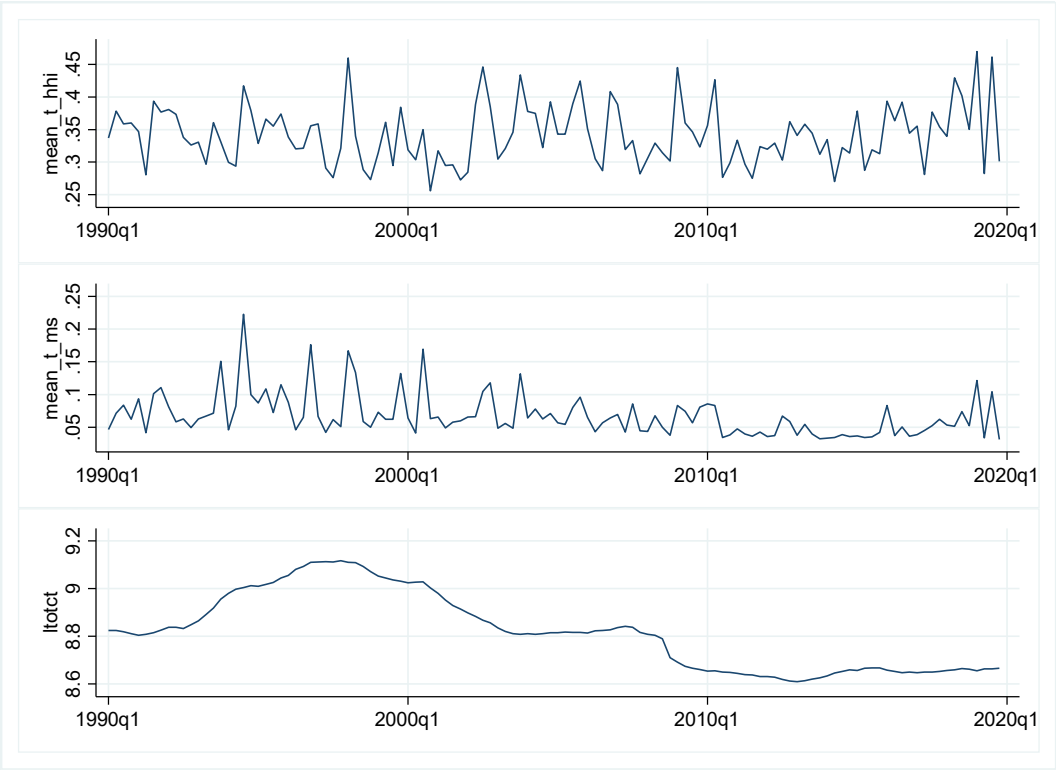
Real Shocks levels



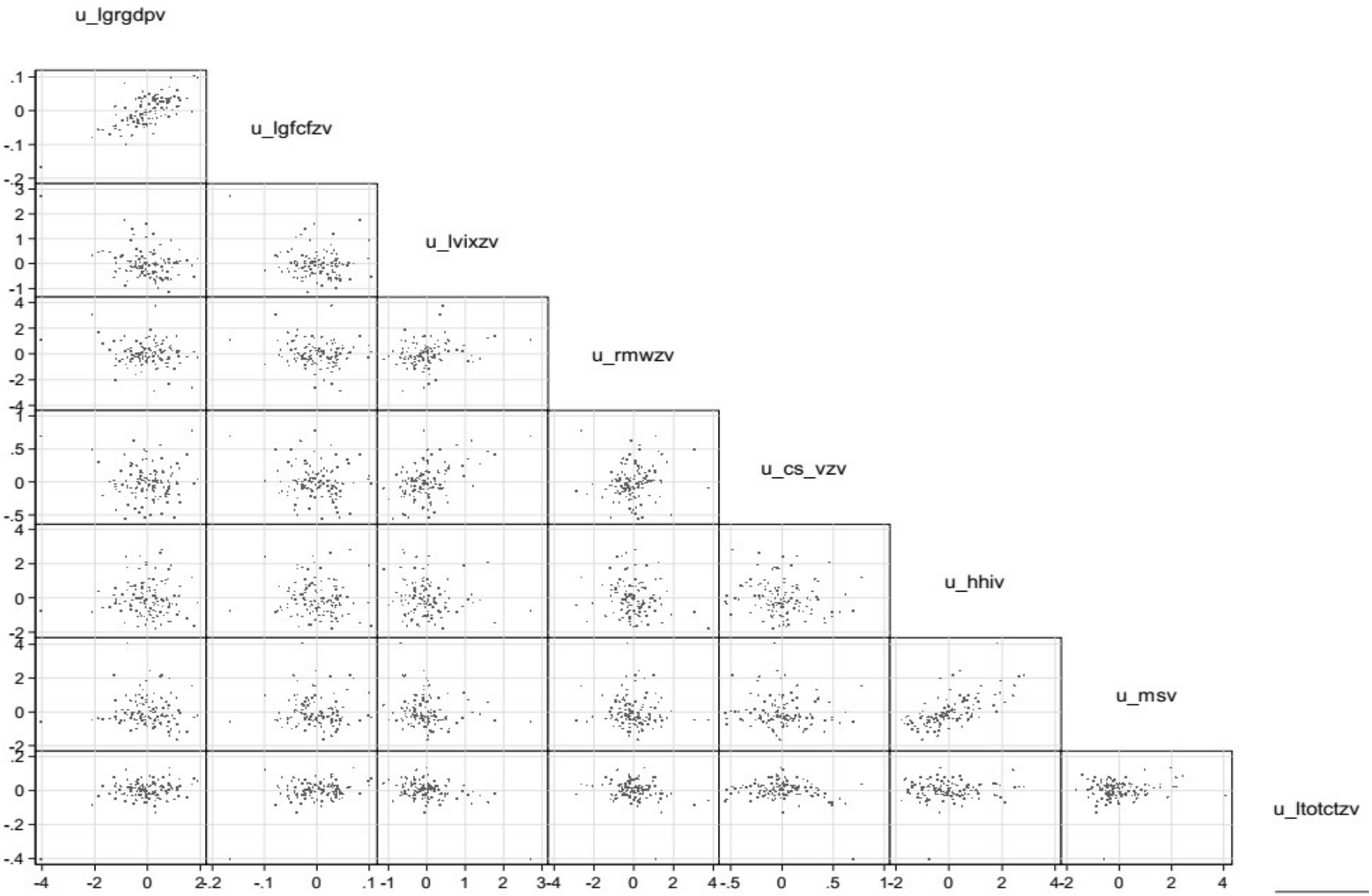
Risk Shocks levels



Structure Shocks levels



Innovations Scatter Plots



BICS: 147 Industries

Advertising & Marketing	Elec & Gas Mktg & Trading	Jewelry & Watch Stores	Real Estate Owners & Developers
Agricultural Chemicals	Electrical Components	Large Pharma	Real Estate Services
Agricultural Machinery	Electrical Power Equipment	Leisure & Travel Services	Recreational Vehicles
Agricultural Producers	Engine & Transmission	Life Insurance	Refining & Marketing
Aircraft & Parts	Engineering Services	Life Science Equipment	Reinsurance
Airlines	Entertainment Content	Lodging	Renewable Energy Equipment
Apparel, Footwear & Acc Design	Exploration & Production	Logistics Services	Renewable Energy Project Dev
Application Software	Fabricated Metal & Hardware	Managed Care	Restaurants
Auto Parts	Factory Automation Equipment	Mass Merchants	Security & Cmdty Exchanges
Automobiles	Flow Control Equipment	Material Handling Machinery	Security Services
Automotive Retailers	Food & Drug Stores	Measurement Instruments	Semiconductor Devices
Automotive Wholesalers	Food Products Wholesalers	Medical Devices	Semiconductor Mfg
Banks	Food Services	Medical Equipment	Specialty Apparel Stores
Base Metals	Funeral Services	Metal Svc Center & Other Whslrs	Specialty Chemicals
Basic & Diversified Chemicals	Generic Pharma	Metalworking Machinery	Specialty Pharma
Beverages	Health Care Facilities	Midstream - Oil & Gas	Steel Producers
Biotech	Health Care Services	Mortgage Finance	Steel Raw Material Suppliers
Building Maintenance Services	Health Care Supplies	Non Wood Building Materials	Telecom Carriers
Cable & Satellite	Health Care Supply Chain	Office Electronics	Textile & Textile Products
Casinos & Gaming	Home & Office Furnishings	Office Supplies	Tobacco
Cement & Aggregates	Home Improvement	Oil & Gas Services & Equip	Toys & Games
Coal Operations	Home Products Stores	Other Commercial Services	Transaction Mgmt Systems
Commercial Finance	Homebuilders	Other Consumer Products	Trucking
Commercial Vehicles	Household Products	Other Financial Services	Utility Networks
Comml & Res Bldg Equip & Sys	IT Services	Other Hardware	Waste Management
Communications Equipment	Industrial Automation Controls	Other Mined Minerals	Wealth Management
Computer Hardware & Storage	Industrial Distribution & Rental	Other Spec Retail - Discr	Wood Building Materials
Construction & Mining Machinery	Industrial Machinery	P&C Insurance	
Consumer Elec & Applc Stores	Information Services	Packaged Food	
Consumer Electronics	Infrastructure Construction	Paper	
Consumer Finance	Infrastructure Software	Payment & Data Processors	
Containers & Packaging	Institutional Brokerage	Pollution Control Equipment	
Courier Services	Instl Trust, Fiduciary & Custody	Power Generation	
Cruise Lines	Insurance Brokers	Precious Metal Mining	
Defense Primes	Integrated Oils	Printing Services	
Department Stores	Integrated Utilities	Professional Services	
Diversified Banks	Internet Based Services	Publishing & Broadcasting	
E-Commerce Discretionary	Internet Media	REIT	
EMS/ODM	Investment Companies	Rail Freight	
Educational Services	Investment Management	Railroad Rolling Stock	

Impact Innovations: Real

	(1) lc_v_r	(2) lc_v_r
lc_assetsz	-0.00709*	-0.00685*
u_lrgdpgrzv	0.0223**	
	[.0290]	
u_lgfcfzv		0.163
N	20105	20105
First-Stag~F	3147.0	3151.6
Hansen-J	0.707	0.749
p-val	0.872	0.862

* p<0.05, ** p<0.01, *** p<0.001

	(1) lc_q	(2) lc_q
u_lrgdpgrzv	0.0191***	
u_lgfcfzv		0.108***
_cons	0.230***	0.243***
N	20105	20105
adj. R-sq	0.942	0.942
F	995.0	868.9

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Impact Innovations: Real

	(1) lc_v_r	(2) lc_v_r
lc_assetsz	-0.00709*	-0.00685*
u_lrgdpgrzv	0.0223**	
	[.0290]	
u_lgfcfzv		0.163
N	20105	20105
First-Stag~F	3147.0	3151.6
Hansen-J	0.707	0.749
p-val	0.872	0.862

* p<0.05, ** p<0.01, *** p<0.001

	(1) lc_q	(2) lc_q
u_lrgdpgrzv	0.0191***	
u_lgfcfzv		0.108***
_cons	0.230***	0.243***
N	20105	20105
adj. R-sq	0.942	0.942
F	995.0	868.9

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Impact Innovations: Risk

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
lc_assetsz	-0.00709*	-0.00727*	-0.00738**
u_lvixzv	-0.0616***		
	[-.0434]		
u_rmwzv		-0.0202**	
		[-.0235]	
u_cs_sd_~vzv			-0.196***
			[-.0695]
N	20105	20105	20105
First-Stag~F	3150.0	3160.1	3144.1
Hansen-J	0.343	0.426	1.344
p-val	0.952	0.935	0.719

* p<0.05, ** p<0.01, *** p<0.001

	(1) lc_q	(2) lc_q	(3) lc_q
u_lvixzv	-0.0576***		
u_rmwzv		-0.0177***	
u_cs_sd_lc_qzv			-0.0624***
_cons	0.237***	0.262***	0.239***
N	20105	20105	20105
adj. R-sq	0.943	0.942	0.942
F	1087.7	851.6	855.0

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Impact Innovations: Risk

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
lc_assetsz	-0.00709*	-0.00727*	-0.00738**
u_lvixzv	-0.0616***		
	[-.0434]		
u_rmwzv		-0.0202**	
		[-.0235]	
u_cs_sd_~vzv			-0.196***
			[-.0695]
N	20105	20105	20105
First-Stag~F	3150.0	3160.1	3144.1
Hansen-J	0.343	0.426	1.344
p-val	0.952	0.935	0.719

* p<0.05, ** p<0.01, *** p<0.001

	(1) lc_q	(2) lc_q	(3) lc_q
u_lvixzv	-0.0576***		
u_rmwzv		-0.0177***	
u_cs_sd_lc_qzv			-0.0624***
_cons	0.237***	0.262***	0.239***
N	20105	20105	20105
adj. R-sq	0.943	0.942	0.942
F	1087.7	851.6	855.0

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Impact Innovations: Structure

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
lc_assetsz	-0.00667*	-0.00679*	-0.00671*
u_mean_t_h~v	-0.00441		
u_mean_t_m~v		0.00129	
u_ltotctzv			0.177
N	20105	20105	20105
First-Stag~F	3169.6	3164.7	3147.0
Hansen-J	0.783	0.690	0.582
p-val	0.854	0.876	0.901

* p<0.05, ** p<0.01, *** p<0.001

	(1) lc_q	(2) lc_q	(3) lc_q
u_mean_t_hhizv	-0.00213		
u_mean_t_mszv		0.00301	
u_ltotctzv			0.144***
_cons	0.248***	0.250***	0.248***
N	20105	20105	20105
adj. R-sq	0.942	0.942	0.942
F	834.9	831.7	959.7

+ p<0.10, * p<.05, ** p<.025, *** p<.01

M&A-Spin-Off Turnover and Risk Innovations

Sample 2005q1-2019q4; Industry fixed effects.

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
lc_assetsz	-0.0179***	-0.0177***	-0.0178***
maso_dummy	0.0200	0.0205	0.0201
maso_dummy_vixv	0.00360		
u_lvixzv	-0.0515***		
maso_dummy_rmwv		-0.00279	
u_rmwzv		-0.00407	
maso_dummy_csv			0.0224
u_cs_sd_lc_vzv			-0.177***
N	15164	15164	15164
First-Stage F	7483.9	7476.0	7494.1
Hansen-J	0.500	1.132	1.363
p-val	0.919	0.769	0.714

+ p<0.10, * p<.05, ** p<.025, *** p<.01

	(1) lc_q	(2) lc_q	(3) lc_q
maso_dummy	0.0119	0.0120	0.0125
maso_dum~x	0.00459		
u_lvixzv	-0.0493***		
maso_dum~w		0.00987	
u_rmwzv		-0.00791***	
maso_du~cs			0.0211+
u_cs_s~vzv			-0.162***
_cons	0.162***	0.176***	0.140***
N	15164	15164	15164
adj. R-sq	0.945	0.944	0.944
F	4764.3	5340.6	5093.6

+ p<0.10, * p<.05, ** p<.025, *** p<.01

M&A-Spin-Off Turnover and Risk Innovations

Sample 2005q1-2019q4; Industry fixed effects.

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
lc_assetsz	-0.0179***	-0.0177***	-0.0178***
maso_dummy	0.0200	0.0205	0.0201
maso_dummy_vixv	0.00360		
u_lvixzv	-0.0515***		
maso_dummy_rmwv		-0.00279	
u_rmwzv		-0.00407	
maso_dummy_csv			0.0224
u_cs_sd_lc_vzv			-0.177***
N	15164	15164	15164
First-Stage F	7483.9	7476.0	7494.1
Hansen-J	0.500	1.132	1.363
p-val	0.919	0.769	0.714

+ p<0.10, * p<.05, ** p<.025, *** p<.01

	(1) lc_q	(2) lc_q	(3) lc_q
maso_dummy	0.0119	0.0120	0.0125
maso_dum~x	0.00459		
u_lvixzv	-0.0493***		
maso_dum~w		0.00987	
u_rmwzv		-0.00791***	
maso_du~cs			0.0211+
u_cs_s~vzv			-0.162***
_cons	0.162***	0.176***	0.140***
N	15164	15164	15164
adj. R-sq	0.945	0.944	0.944
F	4764.3	5340.6	5093.6

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Structure Innovations and Growth Innovations

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
lc_assetsz	-0.0171***	-0.0172***	-0.0172***
u_lrgdpgrzv	0.0237***	0.0214***	0.0190***
u_mean_t_hhizv	-0.00634		
growth_hhiv	-0.000278		
u_mean_t_mszv		0.000649	
growth_msv		-0.0114	
u_ltotctzv			0.400**
growth_ltcv			0.163***
N	20113	20113	20113
First-Stage F	8517.7	8504.8	8486.9
Hansen-J	1.077	0.924	0.509
p-val	0.783	0.820	0.917

+ p<0.10, * p<.05, ** p<.025, *** p<.01

	(1) lc_q	(2) lc_q	(3) lc_q
u_lrgdpgrzv	0.0180***	0.0167***	0.0165***
u_mean_t_hhizv	-0.00260+		
growth_hhiv	-0.00494*		
u_mean_t_mszv		0.00312	
growth_msv		-0.0159***	
u_ltotctzv			0.250***
growth_ltcv			0.0991***
_cons	0.230***	0.240***	0.244***
N	20105	20105	20105
adj. R-sq	0.942	0.942	0.942
F	932.9	919.6	968.4

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Structure Innovations and Growth Innovations

	(1) lc_v_r	(2) lc_v_r	(3) lc_v_r
lc_assetsz	-0.0171***	-0.0172***	-0.0172***
u_lrgdpgrzv	0.0237***	0.0214***	0.0190***
u_mean_t_hhizv	-0.00634		
growth_hhiv	-0.000278		
u_mean_t_mszv		0.000649	
growth_msv		-0.0114	
u_ltotctzv			0.400**
growth_ltcv			0.163***
N	20113	20113	20113
First-Stage F	8517.7	8504.8	8486.9
Hansen-J	1.077	0.924	0.509
p-val	0.783	0.820	0.917

+ p<0.10, * p<.05, ** p<.025, *** p<.01

	(1) lc_q	(2) lc_q	(3) lc_q
u_lrgdpgrzv	0.0180***	0.0167***	0.0165***
u_mean_t_hhizv	-0.00260+		
growth_hhiv	-0.00494*		
u_mean_t_mszv		0.00312	
growth_msv		-0.0159***	
u_ltotctzv			0.250***
growth_ltcv			0.0991***
_cons	0.230***	0.240***	0.244***
N	20105	20105	20105
adj. R-sq	0.942	0.942	0.942
F	932.9	919.6	968.4

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Structure Innovations and Risk Innovations

	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
lc_assetsz	-0.00698**	-0.00710**	-0.00728**
vix_hhiv	-0.00388		
vix_msv		-0.00849	
vix_ltcv			-0.00837+
N	20105	20105	20105
First-Stage F	3166.1	3164.3	3147.7
Hansen-J	0.402	0.337	0.294
p-val	0.940	0.953	0.961
lc_assetsz	-0.00713**	-0.00731**	-0.00743***
rmw_hhiv	0.000794		
rmw_msv		0.00624	
rmw_ltcv			-0.0172**
N	20105	20105	20105
First-Stage F	3175.1	3165.2	3157.1
Hansen-J	0.488	0.453	0.349
p-val	0.921	0.929	0.951
lc_assetsz	-0.00720**	-0.00730**	-0.00751***
cs_hhiv	-0.00733		
cs_msv		-0.0203	
cs_ltcv			-0.0450***
N	20105	20105	20105
First-Stage F	3150.1	3158.7	3136.8
Hansen-J	1.696	1.404	0.873
p-val	0.638	0.705	0.832

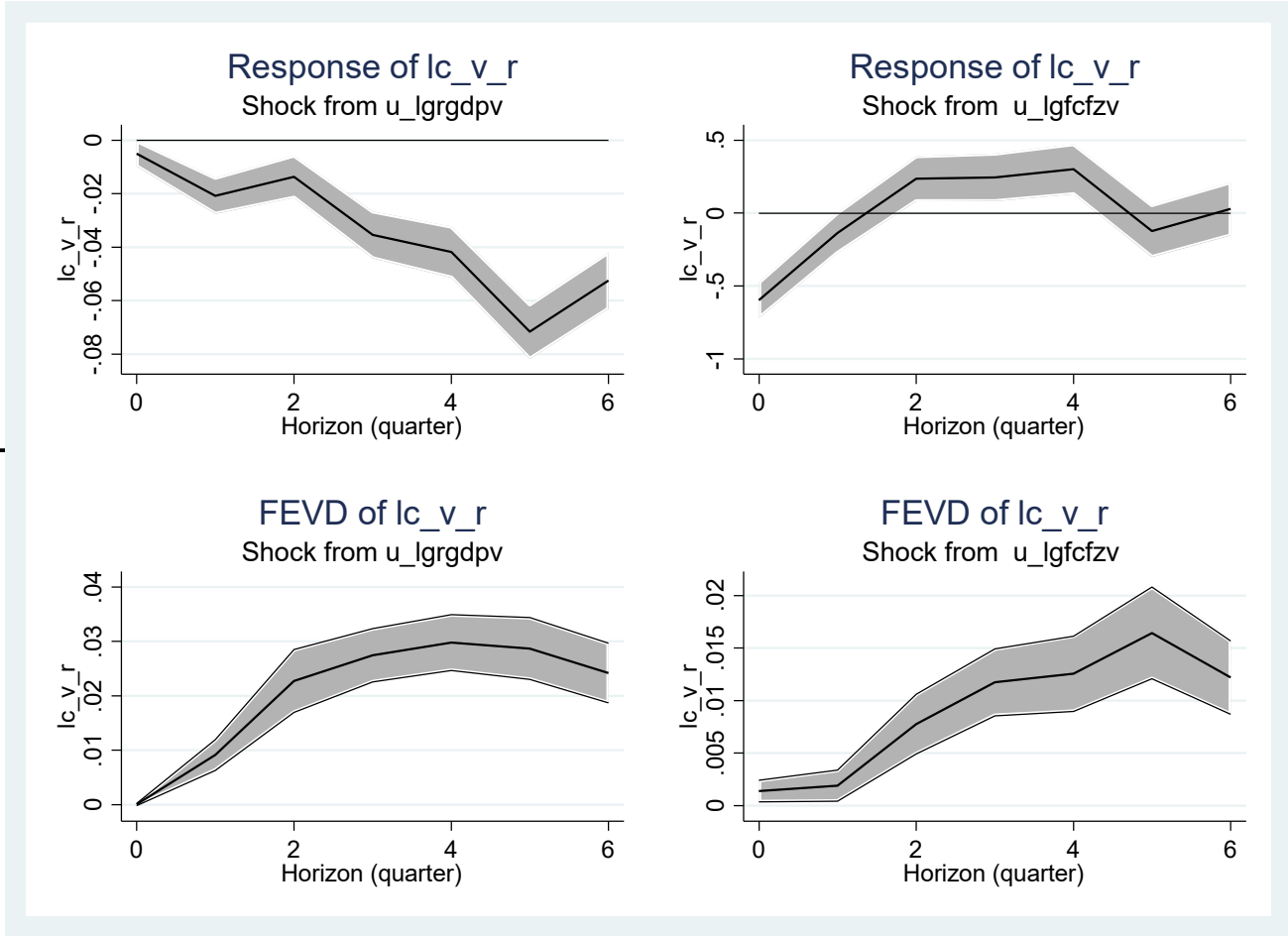
+ p<0.10, * p<.05, ** p<.025, *** p<.01

Structure Innovations and Risk Innovations

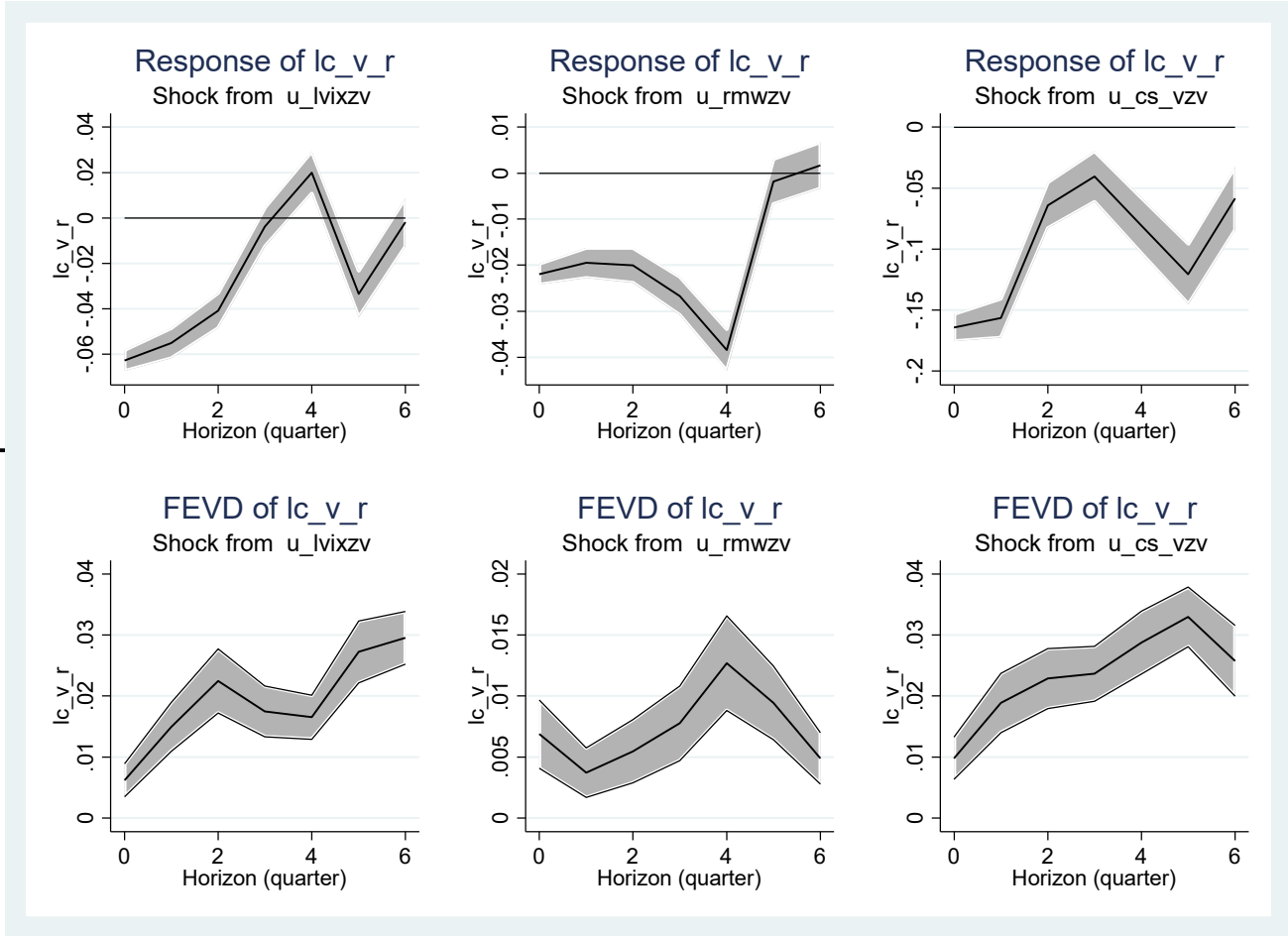
	(1)	(2)	(3)
	lc_v_r	lc_v_r	lc_v_r
lc_assetsz	-0.00698**	-0.00710**	-0.00728**
vix_hhiv	-0.00388		
vix_msv		-0.00849	
vix_ltcv			-0.00837+
N	20105	20105	20105
First-Stage F	3166.1	3164.3	3147.7
Hansen-J	0.402	0.337	0.294
p-val	0.940	0.953	0.961
lc_assetsz	-0.00713**	-0.00731**	-0.00743***
rmw_hhiv	0.000794		
rmw_msv		0.00624	
rmw_ltcv			-0.0172**
N	20105	20105	20105
First-Stage F	3175.1	3165.2	3157.1
Hansen-J	0.488	0.453	0.349
p-val	0.921	0.929	0.951
lc_assetsz	-0.00720**	-0.00730**	-0.00751***
cs_hhiv	-0.00733		
cs_msv		-0.0203	
cs_ltcv			-0.0450***
N	20105	20105	20105
First-Stage F	3150.1	3158.7	3136.8
Hansen-J	1.696	1.404	0.873
p-val	0.638	0.705	0.832

+ p<0.10, * p<.05, ** p<.025, *** p<.01

Dynamics: Real Innovations - V



Dynamics: Risk Innovations - V



Dynamics: Structure Innovations - V