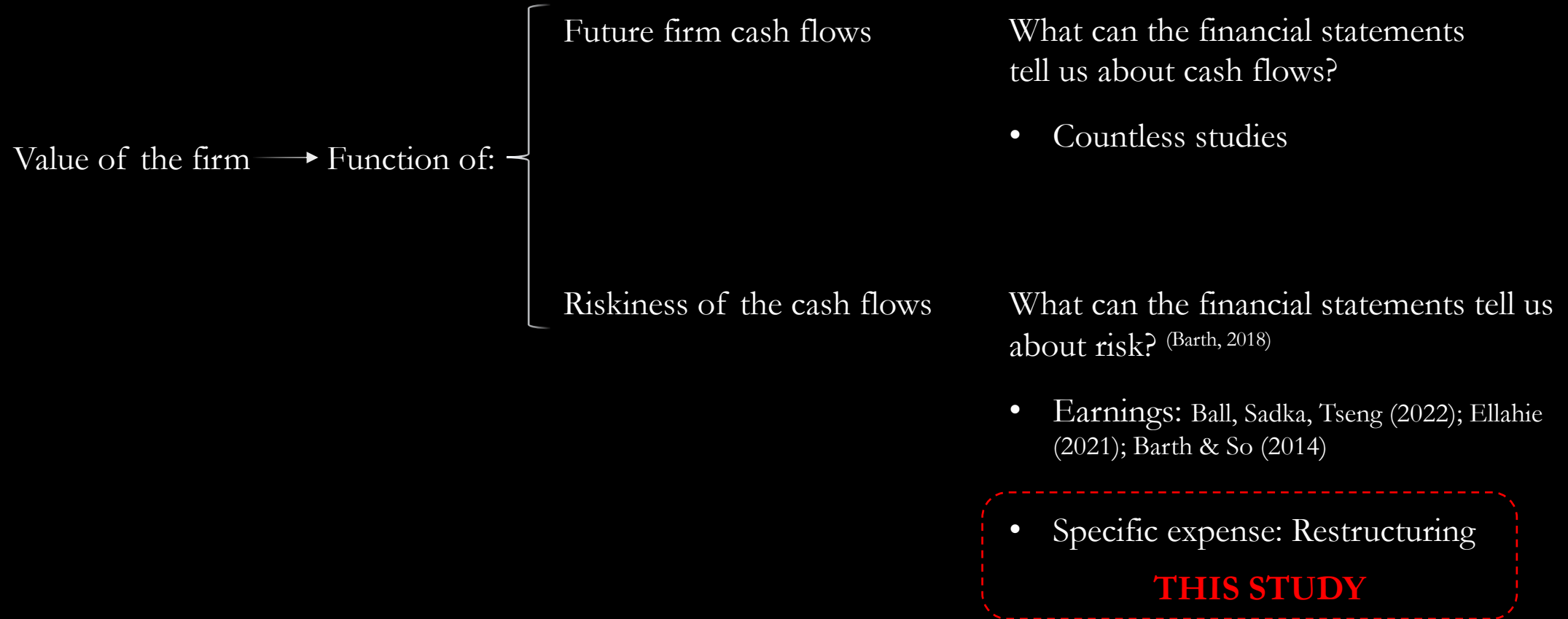


Vivek Raval

March 15, 2024

The risk relevance of restructuring

The literature motivating this study



Restructuring expense is the object of this study

The human capital side of restructuring

- Restructuring includes:
 - a) Involuntary termination benefits
 - b) Costs to relocate employees
 - c) Costs to terminate a contract that is not a lease
 - d) Costs to consolidate or close facilities
- Expensed immediately when announced
- Comprised of committed costs
- Reported quarterly
- Reported in dollars (not people)

The aggregate side restructuring

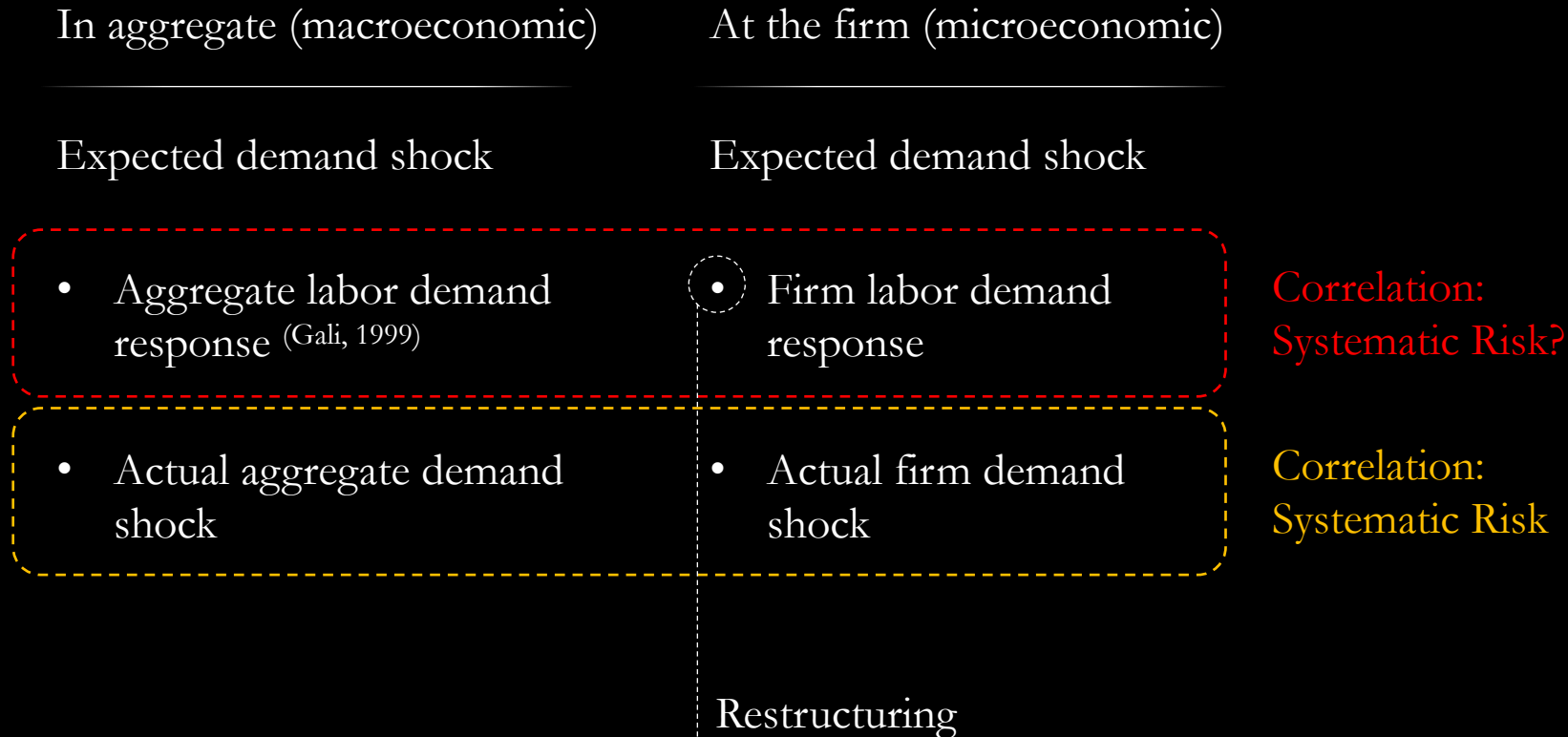
- Reflects aggregate economic shocks (John, Lang, and Netter, 1992)
- Informative about GDP (Abdalla and Carabias, 2022)
- Informative about job destruction (Hann, Li, and Ogneva, 2021)

Restructuring has the potential to be useful, but is generally seen as not useful

The financial reporting side restructuring

- Not persistent
- Often excluded from non-GAAP earnings (Laurion, 2020)
- Excluded from Compustat operating earnings
- Excluded from earnings used in compensation (Dechow, Huston, and Sloan, 1994)
- More than just labor costs
- Part of “big bath” manipulations (Bens & Johnson, 2009)
- Conservative: asymmetrically informative (only labor dis-investment)

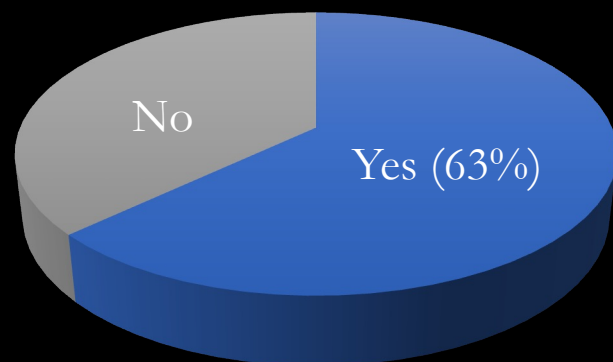
Demand shocks and employment fluctuations



Data, measurement, and sample

Name	Symbol	Definition	Source
Restructuring	$restr_{i,t}$	Rolling 4-quarter restructuring expense scaled by beginning total assets (lower is more restructuring)	Compustat (2001-2020)
Operating earnings growth	$oigrow_{i,t}$	Operating income growth over the same quarter a year ago, scaled by beginning total assets	Compustat
Employment growth	$EMPL_t$	The percentage change in aggregate employment from the same quarter in the prior year, divided by 1,000	BLS

Firms with some restructuring between 2001 and 2020 (# obs)



Variable	N	Mean	SD	25P	Med	75P
$restr_{i,t}$	244,318	-0.0040	0.0105	-0.0026	0	0
$oigrow_{i,t}$	244,318	-0.0022	0.0314	-0.0059	0.0013	0.0097
$EMPL_t$	244,318	0.0003	0.0026	-0.0004	0.0014	0.0019

Restructuring as labor dis-investment

Negative firm-year restructuring

(Restructuring reflects only one side of the change)

Firm-year growth in number of employees

Correlations

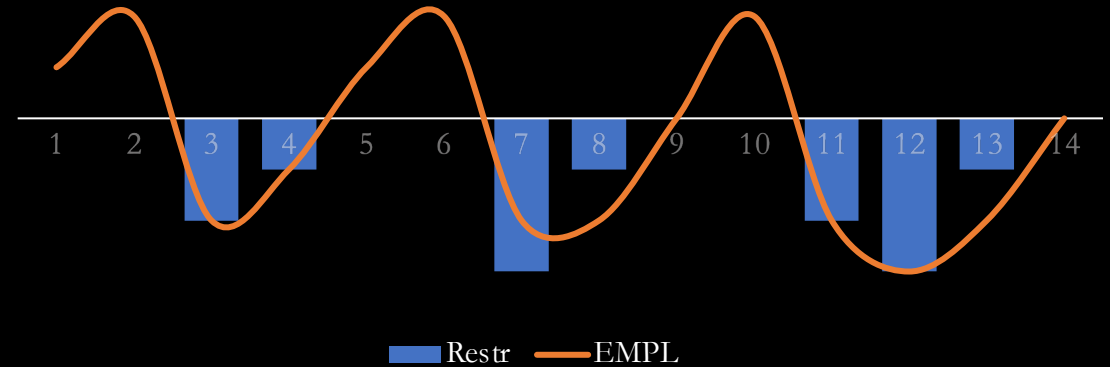
Pearson: 0.05

Spearman: 0.22

Consistent with:

- John, Lang, and Netter (1992): restructuring relates to a departure of 5% of employees
- Hann, Li, and Ogneva (2021): Restructuring, via SPI, is informative about cutting labor

Restructuring correlates negatively with firm-level employment



Restructuring is a censored variable.

Tobit regression:

$$restr_{i,t} = \alpha + \beta \times Employee\ Growth_{i,t} + \varepsilon_{i,t}$$

↑
0.38
(13.98)

Aggregate component of restructuring

		Firm restructuring					Split sample by adjustment costs
		Low adjustment costs					
		High adjustment costs					
		(1)	(2)	(3)	(4)	(5)	
		All obs	Low Union	High Union	Low Unemp	High Unemp	
VARIABLES		$restr_{i,t}$	$restr_{i,t}$	$restr_{i,t}$	$restr_{i,t}$	$restr_{i,t}$	
Aggregate employment growth	$EMPL_t$	0.596*** (3.99)	0.587*** (3.05)	0.588*** (4.13)	0.540** (2.66)	0.577*** (4.96)	
	$oigrow_{i,t}$	-0.044*** (-3.75)	-0.050*** (-3.42)	-0.041*** (-3.96)	-0.034 (-1.43)	-0.031*** (-3.76)	
	Constant	0.009*** (7.55)	0.013*** (7.29)	0.005*** (6.18)	0.011*** (7.23)	0.006*** (5.81)	
	Obs	244,318	112,997	130,828	85,069	139,817	
Firm-year observations (Tobit regression)	Prob>F	0.0006	0.0018	0.0003	0.0489	0.0000	
	Clusters	firm, year	firm, year	firm, year	firm, year	firm, year	

Restructuring correlates with aggregate employment, even when adjustment costs are higher.

Aggregate component of restructuring

Aggregate restructuring
(cross-sectional mean)

Low adjustment costs

High adjustment costs

	(1)	(2)	(3)	(4)	(5)
VARIABLES	All obs <i>AGGrestr_t</i>	Low Union <i>AGGrestr_t</i>	High Union <i>AGGrestr_t</i>	Low Unemp <i>AGGrestr_t</i>	High Unemp <i>AGGrestr_t</i>
<i>EMPL_t</i>	0.237** (2.62)	0.230*** (2.71)	0.241** (2.59)	0.198** (2.30)	0.250*** (3.03)
<i>OI_t</i>	-0.115* (-1.81)	-0.166** (-2.42)	-0.077 (-1.57)	-0.162** (-2.50)	-0.029 (-0.72)
Constant	-0.004*** (-18.65)	-0.003*** (-16.87)	-0.005*** (-20.36)	-0.002*** (-12.08)	-0.005*** (-22.24)
Obs	81	81	81	81	81
Prob>F	0.0208	0.0232	0.0185	0.0336	0.0113
R-squared	0.33	0.37	0.31	0.35	0.31

Separate
timeseries based
on adjustment
costs

Aggregate employment growth

Quarterly observations
(OLS regression,
Newey-West (4) errors)

Restructuring correlates with aggregate employment, even when adjustment costs are higher.

The restructuring-based measure of systematic risk

CAPM:

$$\overset{\text{Firm returns}}{[R_{i,s} - RF_s]} = \alpha_i + \beta_i^{CAPM} \times \overset{\text{Market returns}}{[R_s^{mkt} - RF_s]} + \varepsilon_{i,s}$$

OLS

Restructuring-
based measure:

(Higher is more systematic risk)

$$\boxed{restr_{i,t}} = \alpha_i + \beta_i^{EMPL} \times \boxed{EMPL_t} + \varepsilon_i$$

Negative firm restructuring

Aggregate annual employment growth

Tobit

Operating income
measure:

(As a control)

$$\boxed{oigrow_{i,t}} = \alpha_i + \beta_i^{OI} \times EMPL_t + \varepsilon_i$$

Operating income growth scaled by beginning assets

OLS

The restructuring-based measure of systematic risk

		N	Mean	SD	25P	Median	75P
Restructuring-based measure of systematic risk	β_i^{EMPL}	2730	-1.7380	9.2414	-0.7861	0.0961	0.9362
Ranked restructuring-based measure of systematic risk	$\tilde{\beta}_i^{EMPL}$	2730	2.0000	1.4145	1.0000	2.0000	3.0000
Conventional market beta	β_i^{FF}	2688	1.0463	0.4156	0.7584	1.0193	1.2976
Alternative operating earnings-based measure	β_i^{OI}	2730	0.0959	2.3330	-0.6853	0.2137	1.1593

Highly skewed

Number of firms

		β_i^{EMPL}	$\tilde{\beta}_i^{EMPL}$	β_i^{FF}	β_i^{OI}
	1 $\tilde{\beta}_i^{EMPL}$	0.51			
	2 β_i^{FF}	0.04*	0.11*		
	3 β_i^{OI}	-0.00	-0.02	0.05*	
	4 $size_i$	0.16*	0.07*	0.11*	0.10*
	5 mb_i	-0.03	0.01	0.02	-0.07*
Sales per empl.	6 $SperEmp_i$	-0.00	-0.06*	-0.00	0.08*
# employees	7 Emp_i	-0.04*	0.02	-0.07*	-0.01
Ext. labor share	8 ELS_i	0.04*	0.02	-0.07*	0.06*
Debt/equity	9 DE_i	0.02	-0.02	0.05*	0.04*
Labor/capital	10 LK_i	-0.01	0.08*	-0.06*	-0.19*
Total assets	11 AT_i	0.18*	0.03	0.06*	0.16*
PPE/AT	12 $Tang_i$	-0.01	-0.05*	0.02	0.18*

Positive correlation with systematic risk

Higher dependence on labor, higher β_i^{EMPL}
(More significant Spearman correlations)

Firm-specific systematic risk test

	VARIABLES	(1) β_i^{FF}	(2) β_i^{FF}	(3) β_i^{FF}	(4) β_i^{FF}	Returns-based systematic risk
Restructuring-based risk	β_i^{EMPL}	0.002** (2.24)		0.002** (2.46)		
Ranked restructuring-based risk	$\tilde{\beta}_i^{EMPL}$		0.031*** (5.56)		0.028*** (4.76)	
Operating-income based risk	β_i^{OI}	0.008** (2.44)	0.009** (2.53)	0.010*** (2.89)	0.010*** (2.84)	
Labor leverage controls		No	No	Yes	Yes	
Obs (firms)		2,688	2,688	2,495	2,495	
R-squared (OLS)		0.004	0.014	0.050	0.057	

The restructuring-based measure of systematic risk is associated with higher returns-based measures of systematic risk.

The relation is not explained alternatively by operating earnings or labor leverage

Portfolio systematic risk test

Restructuring-based
risk portfolio

Portfolio of β_i^{EMPL}	Lowest (1)	(2)	(3)	(4)	Highest (5)
Mean β_i^{EMPL}	-12.308	-0.527	0.109	0.723	3.462
β_p^{FF}	0.933*** (79.10)	0.943*** (101.02)	0.983*** (120.63)	1.081*** (117.00)	1.085*** (94.77)
β_p^{SMB}	0.782*** (43.13)	0.647*** (45.26)	0.547*** (43.78)	0.679*** (48.13)	0.841*** (48.42)
β_p^{HML}	-0.100*** (-5.84)	0.131*** (9.69)	0.261*** (22.03)	0.104*** (7.78)	-0.095*** (-5.80)
β_p^{UMD}	-0.139*** (-12.64)	-0.061*** (-6.98)	-0.075*** (-9.79)	-0.114*** (-13.14)	-0.194*** (-18.41)
Constant	0.000 (0.19)	0.002*** (5.93)	0.002*** (6.75)	0.002*** (5.60)	-0.000 (-0.03)

Systematic exposure to
the market

Fama-French-
Carhart factor
betas

OLS (similar
results using
Fama-MacBeth)

- Monotonically increasing
- Highest three portfolios are significantly higher than the lowest

The restructuring-based measure of systematic risk is associated with higher returns-based measures of systematic risk.

Double-sort portfolio systematic risk test

Restructuring-
based risk
portfolio

β_p^{FF}

β_i^{EMPL} portfolio		(1)	(2)	(3)	(4)	(5)
β_i^{OI} portfolio						
Operating earnings-based alternative portfolio	(1)	0.938***	0.884***	1.088***,‡	1.108***,‡	1.032***,‡
	(2)	0.912***	0.891***	0.879***	0.933***	1.079***,‡
	(3)	0.847***	0.868***	0.869***	0.969***,‡	1.046***,‡
	(4)	0.932***	1.076***,‡	1.033***,‡	1.141***,‡	1.119***,‡
	(5)	0.998***	1.087***,‡	1.232***,‡	1.228***,‡	1.136***,‡

Risk is increasing
in restructuring-
based measure at
all levels of OI-
based measure

The restructuring-based measure of systematic risk is associated with higher
returns-based measures of systematic risk.

The increase is not explained by information in operating earnings

Out-of-sample portfolio systematic risk test

Restructuring-based risk portfolio, based on estimates of β_i^{EMPL} prior to estimation of FF factor loadings

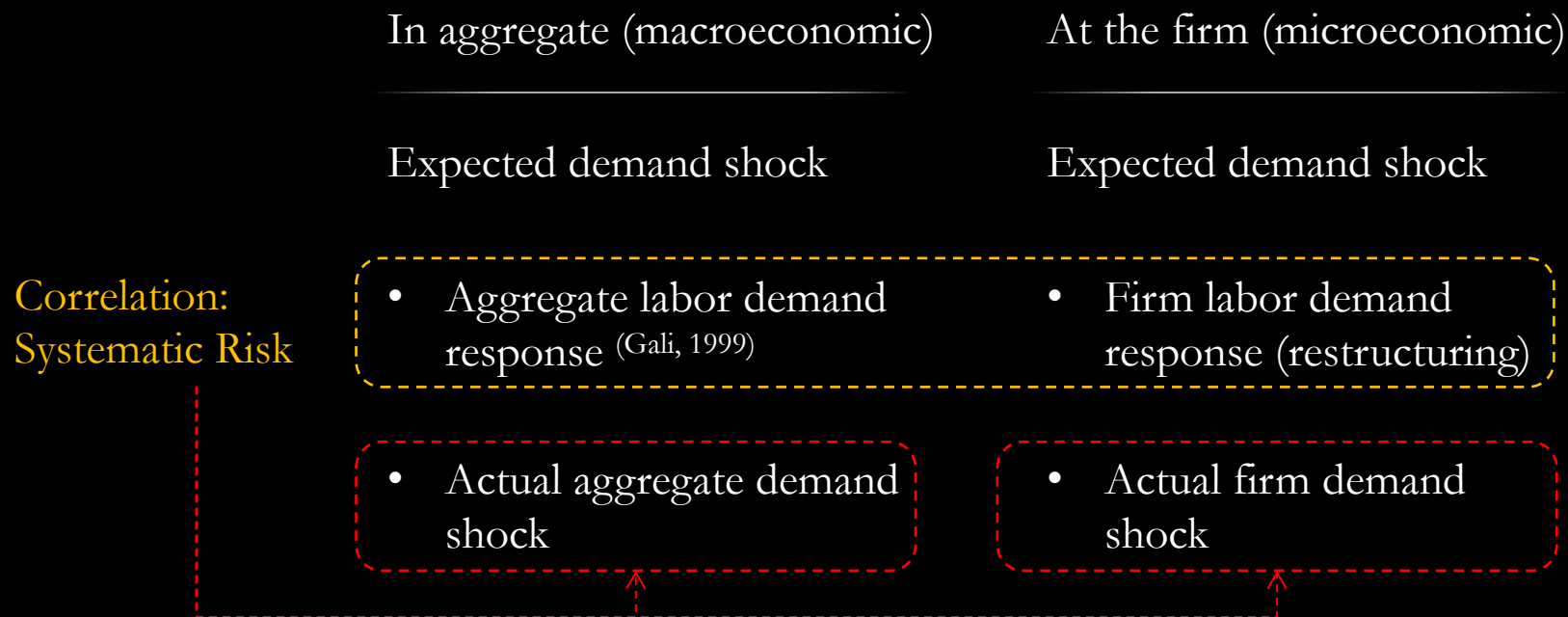
Portfolio of β_i^{EMPL}	Lowest (1)	(2)	(3)	(4)	Highest (5)
	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$
β_p^{FF}	0.901*** (59.04)	0.931***,† (74.73)	0.934***,† (85.99)	1.007***,† (84.46)	0.968***,† (67.55)
β_p^{SMB}	0.754*** (30.78)	0.536*** (26.76)	0.458*** (26.27)	0.445*** (23.26)	0.672*** (29.19)
β_p^{HML}	0.033* (1.67)	0.193*** (12.12)	0.283*** (20.42)	0.194*** (12.71)	0.010 (0.53)
β_p^{UMD}	-0.075*** (-3.83)	-0.123*** (-7.69)	-0.103*** (-7.40)	-0.086*** (-5.57)	-0.096*** (-5.22)
Constant	-0.002*** (-3.14)	-0.000 (-0.82)	0.000 (0.95)	0.000 (0.44)	-0.001** (-2.16)

- Increasing, monotonically through portfolio 4.
- Highest 4 portfolios are significantly higher than the lowest portfolio.

The restructuring-based measure of systematic risk is associated with higher returns-based measures of systematic risk.

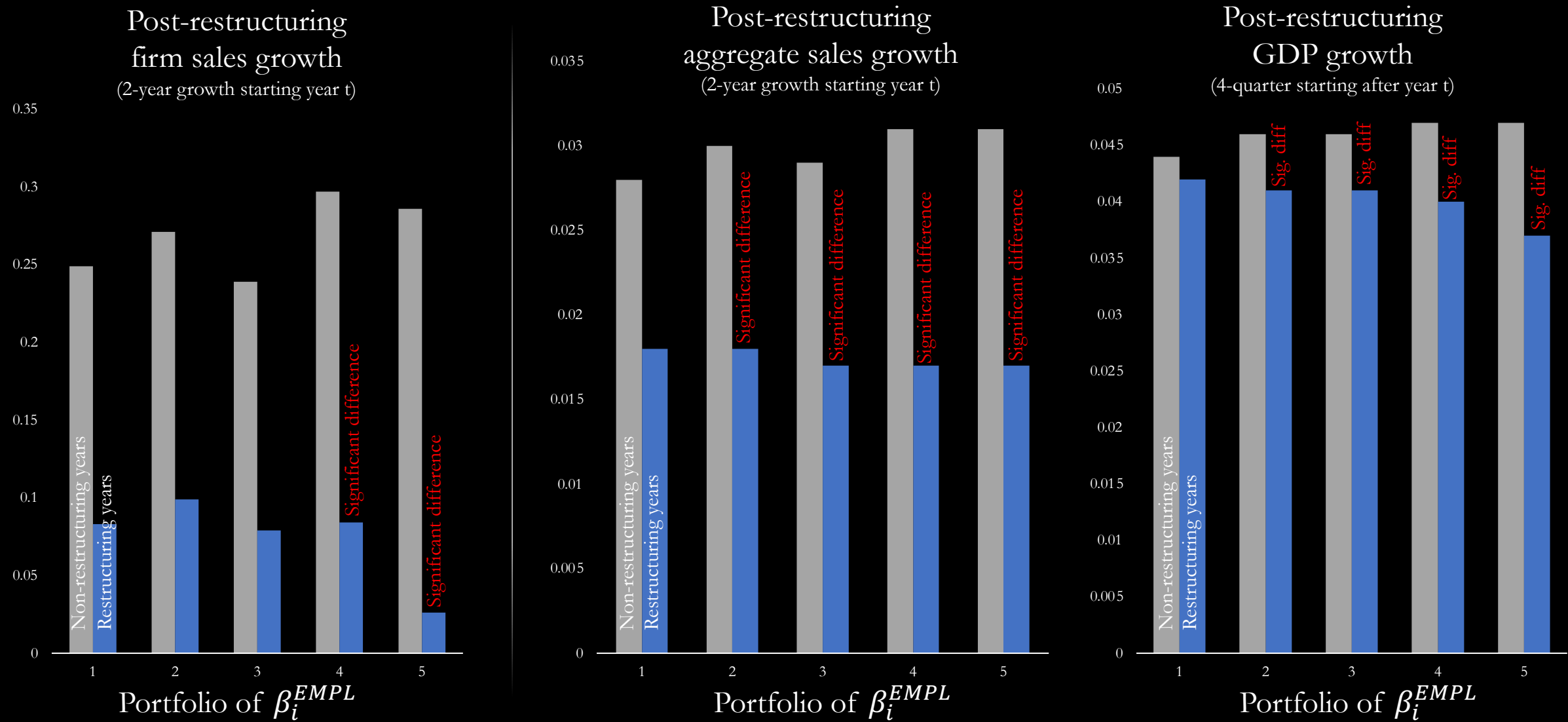
The increase is not explained by overlapping beta calculations.

Do risky firms realize firm and aggregate demand shocks?



Do firms that demonstrate labor dis-investment patterns consistent with the aggregate market actually realize firm and aggregate demand shocks after restructuring?

Do risky firms realize firm and aggregate demand shocks?



Do risky firms reverse more restructuring?

In aggregate (macroeconomic)

At the firm (microeconomic)

Expected demand shock

Expected demand shock

- Aggregate labor demand response (Gali, 1999)

- Firm labor demand response (restructuring)

- Actual aggregate demand shock

- Actual firm demand shock

For high β_i^{EMPL} firms, the expected demand shock is macroeconomic

- Firms know less about macroeconomic shocks versus firm-specific shocks (Hutton, Lee, Shu, 2012)
- Firms are operating with more uncertainty about the macroeconomic shock versus firm shocks
- Firms restructuring because of aggregate shocks are more likely to mis-estimate and need to revise restructuring accruals

Higher β_i^{EMPL} firms will reverse more of their restructuring

Do risky firms reverse more restructuring?

		Average number of reversals		Average reversal amount (positive)	
		(1)	(2)	(3)	(4)
		μ_i^{Rev}	$\mu_i^{Rev\$}$	μ_i^{Rev}	$\mu_i^{Rev\$}$
Ranked restructuring-based measure of systematic risk	$\check{\beta}_i^{EMPL}$	0.003*** (6.65)	0.013*** (4.45)	0.002*** (4.23)	0.009*** (3.03)
	β_i^{OI}			-0.000 (-0.45)	-0.000 (-0.23)
Number of restructurings	$restrF_i$			0.025*** (7.11)	-0.017 (-0.90)
Dollar value of restructurings	$restr\$_i$			-0.703*** (-3.90)	-7.478*** (-7.50)
	$size_i$			0.000 (0.97)	-0.006** (-2.37)
	Constant	0.013*** (10.69)	0.027*** (3.94)	-0.002 (-0.31)	0.090*** (2.79)
	Observations	2,730	2,730	2,691	2,691
	R-squared	0.016	0.007	0.075	0.039

Firms with higher levels of β_i^{EMPL} have more frequent and bigger reversals of restructuring

Alternative expected aggregate demand shock

In aggregate (macroeconomic)

At the firm (microeconomic)

Expected demand shock

Expected demand shock

Aggregate uncertainty
(VIX)

- Actual aggregate demand shock

- Firm labor demand response (restructuring)

- Actual firm demand shock

- Do firms with higher β_i^{EMPL} restructure during periods of high VIX?
- Do firms that restructure during periods of higher VIX have higher systematic risk?

- Aggregate labor declines can be criticized as a measure of aggregate demand shocks (e.g., supply shocks, technology shocks)
- Another macroeconomic effect of expected demand shocks is increased uncertainty about the aggregate market
- VIX uses implied volatilities across the S&P 500 to construct an aggregate uncertainty index (“fear index”)
- VIX is associated with aggregate demand shocks and lower growth (Foerster et al., 2014; Leduc and Liu, 2016)

Alternative expected aggregate demand shock

VIX as of the period of restructuring

$$restr_{i,t} = \alpha_i + \beta_i^{VIX} \times VIX_t + \varepsilon_{i,t}$$

- Tobit estimation by firm
- Restructuring is negative, higher VIX is more uncertainty
- *Lower* (more negative) β_i^{VIX} means *higher* systematic risk and *higher* β_i^{EMPL}

Panel A: Means of aggregate uncertainty by portfolio of β_i^{EMPL}						
Portfolio of β_i^{EMPL}	Lowest (1)	(2)	(3)	(4)	Highest (4)	Correlation with: $\tilde{\beta}_i^{EMPL}$
VIX_t	3.99663	7.65347	7.34578	9.43442	8.14575	0.13246***
β_i^{VIX}	0.00206	0.00027	-0.00000	-0.00022	-0.00128	-0.59532***

Firms with higher β_i^{EMPL} restructure when VIX is higher

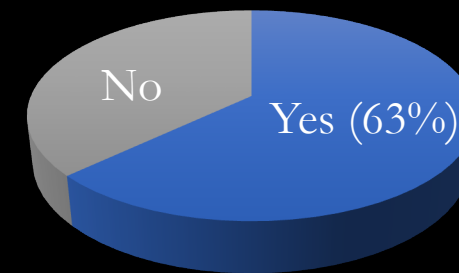
Firms with higher β_i^{EMPL} have lower β_i^{VIX}

Portfolio of β_i^{VIX}	Lowest (1)	(2)	(3)	(4)	Highest (5)
	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$
β_p^{FF}	1.092*** (95.89)	1.082*** (118.18)	0.950*** (113.23)	0.958*** (104.86)	0.944*** (80.70)
β_p^{SMB}	0.817*** (47.26)	0.620*** (44.34)	0.588*** (45.89)	0.648*** (46.40)	0.816*** (45.12)
β_p^{HML}	-0.148*** (-9.06)	0.126*** (9.48)	0.300*** (24.68)	0.102*** (7.70)	-0.072*** (-4.23)
β_p^{UMD}	-0.192*** (-18.27)	-0.107*** (-12.50)	-0.073*** (-9.31)	-0.074*** (-8.62)	-0.137*** (-12.43)
Constant	0.001* (1.91)	0.002*** (4.95)	0.002*** (5.64)	0.002*** (6.55)	-0.000 (-0.70)
Observations	103,558	106,543	107,548	106,631	101,722
R-squared	0.177	0.217	0.212	0.185	0.138

Firms with lower β_i^{VIX} have higher systematic risk

Industry-level β_i^{EMPL}

Firms with some restructuring
between 2001 and 2020 (# obs)



$$restr_{ind,t} = \alpha_{ind} + \beta_{ind}^{EMPL} \times EMPL_t + \varepsilon_{ind,t}$$

- $restr_{ind,t}$ is the cross-sectional average of $restr_{i,t}$ by NAICS2
- $EMPL_t$ is still aggregate employment growth
- All firms in the same industry have the same β_{ind}^{EMPL} (ties create unbalanced portfolios)

Only include the 37% of firms with no restructuring expense between 2001 and 2020

Portfolio of β_{ind}^{EMPL}	Lowest (1)	(2)	(3)	(4)	Highest (5)
	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$	$R_{i,t} - RF_t$
β_p^{FF}	0.658*** (105.50)	0.966***,‡ (81.93)	1.022***,‡ (75.36)	1.054***,‡ (85.80)	1.112***,‡ (81.11)
β_p^{SMB}	0.528*** (58.29)	0.680*** (37.82)	0.922*** (46.65)	0.864*** (50.17)	0.729*** (38.34)
β_p^{HML}	0.471*** (54.11)	0.276*** (16.30)	-0.126*** (-6.71)	-0.138*** (-8.27)	-0.469*** (-25.46)
β_p^{UMD}	-0.045*** (-7.99)	-0.126*** (-11.27)	-0.115*** (-9.10)	-0.179*** (-16.54)	-0.294*** (-24.27)
Constant	0.002*** (8.27)	-0.003*** (-6.97)	-0.004*** (-8.89)	-0.003*** (-5.82)	-0.002*** (-4.58)
Observations	195,766	93,696	101,586	115,011	92,909
R-squared	0.140	0.150	0.129	0.149	0.171

Monotonically increasing

Conclusion

There is evidence that restructuring costs, taken in context of expected demand shocks, can provide systematic risk information.

Human capital information, even if limited, is useful in valuation

Thank you.