Leverage, Labor Market Size, and Employee Pay

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Motivation

- Financial distress leads firms to significantly reduce employment (Hotchkiss (1995), Agrawal and Matsa (2013), Falato and Liang (2014))
- Periods of unemployment lead to lower lifetime earnings (Graham et al. (2015))
  - Lost wages and a deterioration in skills due to search and matching frictions (Mortensen and Pissarides (1994))
  - Elimination of firm-specific capital (Becker (1962)) and lower quality matches (Jovanovic (1979)))
- Research question: Are employees compensated for increases in firm leverage?

Empirical Approach

- Leverage is an endogenous decision by the firm
  - Changes in leverage may be due to investment in labor-augmenting technology
- We use worker-level data from the LEHD to exploit within-firm variation in expected costs of unemployment
  - We proxy for the expected costs of unemployment with the relative share of industry employment in the state
  - Identification is due to firms operating in multiple states

Results

- Employees with higher expected costs of unemployment have higher pay growth when firm leverage increases
- Results are strongest for higher paid employees, employees exposed to firm bankruptcies, and employees with greater bargaining power
- Results are strongest for workers in distressed firms and industries
- Firms with high labor costs reduce leverage when the expected cost of unemployment in their labor markets increase

Related Literature

- Labor and Finance
  - Matsa (2010), Agrawal and Matsa (2013), Chemmanur et al. (2013), Graham et al. (2015), Kim (2015)
- Capital Structure and the Costs of Financial Distress
  - Andrade and Kaplan (1998), Graham (2000), Molina (2005), Almeida and Philippon (2007)
- Unemployment Risk and Compensating Differentials
  - Abowd and Ashenfelter (1981), Topel (1984), Averett et al. (2005), Peters and Wagner (2014)
- We exploit firm-specific variation in risk and worker level data to estimate ex ante wage premium

Outline

- Introduction
- Empirical Strategy and Data
- Results
- Conclusion

Theoretical Framework

- Financial distress leads to increased probability of unemployment
- Unemployment is costly so employees should require a pay premium for an increased probability of distress
- However, the expected cost of unemployment varies across workers within a firm
  - Variation in labor market frictions, firm-specific capital, and quality of match between employer and employee
- The required wage premium should vary across workers

Empirical Strategy

- We focus on variation in expected costs of unemployment arising from variation in labor market size
- In particular, variation arises because individuals in larger labor markets face lower unemployment costs (Helsley and Strange (1990), Petrongolo and Pissarides (2006), Bleakley and Lin (2012))
- We find that, conditional on re-entering employment, individuals in larger labor markets earn significantly higher wages than those in smaller markets

Empirical Specification

- The main specification is:

$$\begin{aligned}\Delta Pay_{ijkl,t\to t+1} &= \alpha + \beta_1 \Delta Lev_{l,t-1\to t} Size_{jk,t} \\ &+ \beta_2 \Delta X_{l,t-1\to t} Size_{jk,t} \\ &+ \beta_3 Size_{jk,t} + \beta_4 Y_{i,t} \\ &+ \gamma_{lt} + \eta_{kt} + \nu_{ijkl,t\to t+1}\end{aligned}$$

- The inclusion of firm-year fixed effects γ_{lt} controls for firm-specific shocks and state-year fixed effects η_{kt} controls for local economic shocks
  - Identification based on variation within firms across states

Data

- Worker-firm level data representing the intersection of CRSP, Compustat, LBD, and LEHD
  - Supplemented with data on manufacturing firms from CMF and ASM
- Firms in finance, utility, and public administration industries are excluded
- Sample of approx. 53 million observations covers 14 million workers at 4,200 firms

Key Variable Definitions

- $Leverage_{lt} = (LongTermDebt_{lt} + ShortTermDebt_{lt})/Assets_{lt}$
- $Size_{jkt} = (Emp_{jkt}/Emp_{jt}) \ / \ (Emp_{kt}/Emp_{t})$
- $PayGrowth_{ilt} = Ln(\overline{QtrPay_{il,t+1}})$ - $Ln(\overline{QtrPay_{ilt}})$

Summary Statistics

	N	Mean	Std. Dev.	Median
Panel A: Worker Level Variables				
ΔPay	53,240,200	0.086	0.649	0.014
Pay	53,240,200	10,975.0	8,806.9	9,052.8
Size	53,240,200	1.700	1.851	1.084
Panel B: Firm Level Variables				
Leverage	25,100	0.233	0.190	0.213
ΔLeverage	25,100	0.003	0.077	-0.001

Leverage and Pay Results

- First, we examine the relationship between firm leverage and employee pay by estimating:

$$Pay_{ilt} = \alpha + \beta_1 Leverage_{l,t-1} + \beta_2 X_{i,t-1} + \beta_3 Y_{l,t-1} + \eta_{it}$$

- Estimate using data in levels and first differences

Leverage and Pay Results

	(1)	(2)	(3)	(4)	(5)	(6)
Leverage	0.036	0.024	-0.006	-0.022	-0.013	-0.006
	(0.032)	(0.019)	(0.006)	(0.017)	(0.019)	(0.001)***
EBITDA / Assets		-0.104	-0.003		-0.019	-0.012
		(0.037)***	(0.014)		(0.038)	(0.002)***
Market-Book		0.009	0.001		0.018	0.019
		(0.003)***	(0.001)		(0.004)***	(0.000)***
Ln Sales		0.006	0.000		0.042	0.041
		(0.002)***	(0.002)		(0.011)***	(0.001)***
Asset Tangibility		-0.016	-0.019		-0.061	-0.082
		(0.019)	(0.009)**		(0.036)*	(0.002)***
Marginal Tax Rate		-0.025	-0.001		0.035	0.032
		(0.024)	(0.009)		(0.068)	(0.002)***
Obs	53,240,200	53,240,200	53,240,200	53,240,200	53,240,200	53,240,200
R-squared	0.00	0.24	0.43	0.00	0.02	0.02
Worker controls	no	yes	yes	no	yes	yes
Levels/Diff	Levels	Levels	Levels	Diff	Diff	Diff
Year FE	no	no	yes	no	no	yes
State FE	no	no	yes	no	no	yes
Firm FE	no	no	yes	no	no	yes

Leverage and Pay Results

- Two key issues likely bias these estimates
  - Selection bias - e.g., firms are less likely to increase leverage in cases where it will significantly increase payroll
  - Omitted variable bias - e.g., firms may raise capital to invest in labor-augmenting technology
- Estimates exploiting within-firm variation is less likely to suffer from selection bias and omitted variable bias

Leverage and Pay Results

	(1)	(2)	(3)	(4)	(5)
Size * ΔLeverage	-0.032	-0.032			-0.019
	(0.015)**	(0.015)**			(0.010)**
Size * (ΔLeverage = Quartile 2)			0.000		
			(0.002)		
Size * (ΔLeverage = Quartile 3)			-0.001		
			(0.002)		
Size * (ΔLeverage = Quartile 4)			-0.004		
			(0.002)**		
Size * ΔTotalDebt				-0.007	
				(0.003)***	
Size	0.003	0.004	0.003	0.003	0.001
	(0.001)***	(0.001)***	(0.001)***	(0.002)	(0.000)**
Firm-Year FE	yes	yes	yes	yes	yes
State-Year FE	yes	yes	yes	yes	no
MSA-Year FE	no	no	no	no	yes
Worker FE	no	yes	no	no	no
Geography	State	State	State	State	MSA
Obs	53,240,200	53,240,200	53,240,200	53,240,200	51,366,300
R-squared	0.06	0.06	0.06	0.06	0.06

Economic Magnitudes

- We use these cross-sectional estimates to estimate the effect of leverage on compensation
  - Split the sample into deciles based on labor market size and assume leverage has no effect in largest labor markets
  - For each other decile, estimate the effect by multiplying the estimate with the average size for the decile minus the top decile average
- 10 pp increase in firm leverage increases
  - Compensation for worker in median labor market by 1.6%
  - Total firm labor costs by 25 basis points of firm value

New Employee Pay Results

	(1)	(2)	(3)
Size * ΔLeverage	-0.055		
	(0.026)**		
Size * (ΔLeverage = Quartile 2)		-0.005	
		(0.018)	
Size * (ΔLeverage = Quartile 3)		0.011	
		(0.019)	
Size * (ΔLeverage = Quartile 4)		-0.046	
		(0.021)**	
Size * ΔTotalDebt			-0.007
			(0.004)*
Size	0.005		0.005
	(0.001)***		(0.001)***
Firm-Year FE	yes	yes	yes
State-Year FE	yes	yes	yes
Obs	19,479,000	19,479,000	19,479,000
R-squared	0.47	0.47	0.47

- 10 pp increase in leverage $\Rightarrow$ 2.6% higher pay for new employees

Employee Pay, Employee Age, and Leverage

- Labor market size is not the only determinant of expected costs of unemployment
- Graham et al. (2016) find that older workers experience larger post-bankruptcy declines in income

	(1)	(2)
Old Worker * ΔLeverage	-0.037	-0.222
	(0.022)*	(0.121)*
Firm-Year FE	yes	yes
State-Year FE	yes	yes
Obs	53,240,200	19,479,000
R-squared	0.06	0.47

Mechanism Evidence

- To win higher wages to compensate for higher unemployment risk, workers need to:
  - Understand that higher leverage increases the probability of unemployment
  - Have sufficient bargaining power
- We split the sample by level of pay and exposure to previous bankruptcy and then by unemployment rates and labor market competitiveness

Worker Characteristics Subsamples

	(1)	(2)	(3)	(4)	(5)
Size * ΔLeverage	-0.059	-0.032	-0.024	-0.037	-0.172
	(0.037)	(0.018)*	(0.014)*	(0.015)**	(0.067)***
Size	0.001	0.002	0.002	0.003	0.001
	(0.002)	(0.001)*	(0.001)*	(0.001)*	(0.007)
Sample	Q1 Pay	Q2 Pay	Q3 Pay	Q4 Pay	BankExp
Firm-Year FE	yes	yes	yes	yes	yes
State-Year FE	yes	yes	yes	yes	yes
Obs	8,159,000	13,368,800	15,377,300	16,335,000	2,236,100
R-squared	0.18	0.05	0.06	0.10	0.05

Labor Market Characteristics Subsamples

	(1)	(2)	(3)	(4)
Size * ΔLeverage	-0.047	-0.009	-0.049	-0.013
	(0.028)*	(0.025)	(0.029)*	(0.019)
Size	0.004	0.003	0.002	0.003
	(0.002)***	(0.001)**	(0.002)*	(0.001)**
Sample	Low Unemp	High Unemp	Comp LM	Uncomp LM
Firm-Year FE	yes	yes	yes	yes
State-Year FE	yes	yes	yes	yes
Obs	22,009,800	31,230,400	31,491,700	21,748,500
R-squared	0.07	0.07	0.06	0.07

Distress Measure Subsamples

	(1)	(2)	(3)	(4)	(5)	(6)
Size * ΔLeverage	-0.070	-0.028	-0.155	-0.023	-0.133	-0.030
	(0.038)*	(0.016)*	(0.092)*	(0.015)	(0.055)**	(0.015)*
Size	0.005	0.003	-0.015	0.003	-0.001	0.003
	(0.003)*	(0.001)***	(0.015)	(0.001)***	(0.004)	(0.009)***
Sample	High P(Def)	Low P(Def)	Distress	No Distress	Ind Distress	Ind No Distress
Firm Controls	yes	yes	yes	yes	yes	yes
Worker Controls	yes	yes	yes	yes	yes	yes
Firm-Year FE	yes	yes	yes	yes	yes	yes
State-Year FE	yes	yes	yes	yes	yes	yes
Obs	5,733,600	47,506,600	1,898,600	51,341,600	1,060,400	52,179,800
R-squared	0.06	0.06	0.06	0.06	0.08	0.06

Alternative Explanations

- Results might be due to reverse causality – firms need to raise debt to pay for higher wages
- Results might be due to differential trends in pay
- We test these explanations by looking at pay growth before and after the change in firm leverage

Timing Regressions

	(1)	(2)	(3)	(4)
Size * ΔLeverage	-0.009	-0.007	-0.005	0.000
	(0.008)	(0.008)	(0.008)	(0.009)
Size	0.000	-0.002	0.001	0.000
	(0.000)	(0.000)***	(0.000)	(0.000)
Year	$t-2$	$t-1$	$t+1$	$t+2$
Firm-Year FE	yes	yes	yes	yes
State-Year FE	yes	yes	yes	yes
Obs	41,919,800	47,309,000	46,755,700	41,132,800
R-squared	0.03	0.06	0.03	0.03

Alternative Explanations

- Empirical strategy controls for firm shocks but not firm-state shocks
  - Pay could be increasing due to increased productivity at establishments in a particular state
- We test this explanation in two ways
  - Labor productivity measures from CMF and ASM data
  - Firm-state growth rates from LBD, CMF, and ASM data

Worker Productivity Results

	(1)	(2)	(3)
Size * ΔLeverage	-0.048	0.003	0.070
	(0.023)**	(0.040)	(0.069)
Size	0.000	0.000	-0.001
	(0.004)	(0.004)	(0.004)
Dep. Var.	Qtr Pay Growth	Labor Prod Growth	Value Add Per Emp Growth
Firm Controls	yes	yes	yes
Worker Controls	yes	yes	yes
Firm-Year FE	yes	yes	yes
State-Year FE	yes	yes	yes
Obs	22,714,400	22,714,400	22,714,400
R-squared	0.07	0.70	0.71

Firm-State Growth Results

	(1)	(2)	(3)	(4)	(5)
Size * ΔLeverage	0.017	0.004	0.009	-0.012	-0.134
	(0.034)	(0.023)	(0.050)	(0.076)	(0.164)
Size	0.015	0.009	0.010	0.018	0.079
	(0.002)***	(0.001)***	(0.003)***	(0.004)***	(0.009)***
Dep. Var.	Emp Growth	Estab Growth	Sales Growth	Value Add Growth	CapEx Growth
Firm Controls	yes	yes	yes	yes	yes
Firm-Year FE	yes	yes	yes	yes	yes
State-Year FE	yes	yes	yes	yes	yes
Obs	118,900	118,900	23,900	23,900	23,900
R-squared	0.46	0.58	0.55	0.54	0.59

Alternative Explanations

- Firms may be raising debt to expand employment
- Competition for workers in small labor markets may be stronger, leading to higher wage growth in those markets
- We test this explanation by splitting the sample in workers at firms increasing employment and workers at firms that are not

Firm Expansion Subsamples

	(1)	(2)	(3)	(4)
Size * ΔLeverage	-0.004	-0.055	0.003	-0.067
	(0.019)	(0.022)**	(0.021)	(0.023)***
Size	0.002	0.003	0.001	0.004
	(0.001)*	(0.001)***	(0.001)	(0.001)**
Firm-Year FE	yes	yes	yes	yes
State-Year FE	yes	yes	yes	yes
Sample	$\Delta Emp_{lt} > 0$	$\Delta Emp_{lt} \leq 0$	$\Delta Emp_{klt} > 0$	$\Delta Emp_{klt} \leq 0$
Obs	26,855,700	26,384,600	25,718,100	27,522,200
R-squared	0.06	0.06	0.06	0.06

Firm Leverage Results

- Evidence suggests that, for workers with higher expected unemployment costs, increased firm leverage leads to increased pay
- Given the role of local labor markets, we study their effect on firm leverage choice
- In particular, we run the regression:

$$\begin{aligned} \Delta Leverage_{i,t-1\to t} &= \alpha + \beta_1 \Delta AvgSize_{i,t-2\to t-1} \\ &+ \beta_2 \Delta X_{i,t-2\to t-1} + \eta_{i,t-1\to t} \end{aligned}$$

Firm Leverage Results

	(1)	(2)	(3)	(4)
ΔAvgSize	0.004	0.005	0.011	-0.001
	[1.52]	[1.58]	[2.20]**	[0.28]
ΔEBITDA / AT		-0.039	-0.05	-0.013
		[4.45]***	[4.95]***	[0.66]
ΔMB		-0.001	0.000	-0.002
		[1.50]	[0.49]	[2.38]**
ΔLog Sales		0.005	0.005	0.001
		[2.07]**	[1.79]*	[0.28]
ΔAsset Tangibility		0.07	0.039	0.113
		[6.07]***	[2.40]**	[6.85]***
ΔMargTaxRate		-0.017	0.016	-0.053
		[1.69]*	[1.13]	[3.61]***
ΔAltmanZ		0.005	0.006	0.005
		[4.88]***	[4.63]***	[2.18]**
Sample	All	All	High Payroll	Low Payroll
Year FE	no	yes	yes	yes
State FE	no	yes	yes	yes
Firm FE	no	yes	yes	yes
Obs	42,500	42,500	19,000	23,500
R-squared	0.00	0.16	0.22	0.17

Conclusion

- Increased firm leverage leads to higher pay for employees with higher expected costs of unemployment
- Results are strongest for employees with high probability of unemployment and inconsistent with a story of higher productivity
- Changes in local labor markets does affect firm leverage decisions, at least for firms with high labor costs