Leverage, Unemployment Risk and Employee Compensation

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Abstract

I study USA manufacturing firms to examine relation between leverage and employee compensation. I find that workers' wage is a function of the firm's likelihood of bankruptcy – arising from high leverage – as well as their likelihood of finding a job elsewhere, should the firm liquidates. If firm's leverage is high but workers' switching cost is low, i.e. when firm goes bankrupt workers can find job elsewhere, their wage is relatively low. On the other hand, when firm has high leverage as well as there are few outside opportunities, employees' compensation increases with leverage. In addition, using state unemployment insurance, I find that the demand for high wage arises from their demand for high premium for bearing higher unemployment risk.

Keywords: leverage, competition, labor wage, unemployment risk

I. Introduction

Traditional corporate finance paradigm suggests asymmetric information and managerial incentives play a key role in determining capital structure of firms. However, as Zingales (2000) suggests, with continuous changing economic landscape, human capital is emerging as the most crucial asset for firms and recommends theory of firm should address how the surplus generated by the firm is allocated among its members. Numerous incidences when extreme conflict between labor and firm has led to either significant loss to all[2] or, worse, firm's liquidation[3] further

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[2] In 2003, California endured the longest supermarket strike in US history. More than 70,000 grocery workers picketed outside their stores for almost five months. Although the two sides eventually reached an agreement, they both endured heavy losses. Many workers went into heavy debt while they were on the picket lines. The chains suffered too, losing more than one billion dollars in sales. [Source: "Labor conflicts: Case of two supermarket strikes", Cate Malek 2005]

[3] Eastern was one of the "Big Four" domestic airlines created by the Spoils Conferences of 1930. Labor disputes and high debt loads strained the company in the late 1970s and early 1980s. After continued labor disputes and a crippling strike in 1989, Eastern ran out of money and was liquidated in 1991. [Source: Wikipedia]
"More debt for Eastern meant greater pressure to cut costs. . . . [The company] is embarked on a confrontation between labor and interest costs. It's not labor and management. It's labor and interest cost." Farrell Kupersmith, Pilots' Union Representative [Frontline, "The Battle for Eastern Airlines," January 31, 1989]

underscores the importance of understanding how capital structure and workforce influence each other.

Both Titman (1984) and Berk, Stanton, & Zechner (2010), in their theoretical models, predict that employees wage demand is linked with firms' probability of liquidation, i.e. a firm with higher leverage pays higher compensation to its risk-averse workforce to compensate them for bearing expected bankruptcy cost. Along similar line, Chemmanur, Cheng, and Zhang (2013) find since a firm is unable to fully insure human-capital risk arising from bankruptcy risk, a firm that has high leverage pays higher wages to its employees.

Nonetheless, literature recommends workers' concern about becoming unemployed affect firm's policies on layoffs and wage-setting (Topel 1984; Li 1986). In other words, from workers' perspective, it is the risk of being unemployed that they really care for, and that is what drives their demand for wages. This paves way for my main hypothesis in this paper – workers' wage is a function of the firm's likelihood of bankruptcy as well as their likelihood of finding a job elsewhere should the firm liquidate.

If a firm has high bankruptcy risk, workers decide to either stay with the firm or they can switch to other firms. When there are enough outside opportunities, i.e. workers switching cost is low, in case of firm's liquidation, workers probability of being unemployed still stays low, since they can find job elsewhere. However, as the outside opportunities reduces and cost of switching increases (e.g. when workers have to change industry they might need to retool), firm's liquidation risk becomes much more important to labor. Therefore, I hypothesize if there are not enough outside opportunities, firm's higher leverage, hence higher probability of bankruptcy, results in demand for higher wages.

It appears there are three factors that influences worker's wages, *viz*. firm's bargaining power, worker's bargaining power and worker's demand for risk-premium. Owing to its unidirectional impact on unemployment, I primarily use import competition to proxy lack of outside job opportunities for labor – Autor, Dorn, and Hanson (2012) and Pierce and Schott (2012) underscore importance of competition in the context of labor's unemployment risk as they find a positive relation between import competition and unemployment in manufacturing sector.

Incremental effect of domestic competition on unemployment, however, could be confounding. For instance, unlike import competition, higher domestic competition might arise from higher number of firms operating in the industry, which results in lower switching and/or retooling costs for labor. In such case when a firm liquidates, workers will find job elsewhere, i.e. higher domestic competition not necessarily results in higher unemployment risk.

I find for firms that operate in industries with low switching cost, i.e. low import penetration, employee compensation decreases with leverage. There are two mechanisms that can potentially explain this. First, as leverage of such firms increases, workers with higher skills switch to other firms; whereas workers with low skill stay with the firm which would drive down average wage. Second, explanation could be in industries with low switching cost, firms enhance their bargaining position by using high cost-of-debt (owing to high leverage) as a constraint on corporate liquidity (Matsa, 2010). One of my proposed plan of actions herein is to determine the mechanism at play here.

However, as import penetration increases, workers probability of staying unemployed increases with firm's increasing probability of bankruptcy. As a result, in industries where worker's switching cost is high, i.e. high-import-competition industries, workers demand higher

compensation as firm's leverage increases. The demand for higher wages can arise because of two reasons, *viz*. (a) workers have higher bargaining power – given increasing importance of human capital for firms (Zingales 2000), it is critical for such firms to retain skilled labor in order to survive the competitive pressure; or (b) because their demand for high risk-premium supersedes firm's bargaining power. The idea that wage differential must compensate workers for bearing unemployment risk dates back to Adam Smith (1976, p. 120). Topel (1984), Titman (1984) and Berk, Stanton, and Zechner (2010) suggest that workers require firms provide a premium wage as a compensation for potential job loss.

To identify the underlying mechanism here, I use state's unemployment insurance benefit. I argue if unemployment insurance increases worker's reservation utility, then wages should increase with these benefits. However, if unemployment insurance reduces labor's risk for being unemployed, higher insurance results in lower differential impact of competition and leverage on employee compensation. I find that it is the demand for risk-premium to be compensated for bearing high unemployment risk that drives wage upwards as firm's leverage increases in industries with high switching cost.

I find as state's unemployment insurance benefit increases, wage sensitivity for the combined impact of leverage and import competition goes down. In other words, for firms operating in states with higher unemployment insurance, workers demand relatively lower wages, *ceteris paribus*, for bearing same risk arising from high import competition and high leverage.

The sample includes 21 manufacturing industries, based on NAICS three-digit classification, from 1989 to 2006. Following Xu (2012), I calculate import penetration index (IPI) – ratio of import value to sum of import value and domestic production value – to measure foreign competition in

these industries. I find firms that operate in less competitive industries use leverage as a bargaining tool, i.e. higher leverage results in lower labor wage. However, for firms operating in more competitive industries, labor's demand for higher wage surpasses firm's bargaining power, brought about by higher leverage. In fact, as higher leverage increases firm's liquidation risk, further exacerbated by high competition, these firms exhibit positive relation between leverage and labor wage. These results are more pronounced for firms that are characterized by higher labor intensity.

These results are statistically as well as economically significant. According to column (1) of Table 2, for a firm operating in low competition industry if book leverage goes up by one standard deviation (0.26 as reported in Table 1), the natural log of average employee goes down by 0.11 (= -0.434*0.26), which is translated into more than 11.8% reduction in average employee expense. In high-competition industry, however, one standard deviation increase in firm's book leverage results in almost 6.6% increase in average employee expense.

There are, however, some concerns about the findings here, for one, endogeneity arising from simultaneity and/or from an unobserved variable impacting both leverage and employee wage. To address that issue, I intend to use marginal corporate tax rate (following Chemmanur, Cheng and Zhang, 2013) as an instrument for leverage, since it does not impact wage directly. Also, estimates could also be biased because of endogeneity arising from import penetration as well. For instance, industries that are profitable might pay high to the employees as well as attract higher import competition. To eliminate that concern, I use import competition as an instrument for import penetration. The results stay consistent with above conclusion, hence reinforcing the causal relation between interaction of competition and leverage on worker wage. I plan to improve IV identification for import competition in my future work.

The other concern is generalizability of the results. Only a fraction of firms – approximately 7% – provides employee wage data. It is likely that results hold only for these firms but not for the entire population. I, therefore, check for Heckman (1979) sample selection bias. After controlling for potential sample-selection bias, the results hold true.

This paper contributes to the growing literature of finance and labor. This paper explores cross-sectional variation and finds when leverage strengthens firm's bargaining position with its workers and when worker's demand for higher premium for unemployment risk supersedes the former. I find that it is not only the risk arising from firms' leverage but also employees ability to find work elsewhere should the firm goes bankrupt that influence workers' wages. This is one of the first papers to empirically establish risk-premium channel in context of worker's being compensated for bearing firm's high liquidation risk.

The rest of the paper has been organized as follows. Section II describes data, whereas section III talks about theoretical motivation behind the research question. Finally, section IV and V discuss empirical framework and results and robustness tests, respectively, and section VI concludes main findings of the paper.

II. Data

The data includes both firm-level and macroeconomic variables, wherein the former comes from Compustat Industrial Annual database and the latter is collected from various sources. The sample approximately 55,750 firm-year observations for USA manufacturing firms spanning from 1989 to 2006. Table 1 summarizes the descriptive statistics of firm-level parameters. All the ratios, viz.

market-to-book, physical capital intensity (PCI), book leverage as well as alternate book leverage[4] are winsorized at 99% level. Herein, I use two measures of leverage, viz. book leverage and alternate book leverage. For definition of these variables, please refer to Table A1.

I use North American Industry Classification System (NAICS[5]) three-digit-code for classification of manufacturing industries, broadly classified into durable and non-durable goods. There are 21 industries, as tabulated in Table A2. I gather macroeconomic data from various sources. Import and domestic production data from National Bureau of Economic Research (NBER)[6] and Bureau of Economic Analysis of the US Department of Commerce, respectively; whereas state unemployment insurance comes from US Department of Labor.

The unemployment insurance system of the United States provides temporary income to eligible workers who become involuntarily unemployed. Each state's unemployment insurance benefits has three key features: eligibility, wage benefit amounts, and duration. Typically, all private sector workers who are involuntarily unemployed and actively seeking new employment are eligible for benefits. Much of the variation in insurance benefits, across states and over time, stems from

Table 1. Descriptive Statistics

	N	Mean	S.D.	Median	Min	Max
Employee Expense (In '000)	3941	1540.44	4203.85	210.57	0	1.30E+05
No. of Employees (In '000)	54322	6.75	26.58	0.5	0	775.1
Net Sales (In mm)	58770	1702.15	9179.55	76.26	-21.8	3.40E+05
Market Capitalization (In mm)	51135	2157.96	11832.13	91.93	0.00	5.4E+05
Total Assets (In mm)	58977	1866.2	10848.13	75.39	0	4.80E+05
Market to Book	47320	3.79	6.05	2.06	0.23	45.11
Physical Capital Intensity	58622	0.49	0.35	0.41	0	1.77
Import Penetration Index (IPI)	58977	0.209	0.115	0.195	0.0235	0.754

[4] Definition of all these variables can be found in Table A1

[5] North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

[6] NBER Data repository: http://www.nber.org/data/

Book Leverage	53106	0.28	0.26	0.24	0	0.94
Alternate Book Leverage	52386	0.25	0.25	0.18	0	0.93

changes to the maximum bounds. States also vary in the duration of time for which the claimant is eligible to receive weekly payments. Unemployment insurance provisions are mostly financed by taxes assessed on eligible firms and aggregated over time into individual state trust funds. Tax rates are experience rated, that is, firms with a history of more worker unemployment claims pay higher tax rates. Agrawal and Matsa (2013) do not find any impact of these increase in tax rates on firm's financing decisions.

III. Research Question

Titman (1984) develops a model wherein he finds if workers and other stakeholders of a firm rationally assess its probability of liquidation, the firm will indirectly bear the cost of imposed cost ex-ante. Along similar lines Berk, Stanton, & Zechner (2010), in their theoretical model, find that firms' optimal capital structure depends on trade-off between human capital expense and tax benefit of debt. Therefore, they suggest wages should have explanatory power for firm leverage as well as in an optimal labor contract, a firm with higher leverage pays higher compensation to its risk-averse workforce to compensate them for expected bankruptcy cost. It has also been established in earlier literature that workers' concern about becoming unemployed affect firm's policies on wage-setting (Topel 1984; Li 1986).

Nonetheless, if a firm has higher bankruptcy risk, workers can either stay and demand higher wage, in order to be compensated for bearing high unemployment risk, or they switch to other firms. When there are enough outside opportunities, i.e. workers switching cost is low, if a firm goes

bankrupt, workers probability of being unemployed still stays low, since they can find job elsewhere. However, as the outside opportunities reduces and cost of switching increases, e.g. when workers have to change industry, firm's liquidation risk will become much more important to labor.

Autor, Dorn, and Hanson (2012) and Pierce and Schott (2012) find a positive relation between import competition and unemployment in manufacturing sector. Therefore, as import penetration increases, workers probability of staying unemployed increases with firm's probability of bankruptcy. This paves way for my first hypothesis – *ceteris paribus*, for same level of leverage, firms operating in high-import-competition industry has higher bankruptcy risk and hence workers demand for higher wages for bearing higher unemployment risk. Nonetheless, in low-import-competition industry, higher leverage would strengthen firm's bargaining position.

Incremental effect of domestic competition on unemployment, however, could be confounding. For instance, unlike import competition, higher domestic competition might arise from higher number of firms operating in the industry, which results in lower switching and/or retooling costs for labor. In such case when a firm liquidates, workers will find job elsewhere, i.e. higher domestic competition not necessarily results in higher unemployment risk.

Topel (1984), Titman (1984) and Berk, Stanton, and Zechner (2010) suggest that workers require firms provide a premium wage as a compensation for potential job loss. Hence, I attempt to determine whether this higher demand for wages arises from labor's demand for higher risk premium against bearing higher unemployment risk[7] resulting from rising import competition.

[7] (Pierce and Schott 2012) find a sharp increase in unemployment after change in US trade policy the eliminated potential tariff increment to Chinese imports.

IV. Empirical Framework & Results

I use import penetration index (IPI) – ratio of dollar value of import to the sum of dollar value of domestic production and dollar value of total import (Xu 2012) calculated at three-digit NAICS[8] code – as a proxy of import competition in an industry. Higher is the IPI, higher is the import competition in the industry. Fig. A1 plots all-industry average of IPI over years thereby insinuating at the intensification of import competition over time. I find the same trend for all 21 NAICS industries I have in my sample.

IV.1 Linear model specification for competition, leverage and employee compensation

I use two measures of wage. First, natural log of average employee expense (AEE) – ratio of employee expense to number of employees – as the response variable in following linear model. And second, employee expense per unit of firm's total asset, say, EE_TA. I run equation (A) on subsamples formed on the basis of industries above and below median import penetration. However, owing to very small size of sample, I run equation (1) on the entire sample, which not only takes care of the sample-size issue but also facilitates comparison of coefficient estimates.

$$\log(\text{wage}_{ijt}) = \alpha_j + \alpha_t + \beta_1 * \text{Leverage}_{ijt} + \boldsymbol{\omega} * \mathbf{Z_{ijt}} + \epsilon_{ijt} \quad \ldots (A)$$

$$\log(\text{wage}_{ijt}) = \alpha_j + \alpha_t + \beta_1 * \text{Leverage}_{ijt} + \beta_2 * \text{Leverage}_{ijt} * \mathbb{I}_{IPI,jt-1} + \beta_4 * \mathbb{I}_{IPI,jt-1} + \boldsymbol{\omega} * \mathbf{Z_{ijt}} + \epsilon_{ijt} \quad \ldots (1)$$

[8] North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

where, $\mathbb{I}_{\text{IPI,jt}} = \begin{cases} 1, & \text{if IPI of industry 'j' is above median at time 't'} \\ 0, & \text{otherwise} \end{cases}$

In the above equation, α_j and α_t correspond to industry and time fixed effects, respectively. My main coefficients of interest here are β_1 and β_2 where the former tells us relation between leverage and average employee expense for low-competition-industry firms and sum of the two reflects on the relation between leverage and average employee expense for high-competition-industry firms. I use two measure of leverage, *viz*. book leverage, and alternate book leverage. Book leverage is ratio of sum of long-term debt and debt in current liabilities to sum of long-term debt, debt in current liabilities and book-value of firm. Welch (2011) suggests that the liabilities that are nonfinancial debt should not be included in the computation of leverage ratio. Therefore, following Chemmanur, Cheng, and Zhang (2013), I calculate alternate book leverage as ratio of sum of long-term debt and debt-due in one year to sum of long-term debt, debt-due in one year and book value of firm.

In addition, I control for other significant firm attributes. I broadly follow model of Chemmanur, Cheng, and Zhang (2013). Firm size might play an important in determining its worker's wage. For instance, average wage for larger firms might be higher. I control for firm size by including natural log of firm's total assets. To control for growth opportunities and productivity of average employee I use market-to-book ratio and average sale per employee, respectively.

I control for physical capital intensity (PCI) – defined as the ratio of gross fixed asset to total asset – because capital intensive firms tend to be more productive (Cronqvist et al. 2009) and there is proportional relation between PCI and worker's compensation (Berk, Stanton, and Zechner 2010). Finally, I also include natural log of number of employees to control for whether firm has higher

number of employees on its payroll. Results for equation (A) and (1) are summarized in Table 2, Panel A.

Table 2. Impact of interaction between competition and leverage on employee expense

Table below summarizes results of equation (A) and (1):

$\log(\text{wage}_{ijt}) = \alpha_j + \alpha_t + \beta_1 * \text{Leverage}_{ijt} + \boldsymbol{\omega} * \mathbf{Z_{ijt}} + \epsilon_{ijt}$

$\log(\text{wage}_{ijt}) = \alpha_j + \alpha_t + \beta_1 * \text{Leverage}_{ijt} + \beta_2 * \text{Leverage}_{ijt} * \mathbb{I}_{IPI,jt-1} + \beta_4 * \mathbb{I}_{IPI,jt-1} + \boldsymbol{\omega} * \mathbf{Z_{ijt}} + \epsilon_{ijt}$

I use two measures of employee wage, viz. average employee expense (AEE) and employee expense per unit of total assets (EE_TA). Definition of control variables can be found in Table A1. α_j and α_t are industry and year fixed effects, respectively. I measure firm's leverage using book and alternate book leverage. Columns (1) and (2) reports estimates for first equation, for below median IPI and above median IPI, respectively. For brevity, I report result only for AEE corresponding to alternate book leverage. Columns (3) to (6) summarizes results for the second equation. Main coefficients of interest here are $\beta_1$and β_2, where the former reflects upon relation between leverage and employee compensation for low-competition industry and sum of the two reflects upon relation between leverage and employee compensation in high-competition industry. Panel A summarizes OLS results whereas Panel B provides statistical significance of $(\beta_1 + \beta_2)$. Numbers in parenthesis are standard errors. Standard errors are robust to heteroskedasticity. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	log(AEE) (1)	log(AEE) (2)	log(AEE) (3)	log(AEE) (4)	log(EE_TA) (5)	log(EE_TA) (4)
Panel A: OLS Result						
Book Leverage			-0.435***		-0.435***	
			(0.0881)		(0.0881)	
Book Leverage*High IPI (t-1)			0.704***		0.704***	
			(0.158)		(0.158)	
Alternate Book Leverage	-0.218**	0.506***		-0.209**		-0.209**
	(0.0978)	(0.158)		(0.0943)		(0.0943)
Alternate Book Leverage* High IPI (t-1)				0.730***		0.730***
				(0.169)		(0.169)
log(Total Asset)	0.483***	0.580***	0.526***	0.525***	-0.474***	-0.475***
	(0.0338)	(0.0556)	(0.0301)	(0.0304)	(0.0301)	(0.0304)
Avg Sale per Employee	0.000422***	0.000317	0.000339***	0.000340***	0.000339***	0.000340***
	(0.000137)	(0.000248)	(0.000115)	(0.000119)	(0.000115)	(0.000119)
Market-to-Book	0.0143***	0.0247***	0.0194***	0.0193***	0.0194***	0.0193***
	(0.00373)	(0.00338)	(0.00241)	(0.00263)	(0.00241)	(0.00263)
Physical Capital Intensity	0.0109	0.493***	0.218***	0.175***	0.218***	0.175***
	(0.0680)	(0.104)	(0.0527)	(0.0562)	(0.0527)	(0.0562)
log(No. of Employees)	-0.441***	-0.569***	-0.494***	-0.496***	0.506***	0.504***
	(0.0329)	(0.0568)	(0.0300)	(0.0304)	(0.0300)	(0.0304)
High IPI (t-1)			-0.402***	-0.369***	-0.402***	-0.369***
			(0.0931)	(0.0947)	(0.0931)	(0.0947)
Constant	0.831***	-0.118	0.606***	0.576***	0.606***	0.576***
	(0.235)	(0.330)	(0.198)	(0.201)	(0.198)	(0.201)
Observations	1,741	916	2,797	2,657	2,797	2,657
R-squared	0.423	0.314	0.367	0.367	0.379	0.367
Adj-Rsq	0.410	0.292	0.358	0.357	0.369	0.358
Ind FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Panel B: Estimating statistical significance of High-competition industries						
Leverage+ Leverage*Import Comp			0.269	0.521	0.269	0.521
Estimated standard error			0.141	0.147	0.141	0.147
Estimated t-stat			1.902	3.550	1.902	3.550

Although I have 500 firms in the sample, for almost half of observation, there are less than six observations per-firm. If I cluster standard errors it might lead to over-rejection of true-null hypothesis. Therefore, I correct standard errors only for heteroscedasticity. It can be inferred from Table 2 that, for both measures of leverage, as leverage goes up for a firm operating in low-competition industry employee wage goes down, i.e. higher leverage increases firm's bargaining power in low competition industries. This relation, nonetheless, inverts for firms operating in high-competition industries and aligns with that of Chemmanur, Cheng, and Zhang (2013). Panel B of Table 2 reports statistical significance of sum of $\beta_1$and β_2. As is suggested by estimated t-stat, the sum is positive and statistically significant for both book and alternate book leverage, and especially stronger for the latter. In sum, as relation between leverage and bankruptcy risk is intensified by competitiveness of an industry, workers demand higher wages so as to compensate increased likelihood of liquidation. One unit increase in book leverage results in 35% reduction in labor wage for low-competition industry whereas the same results in almost 31% increment in compensation for high-competition industry.

IV.2 Estimating strength of results to other variations

State labor laws might play an important role in determining a firm's bargain power. Therefore, in order to determine whether above results are robust to labor laws in different states, I include state fixed effects as well as state-and-year fixed effects in equation (1). Of the firms that report employee expense, Compustat doesn't provide state data for all. In addition, there are states for which there is only one observation. This further reduces the sample size. The results are summarized in Table 3. As we can see from this table, impact of leverage and competition on employee wage still hold true. For brevity, I report results with state fixed effects only for AEE.

Furthermore, I analyze relation between interaction between leverage and competition on employee expense conditional upon firm's labor intensity. Following Agrawal and Matsa (2013), I calculate labor intensity as the ratio of sum of employee expense and pension to net sales of a firm. Firm that are characterized by high labor intensity spend more on it workers, therefore workers of such firms bear higher cost if unemployed. To identify whether these workers demand higher compensation for bearing unemployment risk, I estimate equation (1) for firms grouped as above-median and below-median based on labor-intensity. The results are tabulated in Table 4.

Table 3. Controlling for effect on labor wage arising from state variation

Columns (1) and (2) summarizes results of following equation:

$$\log(\text{wage}_{ijt}) = \alpha_j + \alpha_t + \alpha_s + \beta_1 * \text{Leverage}_{ijt} + \beta_2 * \text{Leverage}_{ijt} * \mathbb{I}_{IPI,jt-1} + \beta_4 * \mathbb{I}_{IPI,jt-1} + \boldsymbol{\omega} * \mathbf{Z_{ijt}} + \epsilon_{ijt}$$

I present result only for average employee expense (AEE). Definition of control variables can be found in Table A1. α_j α_t and $\alpha_s$are industry, year and state fixed effects, respectively. I measure firm's leverage using book and alternate book leverage. Column (3) and (4) summarizes the output with additional control of state-year fixed effects, i.e. $\alpha_s * \alpha_t$, which controls for effect on wages arising from changes in state's labor-law over time. Main coefficients of interest here are $\beta_1$and β_2, where the former reflects upon relation between leverage and employee compensation for low-competition industry and sum of the two reflects upon relation between leverage and employee compensation in high-competition industry. Numbers in parenthesis are standard errors. Standard errors are robust to heteroskedasticity. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	log(AEE) (1)	log(AEE) (2)	log(AEE) (3)	log(AEE) (4)
Book Leverage	-0.560***		-0.724***	
	(0.132)		(0.179)	
Book Leverage*High IPI (t-1)	0.744***		0.943***	
	(0.216)		(0.303)	
Alternate Book Leverage		-0.513***		-0.594***
		(0.129)		(0.168)
Alternate Book Leverage* High IPI (t-1)		0.684***		0.766***
		(0.202)		(0.296)
log(Total Asset)	0.405***	0.405***	0.404***	0.401***
	(0.0513)	(0.0525)	(0.0669)	(0.0685)
Avg Sale per Employee	6.72e-07	-2.45e-05	2.16e-05	7.76e-07
	(0.000206)	(0.000208)	(0.000259)	(0.000266)
Market-to-Book	0.0152***	0.0147***	0.0193***	0.0183***
	(0.00303)	(0.00302)	(0.00347)	(0.00347)
Physical Capital Intensity	0.413***	0.407***	0.469***	0.434***
	(0.0838)	(0.0836)	(0.116)	(0.116)
log(No. of Employees)	-0.387***	-0.389***	-0.384***	-0.384***
	(0.0462)	(0.0476)	(0.0608)	(0.0629)
High IPI (t-1)	-0.292**	-0.235**	-0.209	-0.115
	(0.117)	(0.114)	(0.192)	(0.209)
Constant	1.605***	1.582***	3.253***	0.442
	(0.366)	(0.382)	(0.492)	(0.400)
Observations	1,245	1,225	1,245	1,225
R-squared	0.357	0.353	0.528	0.525
Adj-Rsq	0.314	0.309	0.258	0.246
Ind FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
State*Year FE	No	No	Yes	Yes

For brevity, I report results only for AEE and suppress coefficients of control variables. Columns (1) and (2) of Table 4 reports the estimates for firms exhibiting low labor intensity, whereas columns (3) and (4) B reports that for firms with high labor-intensity. I do not find any significant result for below-median labor intensive firms. The results hold true for high labor intensive firms, where workers bear higher cost of unemployment. These findings align with the previous results, which suggests workers demand higher wages when cost associated with unemployment increases.

IV.3 Workers' bargaining power versus their demand for risk-premium

To ascertain whether this increase in remuneration arises from workers' higher bargaining power or demand for higher risk-premium for bearing higher unemployment risk, I use states' unemployment insurance date. Following Agrawal and Matsa (2013), I calculate maximum unemployment insurance (UI_{max}) for each state for each year (for definition refer to Table A1). Agrawal and Matsa (2013) argue firms capital structure decision is influenced by state's unemployment benefits in the previous year. In particular, they find positive relation between firms' leverage and states' unemployment insurance, indicating managers choose financial policy partly to mitigate labor's exposure to unemployment risk. Management, however, has little control over rising import competition.

State unemployment insurance, hence, provides a nice set-up to compare labor's bargaining power with their demand for risk-premium. If unemployment insurance increases worker's reservation utility, then they will demand higher wage for higher state benefits, ceteris paribus, thereby suggesting it is worker's bargaining power driving higher wages. On the contrary, if driver for higher wages is risk-premium, as unemployment insurance increases workers demand for risk-premium decreases, i.e. workers will demand lower wage from firms operating in states with high

Table 4. Checking variation arising from firm's labor intensity

Table summarizes results of following equation:

$\log(\text{wage}_{ijt}) = \alpha_j + \alpha_t + \beta_1 * \text{Leverage}_{ijt} + \beta_2 * \text{Leverage}_{ijt} * \mathbb{I}_{IPI,jt-1} + \beta_4 * \mathbb{I}_{IPI,jt-1} + \boldsymbol{\omega} * \mathbf{Z_{ijt}} + \epsilon_{ijt}$

I present results only for average employee expense (AEE). Definition of control variables can be found in Table A1. α_j α_t and $\alpha_s$are industry, year and state fixed effects, respectively. I measure firm's leverage using book and alternate book leverage. Columns (1) and (2) summarize results for firms that have below-median labor-intensity, whereas columns (3) and (4) summarize output for firms that have above median labor-intensity. Main coefficients of interest here are $\beta_1$and β_2, where the former reflects upon relation between leverage and employee compensation for low-competition industry and sum of the two reflects upon relation between leverage and employee compensation in high-competition industry. Numbers in parenthesis are standard errors. For brevity, I suppress estimates of controls in this table. Standard errors are robust to heteroskedasticity. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	log(AEE) (1)	log(AEE) (2)	log(AEE) (3)	log(AEE) (4)
Book Leverage	-0.0736		-0.349***	
	(0.163)		(0.0945)	
Book Leverage*High IPI (t-1)	0.366		0.535***	
	(0.305)		(0.114)	
Alternate Book Leverage		0.0672		-0.364***
		(0.153)		(0.100)
Alternate Book Leverage* High IPI (t-1)		0.259		0.551***
		(0.304)		(0.124)
High IPI (t-1)	0.00802	0.0821	-0.341***	-0.322***
	(0.171)	(0.165)	(0.0531)	(0.0514)
Constant	-0.241	-0.315	2.073***	2.075***
	(0.357)	(0.376)	(0.132)	(0.134)
Observations	1,062	1,000	1,058	1,020
R-squared	0.539	0.542	0.659	0.661
Adj-Rsq	0.522	0.523	0.646	0.647
Ind FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Labor Intensity	Low	Low	High	High

benefits, all else equal. Subsequently, I divide states into terciles based on its UI_{max} and create an indicator variable $\mathbb{I}_{UI,st}$ that takes one if a state's UI_{max} is in top tercile and zero if it is in bottom tercile. I run following linear model where I include interaction of leverage and import competition with lagged value of above indicator, i.e. $\mathbb{I}_{UI,s(t-1)}$, as additional controls. Also, in addition to industry and year fixed-effects, I include state fixed effect.

$$\log(\text{wage}_{ijt}) = \alpha_j + \alpha_t + \alpha_s + \beta_1 * \text{Leverage}_{ijt} + \beta_2 * \text{Leverage}_{ijt} * \mathbb{I}_{IPI,jt-1} + \beta_3 * \text{Leverage}_{ijt} * \mathbb{I}_{UI,s(t-1)} + \beta_4 * \text{Leverage}_{ijt} * \mathbb{I}_{IPI,jt-1} * \mathbb{I}_{UI,s(t-1)} + \boldsymbol{\omega} * \mathbf{Z_{ijt}} + \epsilon_{ijt} \quad \dots (2)$$

My main coefficients of interest here are β_3 and β_4, where the former provides difference between marginal effects of leverage on wage brought about by UI for low-competition industries and the

latter is essentially a difference-in-difference estimate of marginal impact of leverage on employee wage. Similarly, $\beta_3 + \beta_4$ reflects difference between marginal effects of leverage on wage brought about by UI for high-competition industries.

The estimates of equation (2) are summarized in Table 5. Sum of β_3 and β_4 is negative suggesting for firms that operate in highly competitive industries, as state unemployment insurance increases marginal impact of leverage on employee wage reduces, *ceteris paribus*. Therefore, it can be inferred that as UI increases, labor's risk for becoming unemployed reduces and so does their demand for wages. This finding insinuates, in context of high import competition, demand for higher wages arise from demand for risk-premium. This finding aligns with prediction of Titman (1984) and Berk, Stanton, and Zechner (2010).

I, however, find weak results if I divide states only in two groups – above and below median – based on UI_{max}, which implies unless there is significant difference between unemployment insurance, it does not influence labor's demand for risk-premium. Interestingly, the results are even stronger for two-year-lagged UI, suggesting firms are influenced by state's decisions of unemployment benefits.

In addition, I attempt to answer whether interaction of leverage with import and domestic competition result in similar impact on employee's remuneration. I begin with estimating impact of interaction of leverage with domestic competition on average employee wage, similar to equation (1). Since HHI is proxy for industry concentration, $\mathbb{I}_{DomComp,jt}$ takes one if industry's HHI is below median and zero otherwise. HHI for an industry is calculated as $\Sigma s_i^2$where s_i is market share of firm 'i' calculated on the basis of net sales, where industries are defined at three-digit NAICS level. I find no incremental impact of domestic competition on employee's wage.

Table 5. Estimating impact of states' unemployment insurance on employee wage

The table summarizes results for following equation:

$$\log(\text{wage}_{ijt}) = \alpha_j + \alpha_t + \alpha_s + \beta_1 * \text{Leverage}_{ijt} + \beta_2 * \text{Leverage}_{ijt} * \mathbb{I}_{IPI,jt-1} + \beta_3 * \text{Leverage}_{ijt} * \mathbb{I}_{UI,s(t-1)} + \beta_4 * \text{Leverage}_{ijt} * \mathbb{I}_{IPI,jt-1} * \mathbb{I}_{UI,s(t-1)} + \boldsymbol{\omega} * \mathbf{Z_{ijt}} + \epsilon_{ijt}$$

I use two measures of employee wage, viz. average employee expense (AEE) and employee expense per unit of total assets (EE_TA). Definition of control variables can be found in Table A1. α_j α_t and $\alpha_s$are industry, year and state fixed effects, respectively. I measure firm's leverage using book and alternate book leverage. Main coefficients of interest here are $\beta_3$and β_4, where the former reflects upon effect of interaction of leverage and competition on employee compensation for states belonging to bottom-tercile unemployment insurance. Sum of the two coefficients reflects upon effect of interaction between leverage and competition on employee compensation given state's unemployment insurance belongs to top-tercile. Numbers in parenthesis are standard errors. Standard errors are robust to heteroskedasticity. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	log(AEE)	log(AEE)	log(EE_TA)	log(EE_TA)
	(1)	(2)	(3)	(4)
Book Leverage	-0.894***		-0.894***	
	(0.253)		(0.253)	
Book Leverage*High IPI (t-1)	1.542***		1.542***	
	(0.391)		(0.391)	
Book Leverage*High UI (t-1)	0.789**		0.789**	
	(0.333)		(0.333)	
Book Leverage*High IPI (t-1)*High UI (t-1)	-1.232**		-1.232**	
	(0.549)		(0.549)	
Alternate Book Leverage		-0.847***		-0.847***
		(0.269)		(0.269)
Alternate Book Leverage*High IPI (t-1)		1.562***		1.562***
		(0.428)		(0.428)
Alternate Book Leverage*High UI (t-1)		0.777**		0.777**
		(0.356)		(0.356)
Alternate Book Leverage*High IPI (t-1)*High UI (t-1)		-1.398**		-1.398**
		(0.595)		(0.595)
log(Total Asset)	0.345***	0.351***	-0.655***	-0.649***
	(0.0620)	(0.0645)	(0.0620)	(0.0645)
Avg Sale per Employee	2.51e-05	-3.11e-05	2.51e-05	-3.11e-05
	(0.000281)	(0.000294)	(0.000281)	(0.000294)
Market-to-Book	0.0122***	0.0115***	0.0122***	0.0115***
	(0.00407)	(0.00404)	(0.00407)	(0.00404)
Physical Capital Intensity	0.507***	0.474***	0.507***	0.474***
	(0.107)	(0.115)	(0.107)	(0.115)
log(No. of Employees)	-0.358***	-0.357***	0.642***	0.643***
	(0.0603)	(0.0635)	(0.0603)	(0.0635)
High UI (t-1)	-0.405**	-0.388*	-0.405**	-0.388*
	(0.199)	(0.197)	(0.199)	(0.197)
High IPI (t-1)	-0.660***	-0.561***	-0.660***	-0.561***
	(0.162)	(0.155)	(0.162)	(0.155)
High UI (t-1)*High IPI(t-1)	0.521**	0.488**	0.521**	0.488**
	(0.231)	(0.221)	(0.231)	(0.221)
Constant	2.511***	2.456***	7.116***	7.062***
	(0.355)	(0.365)	(0.355)	(0.365)
Observations	645	628	645	628
R-squared	0.575	0.567	0.707	0.705
Adj-Rsq	0.518	0.508	0.668	0.664
Ind FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes

Although increasing competition – both import and domestic – results in increased cash-flow volatility and liquidation risk, higher domestic competition need not result higher unemployment

risk for employees. For instance, high domestic competition might also arise from higher number of firms operating in the industry, hence smaller market-share for firms. This will facilitate lower switching and/retooling costs for workers, hence reduced probability of becoming unemployed in case of firm's liquidation. Since the impact of domestic competition need not lead to higher unemployment risk, I do not find any significant result of interaction of domestic competition and leverage on employee wage.

IV.4 Instrumental variable specification for import competition

It is likely that estimates tabulated in Table 2 suffer from endogeneity bias owing to some unobserved variables, unaccounted for here. It is also possible that both import penetration and employee wages are simultaneously determined. For example, if an industry is profitable it might give higher wages as well as attract higher foreign competition. To control for any such endogeneity, I use import competition as an instrument for import penetration. Following Feenstra, Romalis, and Schott (2002), I compute import competition[9] during 1989-2006.

For instrumental-variable specification I use two-period lagged values of import tariff. Since equation (1) includes binary variable based on import penetration, I use an indicator based on import tariff – it takes one if import tariff is above median in year 't' and zero otherwise – as an instrument for $\mathbb{I}_{IPI,jt-1}$. Since I have one more endogenous variable – interaction between leverage and $\mathbb{I}_{IPI,jt-1}$ – I include interaction of leverage and indicator variable computed for import tariff as second instrument[10].

[9] I thank John Romalis for providing the data. http://www.johnromalis.com/publications/
[10] If *x* is endogenous with instrument *z* and *w* is exogenous, then *z*w* can be instrument for *x*w*

There are two parts of first-stage, *viz.* in first part I regress import penetration dummy ($\mathbb{I}_{IPI,jt-1}$) on import tariff dummy, interaction of import tariff dummy and leverage, and all controls used in equation (1) and in second part I regress interaction of $\mathbb{I}_{IPI,jt-1}$ and leverage on the same controls as first part. In the second stage, I regress employee wage on estimated import penetration dummy and interaction of leverage and import penetration dummy. The results are summarized in Table 6. As can be seen, the results are consistent with findings in Table 2. In addition, I reject endogeneity test and weak-instrument tests are rejected for book leverage and alternate book leverage thereby validating use of import tariff as an instrument.

VI. Robustness Test

As can be inferred from Table 1, only 7% of entire sample provides data on employee wage. One possible cause could be a particular set of firms choose to report employee wage. If that is case, results would suffer from self-selection bias. In order to correct for potential sample-selection bias, I run Heckman (1979) two-stage sample selection model. The first step estimates a probit model where the response variable takes one if a firm reports employee wage and zero otherwise. Following Chemmanur, Cheng, and Zhang (2013) argument, i.e. stocks listed on different exchanges might have different reporting standards, I include exchange dummies in the first-step, in addition to aforementioned controls. In the second-step, I run a linear model to estimate relation between interaction of import competition and leverage average employee expense by including inverse Mills ratio (lambda) – obtained from first-step – as an additional control. The estimated coefficients for both steps are reported in Table 7. As can be seen in the second step output, lambda is statistically significant and negative, thereby suggesting firms that report employee expense are

Table 6. Instrumental variable specification for import competition

There are two first-stage regressions, one for import penetration (IPI) and the other for interaction of IPI and leverage. In the first stage I use a binary variable, which takes one if import tariff for an industry is above median at time (t-1) and zero otherwise, as instrument for of $\mathbb{I}_{IPI,jt}$ and interaction of the binary variable with leverage as instrument for leverage*$\mathbb{I}_{IPI,jt}$ .The response variable in the second stage is log(AEEijt) wherein I use estimated values of IPI and Leverage*IPI from first stage. For brevity I report the estimates only for average employee expense. Tests for weak-instrument and endogeneity of instrument are rejected, i.e. instrument is exogenous and strong. Standard errors are robust to heteroscedasticity. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	Second Stage	First Stage		Second Stage	First Stage	
		IPI	Lev*IPI		IPI	Lev*IPI
	(1)	(2)	(3)	(4)	(5)	(6)
High Tariff (t-2)		-0.151***	-0.0573***		-0.150***	-0.0485***
		(0.0168)	(0.0103)		(0.0174)	(0.00967)
Book Leverage*High Tariff (t-2)		2.920***	-2.588**			
		(0.835)	(1.134)			
Alternate Book Leverage*High Tariff (t-2)					1.771**	-2.618**
					(0.866)	(1.231)
High IPI (t-1)	-0.850*			-0.754		
	(0.491)			(0.568)		
Book Leverage	-4.353***	-0.0558*	1.414***			
	(1.526)	(0.0288)	(0.0322)			
Book Leverage*High IPI (t-1)	3.026***					
	(1.132)					
Alternate Book Leverage				-4.390**	-0.0299	1.404***
				(1.909)	(0.0315)	(0.0346)
Alternate Book Leverage*High IPI (t-1)				3.257**		
				(1.425)		
log(Total Asset)	0.503***	-0.0142**	0.00219	0.512***	-0.0145**	0.00136
	(0.0355)	(0.00604)	(0.00462)	(0.0359)	(0.00621)	(0.00426)
Avg Sale per Employee	0.000341***	6.17e-05***	7.61e-06	0.000307**	7.00e-05***	9.67e-06
	(0.000125)	(2.35e-05)	(1.75e-05)	(0.000131)	(2.45e-05)	(1.62e-05)
Market-to-Book	0.0190***	0.000220	-0.00105*	0.0181***	0.000363	-0.000719
	(0.00297)	(0.000590)	(0.000575)	(0.00349)	(0.000619)	(0.000589)
Physical Capital Intensity	0.241***	0.0109	-0.0179*	0.187***	0.0182	-0.0145
	(0.0641)	(0.0128)	(0.00935)	(0.0714)	(0.0138)	(0.00922)
log(No. of Employees)	-0.487***	0.0127**	-0.00158	-0.488***	0.0123**	-0.00155
	(0.0345)	(0.00615)	(0.00449)	(0.0349)	(0.00623)	(0.00408)
Constant	2.137***	1.029***	-0.190***	1.889**	1.012***	-0.160***
	(0.699)	(0.0448)	(0.0341)	(0.786)	(0.0461)	(0.0298)
Observations	2,498	2,498	2,498	2,371	2,371	2,371
R-squared	0.297			0.291		
Adj-Rsq	0.285			0.279		
Endogeneity (Chi-sq)	7.307			7.125		
p-val	0.0259			0.0284		
Weak Instrument Robust test (Chi-sq)	10.04			9.112		
p-val	0.00725			0.0115		
F-stat		29.31	19.26		37.32	15.53
Prob >F		0.00	0.00		0.00	0.00
Ind FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

likely to have lower average employee expense. Estimates of leverage and import competition, however, stay consistent with the first hypothesis, i.e. firms operating in low-competition industry use leverage as a bargaining tool and for high-competition firms higher leverage results in higher employee wage.

Furthermore, it's possible that either leverage and employee compensations are simultaneously determined or some unobservable influence both leverage and compensation, in which case the estimates would be influenced by endogeneity bias. Therefore, to control for endogeneity bias, I intend to run instrumental variable regression, using marginal corporate tax rate as an instrument for leverage. Both theory and empirical studies indicate relation between marginal corporate tax rate and leverage (e.g. Leary and Roberts 2010), but it does not impact employee wage.

V. Conclusion

The main finding of the paper is worker's demand for wage is a function of probability of firm's liquidation as well as worker's probability of finding job elsewhere, should the firm liquidate. If a firm has high bankruptcy risk, workers decide to either stay with the firm or they can switch to other firms. When there are enough outside opportunities, i.e. workers switching cost is low, in case of firm's liquidation, workers probability of being unemployed still stays low, since they can find job elsewhere. However, as the outside opportunities reduces and cost of switching increases (e.g. when workers have to change industry they might need to retool), firm's liquidation risk will become much more important to labor.

Table 7. Heckman sample selection

First stage is a probit model, where the response variable takes one if a firm reports employee wage in a year and zero otherwise. Both in the first and second stages, controls are same as specified in equation (1). In first stage, however, I include dummies for exchange on which a firm is listed, owing to the likelihood that different exchanges might have different reporting standards. In the second stage, which is a linear model, I include Inverse Mills ratio that is obtained from first stage. I report results for Heckman Sample Selection only for AEE. Standard errors are corrected for heteroskedasticity. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively

First Stage: Probit Model	(1)	(2)
log(Total Asset)	0.0299***	0.0267***
	(0.00160)	(0.00165)
Avg Sale per Employee	-7.13e-05***	-5.98e-05***
	(7.40e-06)	(7.53e-06)
Market-to-Book	0.00192***	0.00175***
	(0.000169)	(0.000181)
Physical Capital Intensity	0.0325***	0.0349***
	(0.00334)	(0.00337)
log(No. of Employees)	-0.00701***	-0.00411**
	(0.00160)	(0.00166)
Book Leverage	-0.0735***	
	(0.0135)	
Book Leverage*High IPI	0.0168*	
	(0.00890)	
Alternate Book Leverage		-0.0776***
		(0.0140)
Alternate Book Leverage*High IPI		0.0116
		(0.00933)
Ind FE	Yes	Yes
Year FE	Yes	Yes
Exchange Dummies	Yes	Yes
log(Total Asset)	0.467***	0.460***
	(0.0248)	(0.0257)
Avg Sale per Employee	0.000496***	0.000449***
	(9.88e-05)	(0.000101)
Market-to-Book	0.0157***	0.0163***
	(0.00251)	(0.00280)
Physical Capital Intensity	0.141***	0.0833*
	(0.0466)	(0.0490)
log(No. of Employees)	-0.453***	-0.452***
	(0.0219)	(0.0230)
Book Leverage	-0.421***	
	(0.0839)	
Book Leverage*High IPI	0.771***	
	(0.131)	
Alternate Book Leverage		-0.226**
		(0.0896)
Alternate Book Leverage*High IPI		0.763***
		(0.138)
Inverse Mills Ratio (Lambda)	-0.159***	-0.171***
	(0.0463)	(0.0488)
Constant	1.230***	1.241***
	(0.219)	(0.222)
Observations	38,572	36,299
Uncensored Obs	2,788	2,553
Censored Obs	35784	33746
Wald Chi-Sq	4245.04	3991.08
p-val	0.00	0.00
Ind FE	Yes	Yes
Year FE	Yes	Yes

I use import penetration as a proxy for lack of outside options for workers, since as import penetration increases, unemployment increases as well. I find for firms that operate in industries with low switching cost, i.e. low import penetration, employee compensation decreases with leverage. There are two mechanisms that can potentially explain this. First, as leverage of such firms increases, workers with higher skills switch to other firms; whereas workers with low skill stay with the firm which would drive down average wage. Second, explanation could be in industries with low switching cost, firms enhance their bargaining position by using high cost-of-debt (owing to high leverage) as a constraint on corporate liquidity (Matsa, 2010).

However, as import penetration increases, workers probability of staying unemployed increases with firm's increasing probability of bankruptcy. As a result, in industries where worker's switching cost is high, i.e. high-import-competition industries, workers demand higher compensation as firm's leverage increases. The demand for higher wages can arise because of two reasons, *viz*. (a) workers have higher bargaining power – given increasing importance of human capital for firms, it is critical for such firms to retain skilled labor in order to survive the competitive pressure; or (b) because their demand for high risk-premium supersedes firm's bargaining power.

I use state's unemployment insurance benefit to identify the underlying mechanism. I find that it is the demand for risk-premium to be compensated for bearing high unemployment risk that drives wage upwards as firm's leverage increases in industries with high switching cost. I find as state's unemployment insurance benefit increases, wage sensitivity for the combined impact of leverage and import competition goes down. In other words, for firms operating in states with higher unemployment insurance, workers demand relatively lower wages, *ceteris paribus*, for bearing same risk arising from high import competition and high leverage.

Appendix

Fig. A1 Annual Average Import Penetration Index[11]

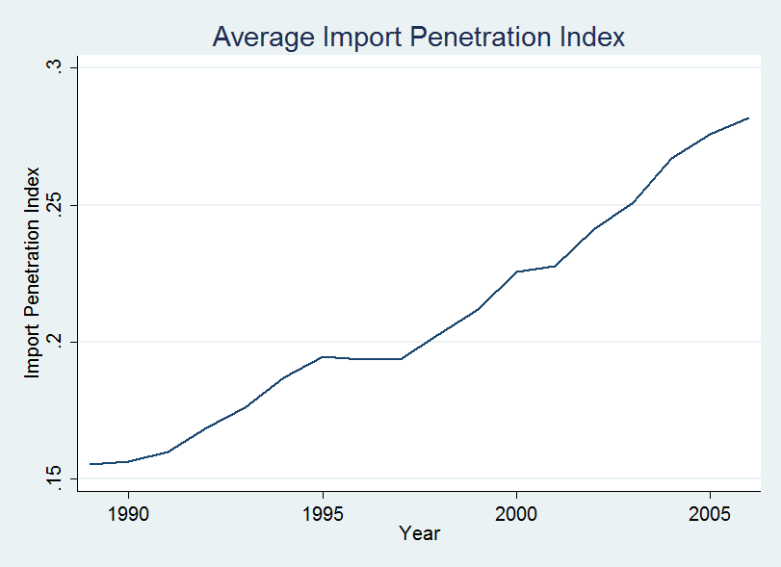

Table A1: Definition of Variables

I have obtained firm-level annual data from Compustat. For import and labor related data I have referred to multiple resources. USA import and domestic production data come from NBER Data[12] and Bureau of Economic Analysis, respectively. Unemployment insurance data for each state and quit-rate at two-digit NAICS industry level has, respectively, been collected from US Department of Labor and Bureau of Labor Statistics. I thank Feenstra, Romalis, and Schott (2002) for providing data on import tariff.

	Definition
Average Employee Expense (AEE)	Ratio of employee expense (Data item 42) to number of employees (Data item 29) for each firm
Employee Expense per unit of Total Asset (EE_TA)	Ratio of employee expense (Data item 42) to firm's total assets (Data item 6)
Market Capitalization	Product of fiscal-year closing share price (Data item 199) and number of outstanding shares (Data item 25)
Book Value of Equity	Difference between total asset (Data item 6) and total liabilities (Data item 181)
Book Leverage	Ratio of sum of long-term debt (Data item 9) and debt in current liabilities (Data item 34) to sum of long-term debt, debt in current liabilities and firm's book value of equity
Alternative Book Leverage	Ratio of sum long-term debt (Data item 9) and debt due in one year (Data item 44) to that of long-term debt, debt due in one year and book value of equity, as suggested by (Welch 2011)
Market-to-Book	Ratio of market capitalization to book value of equity
Physical Capital Intensity (PCI)	Ratio of gross fixed asset (Property, Plant and Equipment) (Data item 7) to total asset (Data item 6)

[11] The increasing trend of IPI is consistent across all 21 three-digit NAICS industries. For brevity, I show the graph only for year-wise average value of all industries.

[12] The U.S. import and export data have been assembled by Robert Feenstra of the Department of Economics, under a grant from the National Science Foundation to the National Bureau of Economic Research (NBER).

Average Sale per Employee	Ratio of net sales (Data item 12) to number of employees (Data item 29)
Maximum Unemployment Insurance	Log of product of maximum weekly unemployment insurance and maximum number of weeks for which unemployment insurance was given. It is calculated for each state-year (Agrawal and Matsa 2013)
Import Penetration Index (IPI)	Ratio of value of domestic production to sum of value of domestic production and value of imported goods (Xu 2012)
HHI	Herfindahl-Hirschman Index based on market share – as $\Sigma s_i^2$where s_i is market share of firm 'i' calculated on the basis of net sales (Data item 12) – at three-digit NAICS level
$\mathbb{I}_{IPI,jt}$	Indicator variable that takes one if IPI of an industry *j* (defined at three-digit NAICS) is above median at time *t* and zero otherwise
$\mathbb{I}_{UI,st}$	Indicator variable that takes one if maximum unemployment insurance for a state is in the top quartile and zero if it is in bottom quartile
$\mathbb{I}_{DomComp,jt}$	Indicator variable that takes one if industry's HHI is below median and zero otherwise.
Labor Intensity	Ratio of sum of employee expense (Data item 42) and pension (Data item 43) to net sales (Data item 12) (Agrawal and Matsa 2013)

Table A2: NAICS Three-Digit Manufacturing Industry Classification

	NAICS Code	Industry
Durable Goods	321	Wood Products
	327	Nonmetallic Mineral Products
	331	Primary Metals
	332	Fabricated Metal Products
	333	Machinery
	334	Computer & Electronic Products
	335	Electrical Equipment, Appliances & Components
	336	Vehicles & Transportation Equipment
	337	Furniture & Related Products
	339	Miscellaneous manufacturing
Non-Durable Goods	311	Foods
	312	Beverages and Tobacco Product Manufacturing
	313	Textile Mills
	314	Textile Product Mills
	315	Apparel
	316	Leather
	322	Paper Products
	323	Printing & Related Activities
	324	Petroleum & Coal Products
	325	Chemical Products
	326	Plastics & Rubber Products

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