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Organization Capital and the Cross-Section of Expected Returns

ANDREA L. EISFELDT and DIMITRIS PAPANIKOLAOU*

ABSTRACT

Organization capital is a production factor that is embodied in the firm's key talent and has an efficiency that is firm specific. Hence, both shareholders and key talent have a claim to its cash flows. We develop a model in which the outside option of the key talent determines the share of firm cash flows that accrue to shareholders. This outside option varies systematically and renders firms with high organization capital riskier from shareholders' perspective. We find that firms with more organization capital have average returns that are 4.6% higher than firms with less organization capital.

Why this is an important paper

- Does not provide an obvious answer
- Generates structure for a squishy topic
  - The paper does not depend on much anecdote and intuition
- Provides a fairly understandable basic model
- Matches theory with empirical tests
- Smith-Breeden Prize Winner & Dimensional Fund Advisors 1st place award

Organizational Capital

Owned by shareholders

Owned by key talent

- Organizational Capital (OC) is firm-specific human capital
  - It is generated by the matching of key talent (managers, engineers, etc.) with processes of the firm
  - It is "embodied" in Key Talent (KT) and therefore movable
- Because OC requires both the firm and KT, both have a claim to its cash flows
- KT will get cash flows equal to their outside option (what they would be paid elsewhere) and shareholders get the residual
- Therefore, the shareholders cash flows are subject to the overall change in what KT are paid outside the firm
- Because the price firms are willing to pay for KT is correlated across firms (because of technology shocks), the firm's shareholders are subject to systematic risk
- That risk is priced, and the price premium is empirically observable.

Basic model setup

The model looks at value from the shareholder's perspective

- We will look for outcomes in stock prices

The firm is endowed with OC and physical capital

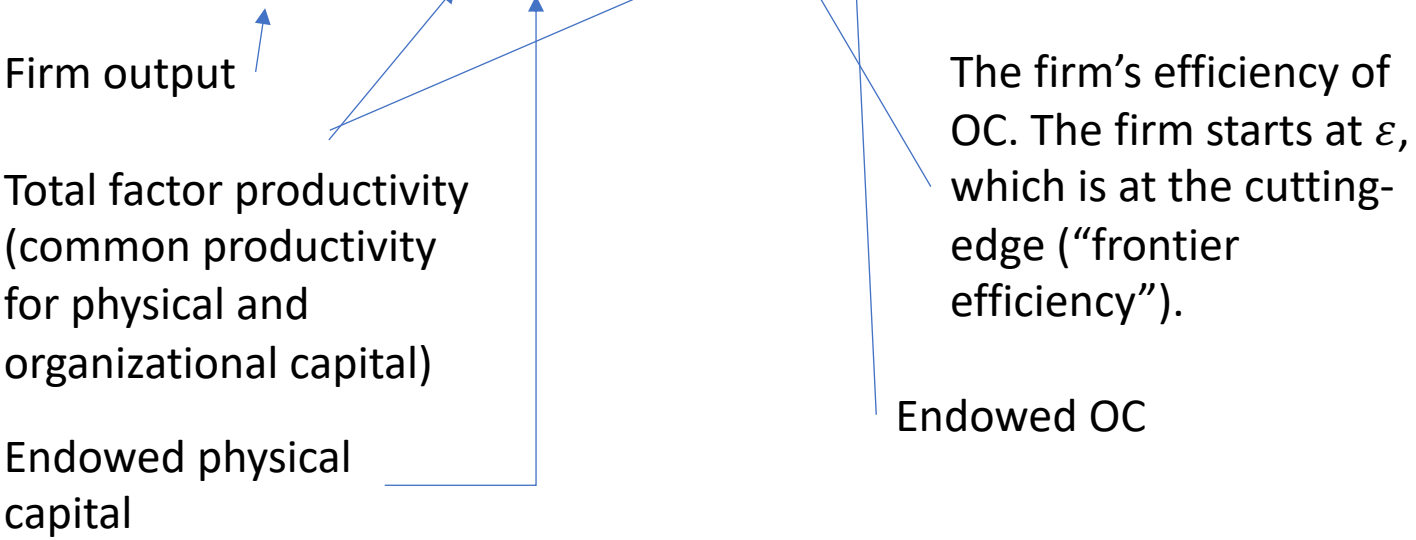
The firm can upgrade their technology once

- The form of the upgrade doesn't matter. They KT can either form a new firm and buy physical capital, or they can just restructure the existing firm

Firm output

- The firm output function:

$$y_{i,t} = \theta_t K_i + \theta_t e^{\varepsilon_i} O_i$$



Value of a firm

The value of a firm (eq: 5)

$$V_{i,t} = V_{i,t}^{K} + V_{i,t}^{O}$$

Value of the firm

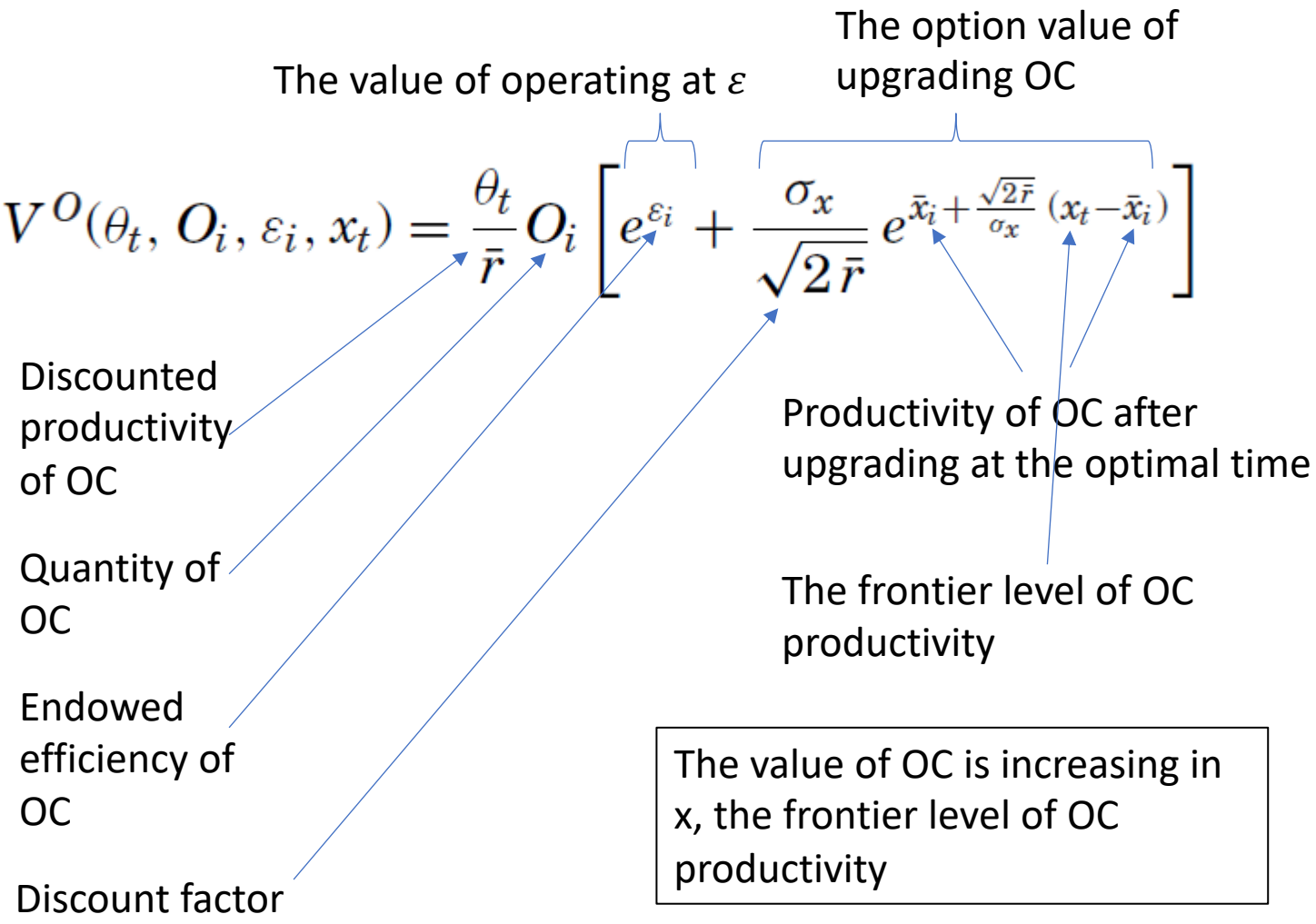
Value of physical capital (discounted productivity of endowed asset K)

Value of organizational capital

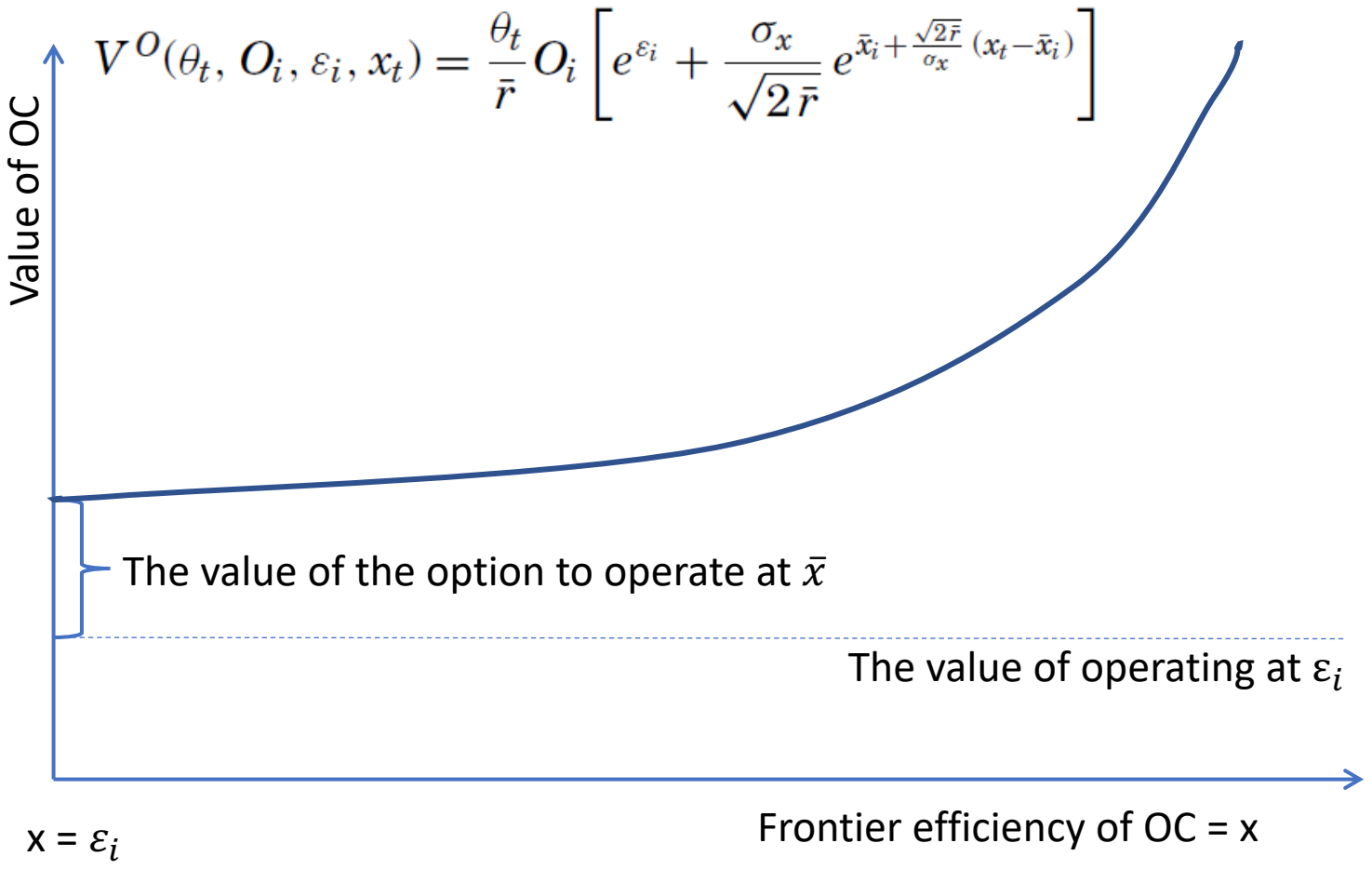
$$V^{k} = \frac{\theta_t}{\bar{r}} K_i$$

Discount rate

Value of OC


The value of operating at ε
The option value of upgrading OC
$V^O(\theta_t, O_i, \varepsilon_i, x_t) = \frac{\theta_t}{\bar{r}} O_i \left[e^{\varepsilon_i} + \frac{\sigma_x}{\sqrt{2\bar{r}}} e^{\bar{x}_i + \frac{\sqrt{2\bar{r}}}{\sigma_x}(x_t - \bar{x}_i)} \right]$
Discounted productivity of OC
Quantity of OC
Endowed efficiency of OC
Discount factor
Productivity of OC after upgrading at the optimal time
The frontier level of OC productivity
The value of OC is increasing in x, the frontier level of OC productivity

Graphically, in terms of x



Splitting the value of OC

Owned by shareholders

Owned by key talent

- Both KT and shareholders have claims on the cash flows from OC
- KT can always demand the value of OC operating at the frontier efficiency ($\overline{V^O}$)
  - Because that is their outside option
  - They can always go to a new firm operating at that efficiency
  - So the shareholders must pay them $\overline{V^O}$

What is left for shareholders?

The same as the last equation = the value of OC

$$V^{OS}(\theta_t, O_i, \varepsilon_i, x_t) = \frac{\theta_t}{\bar{r}} O_i \left(e^{\varepsilon_i} + \frac{\sigma_x}{\sqrt{2\bar{r}}} e^{\bar{x} + \frac{\sqrt{2\bar{r}}}{\sigma_x}(x_t - \bar{x})} - e^{x_t} \right)$$

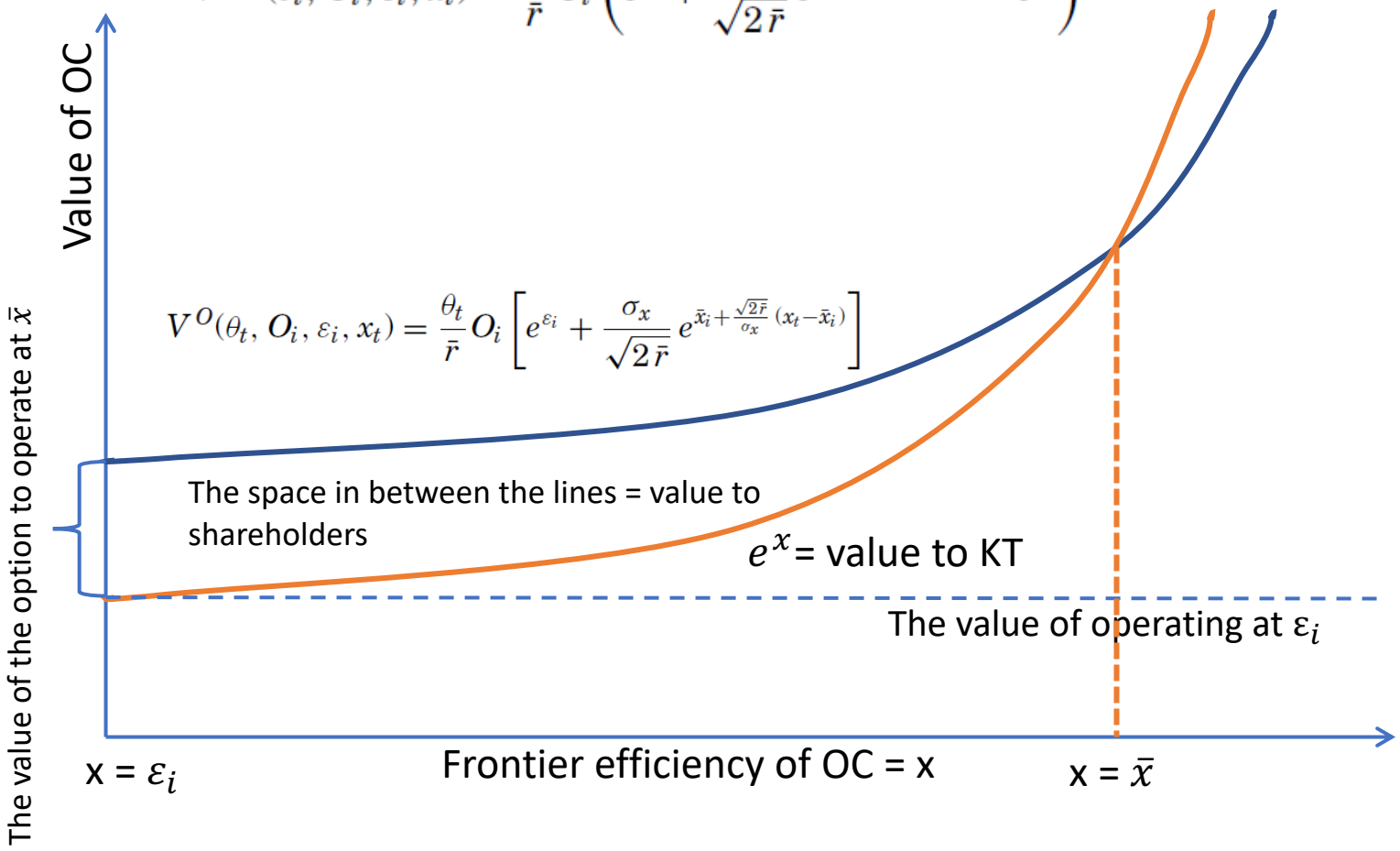
The value of operating at ε

The option value of upgrading OC

The value they key talent capture = the value of operating at the frontier efficiency (x).

Graphically, in terms of x

$$V^{OS}(\theta_t, O_i, \varepsilon_i, x_t) = \frac{\theta_t}{\bar{r}} O_i \left(e^{\varepsilon_i} + \frac{\sigma_x}{\sqrt{2\bar{r}}} e^{\bar{x} + \frac{\sqrt{2\bar{r}}}{\sigma_x}(x_t - \bar{x})} - e^{x_t} \right)$$



Takeaways from the model

- Compensation to key talent is increasing in the frontier efficiency of OC (x)
- Shareholder value in OC is decreasing in x, creating risk for shareholders
  - Because x is an aggregate shock (the frontier technological efficiency affects all firms), shareholder risk in OC is undiversifiable (systematic)
- The effect of the shock to frontier efficiency is increasing in the quantity of OC
- When the frontier efficiency exceeds the firm's efficiency by a certain amount, the firm needs to restructure around more efficient technology

Measuring OC

- Use SG&A
  - Represents investment in intangibles, firm-specific, and tied to labor inputs (management compensation, etc.)
- Costs include: labor and IT spending, training, consulting, and other off-balance sheet items
- $O_{it} = \underbrace{(1 - \delta_O)O_{it-1}}_{\text{Depreciate the base}} + \underbrace{\frac{SGA_{it}}{cpi_t}}_{\text{Add the current expense}}$

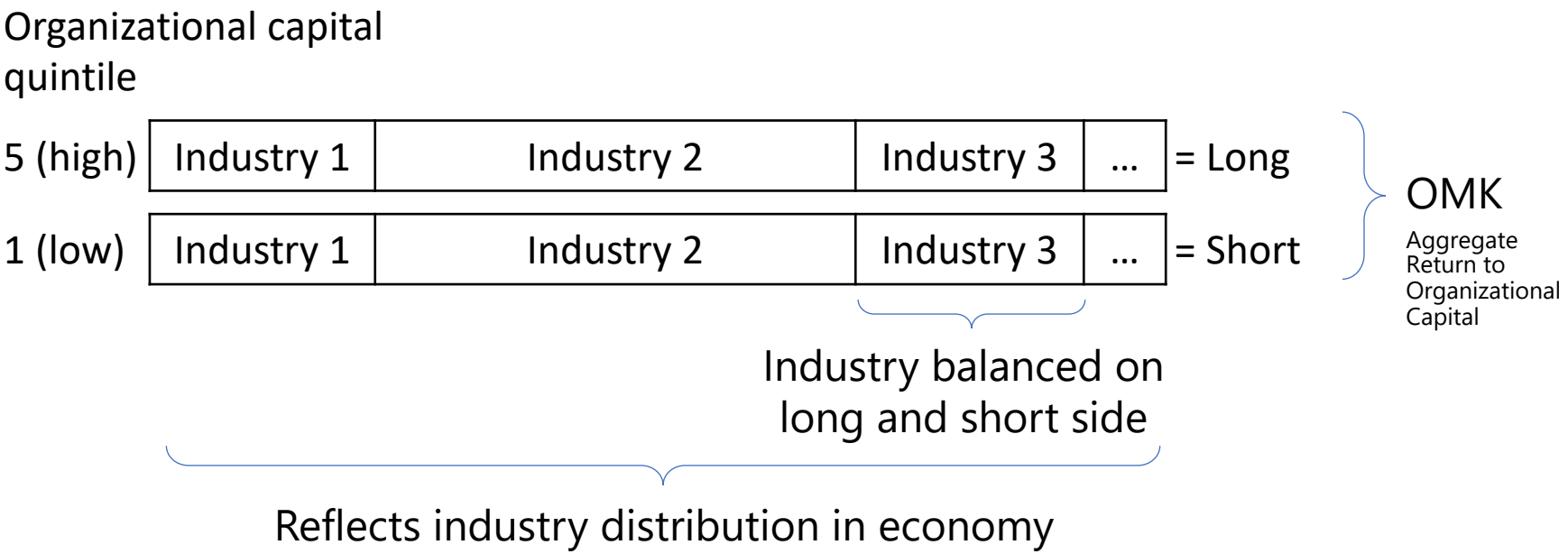
15%

- Scale by K (book assets) and rank each firm by year within industry
  - Remove any industry-specific accounting differences

Validating the measure of OC

	Organizational capital	
	More	Less
Likelihood of listing departure of talent as a risk in 10-K	48%	20%
Level of managerial talent (survey based)	Higher	Lower
Demand for IT	2x	1x
Missing factor of production (Residuals from regression $\log[Sales] = \log[Physical\ capital] + \log[Labor]$)	Higher	Lower
Tobin's Q	Higher	Lower
Executive compensation	Higher	Lower
Labor expense per employee	Higher	Lower

Creating the OMK portfolio



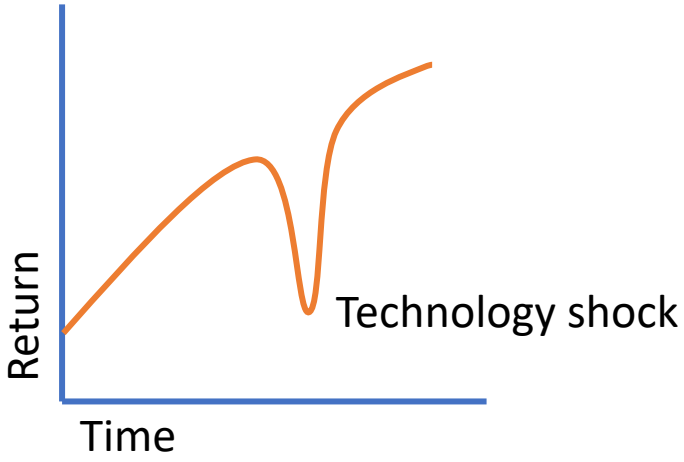
If OC creates systematic risk for shareholders, then the returns for high OC firms should be higher than for low OC firms

Evidence of systematic risk

	Panel A: Data					
Portfolio	1	2	3	4	5	5 − 1
	1. Portfolio moments					
$E[R] - r_f$ (%)	4.18	4.54	5.54	5.95	8.81	4.63
	(1.48)	(1.59)	(2.12)	(2.43)	(3.52)	(2.85)
σ (%)	17.50	17.71	16.26	15.17	15.55	10.10
SR (%)	23.89	25.64	34.07	39.22	56.66	45.84
	2. CAPM					
α(%)	−1.19	−0.92	0.57	1.46	4.38	5.57
	(−1.29)	(−1.07)	(0.67)	(1.54)	(3.69)	(3.47)
β_{MKT}	1.05	1.07	0.97	0.88	0.86	−0.18
	(49.93)	(51.81)	(48.11)	(31.08)	(26.72)	(−4.30)
R^2(%)	90.07	90.90	89.44	83.78	77.62	8.29
	3. Two-factor model					
α(%)	0.89	−0.03	−0.32	−0.17	0.89	
	(1.32)	(−0.04)	(−0.41)	(−0.20)	(1.32)	
β_{MKT}	0.98	1.04	1.00	0.93	0.98	
	(65.09)	(55.79)	(59.22)	(43.02)	(65.09)	
β_{OMK}	−0.37	−0.16	0.16	0.29	0.63	
	(−14.83)	(−5.18)	(5.93)	(8.28)	(24.89)	
R^2(%)	94.33	91.65	90.33	87.23	92.82	

Identifying technology shocks

- Generally, high OC firms should have higher returns than low OC firms (compensation for risk)
- But, from the model, we know that shareholder value is decreasing when the frontier (x) moves out
- So, times when the OMK portfolio demonstrates low return are times of technology shock



Increases to executive compensation

Compensation to key talent ($\Delta\bar{w}_t$)	$-R_t^{OMK}$	$-R_{t-1}^{OMK}$	R_t^{MKT}	R_{t-1}^{MKT}	$\Delta\bar{w}_{t-1}$	R^2	$p(\mathcal{F})$ OMK=0
			Panel A: Data				
Compensation of top three officers, average	−0.172	1.107			0.036	0.353	0.008
	(−0.67)	(4.29)			(0.27)		
	−0.329	1.017	0.189	0.191	0.002	0.428	0.049
	(−1.29)	(3.98)	(1.53)	(1.55)	(0.02)		
Compensation of top three officers, median	0.168	0.418			0.221	0.263	0.004
	(1.11)	(2.82)			(1.63)		
	0.182	0.316	−0.036	0.138	0.230	0.341	0.014
	(1.18)	(2.12)	(−0.50)	(1.95)	(1.78)		

Capital reallocation

Reallocation X_t	$-R_t^{OMK}$	$-R_{t-1}^{OMK}$	R_t^{MKT}	R_{t-1}^{MKT}	X_{t-1}	R^2	$p(\mathcal{F})$ OMK=0
			Panel A: Data				
Capital reallocation rate	0.002	0.089			0.949	0.832	0.030
	(0.07)	(2.53)			(13.21)		
	−0.001	0.034	0.008	0.022	0.942	0.884	0.088
	(−0.03)	(1.94)	(0.90)	(2.45)	(15.93)		
CEO Turnover	0.009	0.091			0.374	0.462	0.006
	(0.36)	(3.35)			(1.63)		
	0.004	0.14	0.018	−0.034	0.471	0.545	0.012
	(0.12)	(3.35)	(0.87)	(−1.37)	(2.02)		
Number of new initial public offerings (Poisson regression)	2.189	1.267			0.002		0.008
	(2.66)	(1.10)			(4.40)		
	0.911	1.18	1.184	1.188	0.002		0.142
	(0.78)	(1.02)	(1.53)	(1.62)	(3.61)		
Number of new management buyouts (Poisson regression)	1.073	−0.461			0.024		0.042
	(2.87)	(−1.38)			(7.00)		
	1.365	0.793	0.077	−0.942	0.025		0.012
	(2.43)	(1.38)	(0.25)	(−2.68)	(19.66)		

Takeaways from E&P

Increases in industry organizational capital efficiency does not mean that all firms benefit

Retaining KT is risky because you are committing to uncertain payments to them in the future

When your firm is not operating at the frontier efficiency, the shocks to the industry may force you to restructure

Organizational Capital and the Effects of Technology Shocks on the Characteristics of Earnings

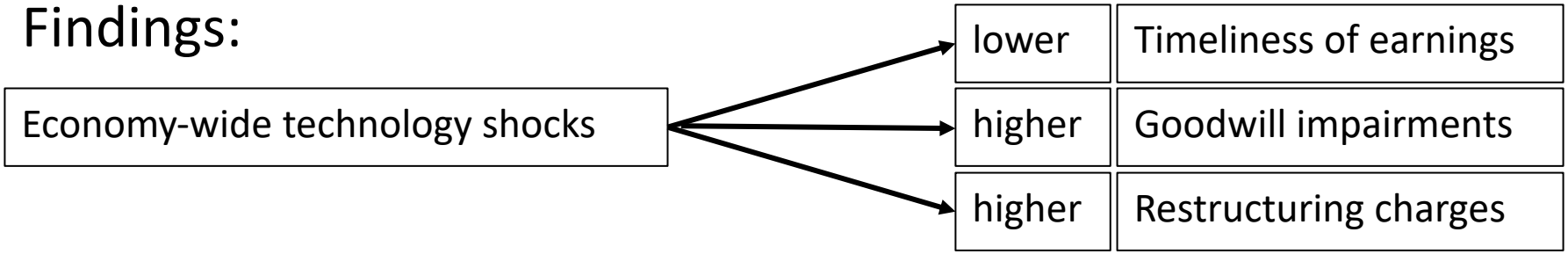
Vivek Raval[1]

December 15, 2022

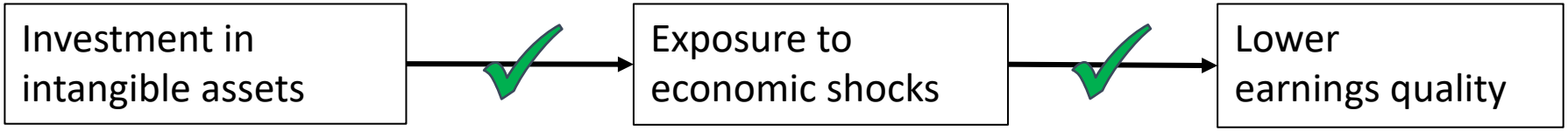
New technology affects characteristics of earnings

Objective:

Findings:

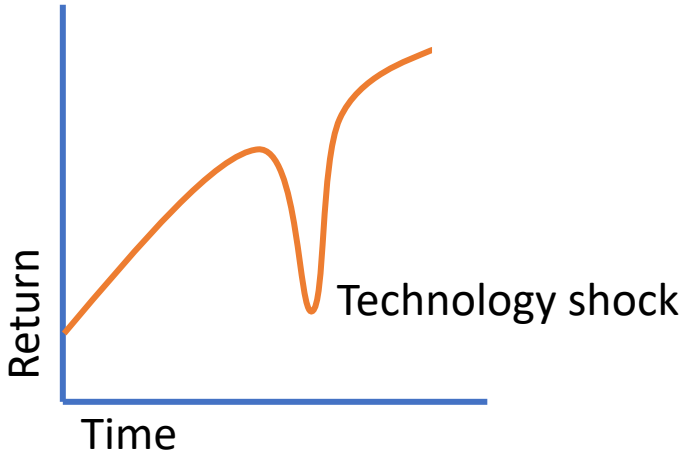


Contribution:



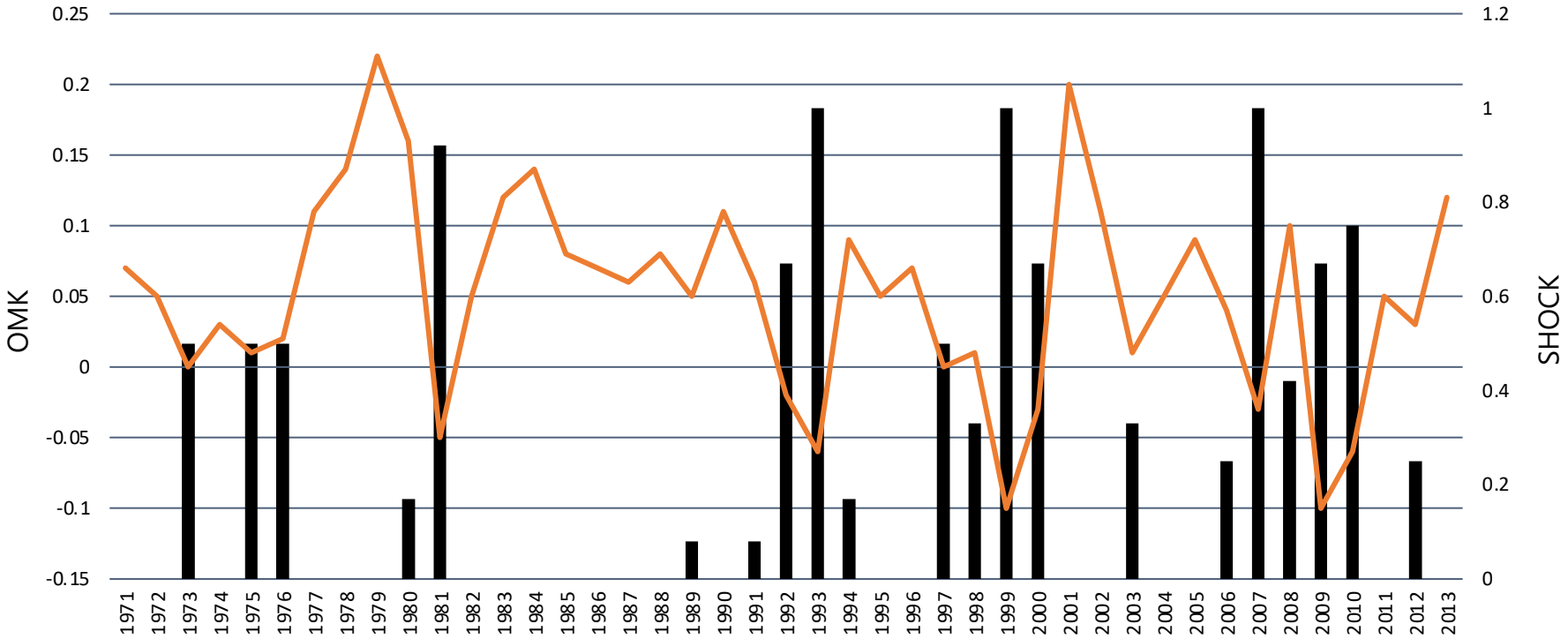
Recall E&P

- Technology shocks are measured as low returns to the OMK portfolio
- Measure OC and OMK just like E&P
- Also use an indicator for low returns
  - SHOCK = percent of months that are in the lowest 25% of OMK returns over the sample period



OMK and SHOCK vary over time

Annual averages of SHOCK and OMK



- Non-trending
- Average SHOCK = 0.25, OMK = 0.05

Three main hypotheses

Theorized relation	Accounting implication	Hypothesis
$\begin{bmatrix} Tech. \\ shocks \end{bmatrix} \xrightarrow{\text{reduce}}$ SH value in OC	• Technology shocks change value of off-B/S asset (org. cap.) • No asset to write down	$\begin{bmatrix} Tech. \\ shocks \end{bmatrix} \xrightarrow{\text{reduce}} \begin{bmatrix} Timeliness\ of \\ earnings \end{bmatrix}$
Stronger in high organizational capital firms		Increasing in the amount of operational capital investment
	• In special case of M&A, org. cap. might appear on B/S as goodwill • Lower value of org. cap. will result in lower goodwill value	$\begin{bmatrix} Tech. \\ shocks \end{bmatrix} \xrightarrow{\text{increase}} \begin{bmatrix} Goodwill \\ impairment \end{bmatrix}$

Three main hypotheses

Theorized relation

$$\begin{bmatrix} Tech. \\ Shocks \end{bmatrix} \xrightarrow{Increase} \begin{bmatrix} New\ tech. \\ adoption \end{bmatrix}$$

Less likely for more efficient firms

Accounting implication

- Adopting a new technology requires re-organizing processes, relocating employees and physical capital
- Introduce a more efficient way of doing business

$$\begin{bmatrix} Tech. \\ Shocks \end{bmatrix} \xrightarrow{increase} \begin{bmatrix} Restructuring \\ charges \end{bmatrix}$$

Less for more efficient firms

Technology shocks reduce timeliness

Earnings — Returns — Neg. returns indicator

R^2 from regression: $E_{i,t} = \gamma_0 + \lambda_1 R_{i,t} + \lambda_2 DR_{i,t} + \lambda_3 (R_{i,t} \times DR_{i,t}) + \omega_{i,t}$

Basu (1997)
Ball et al. (2000)
Bushman et al. (2004)

Indicator for low OMK — Controls

$TIME_t = \alpha + \beta_1 SHOCK_t + \beta_2 MKT_t + \beta_3 SMB_t + \beta_4 HML_t + \beta_5 UMD_t + \varepsilon_t$

Expectation: negative — H1: Technology shocks reduce earnings timeliness

Coefficient:	0.08***	-0.06*	-0.03	0.16	0.09	0.05
T-Stats:	(4.35)	(-2.00)	(-0.31)	(1.02)	(0.08)	(0.88)

5% significance (1-sided)

- N=43, Newey-West standard errors

Moreso for firms with high OC

Cross-sectionally and time-varying measure of timeliness

Continuous measure of technology shock (lower = shock)

Org. cap. rank

MKT_t
SMB_t
HML_t
UMD_t

$$TIME\_XS_{i,t} = \beta_1 OMK_t + \beta_2 (OMK_t \times OC\_R_{i,t}) + \beta_3 OC\_R_{i,t} + CONTROLS_t + \varepsilon_{i,t}$$

Expectation: positive

H1a: Technology shocks reduce timeliness more for firms with more organizational capital

Coefficient:	-0.11	0.02***	-0.01***
T-Stats:	(-1.25)	(2.83)	(-5.78)

- Includes firm fixed effects, cluster by time
- N=78,484
- Robust to inclusion of firm returns (idiosyncratic returns)

Tech shocks and goodwill impairment

$$\sum_{t=1}^{t=3}(goodwill\ impairment)$$

Continuous measure of technology shock (lower = shock)

Firm returns

Controls

$$FUTIMP_{i,t} = \beta_1 OMK_t + \beta_2 R_{i,t} + \beta_3 MKT_t + \beta_4 SMB_t + \beta_5 HML_t + \beta_6 UMD_t + \varepsilon_{i,t}$$

Expectation: negative

H2: Technology shocks increase goodwill impairment

Coefficient:	-0.85**	-0.19***	-0.06	0.26	0.19	0.28**
T-Stats:	(-2.04)	(-4.88)	(-0.32)	(0.69)	(0.78)	(2.28)

- Tobit estimation, cluster by time
- N=17,254
- Industry and cohort fixed effects

Tech shocks and goodwill impairment

$$\sum_{t=1}^{t=3}(goodwill\ impairment)$$

Continuous measure of technology shock

Indicator for org. cap. in top quintile

Returns

MKT_t
SMB_t
HML_t
UMD_t

$$FUTIMP_{i,t} = \beta_1 OMK_t + \beta_2 HIOC_{i,t} + \beta_3 (OMK_t \times HIOC_{i,t}) + \beta_4 R_{i,t} + CONTROLS_t + \varepsilon_{i,t}$$

H2a: Techn. shocks is increase goodwill impairment more for firms with more org. capital

Expectation:			negative	
Coefficient:	-0.80*	-0.05***	-0.05***	-0.19***
T-Stats:	(-1.90)	(-4.88)	(-2.54)	(-4.86)

- Tobit estimation, cluster by time
- N=17,254
- Industry and cohort fixed effects

Tech shocks and restructuring

$$\sum_{t=1}^{t=3}(restructuring)$$

Continuous measure of technology shock (lower = shock)

Org. cap. rank

Returns

MKT_t
SMB_t
HML_t
UMD_t

$$FUTRESTR_{i,t} = \beta_1 OMK_t + \beta_2 OC\_R_{i,t} + \beta_3 R_{i,t} + CONTROLS_t + \varepsilon_{i,t}$$

Expectation: negative

H3: Technology shocks increase restructuring charges

Coefficient:	-0.03**	0.34***	-0.01***
T-Stats:	(-2.45)	(6.99)	(-4.78)

- Tobit estimation, cluster by time
- 26,403
- Industry and cohort fixed effects

Tech shocks and restructuring

$$\sum_{t=1}^{t=3}(restructuring)$$

Continuous measure of technology shock (lower = shock)

Indicator for high asset turnover ($sales/assets$) within industry

Org. capital rank

Returns

MKT_t
SMB_t
HML_t
UMD_t

$$FUTRESTR_{i,t} = \beta_1 OMK_t + \beta_2 HIATO_{i,t} + \beta_3 \left(HIATO_{i,t} \times OMK_t\right) + \beta_5 OC\_R_{i,t} + \beta_4 R_{i,t} + CTLS_t + \varepsilon_{i,t}$$

H3a: Techn. shocks increase restructuring charges less for more efficient firms

Expectation:	negative		positive		
Coefficient:	-0.03**	-0.01***	0.02*	0.44***	-0.01***
T-Stats:	(-2.50)	(-9.68)	(1.70)	(9.29)	(-4.73)

- Tobit estimation, cluster by time
- N=26,403
- Industry and cohort fixed effects

Takeaways

- The E&P theory seems to be supported by accounting data
- Because human capital is not capitalized, in times of technology shocks, earnings are less useful.
- However, technology shocks generate goodwill and restructuring charges, so not all is lost

Can goodwill and restructuring charges tell us about human capital risk?

Preliminary. Please do not distribute.

Vivek Raval[1]

March 27, 2023

Human capital is risky

- Human capital (HC) = firm-specific human capital = organizational capital
- HC is systematically risky
  - See E&P
- Do the financial statements offer any clues about this risk?
  - Perhaps not – HC is not capitalized on the BS
  - Perhaps so – goodwill and restructuring charges are HC-related charges
    - Their timing can help us determine the HC risk exposure of the firm

Why is human capital risky

- Specialized tasks require specialized talent (KT)
- Obtaining/keeping this talent is expensive
- It's not clear ahead of time that the employees will be productive (i.e., how long the firm can operate at current efficiency before restructuring)
- If your highly paid employees are not producing at a high enough level, the firm will need to restructure
- Because firms tend to invest in new technologies and specialists at the same time, human capital investment and rationalization is correlated across firms
  - The risk is systematic

How do investors identify the risk?

- The financial statements are intended to provide relevant information about the firm, including risk
  - Barth, 2018 calls for research on risk disclosure in financial statements
  - Ellahie, 2021 measures systematic risk using earnings
- The information may be available in other ways, but the information that falls in the scope of the FASB and auditors has specific importance
- Can the information provided by firms in the income statement help investors identify systematic risk related to human capital?

How can financial statements help?

- The financial statements do not provide much information about HC
  - Employees not capitalized
  - SG&A spending is not capitalized
- But there is goodwill impairment
  - Goodwill is comprised of intangible assets that can not be specifically identified
  - It is not unusual for firms to pay for acquired human capital (Ranft and Lord, 2000; Uhlenbruck, Hitt, and Semadeni, 2006)
- However, goodwill impairment has been under scrutiny
  - Earnings management (K. K. Li and Sloan, 2017; Z. Li et al., 2011; Ramanna and Watts, 2012)
  - The FASB was considering re-introducing an amortization model (project has since been removed from the agenda)
  - So it may be totally worthless

Any other information?

- Restructuring charges can also provide information
- Restructuring charges are comprised of:
  - **Involuntary termination benefits**
  - Costs to terminate a contract
  - Costs to consolidate facilities
- For many firms, the termination benefits will be the largest component of restructuring cost
- However, these costs have also come under scrutiny (Bens and Johnston, 2009)
- Restructuring may also tell us nothing

Hypothesis 1

Hypothesis 1a *Goodwill impairment charges are associated with lower productivity of human capital.*

Hypothesis 1b *Restructuring charges are associated with lower productivity of human capital.*

- Providing evidence that goodwill and restructuring charges are related to labor productivity

Human capital risk

- If goodwill and restructuring are useful for assessing the labor productivity in the firm, then they can also indicate exposure to systematic human capital risk
- If the goodwill and restructuring charges occur simultaneously with aggregate labor productivity shocks, then the firm is subject to systematic risk

Hypothesis 2 *Firms with a high correlation between goodwill and restructuring charges and human capital productivity have higher systematic risk.*

Human capital productivity measure

- Percent change in the annual industry labor productivity provided by the BLS
  - Output index divided by hours worked
  - Output index is unaffected by changes in sales prices
  - Number of hours worked is based on the BLS National Compensation Survey and Current Population Survey.
  - Not based on accounting data

Goodwill and restructuring measures

- Annual goodwill or restructuring charge scaled by lagged assets
- Goodwill charges are missing if the firm has no goodwill on their prior annual balance sheet
- Aggregate by industry-year:

$$GW_{j,t} = \sum_{i=1}^{I} \frac{gw_{i,t}}{at_{i,t-1}}$$

$$RESTR_{j,t} = \sum_{i=1}^{I} \frac{restr_{i,t}}{at_{i,t-1}}$$

Do the charges reflect changes in aggregate labor productivity?

$$LP_{j,t} = \alpha_j + \beta_1 * GW_{j,t} + \varepsilon_{j,t}$$

$$LP_{j,t} = \alpha_j + \beta_1 * RESTR_{j,t} + \varepsilon_{j,t}$$

	(1)	(2)	(3)
Variable	$LP_{j,t}$	$LP_{j,t}$	$LP_{j,t}$
GW	0.15^{***}		0.11^{***}
	(6.71)		(4.80)
$RESTR$		0.68^{***}	0.55^{***}
		(7.78)	(6.12)
N	1667	1673	1667
R^2	0.17	0.18	0.19
Fixed Effects	Industry	Industry	Industry

Similar results with industry and time fixed effects

The correlation between charges and labor productivity

- Measure correlation at the firm level in the time-series
  - Require more than 10 observations

- Measure for goodwill, restructuring and calculate the average

$$hcr_i = \frac{\rho_j^{gw}\left(gw_{i,t}, LP_{j,t}\right) + \rho_j^{restr}\left(restr_{i,t}, LP_{j,t}\right)}{2}$$

Measure CAPM beta

- Estimate for each firm-year on a rolling 60 month basis

$$[R_{i,s} - RF_s] = \alpha_{i,t} + \beta_{i,t}^{CAPM} * \left[R_s^{mkt} - RF_s\right] + \varepsilon_{i,s}$$

- Then average across all years for a firm

$$\beta_i^{CAPM} = \sum_{t=1}^{T} \frac{1}{T} \beta_{i,t}^{CAPM}$$

GW/Restructuring charges and risk

Variable	(1) β_i^{CAPM}	(2) β_i^{CAPM}	(3) β_i^{CAPM}	(4) β_i^{CAPM}
α_0	1.23***	1.25***	1.22***	1.24***
	(78.94)	(97.27)	(68.78)	(99.68)
ρ^{gw}	0.15***		0.13**	
	(2.69)		(2.24)	
ρ^{restr}		0.25***	0.19***	
		(5.08)	(2.81)	
hcr_i				0.28***
				(5.30)
N	1008	1980	1667	2072
R^2	0.01	0.01	0.02	0.01

Not yet tabulated results

- Robustness:
  - Robust to including HML, SMB, and UMD, the FF & Carhartt factors when determining Beta
  - Robust to including the correlation with pretax earnings excluding goodwill and restructuring charges
- Preliminary Risk results:
  - No correlation with OMK
  - No correlation with HML^{INT} from Eisfeldt, Kim, and Papanikolaou (2022)
    - Both OMK and HML^{INT} use capitalized SGA as the measure of OC. I do not use any measure of OC.
    - I'm looking at reversals of investment in OC, while those measures look at investments in OC.

Contribution

- Human capital information is in demand. Can investors get anything from earnings information?
- Despite their flaws, Goodwill and Restructuring charges appear to correlate with aggregate changes in labor productivity
- Goodwill and Restructuring charges are not persistent, but they can still be useful for assessing firm risk
  - Lack of persistence is not equal to lack of value relevance

Thank you.

OMK has been validated

Theory suggests:	Findings:	
Decreasing shareholder value to organizational capital, increasing rent for key talent	Lower returns to OMK	Unexpected increases in executive compensation (top 3 or CEO only) Eisfeldt and Papanikolaou (2013) Higher wage growth: Silicon Valley, and Professional/Scientific/Technical Svcs. This study
Decreasing shareholder value to organizational capital leads to more adoption of new technology	Lower returns to OMK	More IPOs, management buy-outs, physical capital allocations Eisfeldt and Papanikolaou (2013)
More organizational capital exposes firm to risk of new technology shocks	High organizational capital firms	5% higher returns than low organizational capital firms This study, Eisfeldt and Papanikolaou (2013)
Intuition suggests: Technology shocks occur around the introduction or new, important technologies	Lower returns to OMK	Subsequent increase in books published on computer and networking This study