

# Operating Hedge and Gross Profitability Premium

*Kogan, Li and Zhang*

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# Profitability

## Profitability

- **Profitability premium:** firms with **high gross profitability** have **high average stock returns**
- Highly profitable firms have higher cash-flow cyclicality

# This Paper

## Model

- Standard Model with Capital and Labor in CES production function

$$y = a \cdot z \cdot \left( L^{\frac{\eta-1}{\eta}} + K^{\frac{\eta-1}{\eta}} \right)^{\frac{\eta}{\eta-1}}$$

$$\pi = y - wL$$

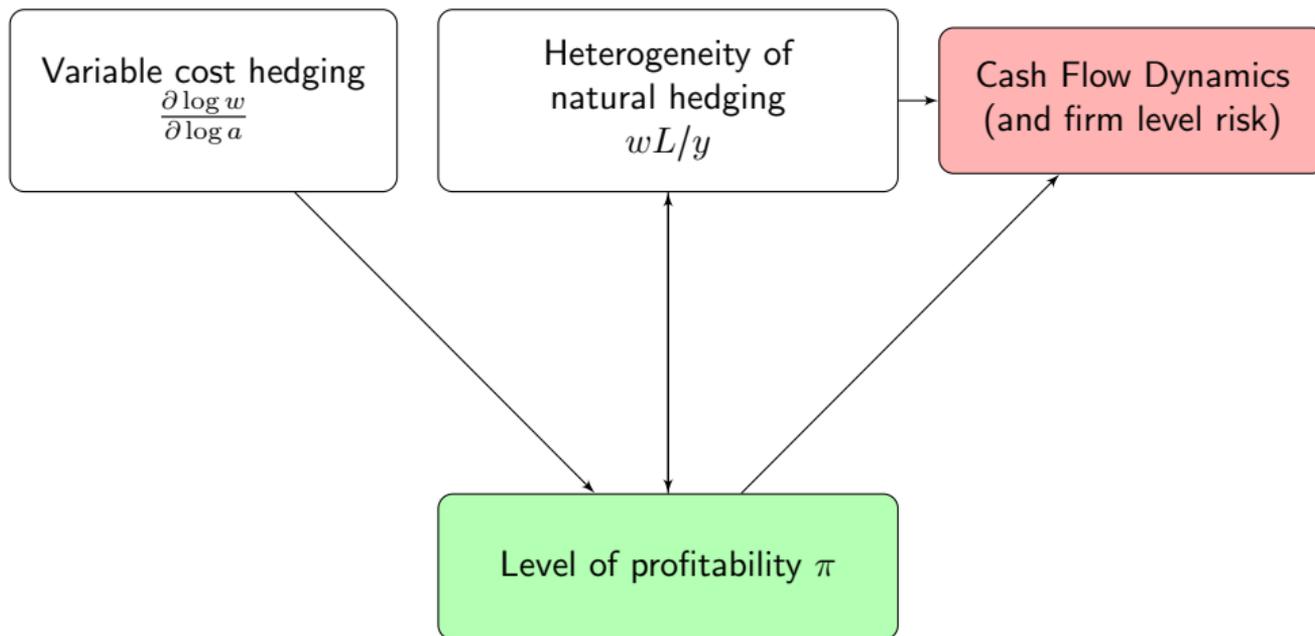
## Cash-flow cyclicity

- Heterogeneous exposure to aggregate shocks  $X$ :

$$\begin{aligned} \beta_X &= \frac{\partial \log \pi}{\partial \log a} = 1 + \left( 1 - \frac{\partial \log w}{\partial \log a} \right) \cdot \frac{wL/y}{1 - wL/y} \\ &= \frac{\partial \log \pi}{\partial \log a} = 1 - \underbrace{\left( \frac{\partial \log w}{\partial \log a} - 1 \right)}_{\text{hedging from costs}} \cdot \underbrace{\frac{y - \pi}{\pi}}_{\text{fraction of costs}} \end{aligned}$$

- Firms with a high ratio of variable costs to revenues benefit more from natural hedging through variable costs

# How to link Variable Costs Hedging to the Profitability Premium



# Measurement

- Heterogeneous exposure in hedging ( $\beta_X$ ) increases with idiosyncratic productivity if:

$$(1 - \eta) \left( \frac{\partial \log w}{\partial \log a} - 1 \right) > 0$$

## Indirect evidence

- Indirect measure confirms the profitability premium:

$$\frac{\partial \log(y/\pi)}{\partial \log a} \propto (1 - \eta) \left( \frac{\partial \log w}{\partial \log a} - 1 \right)$$

- ▶ If revenues are more cyclical than costs, then variable costs hedging dampens cash-flow cyclicity
- ▶ positive profitability premium if high profitable firms have less variable cost hedging

## Direct Evidence

- Direct measure of price elasticity:  $\partial \log w / \partial \log a > 1$ ?
- Direct measure of production function:  $\eta$ ?

# A few comments on direct measurement

## Estimating Price elasticity

$$\frac{\partial \log w}{\partial \log a} - 1 > 0$$

- Some evidence in macroeconomics on the cyclicality of factor prices
- Heterogeneity across industries: wages are sticky, energy and materials are probably more cyclical
- Identifying the elasticity properly would require some exogenous demand or supply shifters

## Production function

$$1 - \eta > 0$$

- In the paper the author regress directly from the F.O.C.

$$\log(wL/K)_{i,t} = \eta \log(\pi/K)_{i,t} + a_t + \varepsilon_{i,t}$$

- Unbiased estimate of  $\eta$  require exogenous variation in the profit rate  $\pi/K$
- Production function estimation is hard (see IO!)

$$\log Y = \sum_i \alpha_i \log L_i$$

# Different Approach: models of competition

## Profitability premium from the angle of a Melitz model of imperfect competition

- Standard Melitz model: firms face CES demand and fixed operating costs
- Firms face idiosyncratic  $z$  and aggregate shocks  $a$

$$\pi(z) = \frac{1}{\sigma - 1} \left( \frac{a}{w} \right)^{\sigma - 1} [z^{\sigma - 1} - \underline{z}^{\sigma - 1}] \cdot E$$

$$\beta_X = \frac{\partial \log \pi(z)}{\partial \log a} = \left( 1 - \frac{\partial \log w}{\partial \log a} \right) \cdot (\sigma - 1) \left( 1 + \frac{\underline{z}^{\sigma - 1}}{z^{\sigma - 1} - \underline{z}^{\sigma - 1}} \right)$$

- Profit sensitivity is high for
  - ▶ firms with high operating leverage ( $z$  is close to the production cutoff  $\underline{z}$ )
  - ▶ firms that have higher labor share (high  $\sigma - 1$ )

## Measurement

- Labor (factor) share literature in macroeconomics
- IO: production function estimation

# Different Approach: models of competition

## Profitability premium from the angle of variations in markups

- Strength of variable costs hedging comes from cyclicity of  $wl/y$ , or  $w/p$  (with  $y = pq$ )
- Standard model with DRS,  $q = al^{\frac{\sigma-1}{\sigma}}$  and time-varying markups  $\mu(a) = p(a)/w(a)$ .
- Elasticity of profits to aggregate shocks depend on behavior of markups

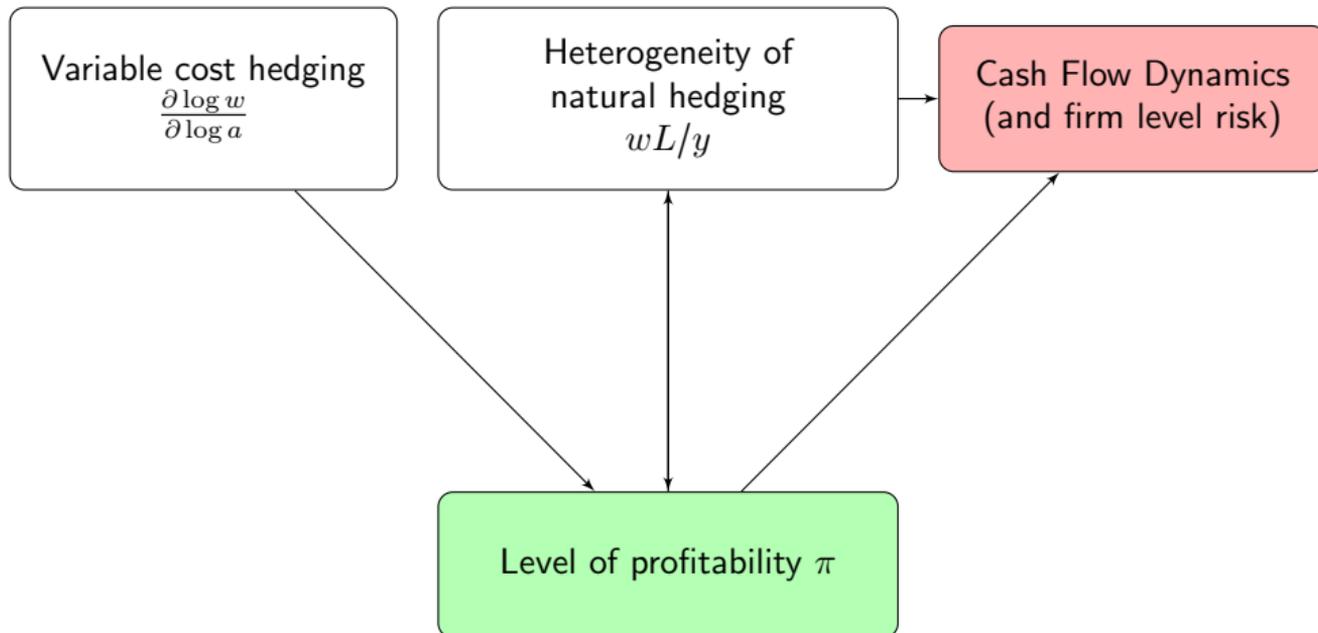
$$\beta_X = \frac{\partial \log \pi}{\partial \log a} = \frac{\partial \log p}{\partial \log a} + (\sigma - 1) \frac{\partial \log \mu(a)}{\partial \log a} + \sigma$$

- Profit sensitivity is high for
  - ▶ firms that have high markup cyclicity (high  $\partial \log \mu / \partial \log a$ )
  - ▶ firms that have higher labor share (high  $\sigma - 1$ )

## Measurement

- Markup cyclicity
  - ▶ Some evidence that industries with high markups have more volatile markups (see Corhay, Kung and Schmid, or Loualiche).

# Is the level of profitability the best measure of cost cyclicity?



## Cyclicalty to the Factor Mimicking Portfolio?

Panel B: Exposure of sales

K =	Lo	2	3	4	Hi	Hi-Lo
0	-0.27 (-0.47)	1.04 (1.91)	1.23 (2.05)	1.12 (2.90)	1.17 (2.18)	1.45 (2.65)
1	-1.25 (-1.33)	0.56 (0.59)	-0.08 (-0.08)	0.62 (0.74)	0.00 (0.00)	1.25 (1.75)
2	-1.36 (-1.20)	-0.10 (-0.07)	-0.50 (-0.37)	0.93 (0.69)	-0.28 (-0.28)	1.08 (1.37)

## Cyclical to the Factor Mimicking Portfolio?

Panel C: Exposures of cost of goods sold

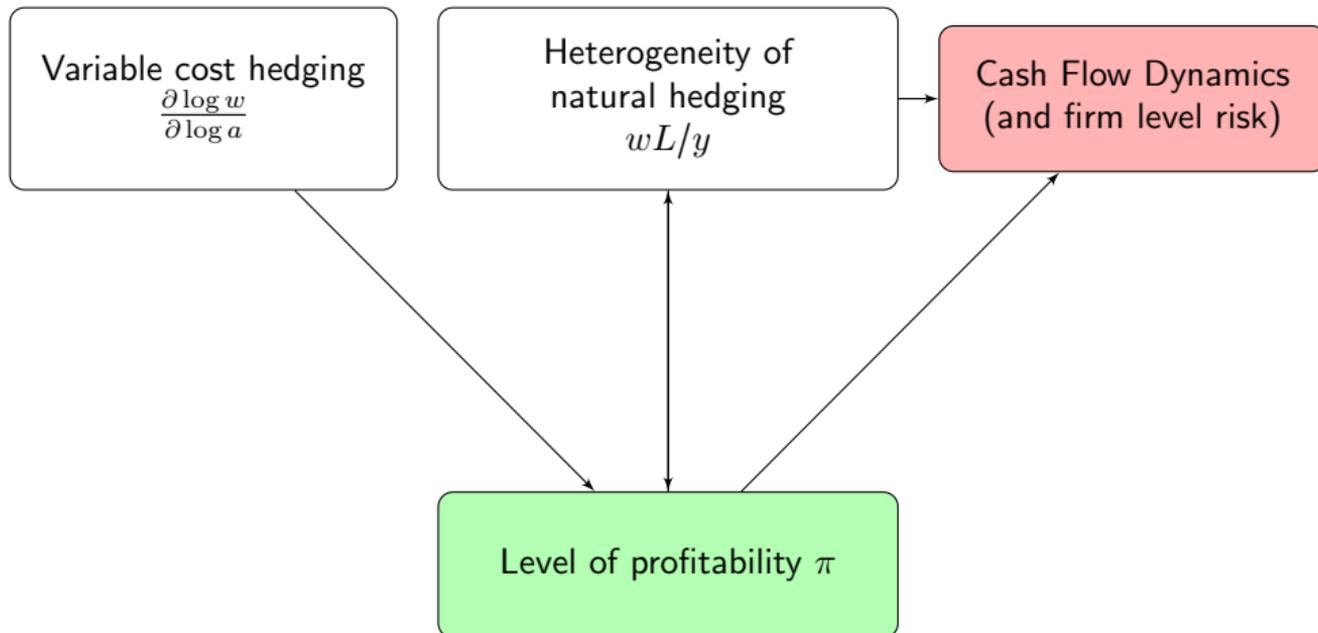
K =	Lo	2	3	4	Hi	Hi-Lo
0	0.46 (0.72)	1.66 (2.75)	1.80 (2.69)	1.76 (2.90)	1.38 (1.99)	0.92 (2.05)
1	-0.13 (-0.15)	1.25 (1.30)	0.64 (0.64)	1.08 (1.34)	0.14 (0.13)	0.28 (0.33)
2	-0.27 (-0.23)	0.31 (0.21)	0.00 (0.00)	1.24 (0.85)	-0.32 (-0.25)	-0.05 (-0.06)

## Cyclical to the Factor Mimicking Portfolio?

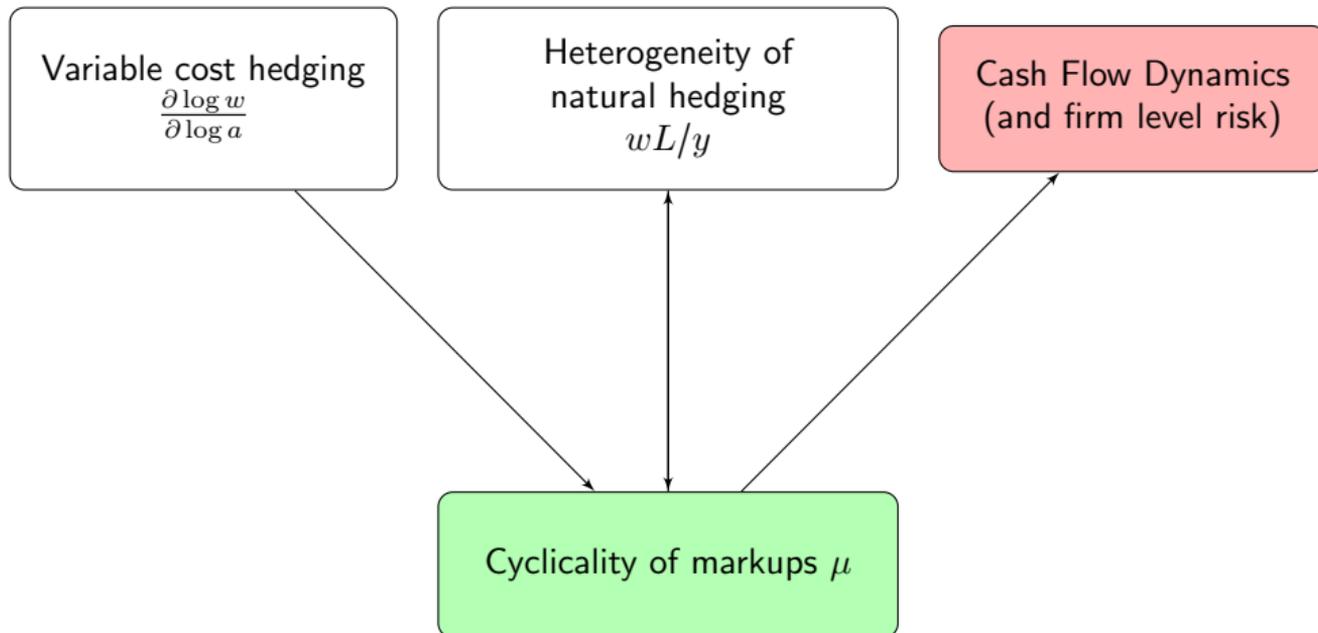
Panel A: Exposures of gross profits

K =	Lo	2	3	4	Hi	Hi-Lo
0	-4.02 (-1.97)	-0.49 (-0.67)	0.18 (0.25)	0.16 (0.27)	0.87 (2.49)	4.89 (2.38)
1	-6.70 (-3.20)	-1.11 (-0.94)	-1.46 (-1.23)	-0.15 (-0.14)	-0.13 (-0.15)	6.58 (4.10)
2	-6.74 (-3.11)	-1.05 (-0.88)	-1.52 (-1.35)	0.43 (0.32)	-0.07 (-0.09)	6.67 (3.39)

# Is the level of profitability the best measure of cost cyclicity?



# Is the level of profitability the best measure of cost cyclicity?



# Final Thoughts

Very interesting Paper!

Take away

- New approach to think about profitability premium
- Matters a lot when we think jointly about the negatively correlated value premium

Great Paper!