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**Valuing intangible capital in agribusinesses: A re-examination of the neoclassical theory of investment**

**Gerald Mashange, Kansas State University, geraldm@ksu.edu**

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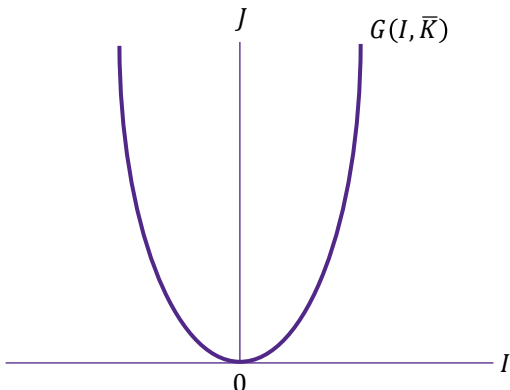
## Objective

1. Estimate the importance of intangible capital for U.S. publicly listed agribusinesses
2. Address the measurement error problem using higher-order cumulant estimators
3. Assess the role of cash flow on investment

## Data

- Compustat–Capital IQ financial statement data
- 1,180 U.S. publicly traded agribusinesses
- Data spans from 1963-2022
- 15,402 firm observations

## Convex Adjustment Costs



## Methods

Following Peters and Taylor (2017):

$$V_{it} = \max_{I_{it+s}^{phy}, I_{it+s}^{int}} \int_0^\infty E_t \left[ \Pi(K_{it+s}^{tot}, \varepsilon_{it+s}) - \left( p^m I^m + K^{tot} \left[ \zeta_i^m \frac{I^m}{K^{tot}} + \frac{\gamma_i^m}{2} \left( \frac{I^m}{K^{tot}} \right)^2 \right] \right) \right] e^{-rs} ds \quad (1)$$

$$\text{subject to: } \dot{K}_t^m = \frac{dK^m}{dt} = (I^m - \delta K^m), m = phy, int. \quad (2)$$

$p_{it}^{phy}, p_{it}^{int}, \varepsilon_{it}$  fluctuate according to a general stochastic diffusion process:

$$d\theta_{it} = \mu(\theta_{it})dt + \sigma(\theta_{it})dz_{it}, \text{ where } \theta_{it} = [\varepsilon_{it} \ p_{it}^{phy} \ p_{it}^{int}]'. \quad (3)$$

$$\frac{\partial V_{it}}{\partial K_{it}^{phy}} = \frac{\partial V_{it}}{\partial K_{it}^{int}} = \frac{\partial V_{it}}{\partial K_{it}^{tot}} = \frac{V_{it}}{K_{it}^{phy} + K_{it}^{int}} = \frac{V_{it}}{K_{it}^{tot}} \equiv q^{tot}(\varepsilon_{it}, p_{it}^{phy}, p_{it}^{int}). \quad (4)$$

The firm's optimal investment rates are:

$$I_{it}^{phy} = \frac{I_{it}^{phy}}{K_{it}^{tot}} = \frac{1}{\gamma_{it}^{phy}} q^{tot} \quad (5)$$

$$I_{it}^{int} = \frac{I_{it}^{int}}{K_{it}^{tot}} = \frac{1}{\gamma_{it}^{int}} q^{tot} \quad (6)$$

$$I_{it}^{tot} = \frac{I_{it}^{phy} + I_{it}^{int}}{K_{it}^{tot}} = \frac{1}{\gamma_{it}^{tot}} q^{tot} \quad (7)$$

## Results & Conclusion

- Total q is a better proxy of investment opportunities than standard q
- Higher convex adjustment (installation) costs for financially unconstrained firms (8.0645) compared to financially constrained firms (1.0730)
- Higher convex adjustment (installation) costs for intangible capital (28.329) compared to physical capital (5.747)
- Cash flows are important for financially constrained firms

## References

Peters, R. H., & Taylor, L. A. (2017). Intangible capital and the investment-q relation. *Journal of Financial Economics*, 123(2), 251–272.

## Sensitivity Analysis

