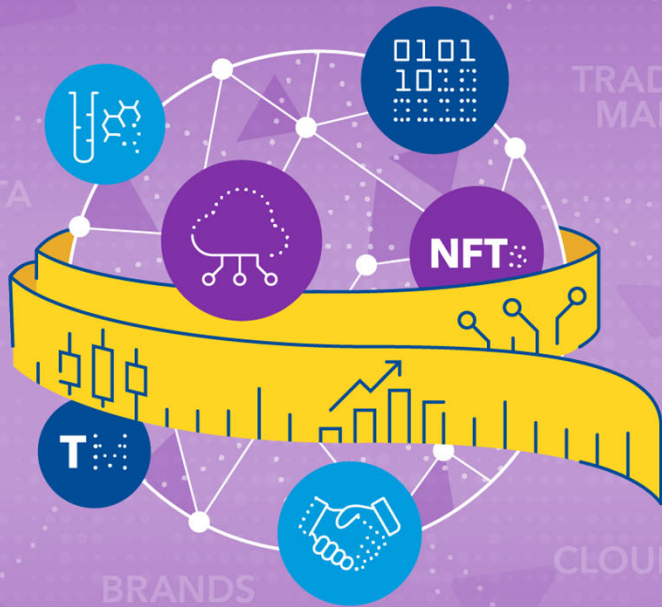


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MEASURING
THE TANGIBLE BENEFITS
OF INTANGIBLE CAPITAL



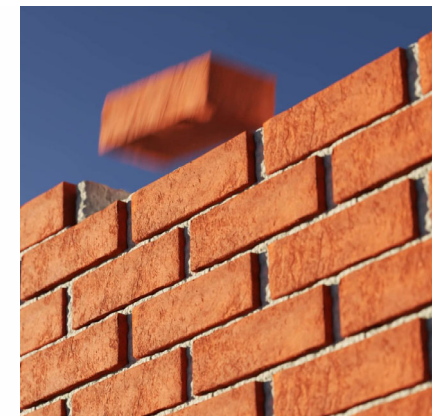
The Rise of Intangible Capital

NOVEMBER 16, 2022

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Measuring the Tangible Benefits of Intangible Capital

- Begin with documentation: intangibles are rising
- Mismeasure important values if we omit intangible capital
 - ▶ Understate investment and capital
 - ▶ What looks like gaps and rents are actually returns to intangibles
- Is intangible capital otherwise different?
 - ▶ Lacks a physical presence
 - ▶ => Opportunities and challenges

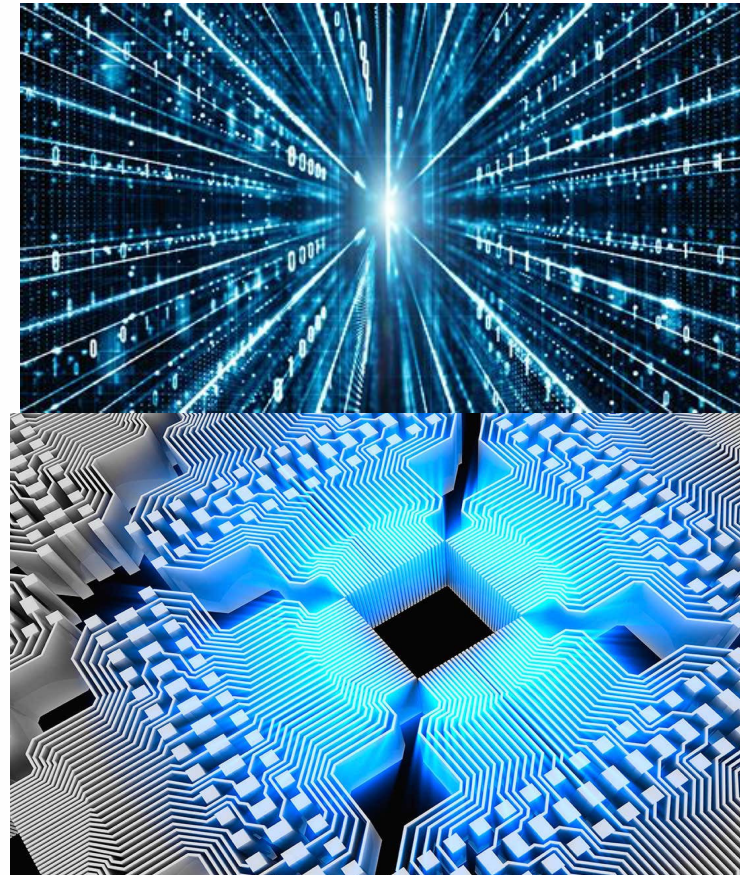
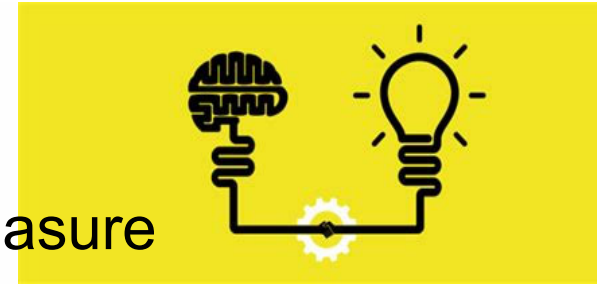


- Challenges – intangibles are intrinsically hard to measure

- ▶ Undermeasurement of intangibles
- ▶ Still present in value and profits => mis-estimation
- ▶ Persistent and on-going efforts to document

- Opportunities – recast production

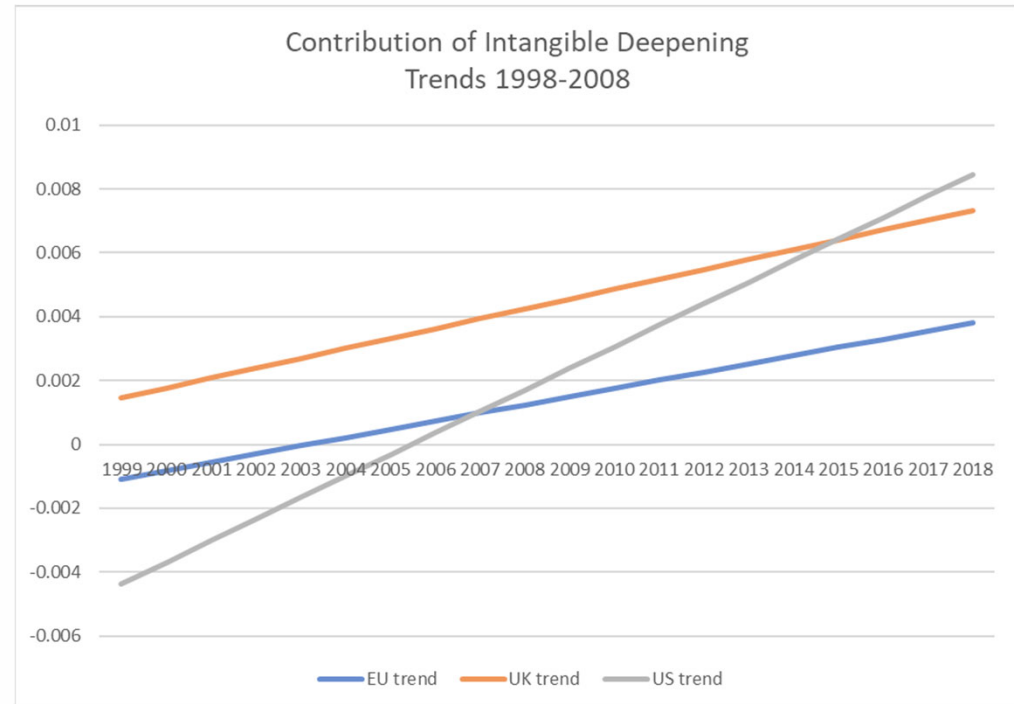
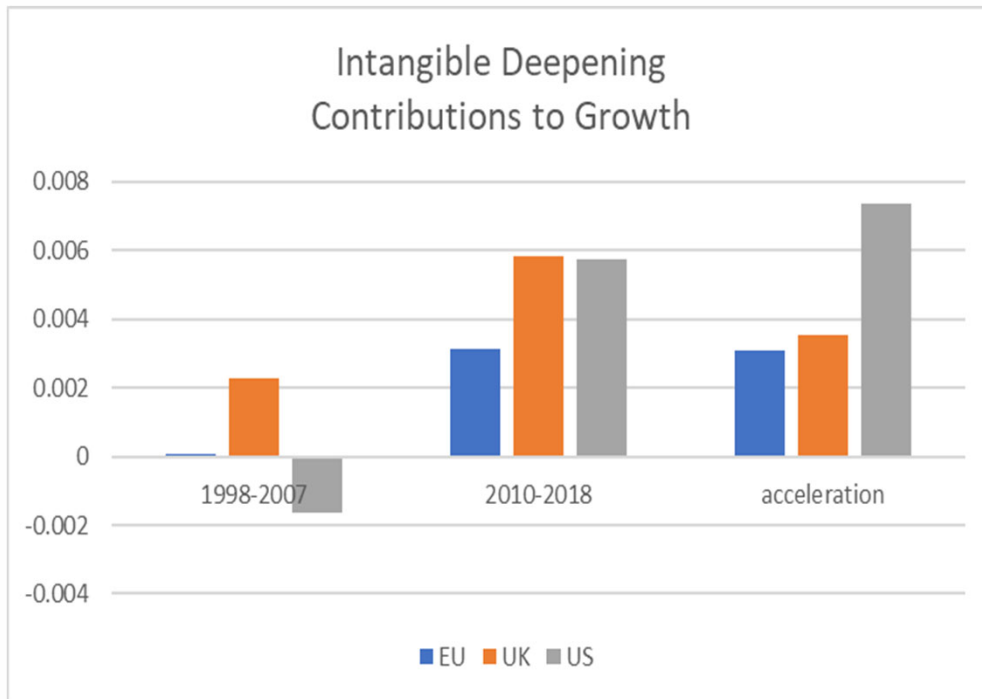
- ▶ How do intangibles generate output
- ▶ Recast estimation with nonrivalry and appropriability





Measurement and Estimation

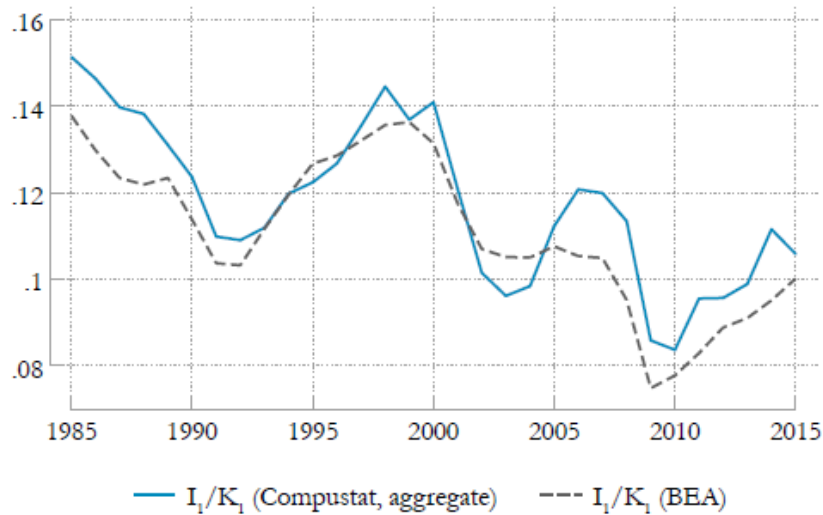
Intangibles contributing more to growth



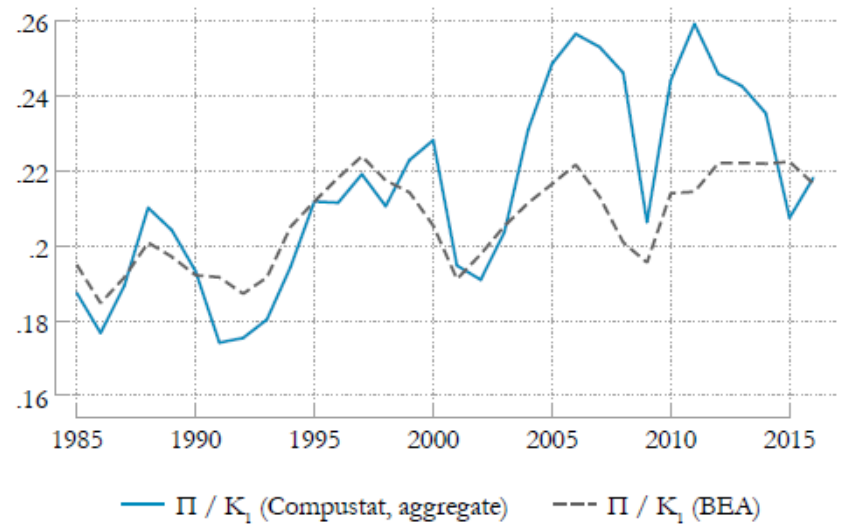
Corrado, Haskel, Jona-Lasinio, Iommi, JEP 2022

Investment declining; Returns stable/rising

Property plant & equipment, firm level and national accounts



Sectoral data



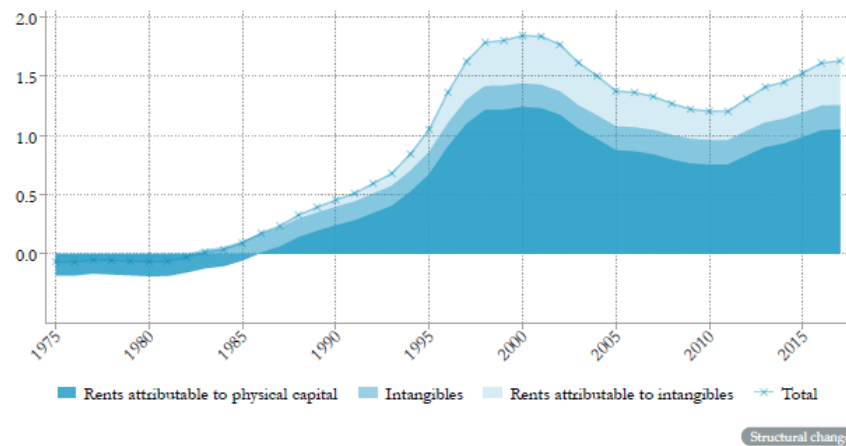
Sectoral data Investment

Gutierrez and Philippon (2017), Alexander and Eberly (2018), Crouzet and Eberly (2019)

Allowing for intangibles and rents explicitly

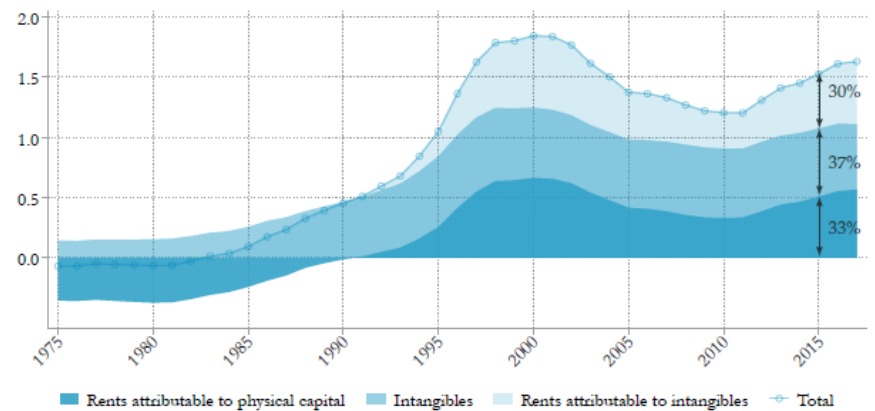
The investment gap in Compustat

(intan = R&D)



The investment gap in Compustat

(intan = R&D + org. cap.)

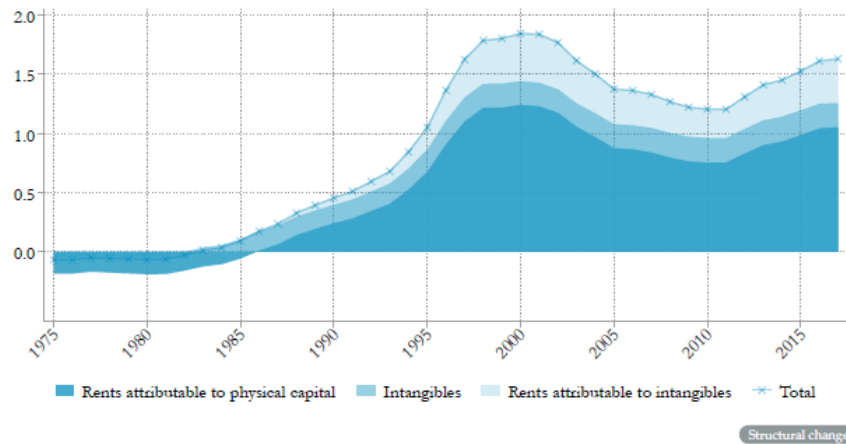


With a narrow measure, intangibles account for 1/3 of the increase in Tobin's Q.
 With a broad measure, intangibles account for about 2/3.

Allowing for intangibles and rents explicitly.

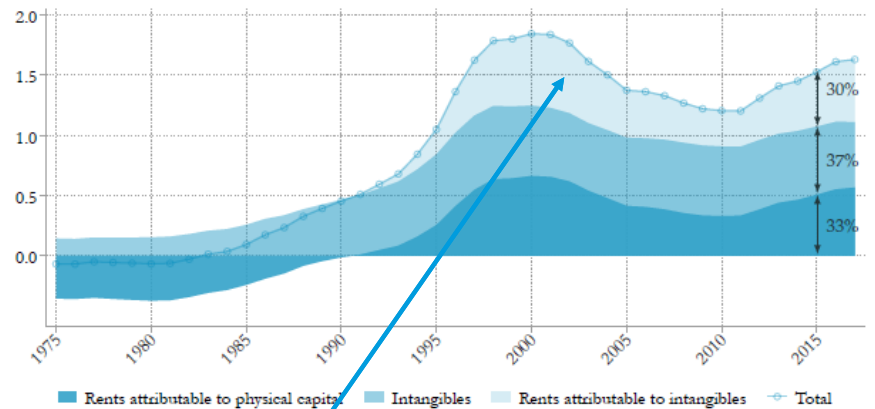
The investment gap in Compustat

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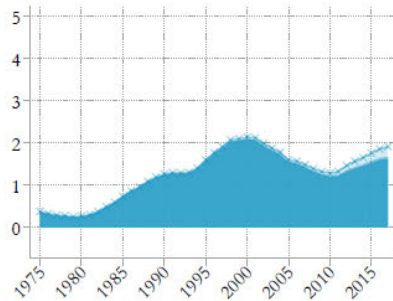
Intangible themselves also generate rents: the interaction explains more of the rise in Q.

Intangible and innovative fields lead.

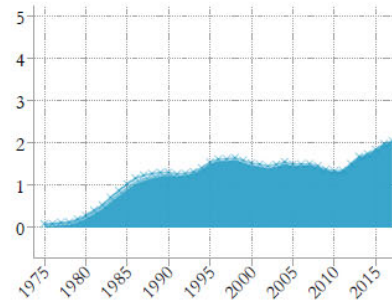
The investment gap across sectors

(intan = R&D)

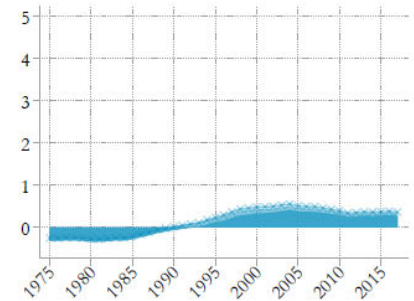
Consumer



Services

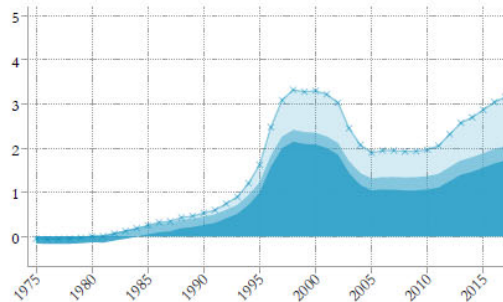


Manufacturing

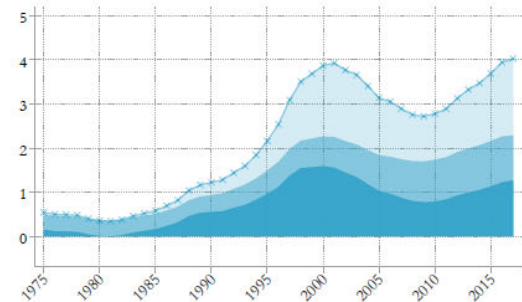


Largest effects of intangibles are in High Tech and Health care

High-tech



Healthcare

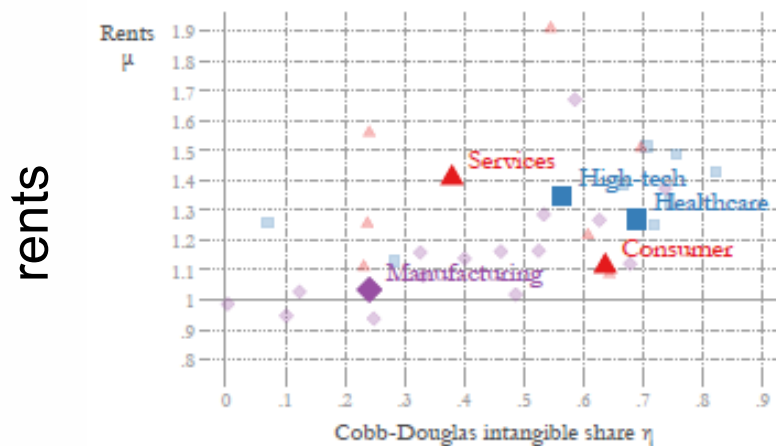


The rise in intangibles coincides with a rise in rents, *even accounting for measured intangibles*

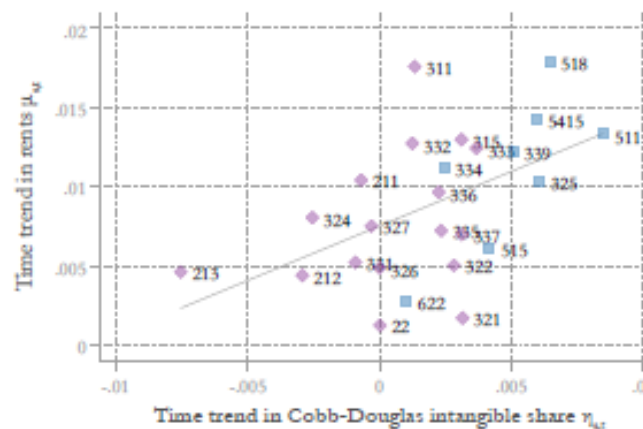
cross-industry

... and over time

(d) Rents and intangible intensity in 2015
R&D + org. cap.



(c) Manufacturing, High-tech, and Healthcare
R&D + org. cap.



intangibles



Recasting Estimation

Thinking differently about production: Nonrivalry

- Capital in production \neq accumulation of investment
- Intangibles can be used simultaneously
- A firm has multiple production streams, s
 - ▶ Products, geographies, lines of business
- Intangible input is not subject to adding up because it is nonrival.

$$\text{Intangible input} = \left[\int_0^x (N_s)^{\frac{1}{1-\rho}} ds \right]^{1-\rho}, \quad 0 < \rho \leq 1$$

Firm value and production, integrating over streams

- Nonrivalry: if $\rho > 0$, intangibles can be used across multiple streams without paying full additional cost (or any cost at all).
- But can this benefit be appropriated?
 - If I can use the intangible simultaneously, can someone else?
- Excluding other users implies a limit to the benefits of nonrivalry
=> importance of institutions, protections

Implications

- Firms face a tradeoff when using intangibles:
 - ▶ Deploy intangibles broadly to exploit nonrivalry, ρ
 - ▶ But doing so exposes them to outside appropriation, δ
 - ▶ Use depends on the tradeoff => the ratio ρ / δ

Measured TFP depends on *intangibles* and the added benefit of *nonrivalry relative to appropriability*

$$\text{tfp} = \log(Y(N)) - a_K \log(K) = a_N \log(N) + \rho a_N [\log(\rho) - \log(\delta)]$$

The economics of intangibles requires new approaches

- Measure more broadly – counting is not enough.
 - ▶ Not only national accounts, but firm-level accounting
 - ▶ If we cannot do economics, neither can investors and policy-makers
- Nonrivalry recasts production and value creation
 - ▶ Capital that can be deployed is not the measured stock
- What is scarce?
 - ▶ The institutions that enforce exclusivity
 - ▶ Storage and distribution technologies (energy, rare earths)
 - ▶ Talent and ideas