

Corporate Asset Pricing

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What must the world be like for asset pricing anomalies to be possible?

In Walrasian equilibrium, the consumption CAPM and the investment CAPM should deliver identical expected returns:

$$R_{ft} + \beta_{it}^M \lambda_{Mt} = E_t[R_{it+1}] = \frac{E_t[\Pi_{it+1}]}{1 + a(I_{it}/A_{it})}$$

In the data:

$$R_{ft} + \beta_{it}^M \lambda_{Mt} \neq E_t[R_{it+1}] = \frac{E_t[\Pi_{it+1}]}{1 + a(I_{it}/A_{it})}$$

Why? The hard problem of asset pricing

Is there a “theory of everything” that unifies our diverse research programs?

The CAPM fails to explain asset pricing anomalies

The consumption CAPM performs often worse than the CAPM

Workhorse factor models formed on firm characteristics

The investment CAPM does a good job in micro finance

The consumption CAPM does a good job in macro finance

Boundedly rational investors in behavioral finance

Despite their prevalence, difficult for active managers to outperform

Theme

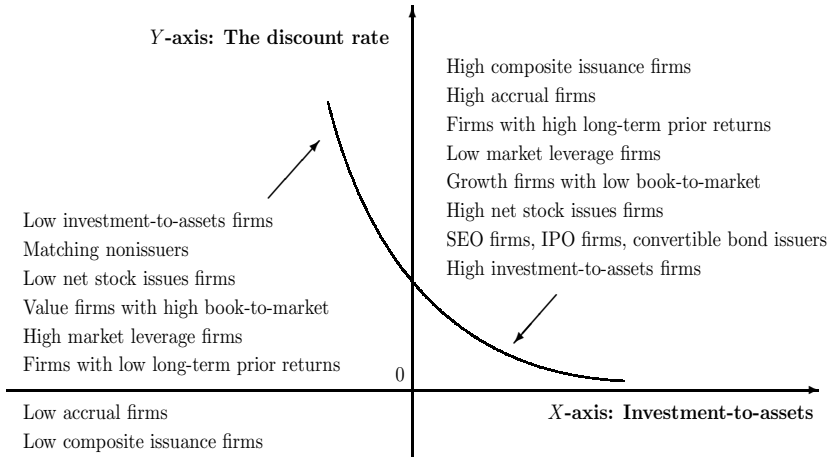
Hou, Xue, and Zhang (2015) inspired by Fama and French (1993):
The q -alphas of HML, CMA, RMW, and UMD = 0 ($p = 0.67$);
the 6-factor alphas of $R_{I/A}$ and $R_{Roe} = 0$ ($p = 0.00$)

1/1967–12/2023	Average returns	6-factor alphas	q -factor alphas
The investment factor, $R_{I/A}$	0.36 (4.12)	0.07 (2.04)	
The Roe factor, R_{Roe}	0.53 (5.23)	0.25 (4.09)	
HML	0.29 (2.07)		0.01 (0.08)
CMA	0.29 (3.15)		0.02 (0.62)
RMW	0.30 (3.18)		0.04 (0.46)
UMD	0.58 (3.51)		0.15 (0.77)

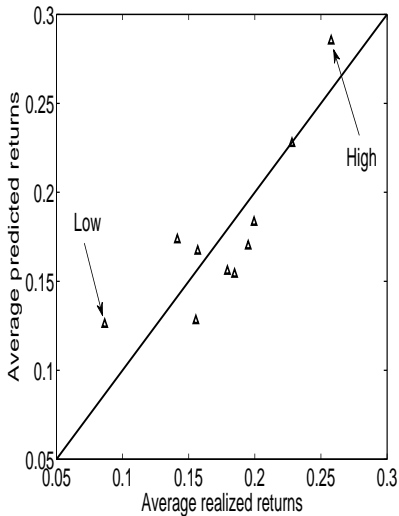
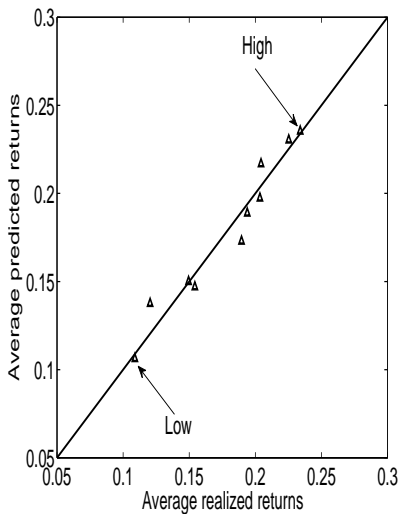
Theme

Hou, Xue, and Zhang (2015):

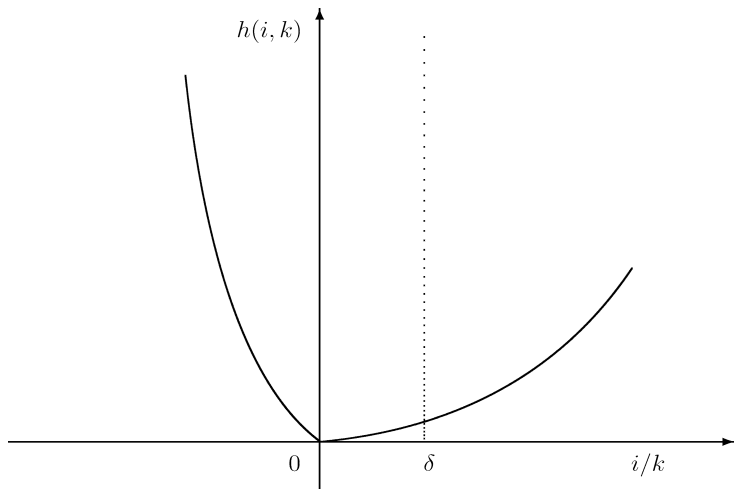
The causal structure behind the investment and profitability factors



Liu, Whited, and Zhang (2009) inspired by Hansen and Singleton (1982)

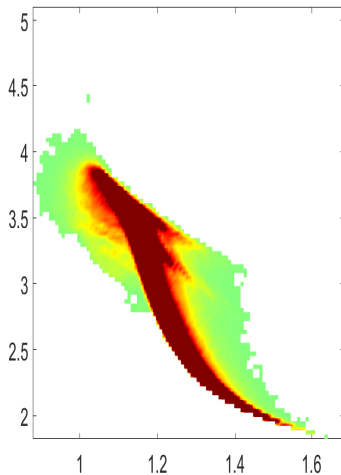
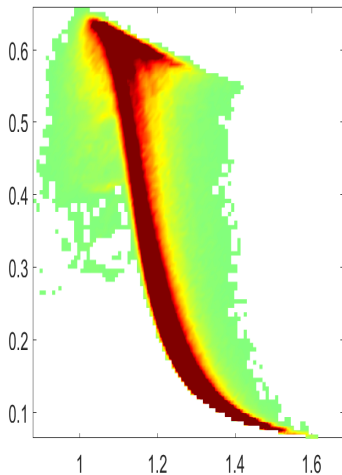


Zhang (2005) inspired by Kydland and Prescott (1982)



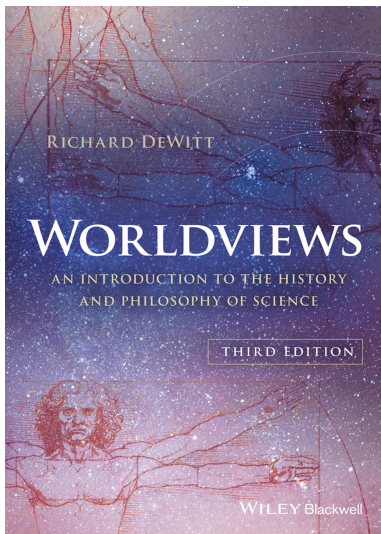
Theme

Bai and Zhang (2022) inspired by Mehra and Prescott (1985):
Attempting to unify business cycle research and macro finance



Theme

What is a worldview?



Worldview: An intertwined, interrelated, interconnected system of beliefs (jigsaw)

Core vs. peripheral beliefs

Beliefs as a continuum on the empirical vs. **philosophical facts**

Metaphysical presuppositions mistaken as empirical facts (geocentrism, circular orbit)

Investors price assets (setting discount rates for firms)

In **equilibrium**, sufficient to study only investors

Who is the marginal investor? The **representative** investor (homogeneous expectations) as idealization

Flat ontology: The right SDF applies everywhere (macro, micro)

SDFism: Asset pricing is all about (nothing but) the SDF

The risk doctrine: **Only** risk matters; SMB, HML as risk factors

Rational expectations

The world as a system of open, adaptive systems (Simon 1962)

Corporate actors are primary causal powers of their own asset prices

The invisible hand as **spontaneous order** (coordination) via **the market process**, not a set of simultaneous equations

Emergence from interacting, heterogeneous actors: The marginal investor not an investor (an ant colony not an ant)

SDFism: Greedy (eliminative) reductionism (Dennett 1995)

EMH: Unpredictable abnormal returns, \neq rational expectations

Bounded rationality (Simon 1957)

What must the world be like for anomalies to be possible?

- Equilibrium vs. systems: Which ontology to prefer?

Meta-theory just like theory (Quine's naturalism)

Abduction: Inference to the best explanation

Which meta-theory explains more facts, broadly?

Grounded in empirical finance, **systems finance** unifies the consumption CAPM, behavioral finance, and the investment CAPM

1 Equilibrium

2 Systems

1 Equilibrium

2 Systems

Equilibrium

Three dogmas: Anthropocentrism, macro-reductionism, equilibrium



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Only **investors** price assets: Anthropocentrism
(eliminative individualism, micro-reductionism)

What is the relation between individuals and society? The individualism-holism, agency-structure, micro-macro debate

Mill's (1843) **psychologism**: “The laws of the phenomena of society are, and can be, nothing but the laws of the actions and passions of human beings united together in the social state ([1974], p. 879)”

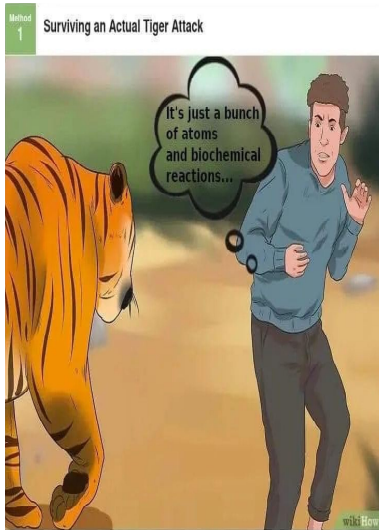
- Mill (1843) also the founder of “British emergentism”

Jevons (1871), Menger (1871), Walras (1874)

Archer (1995): **Emergentism** in the agency-structure debate

Equilibrium

Micro-reductionism per “Philosopher Games” on Facebook



The tiger is just a bag of atoms

If the tiger tries to eat you,
remember you are also just a
bag of atoms

the tiger is simply trying to
rearrange your atoms for you

Alas, the tiger is real (with
causal powers), and so are you

In society, individuals and social
structures are both real

Equilibrium

Anderson (1972, "More Is Different")



Mirowski (1989): "Physics envy"

"At each stage entirely new laws, concepts, and generalizations are necessary, requiring inspiration and creativity to just as great a degree as in the previous one (p. 393)."

Less is Different: Micro and Macro finance as interdependent but autonomous layers of reality

Keynes (1934) founds macro as a field

Lucas (1976) calls for causation in macro: Microfoundation installs intentionality as causes

Intentionality yes, but no microfoundation, with the representative agent as idealization (Maki 2005, Hoover 2010)

Macro-reductionism: Impossible to trace everyone, work with the “marginal investor,” **Lucas's demon**, rivaling Laplace's demon

The demon's SDF prices everything: S&P, firm equity, corporate bonds, government debt, derivatives, FX, etc

DARWIN'S DANGEROUS IDEA

EVOLUTION AND
THE MEANINGS OF LIFE



DANIEL C.
DENNETT

AUTHOR OF
CONSCIOUSNESS
EXPLAINED

SDFism as **greedy reductionism**

When “in their eagerness for a bargain, in their zeal to explain too much too fast, scientists and philosophers often underestimate the complexities, trying to skip whole layers or levels of theory in their rush to fasten everything securely and neatly to the foundation (p. 82).”

Skyhooks (intelligent design) vs. cranes (Darwinian evolution)

Anthropocentrism descends from Markowitz (1952)

Macro-reductionism: Investors have **homogeneous expectations (beliefs)**, holding the same optimal, tangent portfolio

Maki (2004): The beta-return relation as the CAPM's nominated truth-bearer, but anomalies reject the CAPM (no truth-maker)

Macro-reductionism: Factors must be aggregate (SDFism):
Assuming the conclusion (petitio principii)

Risk does matter (investors do agree during flight to quality); but that **only** risk matters is untenable

The representative agent ignores heterogeneity and **nonequilibrium**

The Sonnenschein-Mantel-Debreu theorem

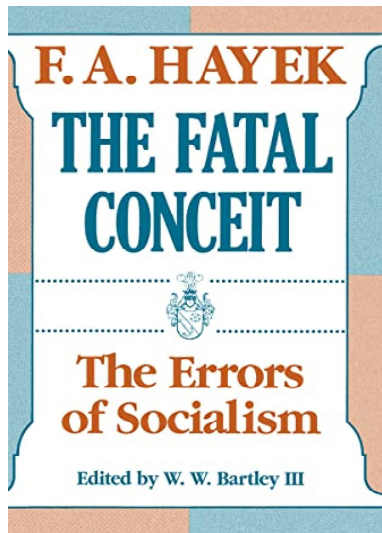
Only existence of equilibrium, no uniqueness, no stability: Walras's tâtonnement as tendencies at best (Hahn 1970; Fisher 1983)

Kirman (1992, 2011); Arthur, Durlauf, and Lane (1997)

In **nonequilibrium**, the investment CAPM and the consumption CAPM need not deliver identical expected returns

Krusell and Smith (1998): Approximate aggregation over heterogeneous consumers, no heterogeneous firms

My phase transition: Equilibrium with heterogeneity in investors and firms?



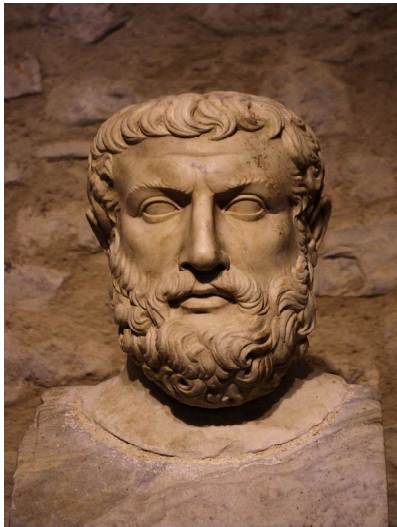
Socialist calculation: Mises,
Hayek vs. Lange, Lerner

The coordination problem
collapsed to a control problem
(bottom up vs. top down)

“[T]he 'data' from which the
economic calculus starts are
never for the whole society
'given' to **a single mind** which
could work out the implications
and can never be so given
(Hayek 1945, my emphasis)”

Equilibrium

Parmenides vs. Heraclitus: Equilibrium (Newton) vs. evolution (Darwin)



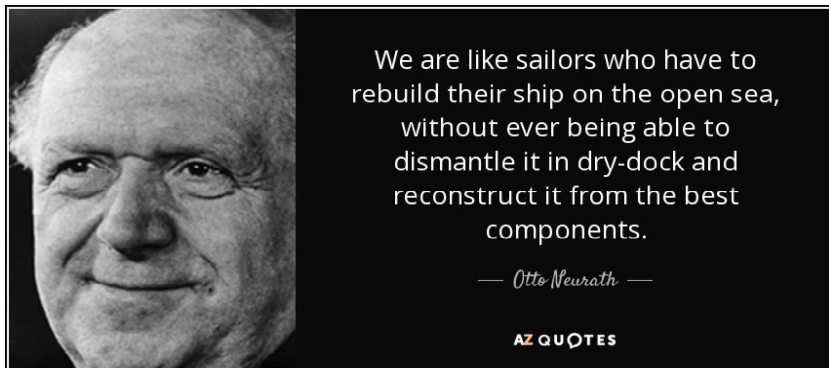
Why does the consumption CAPM succeed in macro finance?

Macro and micro finance as two interdependent but **autonomous** systems with diverse causal structures

Putting i on R_{it+1} but not M_{t+1} in $E_t[M_{t+1}R_{it+1}] = 1$
metaphysically presupposes a flat ontology

The “fundamental” equation of asset pricing not fundamental at all

The consumption CAPM emerges in macro finance but nonexistent in micro finance (no temperature in molecules)



Systems finance with agent-based modeling: The future?

1 Equilibrium

2 Systems

Systems ontology, with middle-range theories (Merton 1968)

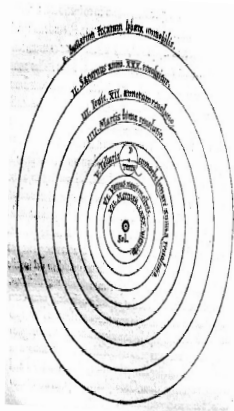
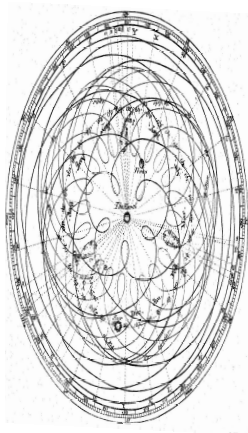
Macro	Meso	Micro
The consumption CAPM (Macro finance)	The investment CAPM (Micro finance)	Behavioral finance (Household finance)

Corporate actors as primary causal powers of their own asset prices, not investors (the **Copernican** shift in finance)

In a complex system, emergentism resolves most debates (arising from imposing the causal structure of one system everywhere)

Systems

Copernicus (1543, "On the Revolutions of the Heavenly Spheres")



Corporate actors as causal powers of the market value (standard):

- Corporate finance, microeconomics, sociology (Coleman 1990)
- Firms have better information (knowledge) about themselves than investors (Myers and Majluf 1984)

Identical causal structure (“truth-preserving”) for the market value as expected return: SDF gone via constant returns

Corporations as **primary** causal powers of their own asset prices

“Primary” does not mean “only” (GameStop)

Complex, open systems: Multiple causes to multiple effects

Drawing inferences on reality from empirical sciences
(characteristics dominate covariances in asset pricing tests):

- Abduction (Kincaid 1996, Ladyman and Ross 2007)
- Putnam's (1975) no-miracles argument
- Transcendental deduction (Bhaskar 1975, Cartwright 1999)

An agent-based model

Heterogeneous investors and firms, local information and knowledge, learning, adaptive expectations, the market process

Firms use heuristics to seek (not necessarily optimize) value, will approximate the “optimal” condition (the investment CAPM)

Investors use heuristics to seek utility

Even if the consumption CAPM emerges in macro, it does not apply (too strongly) to micro

Market prices arise from the market process, not equilibrium

The investment vs. consumption CAPM debate
analogous to the Bohr vs. Einstein debate

Just addressing a
research gap joining two
theories...



The world is a system of open, adaptive systems in evolution

Corporate actors as primary causal powers of their own asset prices, not investors (the Copernican shift in finance)

In a complex system, emergentism resolves most debates (arising from imposing the causal structure of one system everywhere)

Three dogmas of the consumption CAPM (anthropocentrism, macro-reductionism, equilibrium) likely responsible for its failure

Systems theory (with agent-based modeling) as the “theory of everything” in finance, not equilibrium theory