Topic 5
Capitalization:
The Architecture of Power

Conservation
• There is no such thing as a free lunch: from taxation to chemistry to value
• Capital: is finance the same as “real capital”?

The nomos
• The imperative of capitalist determinism: justify profit, critique exploitation
• How are non-capitalist prices set?
• How are capitalist prices set?

The unit of order
• Categories, forms, numbers
• Price: the capitalist unit of order
• Value theory: why was it born only in the 19th century?
• The breadth and depth of the price system

The pattern of order
• Capitalization: the generative order
• Discounting: future earnings and the discount rate
• Fourteenth century Italy: foreign bills
• Seventeenth century England: domestic bills
• Nineteenth century Germany: forestry
• Early twentieth century America: universal principles
• The 1950s takeoff: capital budgeting and portfolio theory

The capitalization of every thing
• Human capital: the Bernoullian “humanoid”
• The brave new world of emotions an genes: creating and discounting a predictable subject
• Organizations: discounting education and entertainment
• Capitalizing institutions: from the law to organized crime to religion
• Discounting processes: from military assets to the course of war
• The future of humanity: it’s all in the discount rate

Capitalization: fiction, mirror or distortion?
• The duality: Hume’s classical dichotomy
• The real world: material production and consumption
• The financial mirror: symbolic images and echoes
• Capital goods versus capitalization: the “thing” meets its “idea”
• Marx: a financial fiction converges
• The neoclassicists: a financial mirror distorted

Marx’s View
• Why is finance a fiction: no “principal”; putative profit; dependency on the rate interest rate
• The dilemma: finance “distorts” values
• The Ghost in the Machine: crisis brings finance down to earth
• Why is there no Marxist theory of finance?
Irving Fisher’s House of Mirrors
- From capital wealth to income services
- From income services to income value
- From income value to capital value
- From capital value to capital wealth
- The two sides of the balance sheet

The quantity of wealth
- The real benchmark: what is finance “equal” to?
- Can material qualities be quantified: the Cambridge Controversy
- Fundamental quantities of physics: mass, distance, time, electrical charge and heat
- Fundamental quantities of economics: utils and socially necessary abstract labour
- Revealed preferences: let prices tell all
- The curse of equilibrium: Can we know it when we see it? Does it ever happen?
- The big cheat: reality is in the mirror, but the mirror is shattered
- With nothing to match, what is there to mismatch?

Microsoft vs. General Motors
- Who is the giant, who is the dwarf?
- Productive capacity and employment
- Equity and total capitalization
- A “technological fix”?

Tobin’s Q: adding intangibles
- Market value of equities and bonds versus current cost of fixed assets
- Why is Tobin’s Q greater than 1?
- Dark matter and the intangible revolution
- Going in reverse: let the market tell all

Boom and bust: adding irrationality
- Why does Tobin’s Q fluctuate?
- When people misbehave: distortions
- The curse of excess: too optimistic, too pessimistic
- Bubbles and fake wealth, crashes and underpriced assets
- Order in the chaos: pro-cyclical irrationality?

The gods must be crazy
- A world turned on its head: capitalists accumulate when capital “decumulates”?
- Force is nothing but its effect: toward a power theory of capital

Capitalization: elementary particles
- The Cowles Commission and the birth of modern finance: science or collective ethos?
- Science: if you are so smart, how come you aren't rich?
- Ethos: the unified ritual and its basic building blocks
- Automaticity vs. power: reactive finance from below, active finance from above

Earnings and hype
- Capitalization and earnings: the long-run and short-run views
- Expectations decomposed: ex-post earnings and hype
- Leveraging hype: passive and active insiders
- Ignoring hype: Kendall’s random walk and Fama’s efficient market hypothesis
- Smart money: do the experts keep the market efficient?
- IBES and the clueless experts
The normal and the risky

- Uncertainty: how much do you trust your own predictions?
- Decomposing the rate of interest: benchmark and deviation
- The neoclassical constant: the productive normal rate of return and the deviations of “risk”
- The rate of interest in antiquity: power, religion and custom
- The scientific/capitalist backdrop: probability meets statistics
- Probability: Pascal and Fermi and the mathematical laws of bourgeois morality
- Statistics: Graunt, Petty and Halley and the mapping of an ever-changing society
- Delineating the unknown: extracting truth from the distribution of errors
- The new stochastic cosmology: bounding uncertainty, explosive science, social restructuring

Risk and uncertainty

- Daniel Bernoulli: from diminishing marginal utility to risk aversion
- The new calculus of accumulation: from expected earnings to expected utility
- The Bernoullian investor: individual, hedonic and risk averse
- The dubious conversion of qualitative uncertainty to quantitative risk: Hume, Knight and Keynes

CAPM

- Nobel Prizes for the (hetero)nomos makers
- Markowitz’s framework for institutional investing: risk and diversification
- The Sharpe and Lintner ritual: let excess return tell the risk premium

Risk and power

- Barking up the wrong tree: hedonic, passive, risk-averse individual
- The real thing: power driven, active, risk-shaping capitalist organizations
- Barking up the wrong tree: price volatility
- The real thing: earnings predictability
- The confident rate of interest and the risk coefficient
- Capitalist power: co-shaping earnings growth and earnings volatility
- Capitalist power: “converting” uncertainty to risk
- Bringing risk into accumulation
**Formulae**

Consider a $1,000 payment due in a year’s time ($K_{t+1}$) and ‘discounted’ at a 5 per cent rate of interest ($r$). Its present value ($K_t$) will be equal of $952.38.

Explanation: suppose the capitalist invests $K_t$ dollars now (the present value of $952.38$) in order to get back a year from now $K_{t+1}$ dollars (the future payment of $1,000$). The capitalist engages in this transaction because the future payment is bigger than its present value: it comprises the repayment of the original investment plus additional earnings ($K_{t+1} = K_t + E_{t+1}$). Since in this case the capitalist knows both the original investment and the future payment, he can compute the rate of return ($r$):

1. \[ r = \frac{E_{t+1}}{K_t} = \frac{K_{t+1} - K_t}{K_t} = \frac{K_{t+1}}{K_t} - 1 = \frac{1000}{952.38} - 1 = 0.05 \]

If we know the future payment and the going rate of interest, we can rearrange the equation to figure out how much the capitalist believes is appropriate to pay for it now, namely the ‘present value’:

2. \[ K_t = \frac{K_{t+1}}{1 + r} = \frac{1000}{1.05} = 952.38 \]

This expression can be generalized for an earning flow of a constant or varying magnitude ($E$), paid over $n$ periods and discounted by successive compounding of the rate of interest, such that:

3. \[ K_t = \frac{E_{t+1}}{1 + r} + \frac{E_{t+2}}{(1 + r)^2} + \ldots + \frac{E_{t+n}}{(1 + r)^n} \]

If the payments are uniform over time (so $E_{t+1} = E_{t+2} = \ldots = E_{t+n}$), their capitalized value would be:\[^1\]

4. \[ K_t = \frac{E}{r} \left( 1 - \frac{1}{(1 + r)^n} \right) \]

If these equal payments continue in perpetuity (so $n \to \infty$), the present value becomes:\[^2\]

5. \[ K_t = \frac{E}{r} \]

And if the perpetual payments are expected to grow at a rate of $g$ per period (provided $g < r$), the present value becomes:\[^3\]

6. \[ K_t = \frac{E}{r - g} \]

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\(^{1}\) To obtain Equation (4), multiply both sides of Equation (3) by $1+r$, subtract the original equation from the new one and rearrange the terms.

\(^{2}\) When the number of payments ($n$) grows infinitely large, the expression in the brackets of Equation (4) approaches 1.

\(^{3}\) To derive Equation (6), assuming $g < r$, substitute $E (1+g)^i$ for $E_{t+i}$ (with $i = 1, 2, 3, \ldots n$) in Equation (3), multiply both sides of the new equation by $(1+r)/(1+g)$, and follow the remaining steps of footnotes 1 and 2.
**Universal Discounting: Toward the Capitalization of Everything**

“It is evident that not bonds and notes alone, but all securities, *imply* in their price and their expected returns a rate of interest. There is thus an implicit rate of interest in stocks as well as in bonds. . . . It is, to be sure, often difficult to work out this rate definitely, on account of the elusive element of chance; but it has an existence in all capital. . . . It is not because the orchard is worth $20,000 that the annual crop will be worth $1000, but it is because the annual crop is worth $1000 that the orchard will be worth $20,000. The $20,000 is the discounted value of the expected income of $1000 per annum; and in the process of discounting, a rate of interest of 5 per cent. is implied.”


**Universal Discounting: Since the Dawn of Time**

“The primitive economy in its choice of enjoyable goods of different epochs of maturity, in its wars for the possession of hunting grounds and pastures, in its slow accumulation of a store of valuable durable tools, weapons, houses, boats, ornaments, flocks and herds, first appropriated from nature, and then carefully guarded and added to by patient effort – in all this and in much else the primitive economy, even though it were quite patriarchal and communistic, without money, without formal trade, without definite arithmetic calculations, was nevertheless *capitalizing*, and therefore embodying in its economic environment a rate of premium and discount as between present and future.”


**The Bernoullian Humanoid**

“There is then nobody who can be said to possess nothing at all in this sense unless he starves to death. For the great majority the most valuable portion of their possessions so defined will consist in their productive capacity, this term being taken to include even the beggar’s talent: a man who is able to acquire ten ducats yearly by begging will scarcely be willing to accept a sum of fifty ducats on condition that he henceforth refrain from begging or otherwise trying to earn money. For he would have to live on this amount, and after he had spent it his existence must also come to an end. I doubt whether even those who do not possess a farthing and are burdened with financial obligations would be willing to free themselves of their debts or even to accept a still greater gift on such a condition. But if the beggar were to refuse such a contract unless immediately paid no less than one hundred ducats and the man pressed by creditors similarly demanded one thousand ducats, we might say that the former is possessed of wealth worth one hundred, and the latter of one thousand ducats, though in common parlance the former owns nothing and the latter less than nothing.”

Table 1: “Military Assets”?

### Fixed Asset Table

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**Table 7.28. Chain-Type Quantity Indexes for Net Stock of Government Fixed Assets**

[Index numbers, 2005=100]

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<td>Government fixed assets ¹</td>
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<td>85.230</td>
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<td>101.913</td>
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<td>Equipment and software</td>
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<td>52.903</td>
<td>49.465</td>
<td>49.145</td>
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<td>44.344</td>
<td>46.440</td>
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<td>92.463</td>
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<td>16</td>
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<td>Military structures ³</td>
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**SOURCE:**

http://www.bea.gov/national/FA2004/TableView.asp?SelectedTable=31&ViewSeries=NO&Java=no&Request3Place=N&3Place=N&FromView=YES&Freq=Year&FirstYear=1997&LastYear=2008&3Place=N&Update=Update&JavaBox=no#Mid

**The Future of Humanity: It’s all in the Discount Rate**

What is the present value of $1,000 of environment damage, incurred 100 years from now?

7. \[ K_t = \frac{E_{t+n}}{(1+r)^n} \]

Using a discount rate of 1.4%:

8. \[ \$249 = \frac{E_{t+n}}{(1+r)^n} = \frac{\$1,000}{(1.014)^{100}} = 4.016 \]

Using a discount rate of 6%:

9. \[ \$3 = \frac{E_{t+n}}{(1+r)^n} = \frac{\$1,000}{(1.06)^{100}} = 339.3 \]
The nature of wealth

Oct 8th 2009
From The Economist print edition

The world confused financial assets with real ones

AT THE heart of the current crisis is a fundamental confusion about the nature of wealth. Think about it from the perspective of a Martian. Were an extraterrestrial to be shown a room full of gold ingots, a stack of twenty-dollar bills or a row of numbers on a computer screen, he might be puzzled as to their function. Our reverence for these objects might seem as bizarre to him as the behaviour of the male bowerbird (which decorates its nest with shiny objects to attract a mate) seems to us.

Wealth consists of the goods and products we wish to consume or of things (factories, machinery, an educated workforce) that give us the ability to produce more such goods and services. Financial assets arise from the desire to postpone consumption so that money can be saved, either for precautionary reasons or to invest so that more goods and services can be consumed in the future.

Looked at in that way, financial assets are not “wealth” but a claim on real wealth. If those claims multiply or rise in price, that does not mean aggregate wealth has increased. If a pizza is cut into eight instead of four slices, there is no more food to eat. If everyone sitting at the table is given shares in the pizza and the share price rises from $1 to $2, the meal will still be no bigger.
**Divergence: Fictitious Capital Unleashed**

“All connection with the actual process of self expansion of capital is thus lost to the last vestige, and the conception of capital as something which expands itself automatically is thereby strengthened. . . . The accumulation of the wealth of this class [the large moneyed capitalists] may proceed in a direction very different from actual accumulation. . . . Moreover, everything appears turned upside down here, since no real prices and their real basis appear in this paper world, but only bullion, metal coin, notes, bills of exchange, securities. Particularly in the centers, in which the whole money business of the country is crowded together, like London, this reversion becomes apparent; the entire process becomes unintelligible.”


**Convergence: Fictitious Capital Tamed**

“In order for the price system to work, financial forces should cause fictitious capitals to move in directions that parallel changes in reproduction values. . . . By losing any relationship to the underlying system of values, strains eventually build up in the sphere of production until a crisis is required to bring the system back into a balance, whereby prices reflect the real cost of production. The fiction of fictitious value cannot be maintained indefinitely. At some unknown time in the future, prices will have to return to a rough conformity with values. . . .”

“The statement that ‘capital produces income’ is true only in the physical sense; it is not true in the value sense. That is to say, capital-value does not produce income-value. On the contrary, income-value produces capital-value. . . . [W]hen capital and income are measured in value, their causal connection is the reverse of that which holds true when they are measured in quantity. The orchard produces the apples; but the value of the apples produces the value of the orchard. . . . We see, then, that present capital-wealth produces future income-services, but future income-value produces present capital-value”.


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<th>PRESENT CAPITAL</th>
<th>FUTURE INCOME</th>
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<td>capital wealth</td>
<td>→ income services</td>
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<tr>
<th>VALUES (FINANCIAL)</th>
<th>capital value</th>
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Table 2
Irving Fisher’s House of Mirrors
Figure 2
General Motors versus Microsoft, 2005

NOTE: The per cent figures indicate, for any given measure, the size of
Microsoft relative to GM.

SOURCE: Compustat through WRDS (series codes: data29 for
employees; data8 for net plant and equipment; data24 for price; data54
for common shares outstanding; data 181 for total liabilities).
Figure 3

The “Quantity” of U.S. Capital

NOTE: The market value of equities and bonds is net of foreign holdings by U.S. residents.

Figure 4

*Figure 4: Tobin’s Q in the United States*

**Ratio of the market value of corporate equities & bonds to the current cost of corporate fixed assets**

NOTE: The market value of equities and bonds is net of foreign holdings by U.S. residents. The 2009 estimate is based on extrapolating the underlying series. The last data point for the market value of corporate equities and bonds is for 2009:Q2. The extrapolation assumes that during 2009:Q3 the market value of equities rose by 20% and that the value of bonds remained unchanged. The last data point for the current cost of corporate fixed assets is for 2008. The extrapolation assumes that over the next nine months (by 2009:Q3) this cost rose by 4.5% – an increase equivalent to the average nine-month growth rate during the previous ten years.

SOURCE: See Figure 3.
* Computed annually by adding to the historical average of the growth rate of current corporate fixed assets 2.5 times the deviation of the annual growth rate from its historical average.

NOTE: Series are smoothed as 10-year moving averages. The last data points are for 2008.

Figure 7
U.S. Capital Accumulation: Fiction vs. Reality

NOTE: The market value of equities and bonds is net of foreign holdings by U.S. residents. Series are shown as 10-year moving averages. The last data points are 2009:Q2 for the market value of corporate equities and bonds, and 2008 for the current cost of corporate fixed assets.

SOURCE: See Figure 4.
10. \( K_t = \frac{E}{r} \)

11. \( P_t = \frac{EPS}{r} \)

**Figure 8**

**S&P 500: Price and Earnings Per Share**

Note: The S&P 500 index splices the following three series: the Cowles/Standard and Poor's Composite (1871-1925); the 90-stock Composite (1926-1957); and the S&P 500 (1957-present). Earnings per share are computed as the ratio of price to price/earnings.

Source: Global Financial Data (series codes: _SPXD for price; SPPECOMW for price/earnings); Standard and Poor's through Global Insight (series codes: JS&PC500 for price; PEC500 for price/earnings).
“Fictitiousness”

“. . . professional investment may be likened to those newspaper competitions in which the competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole; so that each competitor has to pick, not those faces which he himself finds prettiest, but those which he thinks likeliest to catch the fancy of the other competitions, all of whom are looking at the problem from the same point of view. . . . We have reached the third degree where we devote our intelligence to anticipating what average opinion expects the average opinion to be. And there are some, I believe, who practice the fourth, fifth and higher degrees.”

12. \[ K_i = \frac{EE}{r} = \frac{E \times H}{r} \]

13. \[ P_i = \frac{EEPS}{r} = \frac{EPS \times H}{r} \]

Figure 9
S&P 500: Earnings, Earning Estimates and Hype

NOTE: EPS denotes earnings per share. The Hype Index is the ratio between the consensus EPS estimate and the actual EPS.

SOURCE: IBES through WRDS.
**Which Corporation to Buy: Using the Probability of Expected *Earnings***

Civilsoft (more volatile): 50% chance of $50mn and 50% chance of $150mn

14. $100mn = $50mn \times 0.5 + 150mn \times 0.5$

Weaponsoft (less volatile): 100% chance of $100mn

15. $100mn = 100mn \times 1.0$

**Which Corporation to Buy: Using the Probability of Expected *Utility***

**Diminishing Utility Schedule**

<table>
<thead>
<tr>
<th>Marginal Earnings ($mn)</th>
<th>Total Earnings ($mn)</th>
<th>Marginal Utility</th>
<th>Total Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>50</td>
<td>3,000</td>
<td>3,000</td>
</tr>
<tr>
<td>50</td>
<td>100</td>
<td>2,000</td>
<td>5,000</td>
</tr>
<tr>
<td>50</td>
<td>150</td>
<td>1,000</td>
<td>6,000</td>
</tr>
</tbody>
</table>

Civilsoft (more volatile): 50% chance of $50mn and 50% chance of $150mn

16. $4,500 \text{ utils} = \text{utility of} \ 50mn \times 0.5 + \text{utility of} \ 150mn \times 0.5 = 3,000 \text{ utils} \times 0.5 + 6,000 \text{ utils} \times 0.5$

Weaponsoft (less volatile): 100% chance of $100mn

17. $5,000 \text{ utils} = \text{utility of} \ 100mn \times 1.0 = 5,000 \text{ utils} \times 1.0$

**Capitalization Unzipped**

18. $K_i = \frac{EE}{r} = \frac{E \times H}{r_c \times \delta}$

With $r_c$ being the “confident rate of return” and $\delta$ being the “risk coefficient” that inversely expresses the “degree of confidence” capitalists have in their earnings estimates (with $\delta$ rising as confident declines).