

A
Presentation
on
Market
Efficiencies

to

Northfield
Information
Services
Annual
Conference

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The Short-term and Long-term Market Efficiencies

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- Theorem: If players are all rational and for profits, there would be no trade taking place
 - Most investors are reasonably rational. Irrationality as narrowly defined by behavior finance usually is rational in a larger context. Overreaction is a sudden change of risk appetite
 - Most investors trade for profit in the short-term. There is no compelling reason an investor to trade today instead of tomorrow other than risk-returns concerns

- Corollary: for every trade, there is a buyer and a seller. One is smarter than the other
 - The fact trading still takes place means the theorem must be wrong



Alternative explanations

- Why markets exist:
 - There are noise traders and informed traders
 - Buyers and sellers have different investment horizons
 - IBM price goes from \$100 to 80 in a day and to 120 in a year, a short-term sell and long-term buy

- Implications:
 - Both buyer and seller could be right: think twice before you trade
 - It is impossible to perfectly time the market
 - We always leave money on the table

If only I were Newton:

- The long-term return is the integral of the short-term return

$$R(T) = \int_0^T r(t) dt$$

- If one could trade instantaneously without transaction costs, the total return would be astronomical:

$$A(T) = \int_0^T |r(t)| dt$$

- Mathematics ? statistics ? finance

Separation of the long and short terms

- Long-term stock returns are not the integral of short-term returns
 - Stock price is not a differentiable function: missing out a few days could make a big difference
 - Geometric mean and mathematical mean are different: no sufficient statistics to connect the short term and long term
 - Transaction costs weigh in for continuous rebalancing

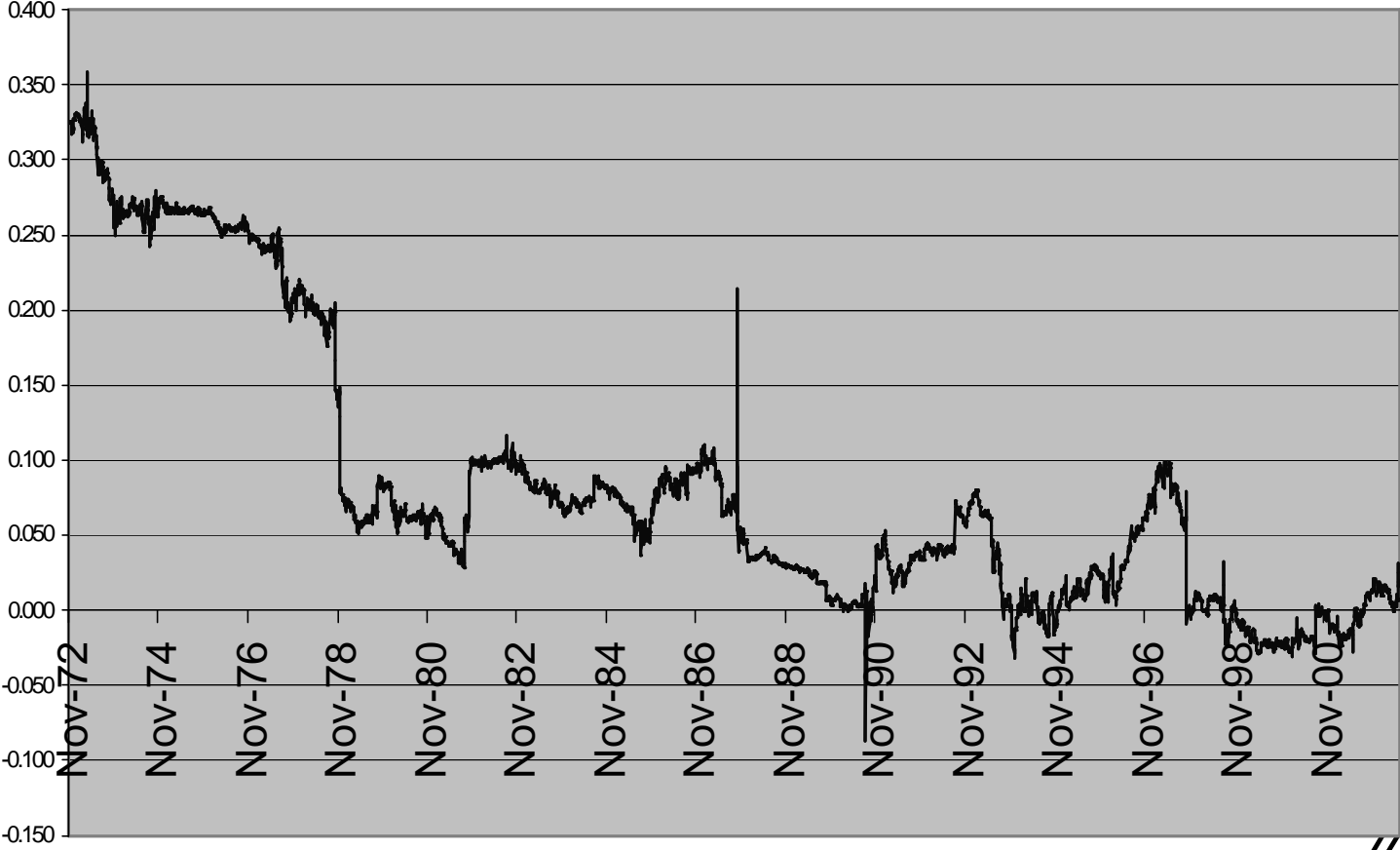
- The drivers of stock market returns are different
 - In the long-term stock market converges to the fair value
 - In the short-term stock market reacts to news and is affected by risk appetites
 - It is difficult to find global maximum/minimum, impossible to perfectly time the market



Short-term Market Return Dynamics

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**Chart 1. Three-year Rolling Window First-order Daily Autocorrelations
S&P 500 Index Returns: 1972-2002**

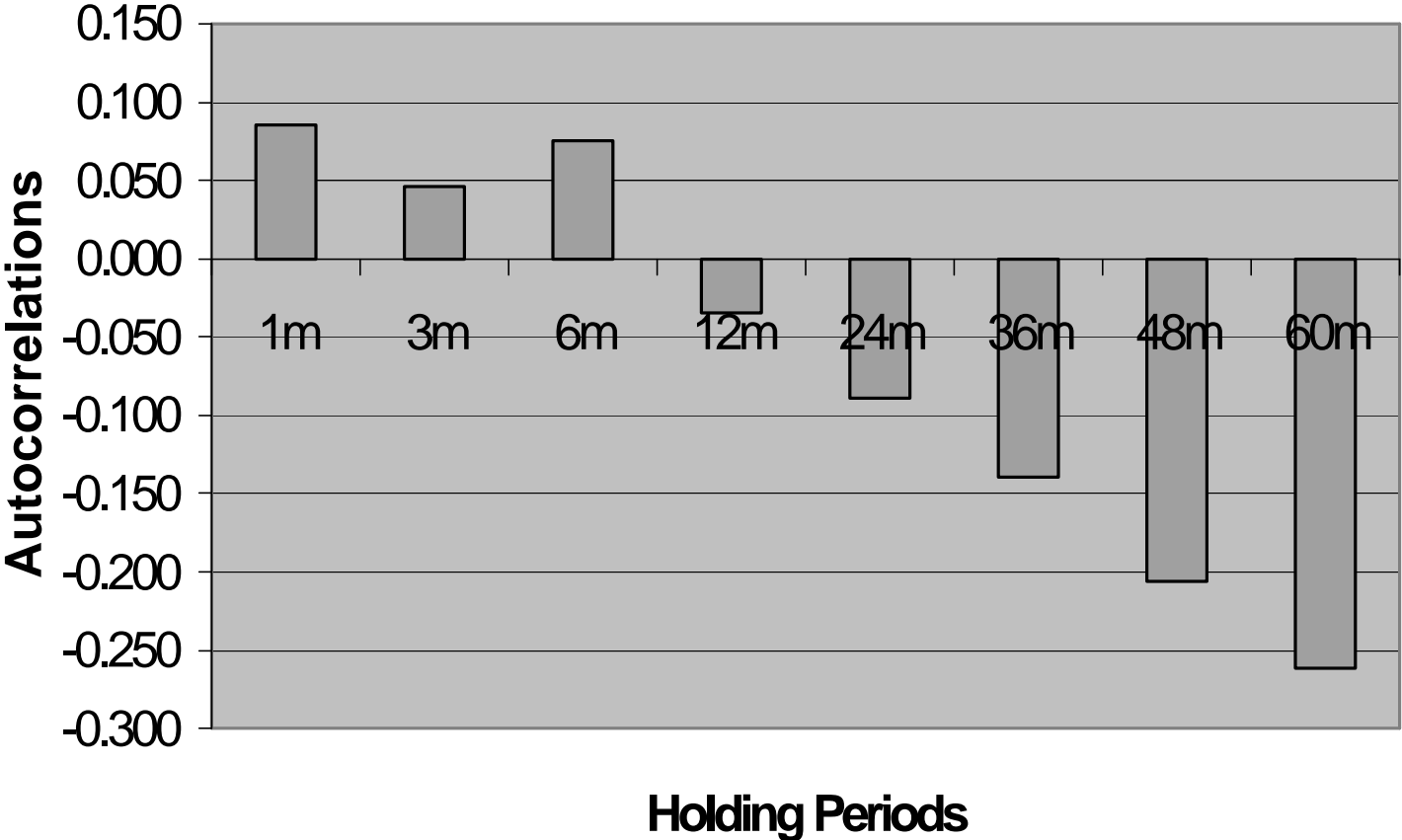


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Long-term Return Dynamics

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**Chart 3. First-order Autocorrelations of MSCI Country Index Returns
18 Developed Market Average: 1969-2001**



Drivers of Market Efficiencies

- Short-term market efficiencies
 - Increasing information flow: financial databases, internet
 - Better trading technology: technology advancement, programming trading
 - More active investment strategies: hedge funds, index arbitrages
 - Same players chasing opportunities worldwide

- Long-term market efficiencies
 - Business cycles and consumption-based capital asset pricing models
 - Behavioral finance and interpretation of information
 - Who are the marginal players?
 - Institution matters: bureaucracy and institutional rigidity



Institutional rigidity and Behavioral Finance

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- How important is asset allocation?
 - Brinson et al (1986 and 1991) original research: 90%
 - Ibbotson and Kaplan (2000), Kritzman and Page (2003): not much

- How do we choose fund managers? Do winners repeat?
 - Goetzmann and Ibbotson (1994), Daniel et al (1997): weak evidence
 - Industry reacts to past performance and often switches styles and managers in the wrong time

- How do managers select stocks?
 - Separation of fundamental and quantitative research
 - No proper investment horizons and single-period optimization
 - Markets aren't good at subtraction and summation



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The Term Structure of Market Correlations

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- The permanent and temporary components of stock returns

$$R_i(t) = \mathbf{m}_i(t) + \mathbf{e}_i(t)$$

$$\mathbf{m}_i(t) = \mathbf{l}_i \mathbf{m}_i(t-1) + \mathbf{d}_i(t)$$

- Stock returns are little or positively autocorrelated in the short term and negatively autocorrelated in the long term
- How about correlations?

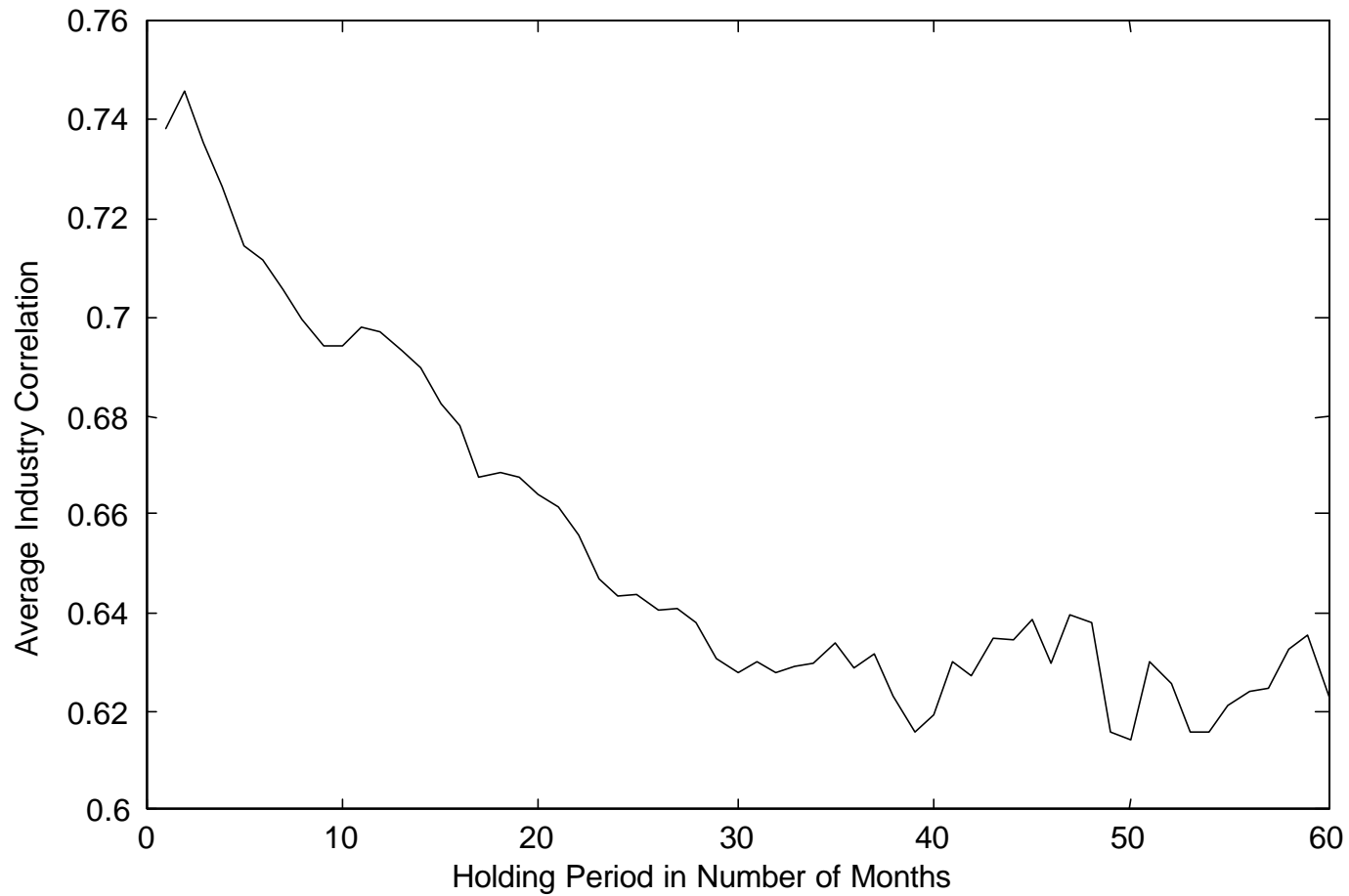


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Term-Structure of Market Correlations

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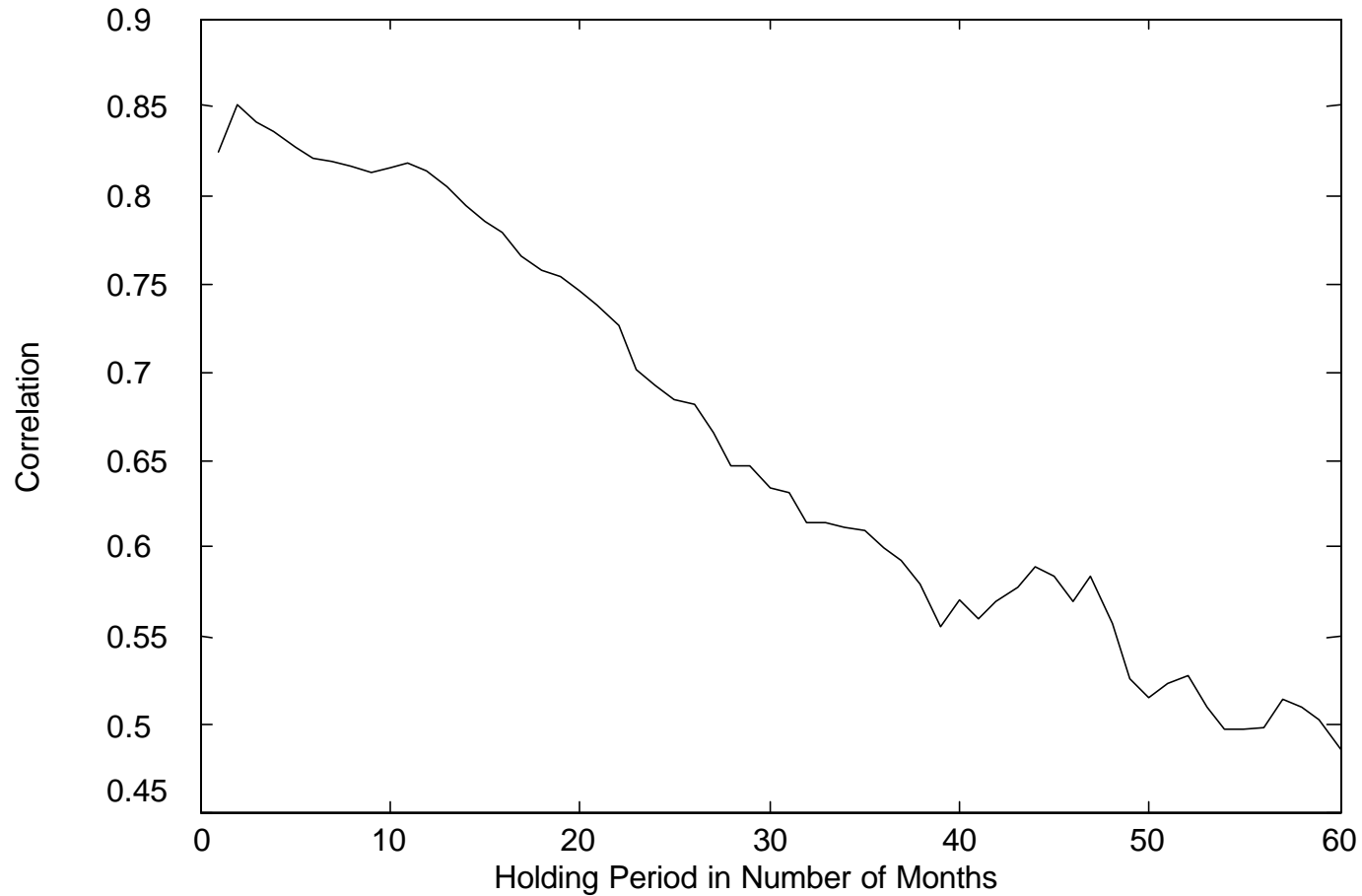
*Chart 4. U.S. 12 Average Industry Portfolio Correlations
July 1926-December 2002*



Term-Structure of Market Correlations

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*Chart 6: Correlation Structure of U.S. Large and Small Cap Portfolios
July 1926-December 2002*



The Long-term and Short-term Correlations

$$\begin{aligned}
 & \text{corr}(R_i(T), R_j(T)) \\
 &= \frac{\sqrt{1-I_i^2} \sqrt{1-I_j^2}}{1-I_i I_j} \frac{T + \frac{I_i}{1-I_i} (T-1-I_i^{T-1}) + \frac{I_j}{1-I_j} (T-1-I_j^{T-1})}{\sqrt{T + \frac{2I_i}{1-I_i} (T-1-I_i^{T-1})} \sqrt{T + \frac{2I_j}{1-I_j} (T-1-I_j^{T-1})}} \text{corr}(R_i(t), R_j(t))
 \end{aligned}$$

The Short-term and Long-term Efficiencies II

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- In the short-term markets worldwide react in a similar fashion
 - Common risk appetites
 - Dominance of noise over information
 - Markets are highly correlated

- In the long-term economic fundamentals emerge and swings in emotion don't matter that much
 - Each industry or market will march to its own drumbeats
 - Markets correlations largely reflect correlated economic fundamentals



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- Investment horizon matters for market efficiencies
- It is important to combine quantitative and fundamental research: different sources of information
- Understand the driving forces of stock returns in countries and industries
- Go beyond the conventional wisdom
 - Look inward for assumptions and methodology
 - Look outward for new ideas and new ways of acquiring information

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