Alcuni problemi matematici che sorgono da osservazioni empiriche sull'asset allocation

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- Il trionfo degli ottimisti
- Mercati efficienti?
- I fatti stilizzati relativi alle serie storiche dei rendimenti
- L’articolo più scaricato dal SSRN nel 2008
- Il rapporto P/E10 di Shiller
- Alcuni problemi matematici?

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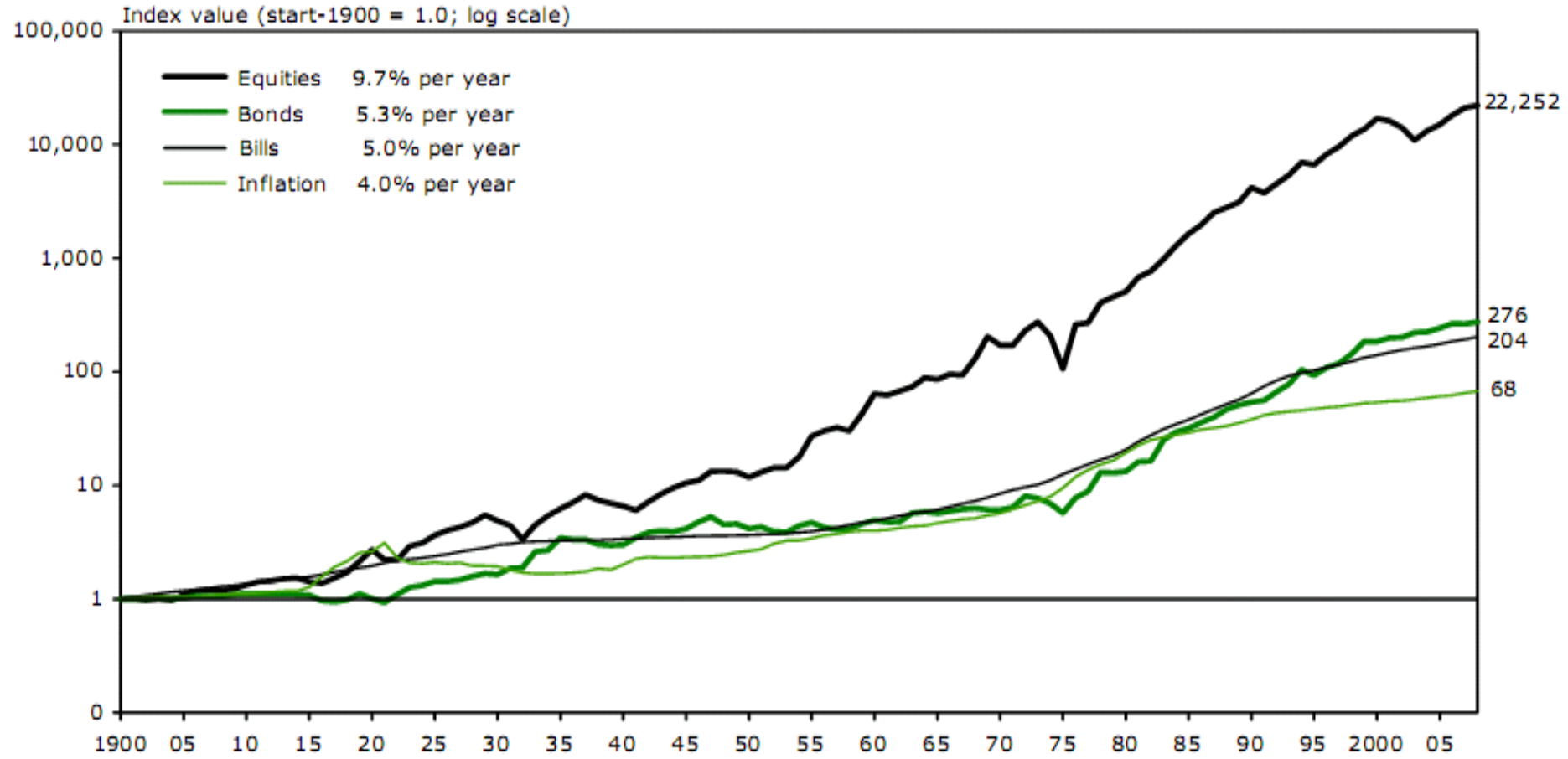
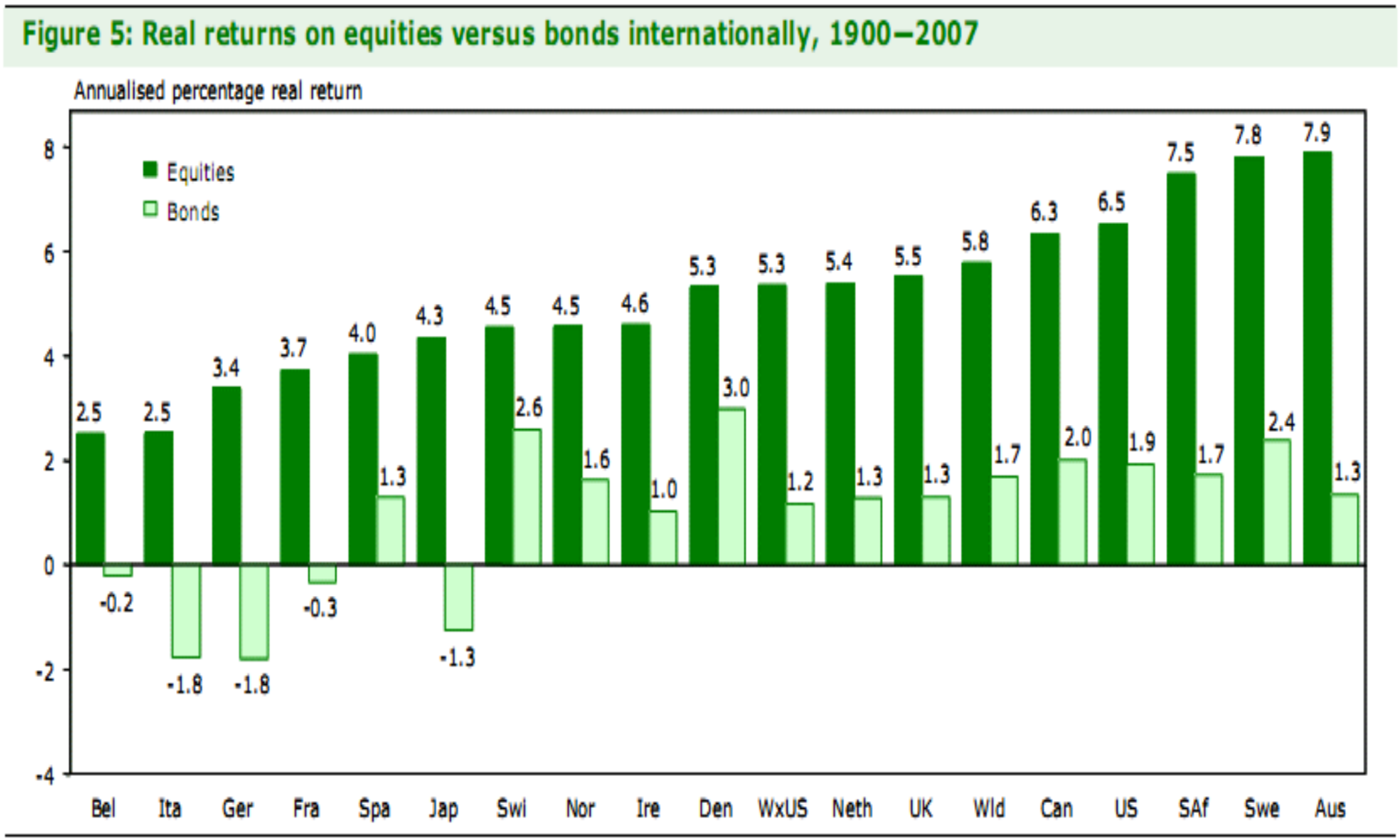
Azioni, obbligazioni e inflazione nel Regno Unito dal 1900 al 2007

Figure 4: Cumulative returns on UK asset classes in nominal terms, 1900–2007



Source: ABN AMRO/LBS Global Investment Returns Yearbook 2008, chart 12

Rendimenti reali (al netto dell'inflazione) annualizzati di obbligazioni e azioni dal 1900 al 2007



Cos'è un mercato efficiente (borsa, sala corse, ecc)?

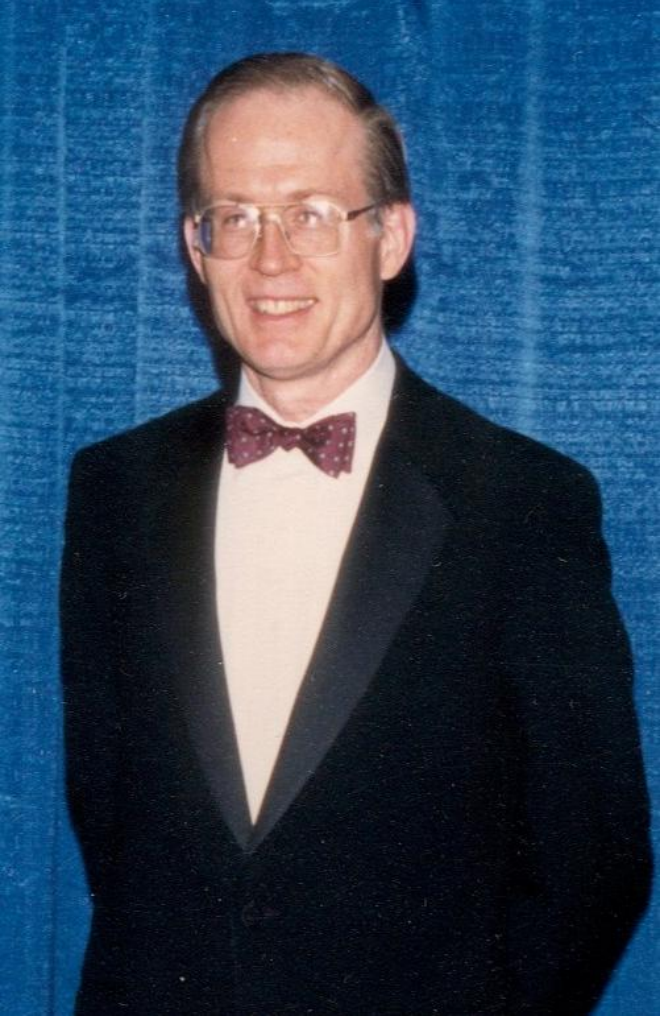
Un mercato è efficiente quando è efficiente nell'elaborazione delle informazioni: i prezzi dei beni (azioni, quote del bookmaker, obbligazioni, materie prime, ecc) osservati in ogni istante di tempo sono il risultato di una valutazione "corretta" di tutta l'informazione disponibile al momento. I prezzi "riflettono pienamente" tutta l'informazione disponibile, sono sempre "fair", cioè buone indicazioni dei valori in gioco.

Bachelier (1900) scrive che "Les influences qui déterminent les mouvements de la Bourse sont innombrables, des événements passés, actuels ou même escomptables, ne présentant souvent aucun rapport apparent avec ses variations, se répercutent sur son cours" …"Si le marché, en effet, ne prévoit pas les mouvements, il les considère comme étant plus ou moins probables, et cette probabilité peut s'évaluer mathématiquement."

Efficienza forte e debole

Un mercato è efficiente rispetto a un "insieme" di informazioni Θ_t se i prezzi non cambierebbero rivelando queste informazioni a tutti gli agenti → non è possibile fare profitti utilizzando Θ_t per il trading

La forma debole dell'ipotesi dei mercati efficienti richiede che i prezzi rispecchino pienamente l'informazione implicita nella successione dei prezzi passati. La forma semi-forte asserisce che i prezzi rispecchiano tutta l'informazione pubblicamente disponibile mentre nella forma forte i prezzi riflettono anche l'informazione non pubblicamente disponibile ma conosciuta da almeno un agente.



Fischer Sheffey Black (January 11, 1938 – August 30, 1995)

"However, we might define an efficient market as one in which price is within a factor of 2 of value, i.e. the price is more than half of value and less than twice value. The factor of 2 is arbitrary, of course. Intuitively, though, it seems reasonable to me, in the light of sources of uncertainty about value and the strength of the forces tending to cause price to return to value. By this definition, I think almost all markets are efficient almost all of the time. 'Almost all' means at least 90% "

F. Black, Noise, Journal of Finance (1986) p. 533.

THE JOURNAL OF FINANCE • VOL. XLI, NO. 3 • JULY 1986

Noise

FISCHER BLACK*

ABSTRACT

The effects of noise on the world, and on our views of the world, are profound. Noise in the sense of a large number of small events is often a causal factor much more powerful than a small number of large events can be. Noise makes trading in financial markets possible, and thus allows us to observe prices for financial assets. Noise causes markets to be somewhat inefficient, but often prevents us from taking advantage of inefficiencies. Noise in the form of uncertainty about future tastes and technology by sector causes business cycles, and makes them highly resistant to improvement through government intervention. Noise in the form of expectations that need not follow rational rules causes inflation to be what it is, at least in the absence of a gold standard or fixed exchange rates. Noise in the form of uncertainty about what relative prices would be with other exchange rates makes us think incorrectly that changes in exchange rates or inflation rates cause changes in trade or investment flows or economic activity. Most generally, noise makes it very difficult to test either practical or academic theories about the way that financial or economic markets work. We are forced to act largely in the dark.

•LE MONDE | 07.01.03 | 12h43

•MIS A JOUR LE 08.01.03 | 13h14

Point de vue

Le mythe funeste des marchés efficients, par Jean-Philippe Bouchaud

Une fois de plus, le repli désordonné des Bourses mondiales et ses conséquences préoccupantes sur l'économie dite *"réelle"* (débâcle financière de géants industriels, baisse auto-entretenue de la confiance, etc.) pose de nombreuses questions sur la nature, le fonctionnement et le rôle, économique et social, des marchés financiers. L'attribution récente – simple coïncidence ou message opportun ? – du prix Nobel d'économie à Daniel Kahnemann et Vernon Smith, deux trouble-fête qui mettent en doute le paradigme dominant, donne une actualité supplémentaire à des questions parfois théoriques, mais qui méritent, me semble-t-il, une plus grande publicité.

L'économie néoclassique présente le marché financier comme un baromètre infaillible de l'activité humaine, dont le rôle cardinal est de donner une valeur précise à tout ce qui peut s'échanger. Le prix de marché est censé représenter la résultante collective des anticipations d'agents parfaitement rationnels. Cette synthèse optimale de l'information, supérieure en qualité à toutes ses parties, permettrait au marché de valoriser correctement et à tout instant un futur économique incertain et de fixer des prix de référence stables qui déterminent nombre de décisions stratégiques. Les prix rationnels devraient, en principe, peu changer au cours du temps, sauf en cas d'information nouvelle dont l'incidence est majeure.

La théorie des marchés *"efficients"*, parfaitement cohérente du point de vue logique, mais –, on s'en doute – fort peu réaliste, est pourtant le socle théorique de l'ultralibéralisme. Elle est aussi l'une des pierres angulaires de la science économique telle qu'elle est enseignée, depuis plusieurs dizaines d'années, à ceux qui ont et auront la charge de gérer, à des degrés divers, l'économie mondiale. Or les idées recues laissent toujours des traces, surtout lorsqu'elles font partie d'un système intellectuellement séduisant. Dans ce cadre, le marché a toujours raison, puisqu'il se place à un méta-niveau, démiurge inaccessible aux individus. Défier le marché est donc au mieux présompteux, au pis suicidaire.

Cette idée est à la fois confortable et dangereuse. Confortable, comme tout instrument de mesure fiable : le prix du marché tout à la fois guide et justifie les décisions économiques et industrielles. Investir dans les pays émergents dans l'économie Internet ? Oui, puisque les marchés, par les valorisations astronomiques des sociétés *dot-com*, nous disent que cette nouvelle économie atteindra des niveaux de rentabilité inédits. Racheter Orange ou d'autres sociétés technologiques à des prix faramineux qui maintenant grèvent de manière inquiétante les comptes de France Télécom ou de Vivendi ? C'est le prix du marché, indiscutable et tyrannique - qui pourrait en effet se prévaloir de façon crédible d'une clairvoyance supérieure à œlle distillée par le consensus collectif ?

Critiche all'ipotesi dei mercati efficienti

Grossman and Stiglitz ("On the Impossibility of Informationally Efficient Markets, American Economic Review, 70, 393-408, 1980) argue that perfectly informationally efficient markets are an impossibility. Roughly speaking the idea is more or less that if markets were perfectly efficient, there would be no profit to gathering information, in which case (in an equilibrium world) there would be little reason to trade and markets would eventually collapse.

Alternatively, the degree of market inefficiency determines the effort investors are willing to expend to gather and trade on information, hence a non-degenerate market equilibrium will arise only when there are sufficient profit opportunities, i.e., inefficiencies, to compensate investors for the costs of trading and information-gathering. The profits earned by these attentive investors may be viewed as "economic rents" that accrue to those willing to engage in such activities. Who are the providers of these rents? Black (1986) gave us a provocative answer: "noise traders", individuals who trade on what they consider to be information but which is, in fact, merely noise.

(From A. Lo, The Adaptive Market Hypothesis, Journal of Portfolio Management 2004)

La difesa:

Can Predicable Patterns in Market Returns be Exploited Using Real Money?
Not likely.

On the occasion of the 30th anniversary of this Journal, which has done so much to enhance the professionalism and the intellectual content of portfolio management, it seems appropriate to examine the shift of belief in the academy as to the efficiency of financial markets and the degree to which stock prices are predictable. In this article, I review some important academic contributions of the past three decades, and present some new empirical evidence concerning stock market predictability.

I argue that it is not realistically possible to earn the excess returns that the academic findings about predictability would seem to suggest. I conclude that considerable skepticism is warranted with respect to active portfolio management strategies as well as strategies designed to alter asset allocations over time on the basis of relative valuations.

FROM EFFICIENT MARKETS TO STOCK MARKET PREDICTABILITY

In 1970, when Eugene Fama published his survey, "Efficient Capital Markets: A Review of Theory and Empirical Work," there was broad consensus in the academy that our security markets were extremely efficient. Stock prices were assumed to reflect information without delay. If prices accurately represent the future prospects of each firm, then one stock would be just as attractive as another, and an investor who tries to switch from security to security in an attempt to gain excess returns would be unsuccessful.

The notion of efficiency was associated with the view that stock prices would move unpredictably. If prices change only with the receipt of new information, and since true

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Analisi tecnica e analisi fondamentale

Secondo l' analisi fondamentale i mercati possono talvolta attribuire un prezzo "errato" a un titolo. In una scala di tempo medio-lunga tuttavia (qualche mese o qualche anno) il mercato attribuirà un prezzo "corretto" al titolo. Analizzando i dati di bilancio, i vantaggi competitivi e la qualità del management si può valutare correttamente un titolo attribuinedo un "fair value" a ogni azione. È allora possibile ottenere dei profitti (superiori alle medie di mercato) mediante l'acquisto dei titoli "sottovalutati" , aspettando che il mercato si accorga dell'errore di valutazione commesso e vendendo il titolo quando viene raggiunto o superato il "fair value".
Secondo l'analisi tecnica tutta l'informazione diponibile è già rispecchiata nel prezzo di un'azione e l'analisi fondamentale è inutile. I *trend* esistono e i cambiamenti nel *sentiment* degli investitori permettono di prevedere e di sfruttare i *trend*. Le risposte emotive degli investitori alle variazioni dei prezzi sono responsabili di *pattern* che possono esere studiati e riconosciuti. L'analisi tecnica non si preoccupa di quale sia il valore di un'azione e le previsioni dei prezzi futuri si basano esclusivamente sulla serie temporale dei prezzi passati.

Formulazione debole dell'IME

Nella sua forma debole l'ipotesi dei mercati efficienti (IME) sostiene l'impossibilità di ottenere rendimenti superiori a quelli del mercato (tenendo conto del rischio) utilizzando le serie storiche dei rendimenti dei titoli azionari: ad esempio non è possibile "battere il mercato" usando l'analisi tecnica. Una strategia di *trading* costruita utilizzando solo dati storici, come i prezzi e i volumi, non produrrà rendimenti sistematicamente superiori a una semplice strategia da "cassettista" (*buy-and-hold*). I prezzi incorporano in modo accurato tutta l'informazione storica e i prezzi attuali sono la stima migliore del valore futuro dell'investimento. I prezzi reagiranno alle notizie ma se le notizie sono distribuite casualmente anche i prezzi cambieranno in modo *random.* L'analisi tecnica non darà profitti (superiori a quelli di mercato).

Le idee alla base dell'analisi tecnica

- I prezzi sono unicamente determinati dalla domanda e dall'offerta
- La domanda e l'offerta sono governate da fattori razionali e irrazionali. Il mercato valuta tutti questi fattori continuamente.
- I prezzi delle azioni e degli asset tendono a seguire dei trend che hanno una durata apprezzabile nel tempo
- I cambiamenti dei trend sono dovuti a spostamenti della domanda e dell'offerta, così come a cambiamenti del quadro macroeconomico. I cambiamenti possono essere rilevati dalla dinamica dei prezzi di mercato

A Quantitative Approach to Tactical Asset Allocation

MEBANE T. FABER

Journal of Wealth Management (2007) and 2009 update available at the SSRN preprint database, id1347034

This article examines a very simple quantitative market-timing model. This trend following model is examined in-sample on the U.S. stock market since 1900 before out-of-sample testing across more than twenty other markets. The attempt is not to build an optimization model (indeed, the chosen model is decidedly sub-optimal, as evidenced later in the article), but to build a simple trading model that works in the vast majority of markets. The results suggest that a market timing solution is a risk-reduction technique rather than a return-enhancing one. The approach is then examined in an allocation framework since 1972, including such diverse asset classes as the Standard and Poor's 500 Index (S&P 500), Morgan Stanley Capital International Developed Markets Index (MSCI EAFE), Goldman Sachs Commodity Index (GSCI), National Association of Real Estate Investment Trusts Index (NAREIT), and United States Government 10-Year Treasury Bonds. The empirical results are equity-like returns with bond-like volatility and drawdown, and over thirty consecutive years of positive returns.

BUY RULE

Buy when monthly price > 10-month SMA.

SELL RULE

Sell and move to cash when monthly price < 10-month SMA.

1. All entry and exit prices are on the day of the signal at the close.
2. All data series are total return series including dividends, updated monthly.
3. Cash returns are estimated with 90-day commercial paper.
4. Taxes, commissions, and slippage are excluded .

Exhibit 6: S&P 500 Total Returns vs. Timing Total Returns (1900-2008)

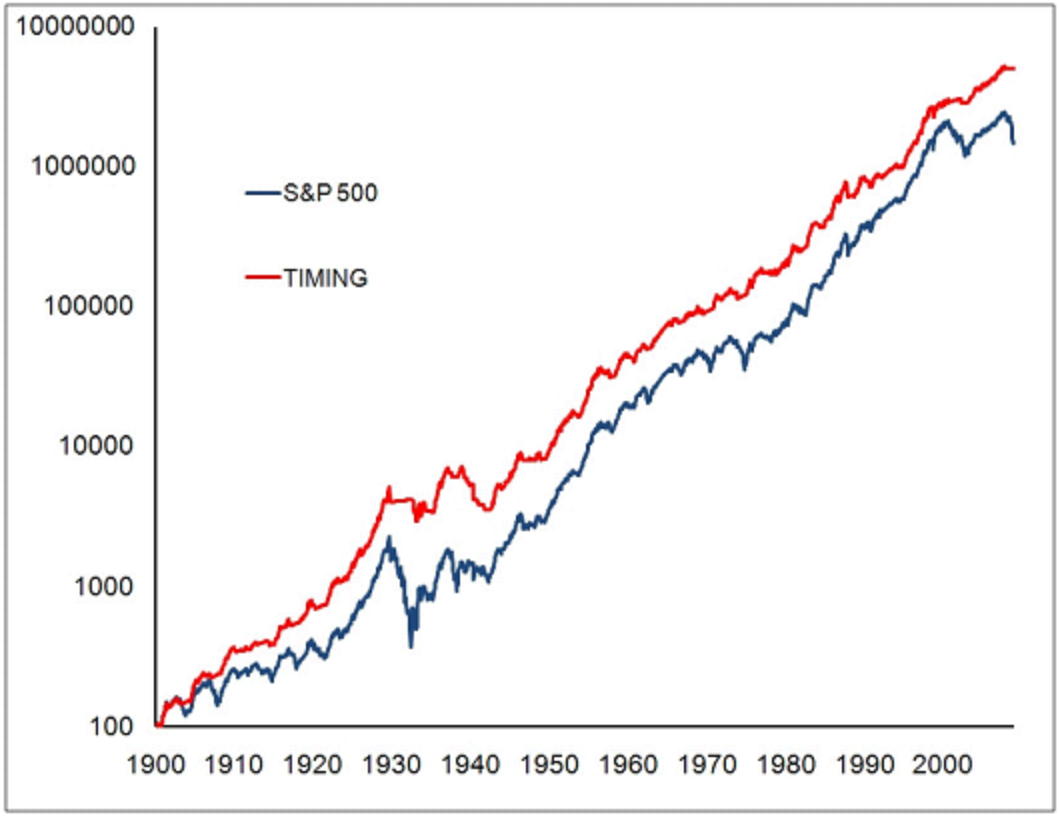


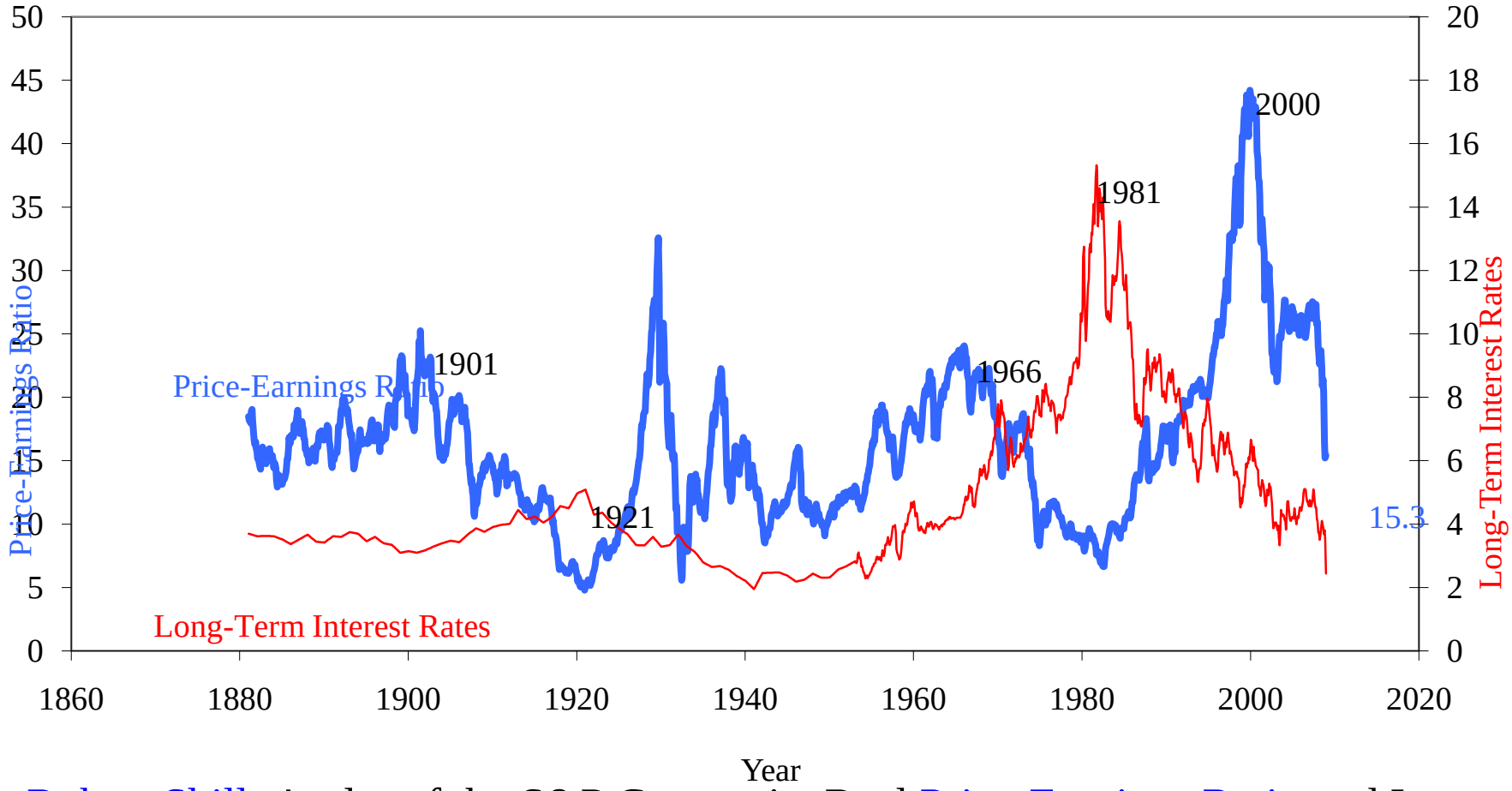
Exhibit 5: S&P 500 Total Returns vs. Timing Total Returns (1900-2008)

	S&P 500	Timing
Annualized Return	9.21%	10.45%
Volatility	17.87%	12.01%
Sharpe (4%)	0.29	0.54
Maximum drawdown	(83.66%)	(50.31%)
Best Year	52.88%	52.40%
Worst Year	(43.86%)	(26.87%)

Efficienza forte e semi-forte

Nella formulazione semi-forte dell'IME si afferma che strategie di *trading* che utilizzino informazioni correntemente pubblicamente disponibili (come i *financial statements*) e le serie storiche dei prezzi non potranno battere sistematicamente una strategia *buy-and-hold*. I prezzi dei titoli si adeguano istantaneamente al flusso di informazione pubblicamente disponibile. L'analisi fondamentale non produrrà profitti (superiori al mercato).

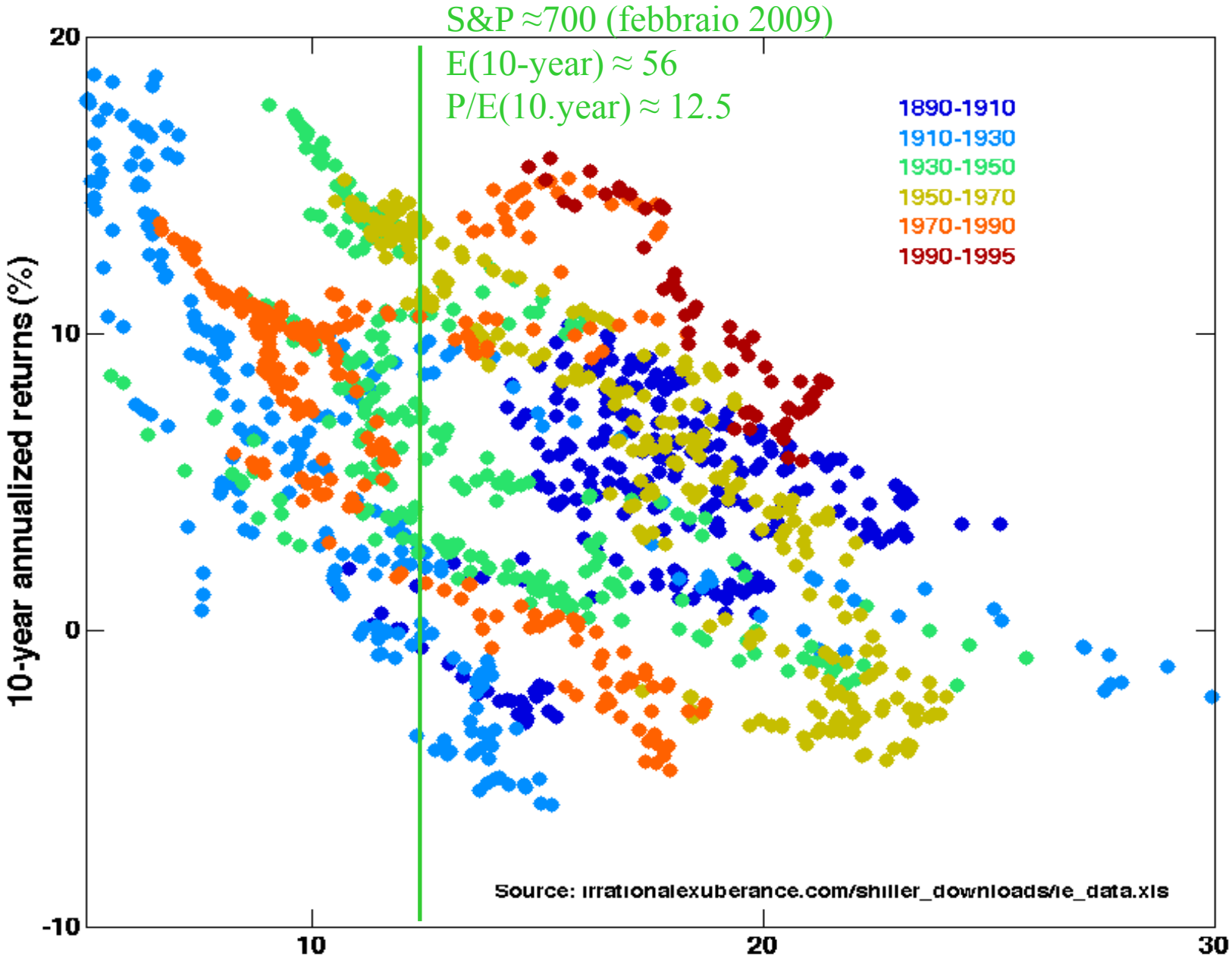
Nella formulazione forte i prezzi riflettono *tutta* l'informazione disponibile, sia pubblicamente sia privatamente. *Nessuno* può in modo consistente ottenere rendimenti superiori al mercato. Anche l'informazione disponibile agli *insiders* non produrrà profitti (superiori al mercato).

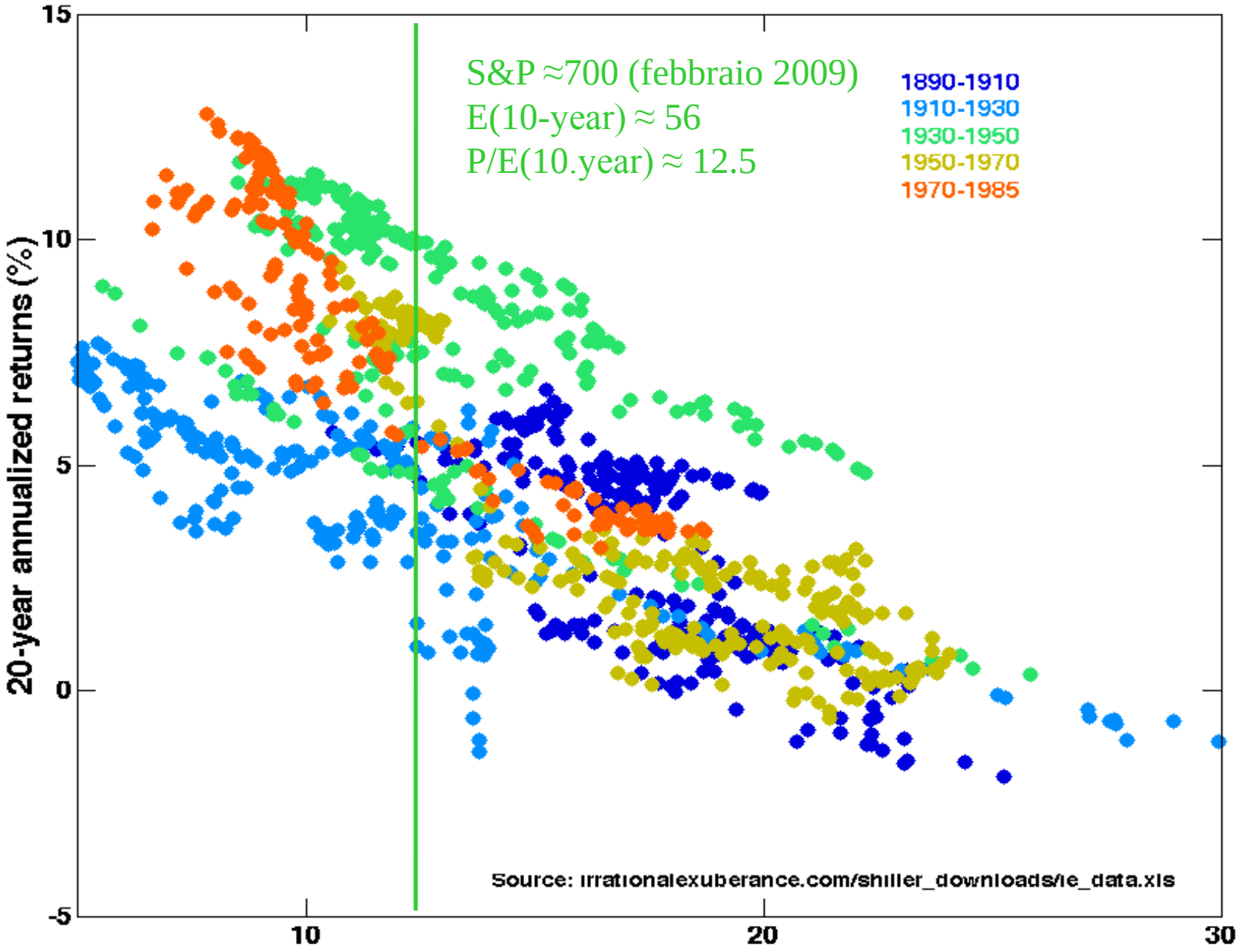


[Robert Shiller]'s plot of the S&P Composite Real [Price-Earnings Ratio] and Interest Rates (1871–december 2008), from *[Irrational Exuberance]*, 2d ed.[1] In the preface to this edition, Shiller warns that "[t]he stock market has not come down to historical levels: the price-earnings ratio as I define it in this book is still, at this writing [2005], in the mid-20s, far higher than the historical average. … People still place too much confidence in the markets and have too strong a belief that paying attention to the gyrations in their investments will someday make them rich, and so they do not make conservative preparations for possible bad outcomes."

P/E ratios as a predictor of long term U.S. stocks returns

Price-Earnings ratios as a predictor of twenty-year returns based upon the plot by Robert Shiller (Figure 10.1 Irrational Exuberance, Princeton University Press.). The horizontal axis shows the real price/earnings ratio of the S&P500 index (inflation adjusted price divided by the prior ten-year mean of inflation-adjusted earnings). The vertical axis shows the geometric average real annual return on investing in the S&P500 index, reinvesting dividends, and selling ten or twenty years later. Data from different ten/twenty year periods is color-coded as shown in the key. According to Shiller these plots "confirms that long-term investors—investors who commit their money to an investment for ten full years—did do well when prices were low relative to earnings at the beginning of the ten years. Long-term investors would be well advised, individually, to lower their exposure to the stock market when it is high, as it has been recently, and get into the market when it is low."


S&P ≈700 (febbraio 2009)
E(10-year) ≈ 56
P/E(10.year) ≈ 12.5
1890-1910
1910-1930
1930-1950
1950-1970
1970-1990
1990-1995
10-year annualized returns (%)
P/E(10-year) ratio
20
10
0
-10
10
20
30
Source: irrationalexuberance.com/shiller_downloads/ie_data.xls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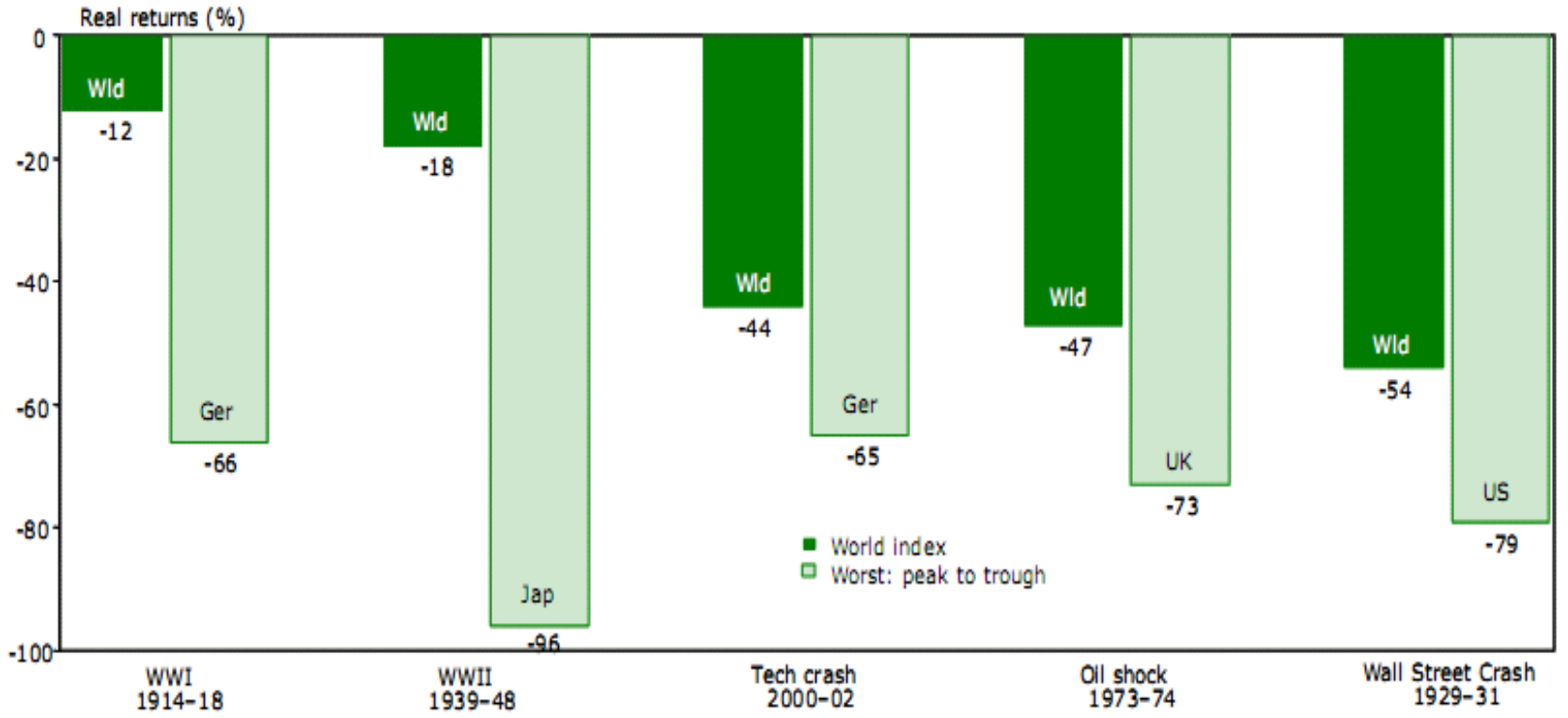
P/E(10.year) ≈ 12.5
1890-1910
1910-1930
1930-1950
1950-1970
1970-1985
20-year annualized returns (%)
P/E(10-year) ratio
15
10
5
0
-5
10
20
30
Source: irrationalexuberance.com/shiller_downloads/ie_data.xls

Alcune analisi statistiche tuttavia indicano come, almeno in certi periodi, le variazioni di prezzo settimanali e mensili non siano completamente indipendenti dal passato e alcuni semplici indicatori fondamentali o tecnici (i multipli e il momento, tanto per citarne due dei più importanti) possano avere una qualche capacità di predire l'andamento futuro dei prezzi. Così, da almeno venti anni, la letteratura accademica si interroga sulla significatività (statistica ed economica) delle numerose *anomalie* riscontrate nelle serie storiche dei rendimenti azionari..È oggetto di controversia il fatto che gli investitori possano farne uso per ottenere dei rendimenti superiori ai benchmark. Gli investitori interessati a strategie di investimento che cerchino di utilizzare queste anomalie devono ricordare che nulla ci assicura che continueranno a prodursi in futuro: come sempre, come ben sappiamo, "i rendimenti passati *non sono garanzia* di rendimenti futuri" … Le anomalie possono scomparire perché, prive di una base economico-finanziaria, sono semplicemente frutto del *data mining*, oppure essere cancellate dall'arbitraggio compiuto da investitori (hedge funds, ad esempio) che prendono ad utilizzarle come strategie d'investimento.

Stock market crashes (before 2008)

GLOBAL INVESTMENT RETURNS BOOK 2008

Figure 6: Extremes of equity market history, 1900-2007



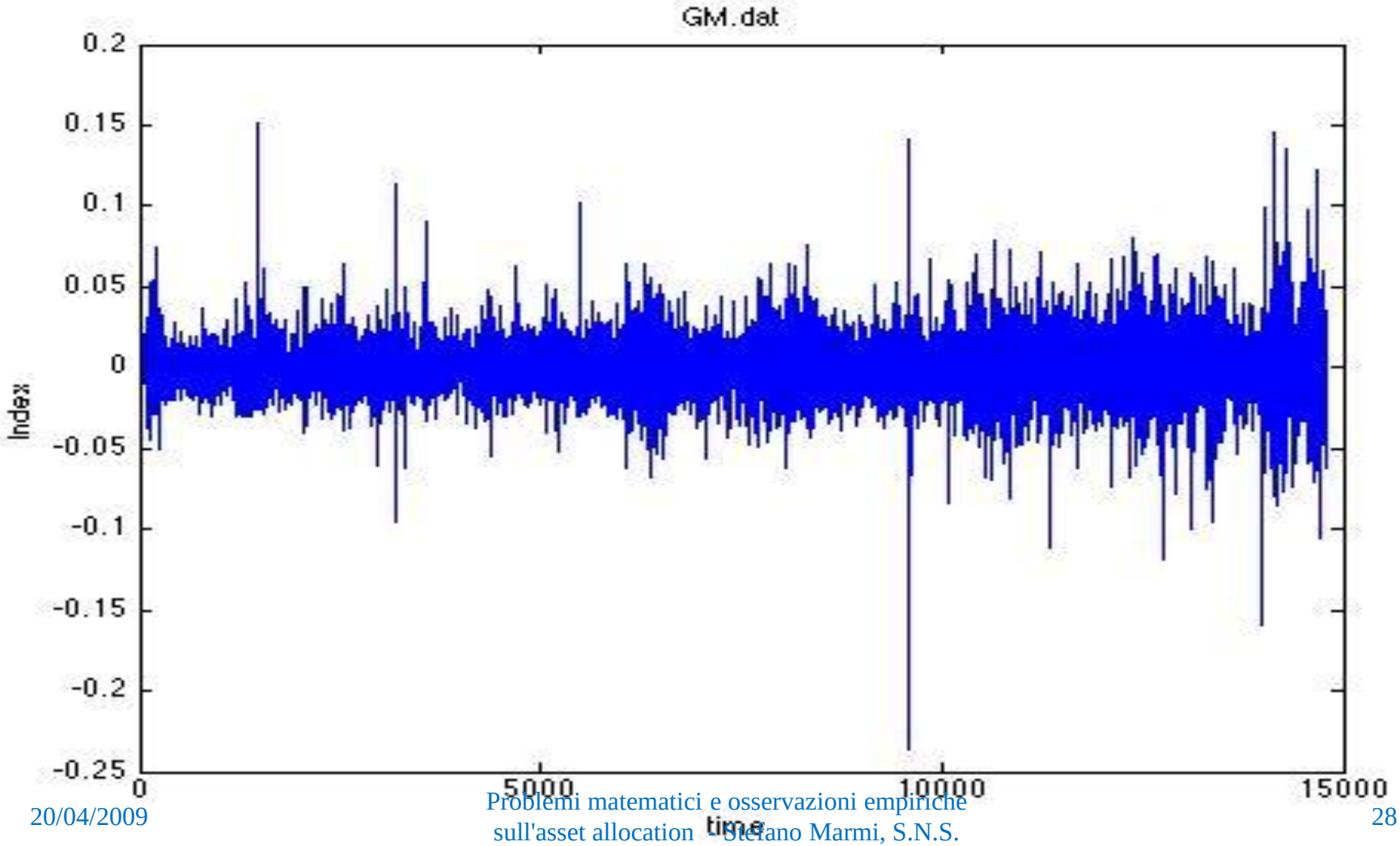
Source: ABN AMRO/LBS Global Investment Returns Yearbook 2008, Table 6

Volatilità delle azioni

Nel periodo 1900-2007, la deviazione standard dei rendimenti annuali delle azioni inglesi è il 19.8%, confrontabile a quella delle azioni USA (20.0%) e tra i valori più bassi di quelli dei mercati sviluppati. I mercati con la volatilità più alta tra quelli ininterrottamente attivi nel ventesimo secolo furono il mercato tedesco (32.3%), giapponese (29.8%), e italiano (28.9%), un risultato che certamente riflette l'impatto delle guerre e dell'inflazione.

Chicago Board Options Exchange Volatility Index, a popular measure of the implied volatility of S&P500 index options. A high value corresponds to a more volatile market and therefore more costly options, which can be used to defray risk from volatility. If investors see high risks of a change in prices, they require a greater premium to insure against such a change by selling options. Often referred to as the *fear index*, it represents one measure of the market's expectation of volatility over the next 30 day period.

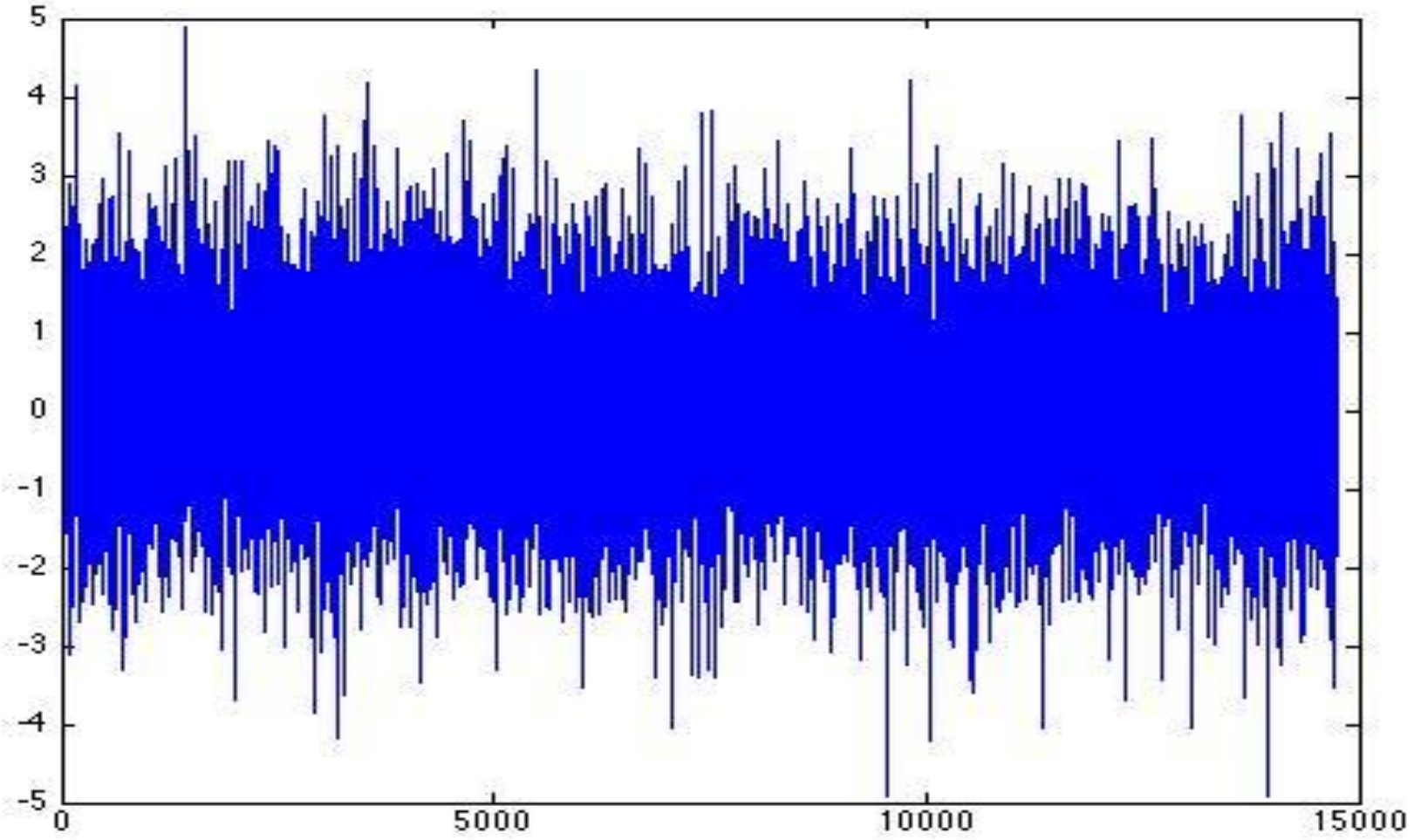
Daily returns of General Motors (1950-2008)



Volatility clustering

Time series plots of returns display an important feature that is usually called **volatility clustering**. This empirical phenomenon was first observed by Mandelbrot (1963), who said of prices that "large changes tend to be followed by large changes—of either sign—and small changes tend to be followed by small changes." Volatility clustering describes the general tendency for markets to have some periods of high volatility and other periods of low volatility. High volatility produces more dispersion in returns than low volatility, so that returns are more spread out when volatility is higher. A high volatility cluster will contain several large positive returns and several large negative returns, but there will be few, if any, large returns in a low volatility cluster.

Daily returns of GM after normalization by short-term (25 days) volatility



Stylized facts (R. Cont, Quantitative Finance (2001))

1. Absence of autocorrelations: (linear) autocorrelations of asset returns are often insignificant, except for very small intraday time scales (≈ 20 minutes) for which microstructure effects come into play.
2. Heavy tails: the (unconditional) distribution of returns seems to display a power-law or Pareto-like tail, with a tail index which is finite, higher than two and less than five for most data sets studied. In particular this excludes stable laws with infinite variance and the normal distribution. However the precise form of the tails is difficult to determine.
3. Gain/loss asymmetry: one observes large drawdowns in stock prices and stock index values but not equally large upward movements

Distribution of returns of DJIA stocks: from "Foundations of Finance", Fama (1976)

TABLE 1.2

Frequency Distributions for Daily Returns on Dow-Jones Industrials

		INTERVALS															
		$\bar{R} - .5s(R) \leq R < \bar{R} + .5s(R)$		$\bar{R} - 1.0s(R) \leq R < \bar{R} - .5s(R)$ and $\bar{R} + .5s(R) < R \leq \bar{R} + 1.0s(R)$		$\bar{R} - 1.5s(R) \leq R < \bar{R} - 1.0s(R)$ and $\bar{R} + 1.0s(R) < R \leq \bar{R} + 1.5s(R)$		$\bar{R} - 2.0s(R) \leq R < \bar{R} - 1.5s(R)$ and $\bar{R} + 1.5s(R) < R \leq \bar{R} + 2.0s(R)$		$R < \bar{R} - 2s(R)$ and $R > \bar{R} + 2s(R)$		$R < \bar{R} - 3s(R)$ and $R > \bar{R} + 3s(R)$		$R < \bar{R} - 4s(R)$ and $R > \bar{R} + 4s(R)$		$R < \bar{R} - 5s(R)$ and $R > \bar{R} + 5s(R)$	
	T	Expected no.	Actual no.	Expected no.	Actual no.	Expected no.	Actual no.	Expected no.	Actual no.	Expected no.	Actual no.	Expected no.	Actual no.	Expected no.	Actual no.	Expected no.	Actual no.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Allied Chemical	1,223	468.5	562	366.5	349	224.8	163	107.7	94	55.5	55	3.3	16	.08	4	.0007	2
Alcoa	1,190	455.8	521	356.6	343	218.7	172	104.8	85	54.1	69	3.2	7	.07	0	.0007	0
American Can	1,219	466.9	602	365.1	336	224.1	157	107.4	62	55.5	62	3.3	19	.08	6	.0007	3
AT & T	1,219	466.9	710	365.1	285	224.1	131	107.4	42	55.5	51	3.3	17	.08	9	.0007	6
American Tobacco	1,283	491.4	692	384.4	311	235.8	138	113.0	73	58.4	69	3.5	20	.08	7	.0008	4
Anaconda	1,193	456.9	513	357.4	331	219.3	204	105.1	88	54.3	57	3.2	8	.08	1	.0007	0
Bethlehem Steel	1,200	459.6	575	359.5	307	220.6	180	105.7	76	54.6	62	3.2	15	.08	4	.0007	1
Chrysler	1,692	648.0	736	506.9	493	311.0	259	149.1	117	77.0	87	4.6	16	.11	4	.0010	1
Du Pont	1,243	476.1	539	372.4	363	228.5	195	109.5	80	56.5	66	3.4	8	.08	3	.0007	1
Eastman Kodak	1,238	474.2	546	370.9	379	227.5	162	109.1	85	56.3	66	3.3	13	.08	2	.0007	2
General Electric	1,693	648.4	784	507.2	479	311.2	222	149.2	111	77.0	97	4.6	22	.11	5	.0010	1
General Foods	1,408	539.3	632	421.8	423	258.8	194	124.0	84	64.1	75	3.8	22	.09	3	.0008	1
General Motors	1,446	553.8	682	433.2	396	265.8	203	127.4	103	65.8	62	3.9	13	.09	6	.0009	3
Goodyear	1,162	445.0	539	348.1	331	213.6	164	102.4	71	52.9	57	3.1	10	.07	4	.0007	2
International Harvester	1,200	459.6	529	359.5	365	220.6	182	105.7	61	54.6	63	3.2	15	.08	4	.0007	1
International Nickel	1,243	476.1	587	372.4	362	228.5	149	109.5	72	56.5	73	3.4	16	.08	6	.0007	0
International Paper	1,447	554.2	643	433.5	442	266.0	180	127.5	100	65.8	82	3.9	19	.09	5	.0009	0
Johns Manville	1,205	461.5	526	361.0	363	221.5	163	106.2	91	54.8	62	3.2	11	.08	3	.0007	1
Owens Illinois	1,237	473.7	591	370.6	323	227.4	188	109.0	69	56.3	66	3.3	20	.08	3	.0007	1
Procter & Gamble	1,447	554.2	726	433.5	389	266.0	171	127.5	71	65.8	90	3.9	20	.09	6	.0009	2
Sears	1,236	473.4	666	370.3	305	227.2	144	108.9	58	56.2	63	3.3	21	.08	8	.0007	5
Standard Oil (California)	1,693	648.4	776	507.2	468	311.2	233	149.2	121	77.0	95	4.6	14	.11	5	.0010	1
Standard Oil (New Jersey)	1,156	442.8	582	346.3	314	212.6	139	101.8	70	52.5	51	3.1	12	.07	3	.0007	2
Swift & Co.	1,446	553.8	672	433.2	409	265.8	194	127.4	85	65.8	86	3.9	18	.09	4	.0009	0
Texaco	1,159	443.9	533	347.3	311	213.0	164	102.1	95	52.7	56	3.1	14	.07	2	.0007	0
Union Carbide	1,118	428.1	466	335.0	338	205.5	178	98.5	69	50.9	67	3.0	6	.07	1	.0007	0
United Aircraft	1,200	459.6	550	359.5	348	220.6	165	105.7	77	54.6	60	3.2	11	.08	3	.0007	1
U.S. Steel	1,200	459.6	495	359.5	337	220.6	219	105.7	90	54.6	59	3.2	8	.08	1	.0007	0
Westinghouse	1,448	554.6	636	433.8	424	266.1	221	127.6	95	65.9	72	3.9	14	.09	3	.0009	2
Woolworth	1,445	553.5	718	432.9	390	265.6	170	127.3	91	65.7	76	3.9	23	.09	5	.0009	2

Source: Adapted from Eugene F. Fama, "The Behavior of Stock Market Prices," *Journal of Business* 38 (January 1965): 47-48.

Table 1.2, constructed from Tables 1 and 3 of Fama (1965), shows frequency distributions for continuously compounded daily returns for each of the 30 stocks of the Dow-Jones Industrial Average, for time periods that vary slightly from stock to stock but which usually run from about the end of 1957 to September 26, 1962. Column (1) of the table shows the number

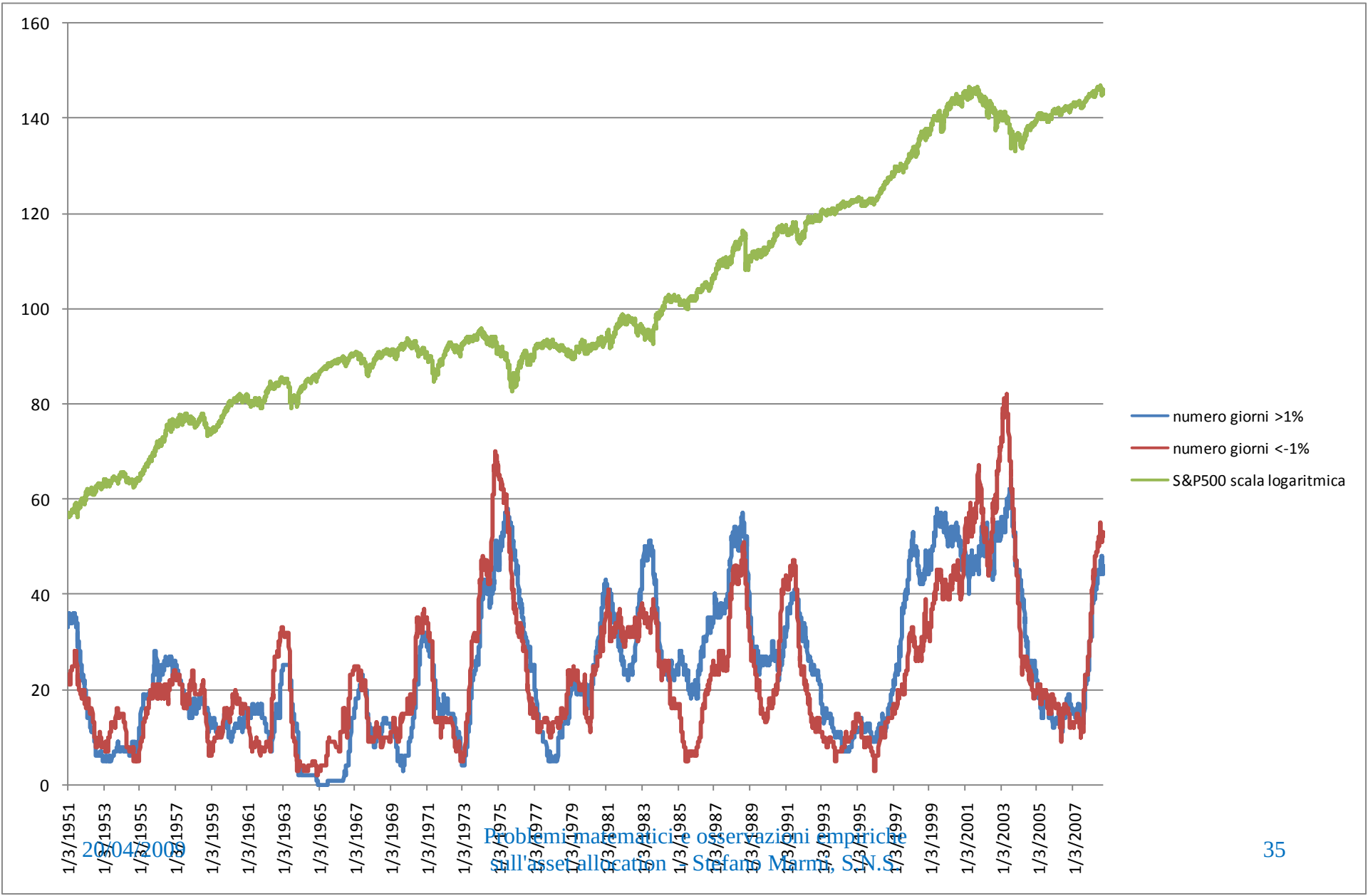
The obvious finding in Table 1.2 is that the frequency distributions of the daily returns have more observations both in their central portions and in their extreme tails than are expected from normal distributions. For every stock the actual number of daily returns within .5 sample standard deviations from the sample mean return is greater than the expected number. Every stock also has more observations beyond three standard deviations from its mean return than would be expected with normal distributions; all but one have more beyond four standard deviations; and all but three have more beyond two standard deviations.

In more vivid terms, if daily returns are drawn from normal distributions, for any stock a daily return greater than four standard deviations from the mean is expected about once every 50 years. Daily returns this extreme are observed about four times every five years. Similarly, under the hypothesis of normality, for any given stock a daily return more than five standard deviations from the mean daily return should be observed about once every 7,000 years. Such observations seem to occur about every three to four years.

Stylized facts (R. Cont, Quantitative Finance (2001))

4. Aggregational Gaussianity: as one increases the time scale Δt over which returns are calculated, their distribution looks more and more like a normal distribution. In particular, the shape of the distribution is not the same at different time scales.
5. Intermittency: returns display, at any time scale, a high degree of variability. This is quantified by the presence of irregular bursts in time series of awide variety of volatility estimators.
6. Volatility clustering: different measures of volatility display a positive autocorrelation over several days, which quantifies the fact that high-volatility events tend to cluster in time.
7. Conditional heavy tails: even after correcting returns for volatility clustering (e.g. via GARCH-type models), the residual time series still exhibit heavy tails. However, the tails are less heavy than in the unconditional distribution of returns.

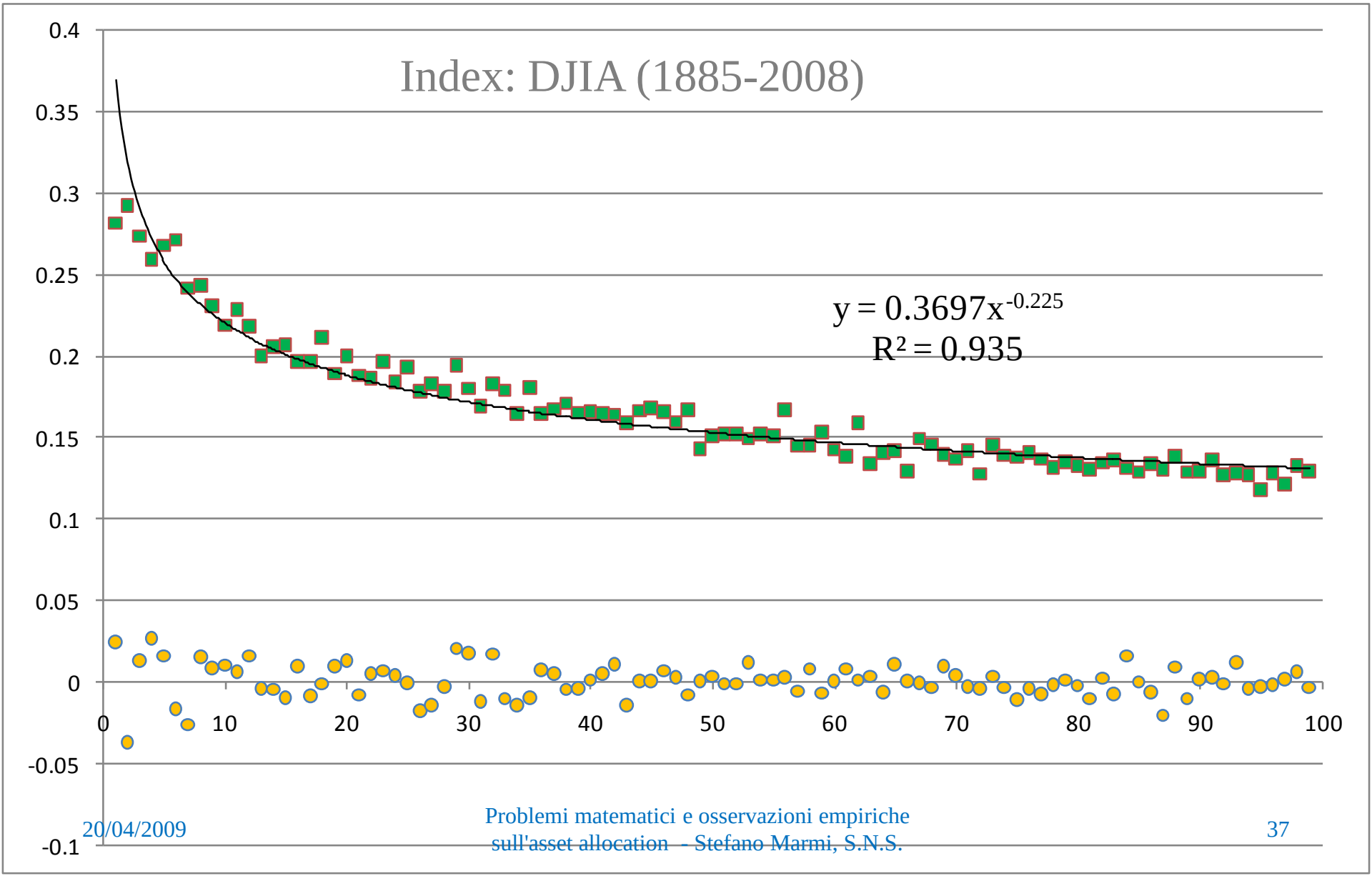
Volatility clustering and leverage effect



Stylized facts (R. Cont, Quantitative Finance (2001))

8. Slow decay of autocorrelation in absolute returns: the autocorrelation function of absolute returns decays slowly as a function of the time lag, roughly as a power law with an exponent $\beta \in [0.2, 0.4]$. This is sometimes interpreted as a sign of long-range dependence.
9. Leverage effect: most measures of volatility of an asset are negatively correlated with the returns of that asset.
10. Volume/volatility correlation: trading volume is correlated with all measures of volatility.
11. Asymmetry in time scales: coarse-grained measures of volatility predict fine-scale volatility better than the other way round.

Autocorreletion of daily returns and of their absolute values. The black line is the best power law fit of the absolute values autocorrelations



L’articolo più scaricato dal SSRN nel 2008 (beh per essere sinceri è il terzo in classifica)

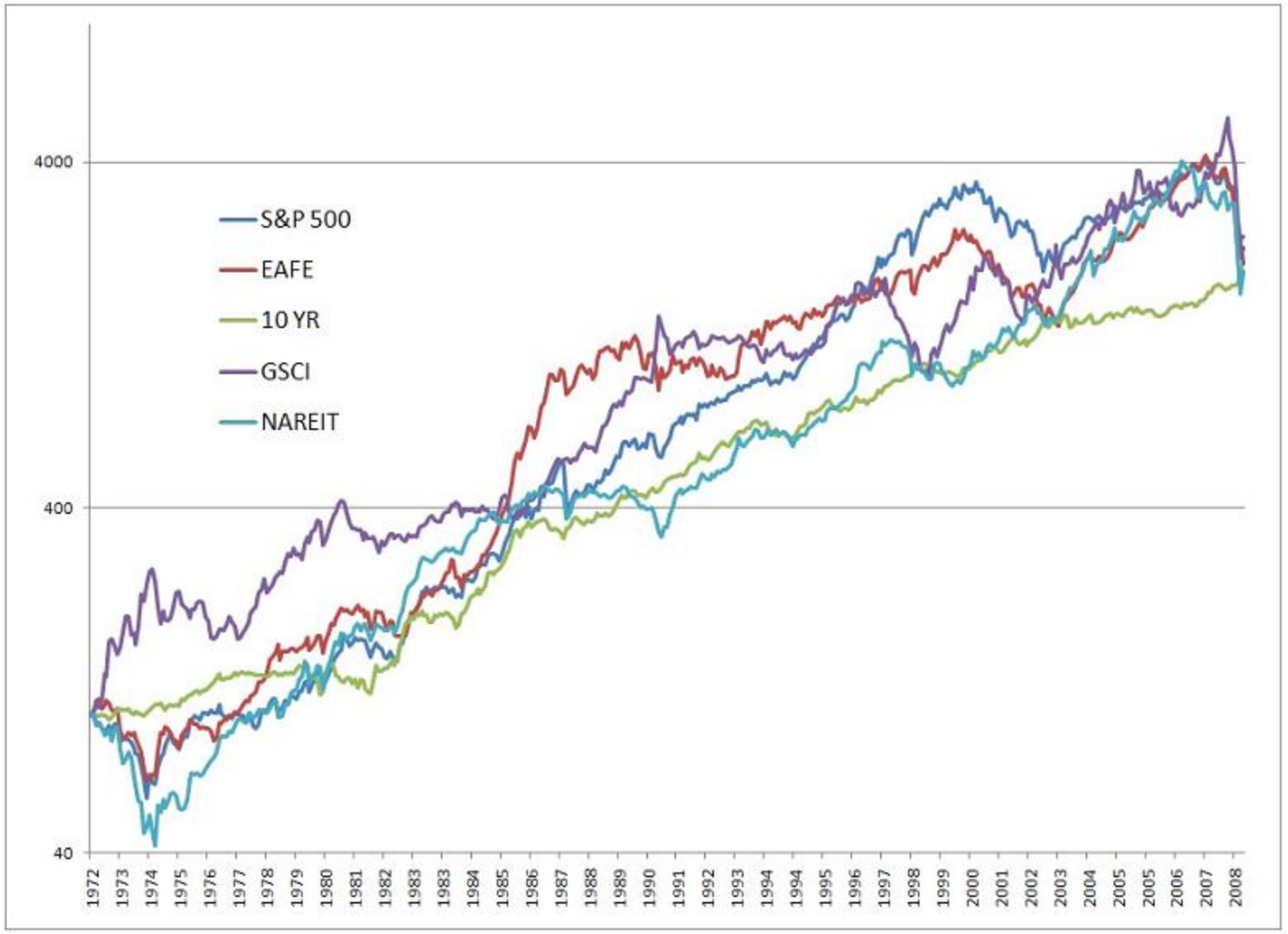
A Quantitative Approach to Tactical Asset Allocation

Mebane T. Faber

May 2006, Working Paper
Spring 2007, *The Journal of Wealth Management*
February 2009, Update

ABSTRACT

The purpose of this paper is to present a simple quantitative method that improves the risk-adjusted returns across various asset classes. A simple moving average timing model is tested since 1900 on the United States equity market before testing since 1973 on other diverse and publicly traded asset class indices, including the Morgan Stanley Capital International EAFE Index (MSCI EAFE), Goldman Sachs Commodity Index (GSCI), National Association of Real Estate Investment Trusts Index (NAREIT), and United States government 10-year Treasury bonds. The approach is then examined in a tactical asset allocation framework where the empirical results are equity-like returns with bond-like volatility and drawdown, together with over thirty-five consecutive years of positive performance.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Cinque assets + liquidità

Exhibit 2 - Asset Class Maximum Drawdowns 1973-2008

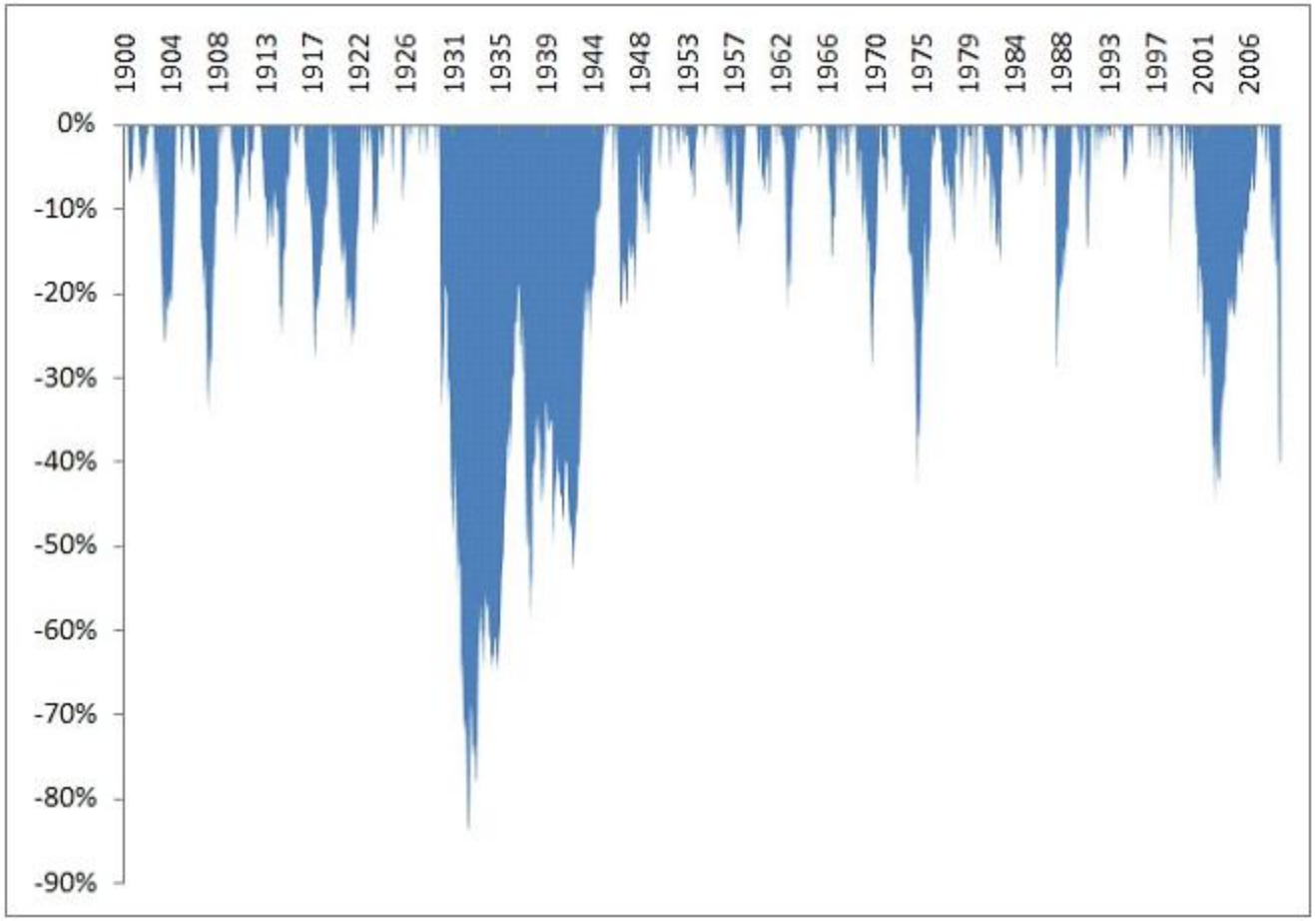
	S&P 500	EAFE	10 YR	GSCI	NAREIT
Return	9.26%	9.04%	8.75%	8.73%	8.54%
Volatility	15.54%	17.18%	9.05%	17.04%	17.06%
Sharpe (6%)	0.21	0.18	0.30	0.16	0.15
Max Drawdown	(44.73%)	(49.21%)	(18.79%)	(62.16%)	(58.78%)
Best Year	37.58%	69.94%	44.28%	74.96%	48.97%
Worst Year	(36.77%)	(43.06%)	(7.51%)	(46.49%)	(42.23%)

Analisi dei rendimenti degli indici S&P500, Lehman Long Term Government Bonds, MSCI Europe Australasia Far East, FTSE North American Real Estate Investment Trusts e Goldman Sachs Commodities Index dal 1973 al 2007. Tratto da "The case for multi-asset investing. Combining asset classes to enhance risk/return potential", Jennison Dryden-Prudential Investment disponibile online al link : http://www.jennisondryden.com/view/upload?docURL=/WDocs/45FB1E842986A540852573E2006BA8C8/$File/JD2065MultipleClass.pdf&docType=pdf

Periodo	S&P 500	Lehman Long-Term	MSCI EAFE	FTSE NAREIT	Goldman Sachs3	Portafoglio classico:	Portafoglio AA: 20% S&P500 20% Bonds
1973-2007	total return	Govern-ment Bond	total return	Equity Index	Commo-dities Index	50% S&P500	20% EAFE 20% NAREIT
Rendimento annuale medio	10.97%	8.90%	11.09%	13.16%	10.92%	10.31%	12.22%
deviazione standard	17.23%	11.49%	21.58%	21.58%	24.46%	11.67%	9.36%
anno migliore	37.43%	42.08%	69.94%	47.59%	74.96%	34.17%	29.91%
anno peggiore	-26.74%	-8.73%	-23.19%	-21.40%	-35.75%	-11.55%	-9.35%
% anni positivi	71%	80%	74%	80%	74%	80%	89%

Tavola 1

Exhibit 3 – S&P 500 Drawdowns, 1900-2008



Timing

BUY RULE

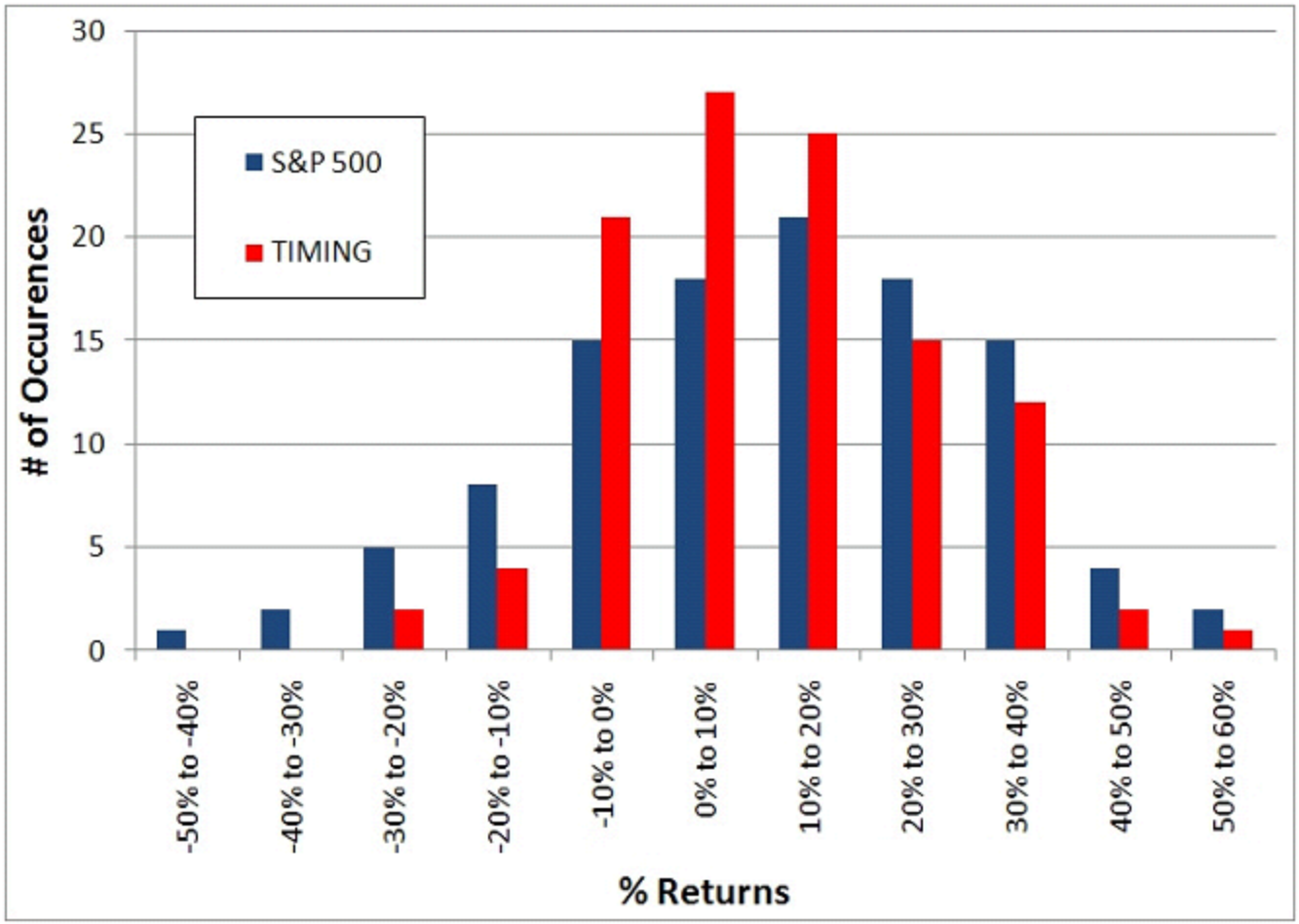
- Buy when monthly price > 10-month SMA.

SELL RULE

- Sell and move to cash when monthly price < 10-month SMA.

1. All entry and exit prices are on the day of the signal at the close. The model is only updated once a month on the last day of the month. Price fluctuations during the rest of the month are ignored.
2. All data series are total return series including dividends, updated monthly.
3. Cash returns are estimated with 90-day Treasury bills
4. Taxes, commissions, and slippage are excluded

Exhibit 10: Yearly Return Distribution, S&P 500 and Timing 1900-2008



	S&P500	Timing	% Change
Annualized Return	9.26%	10.60%	14.52%
Volatility	15.55%	11.90%	(23.42%)
Sharpe (6%)	0.21	0.39	84.44%
Maximum drawdown	(44.73%)	(23.26%)	(48.01%)
% Time Long	-	72.92%	-
Round Trip Trades Per Year	-	0.67	-
% + Trades	-	58.33%	-
Average Winning Trade	-	32.32%	-
Avg Win Trade Length	-	21.00	-
Average Losing Trade	-	(4.98%)	-
Avg Losing Trade Length	-	1.90	-

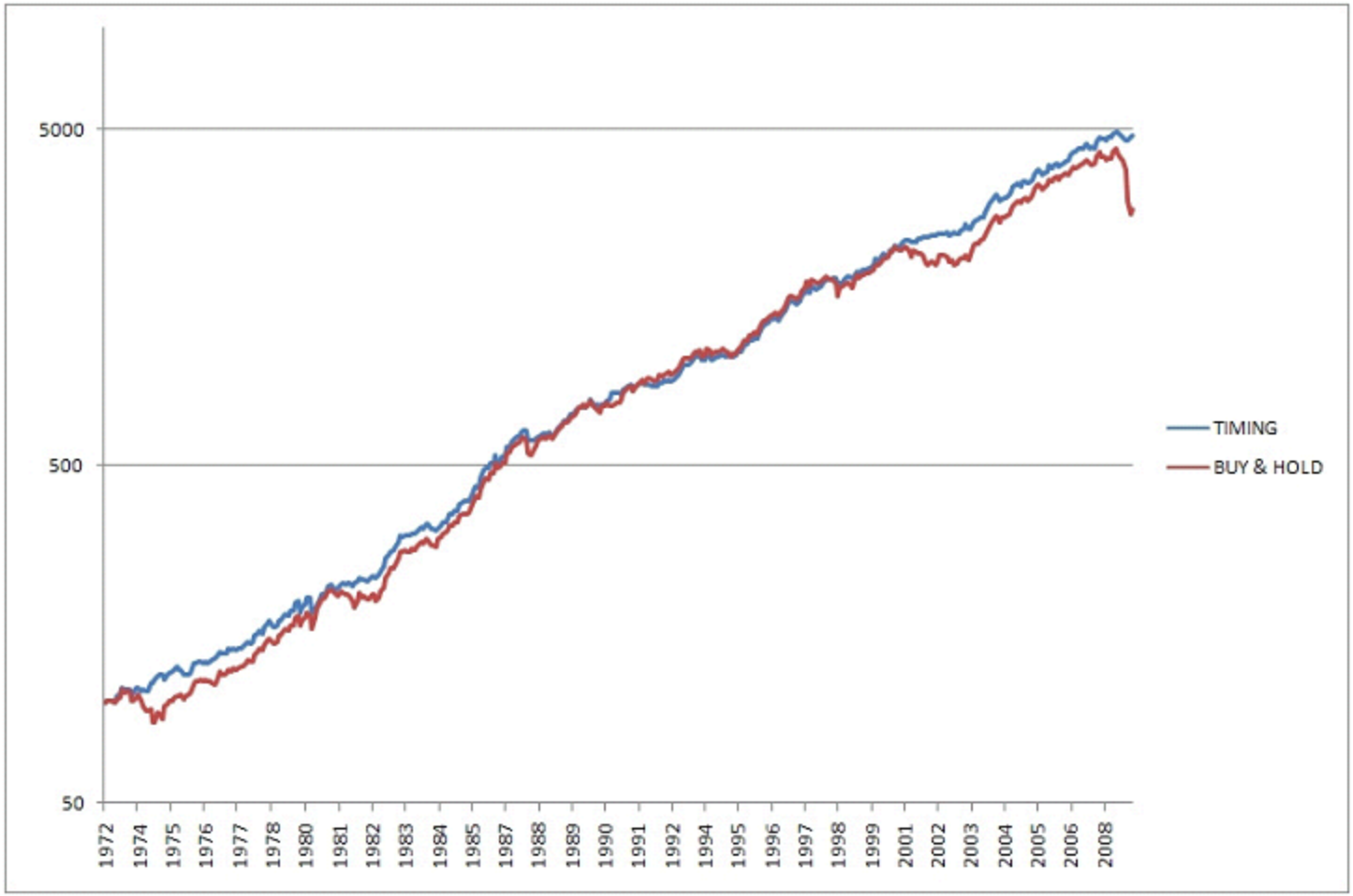
EAFE	Timing	% Change
9.04%	11.10%	22.83%
17.18%	12.47%	(27.40%)
0.18	0.41	131.22%
(49.21%)	(23.16%)	(52.95%)
-	69.91%	-
-	0.75	-
-	44.44%	-
-	45.80%	-
-	20.08	-
-	(5.17%)	-
-	3.93	-

	GSCI	Timing	% Change
Annualized Return	8.73%	11.16%	27.94%
Volatility	20.48%	17.04%	(16.78%)
Sharpe (6%)	0.13	0.30	127.65%
Maximum drawdown	(62.16%)	(37.83%)	(39.15%)
% Time Long	-	66.90%	-
Round Trip Trades Per Year	-	0.83	-
% + Trades	-	36.67%	-
Average Winning Trade	-	33.06%	-
Avg Win Trade Length	-	16.26	-
Average Losing Trade	-	(3.19%)	-
Avg Losing Trade Length	-	3.47	-

NAREIT	Timing	% Change
8.54%	11.74%	37.42%
17.06%	11.55%	(32.29%)
0.15	0.50	233.28%
(58.78%)	(20.90%)	(64.44%)
-	72.45%	-
-	0.61	-
-	54.55%	-
-	41.26%	-
-	23.00	-
-	(5.13%)	-
-	3.60	-

	10 Year	Timing	% Change
Annualized Return	8.75%	9.11%	4.16%
Volatility	9.05%	7.60%	(16.09%)
Sharpe (6%)	0.30	0.41	34.97%
Maximum drawdown	(18.79%)	(11.20%)	(40.40%)
% Time Long	-	76.16%	-
Round Trip Trades Per Year	-	0.69	-
% + Trades	-	48.00%	-
Average Winning Trade	-	27.81%	-
Avg Win Trade Length	-	23.33	-
Average Losing Trade	-	(1.62%)	-
Avg Losing Trade Length	-	3.62	-

Exhibit 18: Buy & Hold vs. Timing Model, 1973-2008, log scale



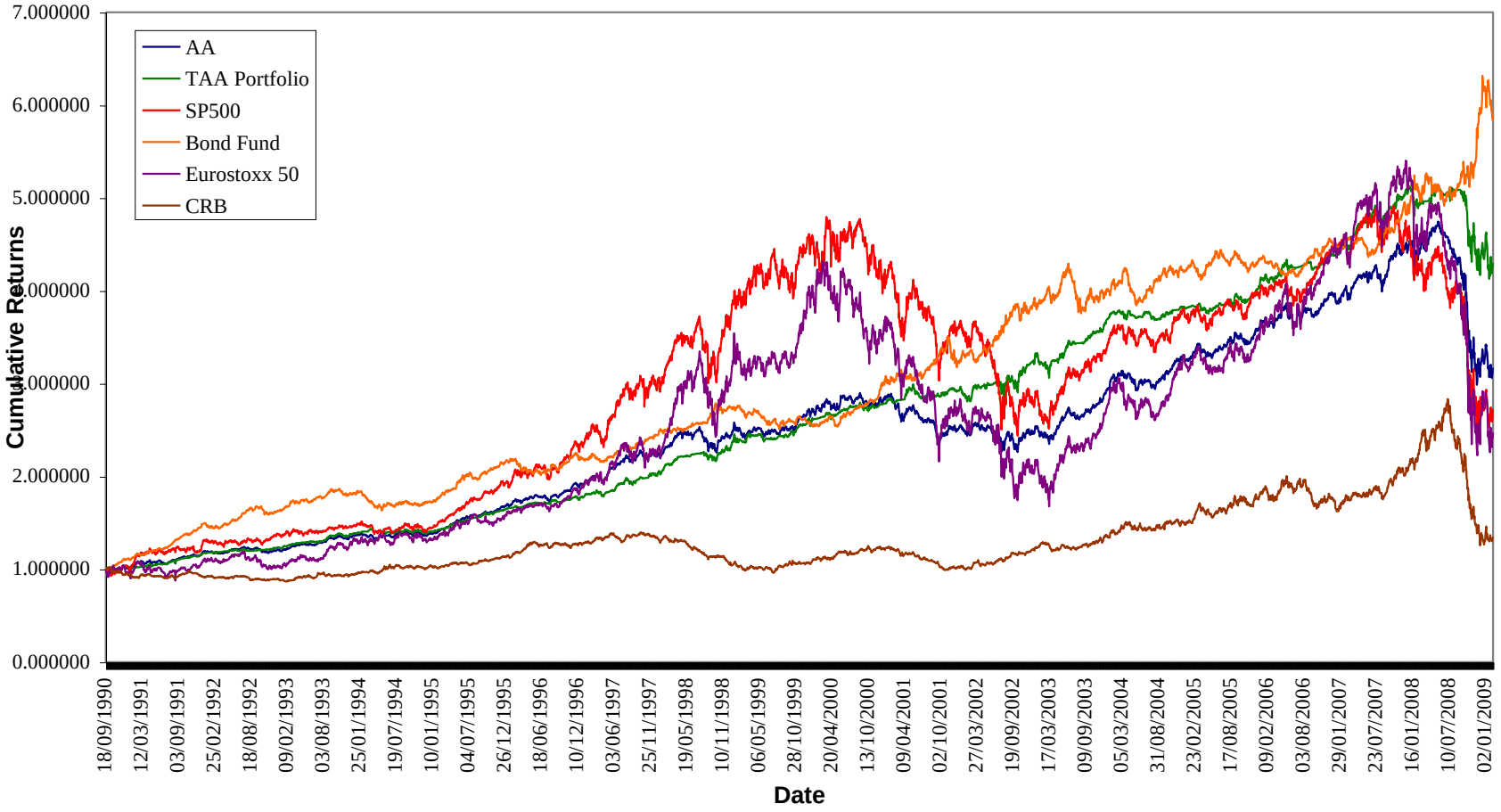
35 anni di profitti !!!

	B&H	TIMING
1973	1.03%	7.39%
1974	(11.80%)	12.07%
1975	20.16%	1.46%
1976	15.04%	16.01%
1977	8.24%	7.20%
1978	13.65%	11.88%
1979	17.89%	14.65%
1980	18.95%	12.91%
1981	(3.34%)	4.80%
1982	21.34%	22.06%
1983	17.97%	15.77%
1984	9.43%	6.98%
1985	26.58%	26.20%
1986	25.50%	21.54%
1987	8.53%	11.63%
1988	18.46%	11.74%
1989	19.25%	18.12%
1990	(1.10%)	4.94%
1991	18.19%	6.34%
1992	3.88%	4.72%
1993	11.90%	12.82%
1994	1.76%	2.43%
1995	22.74%	21.73%
1996	19.32%	19.26%
1997	9.96%	9.94%
1998	(0.49%)	7.38%
1999	14.16%	13.05%
2000	12.73%	13.78%
2001	(9.74%)	3.21%
2002	2.09%	3.39%
2003	25.70%	20.53%
2004	17.44%	15.06%
2005	11.74%	8.20%
2006	12.07%	14.16%
2007	8.06%	9.49%
2008	(29.76%)	1.59%

	B&H	TIMING
Return	9.79%	11.33%
Volatility	9.71%	6.87%
Sharpe (6%)	0.39	0.78
Maximum Drawdown	(35.67%)	(9.53%)
Best Year	26.58%	26.20%
Worst Year	(29.76%)	1.46%

Un altro esperimento

Cumulative Returns of the TAA Portfolio, AA, S&P 500, Eurostoxx 50, CRB and Funds Bond (v=200, controlling each 21 days) from 1990 to 2009



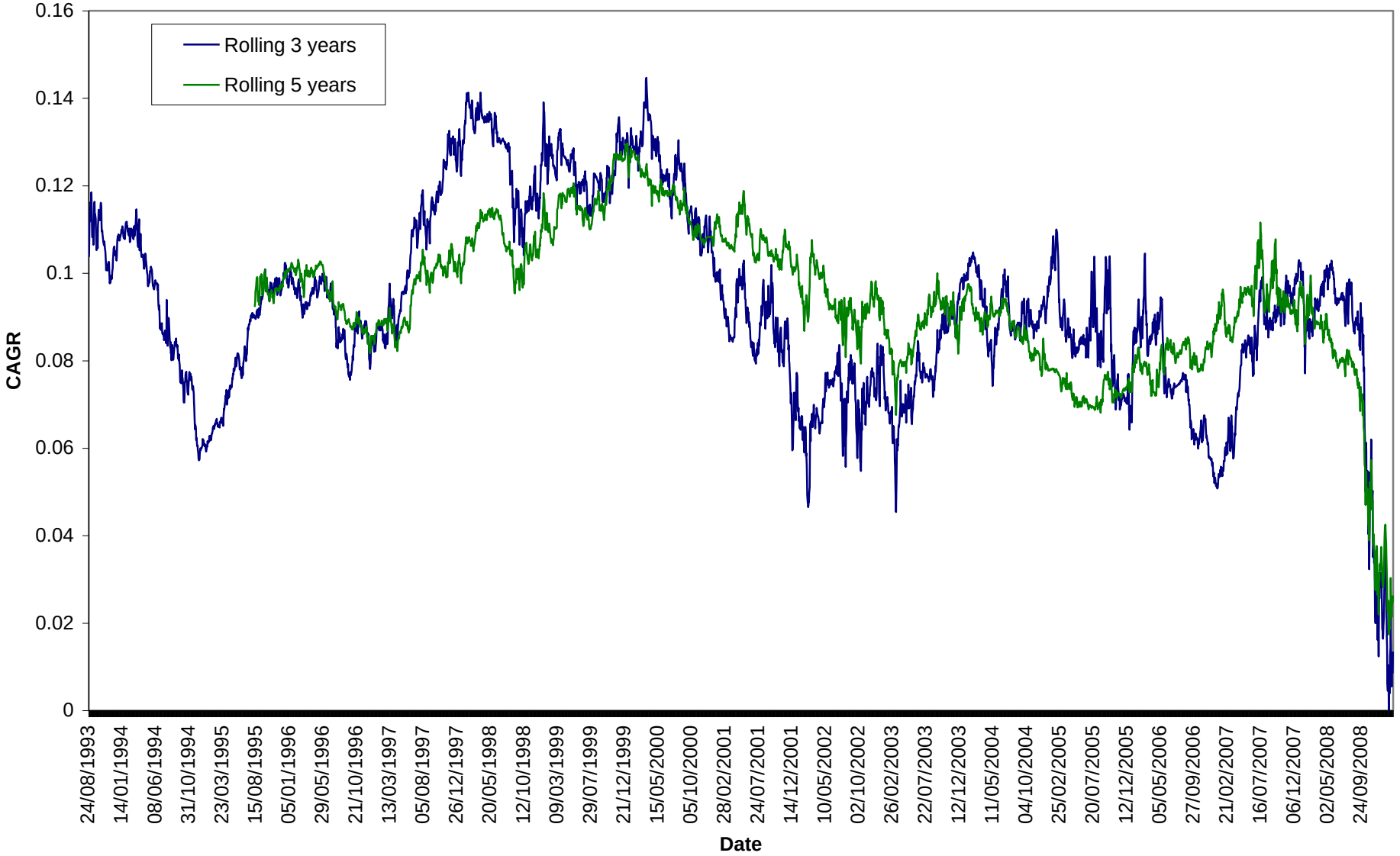
PERFORMANCE STATISTICS*						
	Portfolio	**AA**	**S&P500**	**BondF**	**CRB**	**Eurostoxx50**
Total Cumulative Return	329.88%	217.03%	172.63%	482.95%	34.99%	147.65%
Annualized Rate of Return	8.10%	6.36%	5.50%	9.87%	1.62%	4.96%
Average Daily Return	0.03%	0.03%	0.03%	0.04%	0.01%	0.03%
Median Daily Return	0.02%	0.04%	0.02%	0.02%	0.01%	0.04%
Best Day	4.98%	6.47%	11.58%	4.45%	5.92%	12.71%
Worst Day	-5.05%	-5.36%	-9.03%	-2.59%	-6.65%	-9.92%
% of Positive Days	60.34%	54.28%	53.55%	55.48%	52.57%	52.94%
Average Daily Gain	0.24%	0.40%	0.73%	0.33%	0.50%	0.92%
% of Negative Days	39.66%	45.72%	46.45%	44.52%	47.43%	47.06%
Average Daily Loss	-0.28%	-0.41%	-0.78%	-0.33%	-0.54%	-0.97%
Excess Kurtosis	20.04	13.82	10.57	4.79	9.07	8.48
Skewness	0.18	-0.26	-0.03	0.10	-0.33	0.10

RISK STATISTICS						
	Portfolio	**AA**	**S&P500**	**BondF**	**CRB**	**Eurostoxx50**
Maximum Drawdown	-19.67%	-37.07%	-51.93%	-12.54%	-55.72%	-61.16%
Maximum Drawdown Period (in days)	176	134	289	146	112	780
Time to Recovery (in days)	N/A	N/A	N/A	248	N/A	952
Annualized Standard Deviation	6.86%	9.52%	18.13%	7.53%	12.37%	22.18%
Annualized Downside Deviation	7.05%	9.94%	18.21%	7.32%	12.79%	22.43%
Daily Modified VaR α=-5%	-0.48%	-0.83%	-1.61%	-0.68%	-1.19%	-1.98%

RISK ADJUSTED PERFORMANCE						
	Portfolio	**AA**	**S&P500**	**BondF**	**CRB**	**Eurostoxx50**
Sharpe Ratio	0.74	0.35	0.14	0.91	-0.11	0.09
Sortino Ratio	0.72	0.34	0.14	0.94	-0.11	0.09
Omega Ratio	1.26	1.12	1.07	1.24	1.03	1.05
Calmar Ratio	0.41	0.17	0.11	0.79	0.03	0.08

*** The whole period goes from 1994 to 2008**

MAR=3% annual


Rolling 3 years
Rolling 5 years
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L’esempio di Malkiel (riduzione del rischio via diversificazione)

	Ombrelli S.p.A.	Ombrelloni S.p.A.
Stagione piovosa	+50%	-25%
Stagione soleggiata	-25%	+50%

Portafoglio 50/50 in entrambe le società

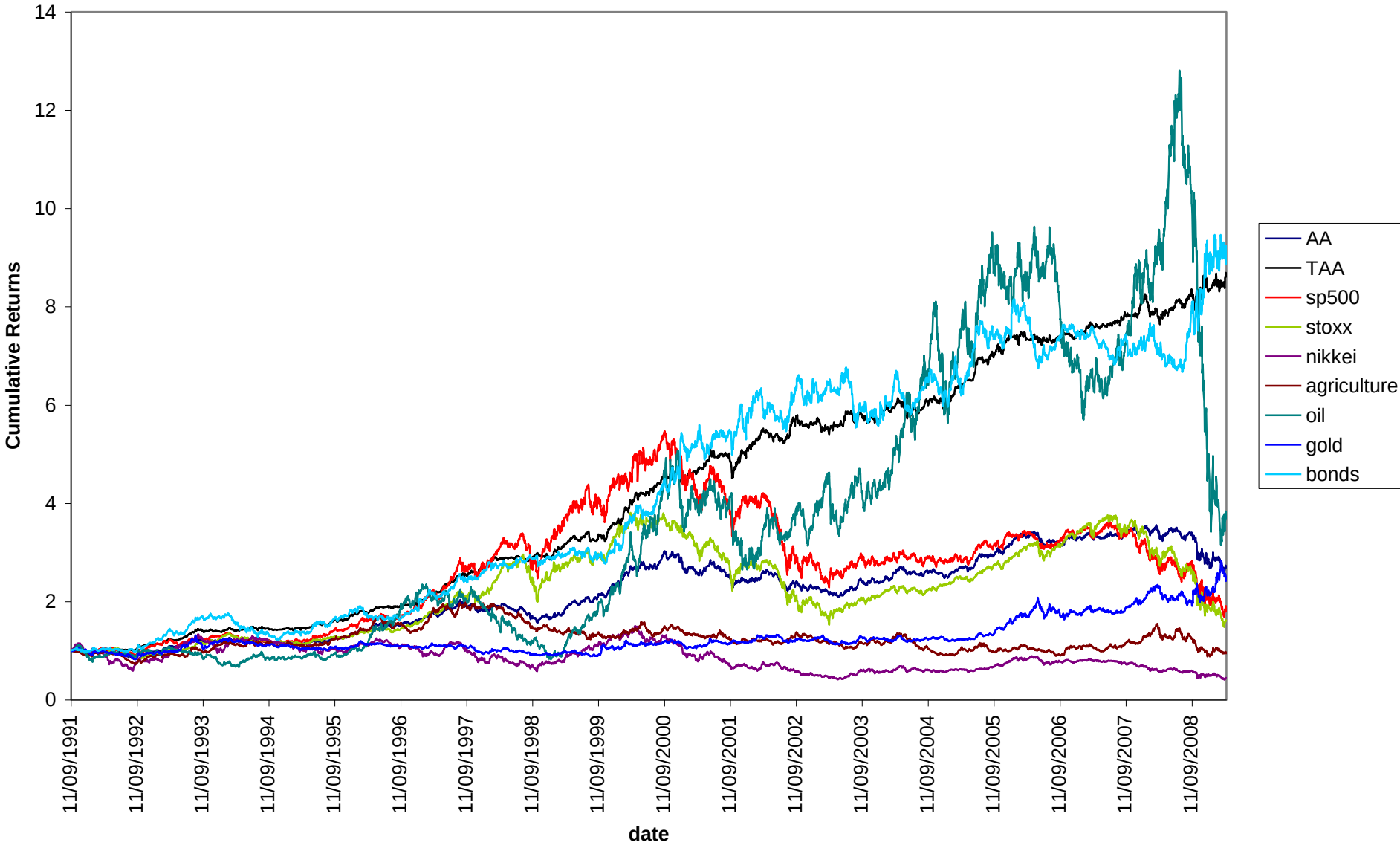
- Rendimento =
  - Pioggia : (0.5) (0.50) + (0.5)(-0.25) = 12.5%
  - Sole: (0.5) (-0.25) + (0.5)(0.50) = 12.5%
  - = 12.5% sia che piova sia che ci sia il sole
- Il rischio è nullo
- La bellezza della diversificazione
- Il modo più semplice di gestire il rischio
- Funziona particolarmente bene perchè gli asset sono anticorrelati

L’origine del miracolo

- I rendimenti degli asset sono perfettamente “anticorrelati”
- Entrambi gli asset hanno un rendimento atteso positivo (=12.5%)
- Non è indispensabile che entrambe le condizioni siano verificate in ogni istante

Obbligazioni, azioni (long e short) e materie prime

- **PORTFOLIO EURO:**
- 31% U.S. Treasury Bonds (Long)
- 15% Stoxx 600 oppure SGI short (dividendi esclusi)
- 15% S&P 500 (dividendi esclusi)
- 15% Nikkei (dividendi esclusi)
- 8% Agriculture
- 8% Oil
- 8% Gold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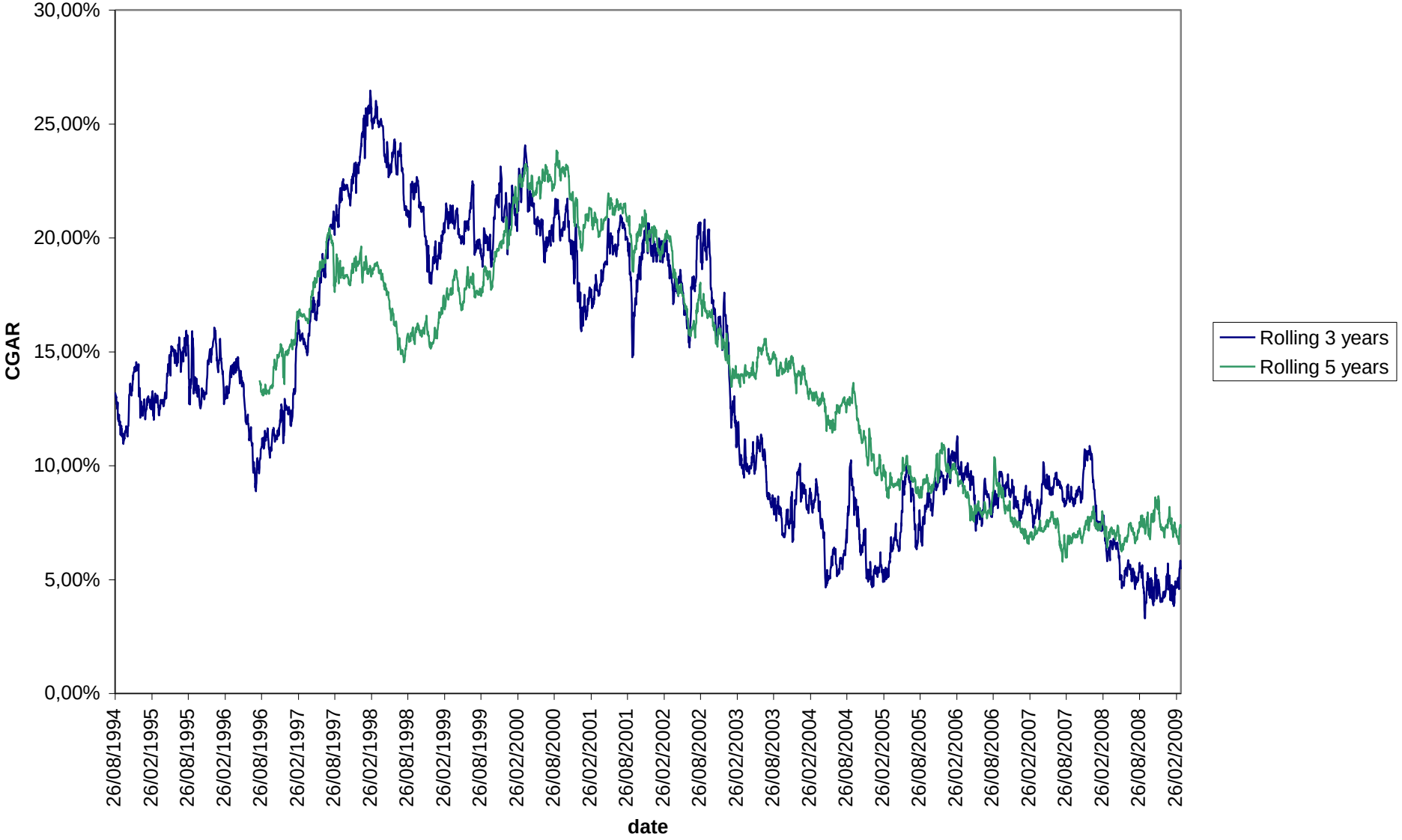
11/09/2006
11/09/2007
11/09/2008
date
AA
TAA
sp500
stoxx
nikkei
agriculture
oil
gold
bonds

Per vedove, orfani e pensionati?



	Portfolio	AA	stoxx	sp500	nikkei	oil	Agric.	gold	bonds
Annualized Rate of Return	12,91%	5,77%	2,77%	3,33%	-4,50%	7,85%	-0,23%	5,34%	13,15%
Excess Kurtosis	4,5073	1,8715	6,7992	5,2839	3,5079	3,412	1,8245	7,0839	12,884
Skewness	0,3676	-0,0754	-0,0569	0,0001	0,2198	-0,1105	-0,0419	0,4718	1,0288
Maximum Drawdown	-11,38%	-30,59%	-61,04%	-69,16%	-72,84%	-75,38%	-55,60%	-32.82%	-30,89%
Maximum Drawdown Period (in days)	86	684	2321	2187	2303	4337	2903	1553	192
Time to Recovery (in days)	38	614	N/A	N/A	N/A	N/A	N/A	722	284
Annualized Standard Deviation	8,47%	11,92%	18,55%	22,19%	26,27%	33,58%	18,25%	16,14%	16,98%
Annualized Downside Deviation	8,06%	12,02%	19,15%	22,18%	25,97%	33,52%	18,16%	15,46%	16,10%
Daily Modified VaR α=-5%	-0,72%	-1,19%	-1,75%	-2,11%	-2,49%	-2,49%	-1,85%	-1,35%	-1,09%
Sharpe Ratio	1,1697	0,2321	-0,0126	0,0147	-0,2853	-0,2853	-0,177	0,1448	0,5981
Sortino Ratio	1,2291	0,2303	-0,0122	0,0147	-0,2886	-0,2886	-0,1778	0,1513	0,6308
Omega Ratio	1,2859	1,0842	1,0367	1,04	0,9863	0,9863	1,007	1,0666	1,1427
Calmar Ratio	1,1345	0,1886	0,0453	0,0481	-0,0617	-0,0617	-0,0041	0,1627	0,4258

* The whole period goes from 1994 to 2008
MAR=3% annual

Il binomio teoria ergodica - teoria della probabilità: statistica - probabilità a priori

« ... There are few persons, even among the calmest thinkers, who have not occasionally been startled into a vague yet thrilling half-credence in the supernatural, by coincidences of so seemingly marvellous a character that, as mere coincidences, the intellect has been unable to receive them. Such sentiments -- for the half-credences of which I speak have never the full force of thought -- such sentiments are seldom thoroughly stifled unless by reference to the doctrine of chance, or, as it is technically termed, the Calculus of Probabilities. Now this Calculus is, in its essence, purely mathematical; and thus ***we have the anomaly of the most rigidly exact in science applied to the shadow and spirituality of the most intangible in speculation****. ... »*

(Egdar Allan Poe, The mistery of Marie Roget)

Alcuni problemi matematici

Estendere la MPT in modo sufficientemente ampio da permettere una analisi di asset allocation tattiche in asset con correlazioni variabili, che possono o non possono presentare trend. L'ideale sarebbe che gli asset stessi possano cambiare significativamente di importanza

$\Delta P = \Delta M + \Delta I + \Delta T$

ΔM trend macroeconomico (variabile lenta, certamente con correlazioni di lunga durata)

ΔI variazioni dell'informazione (variabile di tipo impulsivo, quasi sempre nulla, con ampiezze molto variabili – e.g. 9/11 – con distribuzione di Pareto e distribuzione Poissoniana dei tempi di arrivo dell'informazione)

ΔT trading (variabile veloce, leggermente mean reverting, assimilabile al rumore sulla scala di tempi significativa per ΔM

Dinamica, probabilità, statistica e il problema dell'induzione

- (Ammesso che esista) la probabilità di un evento non è quasi mai nota a priori.
- La sola possibilità è di usare al suo posto le frequenze calcolate osservando con quale frequenza l'evento si è presentato in passato
- Il problema del *backtesting*
- Il problema dell'*ergodicità*, della *storicità* e dei *punti tipici*: da una singola serie di osservazioni vorrei essere in grado di calcolare la probabilità
- *Il pollo di Bertrand Russell's* (tacchino per gli americani)