Wykład 5

Rynek akcji

1.

Co odzwierciedla cena akcji?

Intrinsic value can be defined simply: It is the discounted value of the cash that can be taken out of a business during its remaining life /Warren Buffet 1996/

$$P_i = \sum_{t=1}^{\infty} \frac{D_i}{(1+k)^t}$$

Czy łatwo jest ustalić poziom cen odzwierciedlający strumienie przyszłych dochodów ?

- Analysts **long-term** earnings growth **forecasts perform poorly** against actual realizations, indicating they contain considerable uncertainty.

Stephen Penman, Francesco Reggiani (2013). „Returns to buying earnings and book value: Accounting for growth and risk" Review of Accounting Studies, no. 18: 1021-1049.

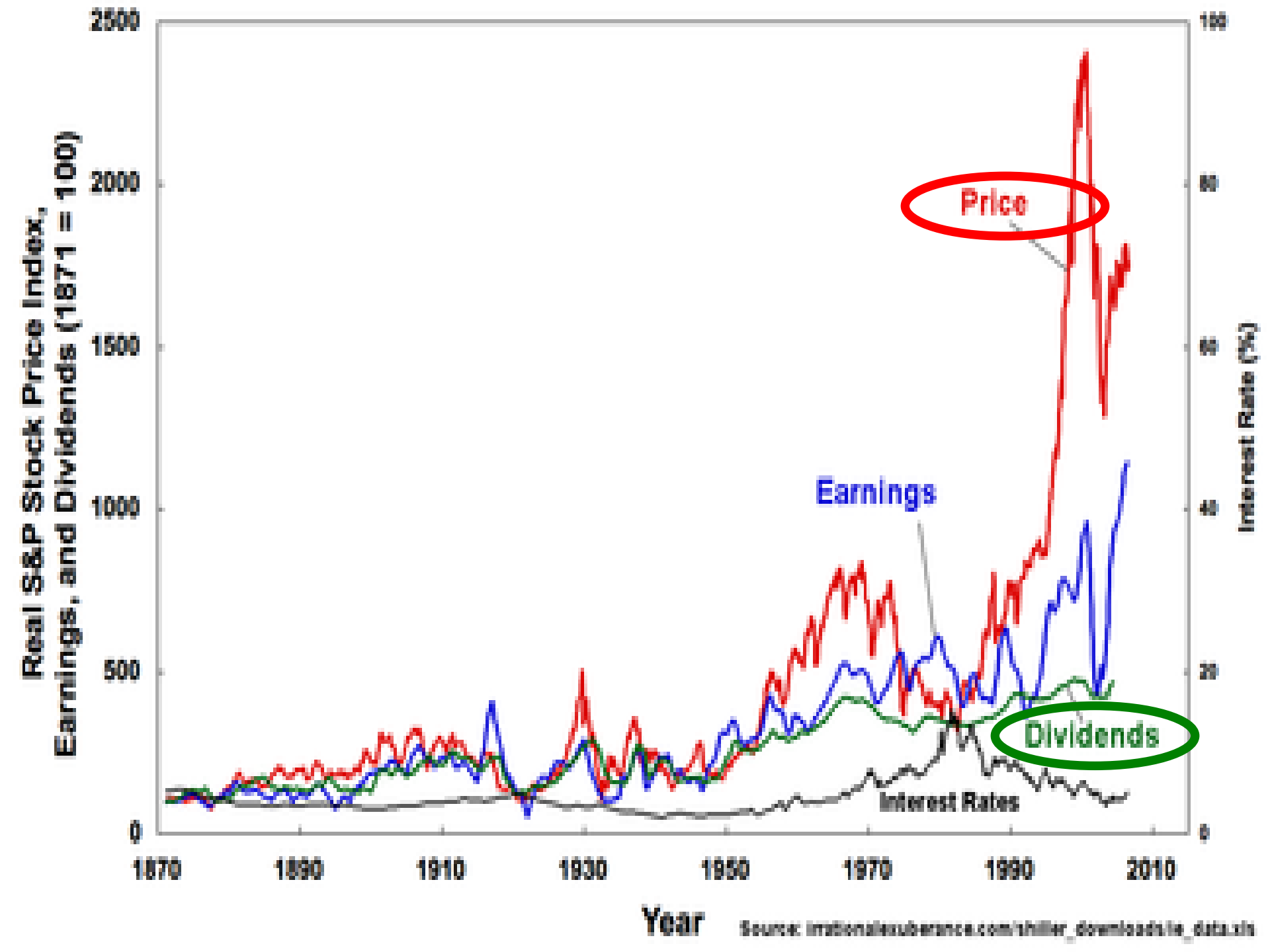
Skąd bierze się w takim razie wartość fundamentalna akcji?

Arbitraż sprowadza ceny akcji do poziomów **uznawanych przez ogół inwestorów** za odzwierciedlające ich **fundamentalną** wartość (*Beauty contest* – Keynes 1936)

- A key teaching from Ben Graham is that in the short term, the **stock market** is a **voting machine**, with a stock's price reflecting the **stock's popularity** with investors on any given day (Janet Lowe 1994)

Cena akcji „powinna” odzwierciedlać przyszłe strumienie wypłat dywidend.
Czy **można zatem traktować** ceny **akcji i zmiany indeksów giełdowych jako** prognozy **kształtowania się przyszłych strumieni dochodów z dywidend?**

$$P_i = \sum_{t=1}^{\infty} \frac{D_i}{(1+k)^t}$$


Real S&P Stock Price Index, Earnings, and Dividends (1871 = 100)
Interest Rate (%)
Year
Price
Earnings
Dividends
Interest Rates
2500
2000
1500
1000
500
0
100
80
60
40
20
0
1870
1890
1910
1930
1950
1970
1990
2010
Source: irrationalexuberance.com/shiller_downloads/ie_data.xls

- There is **no tendency** of the **stock price to forecast the dividend** present value:

- the dividend present value is not doing anything especially dramatic, whereas the price **is jumping around** a great deal

- **Big** stock market **movements** were **not justified by** what actually happened to **dividends later**”

- **Only about 7%** of the variance of annual stock market returns can be justified in terms of **new information about future dividends**.

R. Shiller, 1981

Artykuł Roberta Shillera został opublikowany prawie 40 lat temu.

Może coś może się zmieniło, skoro konsensus rynkowy jest wypadkową dużo większej liczby prognoz?

Equity Trading Volume over GDP

Bai J., Philippon T., Savov (2013) "Have Financial Markets Become More Informative?" *NBER Working Paper* No. 1972

Na ile zatem rynki są informacyjnie efektywne?

Samuelson has offered a dictum that the stock market is **"micro efficient"** but **"macro inefficient"**.

- That is, the **efficient market hypothesis works** much better **for individual stocks** than it does for aggregate stock market.
- **Individual-firm stock price variations are dominated by genuine information** about future cash flows of the firms.
- The reasons for **changes in the aggregate** are more subtle and **harder for the investigating** public to understand, having to do with **national economic growth, stabilizing monetary policy, and the like**"

Jeeman Jung and Robert J. Schiller (2005) „Samuelson's dictum and the stock market", *Cowles Fundation Paper* No. 1183.

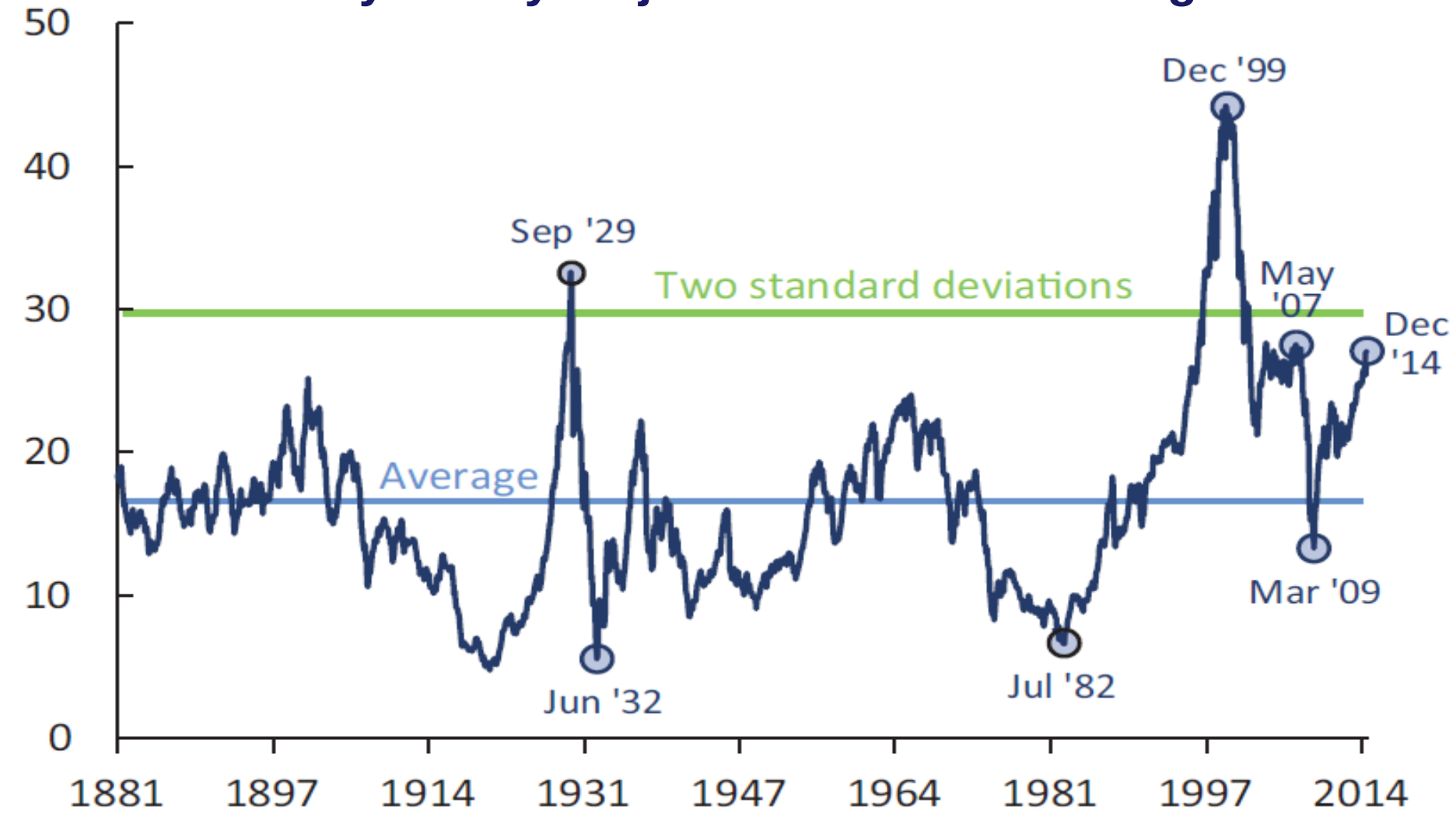
Arbitraż eliminuje odchylenia cen akcji of ich wartości fundamentalnej.

Czynniki behawioralne mają jednak duży wpływ na **zmiany ogólnego poziom cen aktywów**


Czynniki behawioralne powodują „nadmierną” zmienność indeksów- „oderwaną” od zmienności czynników fundamentalnych
Arbitraż dostosowujący ceny akcji do ich – zmieniającej się wartości fundamentalnej
Ceny akcji
Zmienność indeksu na krajowym rynku akcji
Zmienność indeksu na globalnym rynku akcji
Ryzyko rynkowe
Niepewność przyszłości rodzi nadmiernie optymistyczne lub nadmiernie pesymistyczne oczekiwania inwestorów

„Falowanie” indeksów rodzi konieczność **nieustannego konkursu piękności**; co prowadzi do ciągłej zmiany poziomów cen akcji, które rynek (ogół inwestorów) uznaje za odzwierciedlające ich wartość fundamentalną

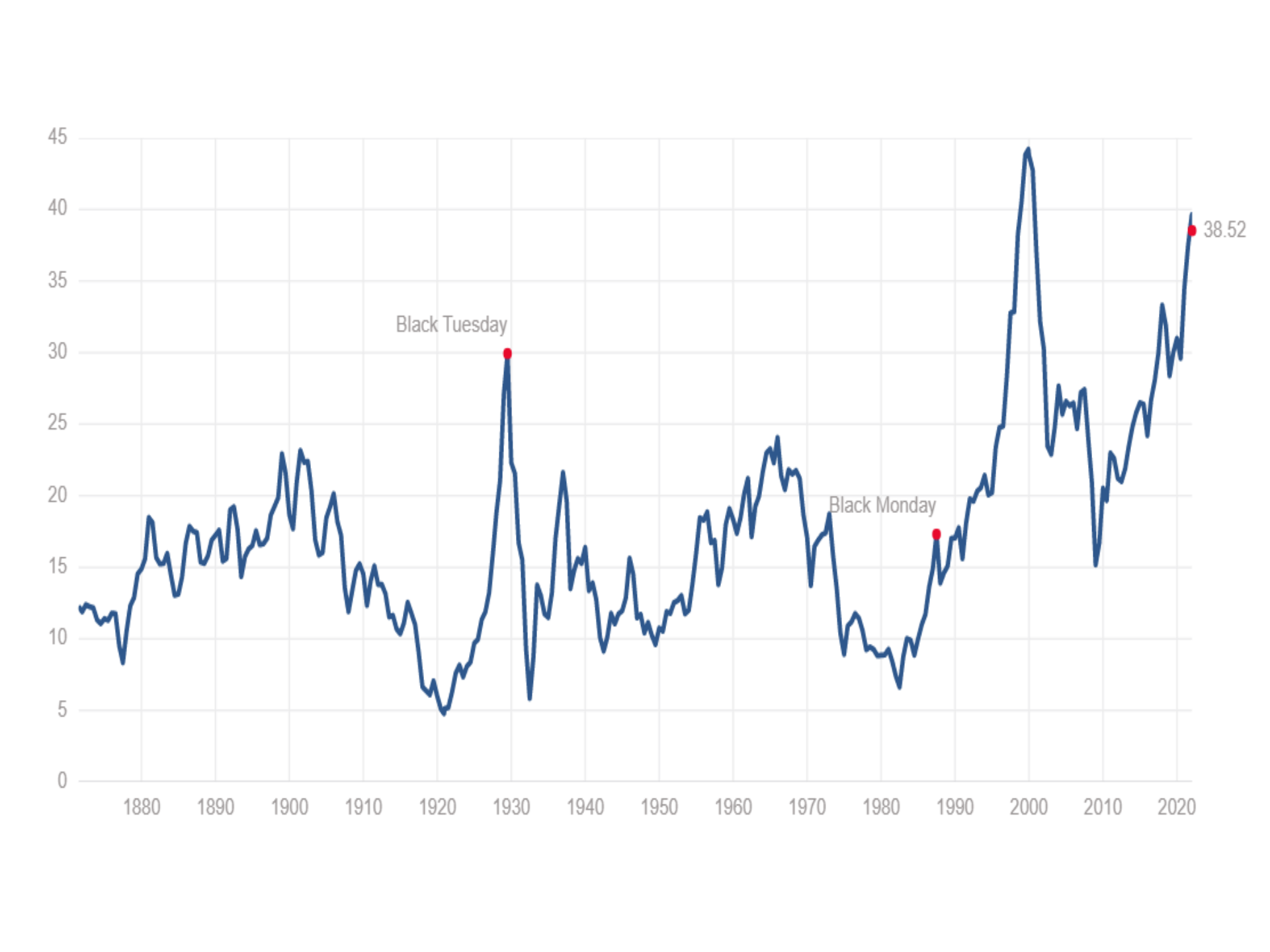
CAPE: Cyclically Adjusted Price-to-Earnings ratio



Note: CAPE is the ratio of the monthly S&P 500 price level to trailing 10-year average earnings (inflation adjusted).

Sources: Robert Shiller, OFR analysis

T. Berg (2015) „Quick Silver Markets", *Office of Financial Research Brief*, 17 March 2015


45
40
35
30
25
20
15
10
5
0
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
Black Tuesday
Black Monday
38.52

- The Social Cost of Carbon (SCC) is the **present value of the flow of marginal climate damages** generated by one ton of CO2 emitted today.

Christian Collier (2019). „A Personal Biography of Marty Weitzman”, Environmental and Resource Economics 74, 943-947

Dlaczego wycena 1 tony emitowanego do atmosfery CO2 jest bardzo trudna?

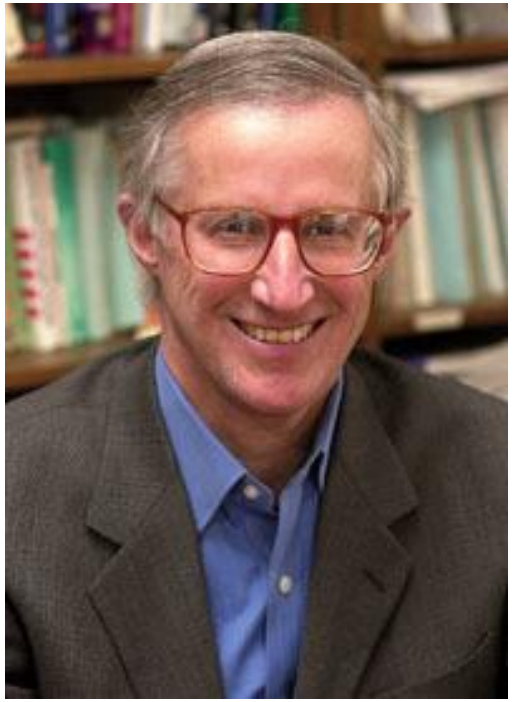
Discounting and **uncertainties** were Martin's (Weitzman) two answers (Collier 2019).

$$P_{CO2} = \sum_{t=1}^{\infty} \frac{L_{CO2}}{(1+k)^t}$$

- W przypadku **akcji** szacujemy dzisiejszą wartość przyszłych dochodów, a inwestorów interesuje przede wszystkim **dość bliska przyszłość** firmy..

- W przypadku emitowanego do atmosfery **CO2** **wiemy**, **że nie wiemy** przy jakim wzroście temperatury proces degradacji środowiska naturalnego może przyspieszyć, powodując **nieodwracalny** w skutkach kryzys klimatyczny.

- **This** relatively **benign view**, which has been articulated for many years by Yale economist **William Nordhaus**, has been the consensus view among economists **until recently**.



Bob Litterman (2013)

Dlaczego William Nordhaus mógł tak w przeszłości uważać?

- **Twenty years ago**, it was believed that such a negative tipping point would occur if the average global temperature grew by **5°C** above its preindustrial level (Lenton et al. 2019).
- **Recent research shows**, however, that an increase of **1.5–2°C** is sufficient to trigger climate degradation (IPCC 2018), which is dangerously close to the current level of global warming. Thus urgent policy measures are needed to halt the unfolding crisis.

Chmielewska, Sławiński (2021)

- **If we knew** with absolute assurance that the **worst** potential **risks** of climate change **could be addressed** successfully **in** the **future**, then **it would make a sense** to focus only on **average (expected) damages** even for those damages in the distant future.

Bob Litterman (2013)

- **That view was dramatically questioned** by Harvard economist **Martin Weitzman** in 2009 article in which he claimed that the **possibility of extremely rare but potentially catastrophic outcomes made it impossible to put an upper bound on the appropriate price** for emission today.

- **Weitzman did not help determine** the appropriate **price** of carbon dioxide emission, but he did **succeed in shifting** the academic **discussion** in a new direction

Bob Lieberman (2013)

Jak myśli o ryzyku klimatycznym ktoś, kto bardzo długo zarządzał ryzykiem w dużym banku inwestycyjnym?

Fundamental principles of risk management:

(1) Think about **worst case scenarios**

(2) Recognize **risks** and warn **when** they are **not** being **priced properly** (tylko wtedy można wiedzieć, czy mamy możliwości pokryć potencjalne straty)

(3) In risk management **time is scarce resource**.
Climate policy: The **uncertainty about thresholds** is a **powerful reason not to delay**

(4) Our **models** give us measures of **risk**, **but** what **we manage** in the financial markets is the broader concept of **uncertainty**. Similarly, with respect to **climate change**, the consequences are **highly uncertain** which is **possibility of bad outcomes**.

Commodity Futures Trading Commission (2019). *Managing climate risk in the US financial system*, Washington D.C.

Robert Litterman was shocked to find out how standard benefit-cost analysis of climate change were treating risk and uncertainty (Gernot Wagner 2020)

- **For a long time** it was believed that the price of a metric ton of CO_2 emitted into the atmosphere should reflect the discounted value of **average (expected) damages** to the natural environment and the economy (**Nordhaus** 1992).
- **Martin Weitzman** argued that since humanity faces the **risk of abrupt and irreversible degradation** of the natural environment, it is impossible to precisely set an upper limit for the price of emitted carbon (2009).
- Accordingly, **Kent, Litterman and Wagner proposed** to impose a **high fee** on carbon emissions, which **would reflect the risks** inherent in continued global warming **until new technologies enable** us to reduce these risks and lower the price to be paid for CO_2 emissions (2018).

Chmielewska, Sławiński (2021)

Opłacalnych technologii wyłapywania CO2 z powietrza wciąż nie ma…

- **One of the greatest problems facing effective climate policy** is that once CO_2 has been released into the atmosphere, it **will remain there for hundreds of years** (Hansen et al. 2017).
- Under these circumstances, **the best way** to stop global warming **would be to deploy technologies** to bind or remove excess CO_2.
- **Attempts to develop such technologies have continued since the late 1970s**. The most promising ones include Carbon Capture and Storage (CCS) and Bioenergy with Carbon Capture and Storage (BECCS); regrettably, **they are unlikely to become technically, financially, or environmentally feasible in the nearest future** (McLaren & Markusson 2020; Dyke, Watson & Knorr 2021).

Chmielewska, Sławiński (2021)

Jaką stosować stopę dyskonta?

$$P_{CO2} = \sum_{t=1}^{\infty} \frac{L_{CO2}}{(1+k)^t}$$

- If climate mitigation is more like an **insurance policy** that pays-off in bad times, than a **lower discount rate is warranted**. **Catastrophic risk** might outweigh these effects altogether, in favor of a **lower discount rate** .

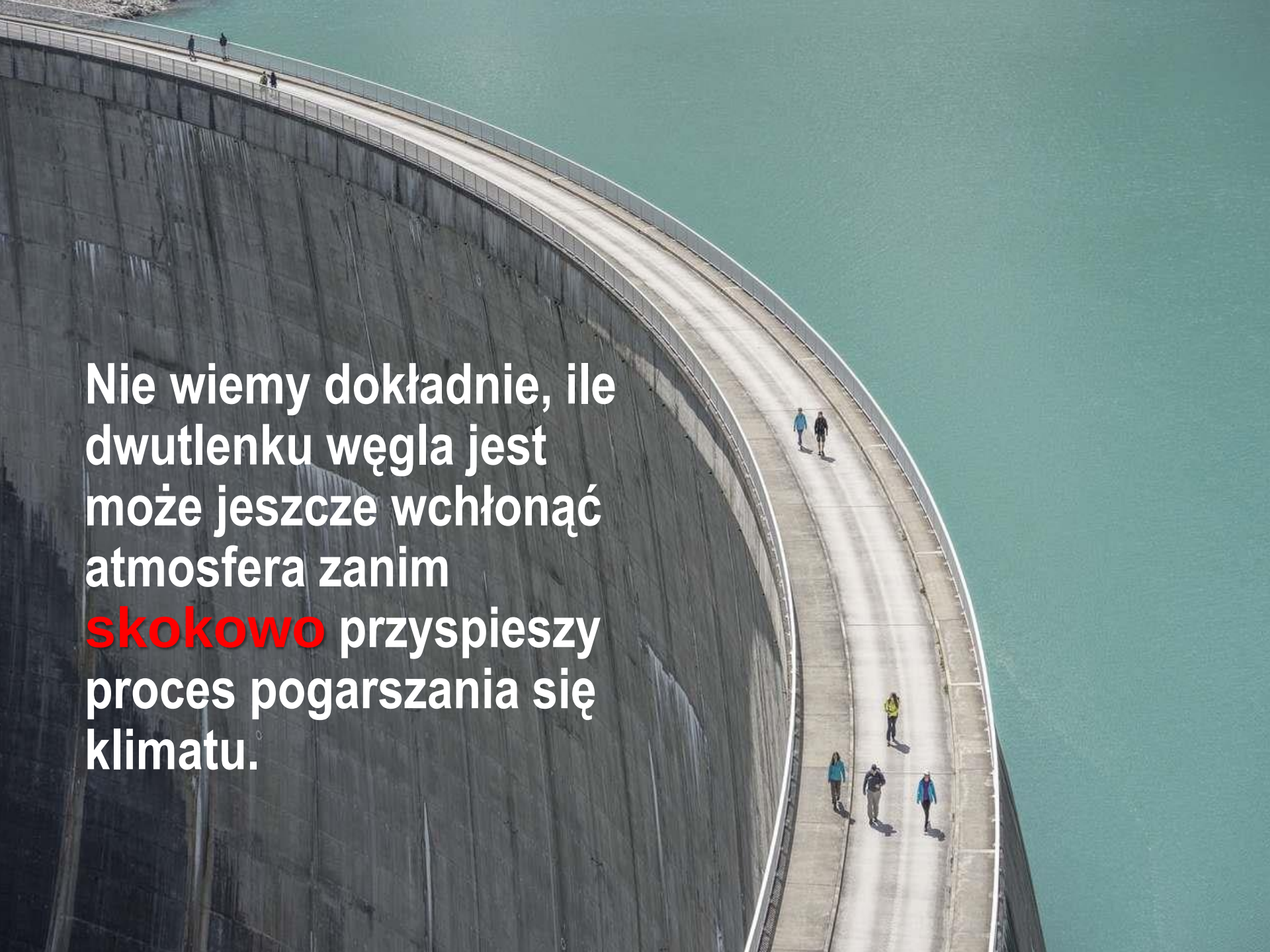
Gernot Wagner et. al (2021). „Eight priorities for calculating the social cost of carbon", *Nature*, vol. 590, February 25

- **Can we hope that the poorest of future generations will be better off that the middle class of the present generation?**

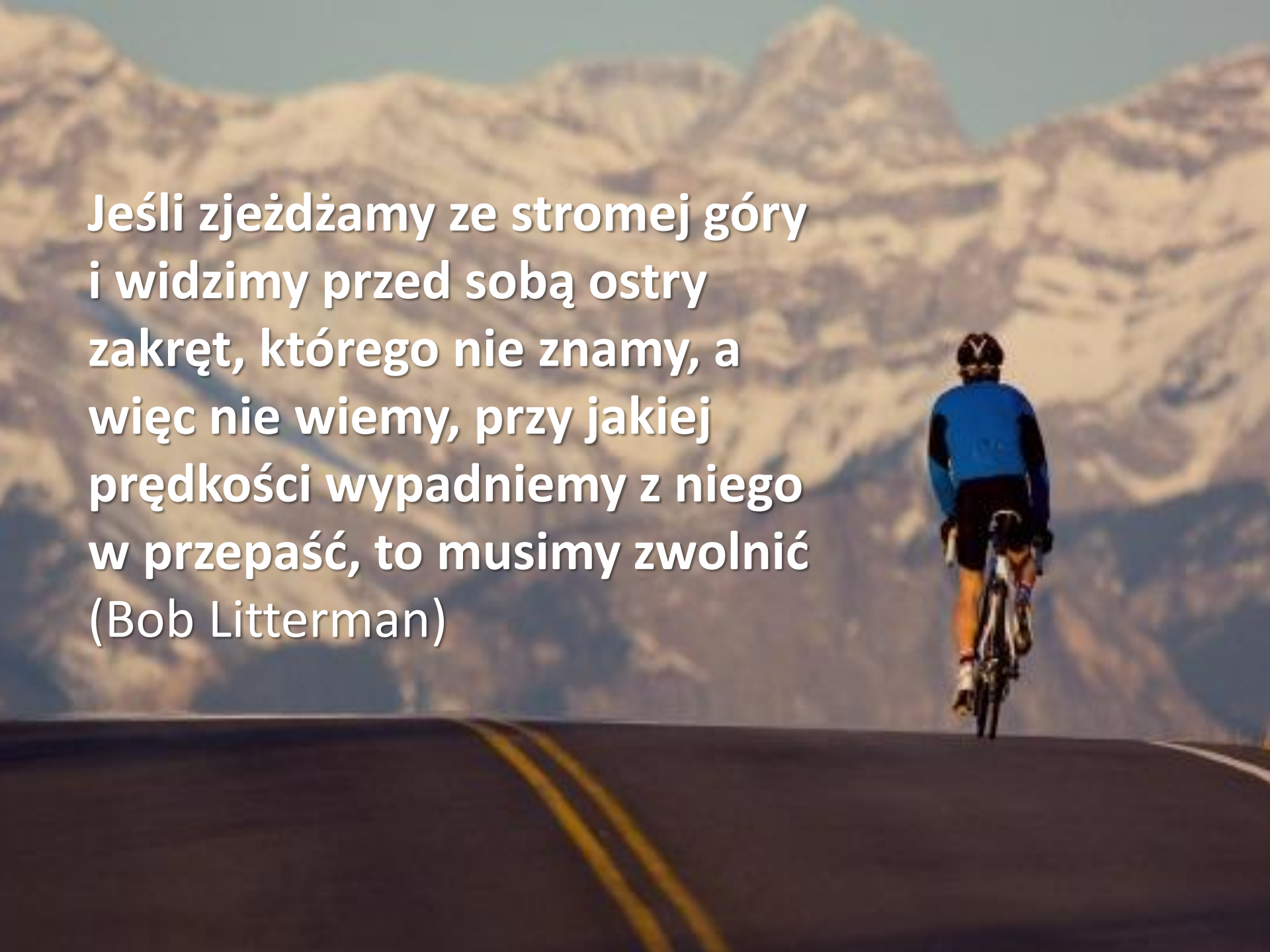
- This appears sadly **unlikely**. Therefore, climate policies deserve to be evaluated with **negative discount rate**.

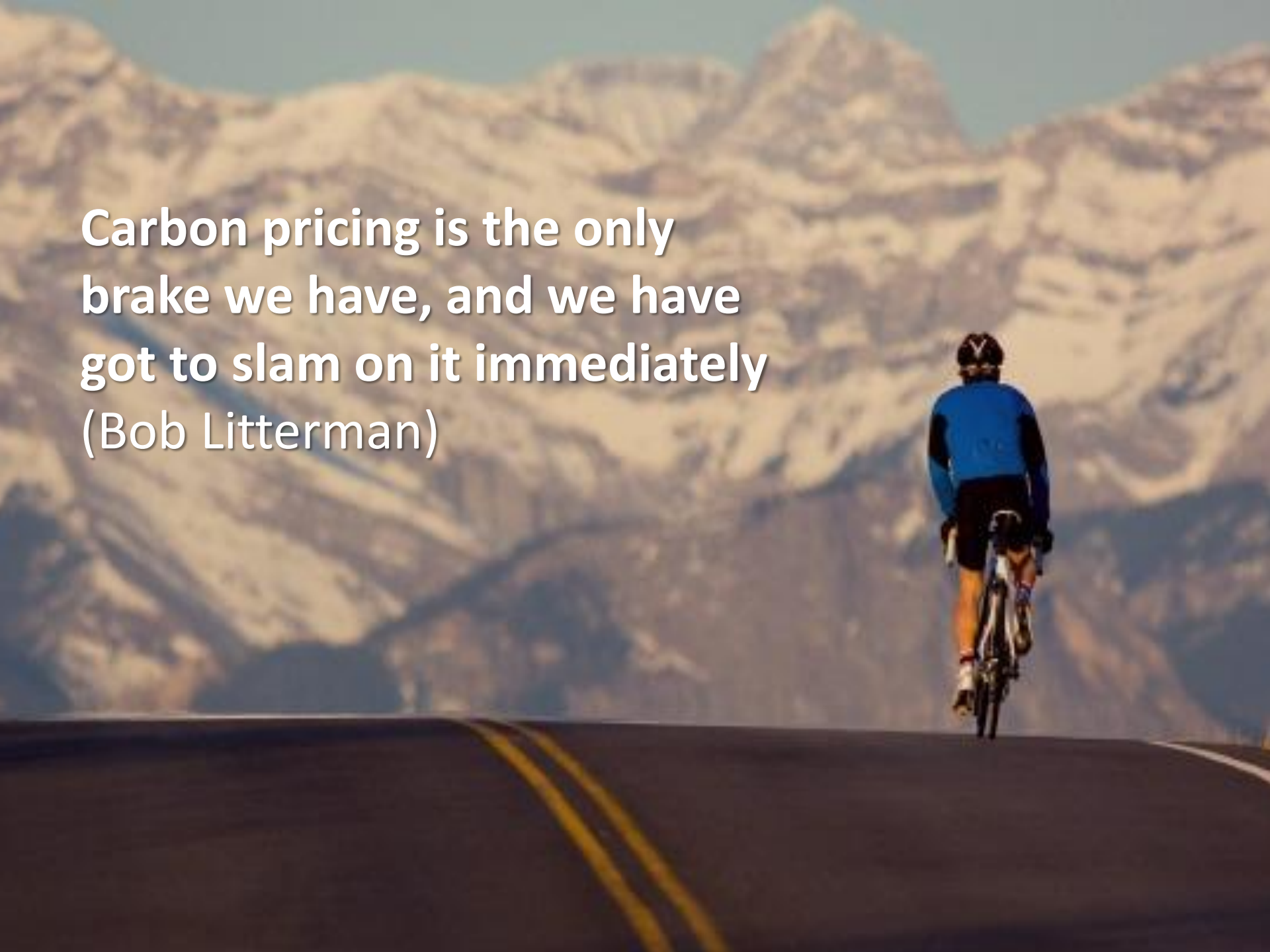
Marc Fleurbaey, Stephane Zuber (2013). „Climate policies deserve a negative interest rate", *Chicago Journal of International Law*, vol. 13, No. 2

Dwa ulubione porównania Roberta Littermana



Nie wiemy dokładnie, ile dwutlenku węgla jest może jeszcze wchłonąć atmosfera zanim skokowo przyspieszy proces pogarszania się klimatu.


Jeśli zjeżdżamy ze stromej góry i widzimy przed sobą ostry zakręt, którego nie znamy, a więc nie wiemy, przy jakiej prędkości wypadniemy z niego w przepaść, to musimy zwolnić
(Bob Litterman)


Carbon pricing is the only brake we have, and we have got to slam on it immediately
(Bob Litterman)

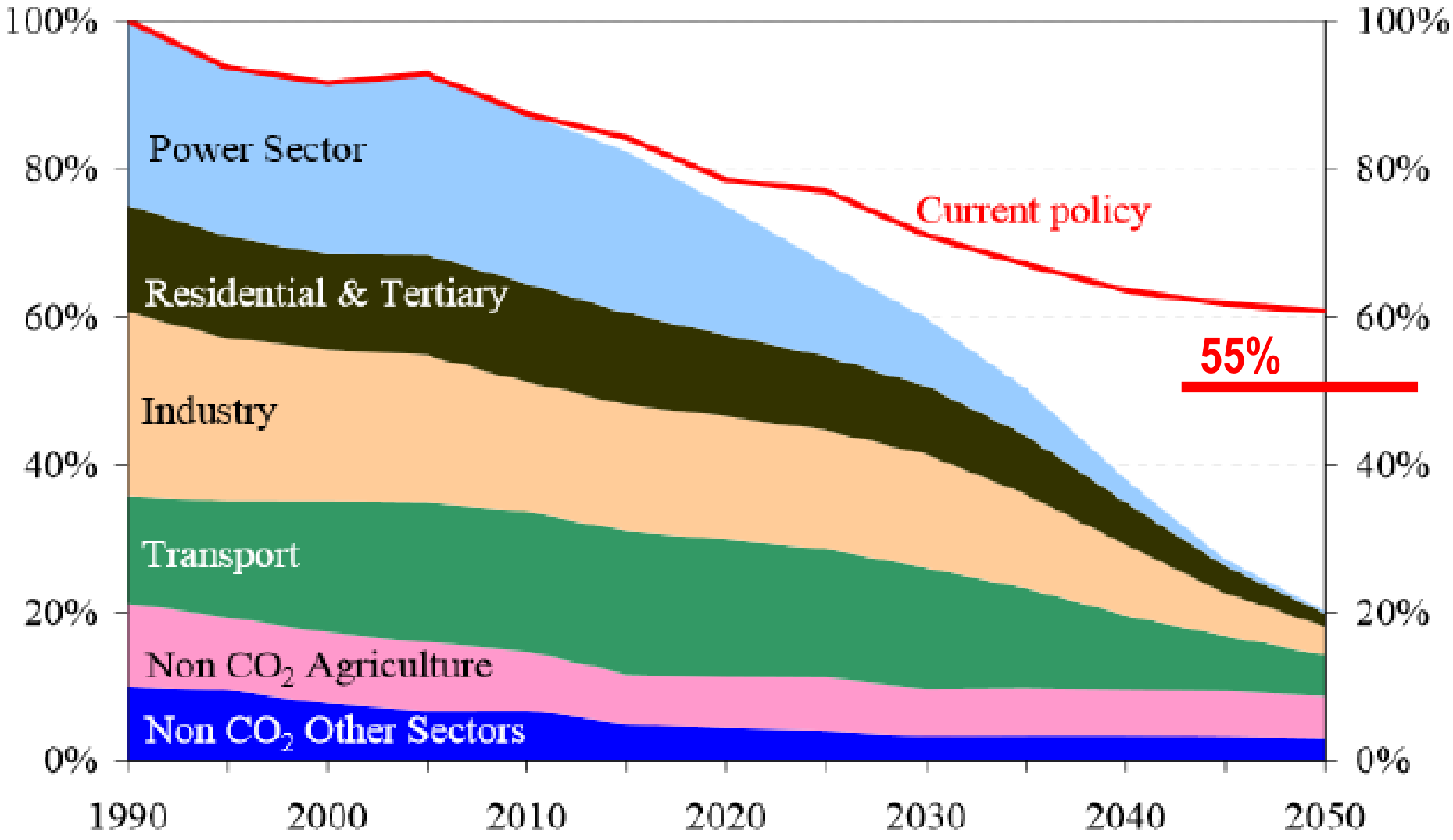
Co trzeba robić, gdy nie wiemy, jaka powinna być optymalna cena 1 tony CO2?

- The classic **alternate approach** in the face of uncertainty is the **cap-and-trade programme**, which involves **mandatory emission targets**.

- **NT2NZCO2** (**Near-Term to Net Zero**) **prices** are designed to accumulate uncertainties and measurement difficulties and to align with real-world policy objectives.

Noah Kaufman, Alexander R. Barron, Wojciech Krawczyk, Haewon McJeoan (2020) „”A near-term to net zero alterntaive

Figure 15: 2050 EU carbon emissions targets by source



Source: European Commission (2011)[95]

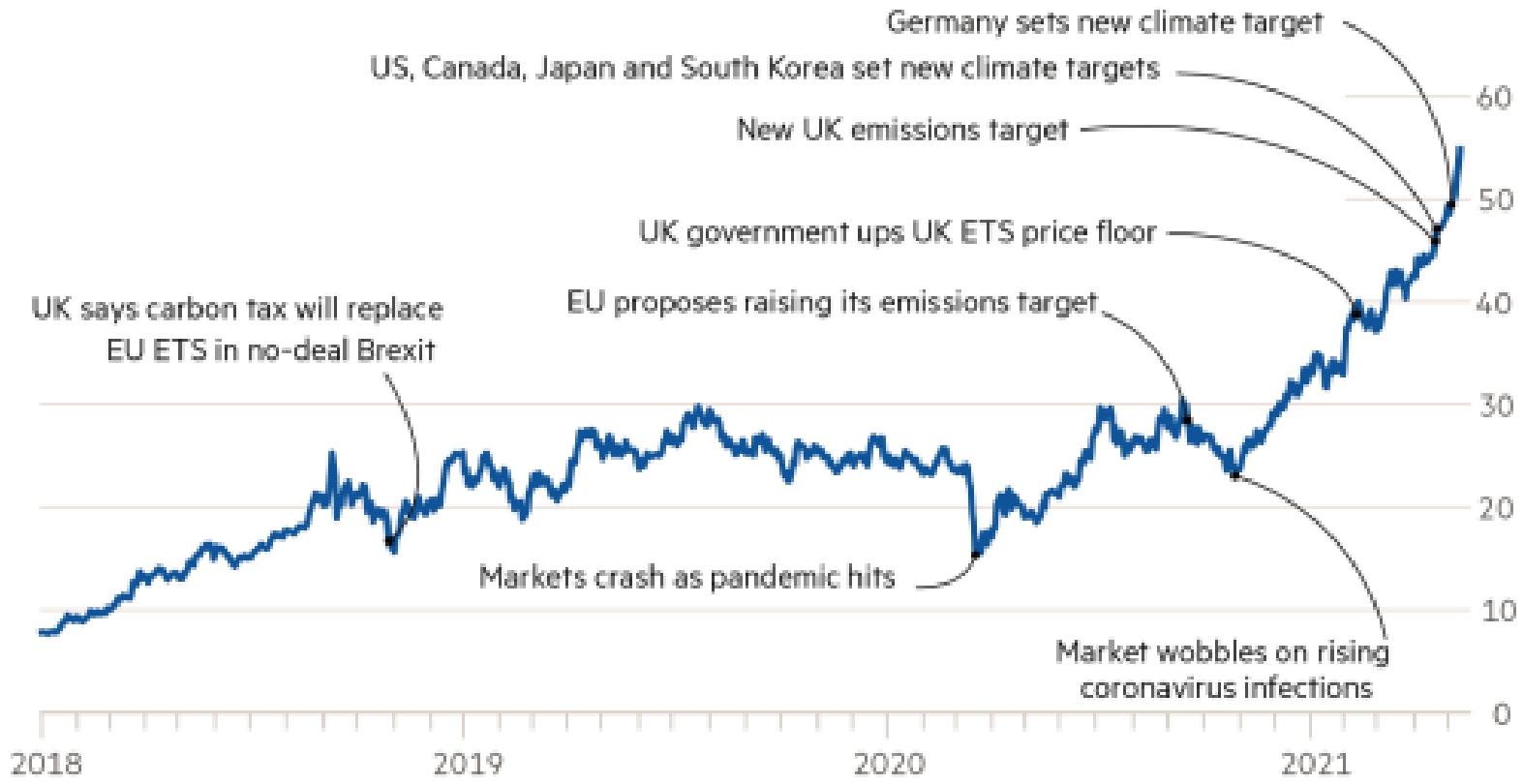
- The **NT2NZ** approach **does not attempt** to set CO2 prices by perfectly balancing costs and benefits, so it does not satisfy the definition of an **optimal** CO2 price.
- **Instead** it **enables** policymakers to consider both qualitative and quantitative **information about** climate **science** and **economics** when selecting a net-zero target.
- Rynek „informuje” nas, przy jakiej cenie możliwie jest osiągnięcie przyjętego pułapu.

Noah Kaufman, Alexander R. Barron, Wojciech Krawczyk, Haewon McJeoan (2020) „”A near-term to net zero alterntaive

Czy
ceny pozwoleń na emisję CO2
będą rosnąć?

The EU carbon price has soared this year as governments have upped their climate pledges

Closing price of allowances traded under the EU ETS



Source: Refinitiv

Financial Times (2021).”UK carbon trading system likely to lead to government intervention, traders warn”, May 17

Jak można wykorzystać informacyjną efektywność rynków kapitałowych w polityce klimatycznej?

- Climate policy should also **take advantage of the informational efficiency of financial markets** as postulated by the Efficient Market Hypothesis, which assumes that asset prices discount all available information and change in response to **new data** that diverge from expectations. Accordingly, the reporting standards that require firms to provide information on **how a progressively tighter climate policy** is likely to **influence** their **profit margins** will lead to a steady decline in the relative stock prices **of firms with a large carbon footprint**, a factor which has yet to be fully taken into account by investors (Buckley et al. 2019). As a result, capital flows will be redirected to investment in clean technologies (CRMRS 2020).

Chmielewska, Sławiński (2021)

Summary of Shareholders' Value Loss by BlackRock Jan. '09 - Mar. '19

	Company	Country of Domicile	Value Loss in Millions	Currency	US$ in Millions
Major Oil & Gas Companies	Exxon Mobil	USA	$ 45,116	USD	$ 45,116
	Chevron	USA	$ 12,364	USD	$ 12,364
	Royal Dutch Shell	Netherlands	€ 1,856	EUR	$ 2,097
	BP	UK	£ 2,590	GBP	$ 3,367
Europe and USA Power Utilities	E.ON	Germany	€ 1,933	EUR	$ 2,184
	RWE	Germany	€ 964	EUR	$ 1,089
	Iberdrola	Spain	€ (200)	EUR	$ (226)
	NextEra	USA	$ (894)	USD	$ (894)
	Duke Energy	USA	$ 992	USD	$ 992
	PG&E	USA	$ 1,722	USD	$ 1,722
USA Coal Mining	Peabody Energy	USA	$ 2,316	USD	$ 2,316
	Cloud Peak	USA	$ 199	USD	$ 199
Thermal Turbine Manufacturers	GE	USA	$ 19,080	USD	$ 19,080
	Doosan	South Korea	₩ 40,410	KRW	$ 34
	Siemens	Germany	€ 417	EUR	$ 471
	Mitsubishi Heavy Industries	Japan	¥ 8,280	JPY	$ 76
Asian Power Utilities	Chubu Electric	Japan	¥ 21,679	JPY	$ 199
	China Light & Power	Hong Kong	$ 211	HKD	$ 27
	KEPCO	South Korea	₩ 56,575	KRW	$ 48
	Huaneng Power International	China	¥ 46	CNY	$ 7
	NTPC	India	₹ 7,387	INR	$ 103
				Total	**$ 90,373**

Source: Thomson Reuters, IEEFA estimates.

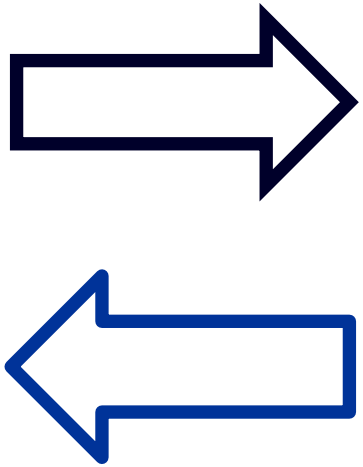
Tim Buckley et.al (2019)."Inaction is BlackRock's Biggest Risk During the Energy Transition", Institute for Energy Economics and Financial Analysis,

Czy można osiągnąć zyski „grając” na relatywy spadek cen spółek emitujących duże ilości CO2?

Stranded Assets Total Return Swap

(zakład o to, że spadną ceny spółek z dużym śladem węglowym)

Portfel z udziałem akcji spółek, których zyski mogą się zmniejszyć w wyniku zmian w polityce klimatycznej – jakkolwiek jest to portfel z niskim błędem odwzorowania



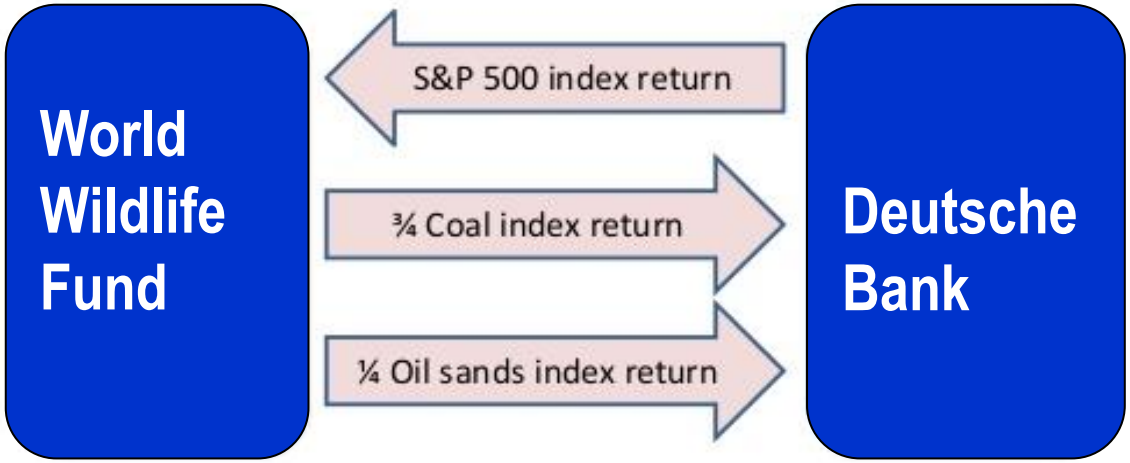
Portfel rynkowy

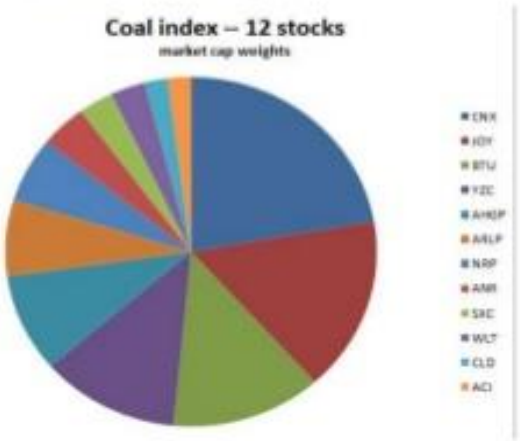
Druga strona gra na to, że przyszłe zmiany polityki klimatycznej

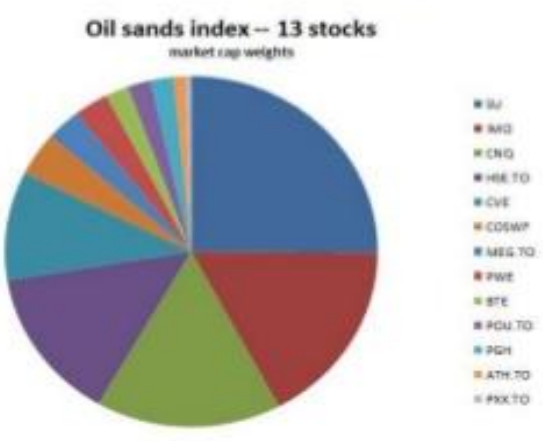
albo są już uwzględnione w cenach akcji

albo zmiany nastąpią później niż rynki oczekują

Stranded Assets Total Return Swap

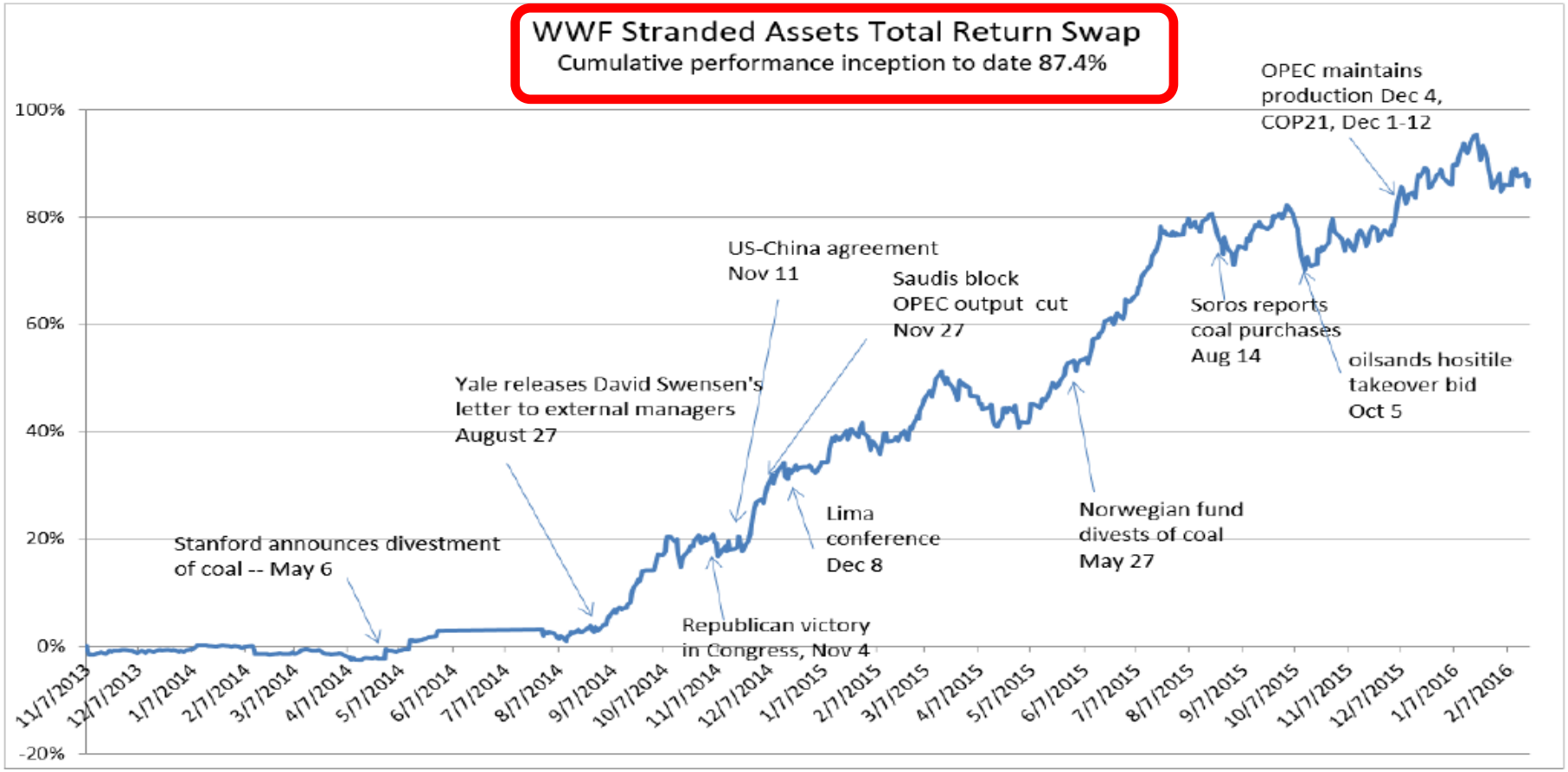






Bob Litterman(2016).”A Pragmatic Approach to Climate Change”, Minnesota Center for Financial and Actuarial Approach

Increasing Expectations of Emissions Pricing?



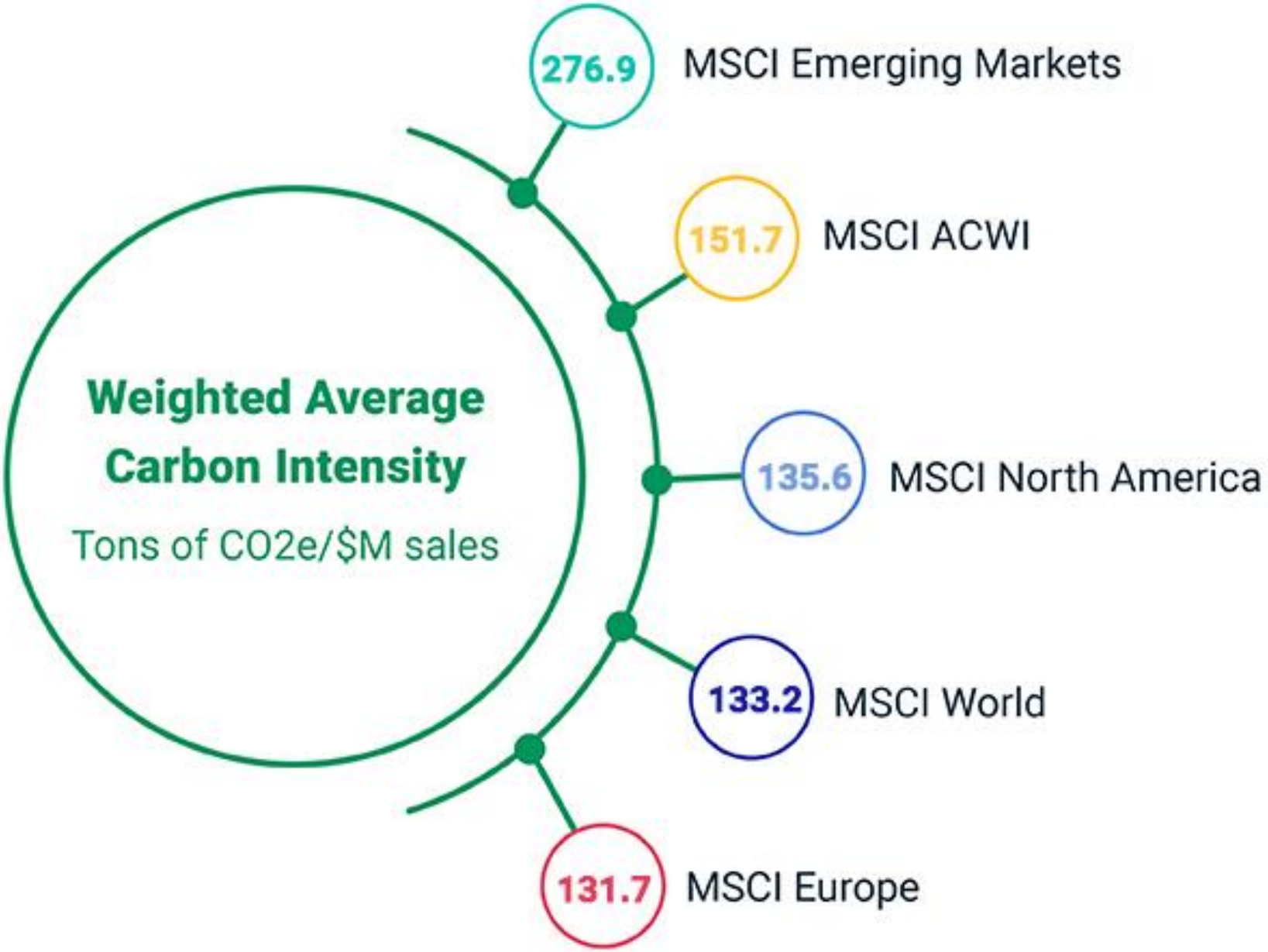
- Stranded Assets underperformed the S&P 500 by 33% last year
- In the previous 3 years, the annualized underperformance was 18%

Bob Litterman(2016).”A Pragmatic Approach to Climate Change”, Minnesota Center for Financial and Actuarial Approach

CUMULATIVE INDEX PERFORMANCE – GROSS RETURNS (USD)
(NOV 2010 – SEP 2021)

(**M**organ **S**tanley **I**nternational **C**apital)

https://www.msci.com/documents/10199/63917e37-a1c1-41c6-8d2e-cdf6c4416bfc


Weighted Average Carbon Intensity
Tons of CO2e/$M sales
276.9
MSCI Emerging Markets
151.7
MSCI ACWI
135.6
MSCI North America
133.2
MSCI World
131.7
MSCI Europe

MANAGING CLIMATE RISK IN THE U.S. FINANCIAL SYSTEM

Report of the Climate-Related Market Risk Subcommittee,
Market Risk Advisory Committee of the
U.S. Commodity Futures Trading Commission

Commissioner Rostin Behnam, Sponsor

Bob Litterman, Chairman

2.

Od czego zależą stopy zwrotu z akcji?

CAPM

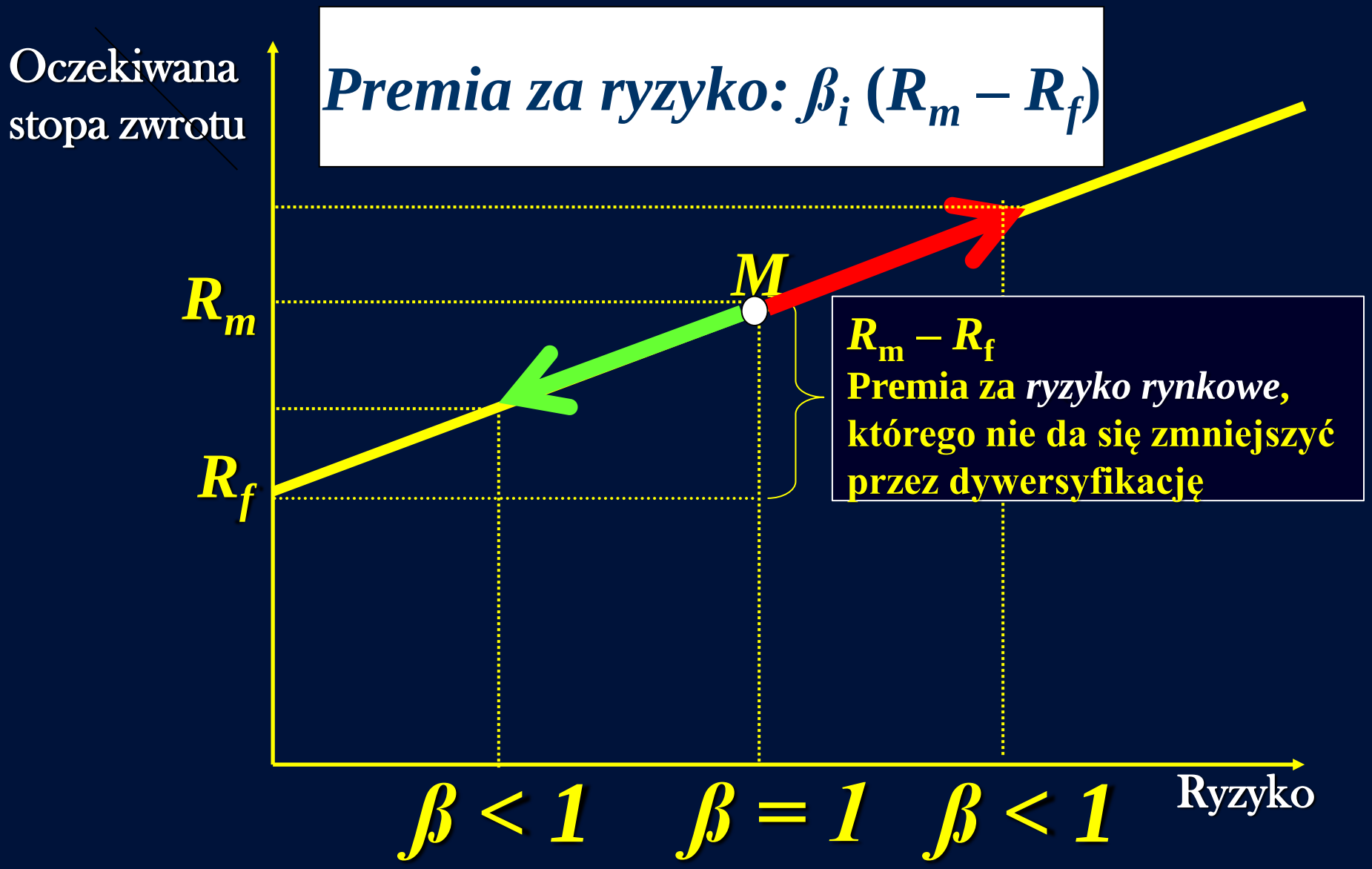
- W sytuacji, w której **aktywa** na rynku kapitałowym **są efektywnie wycenione**,
- **nie można systematycznie osiągać zysków z** wykorzystywania **anomalii cenowych**
- Tym samym **stopa zwrotu** odzwierciedla **premię za ryzyko**

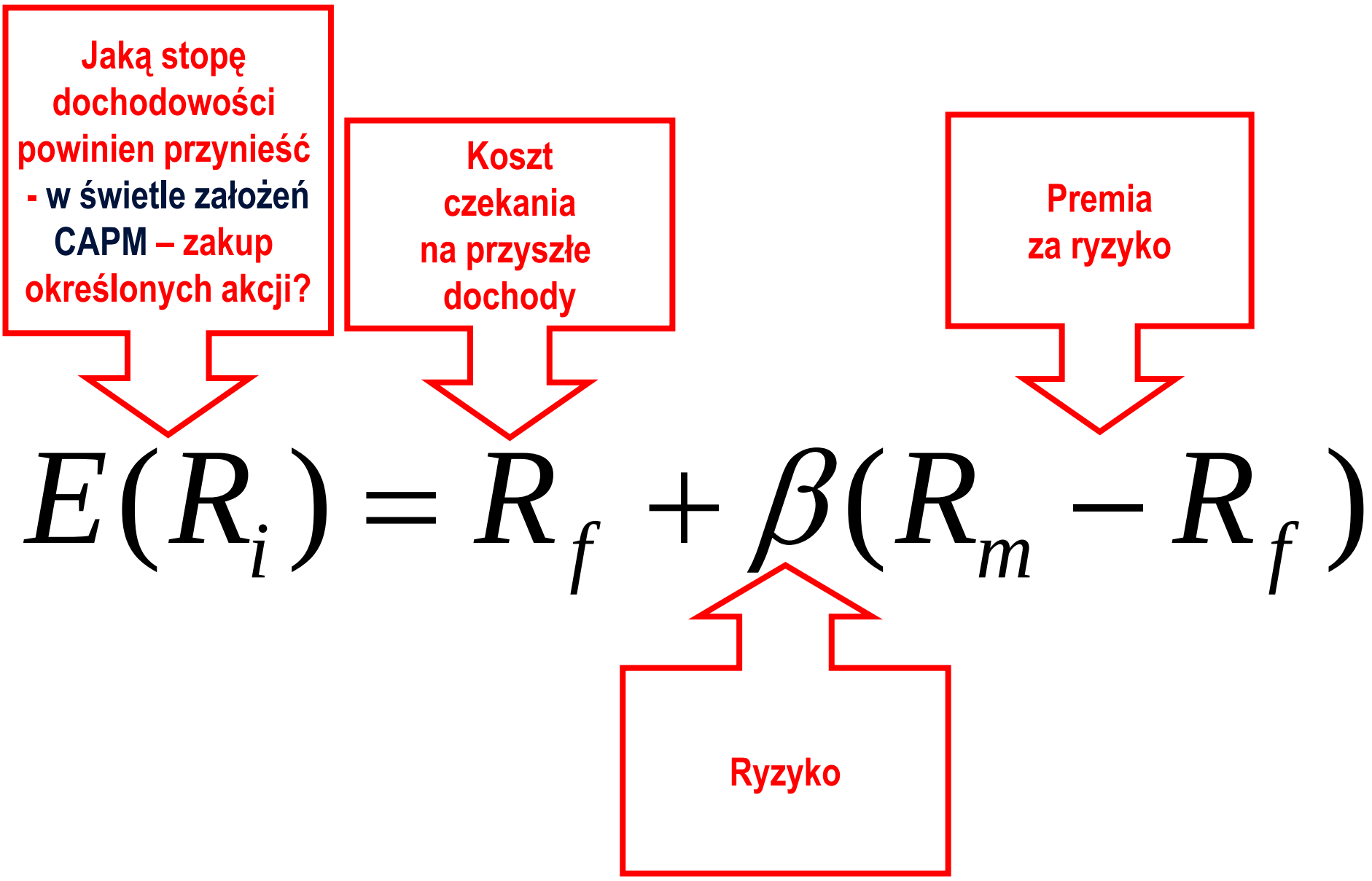

Ryzyko
Stopa zwrotu

Stopa zwrotu
z portfela
rynkowego

oferującego optymalną relację
stopy zwrotu do ryzyka

Linia papierów wartościowych (SML)




Jaką stopę dochodowości powinien przynieść - w świetle założeń CAPM – zakup określonych akcji?
Koszt czekania na przyszłe dochody
Premia za ryzyko
$E(R_i) = R_f + \beta(R_m - R_f)$
Ryzyko

- The central result of the **CAPM model** is that the **risk premium** for any asset **depends on covariance** between it returns and the returns of the market, a parameter we call „beta”

- **Assets** whose returns tend to **pay off in good times** when market return is positive are **more risky** and thus **less valuable**.

- **Assets** that **pay off in bad times** have an insurance property that makes them **more valuable** and requires a **lower risk premium**.

Bob Litterman (2013)

- Linia papierów wartościowych (SML) to ich „**cennik**”

- mówiący, jakie ryzyko trzeba podjąć, by móc liczyć na określoną oczekiwaną **stopę zwrotu**

Jeśli arbitraż dostosowuje ceny akcji do ich wartości fundamentalnej, to dostosowuje także ich stopy zwrotu do wielkości podejmowanego ryzyka

3.

Skąd bierze się współzmienność indeksów w różnych krajach?

Globalizacja

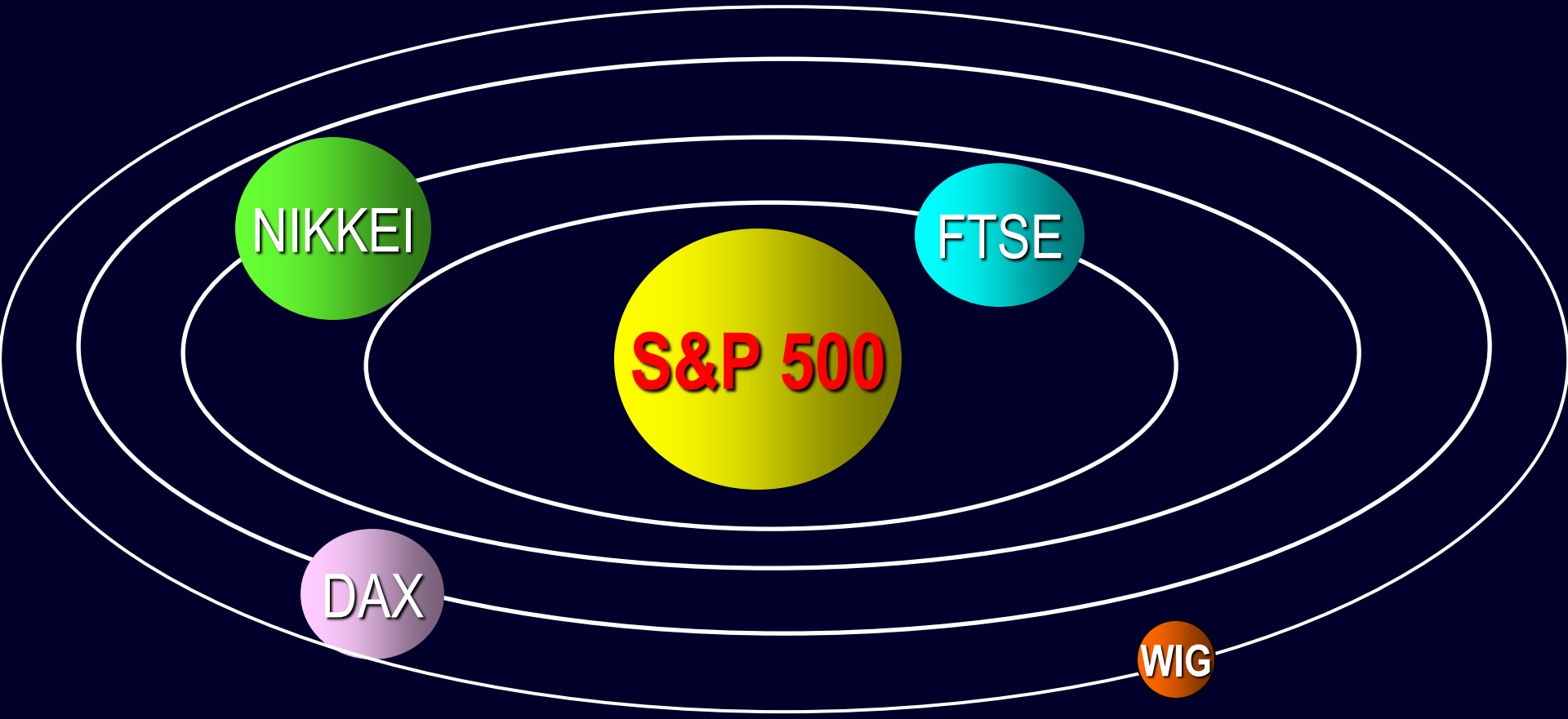
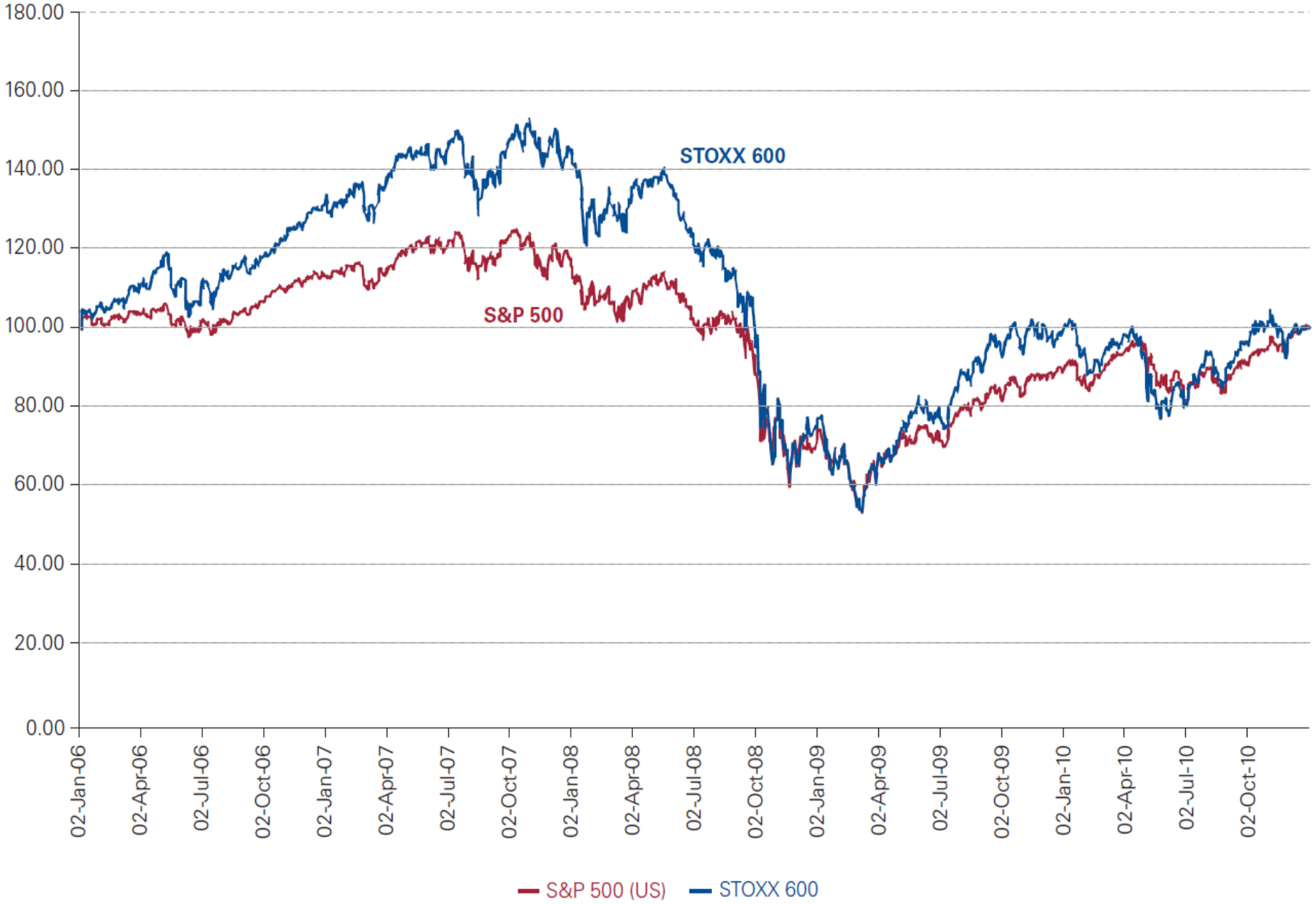
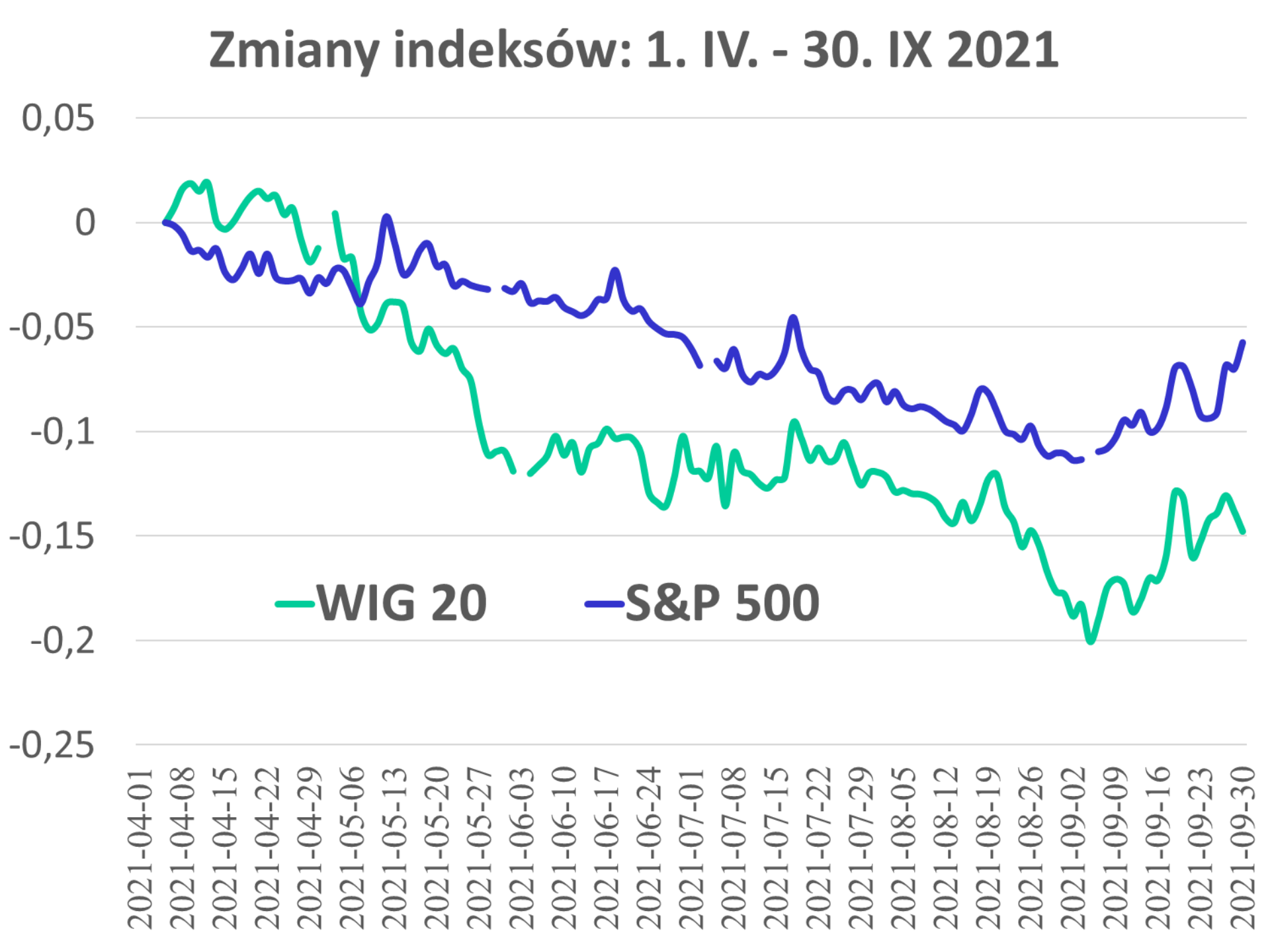


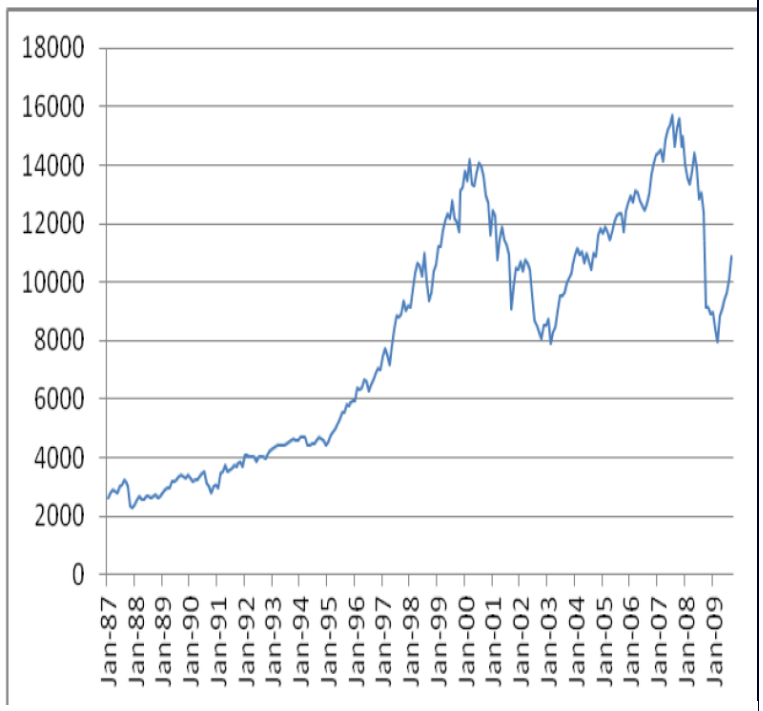
Figure 1: S&P 500 vs. STOXX 600: market prices between 31 Dec. 2005 and 31 Dec. 2010



Source: (http://www.factset.com/): FactSet


Zmiany indeksów: 1. IV. - 30. IX 2021
0,05
0
-0,05
-0,1
-0,15
-0,2
-0,25
WIG 20
S&P 500
2021-04-01
2021-04-08
2021-04-15
2021-04-22
2021-04-29
2021-05-06
2021-05-13
2021-05-20
2021-05-27
2021-06-03
2021-06-10
2021-06-17
2021-06-24
2021-07-01
2021-07-08
2021-07-15
2021-07-22
2021-07-29
2021-08-05
2021-08-12
2021-08-19
2021-08-26
2021-09-02
2021-09-09
2021-09-16
2021-09-23
2021-09-30

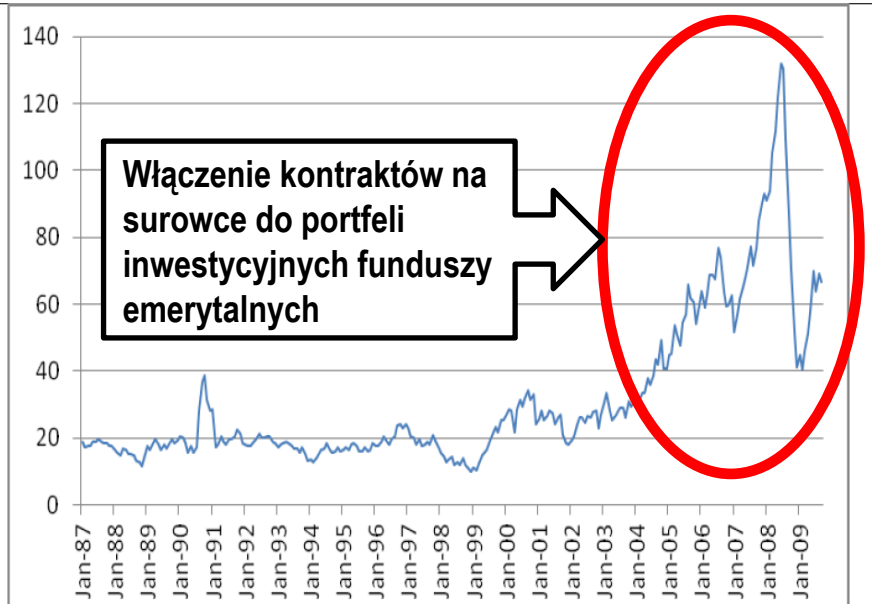
USA: Dow Jones Industrial Index



Germany: DAX 30 Index

Netherlands: AEX General Index

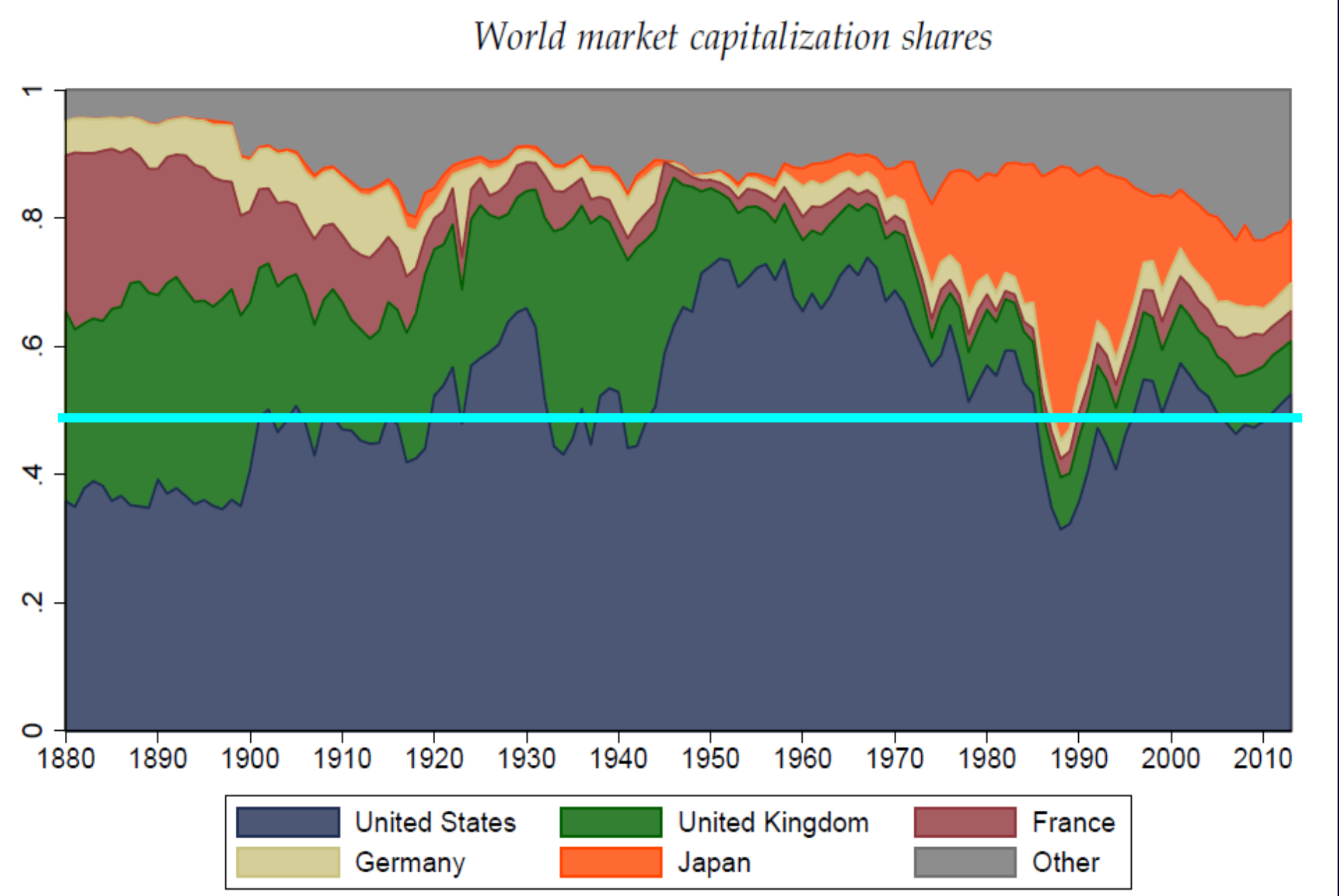
FIGURE 1. Brent crude oil price, in dollars, from January 1987 to September 2009.



Share of US equity held by euro area investors

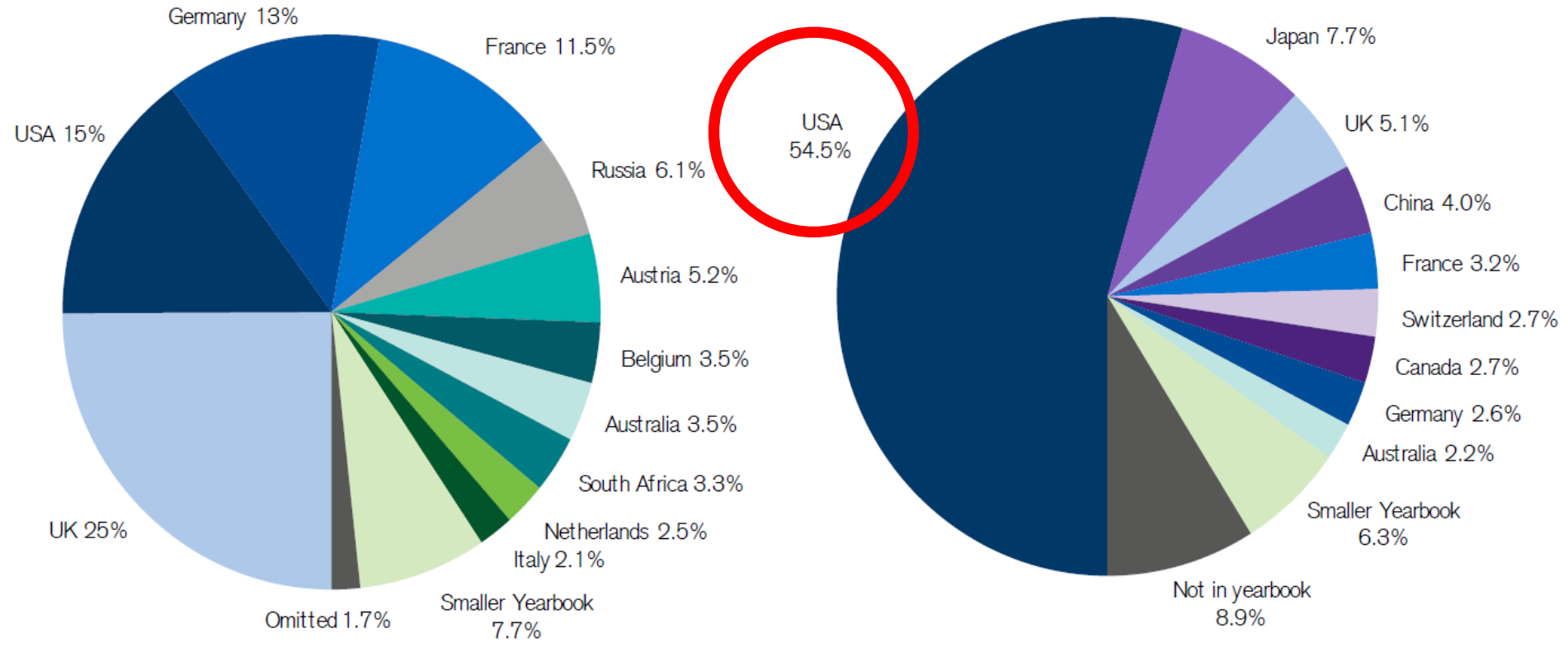
euro area	45.8
Austria	48.2
Belgium	44.8
France	42.5
Germany	45.5
Italy	44.8
Luxembourg	42.7
Netherlands	54.6
Finland	31.8
Greece	40.0
Ireland	46.8
Portugal	41.3
Spain	32.4

Source: Lane and Milesi-Ferretti (2005).



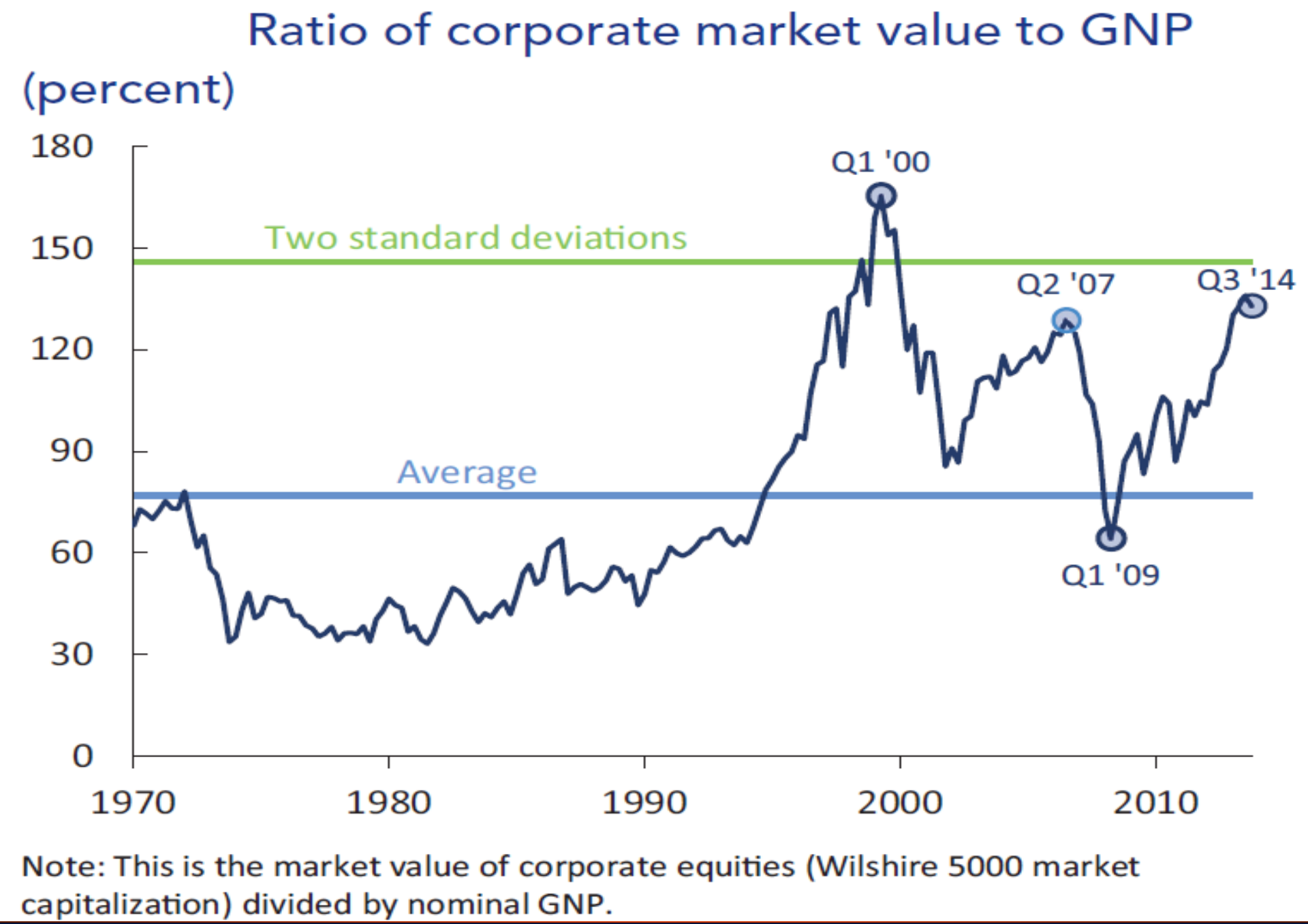
D. Kuvshinov, K. Zimmerman (2018) „in the Long Run", EHES Working Papers in History No. 136

Figure 10: Relative sizes of world stock markets, end-1899 (left) versus start-2020 (right)



Source: MSCI, FTSE Russell, S&P, Elroy Dimson, Paul Marsh, and Mike Staunton. Not to be reproduced without express written permission from the authors.

Dlaczego ulubionym wskaźnikiem Warrena Buffeta jest relacja kapitalizacji rynku do GNP?

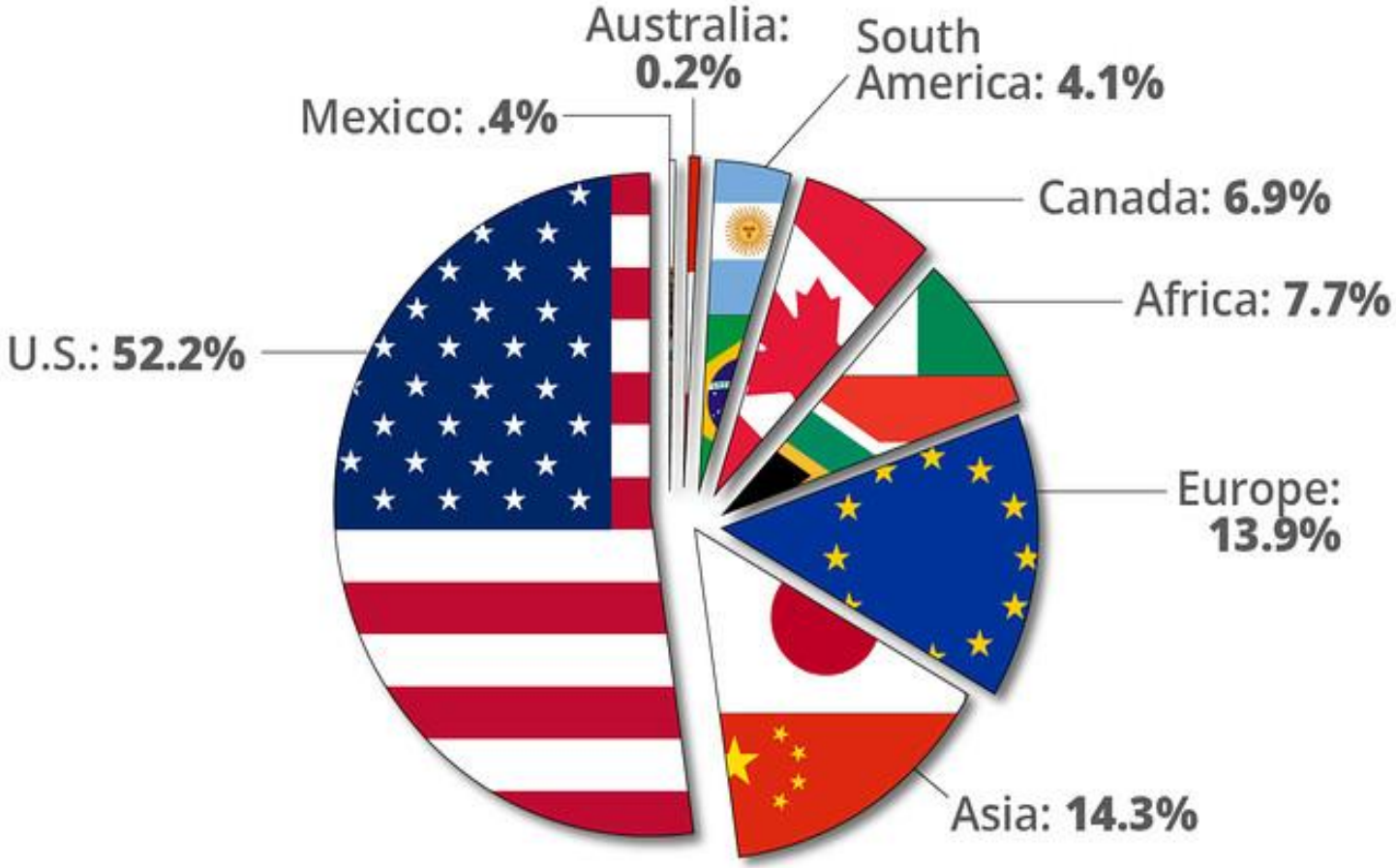


Note: This is the market value of corporate equities (Wilshire 5000 market capitalization) divided by nominal GNP.

Ted Berg (2015). Quicksilver Markets, Office of Fianncial Reseaerch, 17 March

Dlaczego Buffet kupuje tylko spółki amerykańskie?

Estimated percent of S&P 500 company sales



Source: S&P Dow Jones Indices/Author calculations

Jaka jest z korzyść
z międzynarodowej dywersyfikacji
portfeli akcji?

- The word's capital markets are **not fully integrated**. A possible way to achieve above-average returns is international diversification.

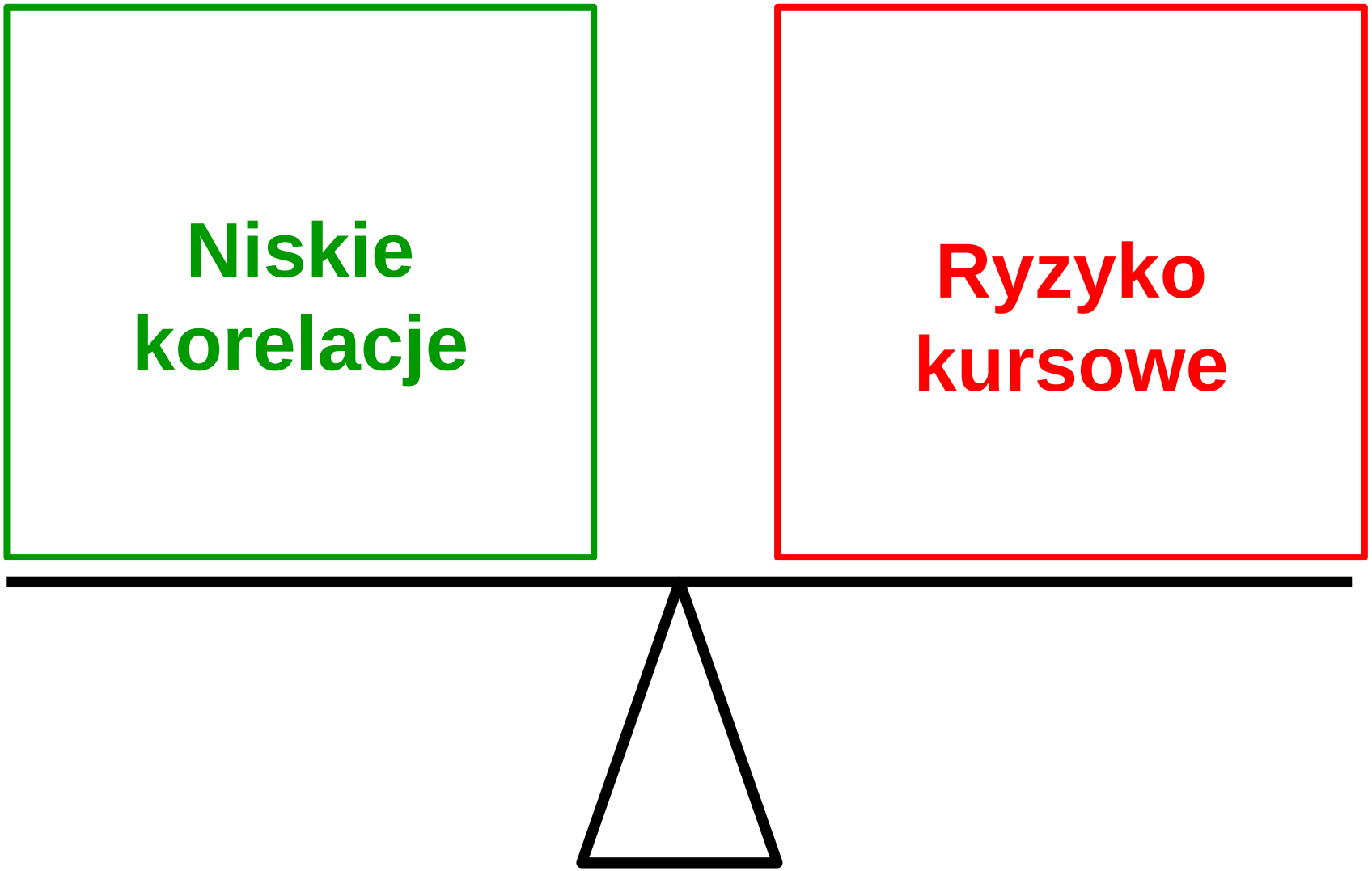
- There is a possibility of added **risk** **from unanticipated changes in exchange rate**.

- Benefits from international diversification have **declined in recent years**.

- **No country consistently** outperform another. Investing in various markets seems to be the best solutions.

T. Miziołek, E. Feder-Sempach, A. Zaremba, International Equity Exchange Traded Funds (2020)

Co może zmniejszyć korzyści z międzynarodowej dywersyfikacji aktywów?

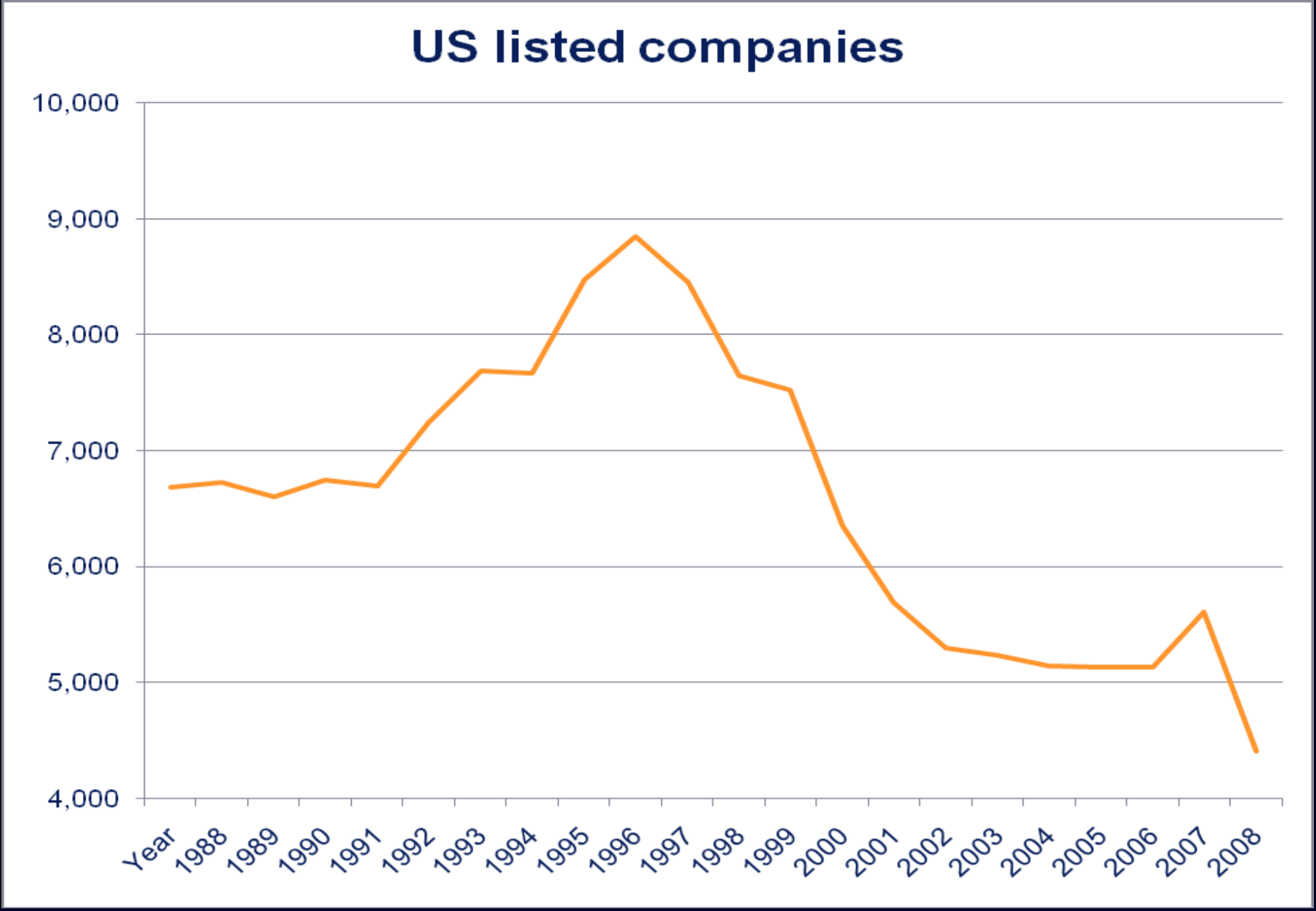

Niskie
korelacje
Ryzyko
kursowe

Dlaczego maleje liczba spółek notowanych na giełdzie w Nowym Jorku?

- **While the United States had more than 8,800 domestic companies listed on stock markets in 1997, it had only 4,100 fifteen years later.**

- **Germany has a robust export-oriented economy with far fewer public corporations than the US. Indeed with fewer than 600 companies listing shares.**

Gerald F. Davis (2013) Shareholder Value and the Job Crisis, *American Management*, Summer



Gerald F. Davis (2013, „After the Corporation", Politics and Society, vol. 41, issue 2

Dlaczego firmy IT coraz mniej potrzebują giełdy dla pozyskania kapitału?

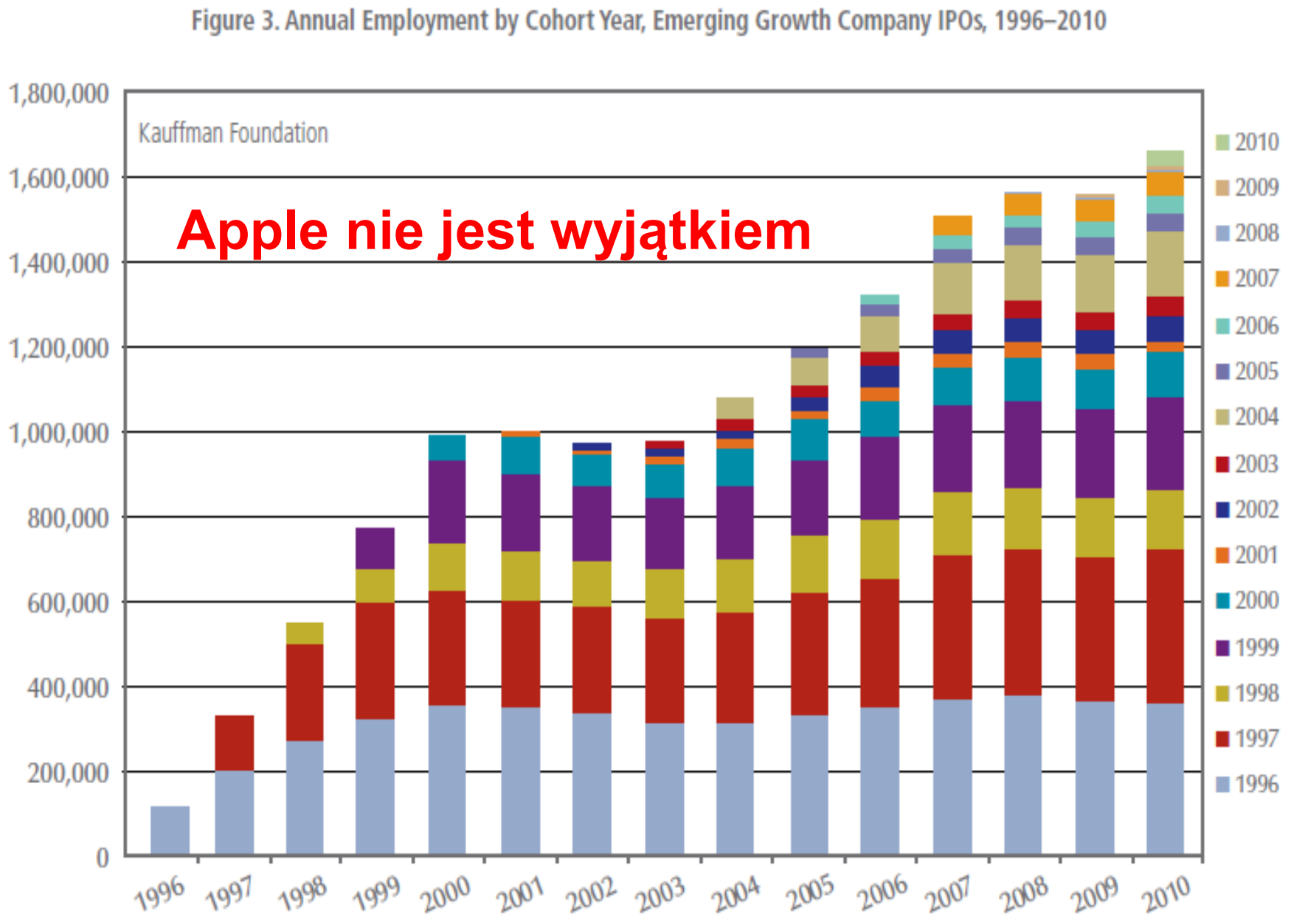
- Rosnąca rola **aktywów niematerialnych**,
- **Outsourcing i offshoring** (pozbywanie się mniej dochodowych faz produkcji i sprzedaży)

- Today, nearly all of **Apple's** products are assembled in Chinese factories **owned by Taiwanese** parent companies.

- The **largest** corporation in the United States in terms of stock market value, it was only **75th** in employment.

- **Operating** a **large public corporation** is costly. In many industries, the economic benefits may **no longer justify expense**.

Gerald F. Davis (2013) Shareholder Value and the Job Crisis, *American Management*, Summer



Kenney, D. Patton, J. R. Ritter, (2012) *Post-IPO Employment and Revenue Growth for U.S. IPOs*, Report for the Kauffman Foundation, May

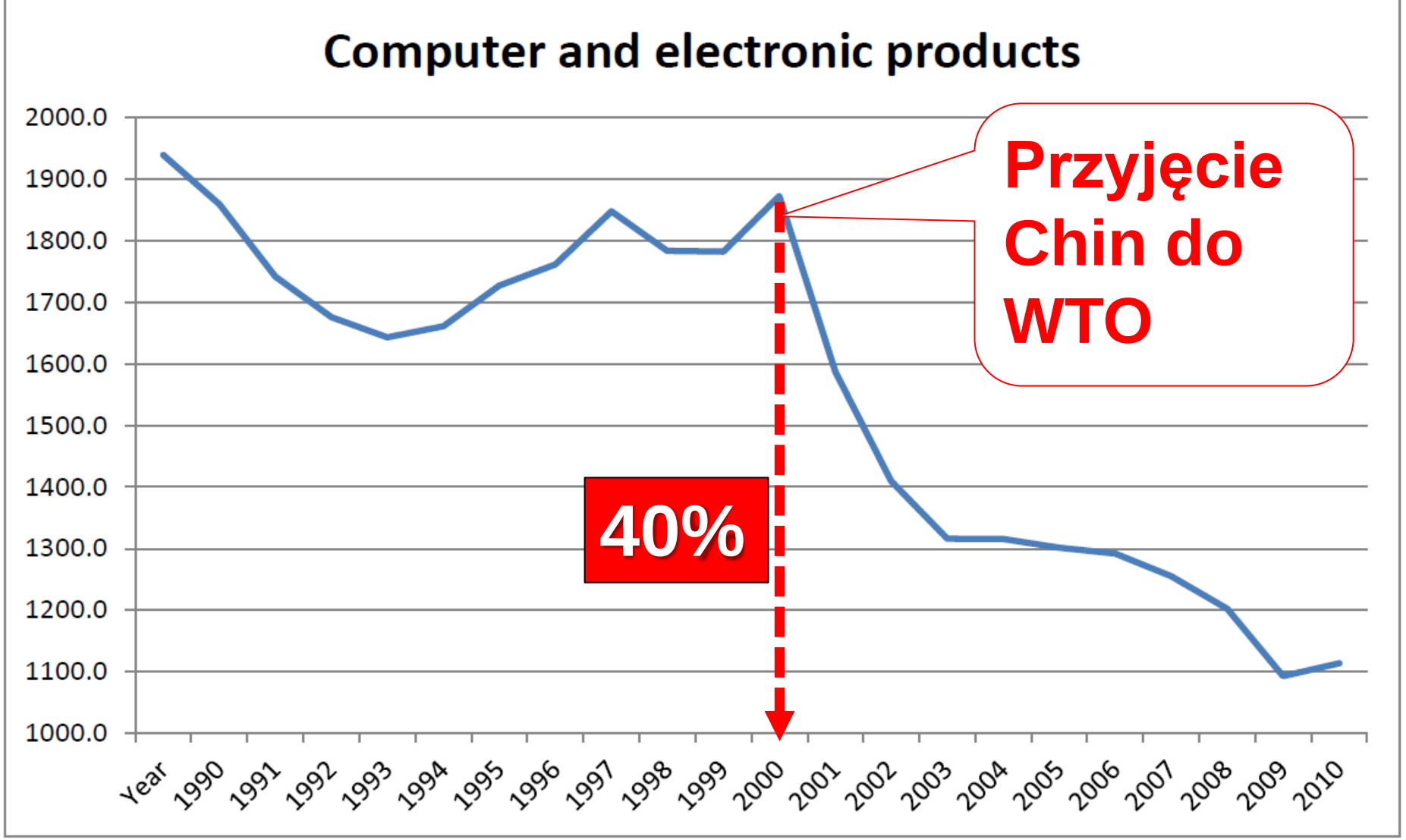


Figure 1: Employment in "Computer and electronic products" industry in thousands, 1988-2011. (Source: Bureau of Labor Statistics)

Gerald F. Davis (2013), „After the Corporation", Politics and Society, vol. 41, issue 2

Po co Facebook emituje akcje, skoro – mając bardzo duże zyski – nie potrzebuje kapitału?

- „we do not have currently any specific uses of net proceeds planned…Pending other uses, we intend to invest the proceeds to us in investment-grade, interest-bearing securities…or hold as cash”

- …they need to satisfy their early investors an employees who want cash out, not because they need capital to grow their business

Gerald F. Davis (2013), „After the Corporation”, Politics and Society, vol. 41, issue 2