University of Zurich[UZH]

Agent-based Financial Economics
Lesson 9: Leverage

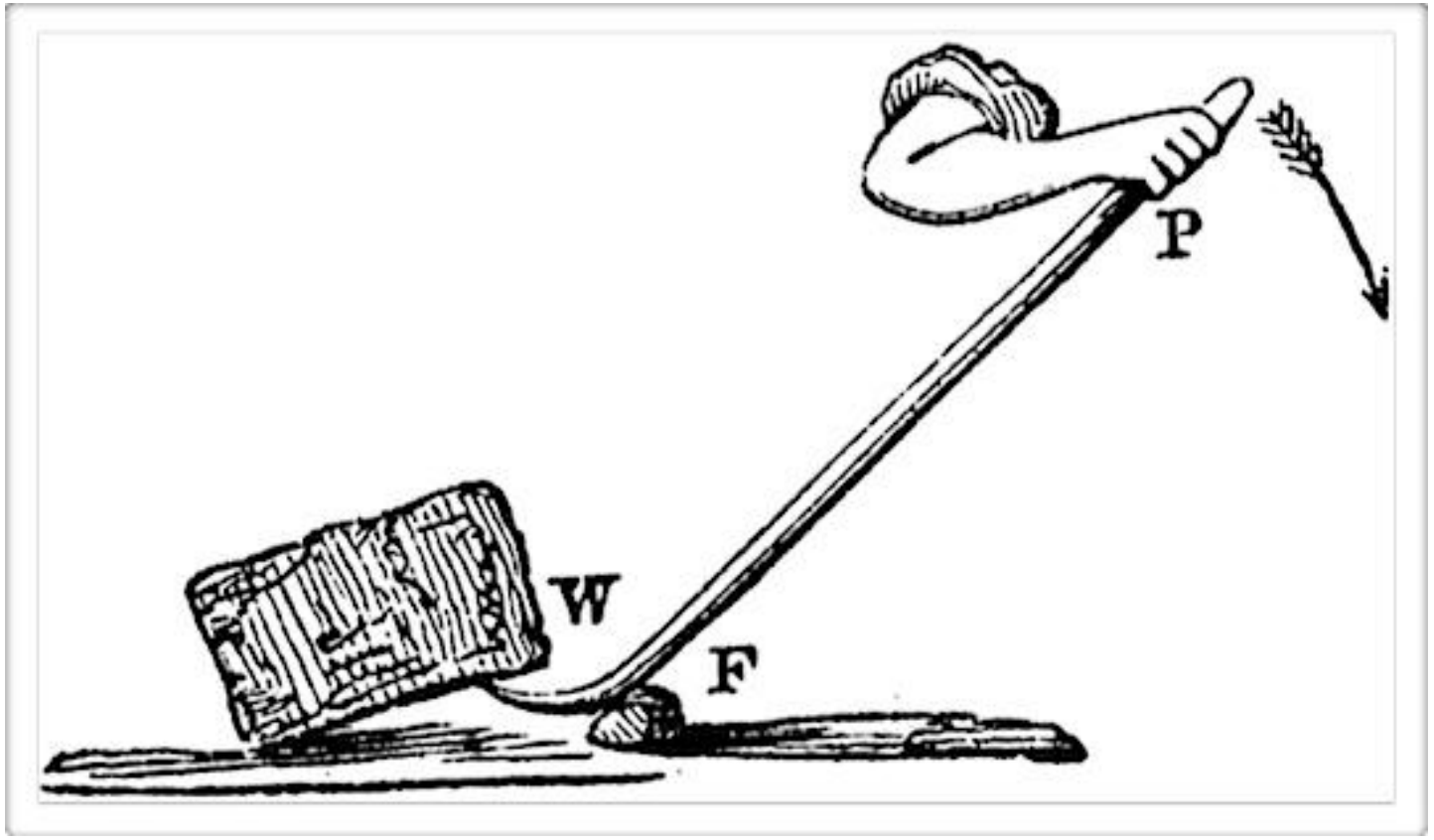
Luzius Meisser, Prof. Thorsten Hens

luzius@meissereconomics.com

"What I cannot create, I do not understand."

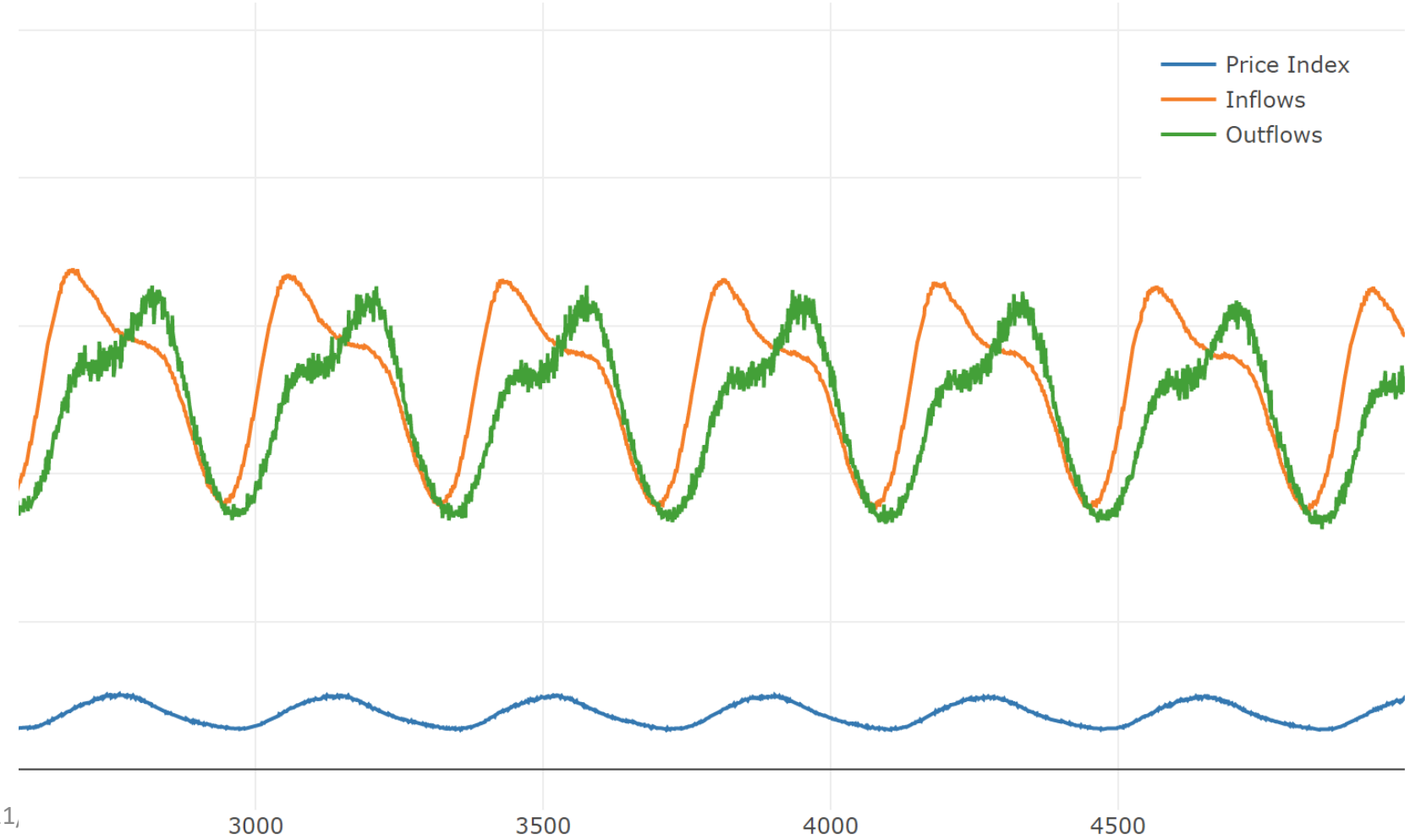
- Richard Feynman

Today



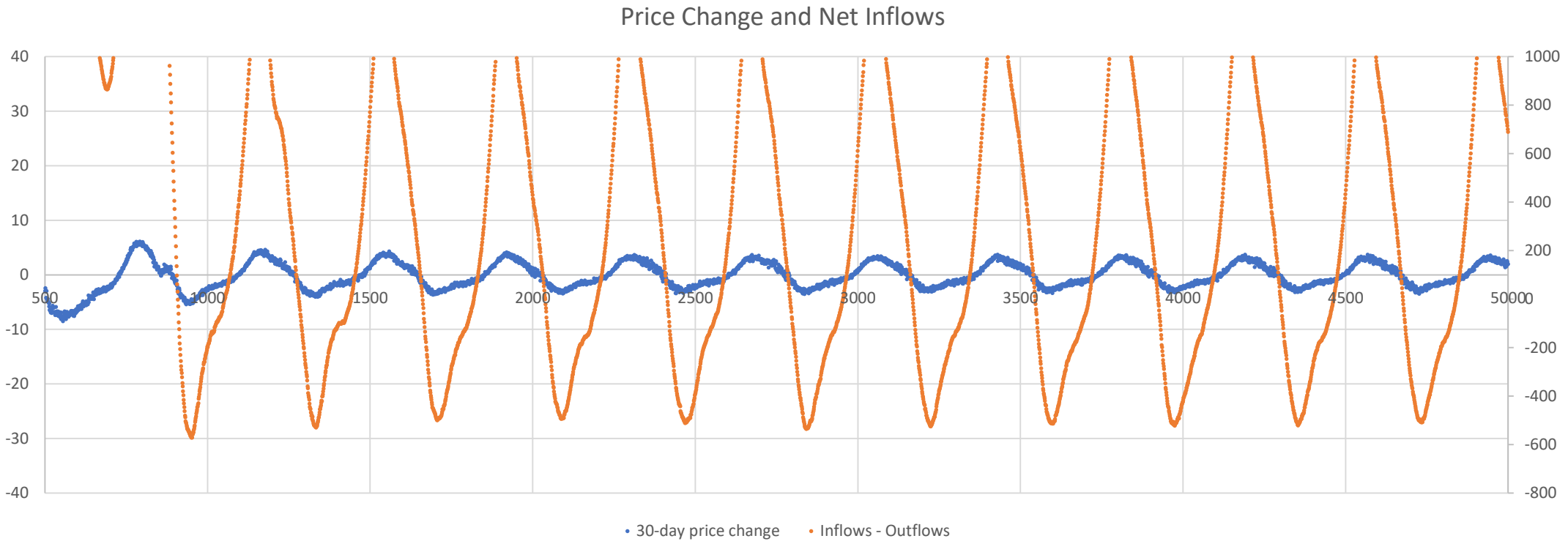
- Discussion of Exercise 5
- Discussion of leverage paper by Farmer et al.
- Diving into the code, discussing ideas for your agents

Exercise 5 - Discussion



$$p_{t+1} = p_t + \lambda(B_t - S_t)$$

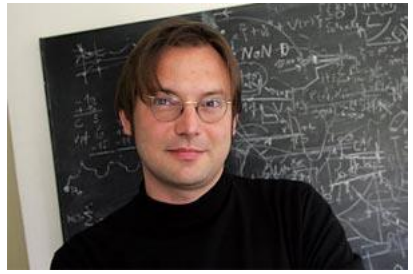
Exercise 5 - Discussion



Exercise 5 - Discussion

SUMMARY OUTPUT									
Regression Statistics									
Multiple R	0.977813								
R Square	0.956117								
Adjusted R Square	0.956106								
Standard Error	0.436357								
Observations	4002								
ANOVA									
	df	SS	MS	F	Significance F				
Regression	1	16594.47	16594.47	87152.24	0				
Residual	4000	761.6312	0.190408						
Total	4001	17356.1							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
Intercept	-1.00411	0.007726	-129.958	0	-1.01926	-0.98896	-1.01926	-0.98896	
X Variable 1	0.003499	1.19E-05	295.2156	0	0.003476	0.003522	0.003476	0.003522	
Note: intercept -1 is due to the spread of the market makers. That's also why inflow is larger than outflow.									

Leverage: single slide overview



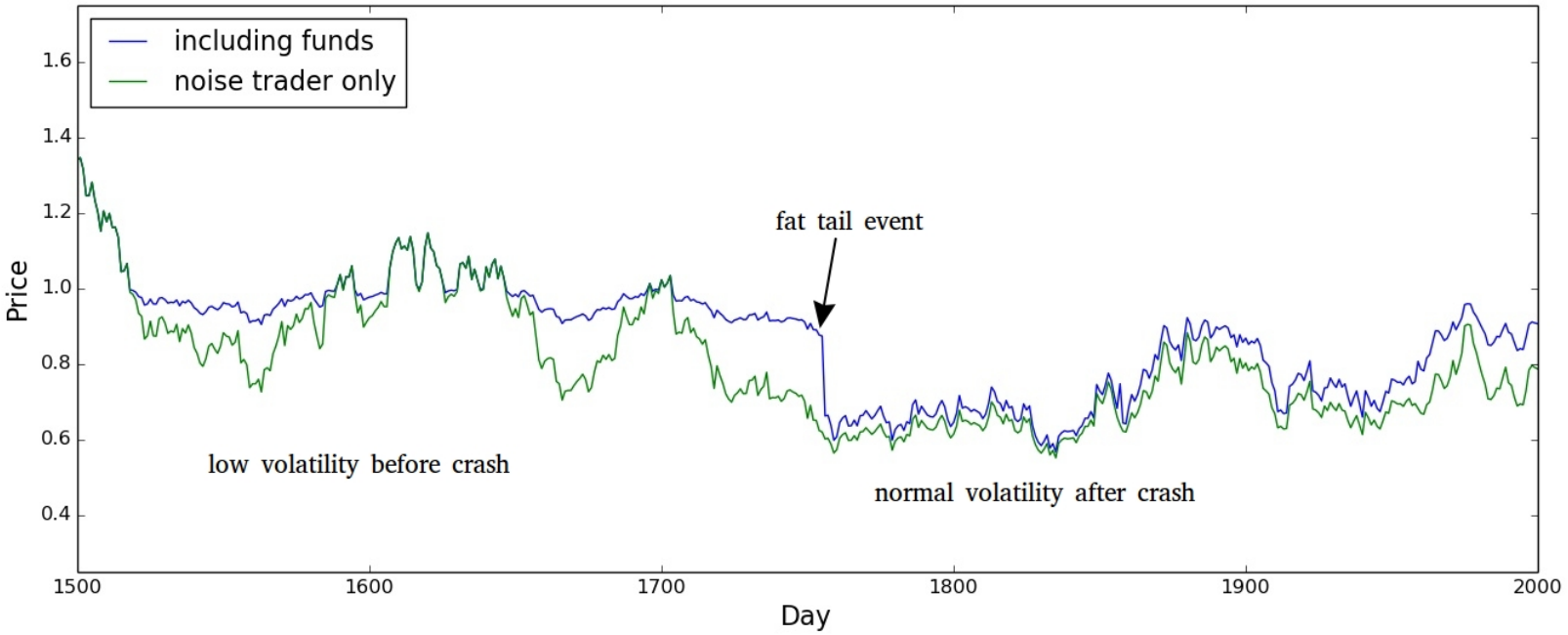
Stefan Thurner

Doyne Farmer

John Geanakoplos

"The market can stay irrational longer than you can stay solvent." - Keynes

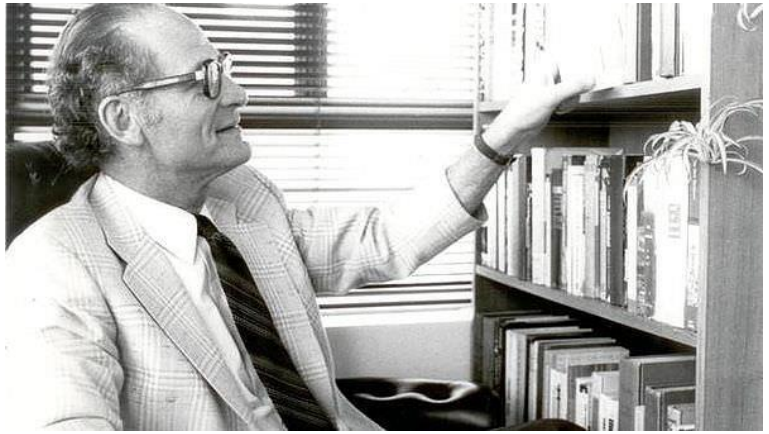
- Leverage can cause fat tail events through cascade of margin calls.
- Two active types of investors:
  - Noise traders
  - Leveraged, fundamentalist funds



See separate presenation for further information.

Stock Valuation - Gordon

Idea: calculate the net present value of the stock by summing all future discounted dividends. This leads to the Gordon growth formula:



Myron J. Gordon

base dividend | growth rate

$$V = \frac{D(1+g)}{1+r} + \frac{D(1+g)^2}{(1+r)^2} + \frac{D(1+g)^3}{(1+r)^3} + \dots = D \cdot \sum_{i=1}^{\infty} \left(\frac{(1+g)}{(1+r)}\right)^i$$

V: net present value; r: interest rate / discount rate

$$= D \cdot \frac{1}{1-\frac{1+g}{1+r}} = D \frac{1}{1+r-(1+g)} = \frac{D}{r-g} \quad \text{for } g < r,$$

using geometric sum; ∞ for $g \geq r$

Does this work in our model?
With a growth rate g=0, a price V=500 and dividends D=2.5, this implies a discount rate of 0.5% per day.

Stock Valuation - Gordon

What is the actual discount rate in our model?

- Is it 0% because agents do not discount the future for as long as they live?
- Is it 0.2% because that is the agent's mortality rate?

Either way, we do not get to the 0.5%.
(Even without knowing the Gordon growth formula, a dividend yield of 1% is way too high when agents discount the future with 0% or 0.2%.)

The Gordon growth formula is provably correct, so there must be something wrong with our simulation:

- Are the agents not behaving optimally?
  Yes, they could buy more stocks when they are young, as your agents do. But that does not help enough.
- So what is holding the agents back from investing more?
  They lack of access to credit. If they could leverage their positions, they would buy much more.

Stock Valuation - Flow

So what other method could be used to explain the observed price?

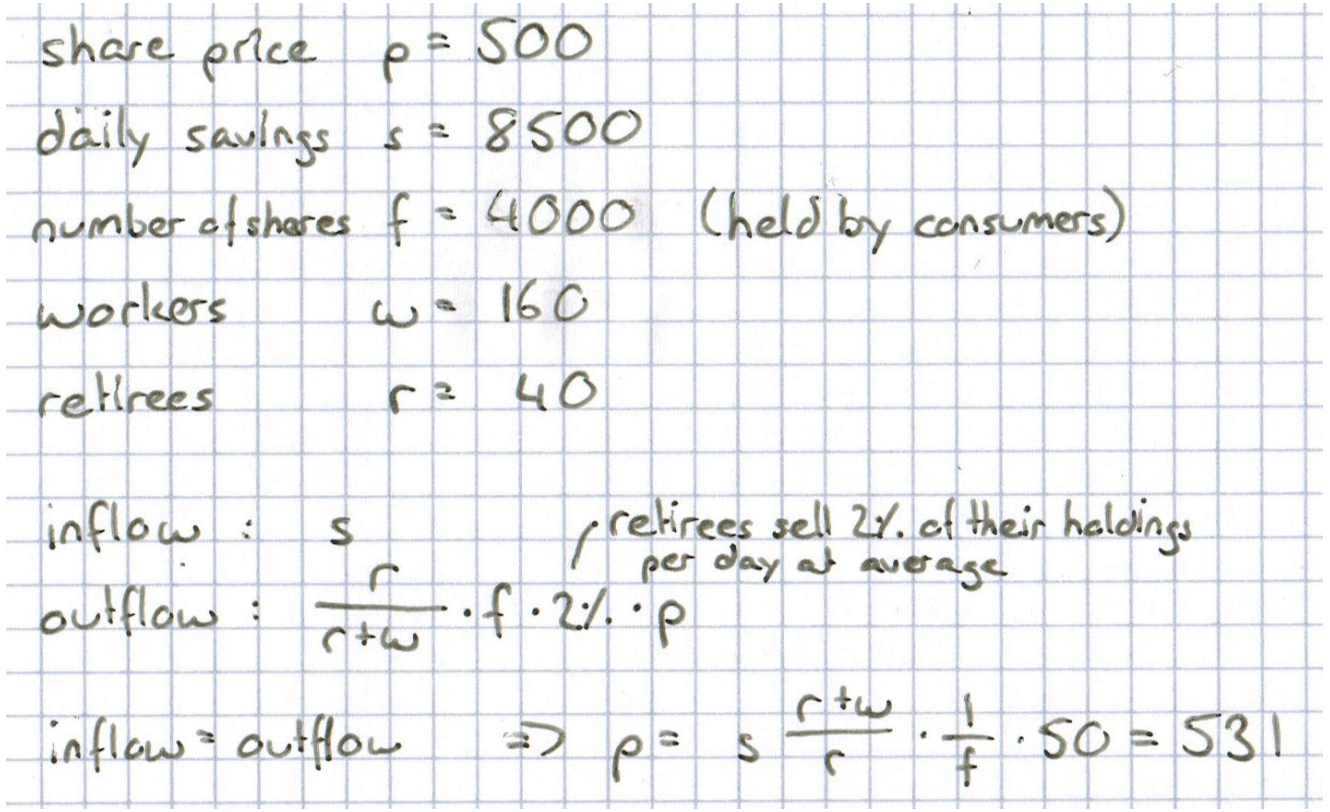
The law of supply and demand: the equilibrium price is where supply and demand are in balance.

Inflow: the amount of money invested into stocks

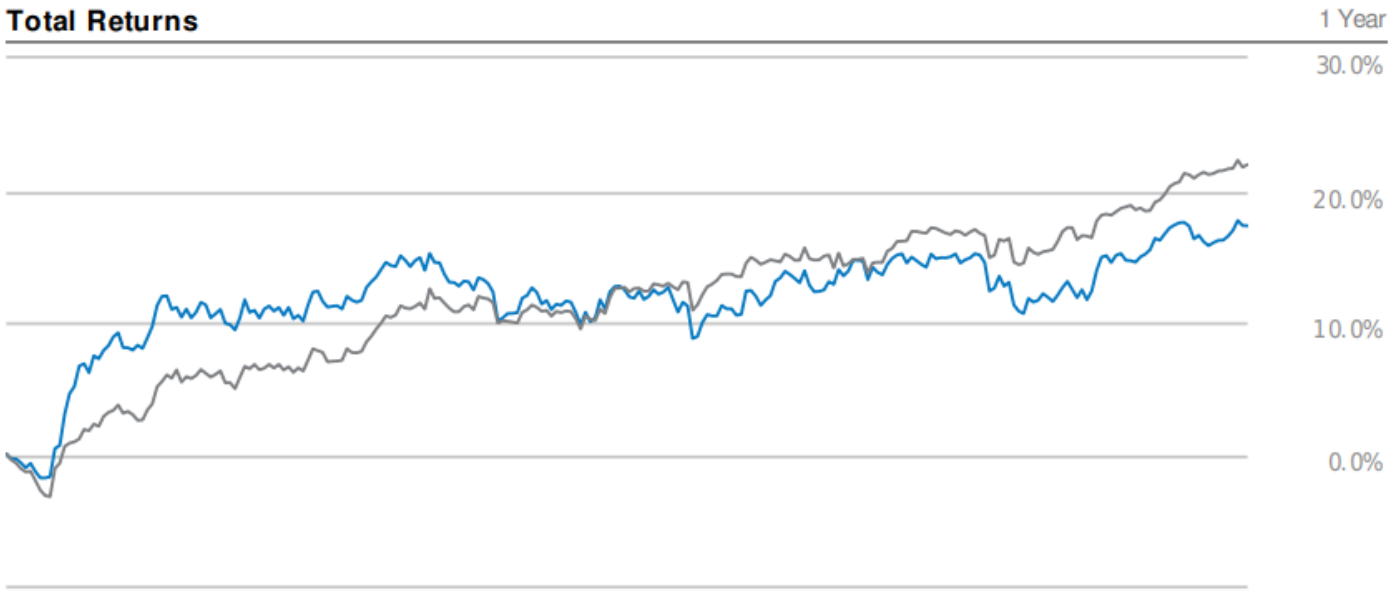
Outflow: the number of shares sold multiplied by their price

Equilibrium: inflow = outflow

Seems to work pretty good at explaining the observed prices in the simulation.



Could you use this for investing?



performance	1 Month	3 Month	YTD	1 Year	3 Years	5 Years	10 Years
TTFS	--	--	--	--	--	--	--
TTFS	2.05%	2.76%	7.23%	17.31%	10.52%	16.09%	--
No Underlying Index	--	--	--	--	--	--	--
MSCI USA Investable Markets_net	2.78%	4.46%	16.22%	21.96%	11.55%	15.17%	7.97%

The Trimtabs Flow Shrink ETF (TTFS) by Charles Biderman tries that.
It buys stocks of firms that have announced to buy back their own shares, so there is a known “inflow”.

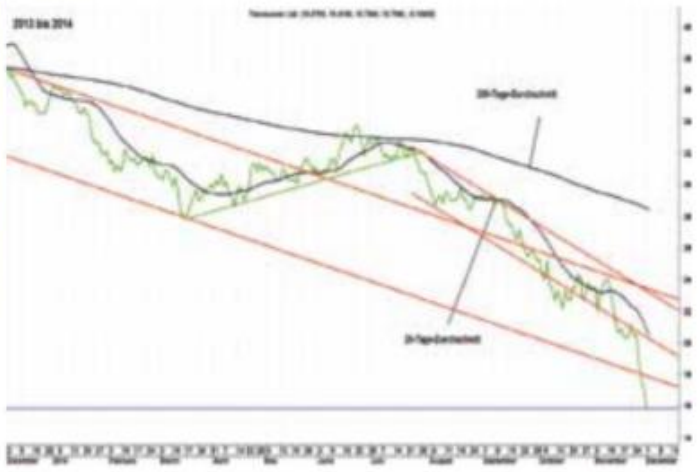
Does not seem to outperform index.

List of stock valuation metrics

- Dividend yield
- Gordon's formula: includes growth
- P/E-ratio (price/earnings)
  Captures the value of firms that reinvest profits instead of paying a dividend
- Praktikermethode:
  1/3 Substanzwert + 2/3 Ertragswert
  Used by Swiss tax authorities.
- Sharpe-ratio: adjusts returns for risks
- Many many others…

Shiller P/E Ratio

Transocean | ISIN CH0048265513 | CHF 19.40 **Kaufen**



KGV14: 5.7
Branche: Versorger/Rohst.

Risiko gemäss Silicon Analyst: Sehr Hoch
Marktkapitalisierung: CHF 7.2 Mrd.
Anlagehorizont: 6 bis 12 Monate

Transocean wird in Sippenhaft genommen

Unsere spekulative Kaufempfehlung für Transocean hat sich als Rohrkrepierer entpuppt. Zwar hat sich der Ölpreis mittlerweile im Bereich um USD 80 pro Fass wie erwartet stabilisiert, für die Aktie von Transocean ging es jedoch steil bergab. Seit Jahresanfang hat das Papier gut 47% an Wert verloren, wobei sich der Baisse zuletzt nochmals beschleunigte. Zwischen dem 10.11. bis zum 27.11. sackte der Kurs um fast 20% ab. Wir halten die erlebten Kursabschläge in dieser Höhe für eine Marktübertreibung, zumal die Papiere von Transocean in Sippenhaft genommen wurden, nachdem der amerikanische Konkurrent Seadrill die Dividendenzahlungen einstellte. Auch bei Transocean kursieren nach den milliardenschweren Wertberechtigungen Gerüchte über eine Dividendenkürzung oder sogar einer Kapitalerhöhung. Darüber hinaus wird immer wieder darüber diskutiert, ob Grossaktionäre Carl Icahn dem Unternehmen seine Treue entzieht und zumindest Teile seines Aktienengagements auf den Markt wirft. Wir halten die Aktie des in Zug ansässigen Ölserviceunternehmens für massiv unterbewertet: Das Papier wird derzeit mit einem 12-Monats-KGV von gerade noch 5.4 gehandelt. Selbst bei einer schlechtmöglichsten Geschäftsentwicklung im kommenden Jahr erscheint uns dieses Bewertungsniveau als nicht gerechtfertigt. Entsprechend halten wir an unserer ursprünglichen Empfehlung fest und raten weiter zum spekulativen Positionsaufbau.

Konklusion:
Wir halten das Transocean-Papier mit einem KGV von gerade 5.4 für massiv unterbewertet. Der Kursrutsch der letzten Wochen erscheint uns masslos übertrieben.

The “Schweizer Börsenbrief» from 15.12.2014 falls into a «value trap» and recommends to buy Transocean at CHF 20.

ZKB already did the same in summer when it was at 40 CHF.

Today, the stock trades at 10 CHF.

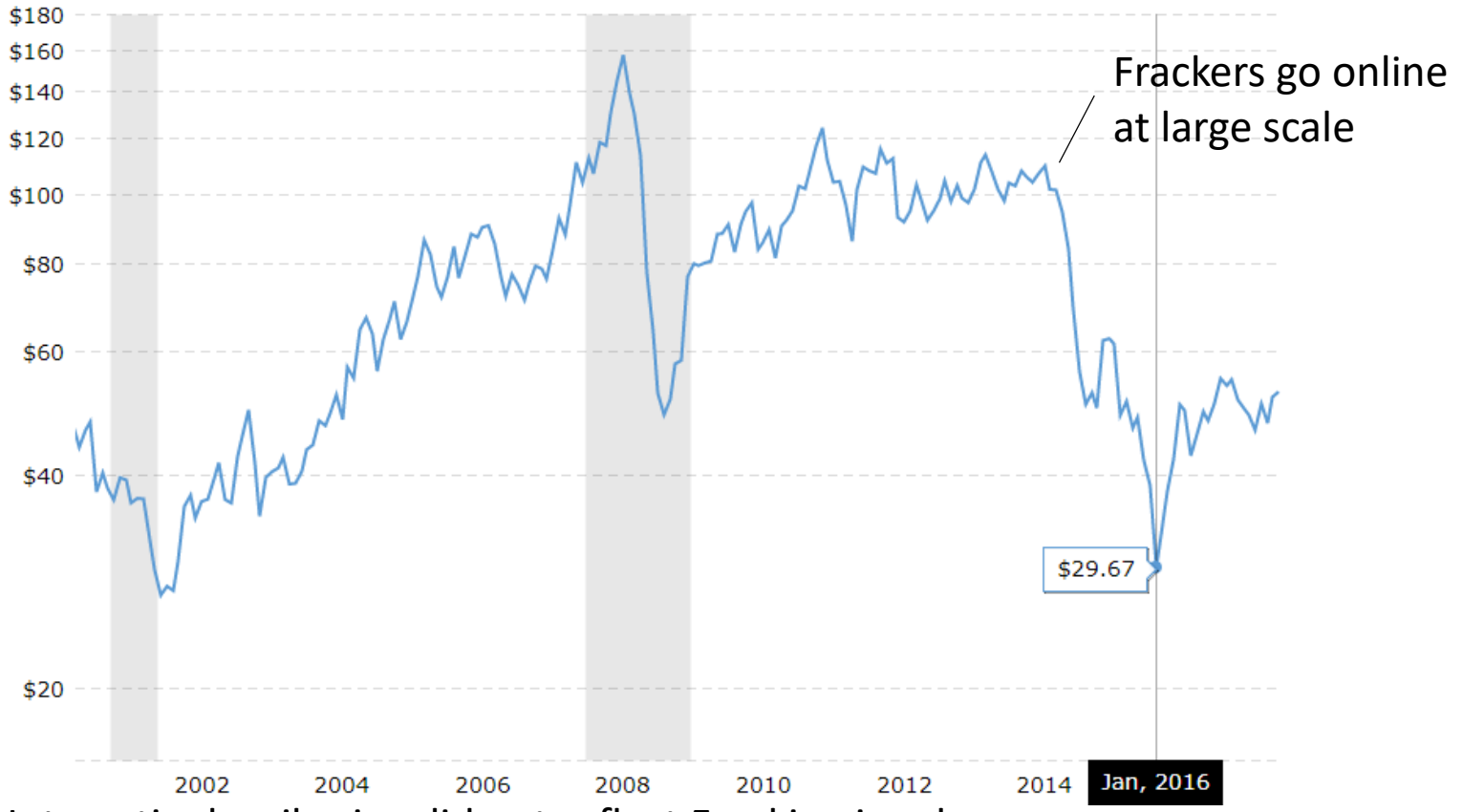
Problem: earnings declined and dividends went to zero.

Sidenote: this is my favorite “analyst” at the moment: ” www.backstagenews.de (in German)

Oil price

What happened to Transocean?

Transocean is profitable for oil prices above roughly 50$ (wild guess). Story was “Peak oil”: oil will get more and more scarce, thus prices can only go up, including the price of Transocean stocks.



Interestingly, oil price did not reflect Fracking in advance.
Was the spot market inefficient?
No: Why selling oil at a cheap price if people need it now?

Presentation Templates

See file abfe-template.pptx, available on the website.

Code dive…