BOSTON UNIVERSITY

Liquidity in Markets and its Impacts during Recession

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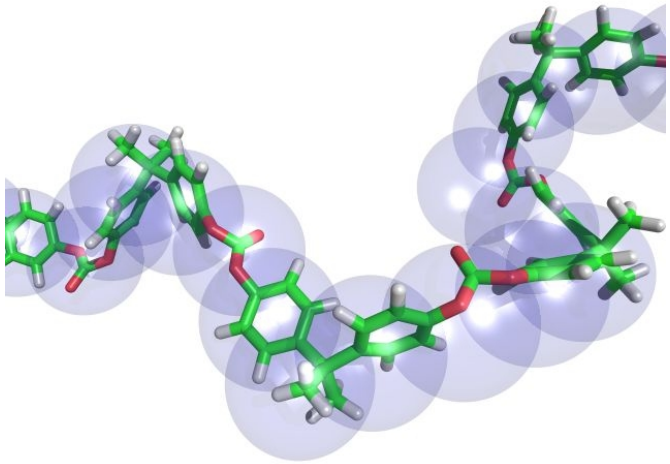
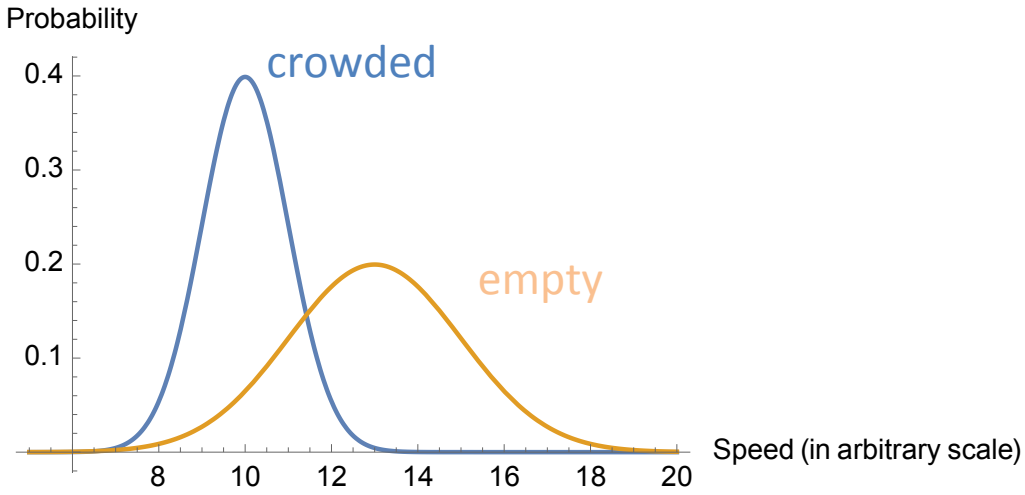


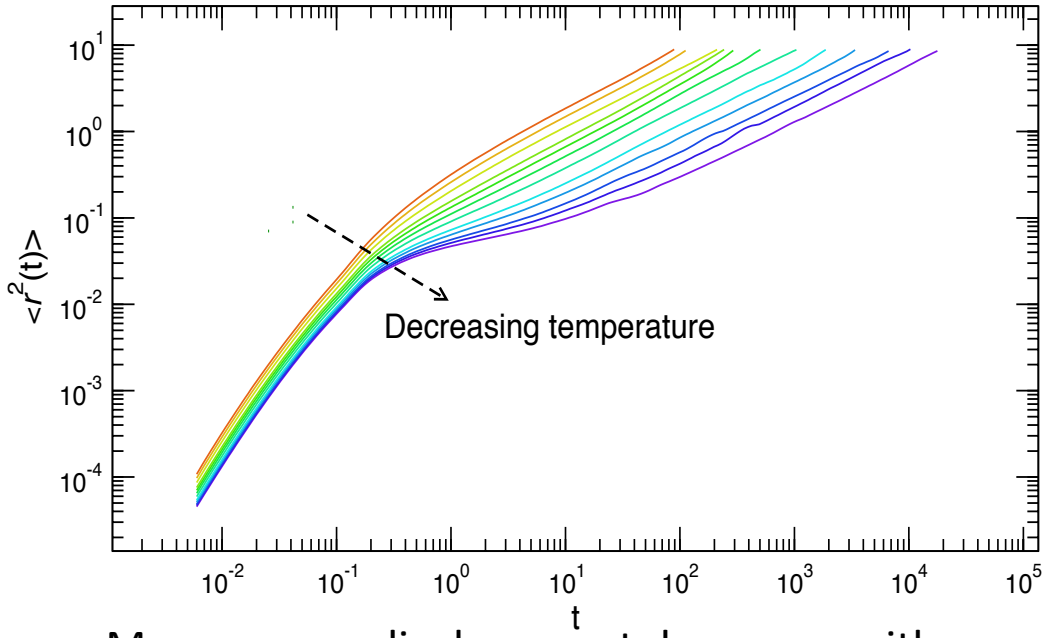
Outline

- Liquidity in physical systems
- Motivation
- Liquidity in markets (good or bad?)
- Conclusion

Free volume idea



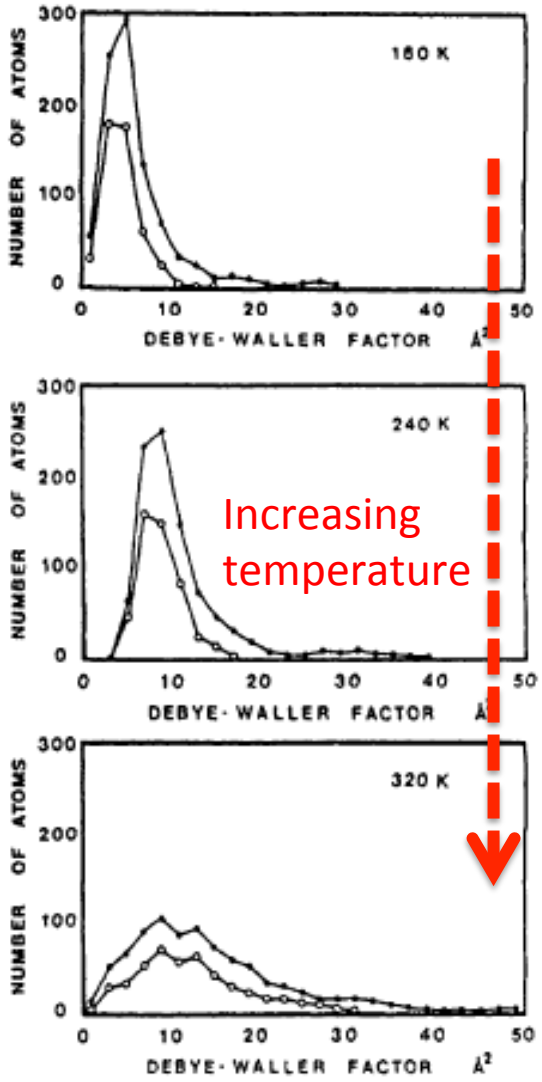
Caging effects in molecular systems



Mean square displacement decreases with decreasing temperature. Caging effects become more apparent at low temperature.

$$\left\langle u^2 \right\rangle = \left\langle r^2(t_{cage}) \right\rangle$$

Hanakata et al. Nature Communications **5**, 5166 (2014)



Ringe et al. Biophysical Chemistry **105** (2003) 667

Dow Jones Industrial Stock Index

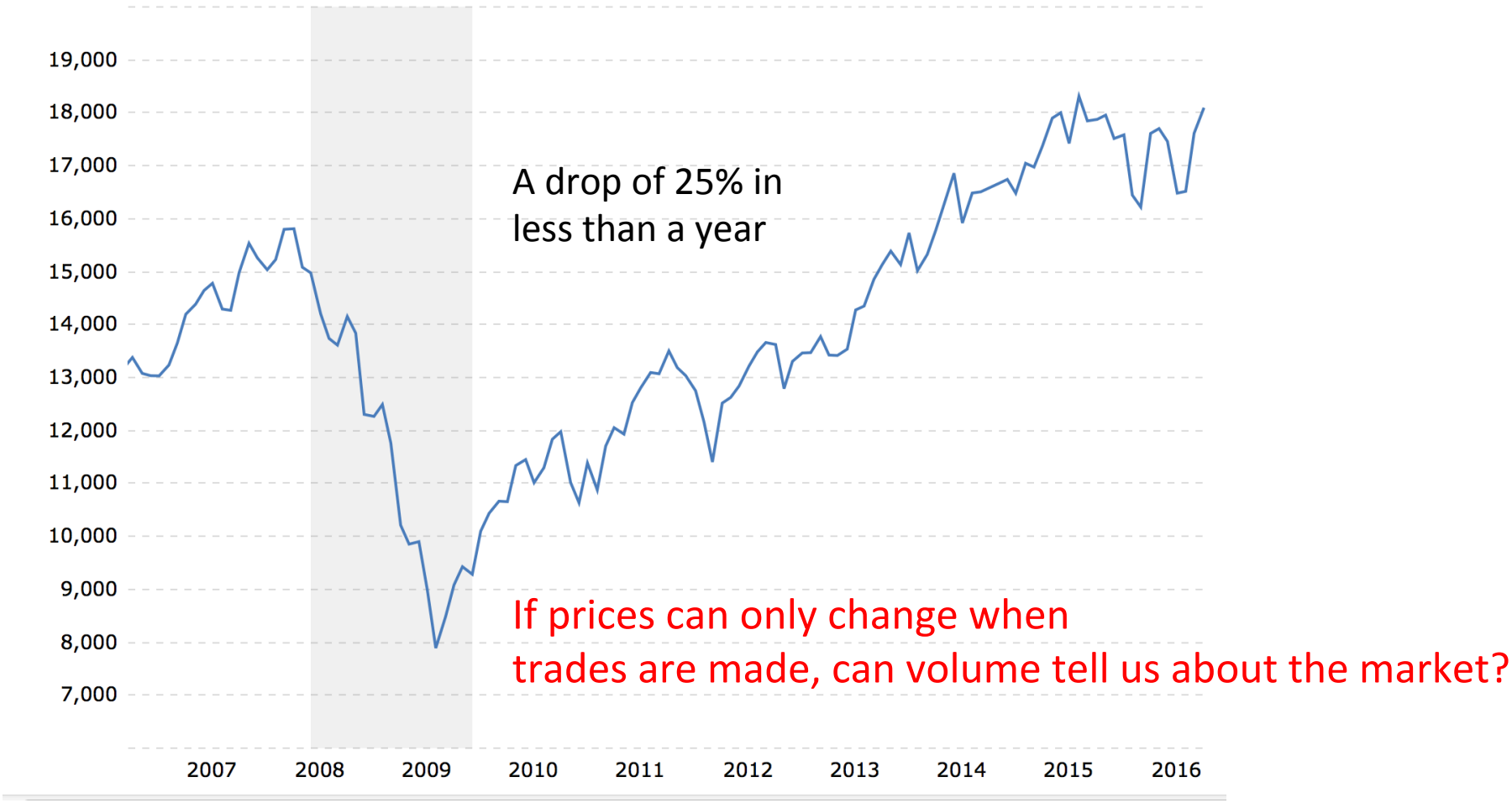


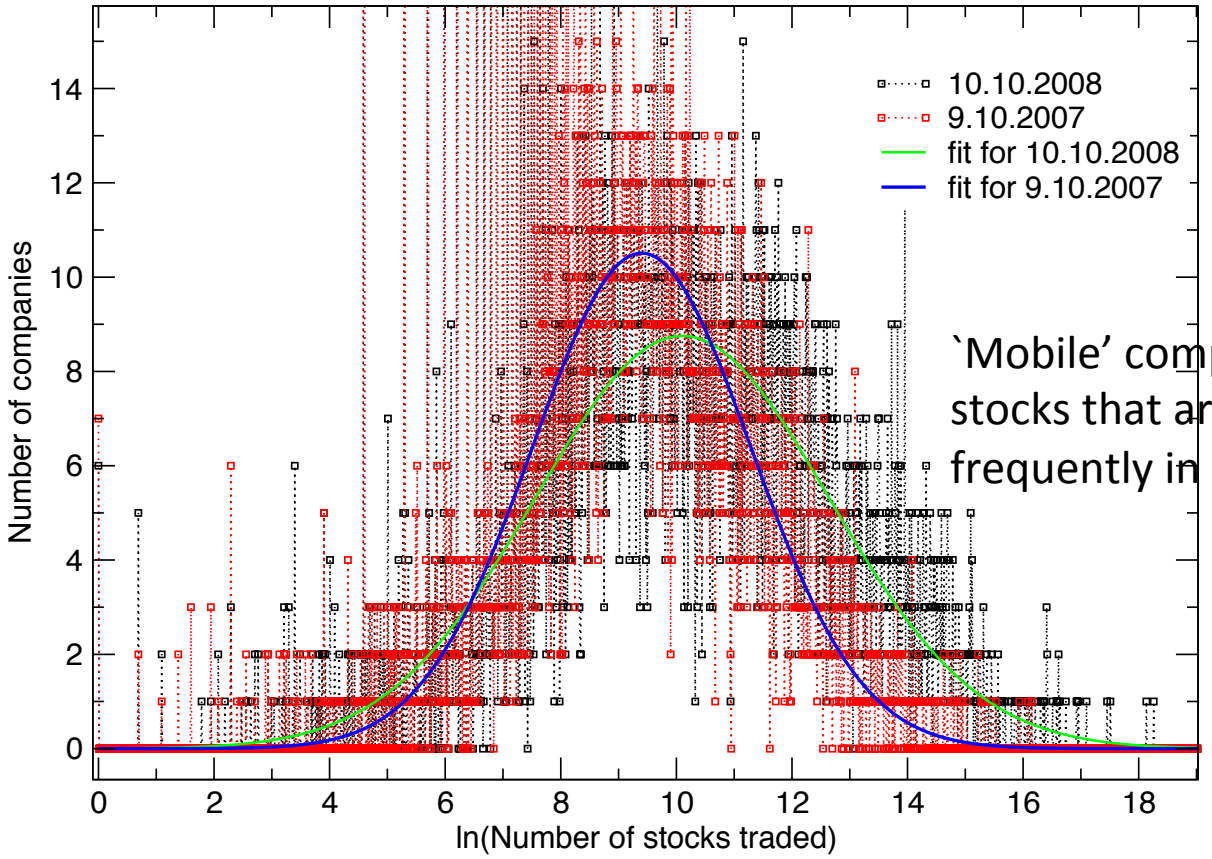
Figure is taken from http://www.macrotrends.net/1319/dow-jones-100-year-historical-chart

Data Sets

- Data: Daily volume data (~6000 companies with a total of ~500,000,000 stocks traded)
- Source: BATS stock exchange
- Time frame: July 2007–December 2008

Log-normal distribution of stocks volume

$$\mathcal{N}(\ln x;\mu,\sigma) = \frac{1}{\sigma\sqrt{2\pi}}\exp\left[-\frac{(\ln x-\mu)^2}{2\sigma^2}\right], \quad x>0.$$



`Mobile' companies have stocks that are traded very frequently in each given day

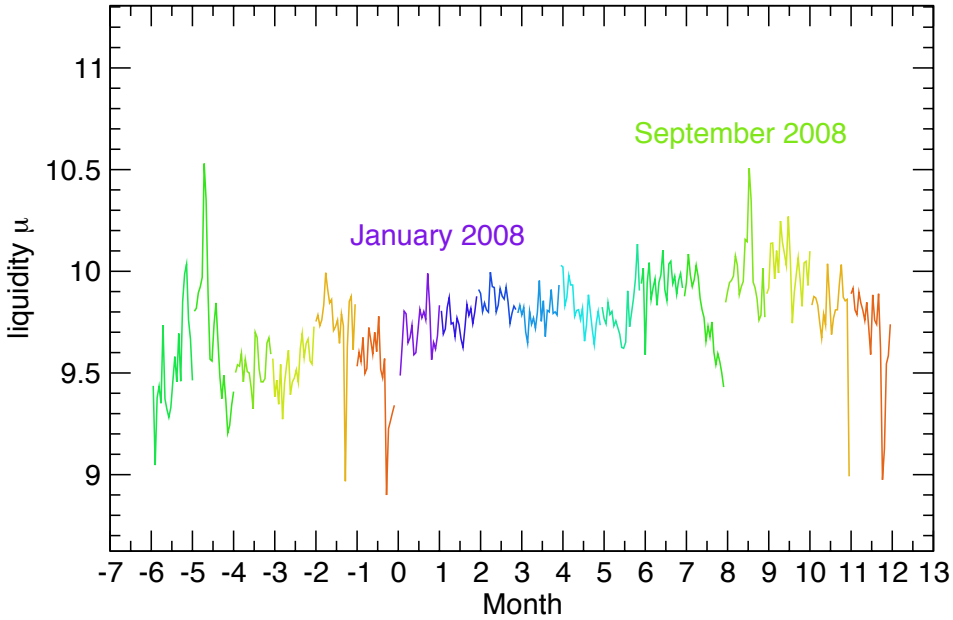
Defining liquidity in market

$$\mathrm{E}[X] = e^{\mu+\frac{1}{2}\sigma^2},$$
$$\mathrm{E}[X^2] = e^{2\mu+2\sigma^2},$$
$$\mathrm{Var}[X] = \mathrm{E}[X^2] - \mathrm{E}[X]^2 = (\mathrm{E}[X])^2(e^{\sigma^2}-1) = e^{2\mu+\sigma^2}(e^{\sigma^2}-1),$$
$$\mathrm{SD}[X] = \sqrt{\mathrm{Var}[X]} = e^{\mu+\frac{1}{2}\sigma^2}\sqrt{e^{\sigma^2}-1} = \mathrm{E}[X]\sqrt{e^{\sigma^2}-1},$$

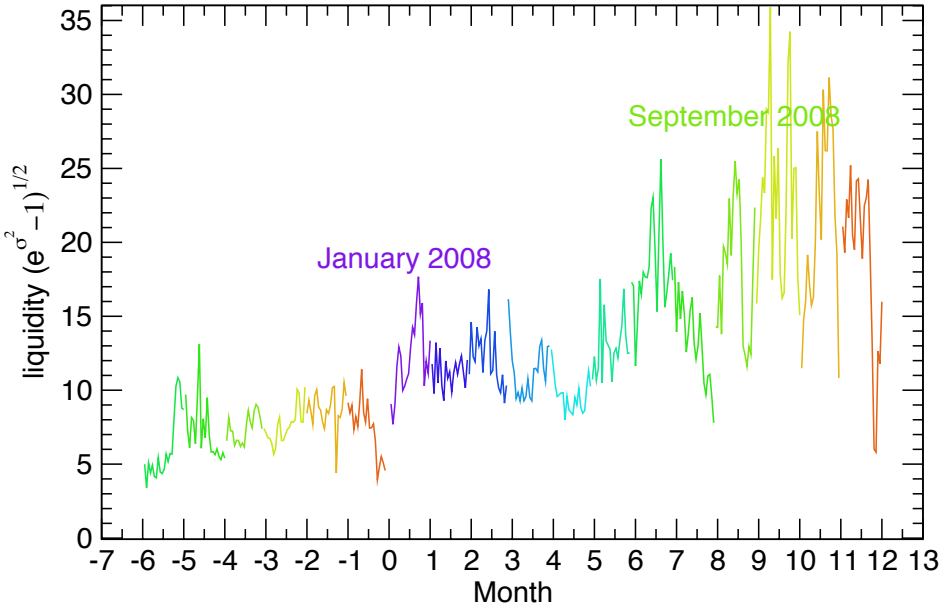
$$\mu = \ln\left(\frac{\mathrm{E}[X]^2}{\sqrt{\mathrm{E}[X^2]}}\right) = \ln\left(\frac{\mathrm{E}[X]^2}{\sqrt{\mathrm{Var}[X]+\mathrm{E}[X]^2}}\right),$$
$$\sigma^2 = \ln\left(\frac{\mathrm{E}[X^2]}{\mathrm{E}[X]^2}\right) = \ln\left(1+\frac{\mathrm{Var}[X]}{\mathrm{E}[X]^2}\right).$$

Define liquidity as $\mathrm{CV}[X] = \sqrt{e^{\sigma^2}-1}.$ or μ

Liquidity during 2008 recession



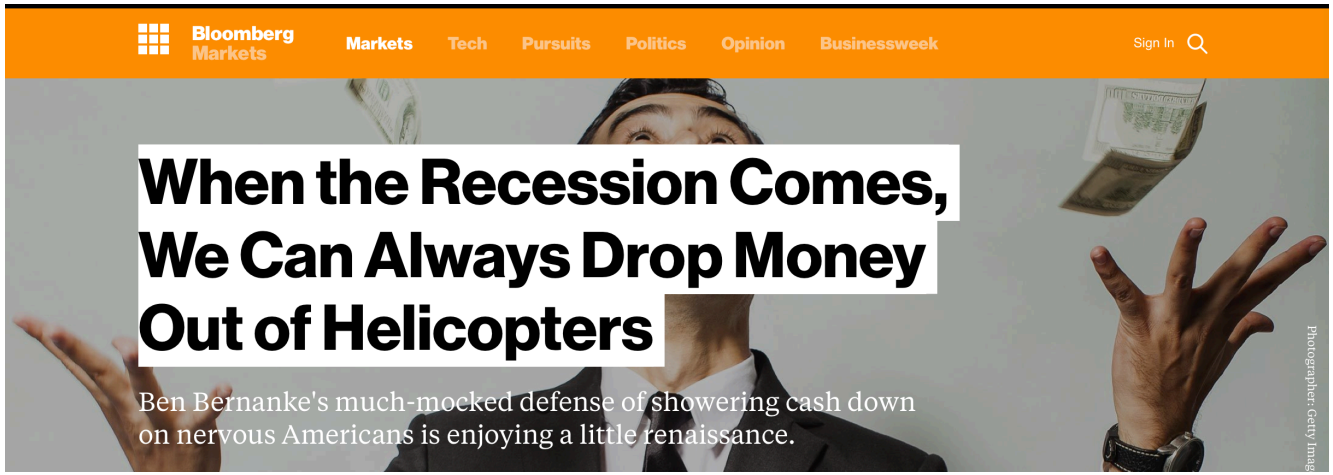
Slight increase in the average number of stocks traded per day



Clear increase in the width of stocks distribution traded per day

Discussion

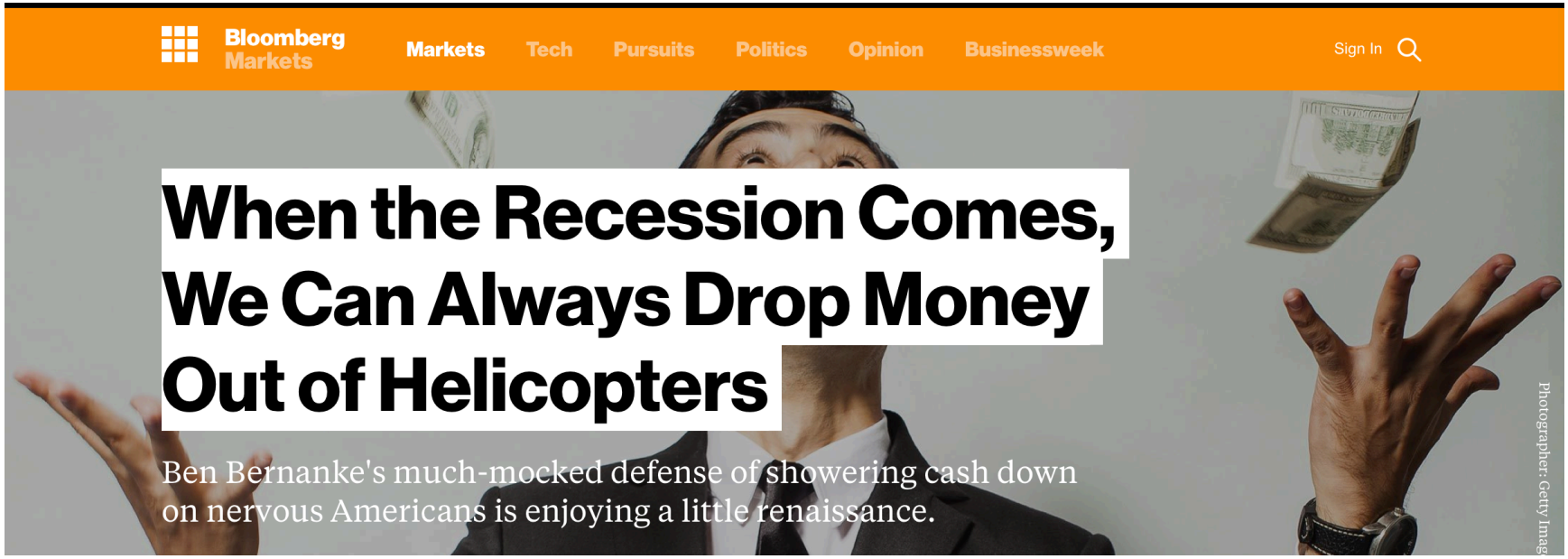
- Increasing money supply should increase price
- Increasing money supply would create liquidity in the market
- High liquidity during unstable economy leads to a significant fall in price



Conclusion

- A method to quantify liquidity in markets was developed
- High liquidity during unstable economy leads to a significant fall in price
- Keeping inflation below 2% is not enough, policy makers need to introduce a new policy to keep liquidity below some values
- Monetary easing might worsen the economy if it is not regulated properly

Thank you for listening



Yes, BUT….