Banking on Physics!

City College Interdisciplinary Seminar
April 2015

Joe Pimbley (maxwell-consulting.com)

- Physics & Finance
- Current State of Banking
- Risk & History of Banking
- Central Banks, Regulation of Banks, Lending & Inflation
- Fixing Banking

My History

- Thirteen years in applied physics, engineering, theoretical physics, applied math
- Recruited to Wall Street (by Citibank physicist)
- Seven employers in 22 years in finance

Physicists' Habits and Traits

- ✧ Solving problems and "figuring things out"

- ✧ "Seeking truth" – this is physics and ....
"natural philosophy"

- ✧ Need always to be on a learning curve (??)

PHYSICISTS IN FINANCE

Though the challenges of "quantitative finance" are diverse and often exhilarating, success for the erstwhile physicist is not at all assured. What factors are involved in making the transition to finance?

Joseph M. Pimbley

To a physicist facing significant difficulty in the job market, the allure of a career in finance is obvious: The industry has numerous opportunities that demand the physicist's quantitative skills, and pay handsomely for them. Those contemplating such a move, however, need to look beyond these immediate considerations, for the culture of finance differs markedly from that of physics, having different goals and philosophies, work styles, even dress codes. To be successful on Wall Street, the physicist must willingly adapt to Wall Street's ways.

To add precision to the phrase "physicists in finance," I am using "physicists" to denote PhD recipients and "finance" to refer to the disciplines that require the greatest mathematical and computational skills, such as derivative pricing and construction, risk management and investigation of trading strategies. It is somewhat unjust

directly into finance following graduate school or from a postdoctoral position. Less common are the émigrés from full-time "legitimate" physicist positions. Certainly this observation implies that one cause of the physics-to-finance transition is the shortage of jobs in physics, especially for those just starting their careers. But it is regrettable that younger physicists, who have not had the opportunity to explore their chosen disciplines and their abilities on their own, are more likely to shift career goals. Older colleagues, by contrast, have orchestrated successful research projects with lasting contributions, and are therefore much better equipped to contemplate leaving the physics profession. They know what they are forsaking and how their philosophies will change.

Although scientists and engineers consider themselves technical people, "technical" has a different meaning

***Physics Today*, January 1997**

Maxwell-consulting.com/Physicists_Finance_low_mem.pdf

Value and Success

- ✧ Since goal is to "seek truth," must also seek *outside* the realms of physical phenomena, math, visualization, *et cetera*
- ✧ Other skills: People; Presentation; Writing; Multi-Lingual; *All* Communication; Information Research and Synthesis; Judgment
- ✧ Arrogance & Humility

Seeking Truth

✧ Truth is *not* the priority of virtually all organizations … often Truth is the *enemy*!

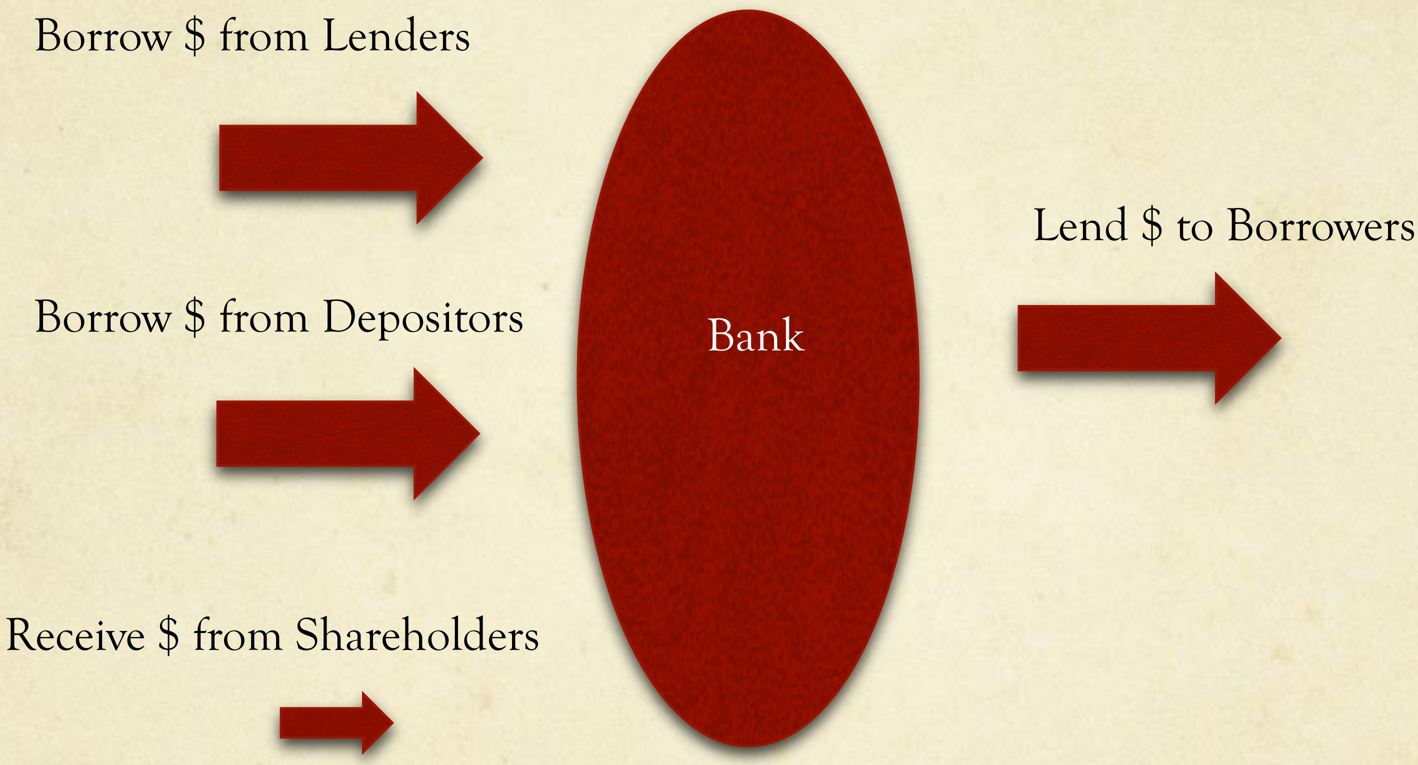
✧ How physicists have failed
- ✧ Use of models
- ✧ Finance has shaped physicists ….

✧ How physicists have succeeded
- ✧ Emphasis on data
- ✧ Growing awareness of model risk
- ✧ Displacing economists

Money, Blood and Revolution

- ✧ Book recommendation!
- ✧ George Cooper argues economics is "in crisis"
- ✧ Best parts are:
  - ✧ Excerpts from History of Science
  - ✧ Explanation of "schools" of Economics
  - ✧ Elaboration that people will continue to use (and even believe) theories, methods, and orthodoxy that are proven wrong UNTIL there are replacements

What do Banks do?



- ✧ Fail frequently and taxpayers "must" support
- ✧ Existence of regulation sensible due to the government liability ("moral hazard")
- ✧ But regulation to "prevent" failures is intrusive, expensive, and ineffective (eg, former CEO BB&T)
- ✧ Failing, weak, or zombie banks reduce lending which decreases money supply => deflation

Observations of Several Sources

- Admati and Hellwig (*Bankers' New Clothes*) claim banks need much more equity

- Mismatch of assets and liabilities is historical mistake (risk management principle)

- Regulation has failed and will fail – see Sheila Bair *Bull by the Horns* – purported capital models are entirely wrong; regulators are "trapped"

- Calomiris and Haber (*Fragile by Design*) argue that banks are "political bargains" between government and bankers

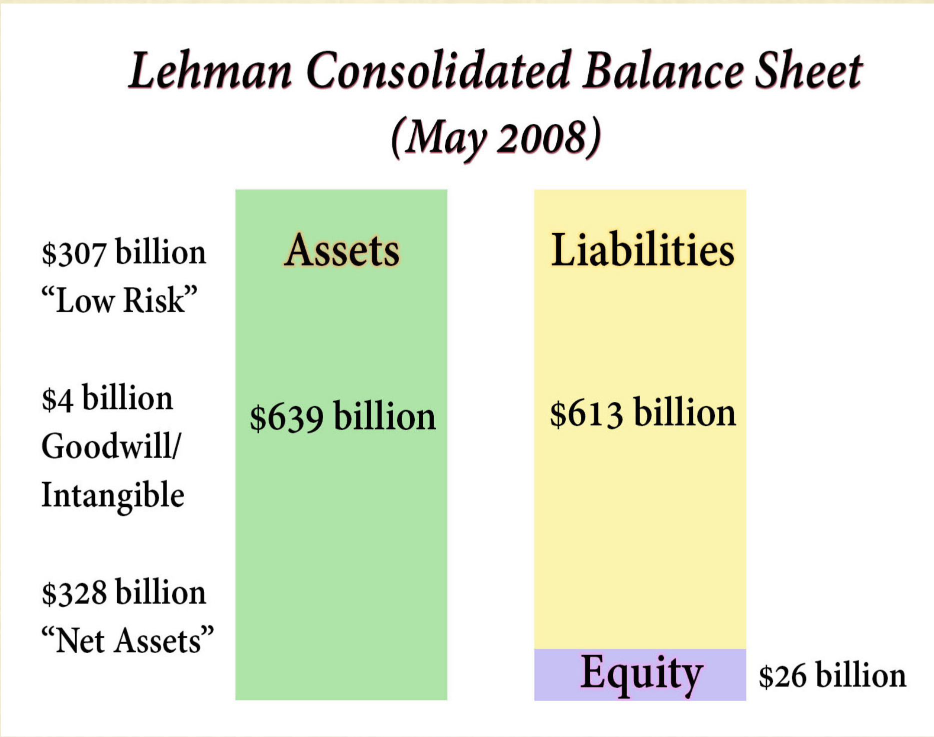
✧ Hundreds of thousands of businesses fail annually in the U.S. (roughly 30 million total)

✧ "Ingenious" (?) aspect of capitalism: threat of failure prods companies to keep customers happy

✧ Gov't does not save non-banks (GM and Chrysler aside), why try to prevent bank failures?

✧ Old J.P. Morgan version of capitalism quite different – competition ruinous to bondholders – form Trusts and monopolies

BANKS: Fail Frequently – RISKY !



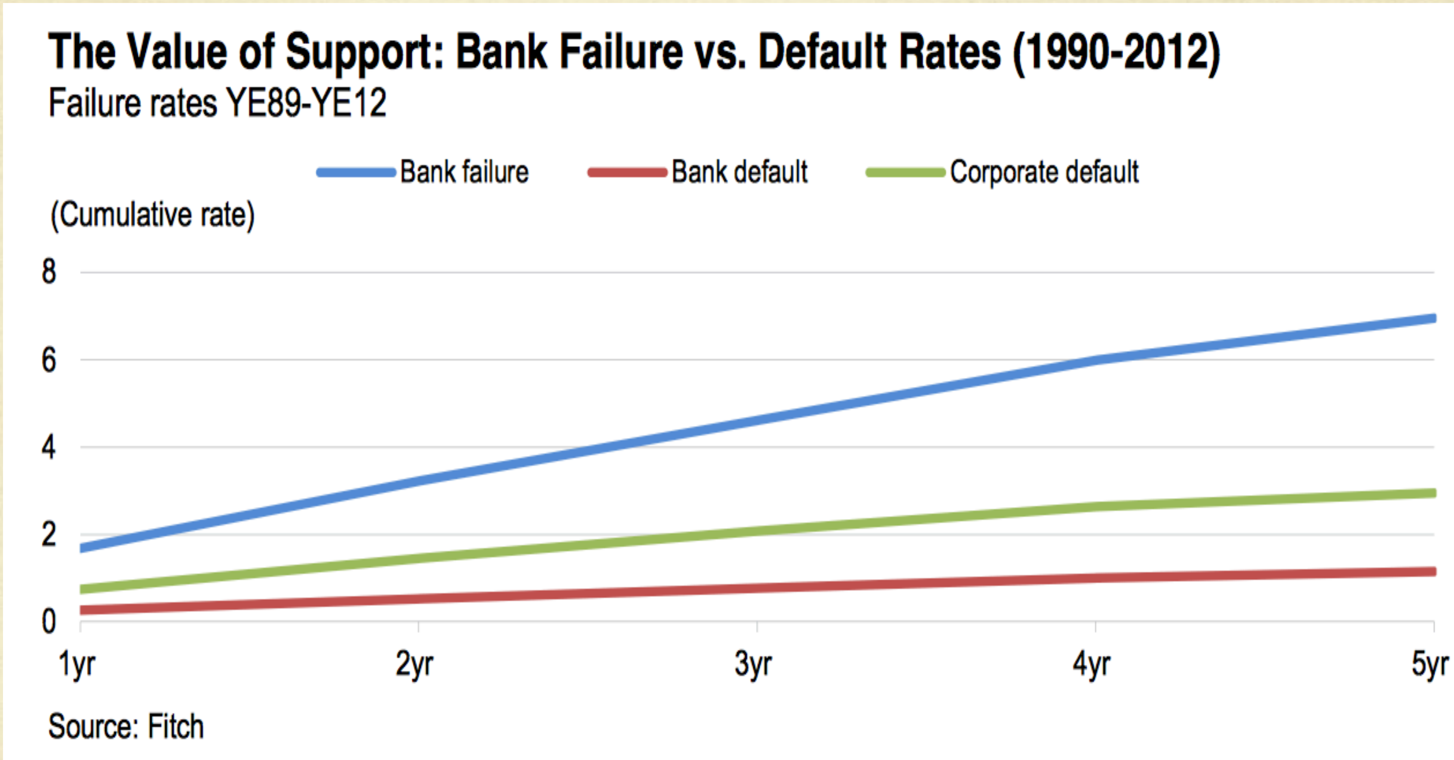
Huge Leverage – Typical of Banks and Similar Financial Entities

BANKS: Fail Frequently – RISKY !

Company/Bank	Total Liabilities ($ billion)	Equity ($ billion)	L/E	Date of 10-K
Citigroup	1,670	204	8.19	Dec-13
JP Morgan Chase	2,160	211	10.2	Dec-13
Goldman Sachs	833	78.5	10.6	Dec-13
Google	23.6	87.3	0.270	Dec-13
Intel	34.1	58.3	0.585	Dec-13
Procter & Gamble	70.6	68.1	1.04	Jun-13
Merck	53.3	49.8	1.07	Dec-13
Walmart	122	76.0	1.61	Jan-14
Target	28.3	16.2	1.75	Jan-14
JC Penney	8.71	3.09	2.82	Jan-14
Amazon	30.4	9.75	3.12	Dec-13
Kellogg Company	11.9	3.55	3.35	Dec-13
General Electric	520	131	3.97	Dec-13
United Parcel Service	29.7	6.47	4.59	Dec-13
Deere & Company	49.3	10.3	4.79	Oct-13
Campbell Soup	7.11	1.22	5.83	Jul-13
Clorox	4.17	0.146	28.6	Jun-13
American Airlines	45.0	(2.73)	NM	Dec-13
United Continental	33.8	2.98	11.3	Dec-13

Bank Leverage is Much Higher That That of Other Corporate Entities

BANKS: Fail Frequently – RISKY !



Bank Failure Rate is DEFAULT Rate in the absence of government rescue / bailout

BANKS: Fail Frequently – RISKY !

Fitch Global Corporate Finance Average Cumulative Default Rates: 1990–2012

(%)	One-Year	Two-Year	Three-Year	Four-Year	Five-Year	10-Year
AAA	0.00	0.00	0.00	0.00	0.00	0.00
AA	0.03	0.03	0.07	0.13	0.19	0.19
A	0.08	0.24	0.41	0.57	0.76	1.93
BBB	0.20	0.68	1.23	1.84	2.45	4.73
BB	1.05	2.80	4.46	5.97	6.91	11.55
B	2.02	4.79	7.24	9.50	10.52	11.60
CCC to C	24.88	31.87	35.59	38.32	36.84	43.75
Investment Grade	0.12	0.36	0.64	0.92	1.22	2.29
Speculative Grade	2.99	5.53	7.66	9.51	10.25	14.14
All Corporates	0.74	1.45	2.08	2.63	2.95	4.14

Source: Fitch.

Banks are JUNK !!

(Bank "Failure Rating" is below Investment Grade)

Deposits are Bank Debt with Daily Maturity
Risky and Unstable !
“Run on the Bank”

- **Bank Deposits are Debt Obligations of the Bank**
- **Depositors May Withdraw Funds at ANY TIME with NO Advance Notice**
- **Yet Banks DO NOT HOLD CASH (or reserves) to Pay Depositors**
- **"Reserve Requirement" is 10% in the U.S.**
- **Bank Failures Always Begin with "Runs"**

- ✧ "Fractional Reserve Banking" has origins in 17th century London (G. Selgin, *Those Dishonest Goldsmiths*)

- ✧ Depositors are thus DEBT INVESTORS in the Bank and have Risk to Bank Activities yet can redeem at par on demand

- ✧ Walter Bagehot, *Lombard Street – a Description of the Money Market*

- ✧ Government Deposit Insurance – Not a Solution !

- ✧ Swedish Riksbank (1668) / Bank of England (1694) – formed as "funding arms" to government

- ✧ Myth of "central bank independence" – which is a good idea! – history's theme is government destruction of the country's money

- ✧ Central banks "control the money" – monetary policy

- ✧ Central banks inspect and regulate the "private banks" to prevent panics and failures

- ✧ Fractional reserve bank lending increases the money supply (common in textbooks but puzzling!)

- ✧ "Money Supply" is roughly "currency + bank deposits" held by citizens and companies

- ✧ Prices in the economy – inflation and deflation – depend directly on money supply, so change in the level of bank lending pushes prices up or down

- ✧ Capital adequacy requirement encourages de-leveraging after losses with resulting deflation as (fractional reserve) bank lending falls

- “Reserve Requirement” ➔ 100%
- Drastic Change, but easy to implement !
- Split each Bank into “Bank A” and “Bank B”
- Bank Deposits “Completely Safe”

The Chicago Plan Revisited

Author/Editor: Benes, Jaromir ; Kumhof, Michael

Publication Date: August 01, 2012

Electronic Access: Free Full text (PDF file siz
Use the free Adobe Acroba

Narrow Banking

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Abstract

This review discusses the history of narrow banks, reform proposals involving narrow banks, and theory and empirical evidence regarding whether narrow banks should play a more prominent role in the financial system. Prior to the early-twentieth century, US banks tended to be much narrower than they are today. Common modern banking practices, such as maturity transformation and explicit loan commitments, arose only after the creation of the Federal Reserve and the FDIC. My review of theory and empirical evidence finds it largely supportive of narr banking system co hazard and reducir financial system.

Keywords

bank regulation, n companies, deposi

JEL codes: G21,

FullReserveBanking.com

Home

Definition

Proposals

Organisations

Web resources

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FAQ

Full reserve banking is also known as **100% reserve banking**

A collection of resources for anyone interested in this alternative monetary system.

Some people dismiss Full Reserve Banking (the opposite of Fractional Reserve Banking) as a crazy system not taken seriously by any leading economists. This is entirely false. As recently as 2010, Mervyn King, the governor of the Bank of England, said in a letter to a full reserve banking supporter...

> *You might be aware that I have said publicly that I think ideas in this spirit - such as those advocated by John Kay - certainly merit serious consideration in the debate as to how we reform our financial system. I remain sympathetic to these views.*

Bibliography

Allen, William R. "Irving Fisher, F.D.R., and the Great Depression." *History of Political Economy* 9 (1977): 560–87.

Daly, Herman E. "The Economic Thought of Frederick Soddy." *History of Political Economy* 12 (1980): 469–88.

Fisher, Irving. *100% Money*. Rev. ed. New York: Adelphi Company, 1936.

Fisher, Irving Norton. *A Bibliography of the Writings of Irving Fisher*. New

y. New York: Fordham Uni-

on, D.C.: Brookings Institu-

al Banking Reform. Unpub- Bard College, Jerome Levy

iety. Chicago: University of

in Mathews & Marrot, 1931.

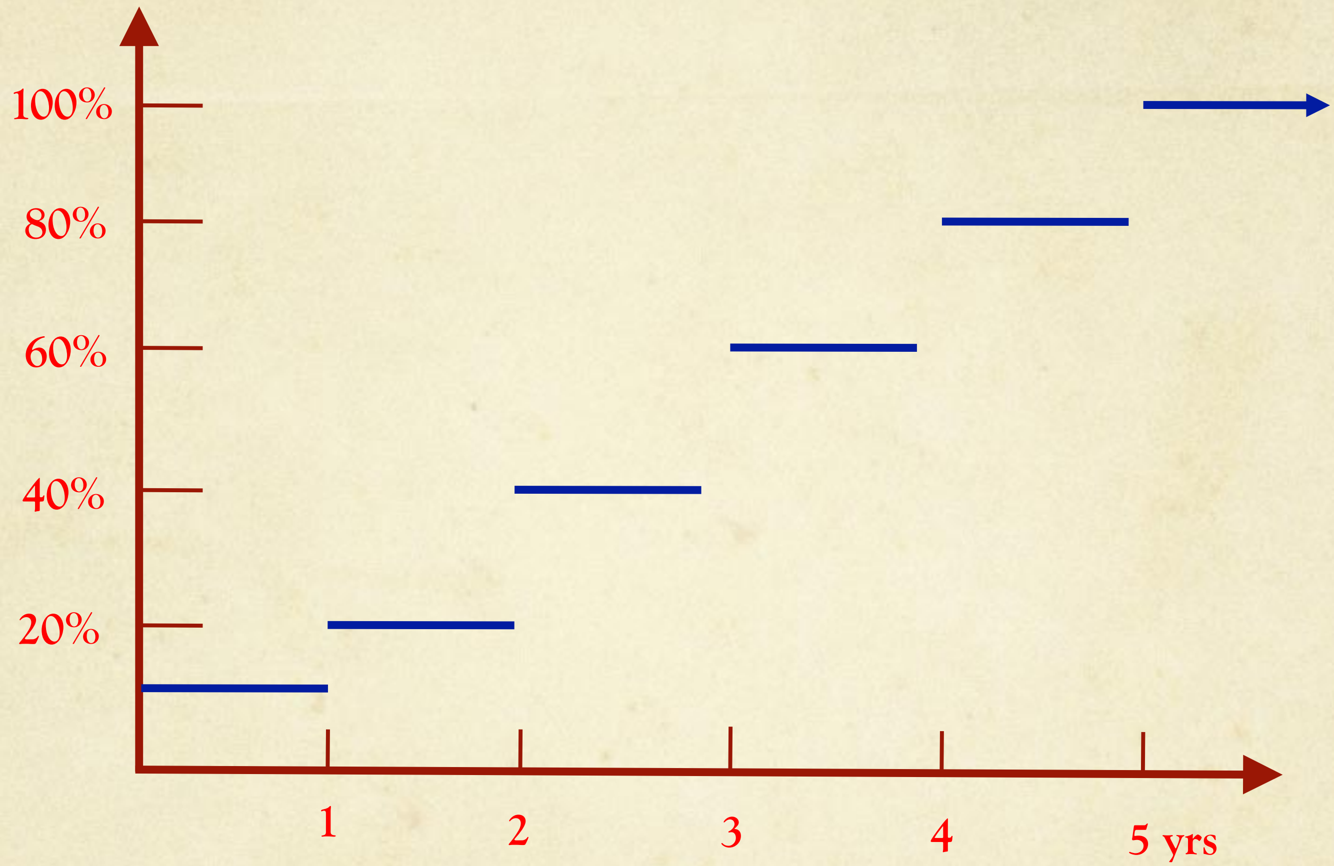
rge Routledge & Sons, 1934.

The University of Chicago

Irving Fisher and the 100 Percent Reserve Proposal
Author(s): William R. Allen
Source: *Journal of Law and Economics*, Vol. 36, No. 2 (Oct., 1993), pp. 703-717
Published by: The University of Chicago Press
Stable URL: http://www.jstor.org/stable/725805
Accessed: 11/05/2011 08:22

ASSETS		LIABILITIES
All Other Bank Assets & Risky Activities	"B"	All Other Bank Debt & Equity
Cash & Reserves	"A"	All Deposits + Some Equity

Split Each Bank into "Bank A" and "Bank B"



Transition to 100% Reserve over Five Years

Banks <u>already</u> have Excess Reserves !

DEFLATION PROBLEM !

- **Full Reserve Banking decreases Money Supply**
- **Deflation would be "confusing" and detrimental to debtors**
- **Solution: "Quantitative Easing" to maintain price level during transition period ONLY**

Columnists

April 24, 2014 1:32 pm

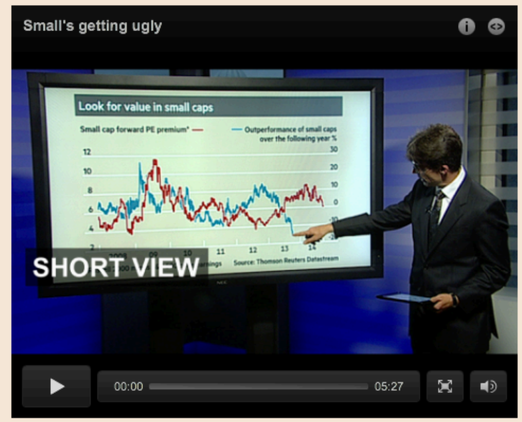
Strip private banks of their power to create money

By Martin Wolf

The giant hole at the heart of our market economies needs to be plugged

Printing counterfeit banknotes is illegal, but creating private money is not. The interdependence between the state and the businesses that can do this is the source of much of the instability of our economies. It could – and should – be terminated.

I explained how this works two weeks ago. Banks create deposits as a byproduct of their lending. In the UK, such deposits make up about 97 per cent of the money supply. Some people object that deposits are not money but only transferable private debts. Yet the public views the banks' imitation money as electronic cash: a safe source of purchasing power.



What would the Central Bank buy in its QE?
More Government Debt?!

- Banks fail frequently
- Choice of high leverage and A-L mismatch
- Gov't support due to fear of bank failures
- Fractional reserve banking ties bank lending (and solvency and health) to full economy
- Solution: eliminate fractional reserve banking and do not rescue "Bank B"