



Haas School of Business
University of California Berkeley



Berkeley Center for Law,
Business and the Economy



What is Money?

Gregory La Blanc

Commercial Bank

Balance Sheet

Loans	Deposits
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Commercial Bank

Balance Sheet

Cash	Deposits
Loans	Equity

Origins of Banking

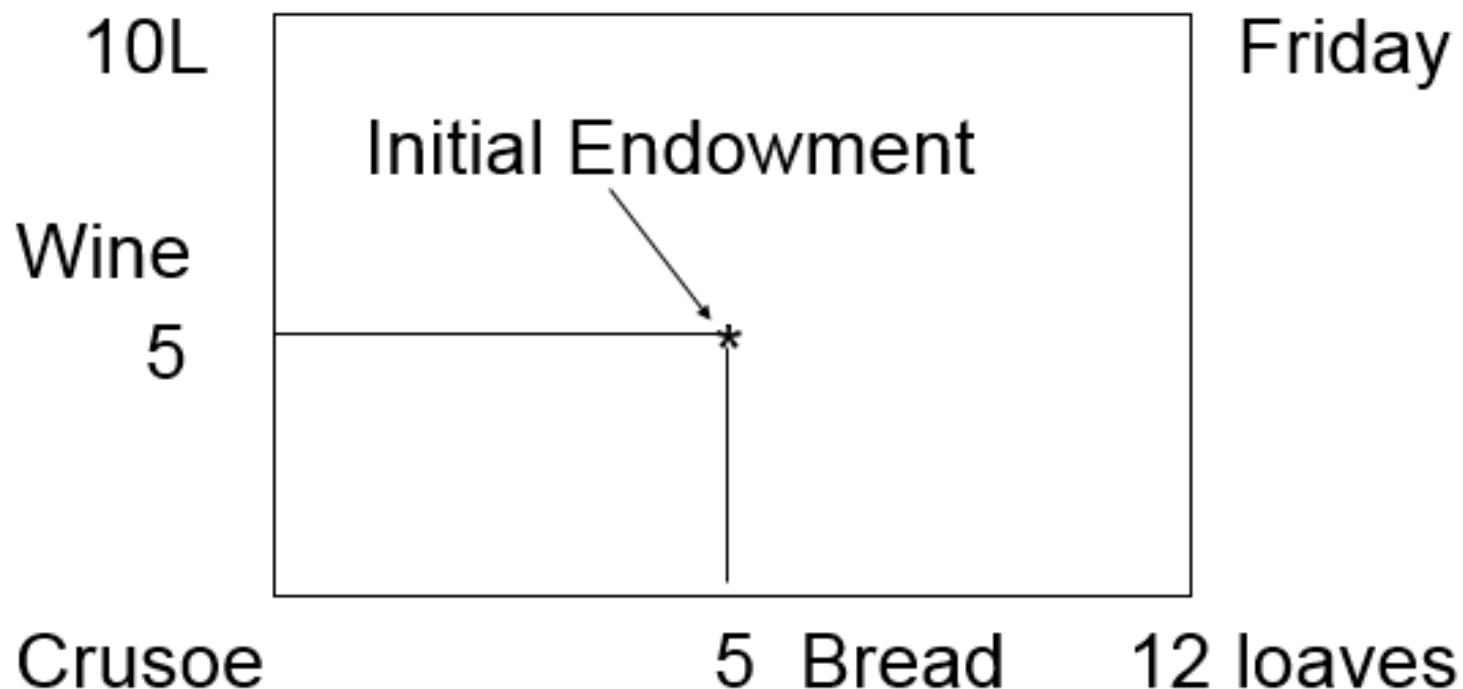
- Before banking there was money.
- What is money?
 - Medium of Exchange
 - Store of Value
 - Unit of Account

Origins of Money

- Why not barter?
- Simple economy
 - Two agents (Crusoe and Friday)
 - Two assets (bread and wine)
 - One period
- Would they need money?

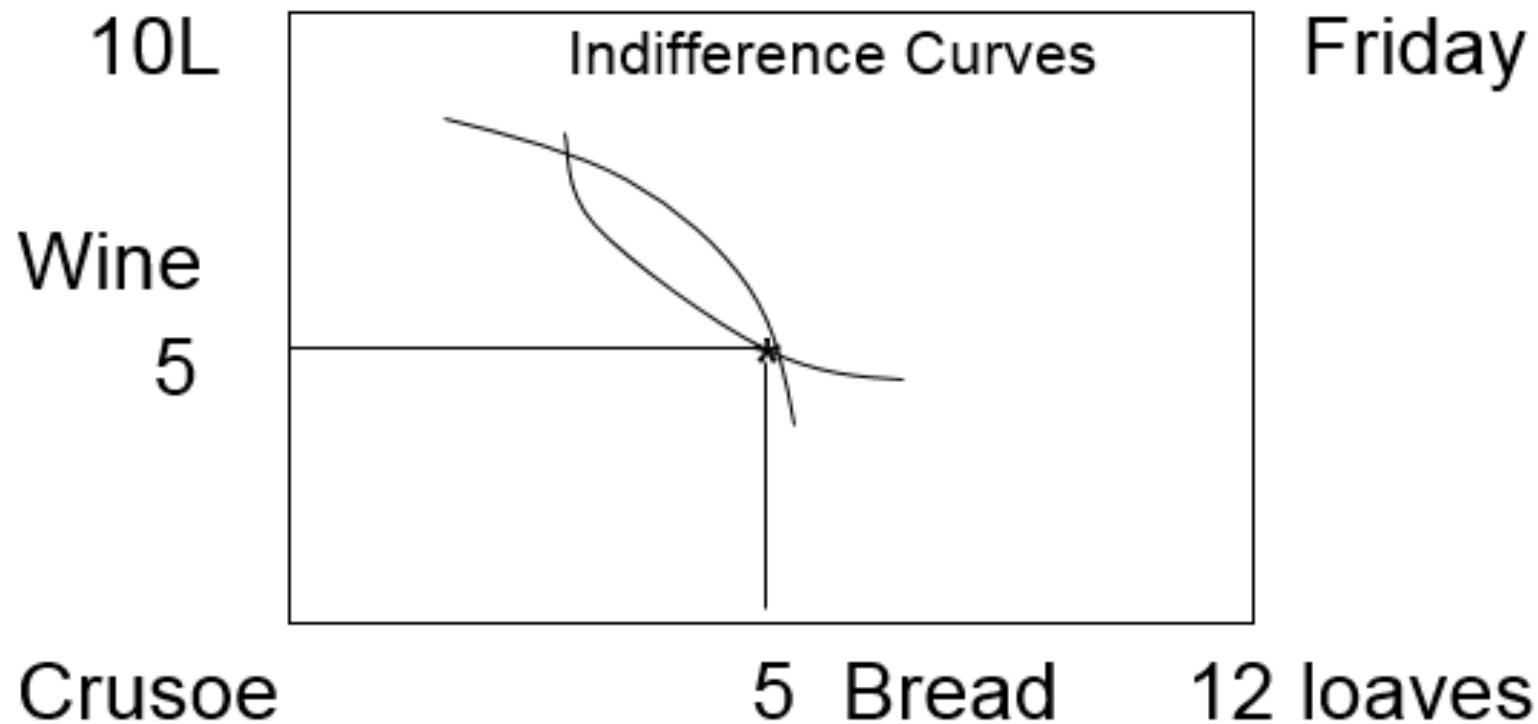
Barter

- Edgeworth Box



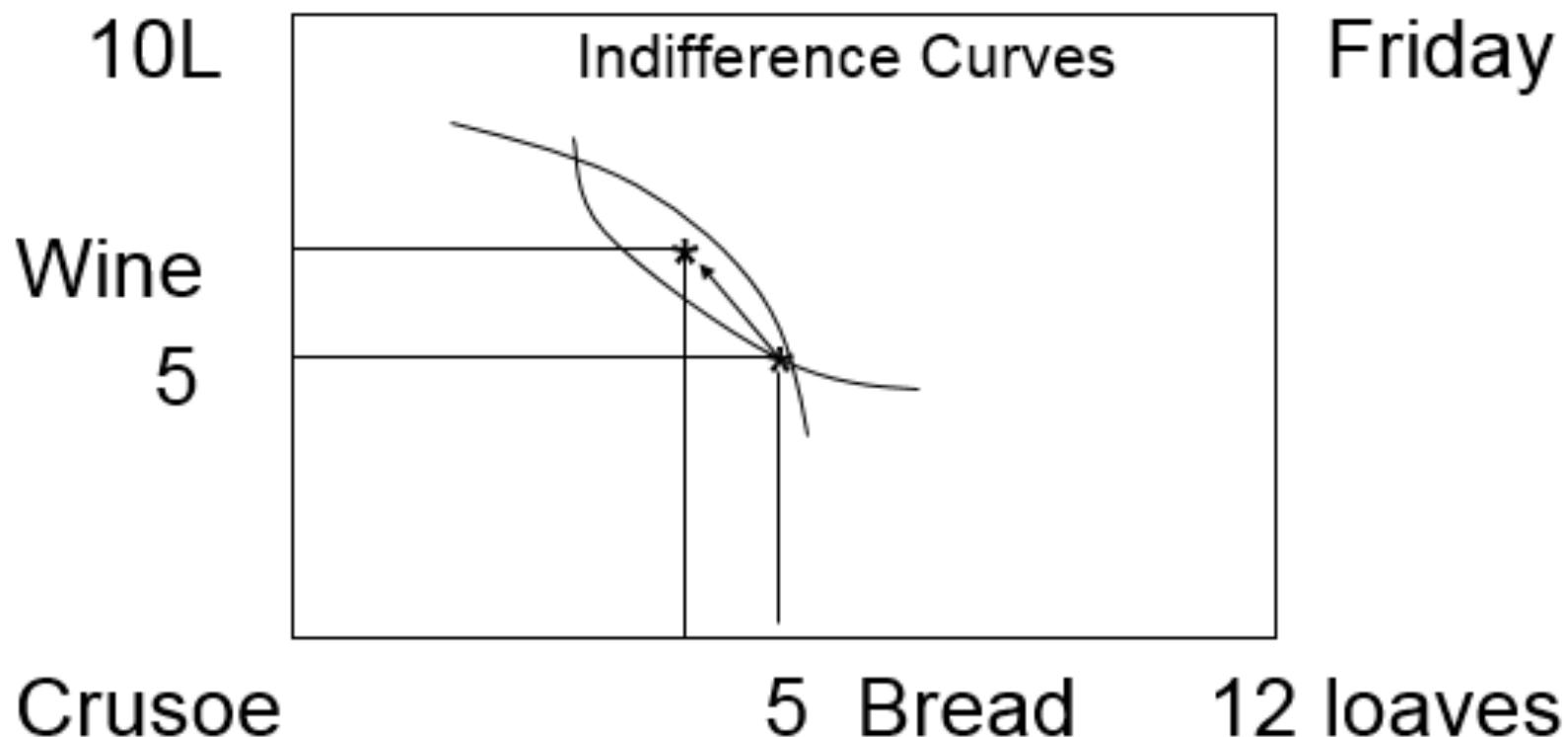
Barter

Is this an equilibrium?



Barter

Is this an equilibrium?



Barter

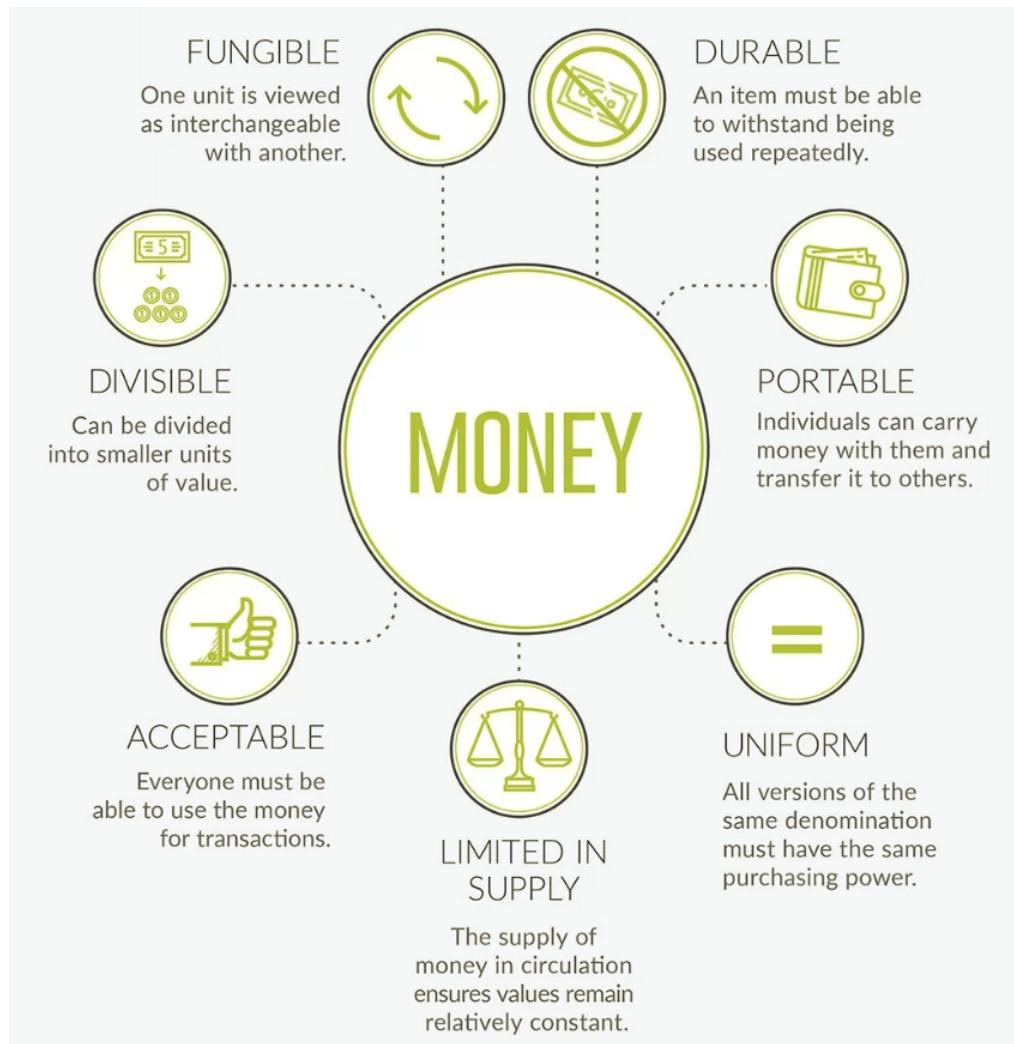
- In a world of barter, prices are denominated in other goods.
- So if Crusoe gives up one loaf of bread in exchange for 1.2 liters of wine,
- The price of a loaf of bread is 1.2L of wine
- The price of a liter of wine is $1/1.2 = 0.8333$ loaves of bread
- Like currency markets now

So why have money?

- Now imagine three people:
 - Crusoe
 - Friday
 - Swift
- Swift harvests shells
- How many transactions may be required involving how many different goods to attain equilibrium?
- How many “exchange rates” will we have?



Commodity Money



Types of Commodity Money

- Gold, Silver, and precious metals



Types of Commodity Money

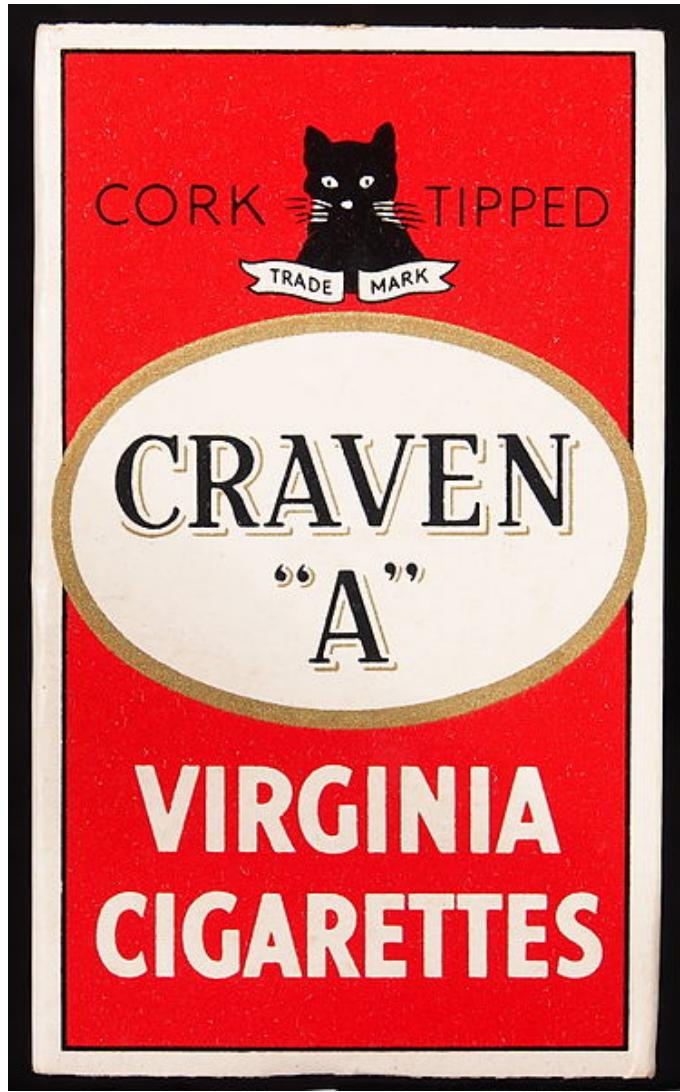
- Grains and other crops



Types of Commodity Money

- Shells (e.g. wampum)





Mackerel Economics in Prison Leads to Appreciation for Oily Fillets

Packs of Fish Catch On as Currency, Former Inmates Say; Officials Carp

By Justin Scheck

Updated Oct. 2, 2008 11:59 p.m. ET

When Larry Levine helped prepare divorce papers for a client a few years ago, he got paid in mackerel. Once the case ended, he says, "I had a stack of macks."

Mr. Levine and his client were prisoners in California's Lompoc Federal Correctional Complex. Like other federal inmates around the country, they found a can of mackerel -- the "mack" in prison lingo -- was the standard currency.



Larry Levine

"It's the coin of the realm," says Mark Bailey, who paid Mr. Levine in fish. Mr. Bailey was serving a two-year tax-fraud sentence in connection with a chain of strip clubs he owned. Mr. Levine was serving a nine-year term for drug dealing. Mr. Levine says he used his macks to get his beard trimmed, his clothes pressed and his shoes shined by other prisoners. "A haircut is two macks," he says, as an expected tip for inmates who work in the prison barber shop.

There's been a mackerel economy in federal prisons since about 2004, former inmates and some prison consultants say. That's when federal prisons prohibited smoking and, by default, the cigarette pack, which was the earlier gold standard.

Prisoners need a proxy for the dollar because they're not allowed to possess cash. Money they get from prison jobs (which pay a maximum of 40 cents an hour, according to the Federal Bureau of Prisons) or family members goes into commissary accounts that let them buy things such as food and toiletries. After the smokes disappeared, inmates turned to other items on the commissary menu to use as currency.



The banner features the EurekAlert! logo on the left, which includes a white swirl icon and the text "EurekAlert! The Global Source for Science News". To the right is the AAAS logo, which consists of a stylized "A" icon followed by the letters "AAAS". Below the banner is a dark navigation bar with links for HOME, NEWS, MULTIMEDIA, MEETINGS, PORTALS, and ABOUT.

PUBLIC RELEASE: 22-AUG-2016

Ramen noodles supplanting cigarettes as currency among prisoners

AMERICAN SOCIOLOGICAL ASSOCIATION



SHARE

PRINT

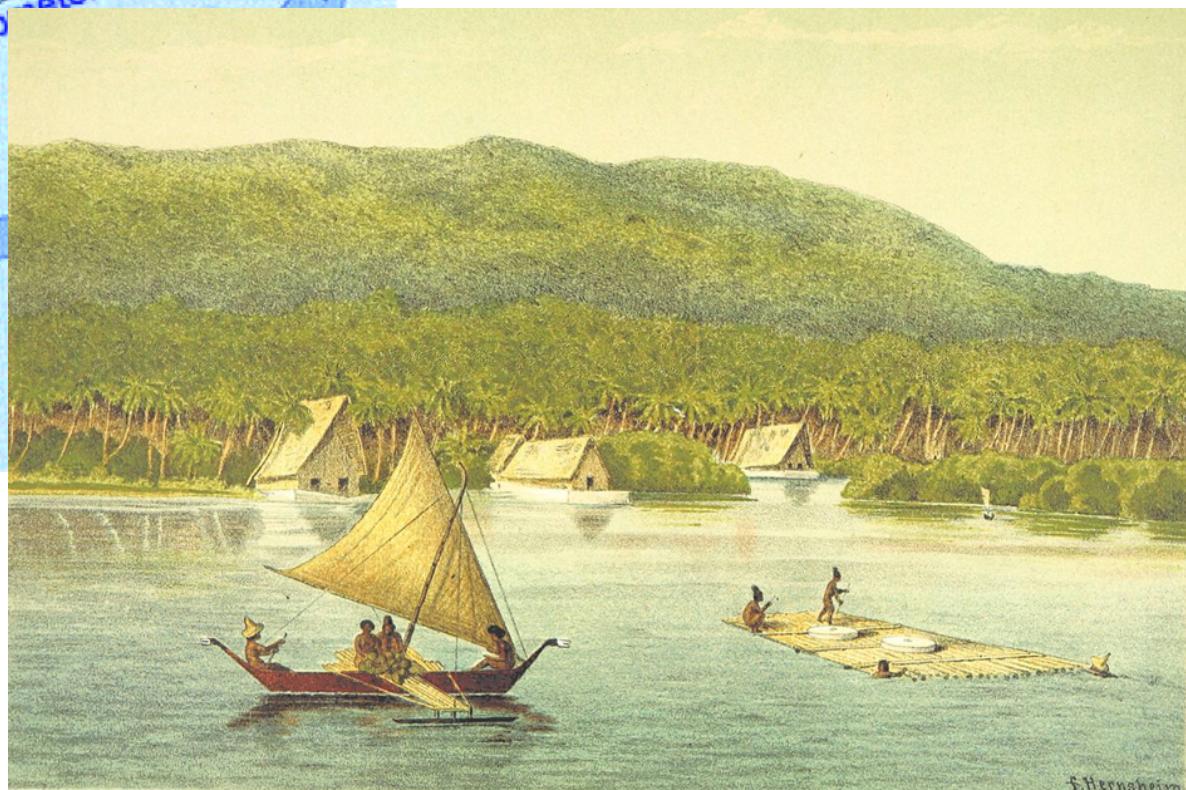
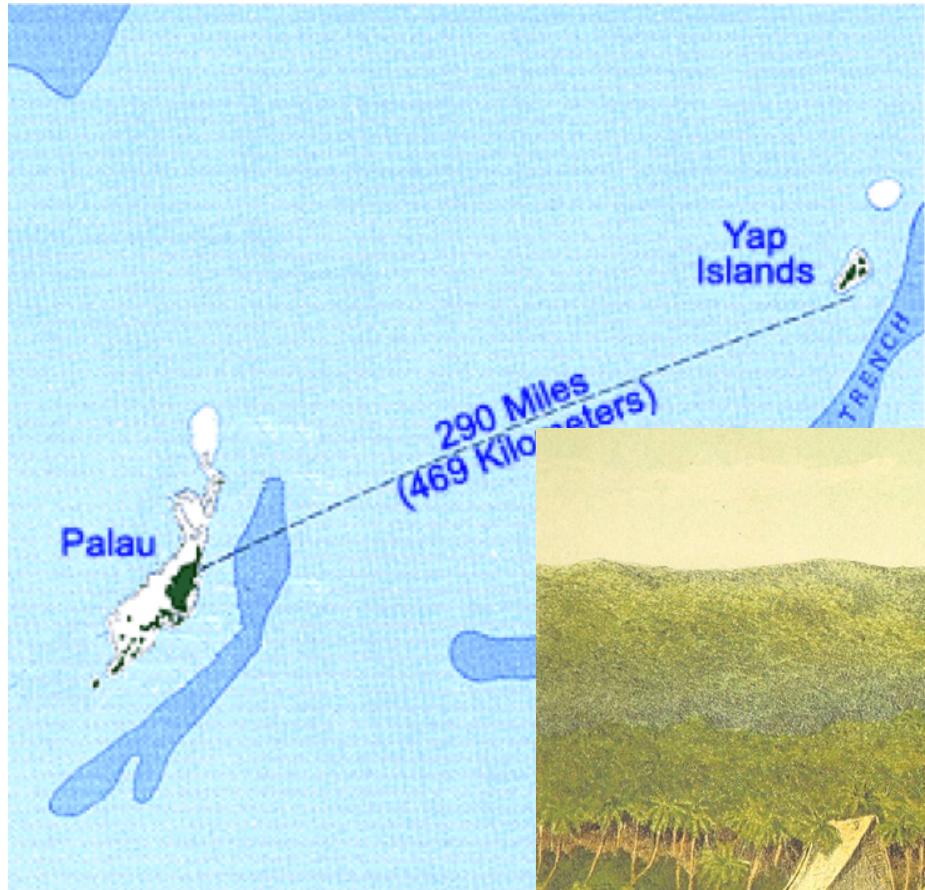
E-MAIL





(c) 2006, Danka Ledgerwood





Drawbacks to Commodity Money

- May lack characteristics of liquidity
 - May be heavy and cumbersome
 - May be difficult to measure or evaluate on the spot
 - Costly to produce!

Limitations on Money

- Problem with paying with cash
 - Carrying cash around can be dangerous or difficult
 - Why not just pay with an IOU?
 - Let the seller come pick up the cash later.
 - If the seller trusts you to have the money later, you need not have it now.
 - Credit

Limitations on Money

- Problem with paying with cash
 - You don't have it.
- Instead you have cash coming in the future, or
- You have a positive NPV project, or
- You have some other valuable asset that could be sold

Origins of Credit

- Trade Credit

Illinois

Beaver

Hunter



Cincinnati

Store

New York

Merchant

London

Merchant



Origins of Credit

In a world without credit, all transactions would have to take place with cash

1. NY merchant pays cash to London merchant for gun.
2. Cincinnati merchant pays NY merchant cash for gun
3. Beaver hunter pays Cincinnati merchant cash for gun
4. Beaver hunter kills beaver
5. Cincinnati merchant pays cash to beaver hunter for pelt
6. NY merchant pays cash to Cincinnati merchant for pelt
7. London merchant pays NY merchant cash for pelt

What's wrong with this?

Origins of Credit

- Trade Credit Period 1

Illinois

Beaver
Hunter

Cincinnati

Store

New York

Merchant

London

Merchant



Trade Credit

Beaver
Guy

Cincinnati
Merchant

New York
Merchant

London
Merchant

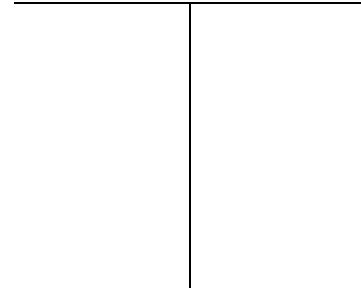
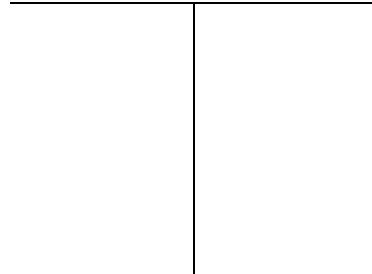
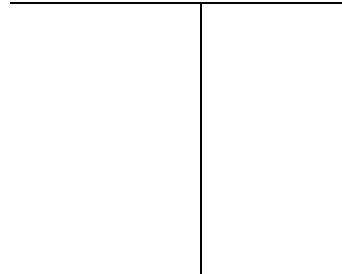
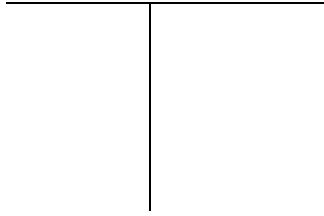
A/P

A/R

A/P

A/R A/P

A/R



Origins of Credit

- Trade Credit Period 2

Illinois Cincinnati New York London
Beaver Store Merchant Merchant
Hunter

\Beaver pelts



IOUs

Trade Credit

- Who owes whom?

London Merchant

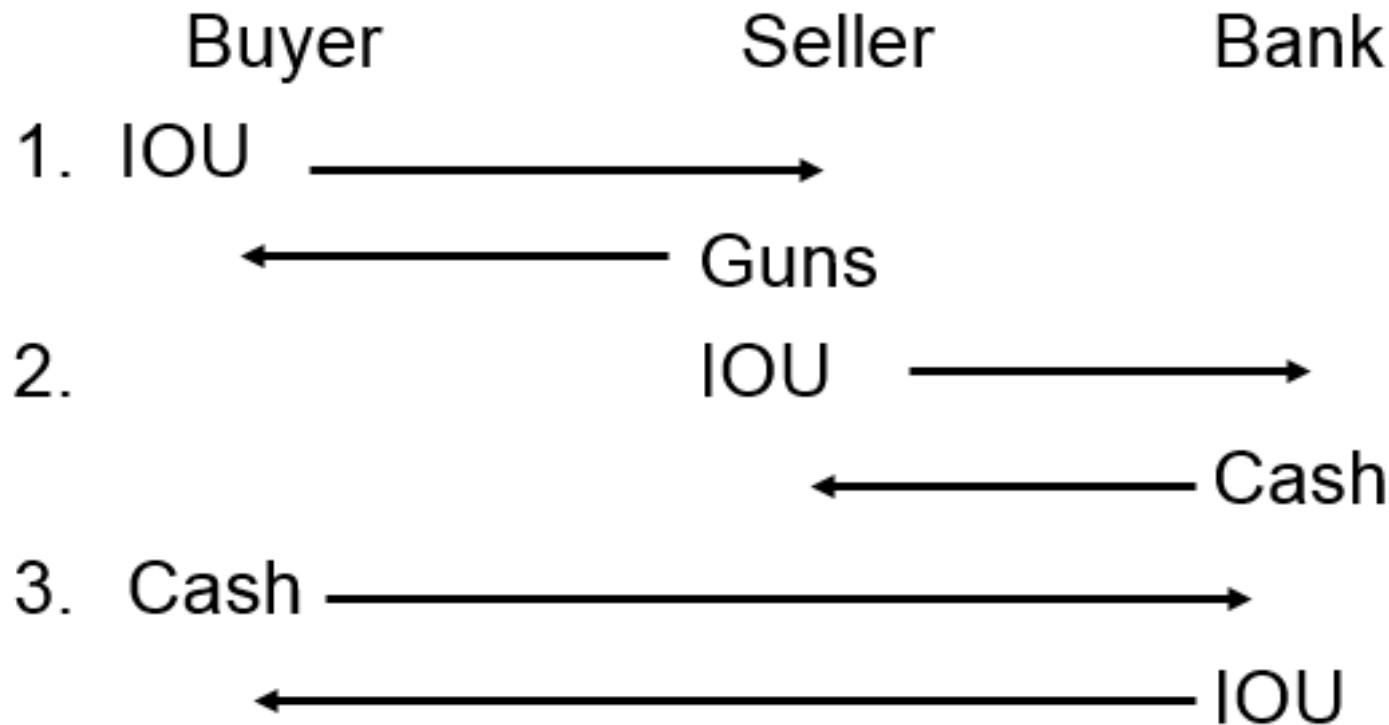
IOUS from
Beaver guy?

Limitations on trade credit

In order to provide trade credit the seller must know the buyer

Alternative: seller knows third party who knows seller.

Discounting



Letter of Credit

- Buyer is stranger to seller, but bank knows buyer, so bank vouches for buyer.
- Or can function like travelers checks

\$1000

N^o A 1828

\$1000. Stg

Lettre de Crédit Circulaire.

Boston, E.U. le 9 avril, 1892.

Messieurs,

Nous prenons la liberté d'introduire auprès de vous et de recommander à vos attentions obligantes
M. Hon. George F. Hoar —

Nous lui ouvrons en même temps un crédit circulaire de Mille livres sterling
\$1000. Stg —

dont vous voudrez bien lui fournir la Contrevaleur sous retenue de vos frais et contre ses traites sur Messieurs Baring Brothers & Co Ltd Londres à vue, qui recevront tout accueil à présentation.

Veuillez inscrire vos paiements au dos de la présente lettre, qui est valable jusqu'au 30 juin 1893.

Agreez, Messieurs, l'assurance de notre parfaite considération.

Signature de l'accrédité

Geo. F. Hoar

Killarney 1892
for themselves and as Attorneys for
Baring Brothers & Co. Ltd

CETE LETTRE DOIT ÊTRE REMISE À LA MAISON QUI PAIERA LE SOLDE.

1892					
June	2	PAID BY BARING BROTHERS & CO LTD	Fifteen pounds	50	
	14	do	Fifteen pounds	50	
	21	do	Fifteen pounds	50	
	27	do	Fifteen pounds	50	
July	8	BANK OF ENGLAND BIRMINGHAM	Fifteen pounds	50	
	18	York Union Bank & Co Ltd	Eleven pounds	11	
	20	PAID BY BARING BROTHERS & CO LTD	Fifteen pounds	50	
	21	do do do	Twenty pounds	20	
July	26	Hottinquer & C° Paris	fifty pounds	50	
Aug	1	" "	do	50.	
	6	BANQUE CANTONALE DE BERNE	fifty pounds	50	
	12	PAID BY LOMBARD DES CHAMPS GENEVA	fifty pounds	50	
Sept	5	Le Galli & C° France	fifty pounds	50	
"	11	the same	fifty pounds	50.	
	23	Nicchini Milan	Twenty One Pounds	20	
Le	1 OCT 92	PAYÉ par BANQUE COMMERCIALE D'AIX LES BAINS	AIX-LES-BAINS	British Nine Shillings	20
Oct	6	PAID BY HOTTINGUER & CO — PARIS	Twenty five pounds	25	
	8	PAID BY BARING BROTHERS & CO LTD	Fifteen pounds	50	
	17	do	One hundred fifty	50	

Italia y R / Plata.
ederer.
Landis.

American Express Company
CONVERTIBLE LETTER OF CREDIT

This Travelers Letter of Credit is negotiable in local currency at any of the Offices or Bank Correspondents named on the accompanying list.

In addition the holder may obtain American Express Travelers Cheques at any American Express office, or at any Travellers Cheque Agency specifically indicated on the list of correspondents accompanying the Letter of Credit. A charge of one-fourth of one percent ($\frac{1}{4}$ of 1%) will be made for American Express Travelers Cheques secured against this Letter of Credit.

The Letter of Credit should not be destroyed. If exhausted, it will be taken up by the Office or Correspondent negotiating the final draft.

If any balance remains unused, the Letter of Credit should be surrendered to the holder's bank or nearest American Express office upon his return home.

(MADE IN U. S. A.)



IMPORTANT

GUARD THIS LETTER OF CREDIT AGAINST LOSS OR THEFT AS YOU WOULD MONEY, but if you should lose it, notify the local police and our bank correspondent in the place where the loss occurred; and IMMEDIATELY TELEGRAPH the nearest American Express office, using the following form (see list with cable and street addresses below):

"Have lost my Travelers Letter of Credit No. _____ at (place) - balance not drawn against Credit (amount)"

The holder should supplement the telegraphic advice with a complete report by mail giving full particulars.

**REGISTERED CABLE ADDRESSES OF CHIEF
AMERICAN EXPRESS OFFICES**

New York, 65 Broadway:
TREASAMEX,--New York.

Paris, 11 Rue Scribe:
AMEXCO,--Paris.

Hong Kong, 4 Des Voeux Road Central:
AMEXCO,--Hong Kong.

Bombay, 82-84 Esplanade Road, Fort:
AMEXCO,--Bombay.

(1756-7-35)

Bill of Exchange

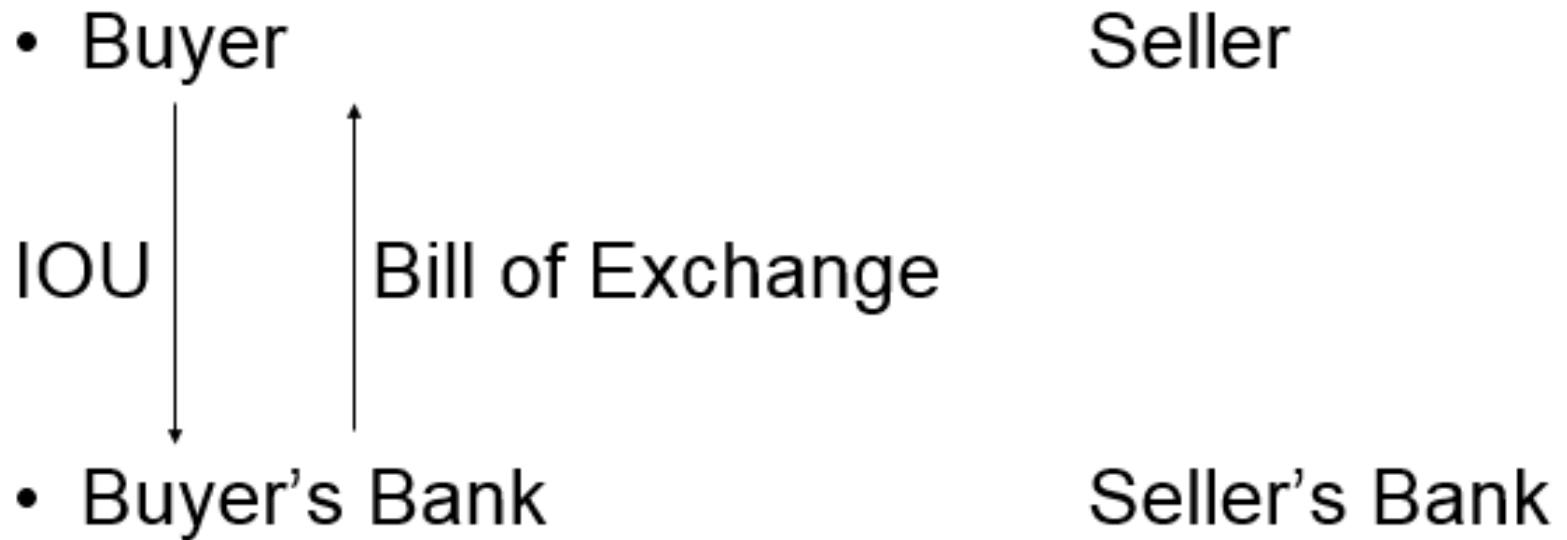
Seller doesn't know Buyer

Sellers bank doesn't know buyer

Buyers bank doesn't know seller, but

Buyers bank knows sellers bank

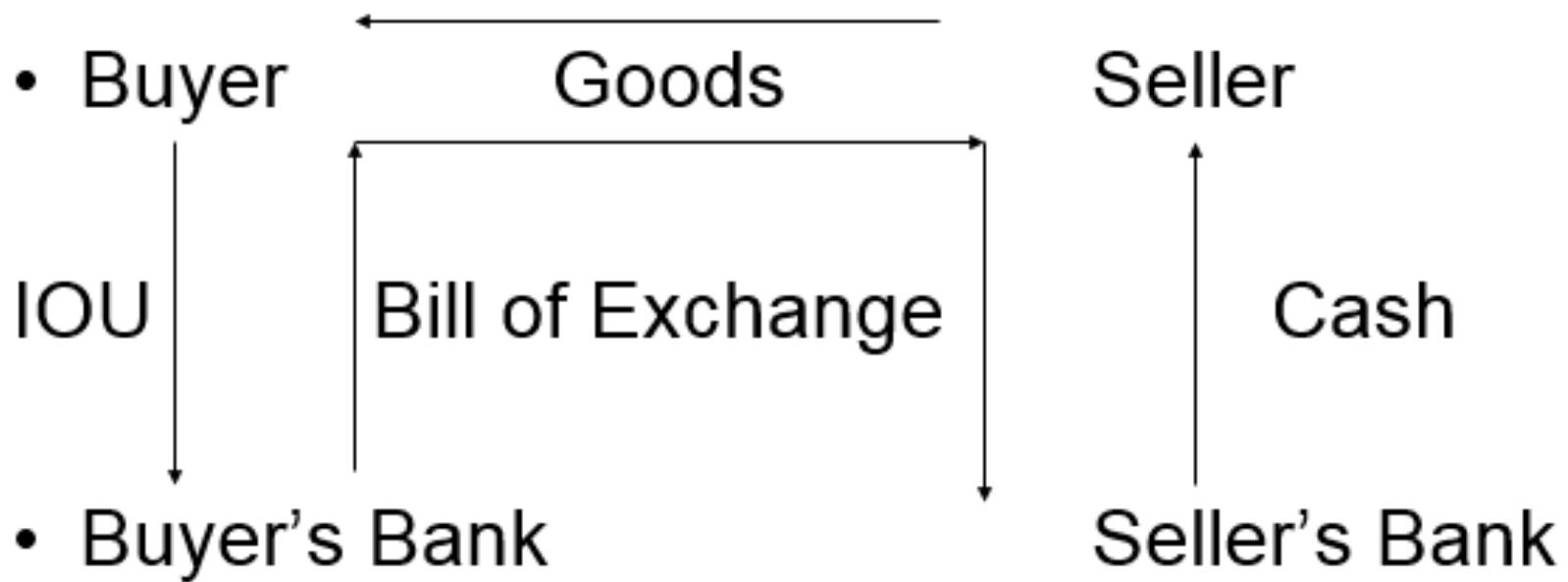
Bill of Exchange



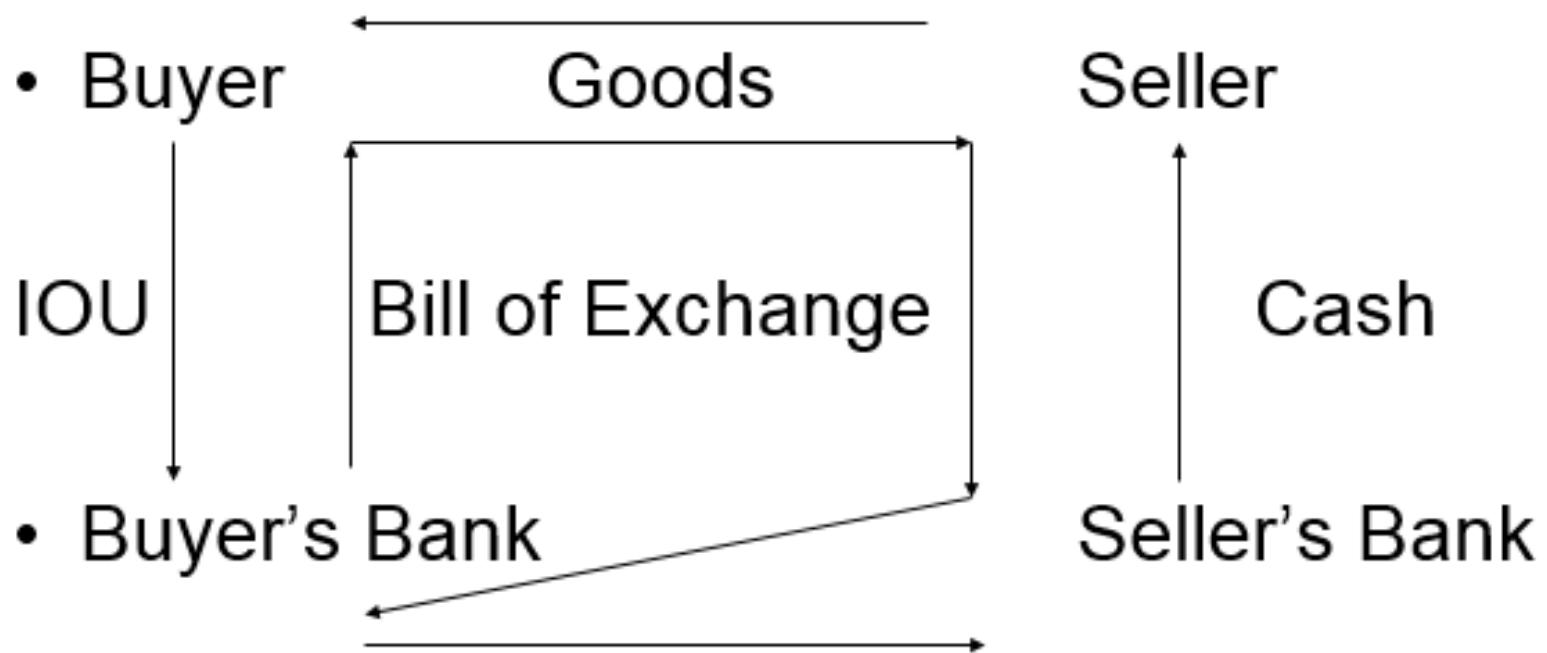
Bill of Exchange



Bill of Exchange



Bill of Exchange



1. Buyer Final Goods Producer

IOU →

← Goods

2.

Input provider

Same IOU →

← Inputs

No need for bank.

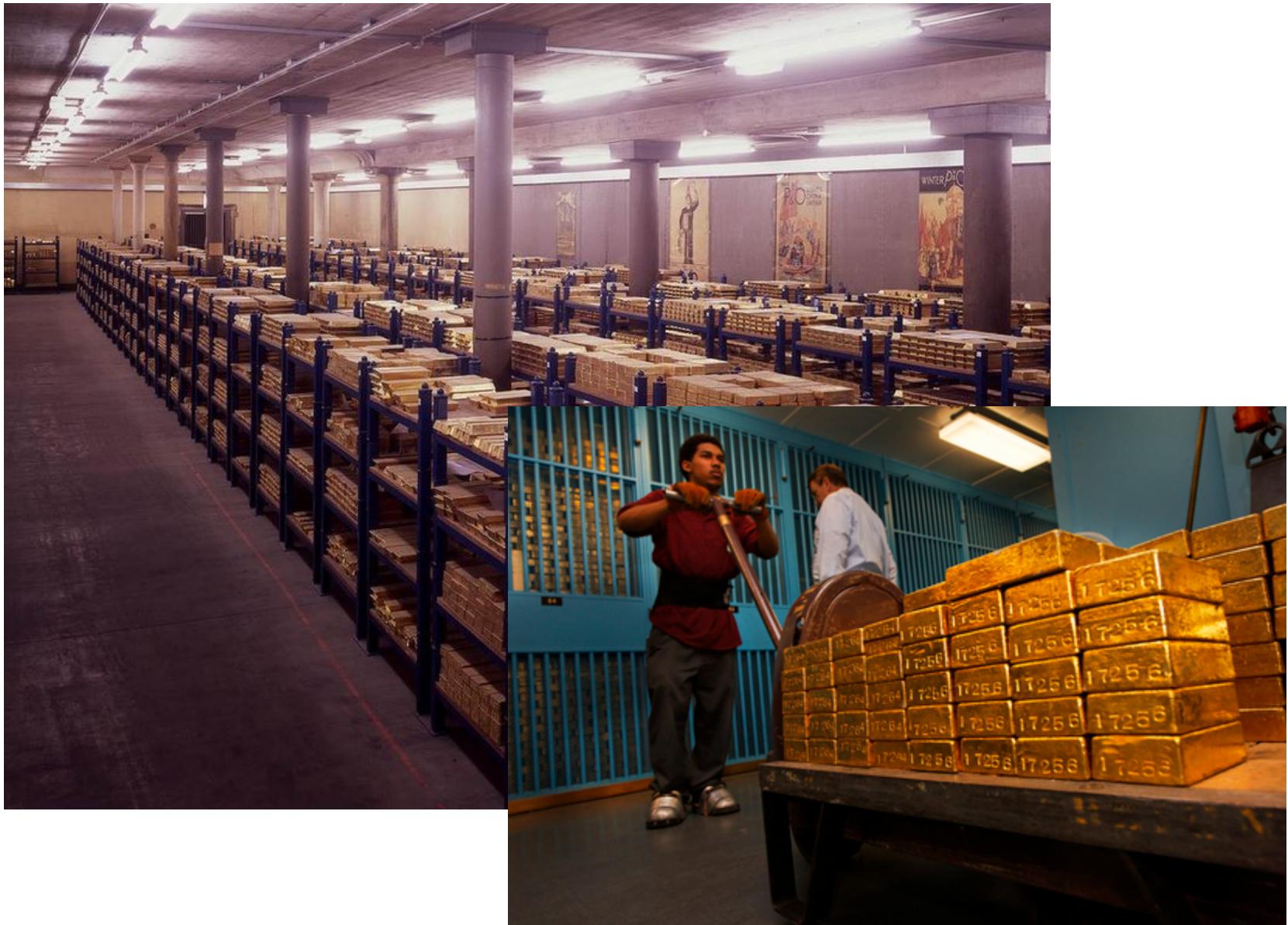
Origins of Banking

- Goldsmith as safe deposit



Origins of Banking

- Safe Deposit Model: why store?
 - Goldsmith issues warehouse receipts
- In colonial America: tobacco
- Today: Brinks
- Is the receipt an asset?
- What does the warehouse balance sheet look like?
- How does the warehouse make money?





JP/2013
TruckTrailers.blogspot.com



Origins of Banking

- If commodity is fungible, warehouse receipt represents a claim. i.e. it becomes a financial asset
- Warehouse B/S

Tobacco
or Gold

Receipts

Origins of Banking

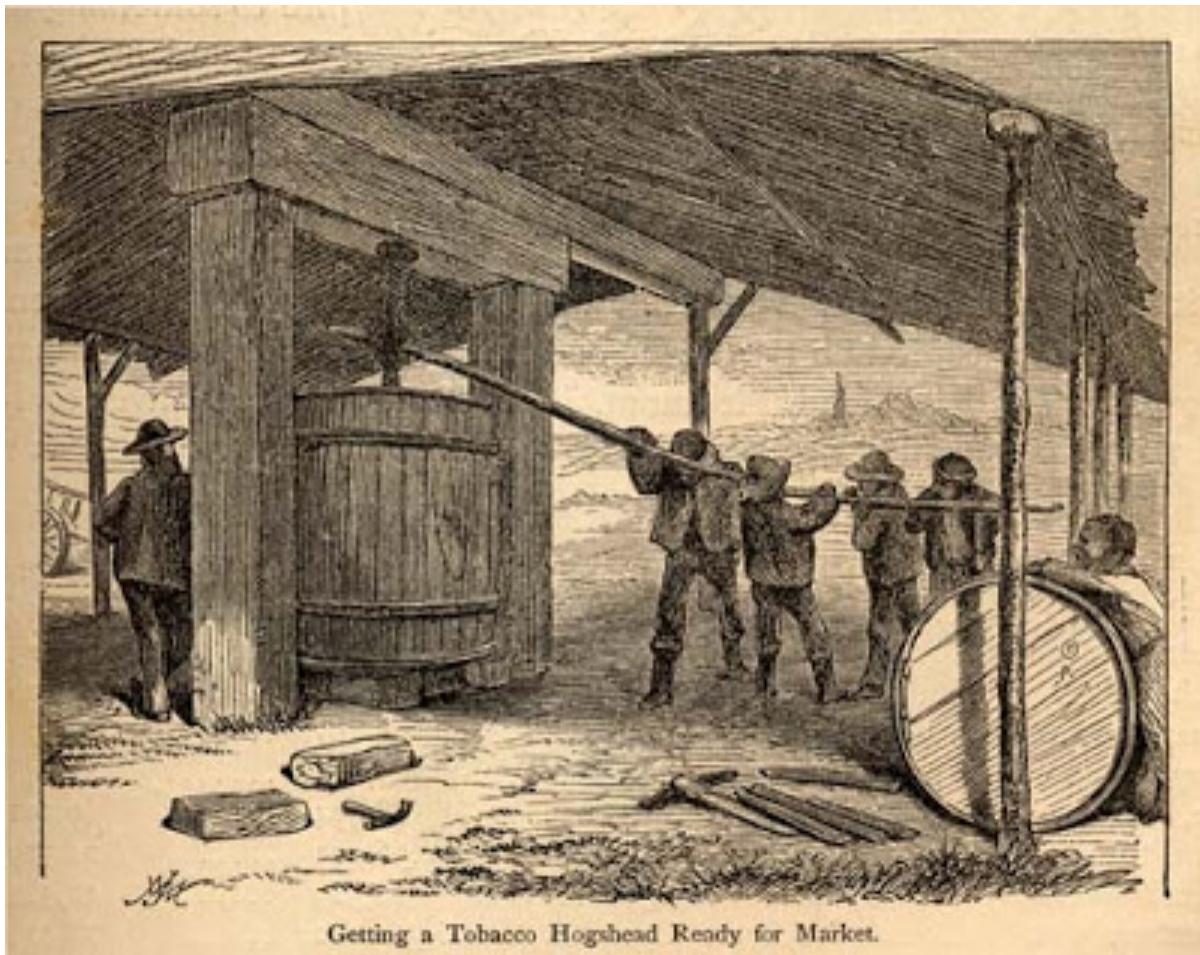
- Why would anyone ever ask for their stuff back?
- If their stuff is gold, they may need the gold for cash transactions.

Origins of Banking

- What is the likelihood of all customers asking for their stuff back on the same day?
- Depends on the covariance of withdrawal behavior among depositors
- How else can the warehouse make money?

Receipts as Money

- The receipt is an IOU
- If the bank has good credit, the receipts will become a medium of exchange
- The receipts may become more liquid than the commodity



Getting a Tobacco Hogshead Ready for Market.

James R I V E R. No.
Shoccoe's Warehouse, the 12 Day of ^{February} 1773
R E C E I V E D of Joyce Rice four hundred seventy three
Pounds of Tobacco. Transfer Jobo. Tobacco,

to be delivered on Demand to him or his Order, according to the Directions of
the Act of Assembly "For amending the Staple of Tobacco, and preventing
Frauds in his Majesty's Customs." Witness our Hands,

473

Robt. Burton
James Page

Origins of Banking

- Warehouse Balance Sheet

Gold 100	Receipts 90 Equity 10
----------	--------------------------

Origins of Banking

- What happens when a loan is made?
- Warehouse Balance Sheet

Gold	100	Receipts	90
		Equity	10
Loan	10	Receipts	10
Total	110		110

Fractional Reserve Banking

- As long as the receipts circulate, the bank will never have to dip into its gold pile.
- If the borrower gives the receipt to someone who wants to redeem it for gold, then the reserve will be reduced
- Does the bank collect storage fees?
- Does the bank pay interest?

Origins of Banking

- How does the warehouse make money now?
- Income Statement
 - Interest Income
 - Loan Losses
 - Op. Exp.

Origins of Banking

- Key questions:
 - How to structure liabilities? Demand deposits or timed deposits
 - How to structure assets? Callable loans or timed loans?
 - How many loans should be made? i.o.w. How big should the balance sheet be?
 - What percentage of liabilities should be held in “ready cash”?

Credit as Money

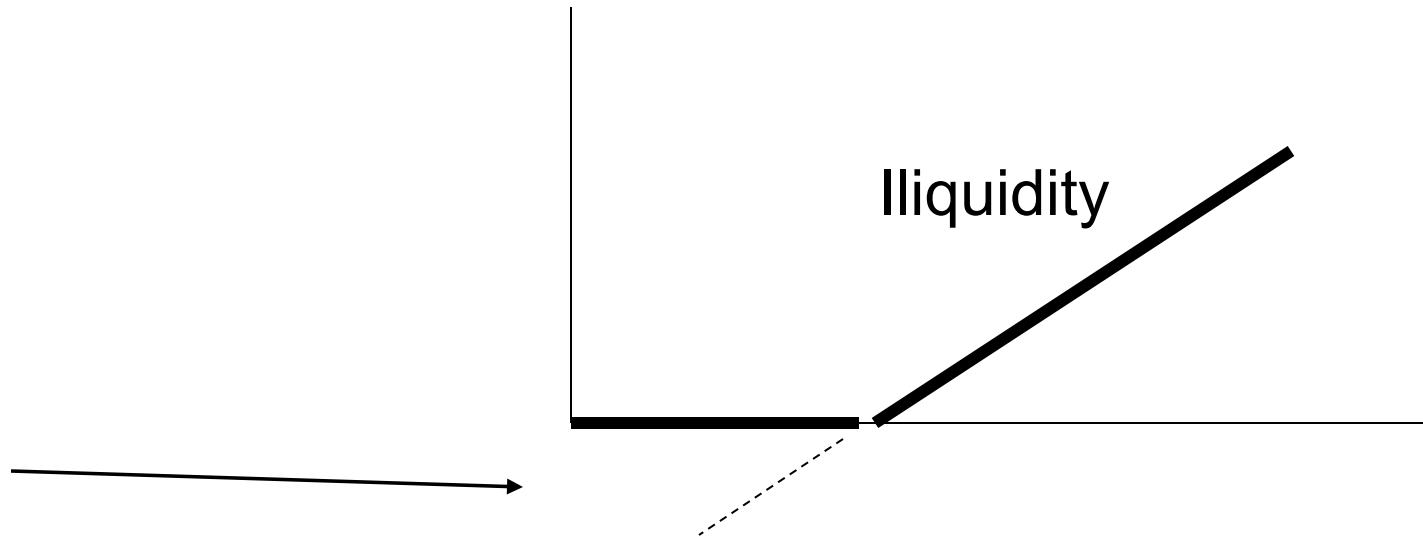
- Warehouse receipt is a financial asset to the holder
- It's a liability to the issuer
- The holder is a creditor
- The issuer is a debtor
- Value of transaction media is a function of the creditworthiness of the issuer
- Why does the holder not charge interest?

Liquidity Demand

- Why does the issuer of the warehouse receipt not pay interest to the holder?
- Liquidity premium in lieu of interest

Interest Charged

??



Liquidity Creation

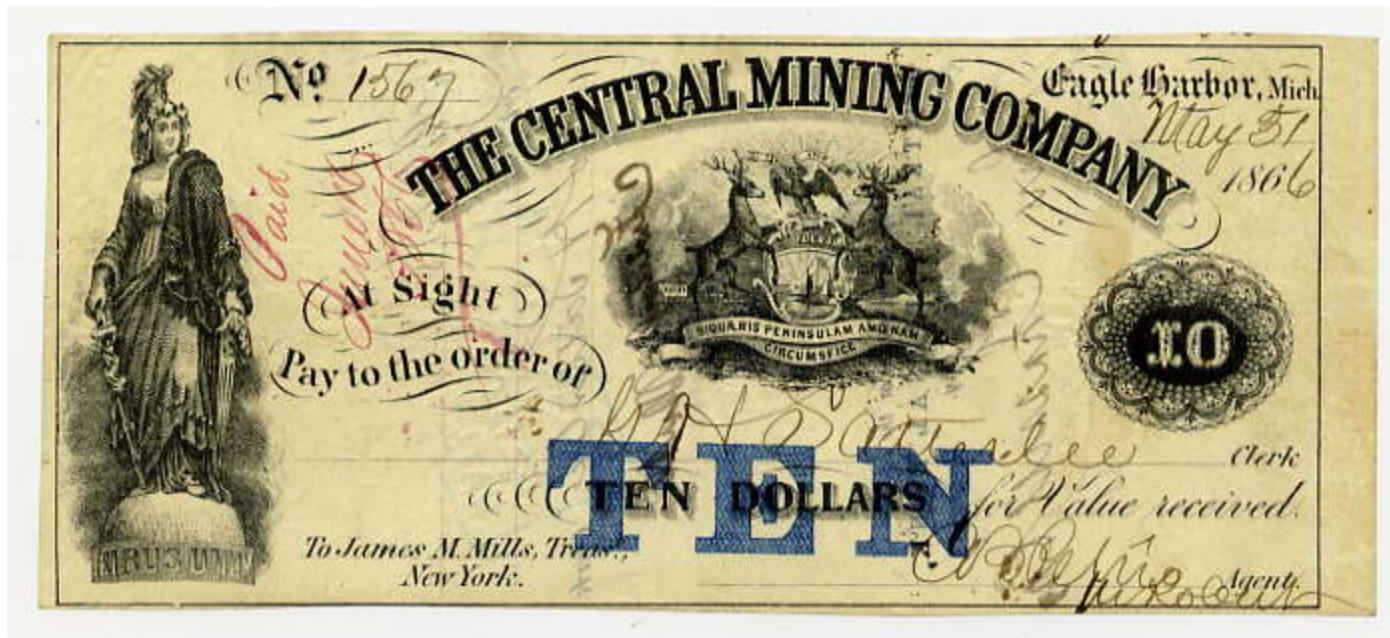
- What makes a debt instrument useful as transaction medium?
- What about other receipts?
 - Best Buy gift cards
 - Postage Stamps
 - Subway Tokens
 - Casino Chips
 - Mobile Phone minutes





IOUs as medium of exchange

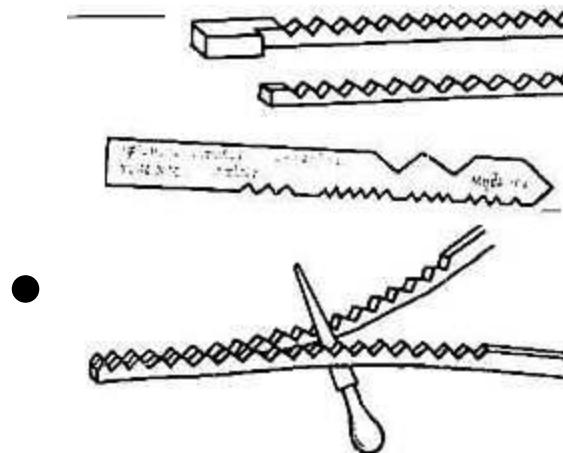
If Debtor is well known, IOUs may circulate
Company Town





Tax Receipts

- Tallies as receipts, tallies as IOUs



CC



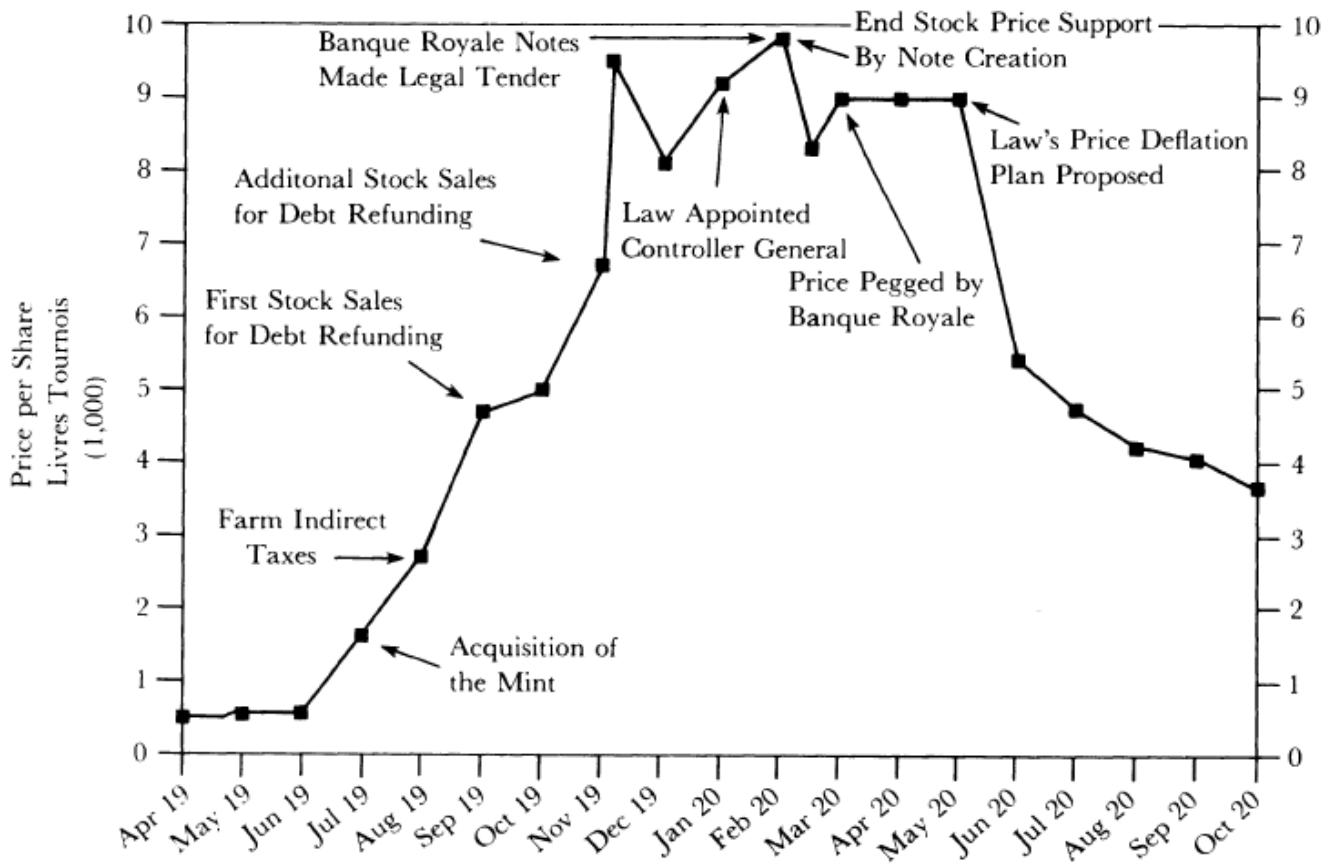
Government

Taxes Receivable

Debt



Compagnie des Indes Stock Price



Bank of England



SEALING OF THE BANK OF ENGLAND CHARTER. 1694.

SIR JOHN HOUISON,
Governor.

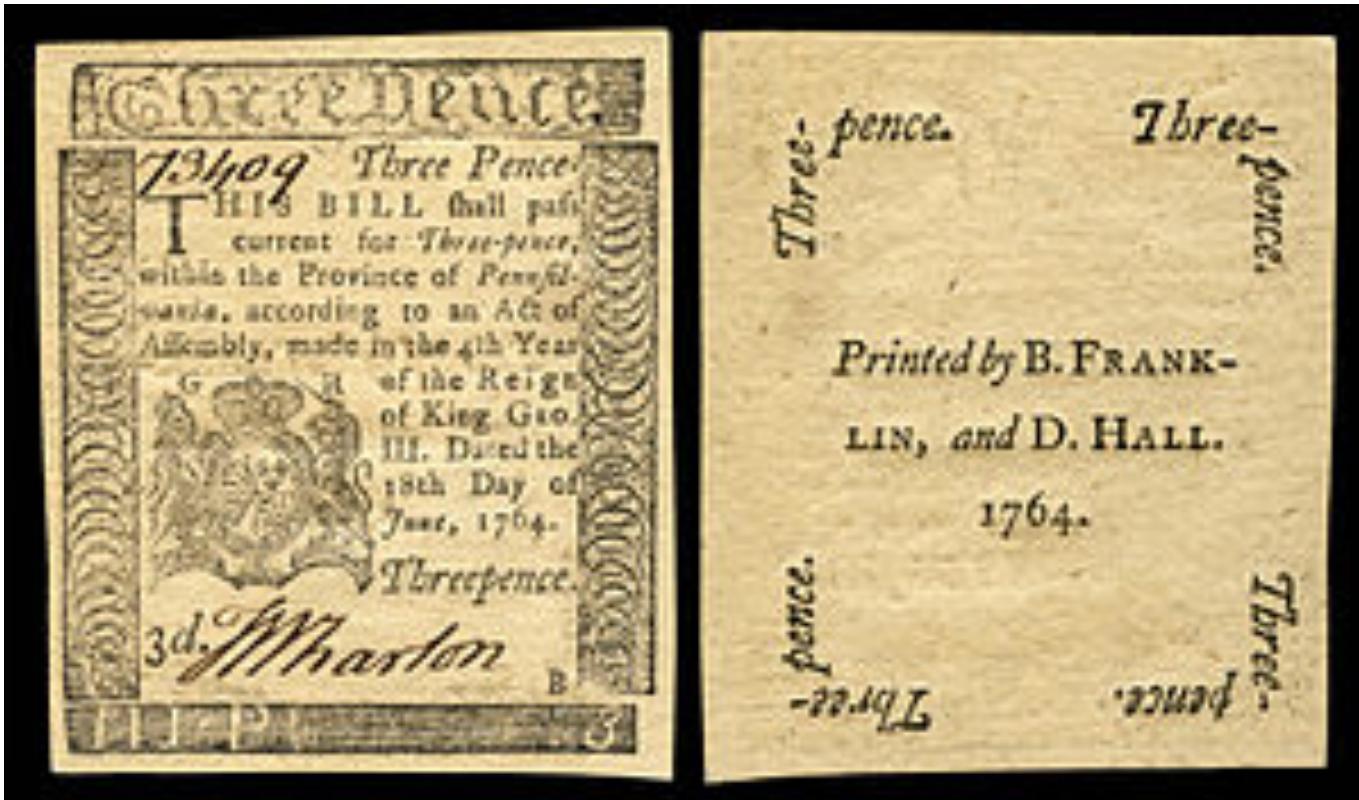
SIR JOHN SOMERS,
Lord Keeper.

MR. MICHAEL GODFREY
Deputy Governor.

Bank of England



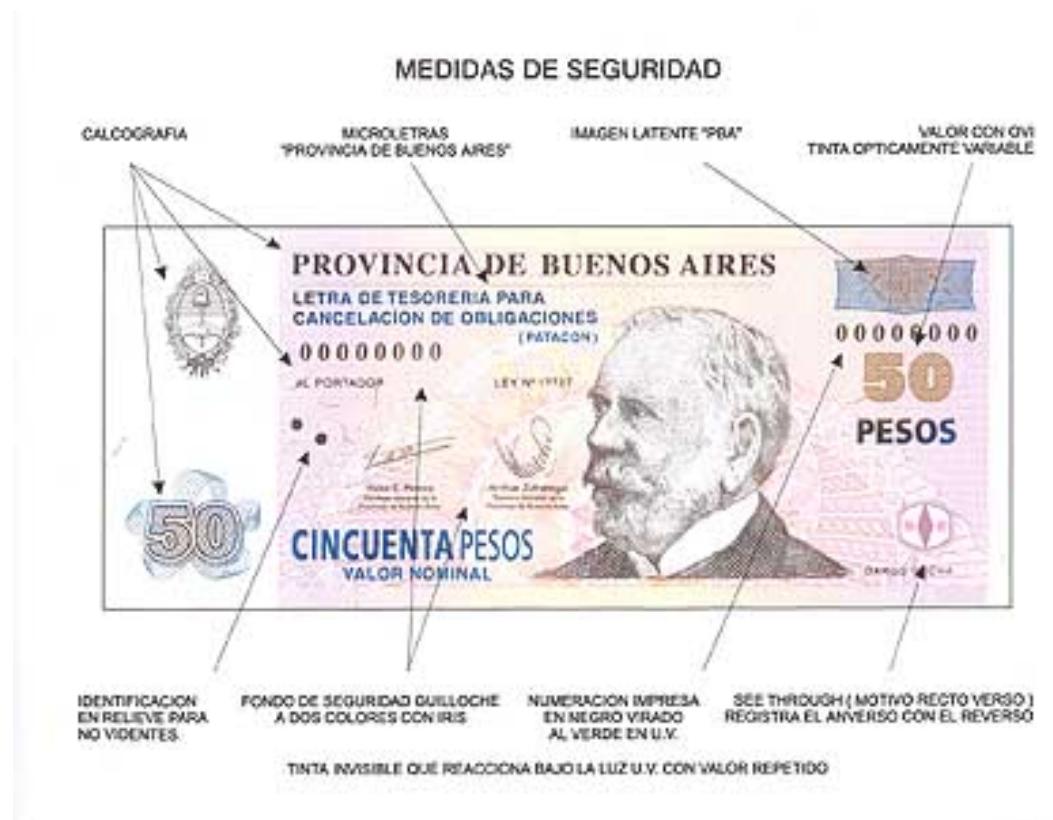
Colonial notes

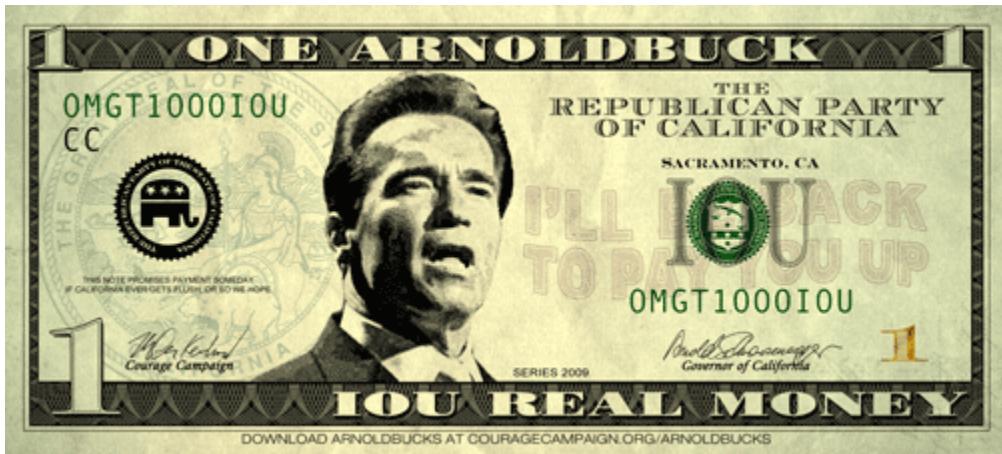


National Banking Act



Patacones

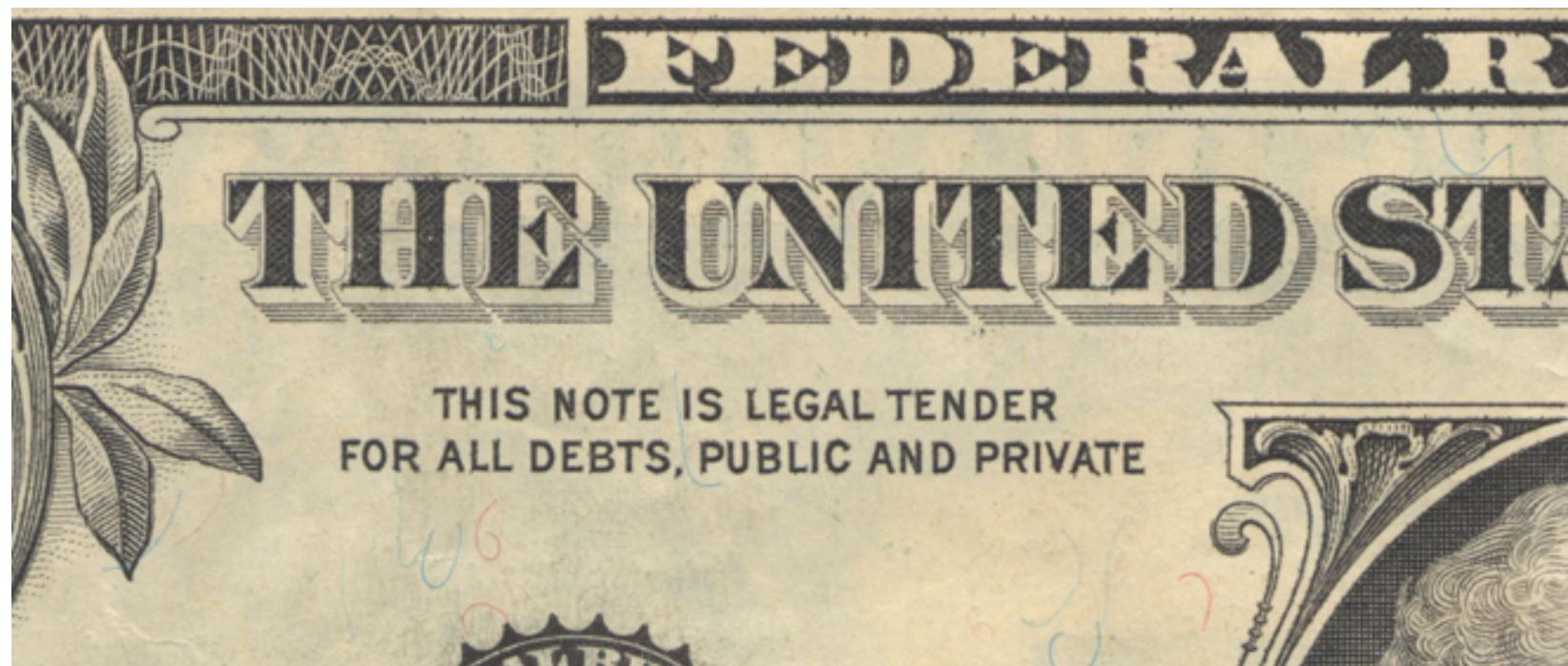




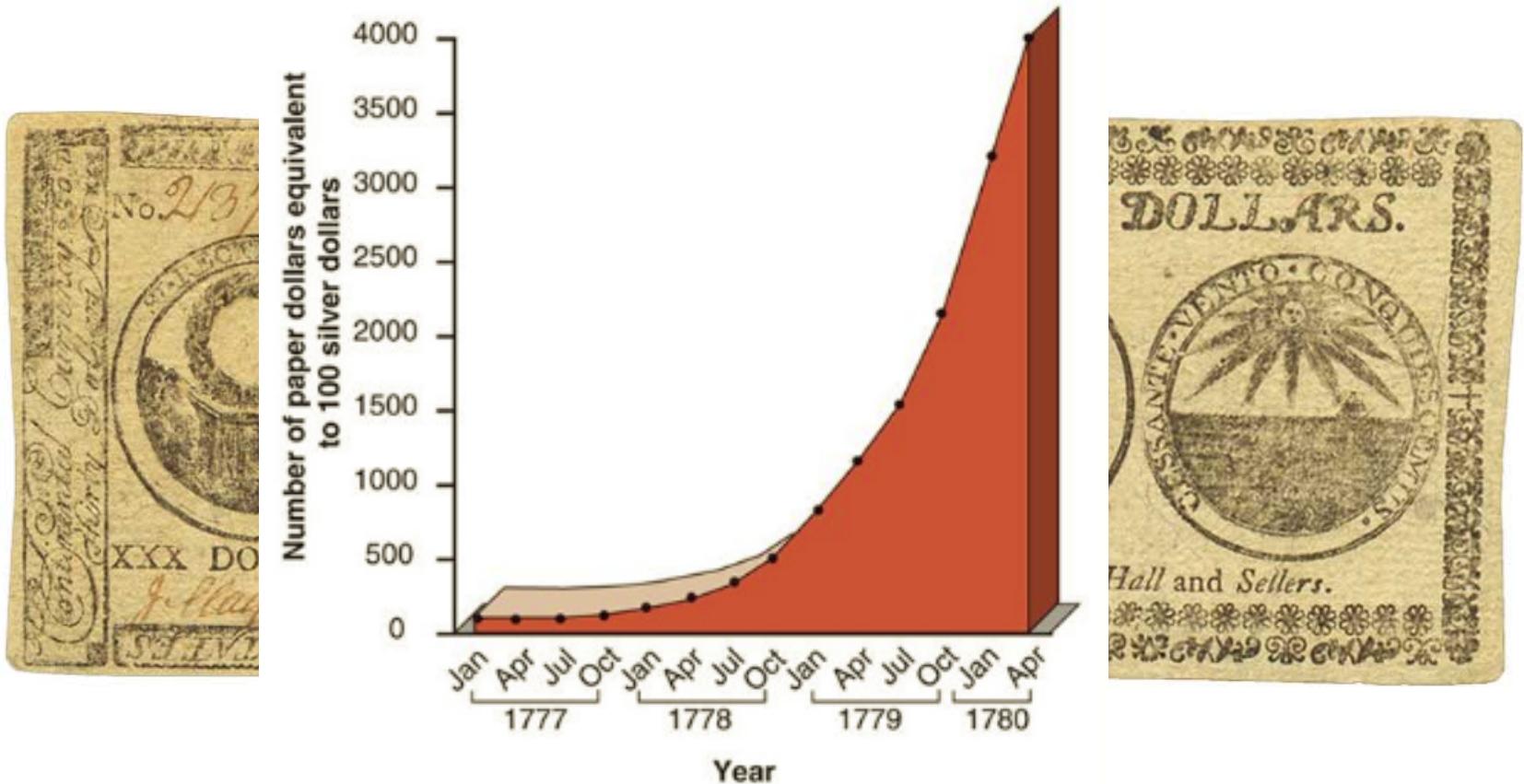
Fiat Money

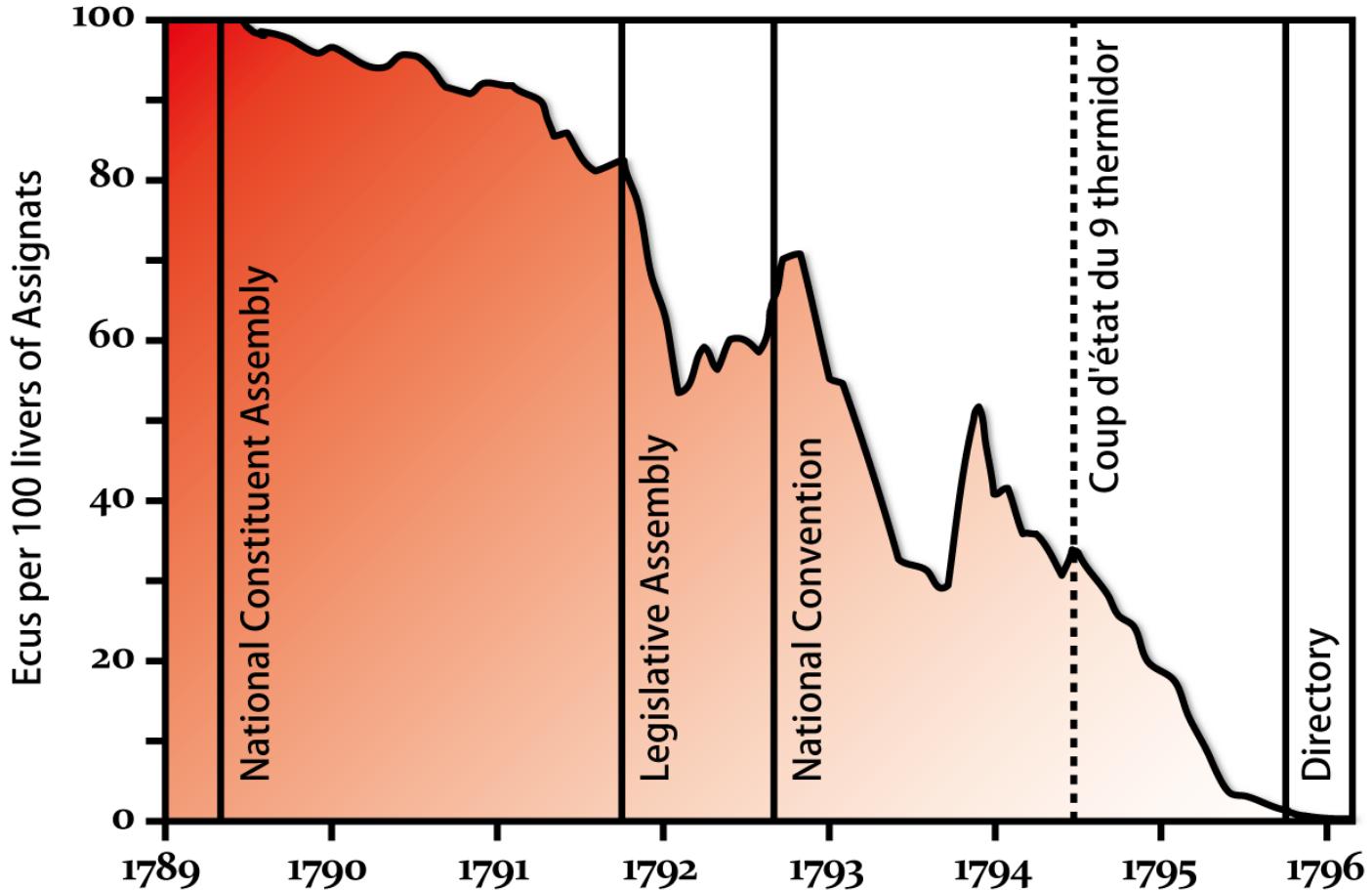
"The Congress shall have Power To...coin Money, regulate the Value thereof, and of foreign Coin...."

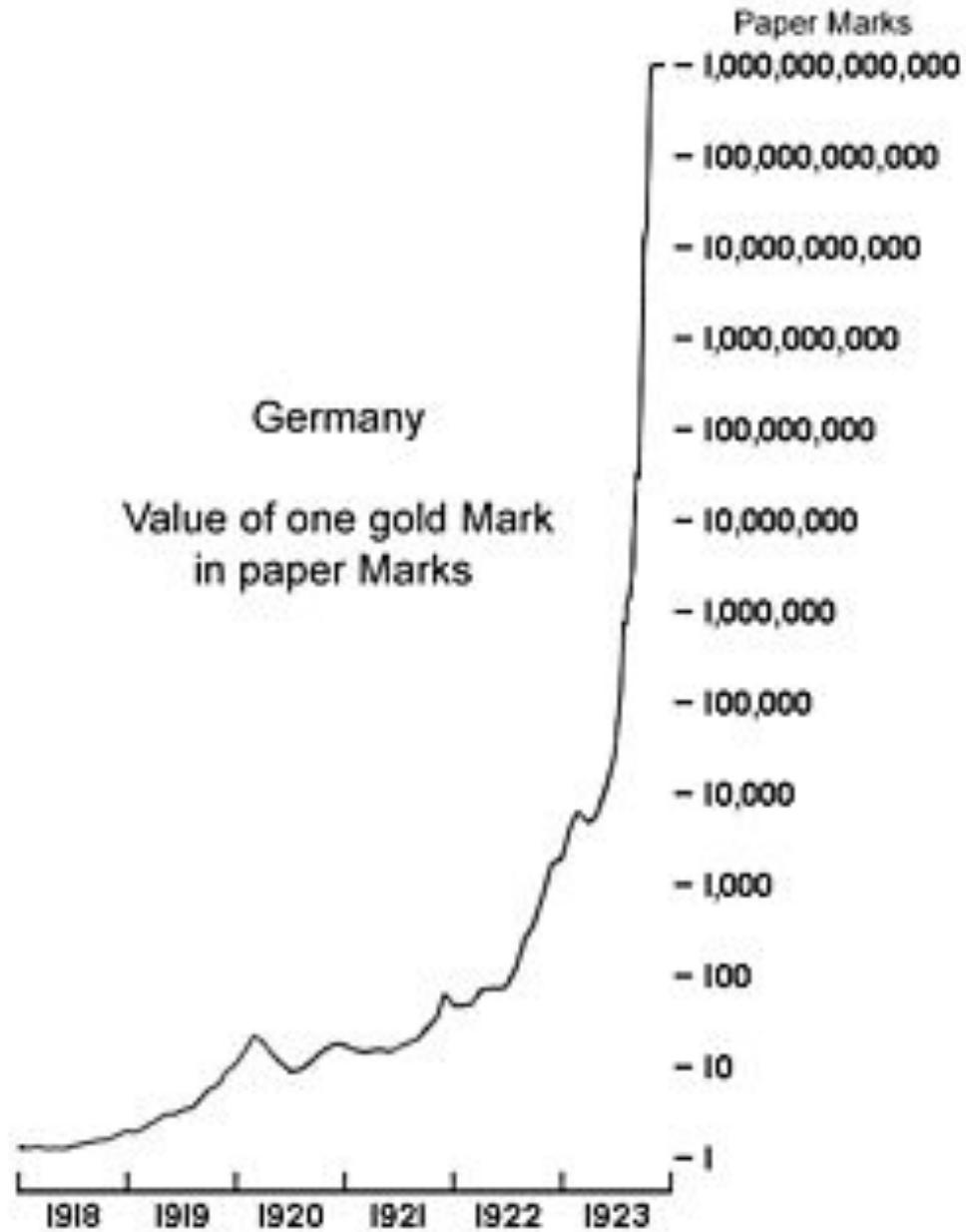
ARTICLE I, SECTION 8, CLAUSE 5



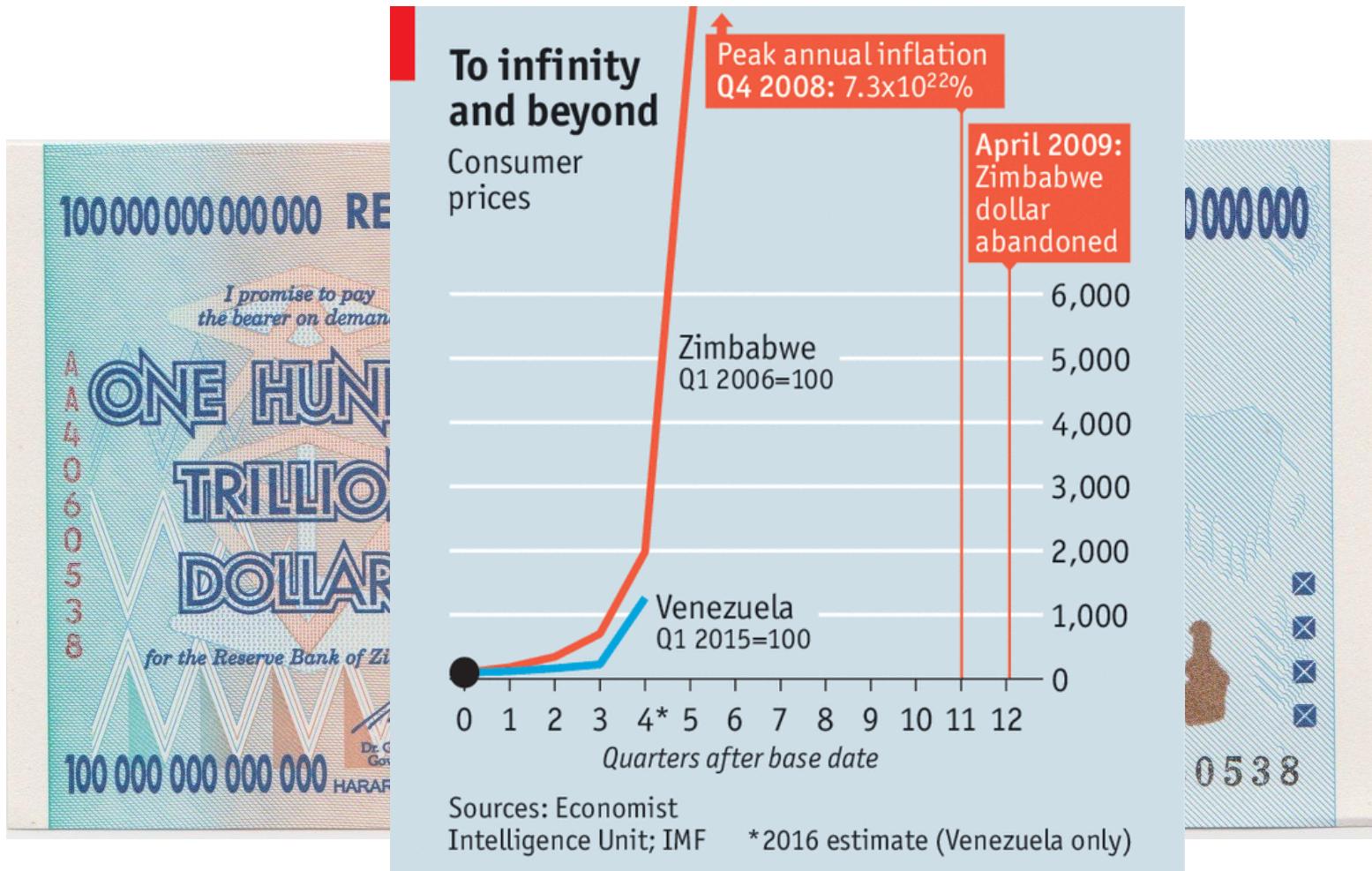
Continental











Economist.com



The Fall in the Value of the Venezuelan Bolívar



Sources: Bloomberg, Wikipedia

Prepared by Prof. Steve H. Hanke, The Johns Hopkins University

Note: For the purpose of illustrating the declining value of the Venezuelan bolívar relative to the U.S. dollar, the y-axis is inverted.



Choice in Currency

A WAY TO STOP INFLATION

F. A. HAYEK

Nobel Laureate 1974

with Commentaries by

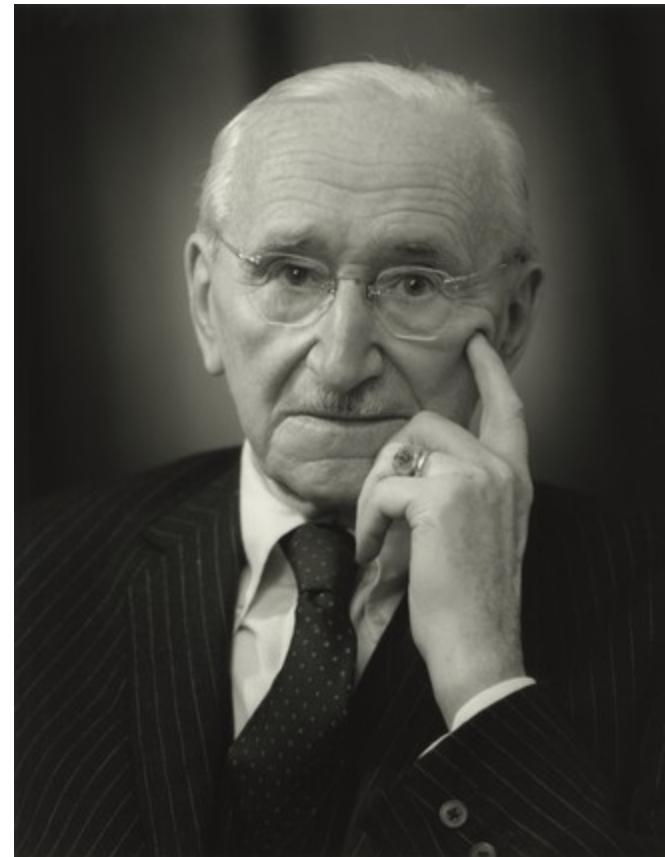
IVOR F. PEARCE • HAROLD B. ROSE
DOUGLAS JAY • SIR KEITH JOSEPH

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1976

Web Edition prepared in 2007. There may be minor differences from the original.

[1]



Free Banking Period



Bank Note Reporters

COMMERCIAL BANKS.	
South Berwick Bank, South Berwick, [W. A. Hayes, Pres., Chas. E. Norton, Cash.]	do
Thomaston Bank, Thomaston, [Richd. Robinson, Pres., J.D. Barnard, Cash.]	do
Ticonic Bank, Waterville, [Tim'ly. Boottelle, Pres., Augus. Perkins, Cash.]	do
Union Bank, Brunswick, (Closed)	—
I.F. The time for redeeming the notes of this bank expires June 1st, 1845.	
Waldo Bank, Belfast,	1
[James White, Cash.]	
5's, altered from the broken Globe Bank, sign- ed Howard, cashier.	
5's, lett. L, dated Belfast, Oct. 1st, 1837, pay to C. Godman, C. O. Alden, Cash., R. C. Johnson, Pres. General appearance light and coarse.	
Washington Co. Bank, Calais. (closed)	—
Westbrook, Bank of, Westbrook,	3
[S. Jordan, Pres., A. G. Fobes, Cash.]	
York Bank, Saco,	4
[Jonathan King, Pres., H. D. Thatcher, Cash.]	
5's, lett. L, pay to P. Lord, dated May 6, 1832, signed Henry S. Thatcher, Cash., Jona. King, Pres. Dark impression.	
5's, lett. A, pay to Elijah Perkins, dated Mar. 12, 1839; patent check plate on the back—same officer as the above.	

Ithaca Dollars

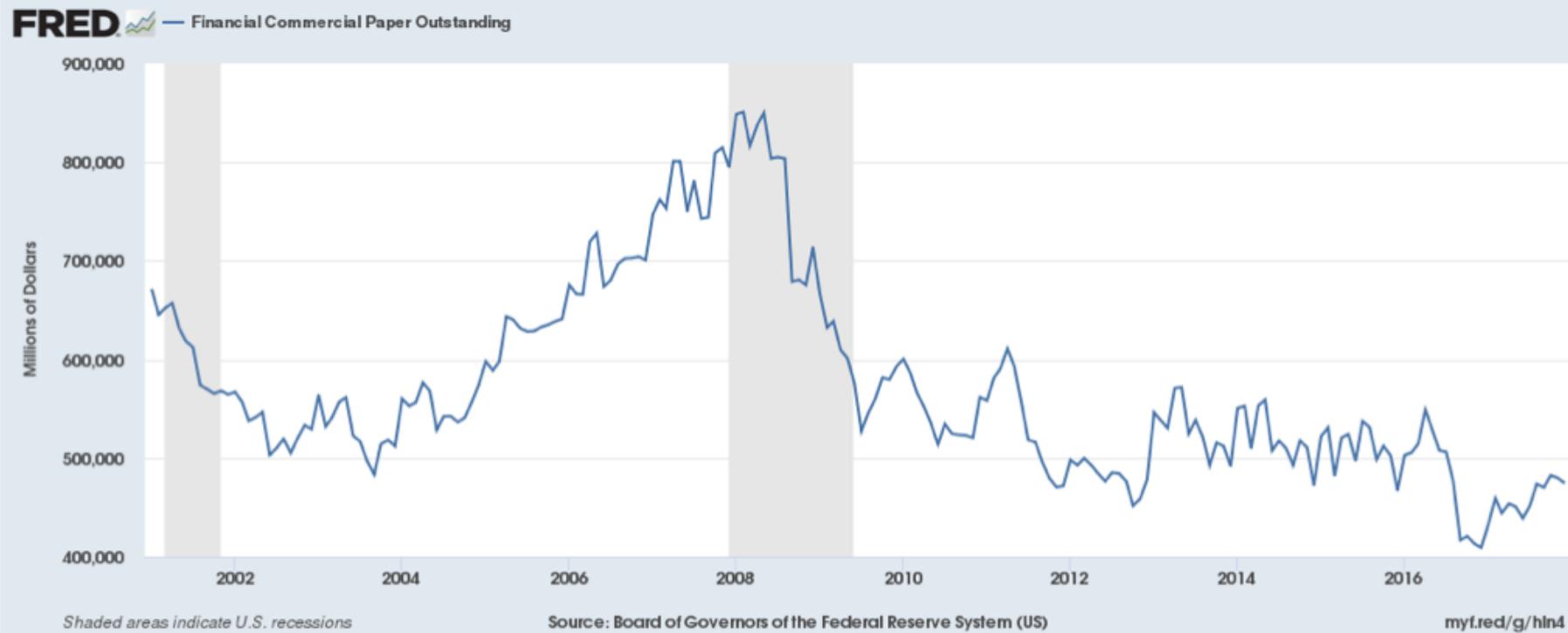




Shaded areas indicate U.S. recessions

Source: Board of Governors of the Federal Reserve System (US)

my.fred/g/



Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto
satoshin@gmx.com
www.bitcoin.org

Abstract. A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

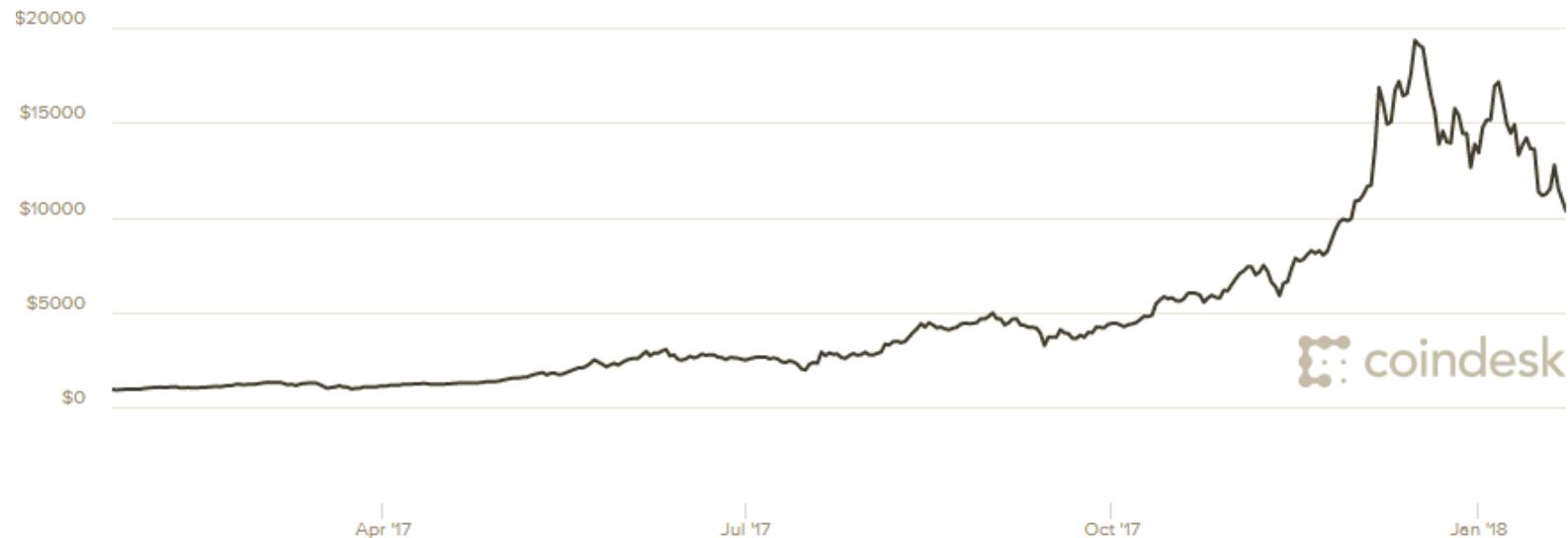
Bitcoin (USD) Price

Closing Price OHLC

1h 12h 1d 1w 1m 3m 1y All

Jan 22, 2017 to Jan 22, 2018

 Export



 coindesk

\$10,336.26 ▼ -10.30%

Today's Open	\$11,522.86	Change	▼ \$-1,186.60
Today's High	\$11,868.72	Market Cap	\$0.174T
Today's Low	\$10,050.79	Supply	16,819,775

Bitcoin Volatility

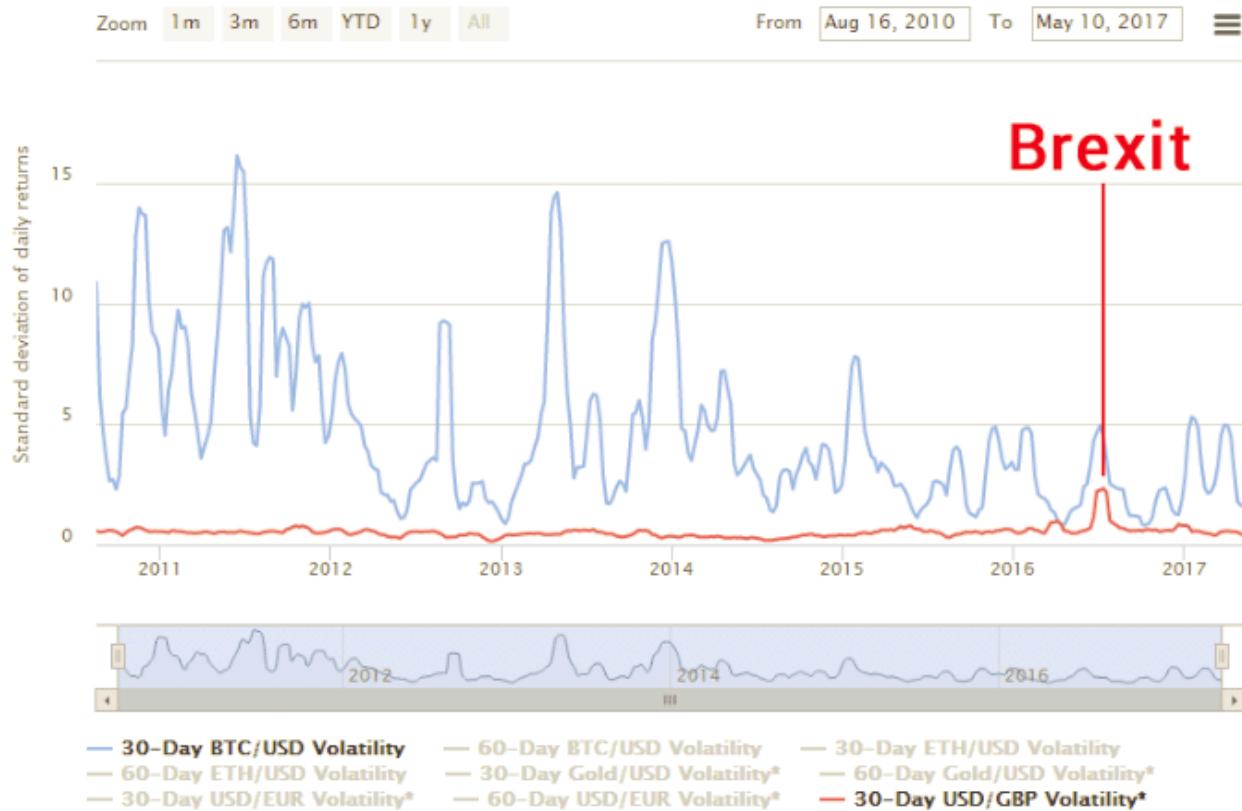
.BVOL24H Index Historical Values



Bitcoin Price Volatility (measured by % of change)



Bitcoin Volatility Time Series Charts



BTC (blue line) and Pound (red line) volatility compared.

1	S&P 500				Bitcoin					
2	Date	Close	Change	% Change	Date	Close	Change	% Change		
3	Mar 28, 2017	\$2,358.57			Apr 10, 2017	\$1,213.37				
4	Mar 29, 2017	\$2,361.13	2.56	0.11	Apr 11, 2017	\$1,224.50	11.13	0.91		
5	Mar 30, 2017	\$2,368.06	6.93	0.29	Apr 12, 2017	\$1,215.83	-8.67	-0.71		
6	Mar 31, 2017	\$2,362.72	-5.34	-0.23	Apr 13, 2017	\$1,178.28	-37.55	-3.19		
7	Apr 03, 2017	\$2,358.84	-3.88	-0.16	Apr 14, 2017	\$1,176.00	-2.28	-0.19		
8	Apr 04, 2017	\$2,360.16	1.32	0.06	Apr 15, 2017	\$1,178.80	2.80	0.24		
9	Apr 05, 2017	\$2,352.95	-7.21	-0.31	Apr 16, 2017	\$1,179.00	0.20	0.02		
10	Apr 06, 2017	\$2,357.49	4.54	0.19	Apr 17, 2017	\$1,194.98	15.98	1.34		
11	Apr 07, 2017	\$2,355.54	-1.95	-0.08	Apr 18, 2017	\$1,201.27	6.29	0.52		
12	Apr 10, 2017	\$2,357.16	1.62	0.07	Apr 19, 2017	\$1,209.40	8.13	0.67		
13	Apr 11, 2017	\$2,353.78	-3.38	-0.14	Apr 20, 2017	\$1,233.65	24.25	1.97		
14	Apr 12, 2017	\$2,344.93	-8.85	-0.38	Apr 21, 2017	\$1,246.00	12.35	0.99		
15	Apr 13, 2017	\$2,328.95	-15.98	-0.69	Apr 22, 2017	\$1,239.63	-6.37	-0.51		
16	Apr 17, 2017	\$2,349.01	20.06	0.85	Apr 23, 2017	\$1,244.98	5.35	0.43		
17	Apr 18, 2017	\$2,342.19	-6.82	-0.29	Apr 24, 2017	\$1,253.94	8.96	0.71		
18	Apr 19, 2017	\$2,338.17	-4.02	-0.17	Apr 25, 2017	\$1,277.77	23.83	1.86		
19	Apr 20, 2017	\$2,355.84	17.67	0.75	Apr 26, 2017	\$1,292.54	14.77	1.14		
20	Apr 21, 2017	\$2,348.69	-7.15	-0.30	Apr 27, 2017	\$1,337.96	45.42	3.39		
21	Apr 24, 2017	\$2,374.15	25.46	1.07	Apr 28, 2017	\$1,343.80	5.84	0.43		
22	Apr 25, 2017	\$2,388.61	14.46	0.61	Apr 29, 2017	\$1,349.97	6.17	0.46		
23	Apr 26, 2017	\$2,387.45	-1.16	-0.05	Apr 30, 2017	\$1,362.40	12.43	0.91		
24	Apr 27, 2017	\$2,388.77	1.32	0.06	May 01, 2017	\$1,418.86	56.46	3.98		
25	Apr 28, 2017	\$2,384.20	-4.57	-0.19	May 02, 2017	\$1,460.07	41.21	2.82		
26	May 01, 2017	\$2,388.33	4.13	0.17	May 03, 2017	\$1,513.71	53.64	3.54		
27	May 02, 2017	\$2,391.17	2.84	0.12	May 04, 2017	\$1,548.51	34.80	2.25		
28	May 03, 2017	\$2,388.13	-3.04	-0.13	May 05, 2017	\$1,551.90	3.39	0.22		
29	May 04, 2017	\$2,389.52	1.39	0.06	May 06, 2017	\$1,578.47	26.57	1.68		
30	May 05, 2017	\$2,399.29	9.77	0.41	May 07, 2017	\$1,589.57	11.10	0.70		
31	May 08, 2017	\$2,399.38	0.09	0.00	May 08, 2017	\$1,644.80	55.23	3.36		
32	May 09, 2017	\$2,396.92	-2.46	-0.10	May 09, 2017	\$1,718.21	73.41	4.27		
33	May 10, 2017	\$2,398.04	1.12	0.05	May 10, 2017	\$1,777.05	58.84	3.31		
34	Average		1.32	0.05	Average		18.79	1.25		
35	Std. Dev.		8.95	0.38	Std. Dev.		24.22	1.62		
36	Std.Dev.of Bitcoin Average % Change / Std.Dev.of S&P % Change									
37	4.26									
38										

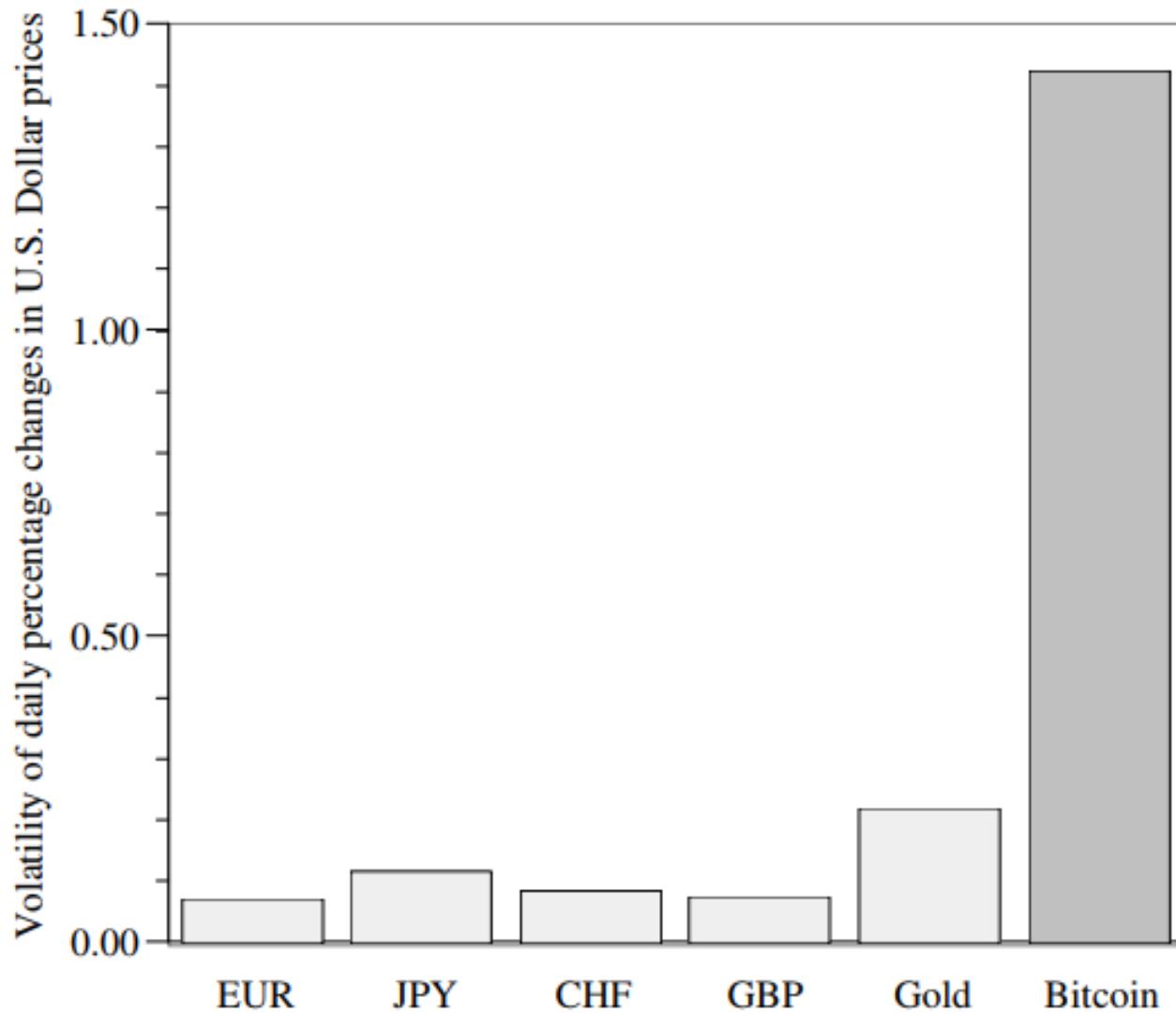
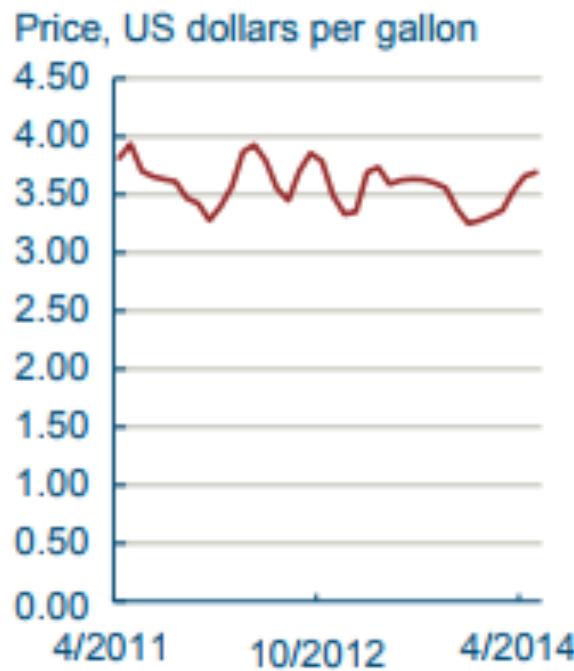
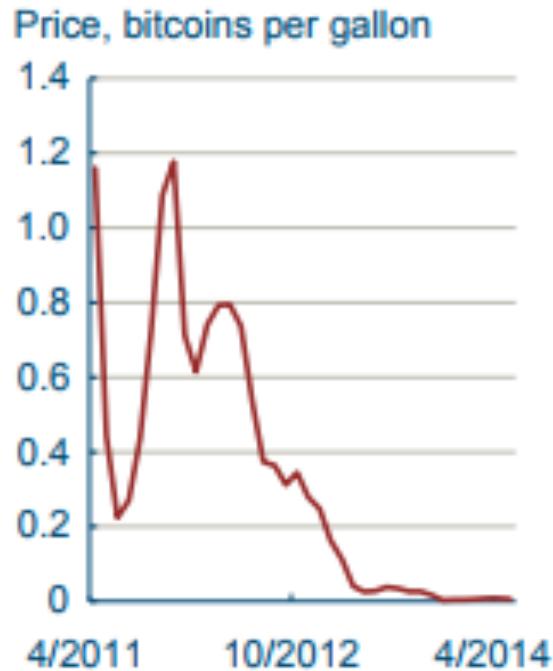


Table 1**Correlation matrix of daily changes in exchange rates, bitcoin, and gold**

The table shows simple correlations of the percentage changes in daily exchange rates for pairs of currencies, with all exchange rates measured against the U.S. dollar. In addition, the table shows correlations between each currency and the percentage change in the daily London gold price as measured in U.S. dollars at 3 p.m. Correlations are calculated for the period from July 19, 2010 up to March 21, 2014.

	EUR	JPY	CHF	GBP	Gold	Bitcoin
EUR	1.00	0.18	0.61	0.64	0.20	-0.05
JPY		1.00	0.33	0.20	0.07	0.01
CHF			1.00	0.42	0.19	-0.04
GBP				1.00	0.21	-0.02
Gold					1.00	-0.06
Bitcoin						1.00

Price of Gasoline Since April 2011, US Dollars and Bitcoins



Sources: Bureau of Labor Statistics; Quandl.

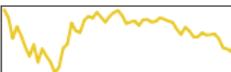
Acceptance



NEASE
neasecartoons@gmail.com



Coincap

All	Coins	Tokens	USD	Next 100 →	View All		
#	Name	Market Cap	Price	Volume (24h)	Circulating Supply	Change (24h)	Price Graph (7d)
1	Bitcoin	\$181,699,259,880	\$10,802.50	\$10,434,200,000	16,820,112 BTC	-7.40%	
2	Ethereum	\$96,357,566,162	\$991.85	\$3,779,820,000	97,149,823 ETH	-6.20%	
3	Ripple	\$51,312,319,002	\$1.32	\$2,669,100,000	38,739,142,811 XRP *	-5.49%	
4	Bitcoin Cash	\$27,469,773,415	\$1,622.90	\$686,321,000	16,926,350 BCH	-9.36%	
5	Cardano	\$14,540,990,095	\$0.560842	\$505,132,000	25,927,070,538 ADA *	-8.33%	
6	Litecoin	\$9,757,181,109	\$177.80	\$491,532,000	54,876,358 LTC	-7.25%	
7	NEM	\$8,693,081,999	\$0.965898	\$71,866,800	8,999,999,999 XEM *	-10.07%	
8	Stellar	\$8,338,074,044	\$0.466652	\$434,034,000	17,867,863,083 XLM *	-0.16%	
9	EOS	\$8,324,349,024	\$13.39	\$2,823,930,000	621,540,123 EOS *	-1.55%	
10	NEO	\$7,898,345,000	\$121.51	\$324,260,000	65,000,000 NEO *	-8.70%	

Bitcoin Energy Consumption Index

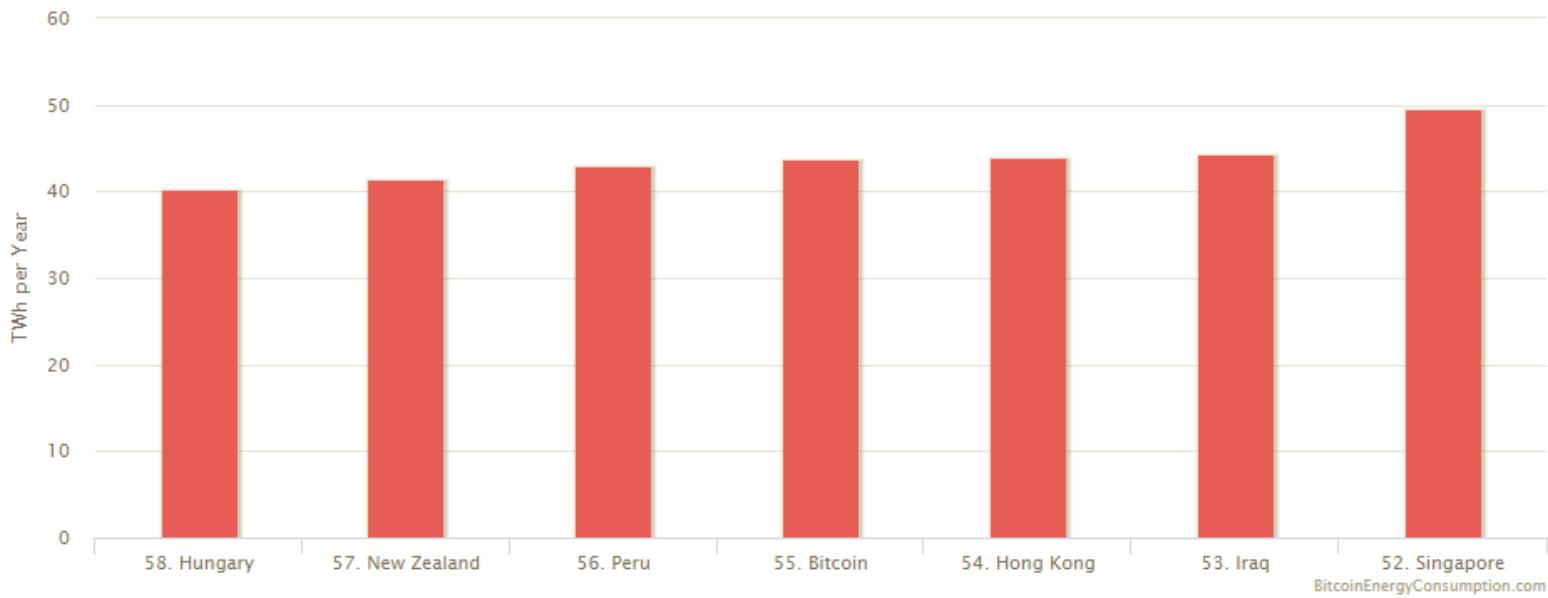
Bitcoin Energy Consumption Index Chart



Click and drag in the plot area to zoom in



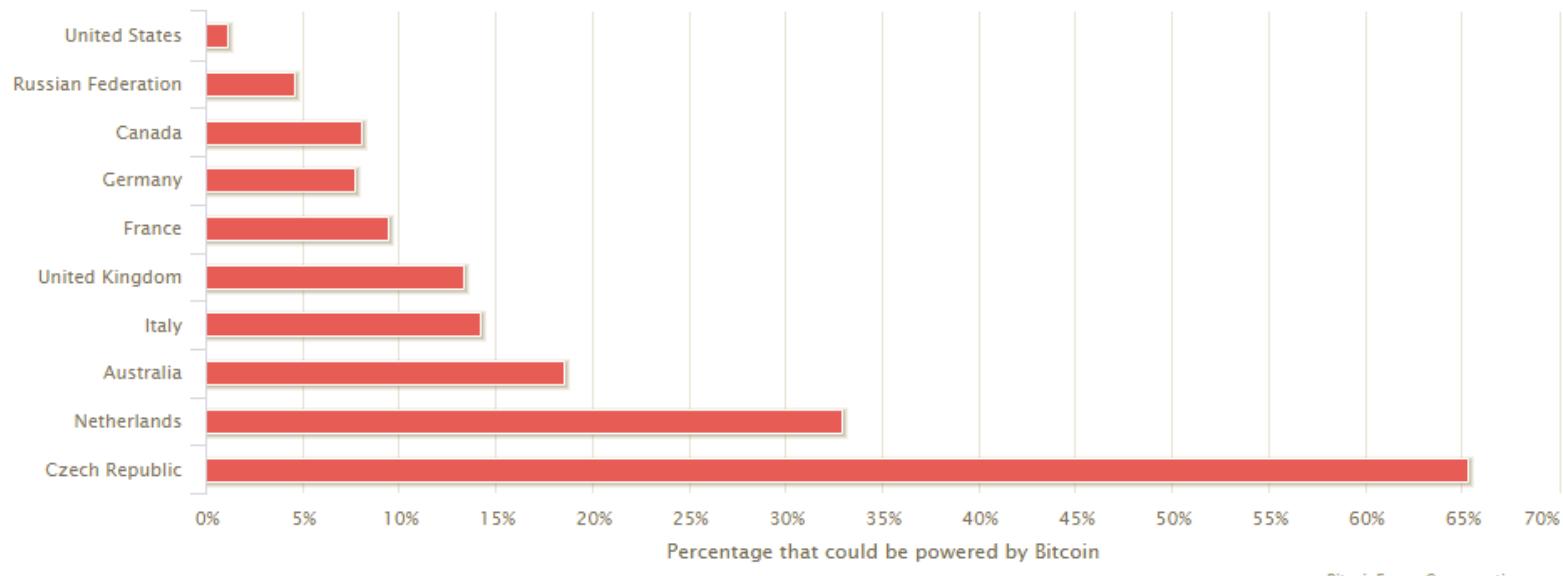
Energy Consumption by Country Chart



Apart from the previous comparison, it is also possible to compare Bitcoin's energy consumption to some of the world's biggest energy consuming nations. The result is shown hereafter.



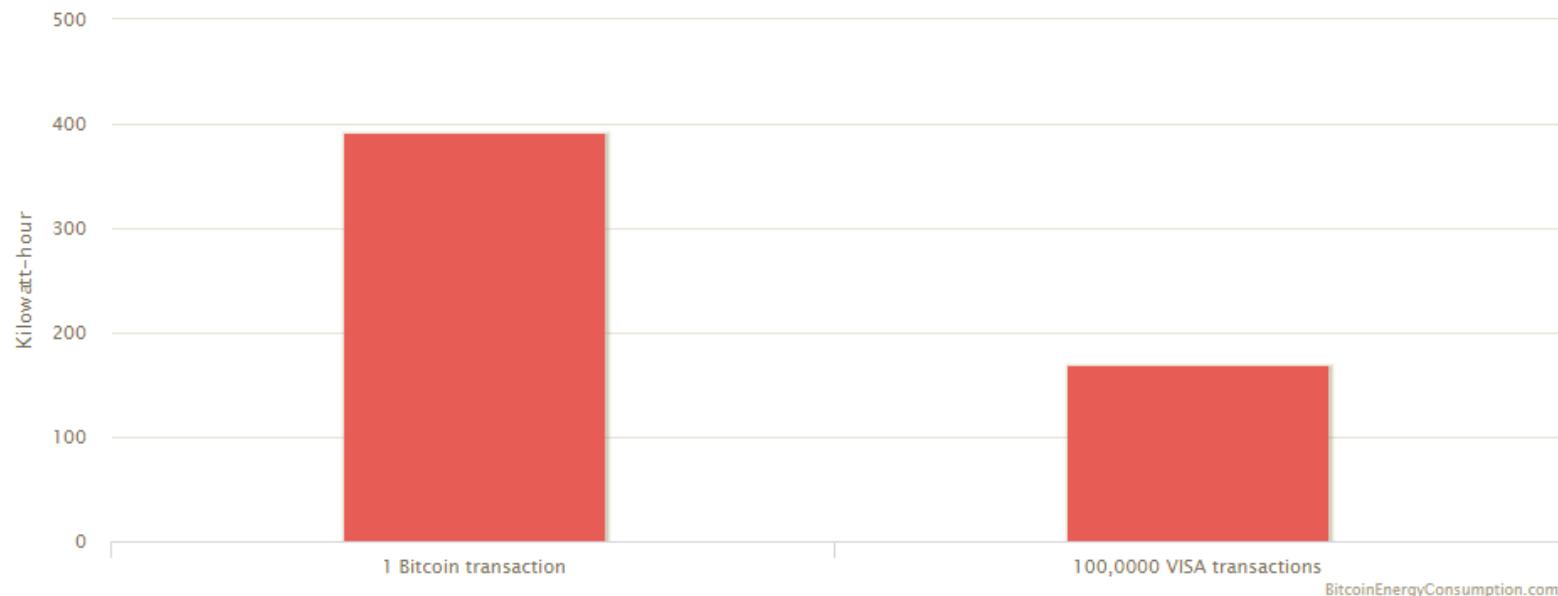
Bitcoin Energy Consumption Relative to Several Countries

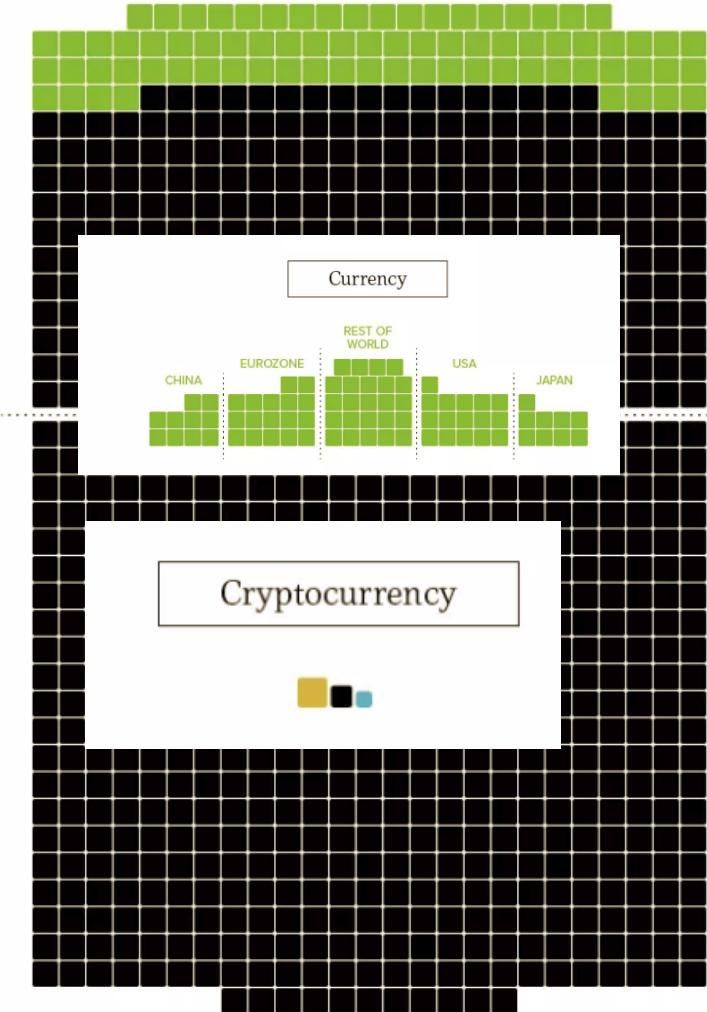


BitcoinEnergyConsumption.com



Bitcoin network versus VISA network average consumption





Narrow Money

The total value of the world's easily

Coins & Bank Notes

The total value of all of the world's coins and banknotes is roughly **\$7.6 trillion**.

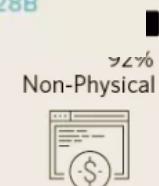
Cryptocurrency

The world's fastest growing asset class is cryptocurrency – but even Bitcoin looks tiny in the grand scheme of things, when compared to other global markets.

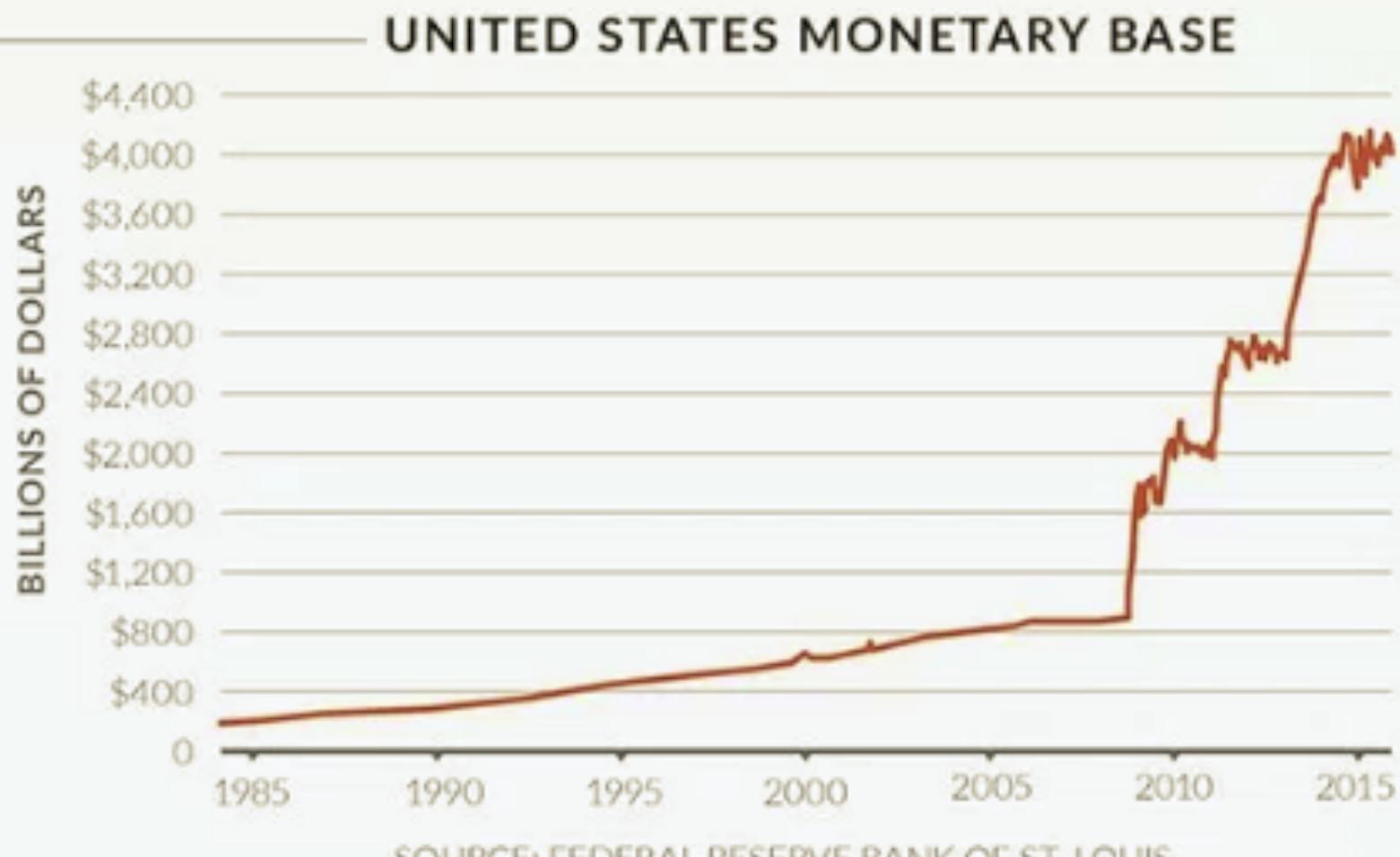
BITCOIN
\$100B

THE REST
\$45B

ETHEREUM
\$28B



Bitcoin Market Cap



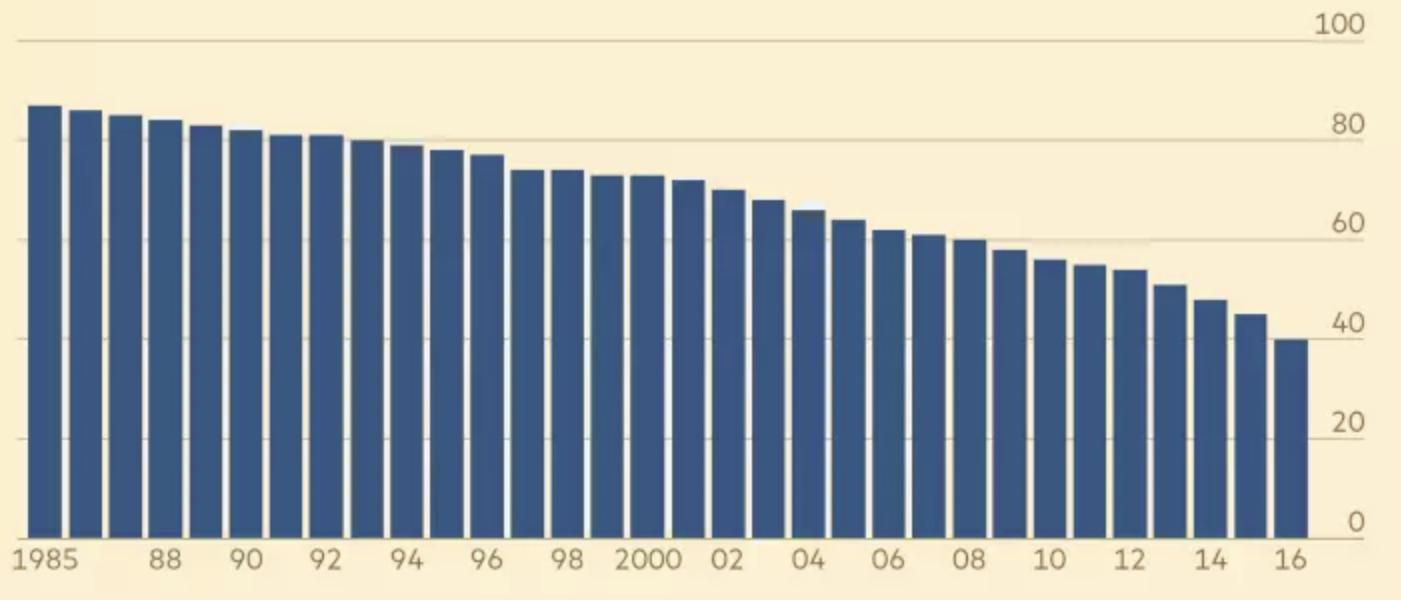
$$M\bar{V} = P\bar{Q}$$

In the long run, the price level (P) moves in proportion to the money supply (M).

This is the “Quantity Theory of Money.”

Pros:	Cons:
Low transaction costs	Currently volatile value
International transferability and convertibility	Limited adoption by retailers
Protection from some political risk and inflation (if not rapid price changes)	Combined with other software, anonymity can be used for illegal purposes
Basic alternative digital currency problems of supply growth and double payment/verification solved	Lack of trusted intermediaries to challenge unauthorized transactions and fraud Potential to expose a user's transaction history to the public
Operation is outside the banking system — immune to bank failures, but not protected by deposit insurance	Uncertainty about the cryptocurrency's security and operational resiliency Inadequate mass-market understanding

Cash payment As a % of all payments



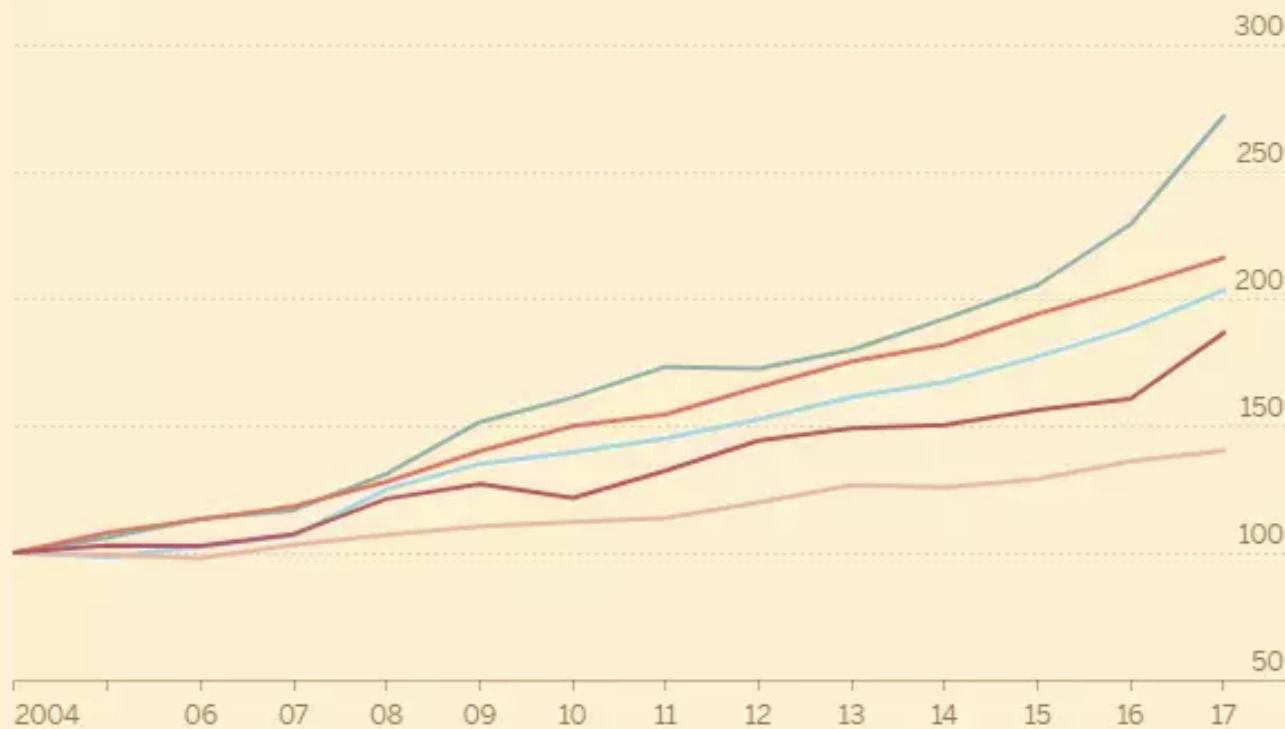
Source: UK Finance

FT

Value of Bank of England notes in circulation

Index, 2004=100

- £5
- £10
- £20
- £50
- Total



Figures relate to the end of February

Source: Bank of England

FT

