

SYSTEMIC LIQUIDITY RISK

*What we are missing: from our risk capital models to our
general understanding of finance and economics*

2022 CAS SPRING MEETING

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Risk capital models (unintentionally) exclude consideration of SYSTEMIC LIQUIDITY RISK

RISK	Pure Risk	Speculative Risk
External Risk	Hazard Risk	Strategic Risk
Internal Risk	Operational Risk	Financial Risk

Naturally, based on pre-existing scholarship from Finance and Economics

Financial Risk

- Asset-side Risk
 - Market Risk
 - Credit Risk
- Liability-side Risk
 - Liquidity Risk
 - Underwriting Risk
 - Reserve Risk
 - Catastrophe Risk

Not the same as systemic liquidity risk, and inert for insurance carriers

Actuarial Wheelhouse

- Asset Price Risk
- Interest Rate Risk
- Inflation Risk
- Exchange Rate Risk

Systemic Liquidity Risk:
Risk in the machinery of exchange
 Whether implicit or explicit (using an ESG), each model includes an assumed underlying economic and monetary framework that reflects the interdependencies of these various types of market risk.

Systemic Liquidity Risk is inseparably embedded in the assumed economic and monetary framework, influencing all types of Market Risk. However, Economic theory has neglected systemic liquidity risk, thus the economic framework is based on an incomplete premise, resulting in a lot of confusion about or *mis-quantification of Market Risk*.

Naturally, most of the attention is here for risk capital models

3

The discipline of Economics has excluded consideration of Systemic Liquidity Risk from its academic framework, impairing our understanding of Market Risk

This is all directly from Economists talking about Economics

- "Depressions like this are provoked by an impediment in the machinery of exchange."**
 Henry George (1879), a US economist commenting on the extended length of the depression in the 1870s

A **recession** is considered a part of the regular economic boom/bust cycle; whereas a **depression** represents a break or a discontinuity from the regular economic cycle. Henry George correctly understood that those discontinuities are brought upon exclusively by frictions within the money system. Econometric models and their underlying assumptions do not include a consideration for **permanent breaks**. Thus, **economic theory neglects to consider systemic liquidity risk** - the risk of frictions in the money system.
- Milton Friedman's plucking model of trend-cycle analysis (1964 and 1993) - *theoretical examples of permanent breaks being excluded from econometrics*

The Natural Interest Rate Theory [BIS Working paper #171 (2005), Wicksell (1896), Friedman (1968)] defined as the equilibrium real interest rate consistent with price stability. **This theory implies that the boom/bust cycle is symmetrical.**

The "Plucking Model" of Business Fluctuations Revisited [Friedman (1993)] - **Friedman suggests that a half century of empirical data confirms his theory of economic cycle mean reversion, that output always reverts back to the underlying trend, or in other words, the boom/bust cycle is symmetrical.**

Theoretically, this can't happen. In terms of econometric time series, Roots (series coefficients) >= 1 (Unit Root = 1) are excluded, which means the process is "non-stationary", it does not revert back to its mean, it is a permanent shock, leaving the historical data with limited predictive power to project the future.
- "This neglect of other aspects of the system has been made easier by another feature of modern economic theory—the growing abstraction of the analysis, which does not seem to call for a detailed knowledge of the actual economic system or, at any rate, has managed to proceed without it...the evidence/theory ratio...is currently very low in this field...What is studied is a system which lives in the minds of economists but not on earth...The 'firm' and the 'market' appear by name but they lack any substance...Even more surprising, given their interest in the pricing system, is the neglect of the market or more specifically the institutional arrangements which govern the process of exchange. ...what we have is a very incomplete theory."** [Ronald H. Coase, 1991 Nobel Prize lecture]
- Students in the UK (2013) form the "Post-Crash Economics Society" to unify in protest of the intellectual monoculture in Economics being heavily biased in favor of orthodoxy; and protest its failure to adapt to and teach an evolving economic system.

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Risk Source of the largest Single Quarter (% basis) Surplus Shocks in P&C Insurance history

1. Black Monday (Oct 1929) – associated with The Great Depression (1929-1938)

Risk Source: Systemic Liquidity Risk

Econometric models use only post-war era data due to this "Unit Root" event, because the post-war world no longer looks like the pre-war world

2. Lehman Bros/AIG (Sept 2008) – associated with the Global Financial Crisis (2008) or the "Great Recession" which was misdiagnosed, falsely attributed to the US subprime mortgage market; rather, this was a 8/9/2007 fracture in the machinery of exchange, and mislabeled as a recession, when it has exhibited the behavior of a depression

Risk Source: Systemic Liquidity Risk

Econometric models do not acknowledge this as a "Unit Root" event, so the post-crisis world is proceeding under a false economic narrative

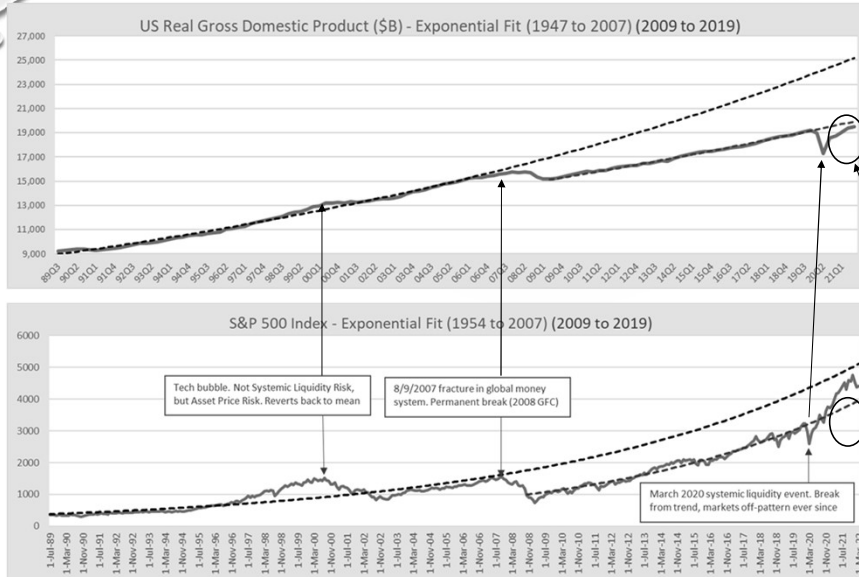
3. COVID Crash (Feb-Mar 2020) – also the Global Financial Crisis. This was also misdiagnosed, falsely attributed to COVID, although COVID no doubt contributed to its magnitude. This is a continuation of the same problem from 2008

Risk Source: Systemic Liquidity Risk

Our risk capital models are missing what is both the largest risk historically and a very present risk in 2022-23.

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ASSET PRICE RISK



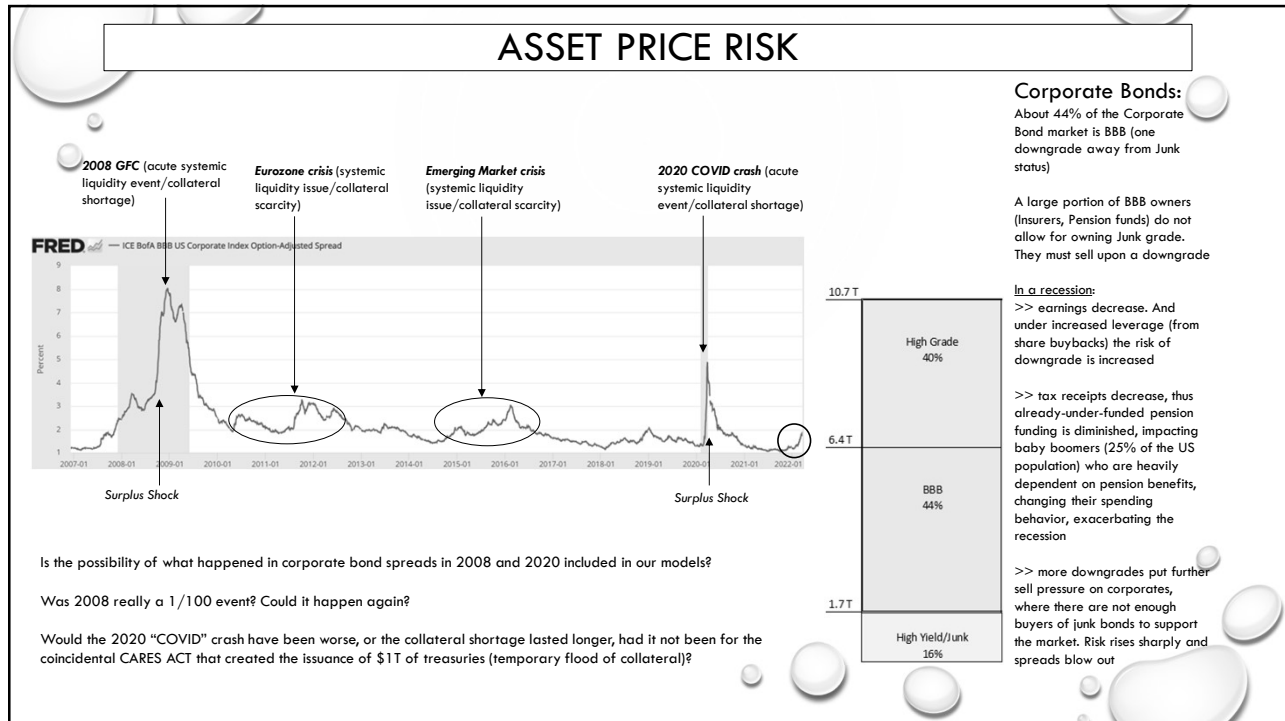
Equities:

Markets crash during liquidity events. Markets are more uncertain afterward.

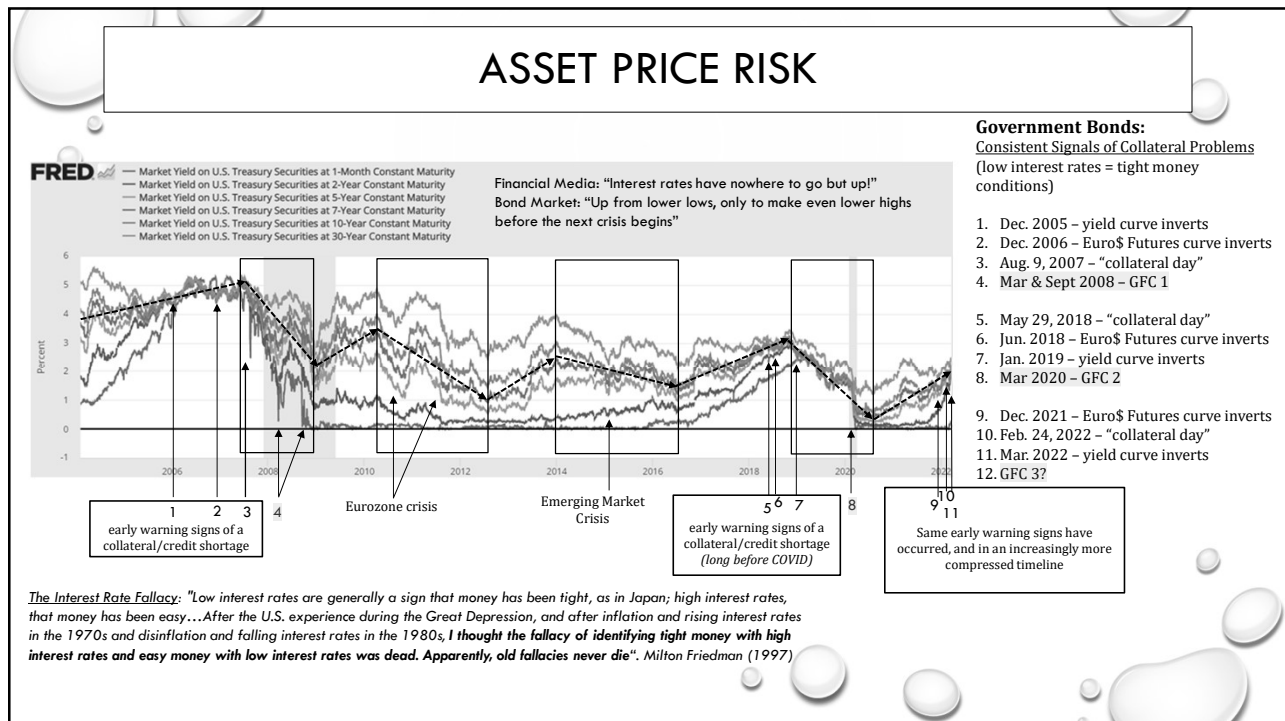
Stocks detach from GDP after 2008 market crash and GDP drags at a lower growth rate than previously. New GDP growth rate after 2020 is uncertain.

Stocks detach from reality after 2020 market crash. Historical data will have limited predictive power to project the future.

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7



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INTEREST RATE RISK

Fisherian Deconstruction of Interest Rate Risk (Irving Fisher - US economist and prolific writer of economic theory)

$$i = s + c + f + p$$

where
s = the expected path of short-term interest rates (a measure of GDP growth expectations, influenced in the ST what the Fed is going to do with fed funds)
c = credit risk (assumed to equal zero for sovereign bonds, but added here for the benefit of the sovereign debt discussion)
f = expected future inflation/deflation (the real kind of inflation that is strictly monetary in nature, not just some measure of expected price movements)
p = term premiums (just an offset term to explain the difference between the measurable terms, *s + f*, and the prevailing market level interest rate)

The decrease in i can't be due to a declining s, but nominal low i can be attributed to a shock decrease in s

Financial media: "interest rates have nowhere to go but up."

40-years of interest rates and nothing but persistent downward trajectory

as s, c, f, and p increase, i increases, so what (since 2007) is causing the persistent decline and low nominal levels?

The financial media's narrative of s, c, f & p would all result in higher interest rates. So how can we possibly get interest rate risk right if we don't understand interest rates?

Financial media: "the economy is red hot!" Huh? Wouldn't that get priced in?

Real GDP - % change from 1 year ago. s used to avg ~ +4%, but now ~ +2%

Financial media: "we have a debt crisis looming!" Sure, but why is it not being priced in?

the decrease in i can't be due to a decreasing c

Sovereign debt to GDP ratio (as a measure of sovereign credit risk) At a minimum, c must be >=0

2021-22 excluded due to pandemic impacts that broadens the y-axis scale and compresses the rest of the chart

TIPS market breakevens (market CPI expectations)

Financial media: "inflation hysteria!" Prices have risen, so why is inflation not being priced in?

the decrease in or low i can't be due to a negative f, nor due to a decreasing f

Ben Bernanke, former Federal Reserve Chair acknowledged this conundrum:
 "[A term premium] is the extra return lenders demand to hold a longer-term bond instead of investing in a series of short-term securities...implying that term premiums are usually positive (investors require extra compensation to hold longer-term bonds...)"

What about the decline in longer-term yields since early 2014? In the US at least, that decline is somewhat surprising, as economic fundamentals have recently seemed more consistent with rising, not falling, longer-term yields...By the process of elimination, with fundamentals stable or improving, much of the decline in yields over the past year must reflect a sharp drop in term premiums.

"Why Are Interest Rates So Low, Part 4: Term Premiums", Ben Bernanke, published by the Brookings Institute (April 2015)

Term Premiums are a fictional quantity. It is really just unacknowledged model error.

What is this "unknown" force exerting persistent downward pressure on bond yields? Hint: What risk is unacknowledged from the mainstream narrative (and our models)? Spoiler: High systemic liquidity risk (q) results in high demand on safe, liquid assets, which would decrease interest rates (a counter-signal; high q = low i).

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INFLATION RISK

CPI Effect 1 - Expansion of Money Supply

Share of Goods in the CPI

Expansion of money supply

Supply/demand dynamics vary by category

These changes in prices represent true inflation (more money chasing the same amount of goods & services) (money supply changes without regard to share % = price changes)

CPI Effect 2 - Shifts in Supply/Demand curve

Elastic supply

Inelastic supply

These changes in prices are NOT true inflation (same amount of money chasing shifting supply/demand of goods & services) (share % changes without regard to money supply = price changes)

Both of these effects are indistinguishably captured in the CPI, both create price changes, but only one is true inflation.

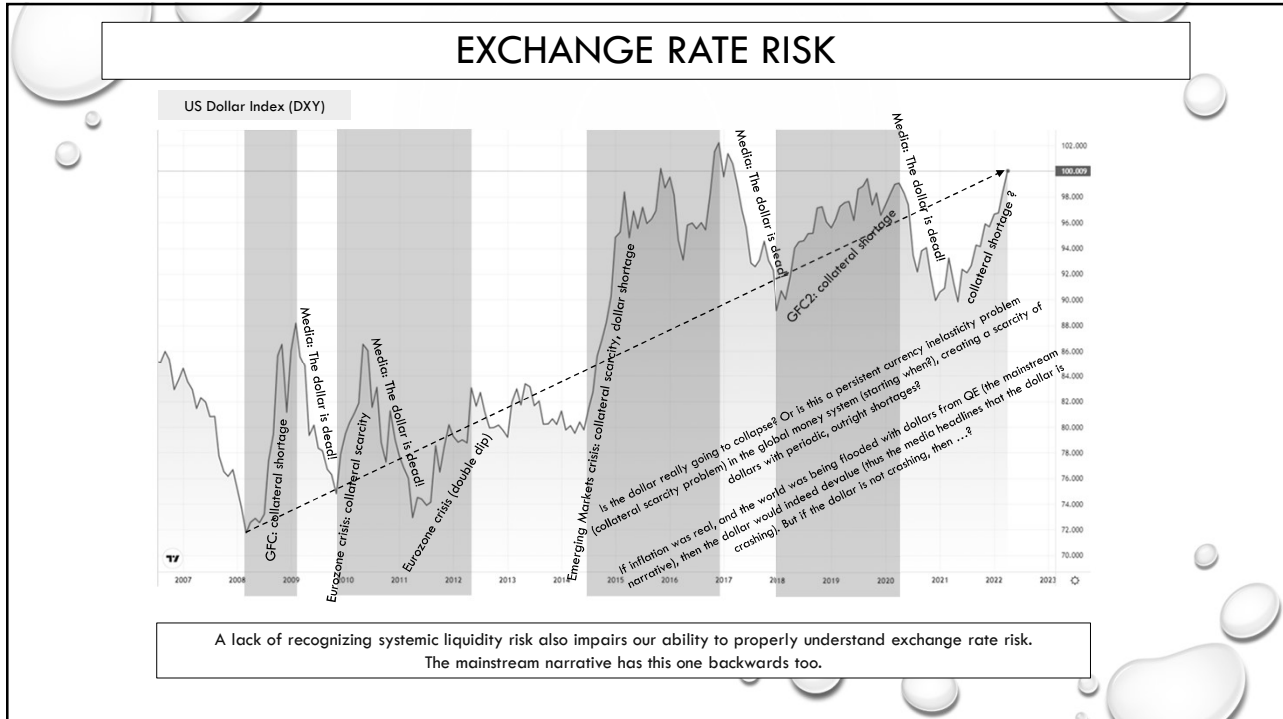
Even with a known supply shock due to the pandemic, and a known shift (right) in the demand curve due to government stimulus, the mainstream is still confused about which effect is currently at play? Nor does the public realize that Effect #1 has been rendered immeasurable (in the US) due to the influence of the global money system (because it too is US dollar based and is a shadow system).

Is the CPI increase due to the money supply (M2) increasing (the Federal Reserve is "printing money", a.k.a. Quantitative Easing)? QE transactions are traceable (on a ledger), so if the money doesn't get into the broader economy, but remains in the banking system, nor causes inflation, then is QE really expanding the money supply? And even if QE was money printing, then you must ask what enormous deflationary gap is QE filling?

How can QE or rate changes (monetary policy) move shipping containers or pump oil out of the ground faster, or get computer chips manufactured faster and efficiently shipped to the where they are most needed? How does monetary policy change the "just in case" inventory approach back to the "just in time" approach? How is monetary policy going to fix any supply chain disruptions? **Do we have inflation risk properly quantified in our models?**

If inflation/deflation is always and everywhere a matter of money supply, then the question of how to deal with inflation/deflation would be as simple as, "Is there or is there not too much money in the system?" The Federal Reserve has money supply metrics (M2), so why do they reference the PCE and CPI in stead of their money supply statistics in managing inflation? This is a clear indication that the Federal Reserve knows they cannot reliably calculate money supply. This is important because if the monetary authority doesn't do money, then what do they do?

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INFLATION IS MONEY

“INFLATION IS ALWAYS AND EVERYWHERE A MONETARY PHENOMENON IN THE SENSE THAT IT IS AND CAN BE PRODUCED ONLY BY A MORE RAPID INCREASE IN THE QUANTITY OF MONEY THAN IN OUTPUT.”

MILTON FRIEDMAN
COUNTER-REVOLUTION IN MONETARY THEORY.
 WINCOTT MEMORIAL LECTURE, INSTITUTE OF ECONOMIC AFFAIRS, OCCASIONAL PAPER 33.

“AS A CONSEQUENCE, WHILE OF NECESSITY IT MUST BE THE CASE AT THE END OF THE DAY THAT INFLATION HAS TO BE A MONETARY PHENOMENON, A DECISION TO BASE POLICY ON MEASURES OF MONEY PRESUPPOSES THAT WE CAN LOCATE MONEY. AND THAT HAS BECOME AN INCREASINGLY DUBIOUS PROPOSITION.”

ALAN GREENSPAN
 FOMC MEETING TRANSCRIPT
 JUNE 2000

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WHAT IS MONEY?

**FOREIGN
DOLLAR
LOANS
IN
EUROPE**

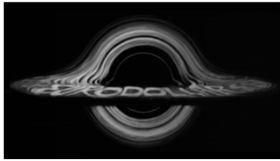
**PAUL
EINZIG**

"THE EURODOLLAR MARKET WAS FOR YEARS HIDDEN FROM ECONOMISTS AND OTHER READERS OF THE FINANCIAL PRESS BY A REMARKABLE **CONSPIRACY OF SILENCE**. I STUMBLED ON ITS EXISTENCE BY SHEER ACCIDENT IN OCTOBER 1959, AND WHEN I EMBARKED ON AN ENQUIRY ABOUT IT IN LONDON BANKING CIRCLES SEVERAL BANKERS EMPHATICALLY ASKED ME NOT TO WRITE ABOUT THE NEW PRACTICE."

PAUL EINZIG

FOREIGN DOLLAR LOANS IN EUROPE

1965



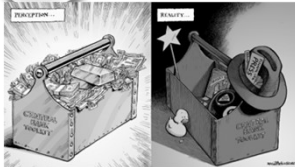
"THE HOLDING OF DOLLARS HAD SERVED TO PROMOTE A DEGREE OF WORLD LIQUIDITY THAT COULD NEVER HAVE BEEN ACHIEVED IF EVERYONE HELD GOLD."

FOMC MEMORANDUM OF DISCUSSION

MARCH 6, 1962

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WHAT IS MONEY?



"[THE CHAIRMAN] ADDED, PARENTHETICALLY, THAT HE QUESTIONED THE USE OF THE WORD "TIGHTNESS" AT THIS JUNCTURE. NEVER HAD HE SEEN A PERIOD WHEN THERE WAS SO MUCH LOOSE SPECULATION WITH MONEY. THE PRACTICE OF AMERICAN BANKS IN USING THE EURO-DOLLAR MARKET WAS GROWING ALL THE TIME...THIS SHOULD BE A MATTER OF CONCERN TO THE FEDERAL RESERVE SYSTEM."

FOMC MEMORANDUM OF DISCUSSION

JUNE 18, 1963



"IN ADDITION, SOME LENDING OF EURO-CURRENCIES HAS CLEARLY HAD NOTHING TO DO WITH INTERNATIONAL TRADE; FOR INSTANCE, SOME US SECURITY DEALERS AND BROKERS HAVE BEEN BORROWING IN THE EURO-DOLLAR MARKET INSTEAD OF FROM BANKS IN NEW YORK."

BIS 34TH ANNUAL REPORT

JUNE 8, 1964

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WHAT IS MONEY?



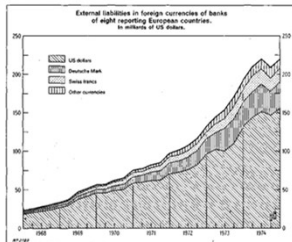
"...YET IN THE PAST FEW YEARS THE TREASURERS OF LARGE CORPORATIONS HAD BECOME INTERNATIONAL OPERATORS. THEY WERE NO LONGER GOING TO SIT BY IN THE SAME WAY AS 10 OR 15 YEARS AGO, AND THE DEVELOPMENT OF THE EURO-DOLLAR MARKET TO ITS PRESENT MAGNITUDE HAD BEEN A REFLECTION OF THESE ACTIVITIES."

FOMC MEMORANDUM OF DISCUSSION

JUNE 8, 1964

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WHAT IS MONEY?



"THE EXPANSION OF THE EURO-CURRENCY MARKET WAS ONCE AGAIN VERY RAPID IN 1973. THE EXTERNAL ASSETS AND LIABILITIES IN FOREIGN CURRENCY OF THE BANKS OF EIGHT REPORTING EUROPEAN COUNTRIES ROSE BY 43 AND 45 PER CENT, TO \$189 AND 191 BILLIARD RESPECTIVELY."

BIS 44TH ANNUAL REPORT

JUNE 10, 1974



"MR. MITCHELL SAID HE COULD THINK OF NO TIME WHEN THE MONETARY AGGREGATES WERE LESS USEFUL FOR POLICY PURPOSES THAN THEY WERE NOW...ANOTHER UNCERTAINTY IN THE INTERPRETATION OF THE MONETARY STATISTICS AROSE IN CONNECTION WITH EURO-DOLLARS; HE SUSPECTED THAT AT LEAST SOME PART OF THE EURO-DOLLAR-BASED MONEY SUPPLY SHOULD BE INCLUDED IN THE U.S. MONEY SUPPLY."

FOMC MEMORANDUM OF DISCUSSION

DECEMBER 17, 1974

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WHAT IS MONEY?

Exchange Rate Arrangements in the Eighties

Robert V. Roosa*

Literally dozens of international conferences have been convened already in the decade of the eighties to deplore "the failure of Bretton Woods" and to call for bold new reforms. It seems to me a calamity, though, to attribute failure to either of the Bretton Woods institutions, or to any of the supplemental facilities added to their scope over the past 40 years. The only trace of failure is to be found in that one segment of the international financial system that has been assigned to me for this symposium—exchange rate arrangements. And I am going to suggest that even the system of par value exchange rates envisaged here on Mt. Washington in 1944, and broadly realized across the world by 1955, only broke down in the early seventies because it had already by that time successfully promoted a remarkable diversity of growth in the incomes and trade of the principal participating countries. What is more, an increasing number of participants in the international markets for money and goods, after living with the resulting movement of floating exchange rates for over a decade, are beginning to yearn for the comparative orderliness and stability which their idealized memories associate with "the days of Bretton Woods."

My own view is that for the rest of the eighties, and no doubt for even longer, the preoccupation of most of the world, so far as exchange rate matters are concerned, will be in finding ways back to the objective—though

"BUT THIS COMBINATION OF IMPROVISATIONS COULD NOT COPE WITH, AND INDEED MAY HAVE CONTRIBUTED TO, THE ENORMOUS EXPANSION IN MARKETS FOR U.S. DOLLARS OFFSHORE, AND THE NEW NETWORKS OF INTERBANK RELATIONS THAT MADE POSSIBLE THE CREATION OF ADDITIONAL SUPPLIES OF DOLLARS OUTSIDE THE UNITED STATES AND BEYOND THE CONTROL OF THE FEDERAL RESERVE."

ROBERT ROOSA, THE INTERNATIONAL MONETARY SYSTEM: FORTY YEARS AFTER BRETTON WOODS

CONFERENCE AT BRETTON WOODS SPONSORED BY FEDERAL RESERVE BANK OF BOSTON

MAY 1984

The New York Times

Market Place; Agility Counts in Currency Chaos



By Allen R. Myerson
Sept. 17, 1992

"THE WORLD'S CURRENCY MARKETS, IT SEEMS, ARE NO LONGER GOVERNED BY CENTRAL BANKERS IN WASHINGTON AND BONN, BUT BY TRADERS AND INVESTORS IN TOKYO, LONDON AND NEW YORK, AS THE CHAOS IN THE CURRENCY MARKETS THIS PAST WEEK HAS SHOWN."

ALLEN R. MYERSON, THE NEW YORK TIMES

SEPTEMBER 17, 1992

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SEPTEMBER 17, 1992

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WHAT IS MONEY?



"INCREASINGLY SINCE 1982 WE HAVE BEEN SETTING THE FUNDS RATE DIRECTLY IN RESPONSE TO A WIDE VARIETY OF FACTORS AND FORECASTS. WE RECOGNIZE THAT, IN FIXING THE SHORT-TERM RATE, WE LOSE MUCH OF THE INFORMATION ON THE BALANCE OF MONEY SUPPLY AND DEMAND THAT CHANGING MARKET RATES AFFORD, BUT FOR THE MOMENT WE SEE NO ALTERNATIVE. IN THE CURRENT STATE OF OUR KNOWLEDGE, MONEY DEMAND HAS BECOME TOO DIFFICULT TO PREDICT."

ALAN GREENSPAN, SPEECH, STANFORD UNIVERSITY

SEPTEMBER 5, 1997



"LIQUIDITY PRESSURES IN FINANCIAL MARKETS WERE NOT LIMITED TO THE UNITED STATES, AND **INTENSE STRAINS IN THE GLOBAL DOLLAR FUNDING** MARKETS BEGAN TO SPILL OVER TO U.S. MARKETS."

BEN BERNANKE, BEFORE THE COMMITTEE ON FINANCIAL SERVICES, U.S. HOUSE OF REPRESENTATIVES, WASHINGTON, D.C.

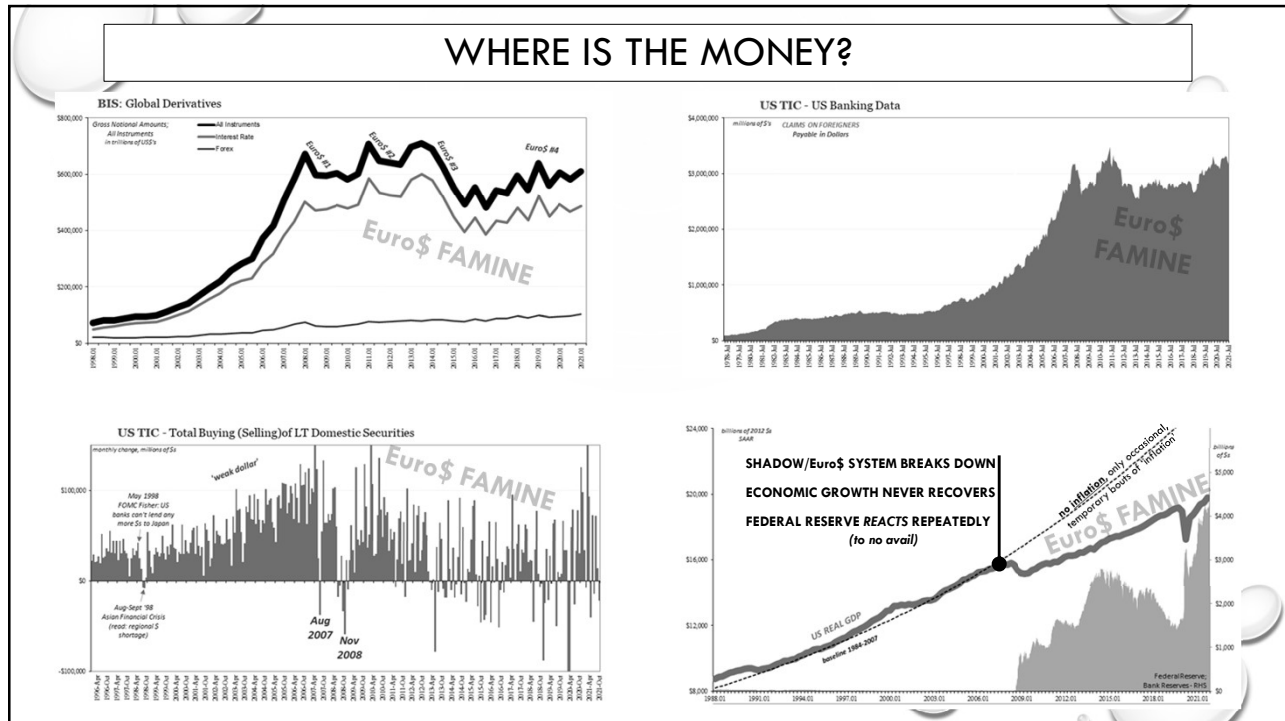
FEBRUARY 10, 2010

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WHERE IS THE MONEY?



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CURRENCY POTENTIAL

Bond yields are growth/inflation expectations.

Inflation is money, otherwise "inflation."

Money is Euro\$ (offshore + ledger), not Fed.

Euro\$ shows up ~'55, then breaks down in '07.

Eurodollar inelasticity + Federal Reserve irrelevance =

OPEN DOOR FOR COMPETING CURRENCY forms (Crypto)

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