CARIBBEAN ACTUARIAL ASSOCIATION

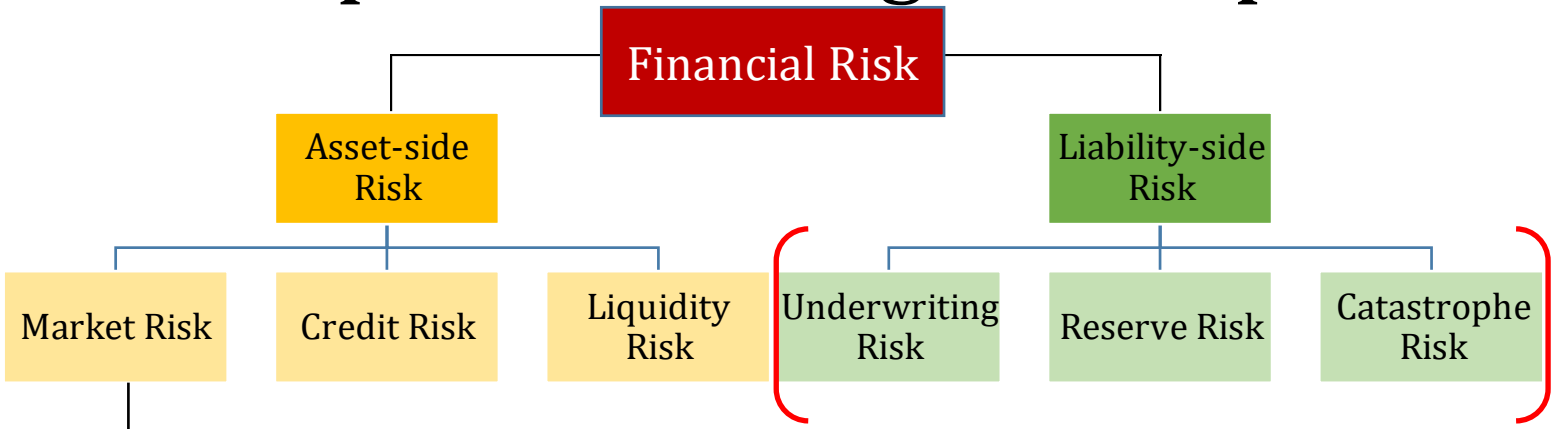
Robert B. Anderson, ACAS
CRO & Chief Actuary, Palms Insurance

REVISITING ASSET-SIDE RISKS

My 2008 Experience - Capital Modeling Blind Spot

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

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



"Actuarial Wheelhouse"

1. *Asset Price Risk*
2. *Interest Rate Risk*
3. *Inflation Risk*
4. *Exchange Rate Risk*

Something is missing from this 'risk' narrative

1. 4-week t-bill lower than Fed funds lower bound (RRP)
2. 3mo LIBOR bifurcates from 3mo Bond Yields
3. I/R Swap Spreads go negative
4. Yields in Japan & Europe go negative

Acknowledgement of the Blind Spot by Economist

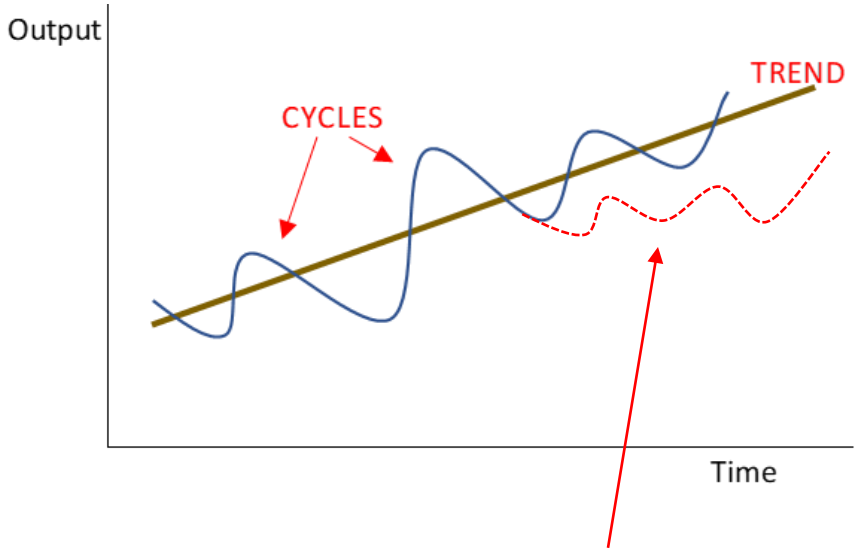
"This neglect of other aspects of the system has been made easier by another ***feature of modern economic theory—the growing abstraction of the analysis, which does not seem to call for a detailed knowledge of the actual economic system or, at any rate, has managed to proceed without it****…the evidence/theory 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]

Acknowledgement of Blind Spot by Economics Students

In 2013, students in the UK 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.

“Monetary System Risk” excluded from Economic theory



Theoretically, this can’t happen. In terms of econometric time series, Roots (series coefficients) >=1 (Unit Root = 1) are excluded. The process is “non-stationary” or does not revert back to its mean, it is a permanent shock, leaving the historical data with limited predictive power to project the future.

Milton Friedman’s plucking model of trend-cycle analysis (1964 and 1993)

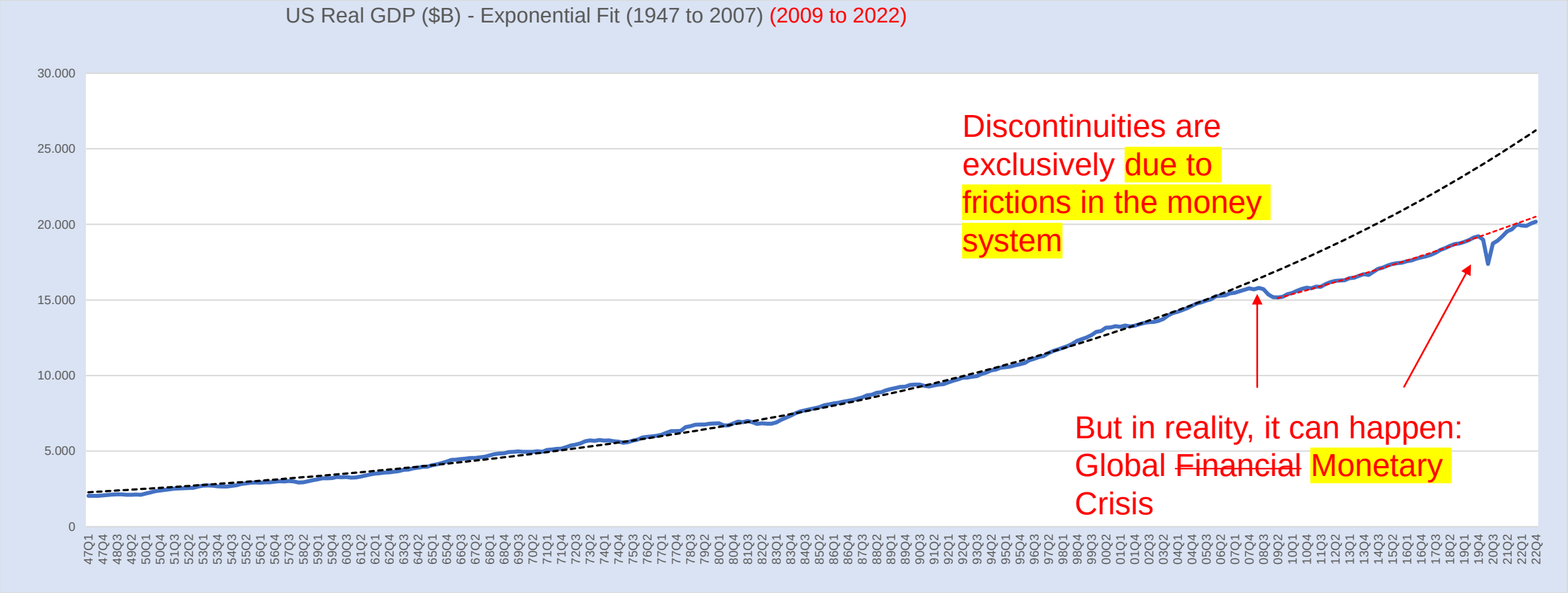
- **The Natural Interest Rate Theory** [BIS Working paper #171 (2005), Wicksell (1896), Friedman (1968)]

defined as the equilibrium real interest rate consistent with price stability. **This theory implies that the boom/bust cycle is symmetrical—it mean-reverts.**

- **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—it mean-reverts.**

US Real GDP – When there are breaks it is due to a break in the money system



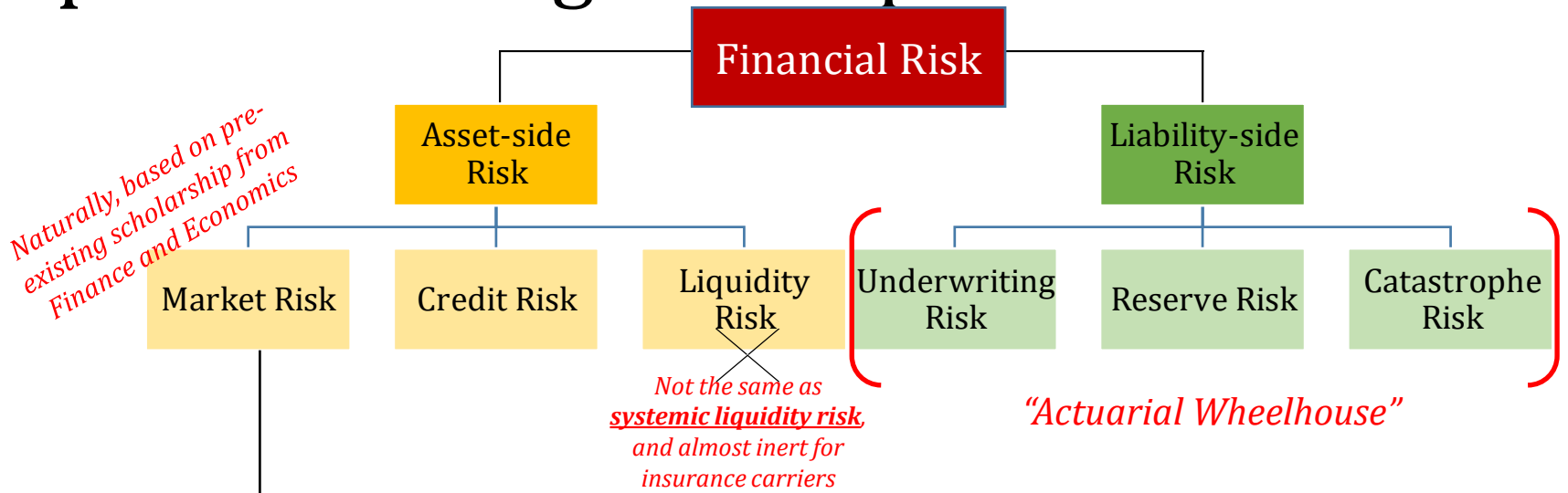
"Depressions like this are provoked by an impediment in the machinery of exchange."

Henry George (1879), a US economist commenting on the extended length of the depression in the 1870s

Capital Modeling Blind Spot

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

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



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

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

"Actuarial Wheelhouse"

1. *Asset Price Risk*
2. *Interest Rate Risk*
3. *Inflation Risk*
4. *Exchange Rate Risk*

Systemic Liquidity Risk:

Risk in the machinery of exchange

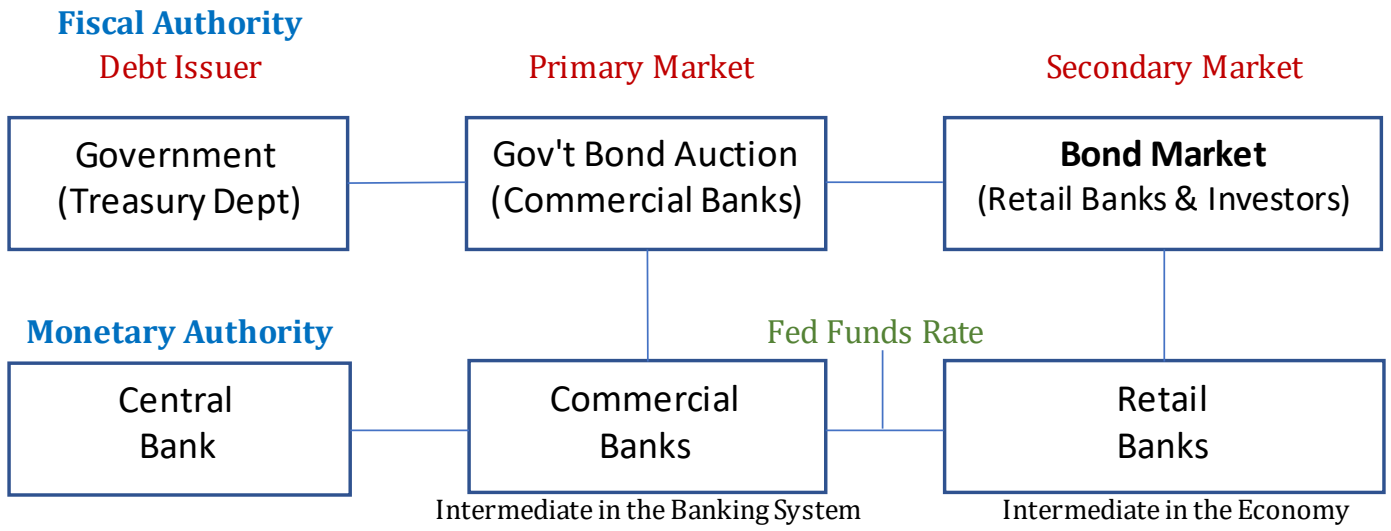
Whether implicit or explicit, each model includes an assumed underlying economic and monetary framework that reflects the interdependencies of these various types of market risk.

Economic theory has neglected money system risk, thus the economic framework is based on an incomplete premise, resulting in a lot of confusion about or mis-quantification of Market Risk.

Interest Rate Risk

Who Controls Interest Rates?

A. The Bond Market
B. The Central Banks
C. The Commercial Banks
D. The Retail Banks
E. The Federal Government



The Interest Rate defined

- **The interest rate (IR) is the most fundamental concept related to money**

1) IR = the risk in a transaction, over a specified time period

2) IR = risk premium a lender charges a borrower for use of the lender's money; or on the flip side, IR = risk premium a borrower must pay to borrow money

3) IR = the **time** value of **money**

Historical Decomposition of the Interest Rate

[nominal interest rate] = [real interest rate] + [expected inflation]

- **~ 1740 - William Douglass**
- **1811 – Henry Thornton**
- **1889 – Jacob de Haas**
- **1890 – Alfred Marshall**
- **1896 – Irving Fisher: "Appreciation and Interest" paper**

Fisher explains **real interest rate = expected economic growth rate**

[nominal interest rate] = [expected economic growth] + [expected inflation]

Decomposition of the Interest Rate

***i* = *economic* *g*rowth expectations + in*f*lation expectations**

i = g + f

***i = g* (*economic* component) + *f* (*monetary* component)**

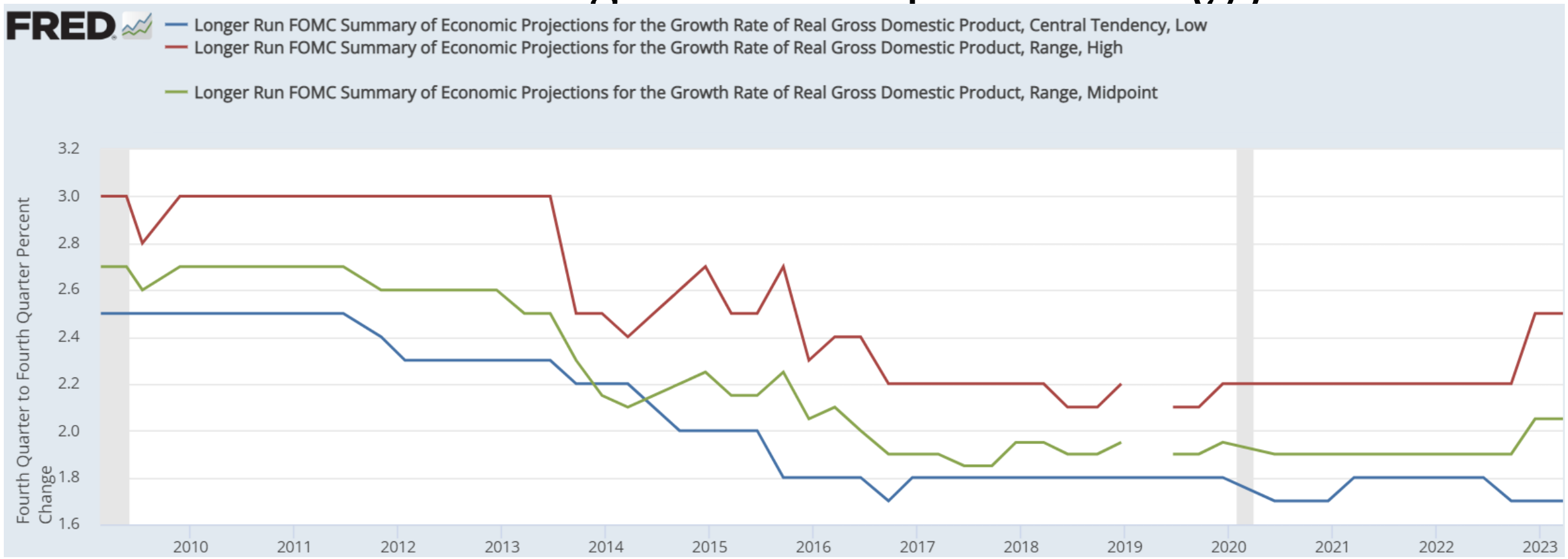
***i = g + f*; where (g + f) >=0**

(g+f)>=0 because between the choice to pay a borrower to lend money to them or not lend the money at all, not lending the money at all is the clear choice

So how do we explain zero-bound or even negative interest rates?

Something is missing from this fundamental (280+ year) formula

Measuring Growth Expectations (g)

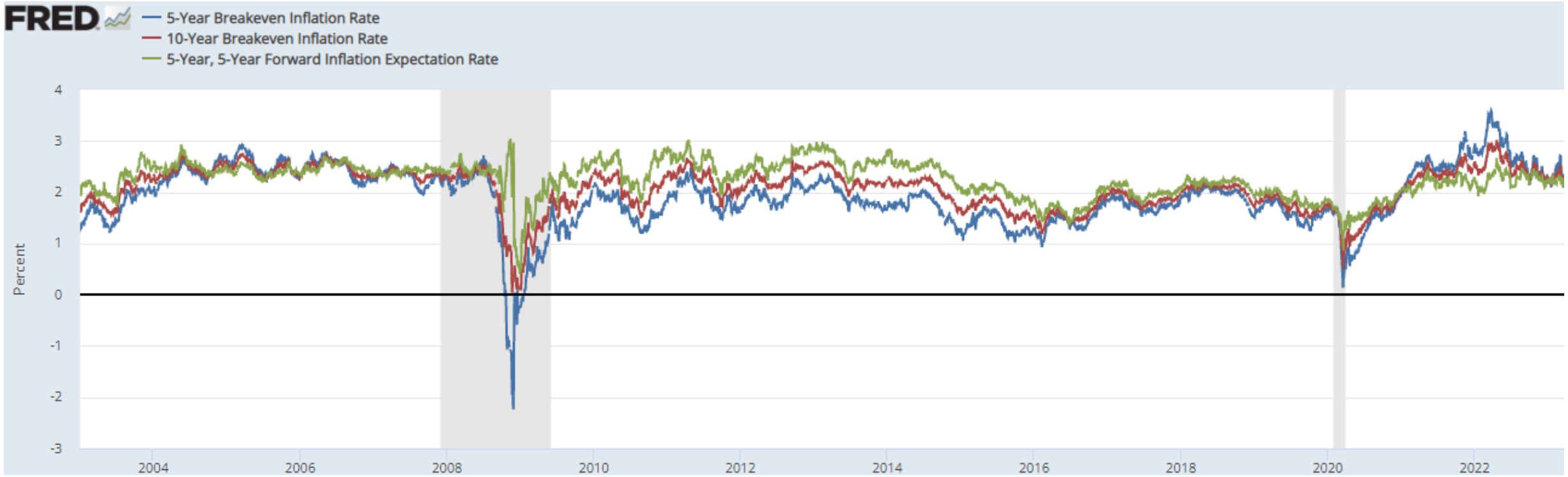


While ***g*** may be contributing to lower ***r***, it is not contributing to negative ***r***. ***g*** = 2.0%

This does not mean that investors will never have negative growth expectations, but rather they wouldn't invest on it

Measuring Inflation Expectations (*f*)

US TIPS market data:



f (inflation expectations) have been fairly consistent at 2-3%. Clearly ***f*** is not contributing to a negative ***r***

f = 2.0%

What about Credit Risk and Term Risk?

i = g + f + c + p

i = g *(financial component)*

+ *f* *(monetary component)*

+ *c* *(individual credit risk component)*

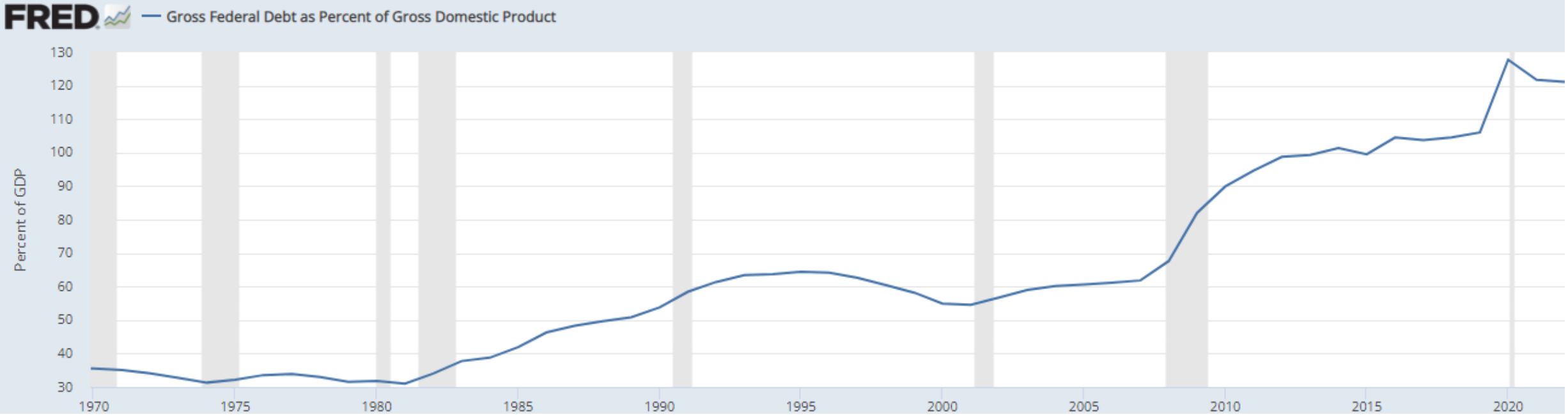
+ *p* *(term premium component)*

r = risk free rate: ***r = g + f + c + p****; where (g + f + c + p) >=0*

Does this explain negative interest rates or identify what is missing?

Measuring Credit Risk (c)

US Federal Debt to GDP: a measure of US sovereign credit risk



US sovereign credit risk is likely still essentially zero, given the demand for US debt;
however, if ***c*** is theorized to be non-zero, then it would be >0%, and could therefore not contribute to negative ***r***

c = 0%

Measuring Term Premiums (p)

- 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)

***p** = 0%*

- Term Premium as a concept, at first glance, sounds legitimate, but even if the concept was true, how could you separate it from growth expectations?
- And if it was separable, then it would be a function of time, which isn't a random variable, so imbalances would be arbitraged away. It is a fictitious quantity, made up by monetary authorities, to bridge the gap between their econometric models for ***r*** and the market rate ***r***. It is essentially *model error.*

What Insights can Risk Theory Provide?

***r* = *g* + *f* ~~+ *c* + *p*~~**; *where (g + f ~~+ c + p~~) >= 0*

r* = *g* + *f*; *where (g + f) >= 0

Something is still missing

*What kind of insights might **Risk Theory** provide?*

Foundations of Risk

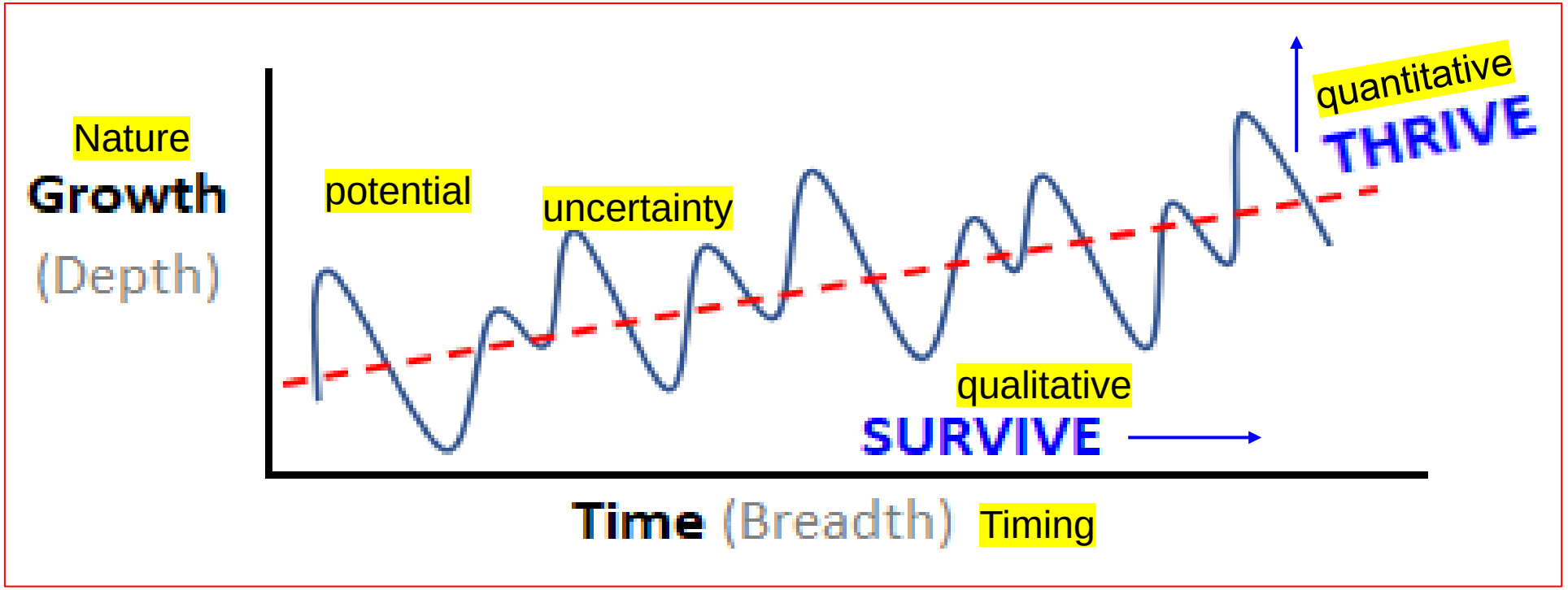
- Risk is any potential event where there is **uncertainty** in terms of:

    1. ***Timing***, and

    2. ***Nature***

  associated with the future event, and where the loss event **has a real qualitative or quantitative impact**.

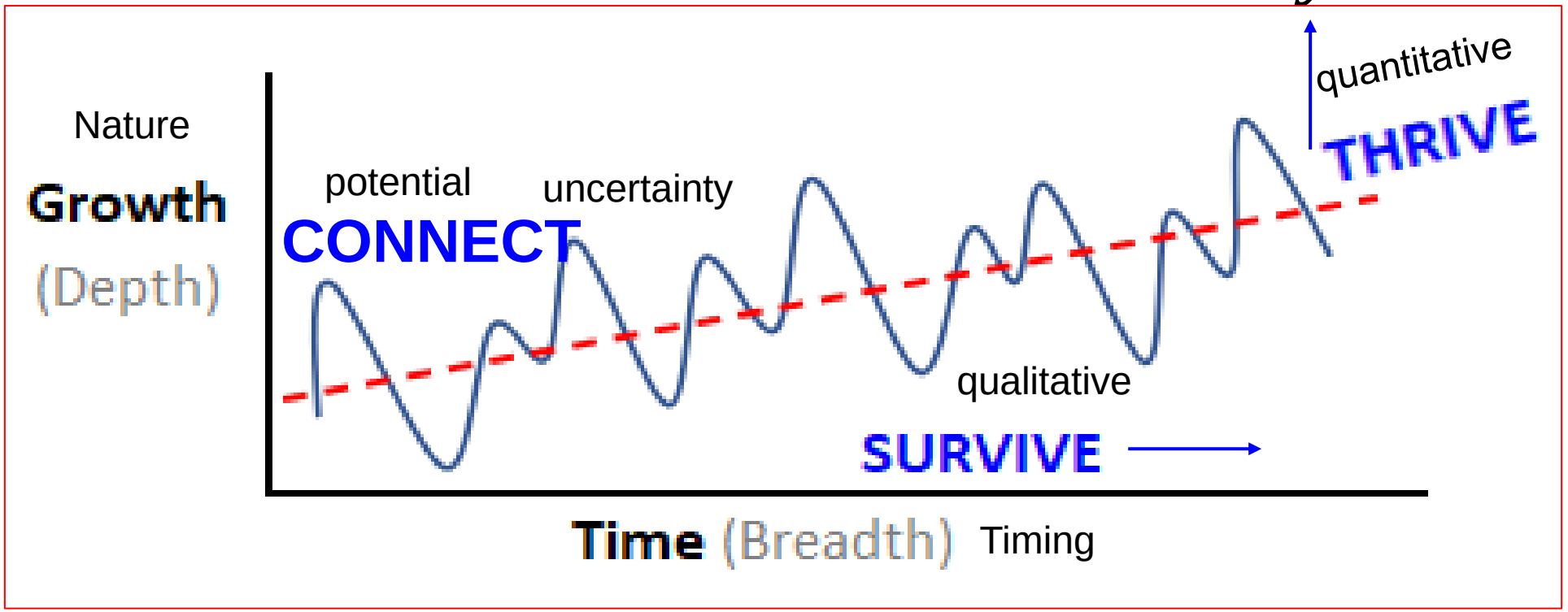
Foundations of Risk - *Reframed*



3 Basic Human Instincts:

1. Instinct to **Survive** (live, continue to exist)
2. Instinct to **Thrive** (grow, produce, reproduce, increase)
3. Instinct to **Connect** (transact, participate, belong, create social groups)

Foundations of Risk - *Resiliency*

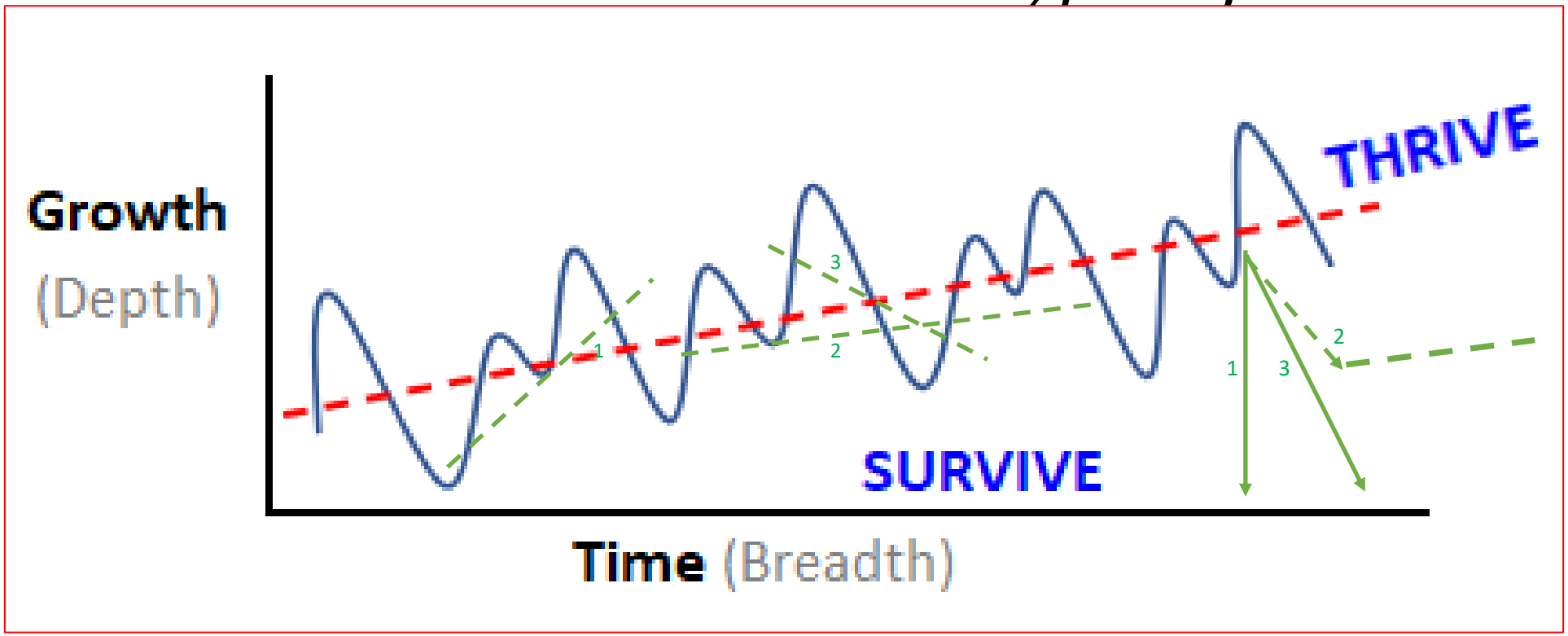


Given a **Connection** has occurred to create **Potential** and **Uncertainty** (a system is **Relevant**), then 2 Basic Risks exist:

1. Failure to **Survive** = **Ruin**
2. Failure to **Thrive** = **Damage**

When a system is both surviving and thriving, that system is **Resilient**. ***Risk Management is the Science of Resiliency***

Foundations of Risk – *Types of Risk*



(Speculative) risks related to THRIVING/Damage:

1. Over-heating (inflationary)
2. Depression (permanent shock, reset)
3. Recession (deflationary)

(Pure) risks related to SURVIVING/Ruin:

1. Abrupt Ruin
2. Permanent Shock
3. Progressive Ruin

Interest Rate Decomposition – risk terms in a financial context

r *= relevance*(thrive) + (1-relevance)*(survive)*

v *= relevance; where 0 <=* ***v*** *<= 1 (under normal economic conditions or no stress in the banking system, v = 1)*

t *= thrive; where* ***t*** *>= 0*

t *=* ***investment risk*** (speculative risk)

t = g + f

s *= survive*

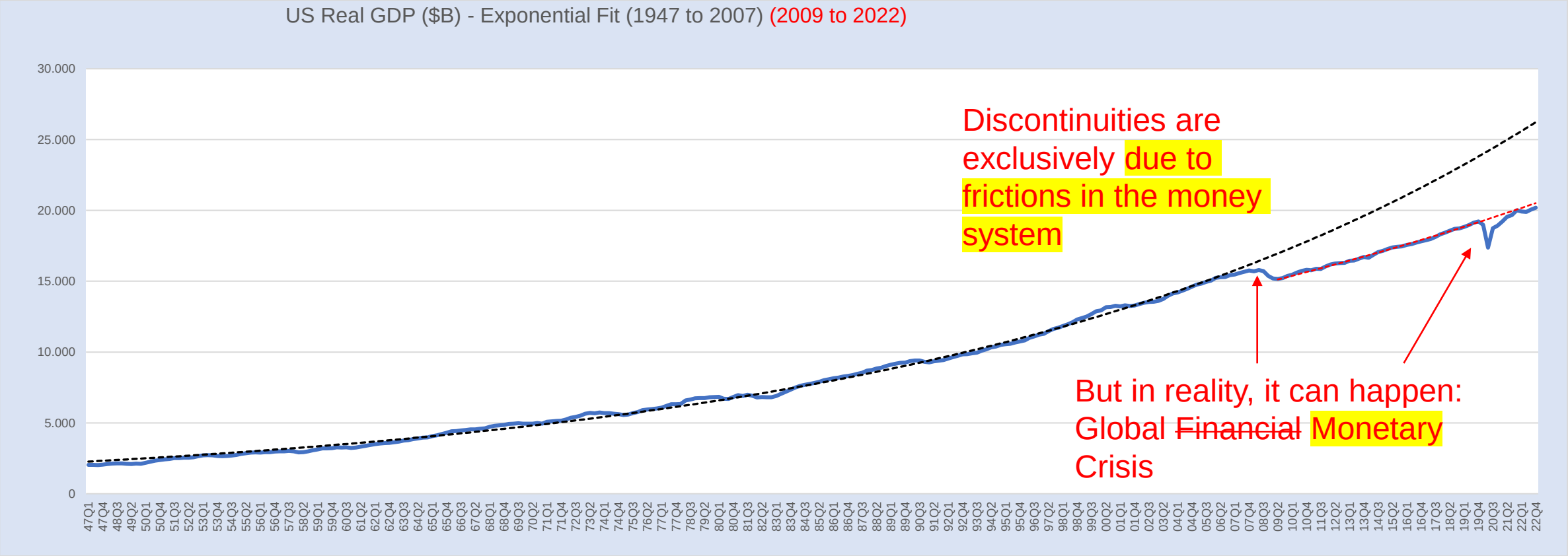
s *=* ***systemic liquidity risk*** (pure risk)

s *= [direction* ***d****; where -1 <=* ***d*** *<= 1]*[survival risk* ***u****; where* ***u*** *>= 0]*

r = v[g + f] + (1-v)*[d*u]* ← *The missing piece!*

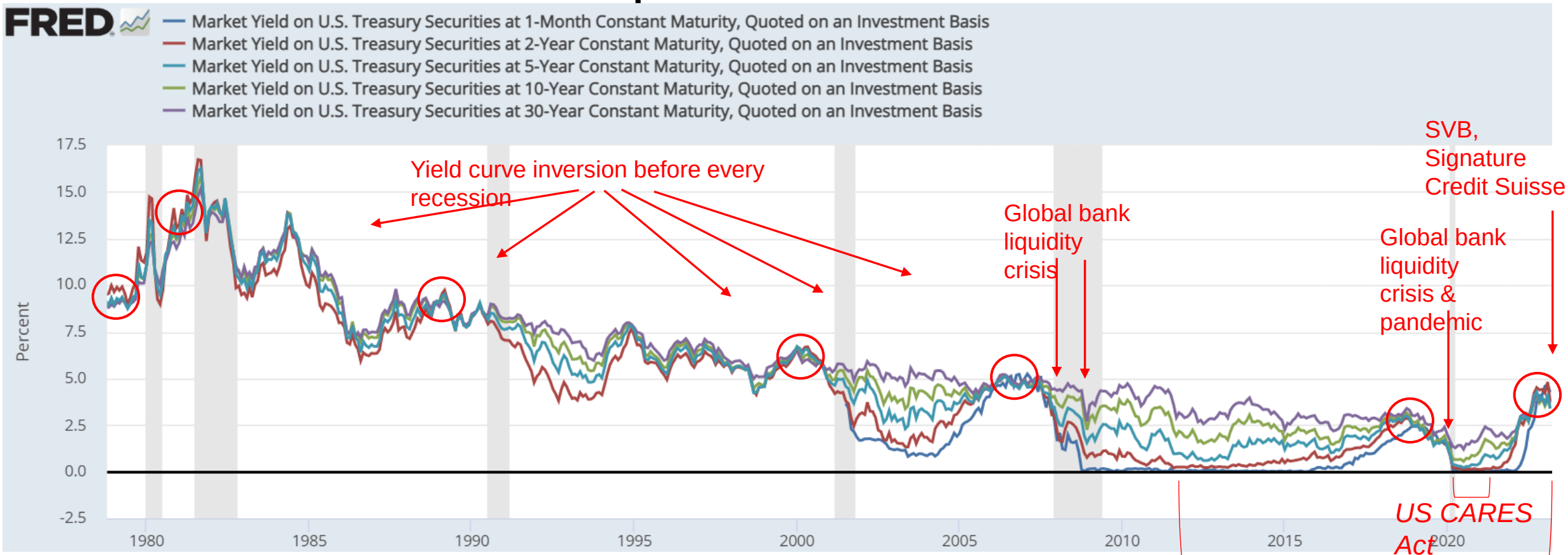
- ***"Systemic" Liquidity risk*** embedded in the price of a security refers to its utility as an instrument of collateral (as opposed to its utility as a vehicle for investment returns)
- ***Relevance*** refers to the balance of an investor's concerns as it relates to investment risk versus liquidity risk. The nature of survival risk (ruin) is qualitative, meaning thrive considerations are abandoned when survival is a present threat
- ***s*** is negative when ***d*** is negative, which occurs when systemic liquidity risk is high, resulting in a flight to safe and liquid instruments, which can be large enough to overwhelm ***t***, especially when ***v*** is small, resulting in negative ***r***

Why is this Important?



This is an unidentified ***Permanent Shock (Depression)***. Something happened within the global money system in 2008. This will remain a risk of ***progressive ruin*** until identified and fixed

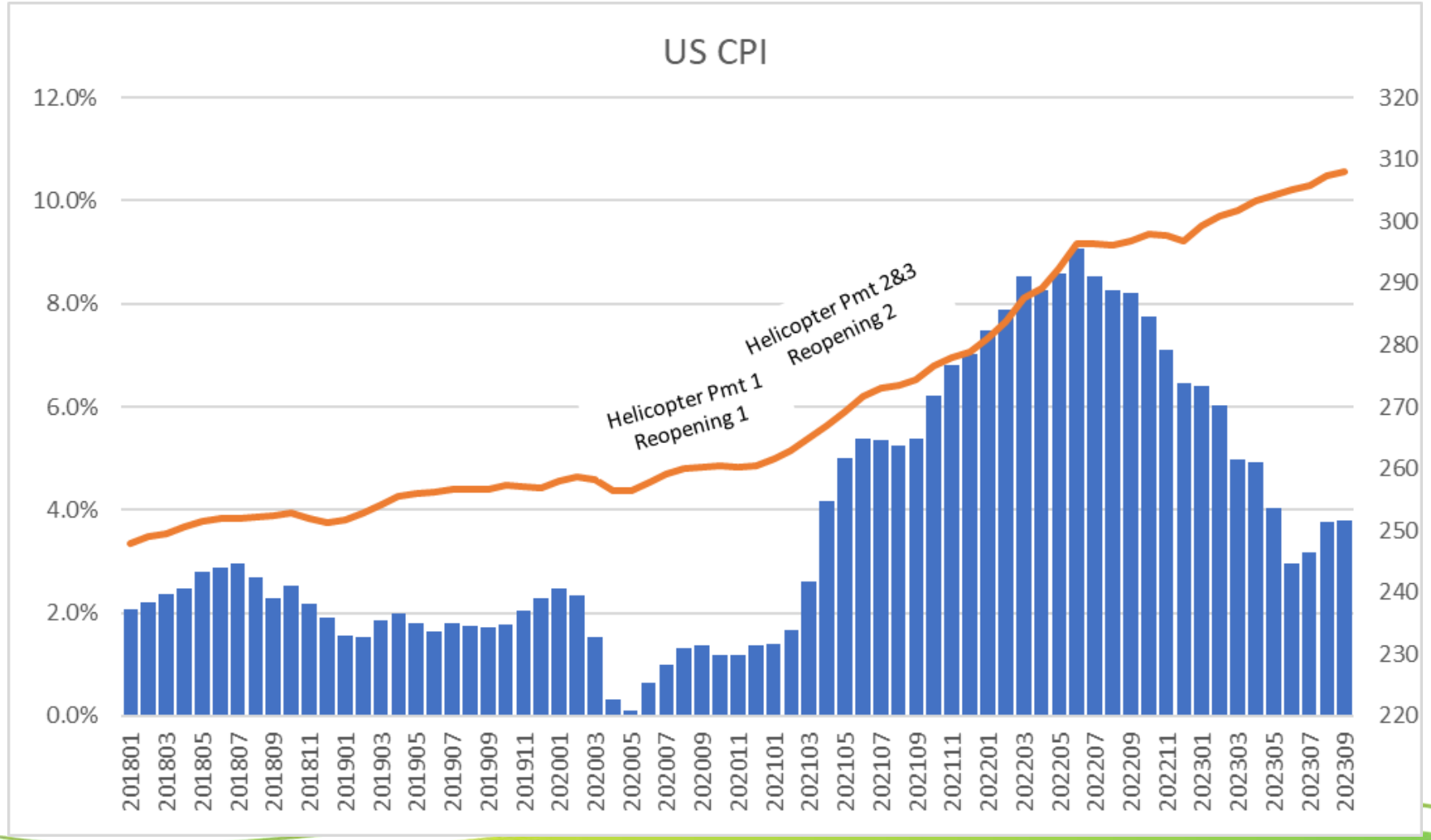
What to Expect of the Interest Rate



Since 2008, recessions come with a global bank liquidity crisis, indicating problems in the global money system, putting heavy ***downward*** pressure on interest rates

Inflation Risk

Inflation is defined in the mainstream by the CPI



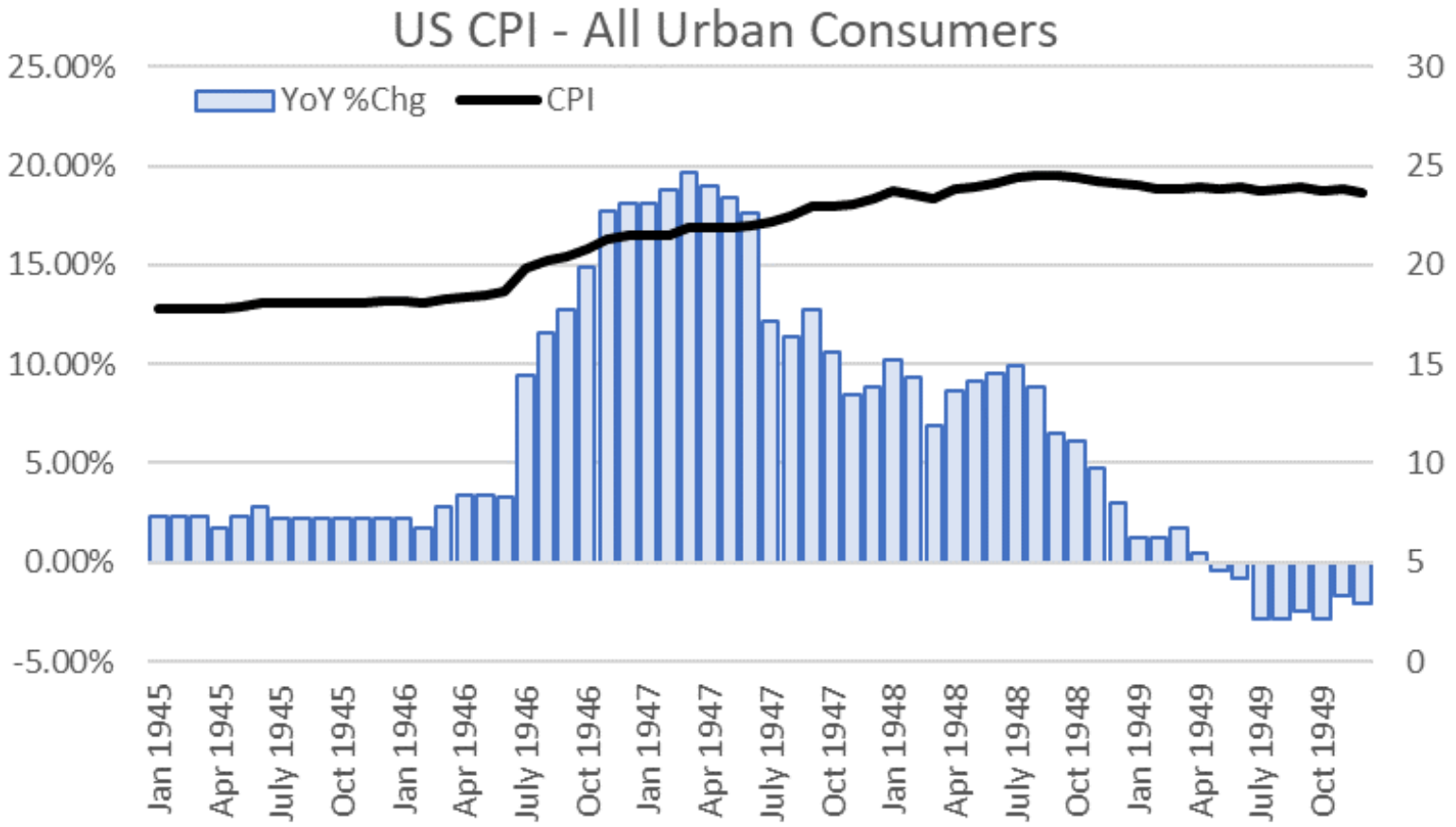
Supply Shock:

Rapid rise in prices, followed by a transitory descent in prices

True Inflation:

Gradual movement in prices related to bank lending activities. Transition to a new price equilibrium

Post WWII – known Supply Shock



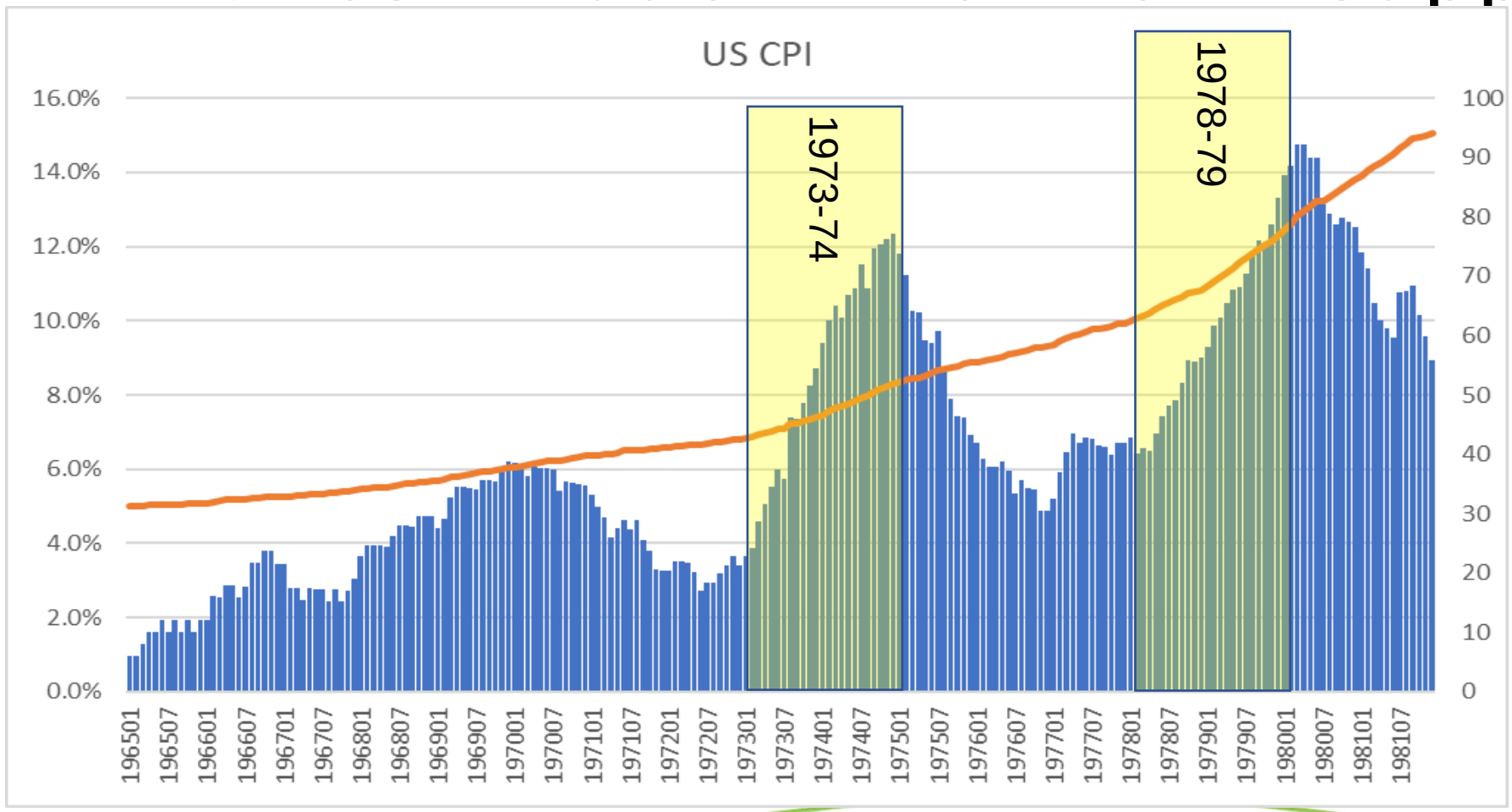
Supply Shock:

Rapid rise in prices, followed by a transitory descent in prices (mean reversion)

Inflation:

Gradual movement in prices related to bank lending activities. Transition to a new price equilibrium

1970s Inflation – no known Supply Shock



Supply Shock:

Rapid rise in prices, followed by a transitory descent in prices (mean reversion)

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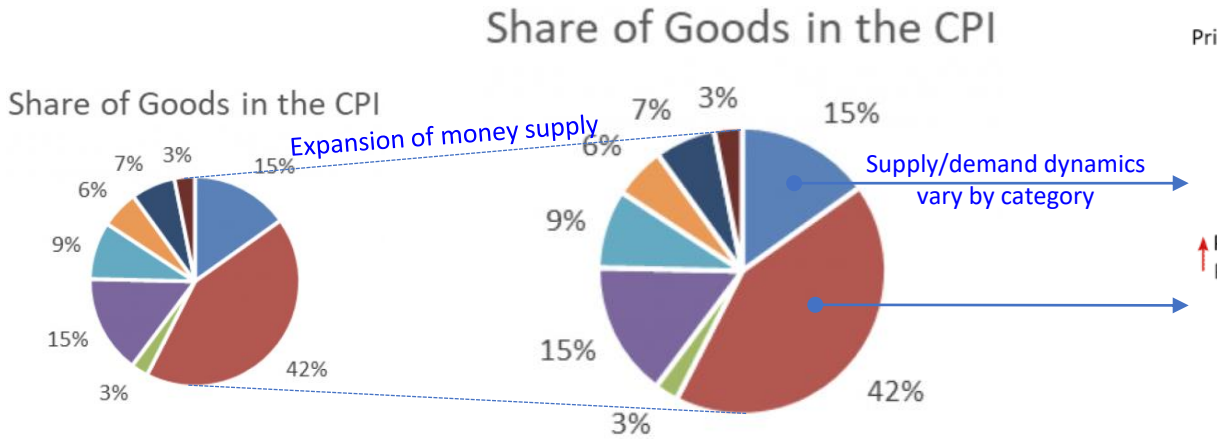
Gradual movement in prices related to bank lending activities. Transition to a new price equilibrium

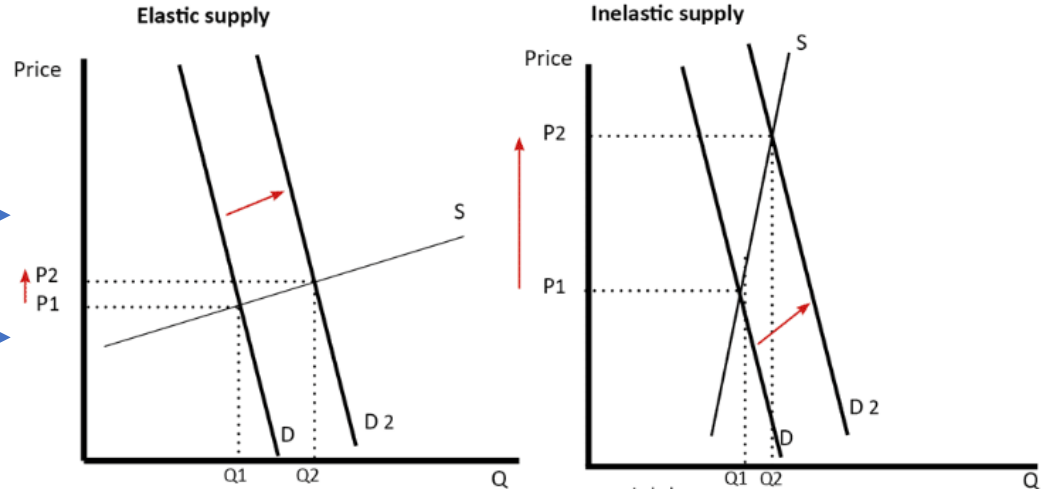
The CPI has two distinct, yet inseparable effects

CPI Effect 1 – Expansion of Money Supply



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



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)

The Fed doesn't understand inflation because they allow it to be defined by the PCE deflator (or CPI), which includes the distorting effect of shifts in the supply/demand curve of the basket of goods and services (not inflation).

So why does the Fed use the PCE deflator, especially if they are the ones who supposedly manage money supply?

Economic Orthodoxy definition of INFLATION

Inflation is a matter of money supply

- "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, US Economist,
  Speech in India, 1963

- "Nonetheless, we recognize that inflation is fundamentally a monetary phenomenon, and ultimately determined by the growth of the stock of money, **not** by nominal or real interest rates."

  Alan Greenspan, Former Federal Reserve Chairman
  Stanford University Speech, Sept. 5, 1997

How do Central Banks control the supply of money?

- ***Central Banks control the supply of money in an economy by increasing or decreasing the monetary base***
- What is the monetary base?

  = [currency in circulation ~3%] + [deposit balances held at retail banks ~97%]
- How do they functionally increase or decrease it?

  by buying or selling treasuries within the banking system (a *cash asset* in a bank is offset by a *deposit liability*)
- How do they know whether to increase or decrease?

  Central Banks have money demand models to compare against money supply

WHY ARE CENTRAL BANKS NOT DOING THIS ANYMORE?

So how did the “inflation” narrative get off track?

- 1940s – global gold shortage (partial representative/hard money system)
- 1944 – Bretton Woods conference (US dollar becomes global reserve currency) – Triffin’s Dilemma
- 1959 – Paul Einzig’s 1965 book mentions the “Eurodollar”, working in the London financial market in 1959
- 1961 – FOMC minutes first mention “Eurodollar”, by 1968 it is mentioned frequently. BIS reports on it in 1964
- 1971 – Nixon closes the gold window (money creation function supposedly merged with intermediation function),
- 1973 – OPEC deal (petrodollar – just a subset of the already existing Eurodollar)
- 1974 – FOMC says M1/M2 are obsolete, errors in their money demand models, admit they’ve lost control of money supply
- 1976 – Stephen Goldfeld, commissioned to research the problem, “Case of the Missing Money”. **Confirmed the Fed had lost control of money supply**, identified the Eurodollar system as the reason
- 1970s inflation – swift expansion of the Eurodollar supply (distinct system, yet indistinguishably interchangeable with the domestic dollar). 1970s inflation still misunderstood to this day. Paul Volker myth – Fed is an inflation fighter via interest rate policy. **Use of the CPI as a proxy for inflation**
- 1980s/90s – globalization, Eurodollar expansion, Greenspan continues interest rate policy and referencing CPI, a false narrative takes hold in the financial media
- WE’VE BEEN OFF TRACK FOR 50 YEARS!!! Despite a global monetary crisis in 2008 and CB intervention ever since, with no GDP to show for it, we still haven’t figured out what is going on!

EVOLUTION OF GLOBAL MONEY SYSTEM

Expansion of Eurodollar Activity

"…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."

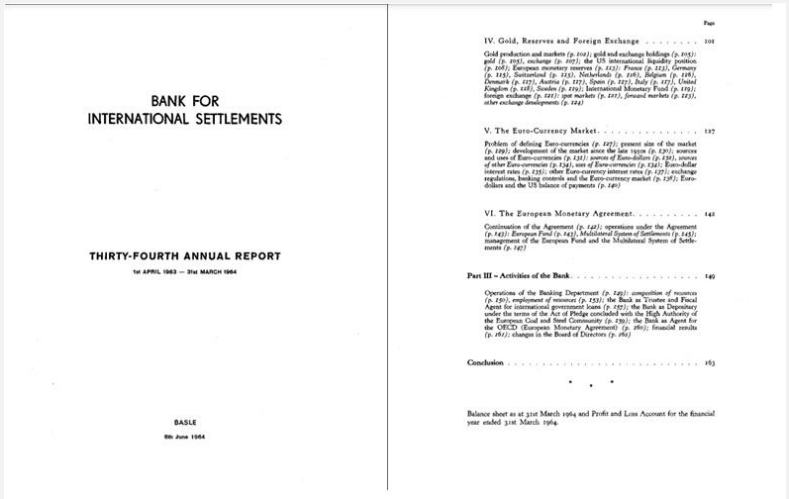
FOMC Memorandum of discussion

June 8, 1964

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

BIS 34TH ANNUAL REPORT

JUNE 1964



BANK FOR INTERNATIONAL SETTLEMENTS

THIRTY-FOURTH ANNUAL REPORT

1st APRIL 1963 — 31st MARCH 1964

BASLE

8th June 1964

Page

IV. Gold, Reserves and Foreign Exchange 101

V. The Euro-Currency Market 127

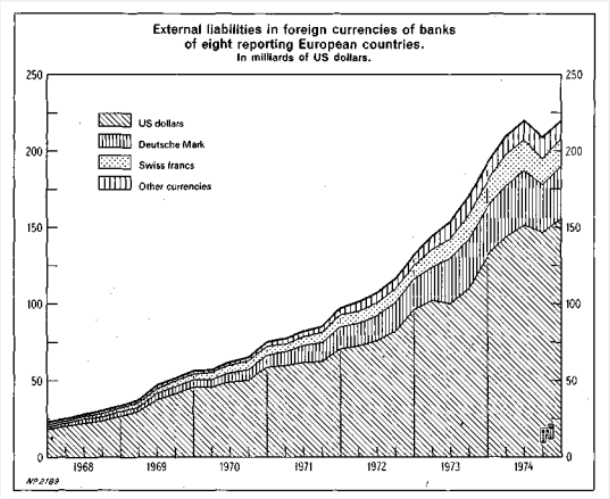
VI. The European Monetary Agreement 142

Part III – Activities of the Bank 149

Conclusion 163

Move toward a lower-friction system, and for financial transaction purposes, not for trade. Brokers/dealers are in the market assuming the store of value function

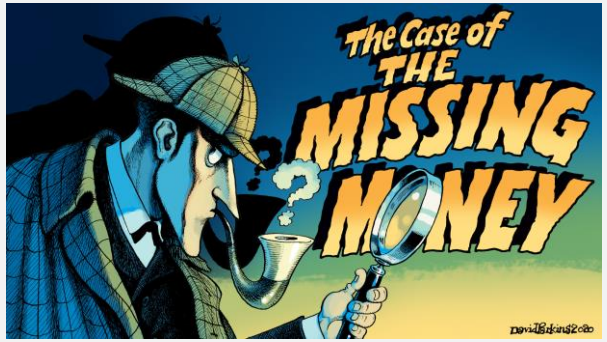
EVOLUTION OF GLOBAL MONEY SYSTEM



"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 MILLIARD 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. More generally, he thought M1 was becoming increasingly obsolete as a monetary indicator. The Committee should be focusing more on M2, and it should be moving toward some new version of M3--**especially because of the participation of nonbank thrift institutions in money transfer activities**."

"In reply, Mr. Coombs said an effort could be made to develop such a measure, but he doubted that it would be successful. **The volume of funds which might be shifted back and forth between the Euro-dollar market and the United States had become so large** that shifts in those funds in response to interest rate differentials could swamp changes in dollar holdings of foreign monetary authorities…" (https://www.federalreserve.gov/monetarypolicy/files/fomcmod19740820.pdf)

FOMC Memorandum of discussion

December 17, 1974

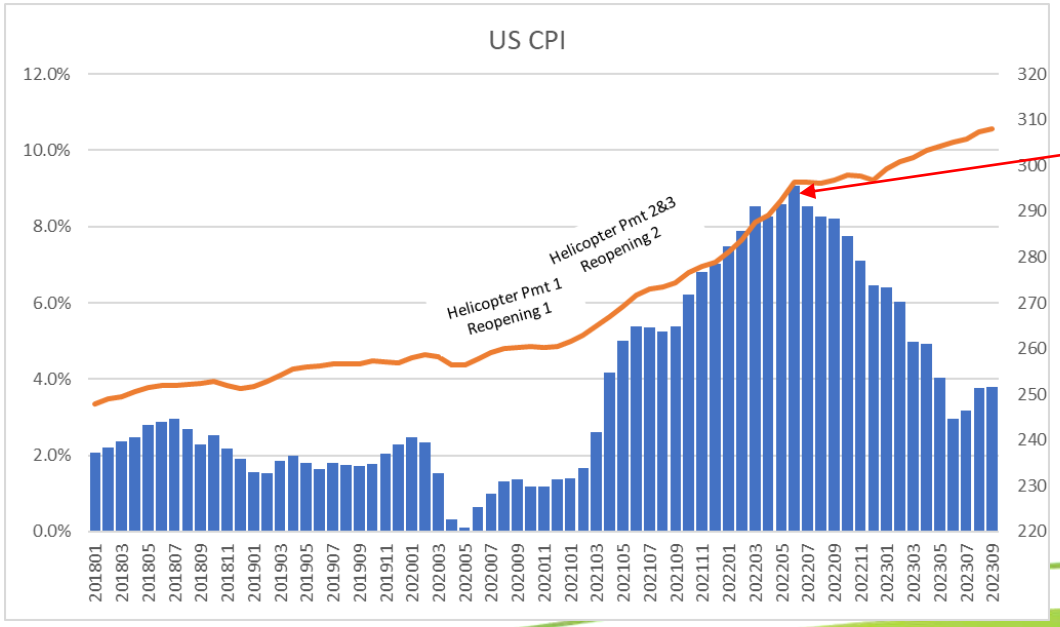
Greenspan admitting to it all (already 20-25 years later)

- "Unfortunately, money supply trends veered off path several years ago as a useful summary of the overall economy. Thus, to keep the Congress informed on what we are doing, we have been required to explain the full complexity of the substance of our deliberations, and how we see economic relationships and evolving trends…There are some indications that the money demand relationships to interest rates and income may be coming back on track. It is too soon to tell, and in any event we cannot in the future expect to rely a great deal on money supply in making monetary policy. Still, if money growth is better behaved, it would be helpful in the conduct of policy and in our communications with the Congress and the public." **Greenspan, 1996**

- The problem is that we cannot extract from our statistical database what is true money conceptually, either in the transactions mode or the store-of-value mode. One of the reasons, obviously, is that the proliferation of products has been so extraordinary that the true underlying mix of money in our money and near money data is continuously changing. 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**." **Greenspan, 2000**

The Federal Reserve - INFLATION fighters?
(Yet another 25 years later)

- "We now understand better how little we understand about inflation."



Jerome Powell, Federal Reserve

ECB Forum, Portugal, June 29, 2022

Questions based on this alarming statement

1. What was the purpose of the rate hikes?
2. What is inflation and how is it measured?

What does Inflation have to do with the CPI?

- What is the CPI (or PCE deflator, or PPI)? Average price of a basket of goods & services
- How do average prices help calculate money supply? They don't, unless the supply/demand dynamics of all goods and services could be held constant, then it could be backed into
- So why does the Federal Reserve use the PCE deflator to measure inflation? They lost control of the money supply, making the CPI the best proxy estimator
- What is the main component of the CPI? Oil

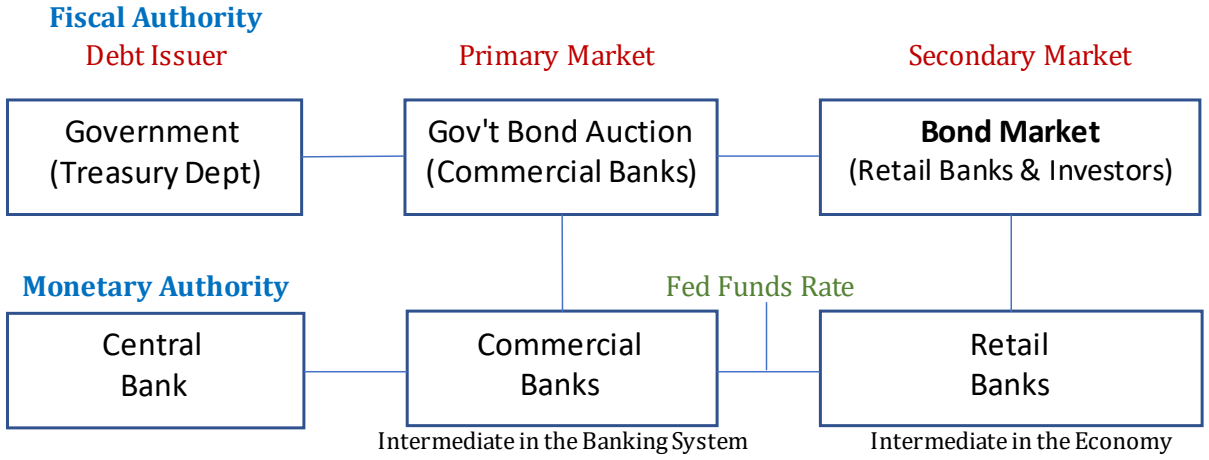
Why does the Fed not discuss the oil market and not present themselves as oil market experts if they are inflation experts, and inflation is the CPI, and the CPI is oil?

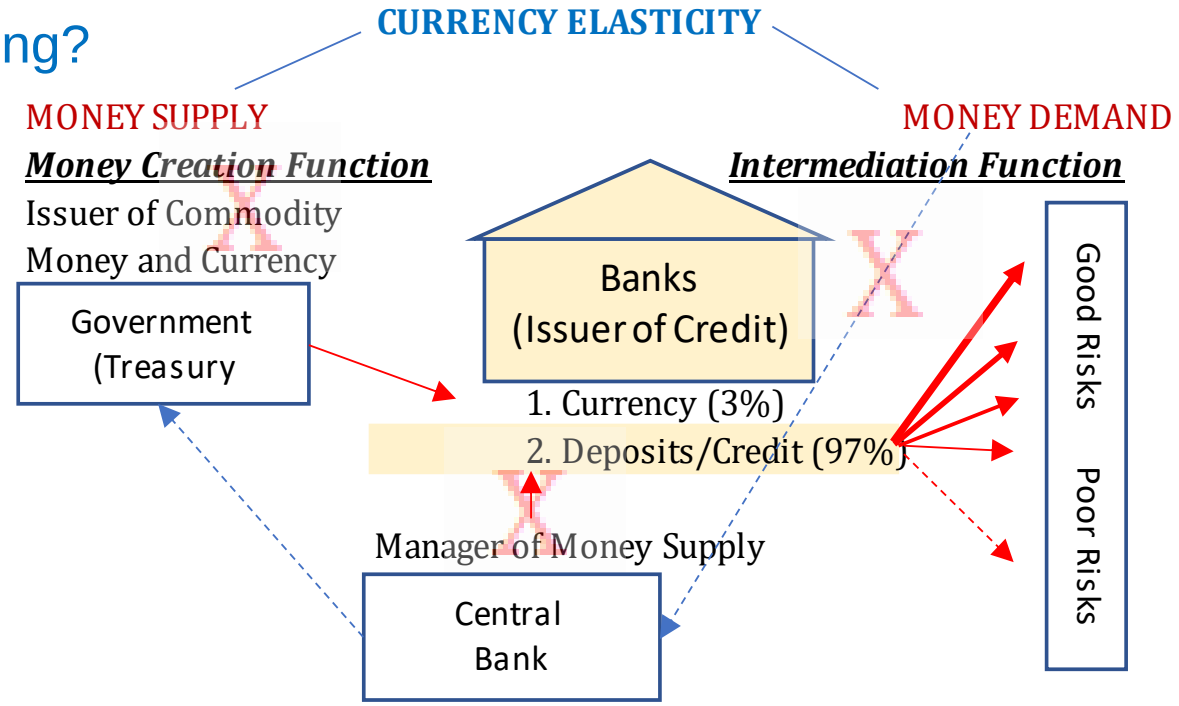
Money Printing, Quantitative Easing, & Inflation

Could the government also print currency and inject it into the economy?

Not in the US (illegal per the Federal Reserve Act of 1913)

Why is Quantitative Easing described as money printing?





QE is an asset swap between the Central Bank and Banks (swap treasuries for bank reserves)

Why does the Fed talk about the Phillips Curve in relation to inflation?

- Nov. 1958 – paper written by A.W. Phillips in the UK – *The Relationship between Unemployment and the Rate of Change of Money* – *showed there was a correlation between inflation and unemployment, as inflation went up, unemployment went down*

- *Over the last 7 decades, this hypothesis has been largely abandoned, as it was never able to prove causation, and only shows weak correlation.*
  - ***Strong Economic activity** = more lending = expansion of money supply = **inflation** = business expansion = competition for workers = lower unemployment/higher wages = increased costs passed on to customers = price increases (where price increases are now confused with inflation, so the cycle theoretically loops). Assumes falsely that money is infinite (wage-price spiral myth).*
- *The problem: the theory requires you start with "strong economic activity = inflation", but Central Banks think the unproven causation also applies in reverse, concluding that "inflation = strong economic activity". But if they also think "CPI = inflation", then they conclude "CPI = strong economic activity", resulting in rate hikes in the face of a disinflationary economy.*
- ***Another signal the Fed has no clue about inflation***

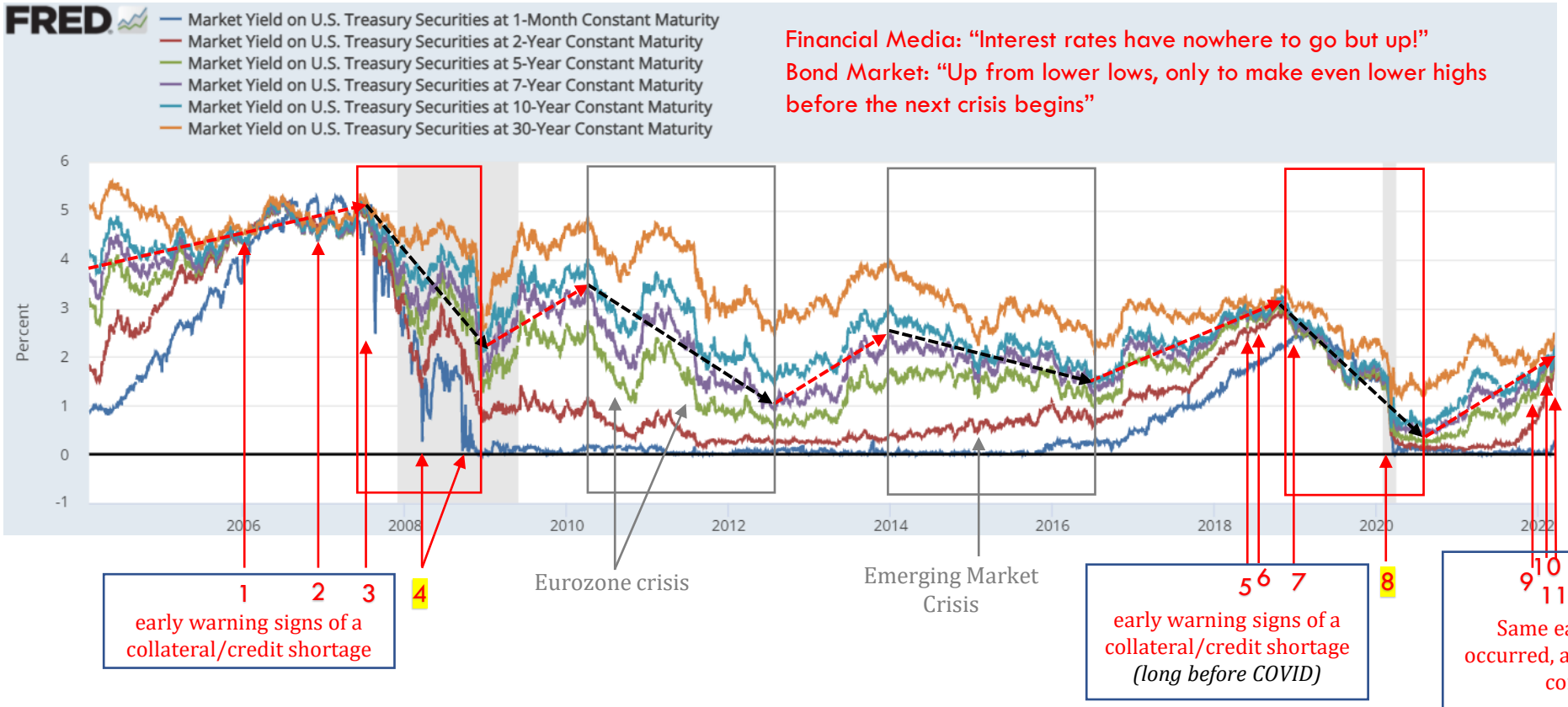
Why is the distinction important?

- **Inflation or price increases**, why does it matter when they are expressed in the real economy by the same phenomenon – higher prices? Who cares about semantics? Prices are still higher than they were last year, and that is what everyone cares about.

- The distinction is important because if you understand money, then you can understand inflation, and then you can begin to understand the CPI, and then you can better anticipate what to expect for “social inflation” (insurance cost trends) going forward.
  - Social Inflation – rising costs of jury verdicts/claims demands and settlements
    - **Demand** is set by claims frequency
    - **Supply** is set by societal sentiment (sentiment based on mainstream socio-economic narrative, which is backwards)
    - Ultimately, this is a reallocation of monetary resources, it does not create additional money supply, so it is not inflation, but it is claim cost trend

Asset Price Risk

ASSET PRICE risk



Government Bonds:

<u>Consistent Signals of Collateral Problems</u>
(low interest rates = tight money conditions)

1. Dec. 2005 – yield curve inverts
2. Dec. 2006 – Euro$ Futures curve inverts
3. Aug. 9, 2007 – "collateral day"
4. Mar & Sept 2008 – GFC 1

5. May 29, 2018 – "collateral day"
6. Jun. 2018 – Euro$ Futures curve inverts
7. Jan. 2019 – yield curve inverts
8. Mar 2020 – GFC 2

9. Dec. 2021 – Euro$ Futures curve inverts
10. Feb. 24, 2022 – "collateral day"
11. Mar. 2022 – yield curve inverts
12. GFC 3?

<u>The Interest Rate Fallacy</u>: *"Low interest rates are generally a sign that money has been tight, as in Japan; high interest rates, that money has been easy…After the U.S. experience during the Great Depression, and after inflation and rising interest rates in the 1970s and disinflation and falling interest rates in the 1980s,* ***I thought the fallacy of identifying tight money with high interest rates and easy money with low interest rates was dead. Apparently, old fallacies never die****". Milton Friedman (1997)*

Asset price risk

2008 GFC (acute systemic liquidity event/collateral shortage)

Eurozone crisis (systemic liquidity issue/collateral scarcity)

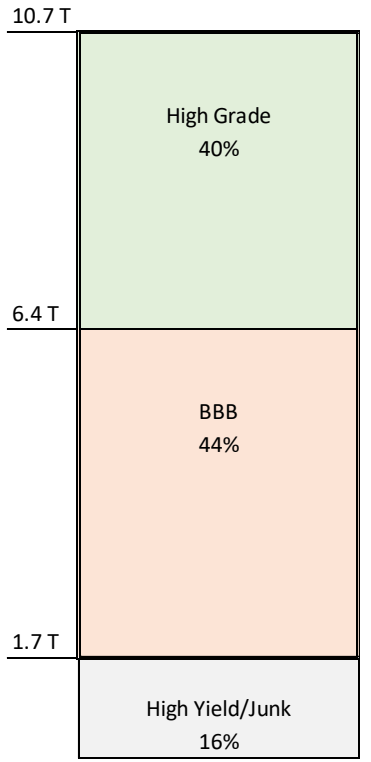
Emerging Market crisis (systemic liquidity issue/collateral scarcity)

2020 COVID crash (acute systemic liquidity event/collateral shortage)

Surplus Shock

Surplus Shock

Would the 2020 "COVID" crash have been worse, or the collateral shortage lasted longer, had it not been for the coincidental CARES ACT that created the issuance of $1T of treasuries (temporary flood of collateral)?



Corporate Bonds:

About 44% of the Corporate Bond market is BBB (one downgrade away from Junk status)

A large portion of BBB owners (Insurers, Pension funds) do not allow for owning Junk grade. They must sell upon a downgrade

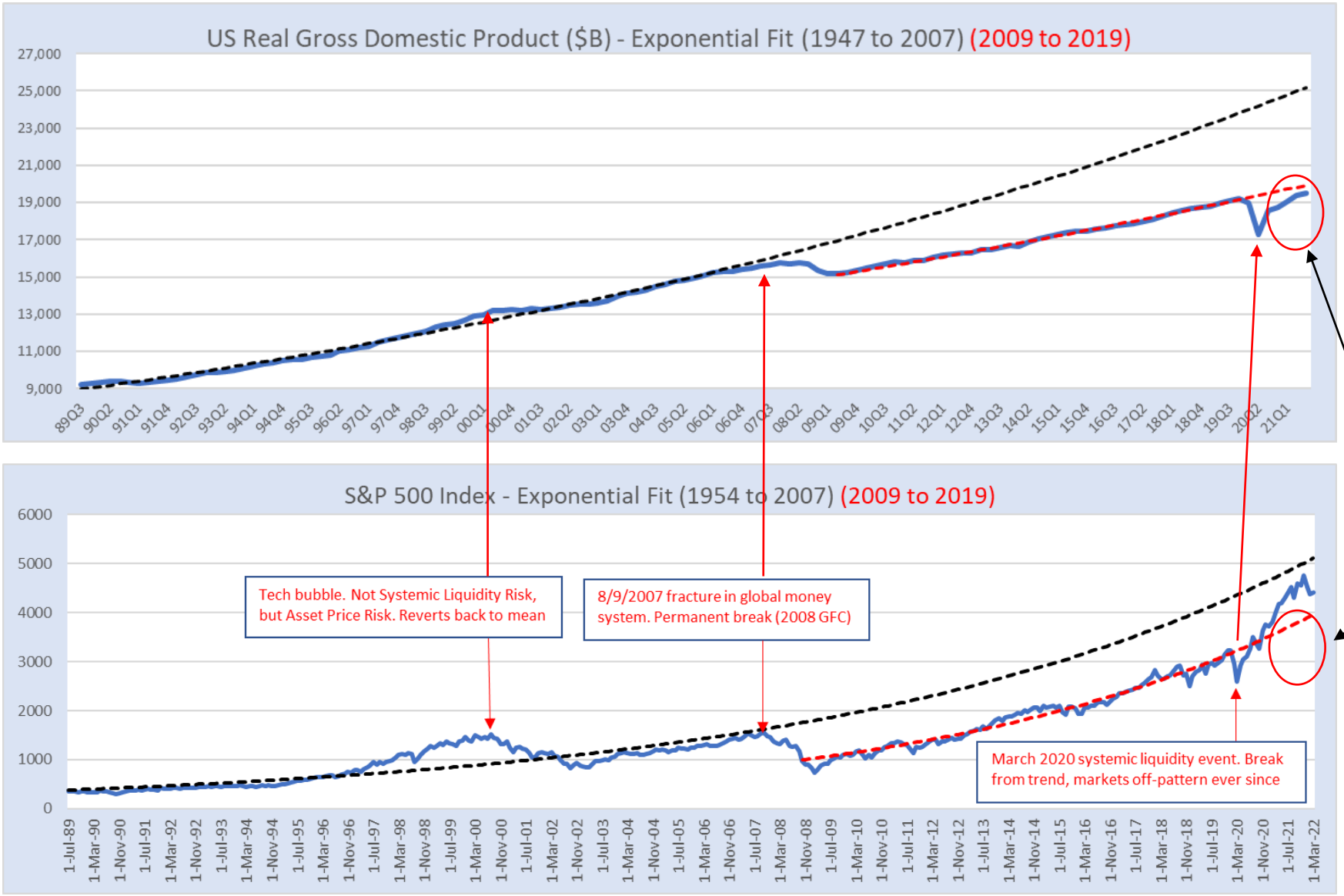
<u>In a recession</u>:

>> earnings decrease. And under increased leverage (from share buybacks) the risk of downgrade is increased

>> tax receipts decrease, thus already-under-funded pension funding is diminished, impacting baby boomers (25% of the US population) who are heavily dependent on pension benefits, changing their spending behavior, exacerbating the recession

>> more downgrades put further sell pressure on corporates, where there are not enough buyers of junk bonds to support the market. Risk rises sharply and spreads blow out quickly

Asset price risk



Equities:

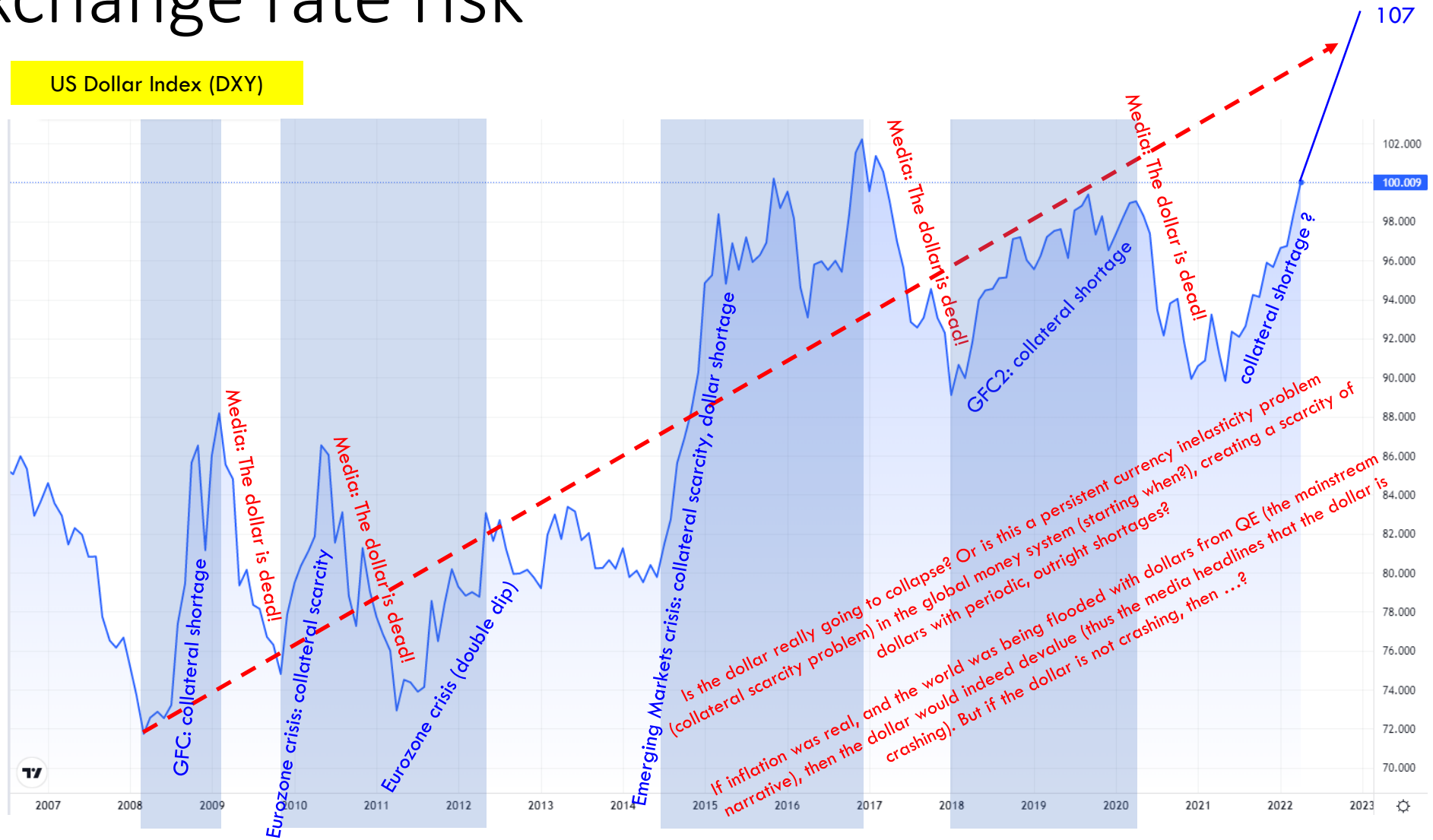
Markets crash during liquidity events. Markets are more uncertain afterward.

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.

Foreign Exchange Rate Risk

Exchange rate risk



A lack of recognizing systemic liquidity risk also impairs our ability to properly understand exchange rate risk.
The mainstream narrative has this one backwards too.