Chapter 6. Study of Crises and Inflation

UMSL

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Study of Crises and Inflation: Facts

Three Major US Crises Post-WWII & their Inflation Rates

1. Great Depression of 1930's;
2. Great Recession of 2008-2010 period;
3. Vietnam War Era of 1970's (Cold World War II).
4. Korean War: 1950-3 (Cold World War I).

Bank Crises & Correlations with Government Unrest, War

- First Two: Major widespread banking sector disruption:
  - panics & bankruptcies of financial intermediaries.
  - Why? Both before major Wars
  - & after decade long expansions after Last War.
  - Expectations of long future profits destroyed?

1 Inflation was negative in Great Depression:

- suddenly a long War was looming after great 1920's expansion,
- following Winning of WWI.
- Stock markets collapsed in 1929;
- & 50% decrease in stock prices from 1937 to 1938.
- Arguably a "lost decade" from 1929-1939?

2 Infl. between zero & 4% in Great Recession:

- suddenly a long War was looming after great 1990's expansion,
- following Winning of Cold World War III.
- Stock markets collapsed in 2000 (-5%) to 2001 (-7%)
- & 2008 (4 drops by between -5% and -8%).
- Arguably a "lost decade" from 2000 to 2010?

Third (and Fourth) Crisis

- No high inflation Rates in 1 & 2:
  - only collapse of future Profit Streams.
- Third & (4): Moderately High Inflation & Money Supply Growth
  - 3. 1970's inflation rose steadily, & over 10% CPI inflation rate
  - (4). 1951 Inflation peak of 9% (CPI monthly data).
- WWI and WWII: mass militarization.
  - Also had high inflation, high government deficits
  - & high money supply growth rates.
- Theme: War (with Inflation), After-war Recession;
  - then After-war Growth, Crisis;
  - & Theme Repeats: War (with Inflation), After-war Recession;
  - After-war Growth, Crisis,...
  - Question: Are particular Wars Expected to some extent?,
  - as well as their coinciding Inflation Increases?

Economists Do Not Like to Include War

- Economists tend to avoid analysis of strict war periods:
  - Many exceptions, eg. Sargent; more typical: "In Post-WWII period..."
  - Some explain Wars with RBC theory (Ohanian, 2015).
- Vietnam War viewed as occurring in 1960's and 1970's,
  - but analysis of War effects on economy are largely ignored.
  - As part of "Post-war WWII period" certain Macroeconomic textbooks
  - have long considered 1970's to be "peacetime period".
- Number of US soldiers committed to Vietnam war
  - authorized at over 500,000, & killed American soldiers : 58,000,
  - larger than reported 36,000 for Korean War.
- Vietnam War: much longer than Korean War
  - some date Vietnam from Nov 1955 to Apr 1975,
  - 1950: first presence of US military advisors.
  - US troop deployment accelerated in 1961 to 1962,
  - full unit deployment by US began in 1965; ended 1975.

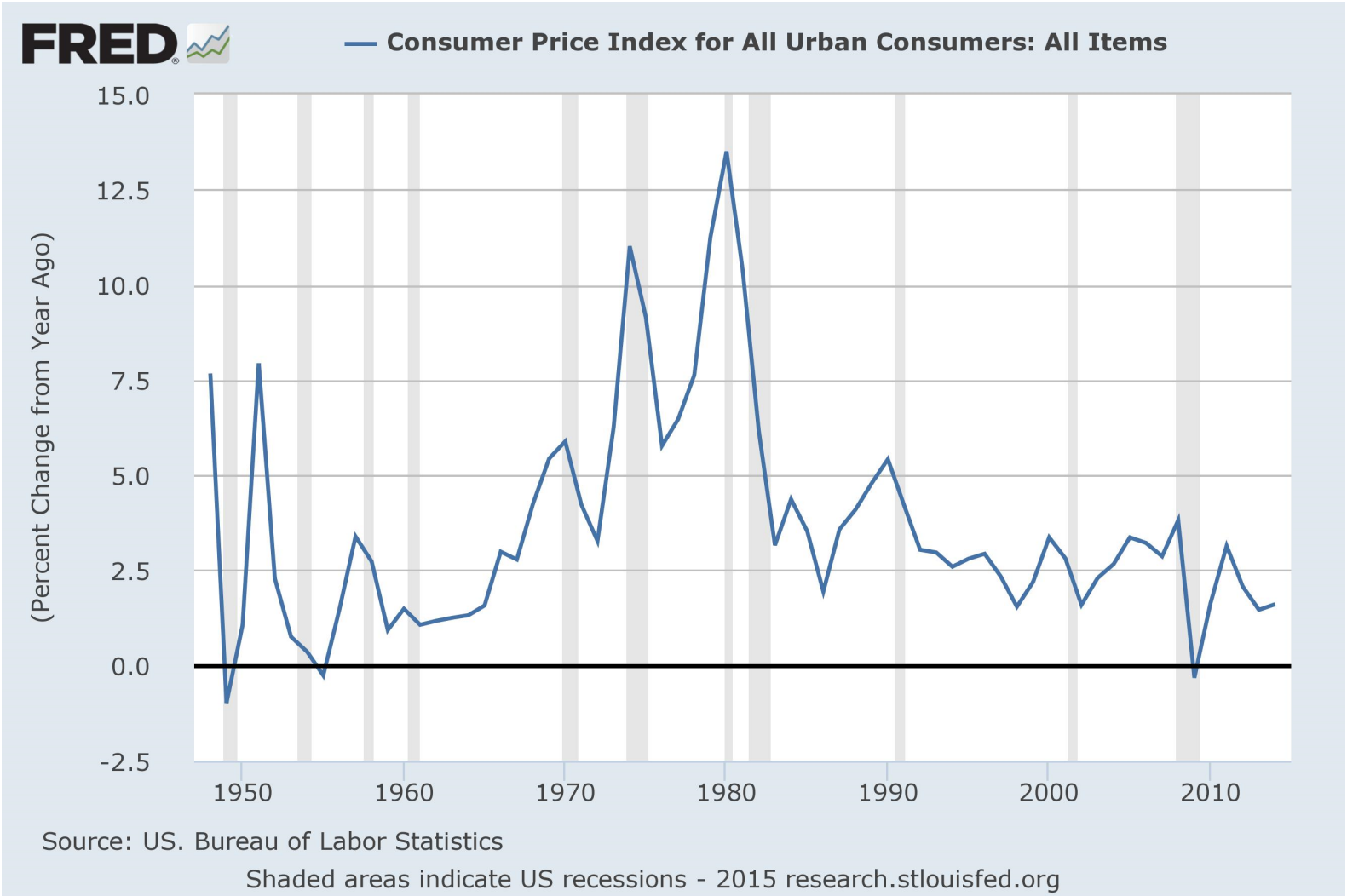
Vietnam as Cold World War II

- Chinese troops reportedly 320,000: 1965 to 1971;
- 3000 Soviet troops reported in Vietnam 1964 to 1965,
- with massive Soviet equipment aid reported throughout war.
- Started right after Korean War Armistice,
- Korean War was never actually ended.
- Reportedly 28,500 American soldiers Now in S.Korea.

The Vietnam War Period

- If not War caused inflation, then What?
- "Oil shocks caused inflation";
- "it was a low growth, low productivity period";
- it was both: a new Event called Stagflation.
- Stagflation Theory had Nothing to do with War.
- Yet: end of Vietnam War, as with other wars,
- followed by sharp recession, in 1974 to 1975.
- GDP growth fell by 6% from 5.6% in 1973 to -0.5 in 1974.

Post WWII Period Inflation Rate



War and Stagflation: Related?

- Recessions followed previous US military wars.
  - After WWI, 1920 to 1921, real GDP growth -2% to -7%; deflation 18%.
  - Severe -11.6% 1946 GDP growth: short, severe Post-WWII recession;
  - short recession after Korean War in 1954, -0.6% GDP growth rate.
- Prolonged Vietnam War: more likely prolonged inflation
  - & high inflation lowers growth: was decade of low growth in 1970's;
  - compared to higher average GDP growth rate in 1960's.
  - End of Vietnam War: sharp recession in 1974 to 1975.
  - GDP growth fell by 6% from 5.6% in 1973 to -0.5 in 1974.
- Milder recession 1970 to 1971; declining but positive GDP growth.
- Taken together: *stagflation*. Prolonged low growth plus high inflation.
- Conventional economic theory could not explain it,
- within framework of "peacetime economy".

Oil Price Shocks? 1st and 2nd

- One way to explain stagflation: ignore War effects
  - of subsequent recessions, since a prolonged war for Vietnam.
  - Prolonged: made it hard to associate recessions with War period.
- Instead: find link between high inflation & low economic growth.
- "Stagflation from series of oil price increases" in the 1970's.
  - Oil prices (West Texas Intermediate Crude) jumped in June 1973,
  - then in December 1973 from $4.31 to January 1974 price of $10.11
  - a 235% increase in just one month: called "first *oil price shock*".
- 2nd jump in 1979-1980: By April 1979 up about 50% more to $15.85.
  - From April 1979 to April 1980, WTI oil price rose from 15.85 to 39.50,
  - a rise of 250%, similar to 1st "oil price shock".

WTI Price from FRED

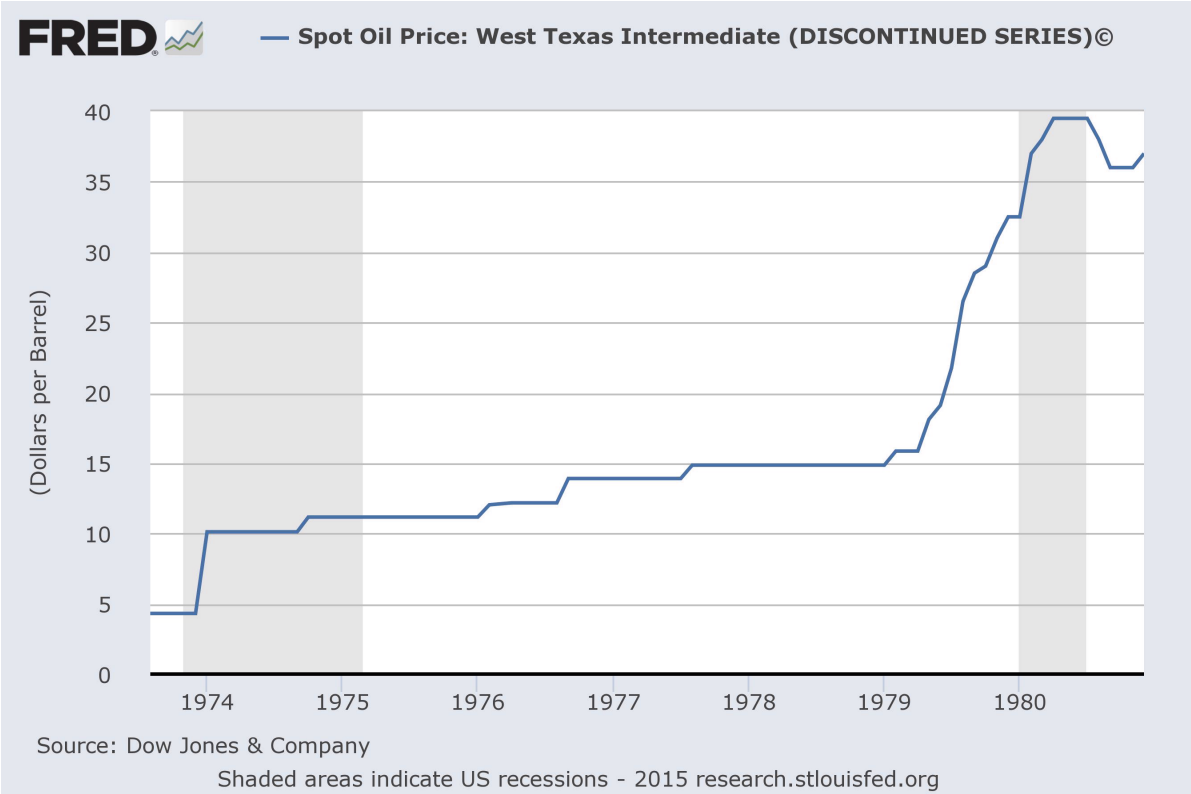


Figure: Spot Oil Prices: West Texas Intermediate Crude, US Dollars per barrel, August 1973 to December, 1980.

WTI Oil Prices: January 1946 to July 2013

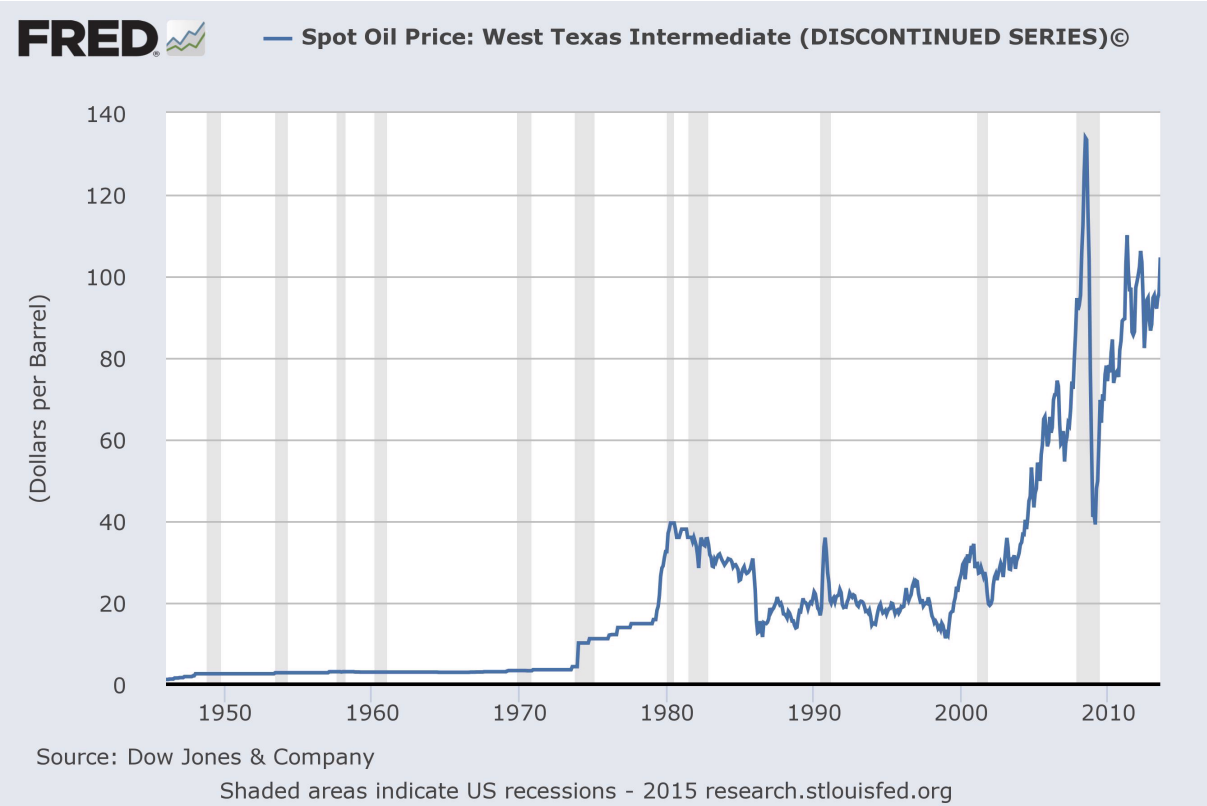


Figure: WTI Oil Prices, January 1946 to July 2013, US Dollars per barrel.

Oil Prices before and after the "Shocks"

- Oil prices fell back down to 15.44 in February 1986.
- 1980's and 1990's: fluctuations around $15.
- A large climb upwards followed after 2001 recession.
- In historical context, 1970's oil shocks historical curiosities
- not foundations for theory of oil shocks causing stagflation.
- But to this day oil shocks continue to be asserted as underlying cause of Stagflation,
- as stated explicitly in Mankiw 2015.
- What constitutes an oil shock remains a controversy
- as well as to how they affect economy.

Real Oil Prices

- Real oil prices: stable from January 1948 to November 1958.
- From November 1958 to July 1973: steadily trended downwards.
- In 1982 dollars: fell from $11 in 1958 to $8 in 1973, a 27% decrease.
- First oil "Shock" came, July to August of 1973,
  - when price rose from $8.05 to $9.58 (in 1982 prices),
  - a 19% increase, still not back to 1958 levels.
- Dec 1973 to January 1974, real price rose to $21.6 in 1982 dollars,
  - almost double the 1958 levels of 11.
  - But if real prices had been increasing by 5% every year from 1958 to 1973,
  - they would also have doubled from 11 in 1958 to 22 in 1973.
  - Increase in December 1973, "1st Shock", making up for long trend down,
  - by establishing a price consistent steady 5% upwards trend,
  - perhaps consistent with a normal return on oil capital.

Oil Price Shocks and Business Cycles?

- 2nd oil price shock of 1979 to 1980 significantly raised real oil prices.
- But after 1983, real oil prices remained stable until 2001.
- Rise and fall since 2001.
- Prices now back down to real level near trough of Great Recession.
- Oil price facts raise questions of why 1970's oil shock occurred.
- Recent oil price "shocks" have had little correlation with inflation being high.
- Recent oil price experience has had little to do
- with high oil prices being associated either with
- expansion, contraction, or stagflation, or with Economic growth.

Real Oil Prices Before "Shocks"

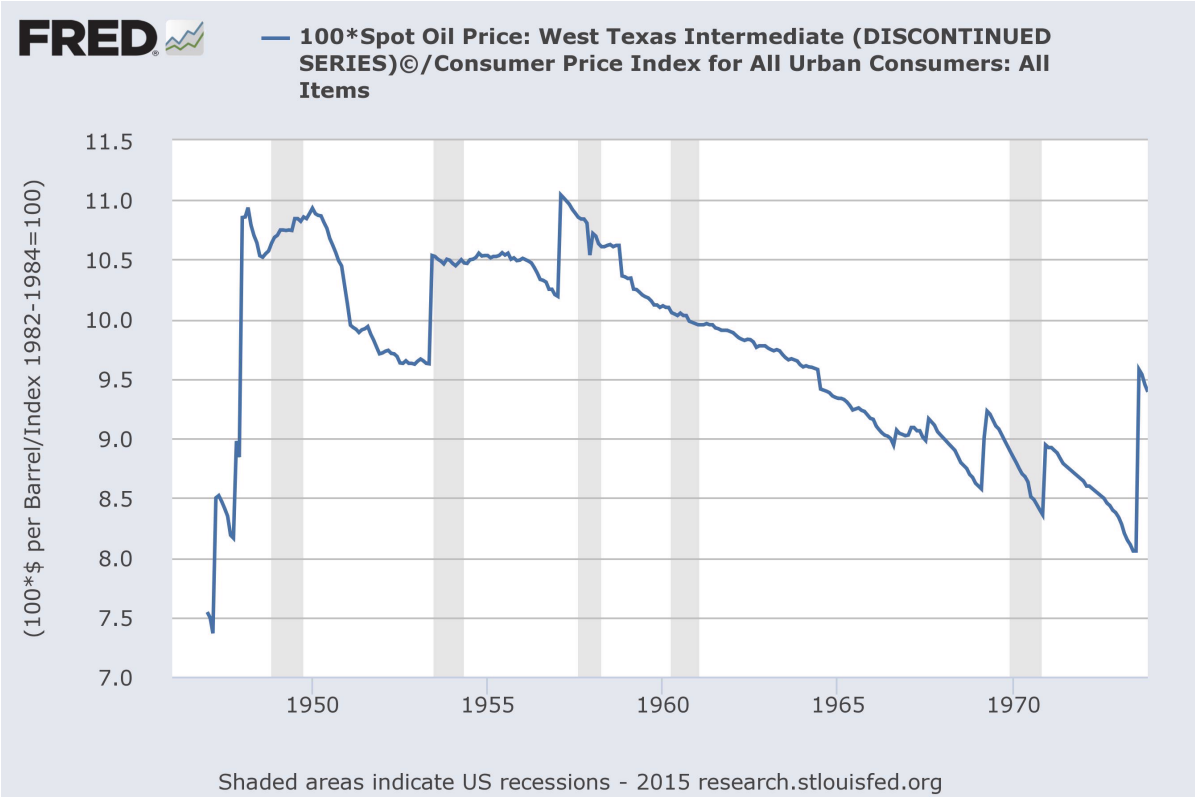


Figure: Real WTI Oil Prices, from Jan. 1947 to Dec. 1973: WTI US$ per barrel divided by US CPI index, in 1982 Constant Dollars.

Real Oil Prices Since 1947

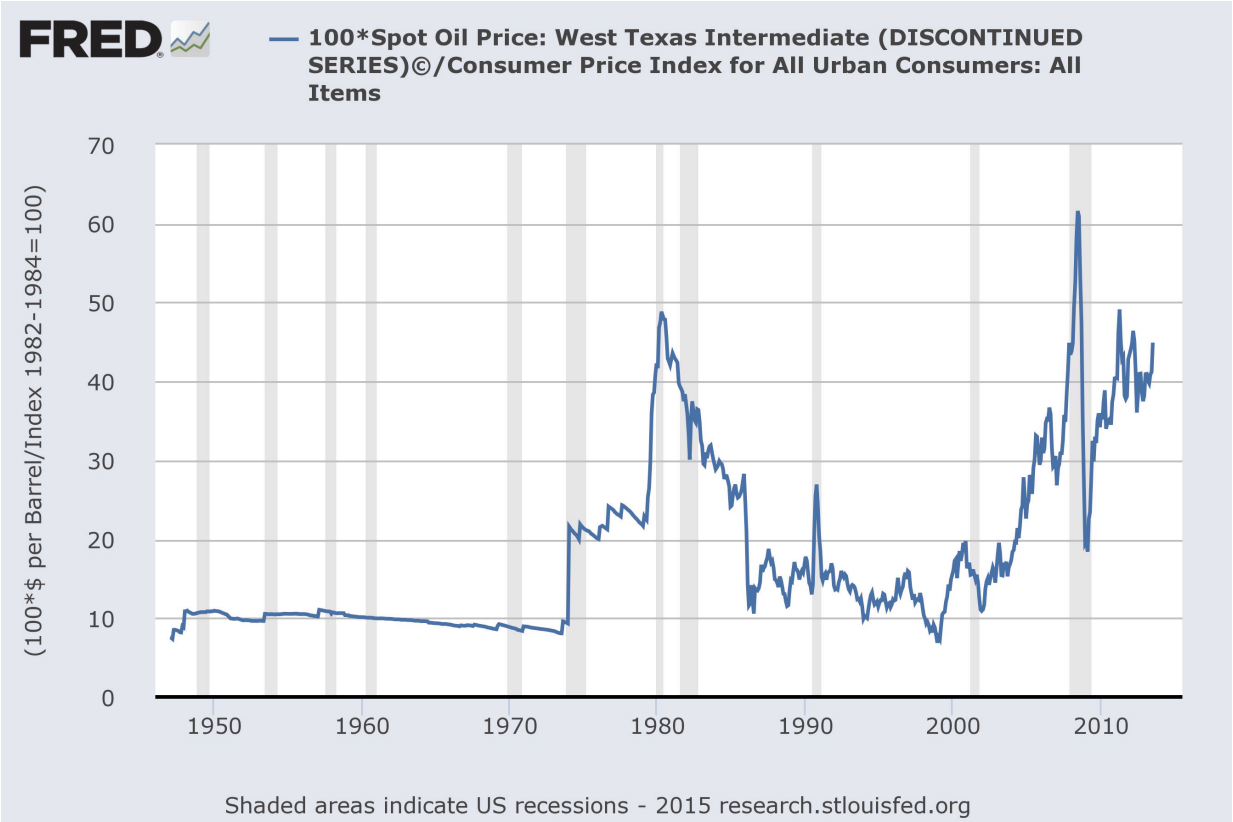


Figure: Real Oil Prices in 1982 US Dollars, 1947 to 2013.

US Inflation and Growth Experience

- Instead of an oil shock explanation of the Vietnam War era of "stagflation",
- Figure 5 shows a different correlation of data that may help characterize not only the stagflation period but a much more comprehensive period of US history.
- The Figure shows for 1954 to 2000, the CPI inflation rate in blue and the Real GDP growth rate in red. Their negative correlation is striking.
- When the inflation rate rises, real GDP growth tends to fall; when inflation falls, real GDP growth tends to rise.

Inflation & Real GDP Growth Negative Correlation

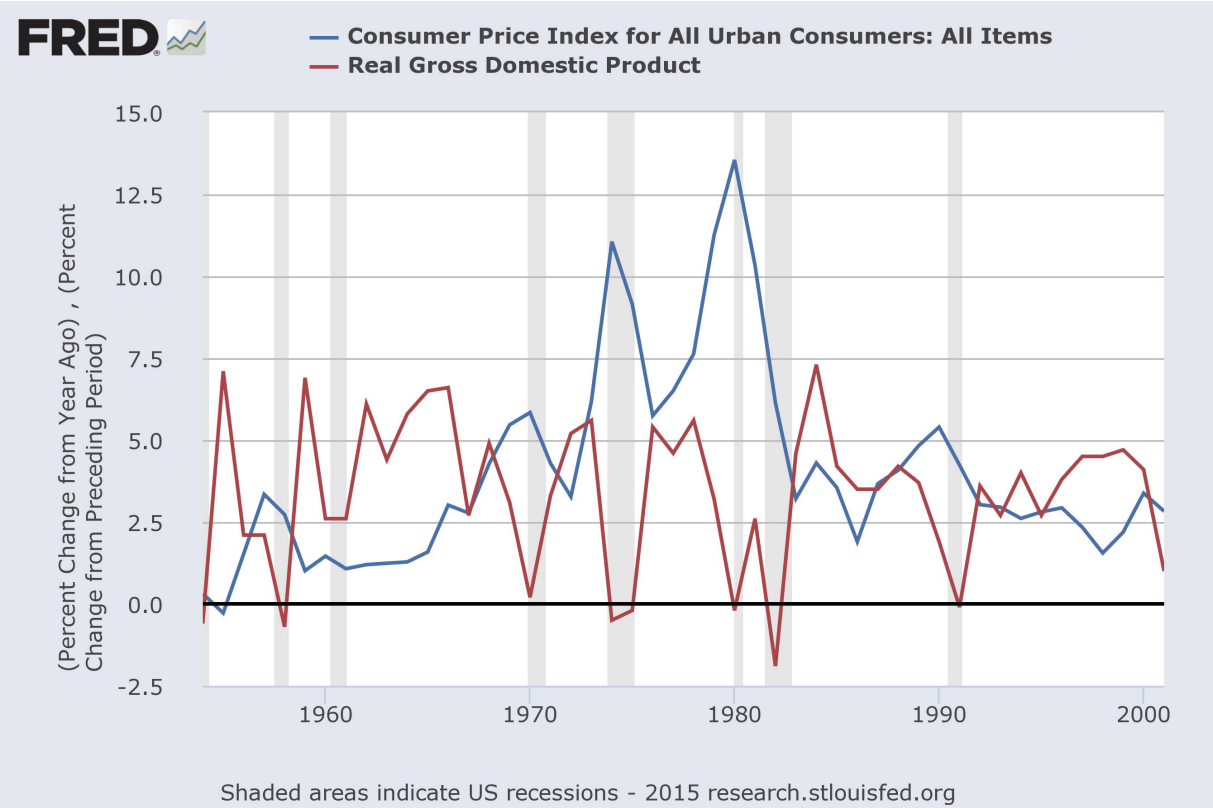


Figure: US CPI Inflation Rate (Blue) and Real GDP Growth Rate (Red), 1954 to 2000.

Money Supply Growth, Inflation and Oil Prices

- Inflation may affect real GDP growth,
  - what data tells us cause for inflation?
  - Evidence: money supply growth rate causes inflation in US data
  - Money supply growth & inflation both *Granger-caused* oil prices,
  - including 1970 oil price "shocks" period.
- "Forecasting the Price of Oil", by Alquist, Kilian & Vigfusson
  - by Federal Reserve Board of Governors, in
  - book, *The Economics of Forecasting,* Volume 2.
- Kilian & co-authors: suggest monetary factors cause oil prices to rise.
  - Gillman & Nakov (2009) supplying theory & evidence for this:
  - money supply growth causing both inflation rate & US Dollar oil prices.
  - Alquist et al. (2011) extend on nominal causes of oil prices,
  - with emphasis on 1970's.

Granger-Causality Evidence of Oil Price Determination

- Clive Granger: (Nobel prize) shows causality in economic data.
- "Granger-causality":systematic relation between two data series
- whereby changes in one data series precede changes in other series.
- Preceding movement gives impression of possible "causality"
- by that series of changes in other series.

Alquist, Kilian and Vigfussion (2011, pp.11-12)

"There are several reasons to expect the dollar-denominated nominal price of oil to respond to changes in nominal U.S. macroeconomic aggregates. One channel of transmission is purely monetary and operates through U.S. inflation. For example, Gillman and Nakov (2009) stress that changes in the nominal price of oil must occur in equilibrium just to offset persistent shifts in U.S. inflation, given that the price of oil is denominated in dollars. Indeed, the Granger-causality tests in Table 1a indicate highly significant lagged feedback from U.S. headline CPI inflation to the percent change in the nominal WTI price of oil for the full sample, consistent with the findings in Gillman and Nakov (2009)."

Alquist, Kilian and Vigfussion Continued

"Gillman and Nakov view changes in inflation in the post-1973 period as rooted in persistent changes in the growth rate of money. Thus, an alternative approach of testing the hypothesis of Gillman and Nakov (2009) is to focus on Granger causality from monetary aggregates to the nominal price of oil. Given the general instability in the link from changes in monetary aggregates to inflation, one would not necessarily expect changes in monetary aggregates to have much predictive power for the price of oil, except perhaps in the 1970s (see Barsky and Kilian 2002). Table 1a nevertheless shows that there is considerable lagged feedback from narrow measures of money such as M1 for the refiners' acquisition cost and the WTI price of oil based on the 1975.2-2009.12 evaluation period."

Their Footnote

"For an earlier exposition of the role of monetary factors in determining the price of oil see Barsky and Kilian (2002). Both Barsky and Kilian (2002) and Gillman and Nakov (2009) view the shifts in U.S. inflation in the early 1970s as caused by persistent changes in the growth rate of the money supply, but there are important differences in emphasis. Whereas Barsky and Kilian stress the real effects of unanticipated monetary expansions on real domestic output, on the demand for oil and hence on the real price of oil, Gillman and Nakov stress that the relative price of oil must not decline in response to a monetary expansion, necessitating a higher nominal price of oil, consistent with anecdotal evidence on OPEC price decisions (see, e.g., Kilian 2008b). These two explanations are complementary."

Alquist et al: Oil Price Shock Theory:

"If the U.S. money supply unexpectedly doubles, for example, then, according to standard macroeconomic models, so will all nominal prices denominated in dollars (including the nominal price of oil), leaving the relative price or real price of crude oil unaffected (see Gillman and Nakov 2009). Clearly, one would not want to interpret such an episode as an oil price shock involving a doubling of the nominal price of oil. Indeed, economic models of the impact of the price of oil on the U.S. economy correctly predict that such a nominal oil price shock should have no effect on the U.S. economy because theoretical models inevitably are specified in terms of the real price of oil, which has not changed in this example."

Theory: Oil price shocks cause "*supply-side*" Inflation

- Oil price shocks: foundation of so-called "*supply-side shocks*"
  - used to explain US Vietnam War era of stagflation.
  - Recent work: 2 oil shocks of 1970's were largely monetary based shocks.
  - If true, jump in nominal & real prices "catching up" for past inflation,
  - as a result of money supply increases, and US dollar devaluation.
- If inflation caused 1970's oil shocks,
  - then oil shocks did not cause inflation.
  - Oil shocks causing high inflation in the 1970's:
- Basis of supply-side *oil shock theory* of economic stagflation
  - during Vietnam War era.
  - Recent research "debunks" view,
  - with a monetary explanation as primary cause
  - of both the oil shocks and the inflation.
- Supply Sidy Shocks still thought of as Cost-Push Inflation

Metallic Standard & End of Bretton Woods Gold Standard

- Monetary causation of Vietnam era oil prices, if true,
  - leaves question of what caused US money supply increase
  - US historical evidence shows how high inflation coincides with wartime.
  - Typically by printing money to pay for wartime govt deficits
  - without having to raise corp income & pers income tax rates.
- Money supply growth & inflation by early 1970's so high
  - drove US off gold standard, permanently it appears.
  - US currency backed by metallic standard since
  - 1776 US Declaration of Independence, various "suspensions".
  - 1971 to 1973 gold standard abandoned in series of steps.
- Coinage Act of 1792 created US dollar through free US coinage
  - into silver & gold at set ratio per dollar (15 silver to 1 gold grain).
  - 1792 to 1834 silver main currency; Coinage Act 1834:
  - *conversion ratio* to 16 to 1, causing gold to circulate.
  - From 1834 to 1971, US on gold standard
  - except Civil War (until 1879), WWI & WWII.

Bretton Woods End and Nixon's US Price Controls

- *Bretton Woods* set US dollar redeemable in gold,
  - for international central banks, at $35 dollars per gold ounce.
  - US government budget deficit financed by US Treasury buying from Fed.
  - (excluding at-the-time accumulating Social Security Trust Funds).
  - Created new money that caused inflation pressure in US.
- Other countries linked by *fixed exchange rates* of Bretton Woods
  - had to buy up US dollars with own currencies in order to keep
  - underlying exchange rate values at fixed rate set by Bretton Woods.
  - US *exported inflation* of Vietnam War to Bretton Woods nations.
- US Nixon tried to control US inflation: wage & *price controls*
  - by executive action in August 15, 1971 (lasted until 1974).
  - Controls of 1971 included suspension of currency into gold.
  - Violated Bretton Woods agreement, ended gold standard.
  - During height of US involvement in Vietnam War,
  - US price controls said to be "unprecedented in peacetime";
- 1973: countries of Bretton Woods went to floating exchange rates.

Confluence: Inflation, War End, Gold Standard End, Deepest Recession

- Nixon resigned August 9, 1974 & Ford inaugurated President.
  - Same month US cut military aid to Vietnam.
  - US Dow Jones Industrial average lost 45% of value 1973:1-1974:12.
  - Biggest stock market crash since Great Depression.
  - Real GDP growth declined for 2 years 1973 to 1975.
- Confluence of 45% value stock market crash,
  - end of US Vietnam military involvement,
  - deepest recession since Great Depression,
  - end of Bretton Woods & rising inflation
- All taught in macroeconomic theory to be result of oil shocks
  - starting with Arab *oil embargo* of 1973.
  - Supply side increases in cost of production caused set of events.
  - Supply side oil shocks still taught as reason for 1970's inflation.
- *Blaming the oil exporters* for breaking fixed price oil sales contracts,
  - agreements made with Bretton Woods gold standard:
  - like blaming friends for trusting you.

Mankiw (2015) on Stagflation

"Some of the largest economic fluctuations in the US economy since 1970 have originated in the oil fields of the Middles East."... "Firms in the United States ...experience rising costs, and they find it less profitable to supply their output of goods and services at any given price level. The result is a leftward shift in the aggregate-supply curve, which in turn leads to stagflation."(p. 450-451, Seventh Edition, N. Gregory Mankiw, Principles of Macroeconomics).

Oil Shock Theory of Stagflation

- Organization of Petroleum Exporting Countries (OPEC)
  - accused as monopolist suddenly exerting monopoly power to raise oil price.
  - Ignores long term, fixed dollar price, OPEC contracts
  - made by US affiliated energy companies with OPEC member countries,
  - based on fixed price of gold in US dollars under Bretton Woods system.
- OPEC for no known reason to date, exerted monopoly power in 1970's only;
  - refused to export oil under previously contracted prices
  - during Arab oil embargo of October 1973, & raised oil prices.
- Once Japan & European Union (then called EEC) let currency rates float,
  - value of oil prices in fixed US dollars declined across globe;
  - in addition, to lower value in US dollars as 1970's inflation took off.
- Actual oil shock: reduction in OPEC real profits & in US oil costs,
  - once international monetary system collapsed.

Supply Shocks, Agg. Demand & Supply in Nominal Prices (Shocks, AS & AD analysis with Nominal P)

Construct full oil shock theory of stagflation: many assumptions.

- 1. long run (LR) supply of aggregate output is vertical;
  - output is fixed, no matter what price.
  - Comment: economic growth shows output expands along positive trend,
  - implying an ever larger supply of output every year.
  - *Long run* (LR) actually has no clear definition in economics:
  - just jargon used in 18th and 19th centuries.
- 2. assume price is US dollar price of goods & services;
  - nominal price, not relative, or "real" one, as in microeconomics.
  - Micro-inconsistent, nominal theory of aggregate supply & demand.
- 3. *short run* (SR) agg. output supply (AS), demand (AD) curves
  - slope as in micro, although no definition of short run exists here.
- 4. SR Output can fall below fixed LR output, but not exceed it.

Dynamics of Nominal AS-AD Analysis

- Start with equilibrium between SR AS & AD and LR AS:
  - short run supply & demand coincide with fixed long run output,
  - at "full-employment level of output", as in Keynesian Cross.
- What disturbs this equilibrium?
  - Either a "*supply-side shock*" or "*demand-side shock*"
- Eg. oil supply shock increase US cost of production of output.
  - In theory, oil shock causes SR AS to shift upwards, back.
  - New SR equilibrium where it SR AS & AD intersect,
  - with movement upwards along SR AD curve; to lower output,
  - below *"full-employment" long run level of output*.
- Nominal price rises, output falls, & called "*cost-push inflation*".
- Problems: zero inflation after P adjusts;
  - i.) analysis gives single price level increase, drop in output;
  - but *no prolonged inflation* as in Vietnam; even if 2 oil shocks.
  - ii.) output dropping 1 or 2 times: *not prolonged low output grwth rt*

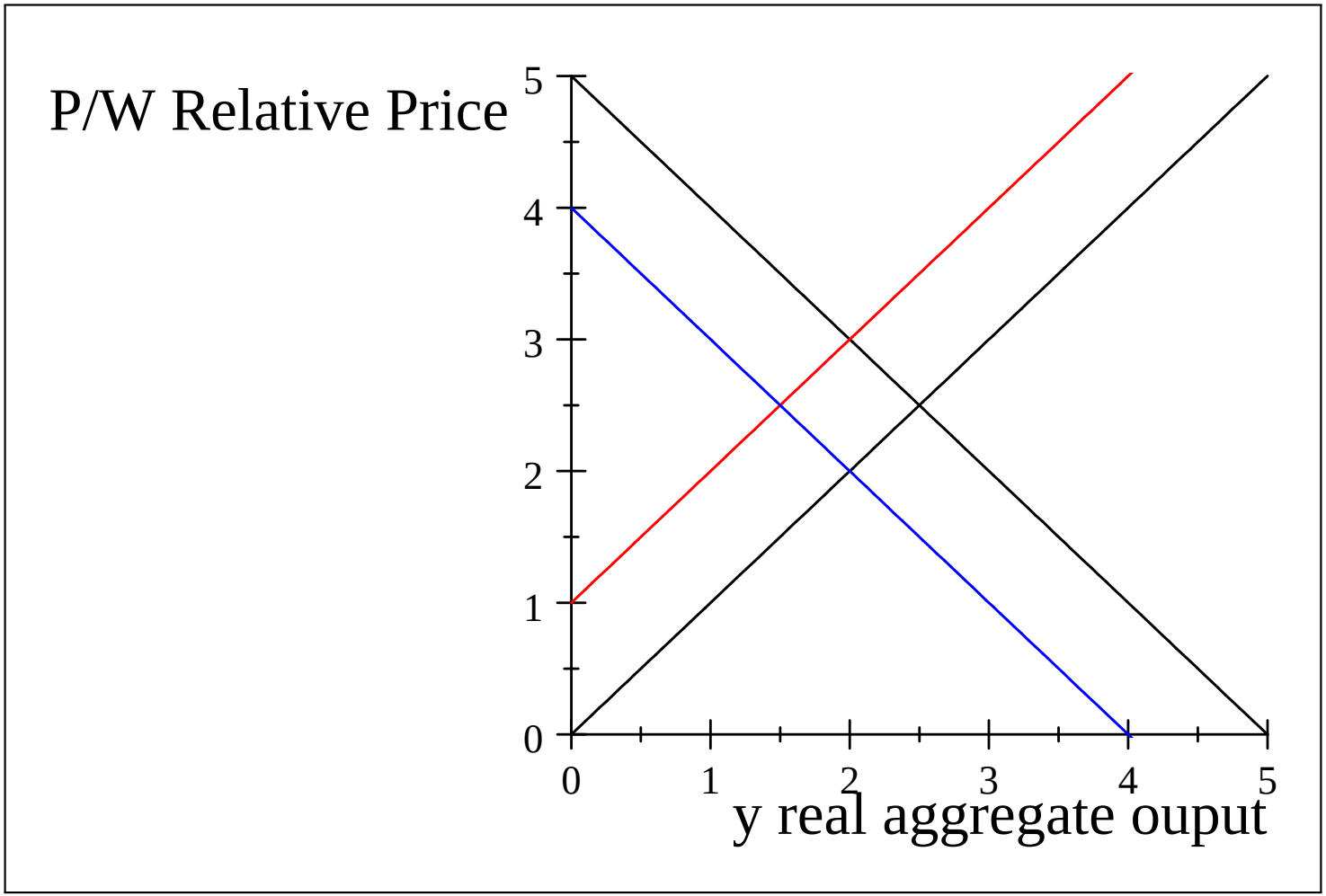
Demand Management Theory as Demand Side Shock

- Second part of SR AS-AD: demand side shock.
  - govt spending causes economy to "overheat".
  - Higher agg. demand from higher govt spending,
  - causes movement up aggregate supply (AS) curve
  - to higher output, higher nominal price, IF BELOW FULL EMPLOYMENT.
- If at full employment level, output cannot rise; only get higher price.
  - stay at fixed long run level of output,
  - Higher price level called "*demand-pull inflation*".
- Problems: 1) price level increase does not cause prolonged inflation.
  - 2), real output supply & demand do not depend on nominal prices.
- Supply side oil shock theory & demand side govt shock theory
  - another chapter in so-called *stabilization theory*.
  - Government can increase spending & aggregate output,
  - but needs to be careful not to push output past its fixed long run level,
  - causing demand-pull inflation.

Relative Price of Output and Real Oil Shock

- Let price of output be nominal price of goods and services (GDP): P.
- Let goods price be relative to nominal price of labor, as denoted by W,
  - which stands for nominal wage rate.
- Let relative price of goods to labor be stated as P/W.
- Now plot AS and AD curves with relative price P/W
  - as consistent with mainstream (Ramsey, 1928) micro-based macro-economy.
  - (Each of these AS and AD sets of curves is for the given equilibrium capital stock that is attained at the equilibrium relative price at which the AS and AD intersect).

AS-AD analysis with "Oil Shocks", Demand Shocks



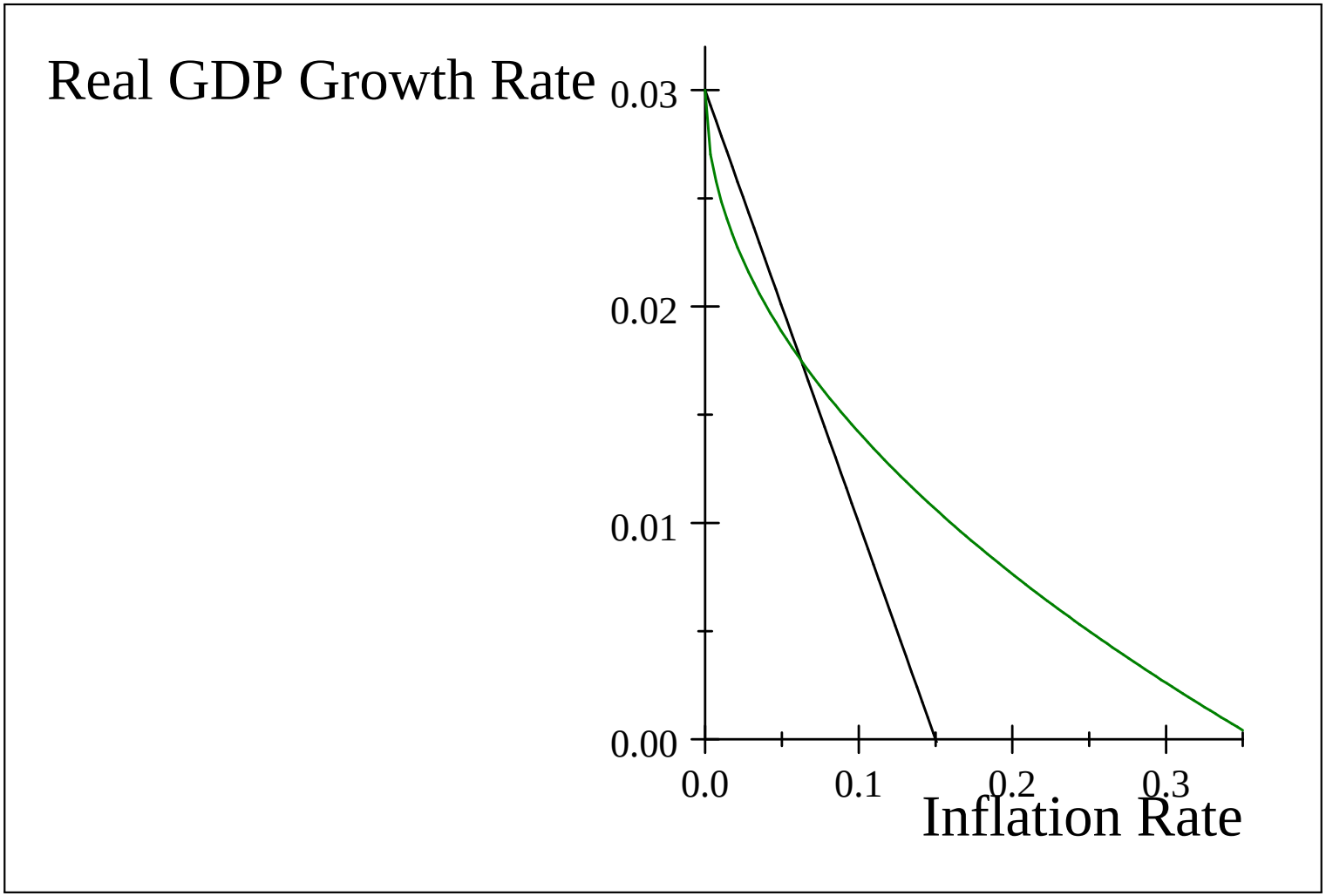
Long Run Inflation and Growth Theory

- Neoclassical growth theory: credible link of inflation & output growth.
  - unrelated to government demand-managed inflation
  - or monopolist oil-price caused inflation.
  - Rather is combined with how money supply growth causes inflation,
  - and inflation in turn acts as tax that lowers output growth.
- Inflation & output growth systematically negatively correlated:
  - consistent with economic growth theory with inflation tax.
- Shocks to money supply growth rate:
  - eg. to to finance wars, banking crises.
  - Money supply growth rate causes inflation rate.
  - Inflation taxes economy, lowers return to capital.
  - Lower return on capital causes lower output growth rate.
- As inflation rate rises & fall, growth theory predicts
  - opposite movements in inflation & growth rate of output; as in data.
  - Employment falls when output growth falls.

Decreasing Negative Growth Effect from Inflation

- Graphing effects of inflation rate on long term growth rate.
- Straight black line indicates that as inflation rate rises, growth rate falls at a constant rate.
- More nuanced theory is that as inflation rate rises, the growth rate indeed falls but at a decreasing rate as in the green line.
- Curved type of inflation-growth profile backed by empirical evidence and theory (Gillman et al., 2004).
- Results because as inflation rate rises, usage of fiat money (cash) is subject to higher tax rates,
  - causing consumers to increasingly substitute to other costly means of exchange through use of banking, rather than use cash.
  - Avoidance of inflation tax gives a valve by which consumer can escape tax
  - so a smaller decrease in employment and in output growth rate,
  - as the inflation rate gets ever higher.

Inflation and Growth: Theory and Evidence



Panel Data Estimation: OECD Inflation & Growth

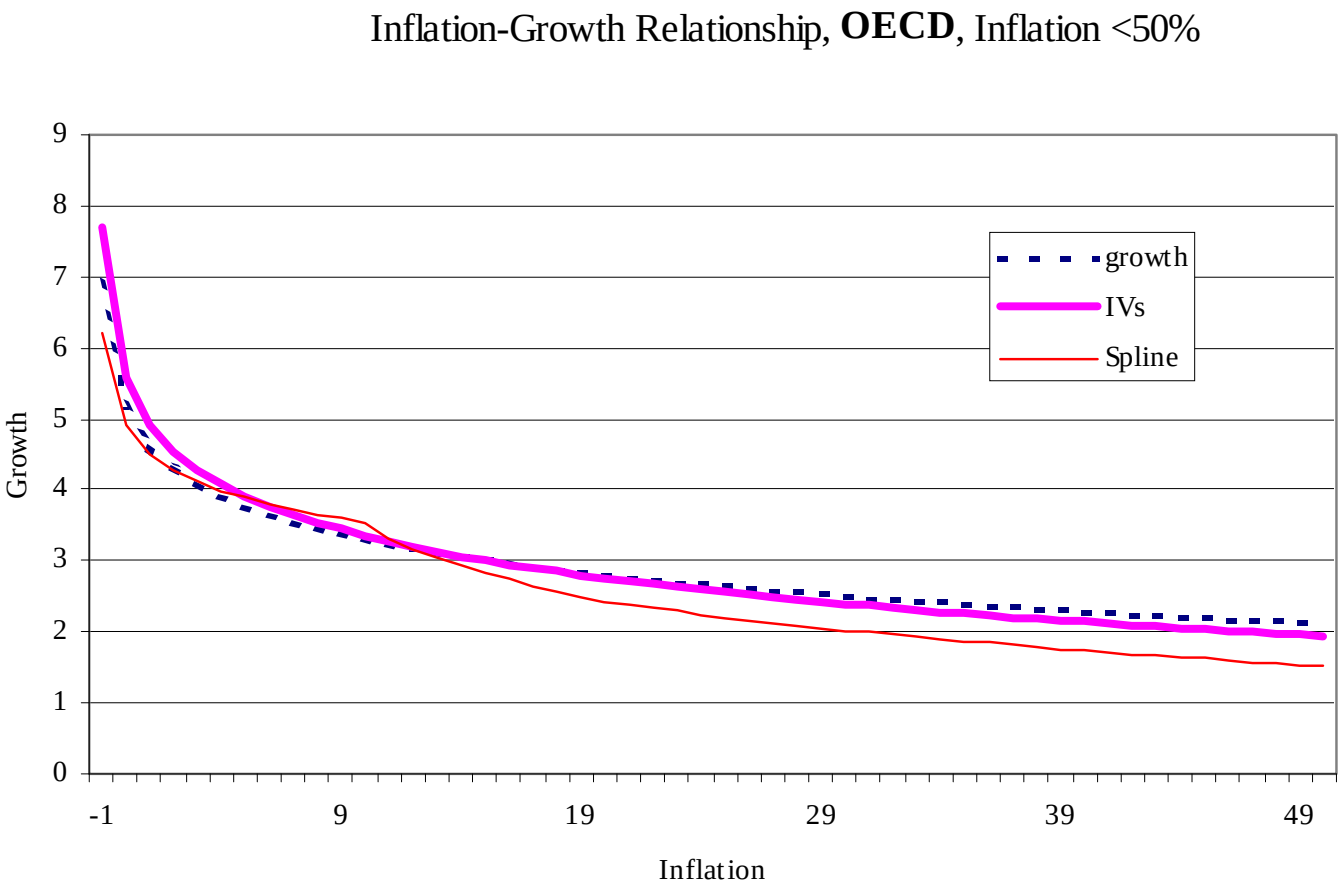


Figure: Effect of inflation on real GDP Growth rate, OECD developed country sample set; panel data estimation.

Panel Estimation: Developing Countries Inflation & Growth

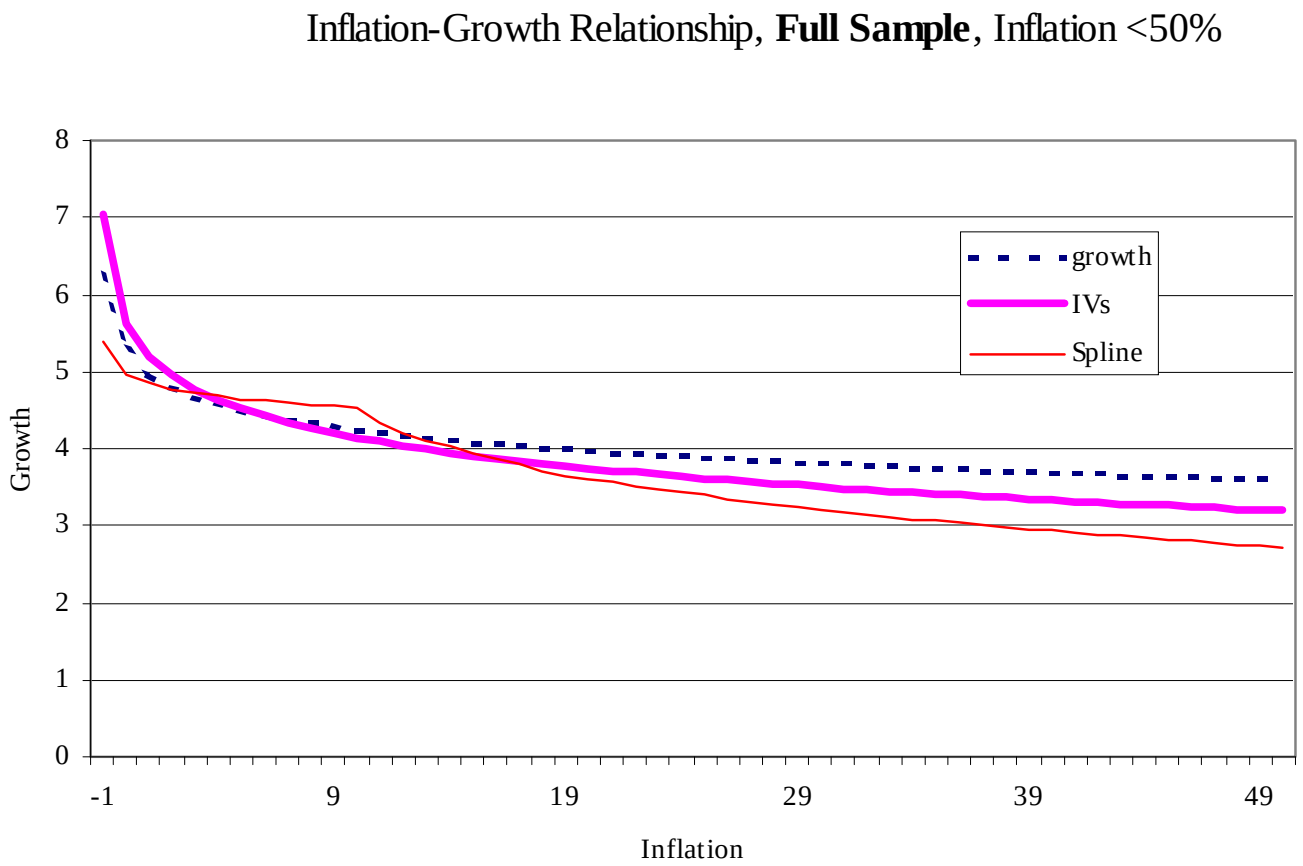


Figure: Effect of inflation on real GDP Growth rate, Less Developed country sample set; panel data estimation.

Phillips Curve: Short Run Inflation and Output Theory

- AS-AD with nominal price a mistake: ignores microeconomics.
- Phillips Curve looks at inflation rate, not price level & "Natural output" level.
  - *Uses both* statistical & theoretical concepts.
  - I. Fisher's published first Phillips curve statistical work (1923).
- Graphs positive correlation between inflation rates & unemployment rates,
  - over time, with time on the horizontal axis (in Fisher).
- For US, can see Fisher-Phillips Positive correlation for some periods,
- especially 1960's-70's, when Inflation Unexpectedly accelerated upwards;
- also in Great Recession, 2008-2012.

Inflation and Unemployment, US Post-WWII

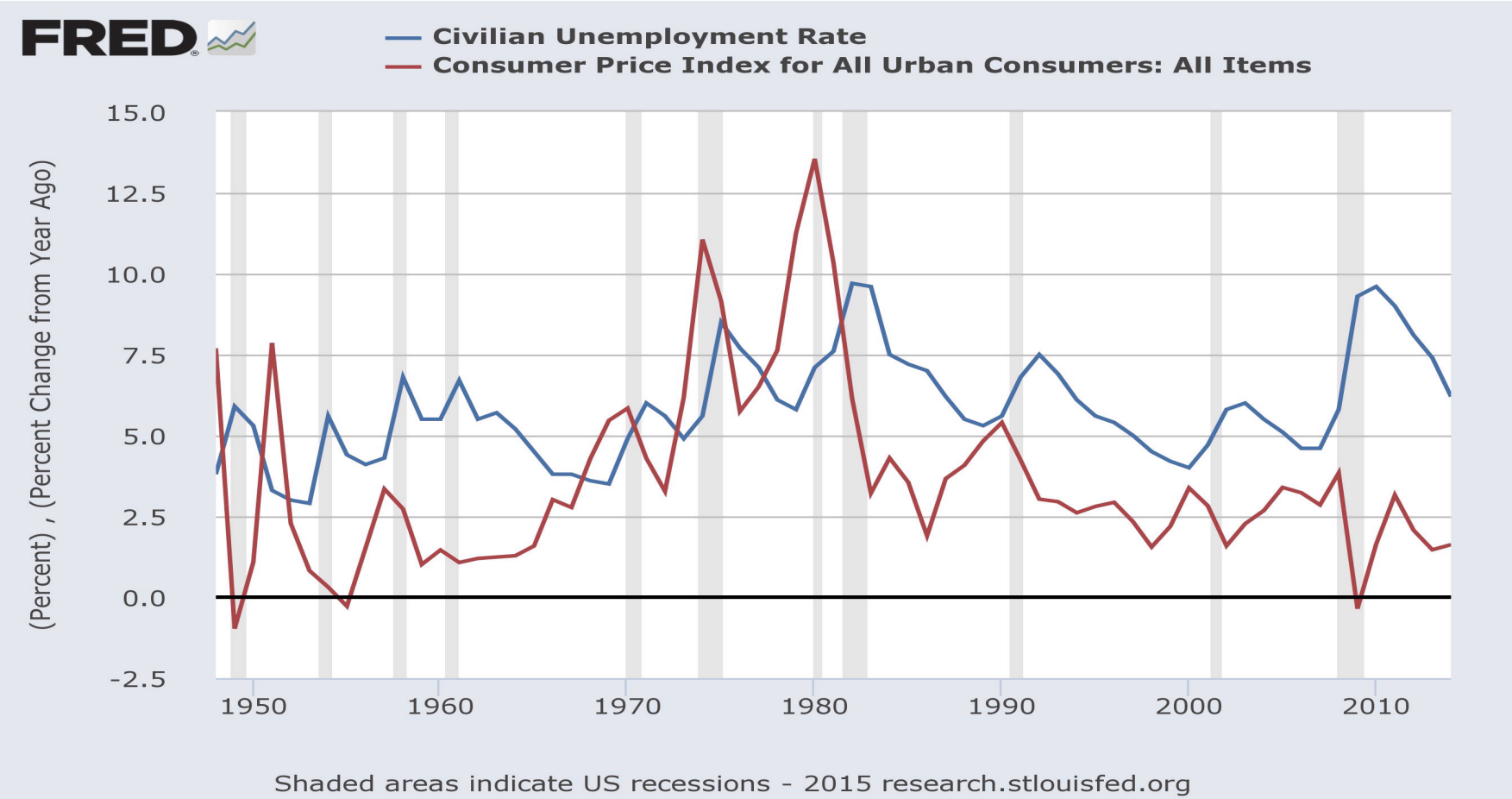


Figure: US Civilian Unemployment Rate (Blue) and the *CPI* Inflation rate (Red), 1948-2015.

Phillips Graph of Inflation and Unemployment

- *Inflation - unemployment statistical relation,* Phillips (1958),
  - became most popular way to show relationship.
  - Phillips used rate of change in nominal wages as vertical axis
  - & unemployment rate as horizontal axis of graph.
  - Then plot pairs of these two variables for each year.
- Gave downward slope for some periods,
  - so higher wage inflation linked to lower unemployment.
  - Phillips curve is purely statistical relation, with negative slope.
  - Can use CPI inflation instead of nominal wage rate change;
  - CPI inflation typically in modern Phillips curve graphs.
- Standard Phillips curves graph each point as inflation rate & unemployment rate of a given year, in a given country.
- Problem: negative slope breaks down, over time, many times.

Phillips Curve Theory of Data Relation

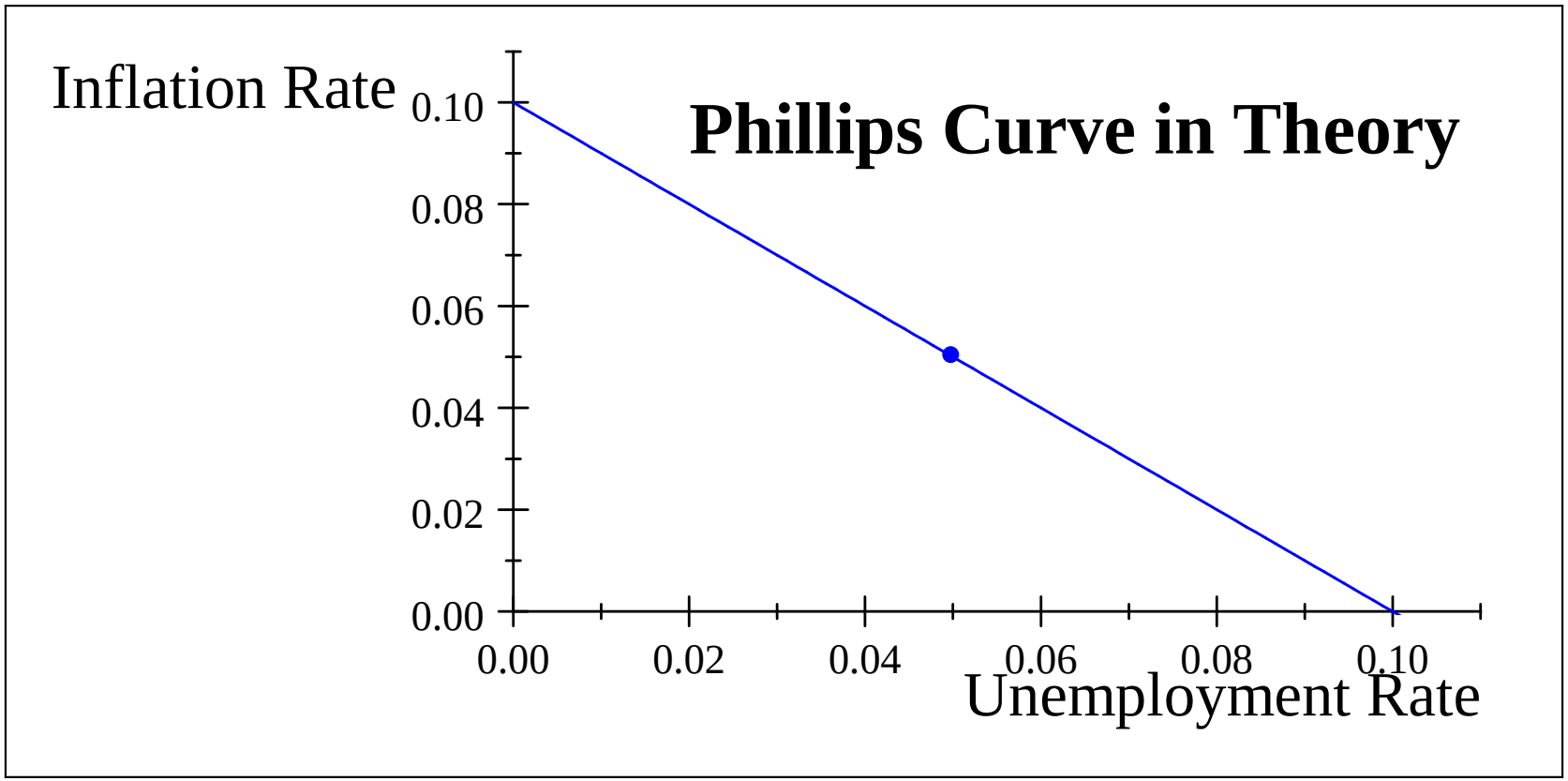


Figure: Phillips Curve: Example Short Run Statistical Trade-Off of Unemployment Rate and Inflation Rate, where each point on line represents a particular year.

Phillips Curve 1948-2009

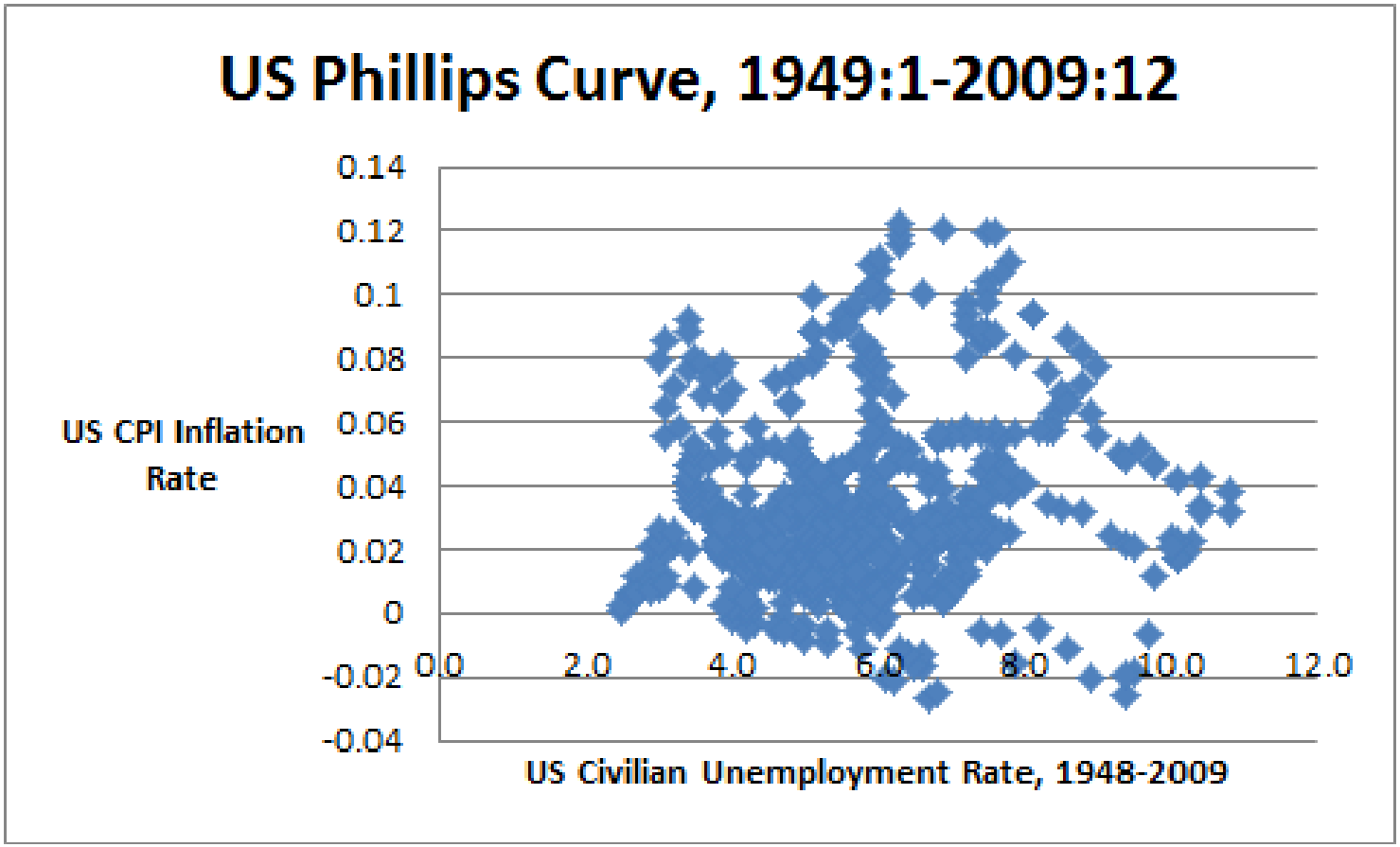


Figure: FRED data for Phillips Curve, 1948-2009

US Phillips Data, 1959:1 to 1969:12

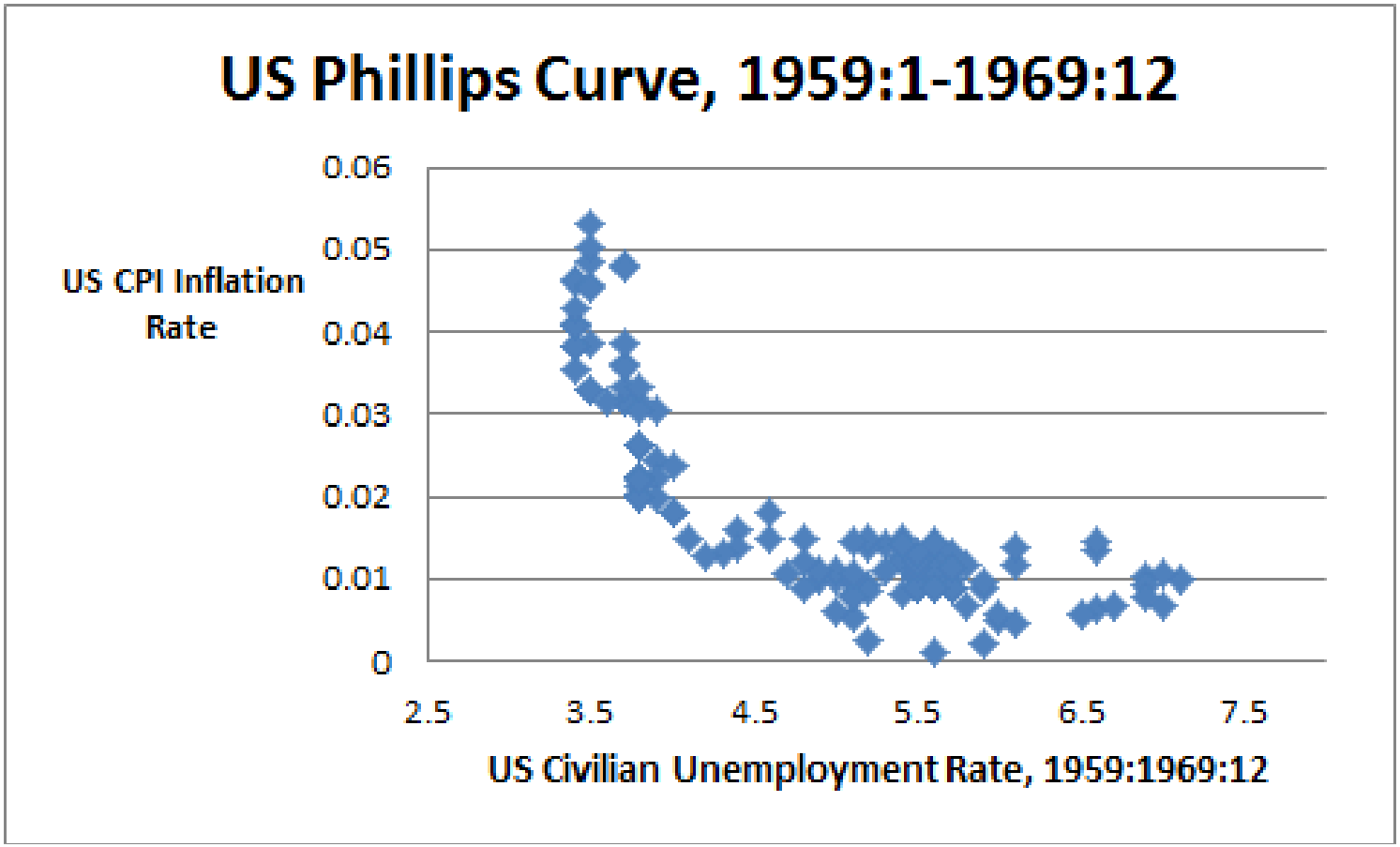


Figure: US Phillips Decade-Long Data with Negative Slope

Volcker's Deceleration of the Inflation Rate

- Figure graphs monthly US Phillips curve data, 1981:7 - 1983:11.
- US Fed reduced money supply growth rapidly in early 1980's;
- unemployment rose as inflation rate fell.
- Reverse movement down a Phillips curve.
- Inflation hit low point of 1.74% in June 1983.
- July 1983, inflation began rising again, unemployment began falling.
- Figure shows apparently new Phillips curve,
- appears shifted inwards relative to other Phillips curve.

Phillips Curve: Volcker Deflation

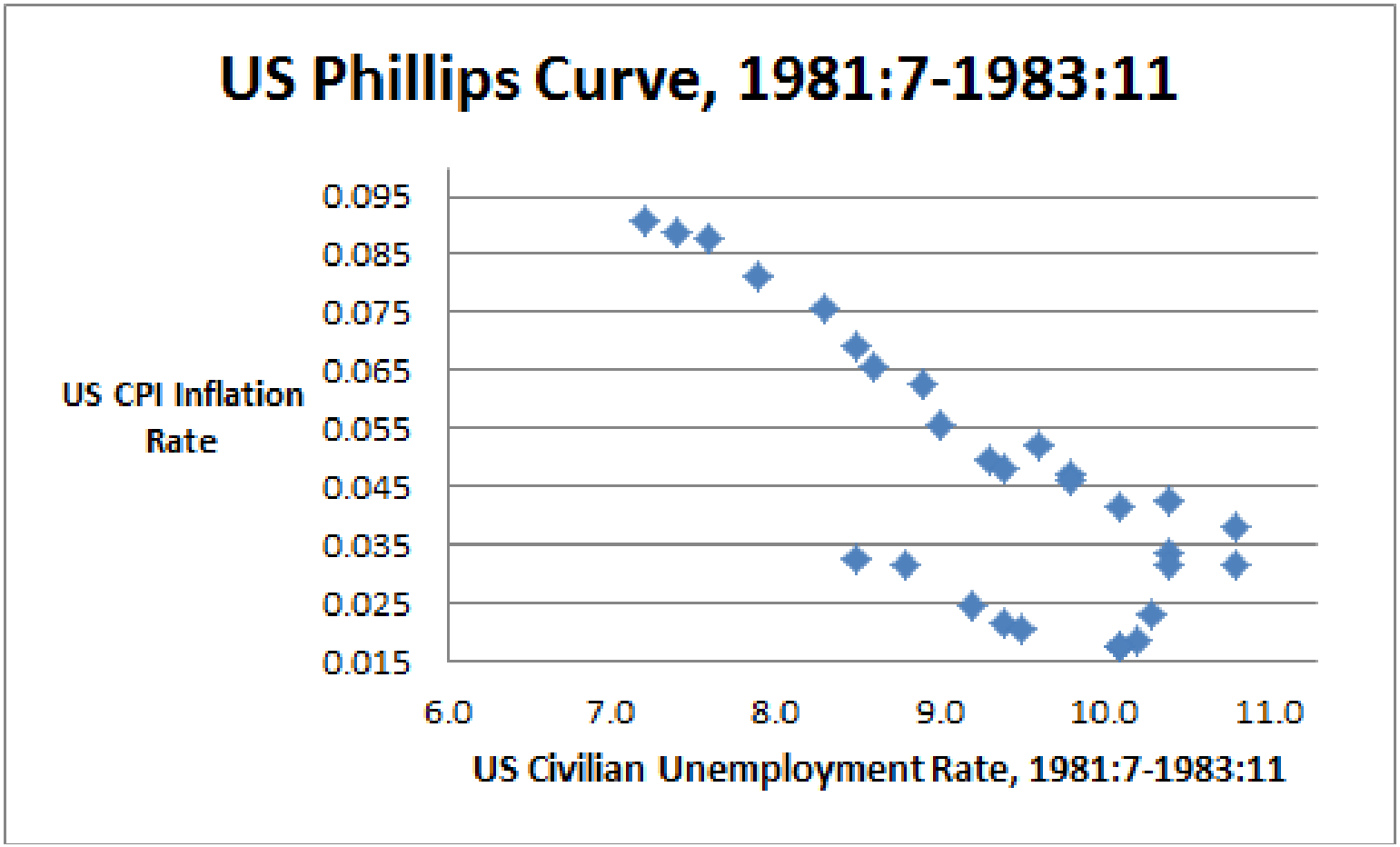


Figure: US Phillips Curve is Shifted Out During Volcker Deflation

Expectations Theory of Phillips Curve

- Shifting of empirical Phillips curves over time,
  - related to whether inflation rate changes unexpectedly.
  - Theory about difference between expected & actual inflation,
  - to explain existence of Phillips curves.
- Known as *Expectations Theory of the Phillips curve*.
  - Inflation rate accelerates unexpectedly,
  - unemployment rate expected in theory to fall.
  - Inflation rate decelerates unexpectedly,
  - inflation rate expected to rise.
- When inflation stays at expected,
  - no Phillips curve exists during that time period.
- No Tradeoff: Long Run Vertical Phillips

Explain Moving Up or Down Phillips Curve, & Shifts

- Overall data: no systemic relation between inflation & unemployment;
- but 1960's movement up Phillips curve when inflation accelerated;
- early 1980's movement down another Phillips curve.
- Expectations Theory: as people adjust expectations
  - to actual inflation rate,
  - then Phillips curve shifts outwards or inwards.
  - Eg. shifted outwards from 1960's to early 1980's,
  - & Phillips curve shift inwards in later part of 1983.
- Concept of Expectations Theory
  - confusion between real demand for output
  - & change in nominal value of output.
  - Inflation accelerates unexpectedly,
  - firms see nominal value of demand rising,
  - but think its real demand rising; raise output.

Graph of Phelps Expectation Theory

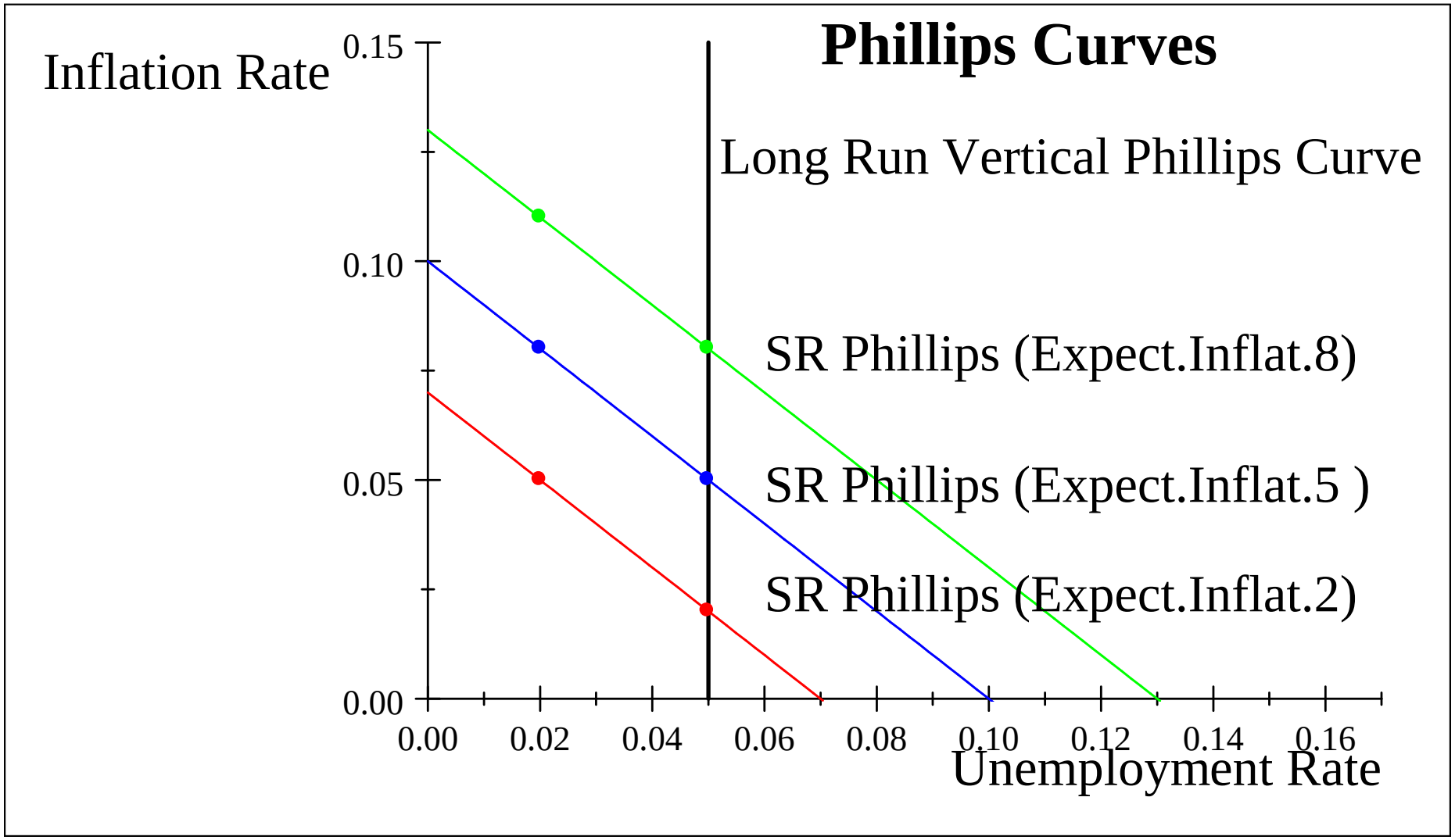


Figure: Phillips Curve: Short Run Statistical Trade-Off Versus Long Run No-Tradeoff; Unemployment Rate Unaffected by Inflation Rate at "Natural Rate

Vertical Long Run Phillips Curve

- Can up or down *short run Phillips curve*.
- When actual inflation equals expected inflation,
- no tradeoff between unemployment & inflation.
- Unemployment unchanged by Fully Expected inflation.
- Then Cannot Exploit "tradeoff" by raising inflation rate,
- to get lower unemployment, cause expectations adjust,
- and then no tradeoff exists.

Banking Theory of Crises, Debt-Deflation, & Phillips

- So-called stagflation era of Vietnam war a *low growth "crisis".*
- Other Lost Decades: Great Depression & Great Recession.
- Latter 2 saw major banking crisis, unlike stagflation Vietnam era.
  - However high inflation of late 1970's & early 1980's
  - instigated major bank regulation changes: deregulation,
  - in steps from 1981 until 1994.
- Banks in Crisis during high Inflation *before* 1980's-90's Deregulation.
- Banks in Crisis in Great Depression & Great Recession.
- Irving Fisher "*Debt-Deflation downwards spiral*":
  - seen in all three Lost Decades?
  - with 1981 one induced by Fed more directly?
  - (as after Civil War?)
- Fisher's debt-deflation theory does not contradict Expectations Theory,
  - may be complementary.
  - Asset price collapse causes unexpected deflation,
  - & rising unemployment?

Phillips Curve & Stock Prices: July 2008 to May 2009

- Dow Jones Industrial Average: 11,555 on August 1, 2008
- to 7063 on February 1, 2009, a 39% fall;
- correlated with Phillips Curve:

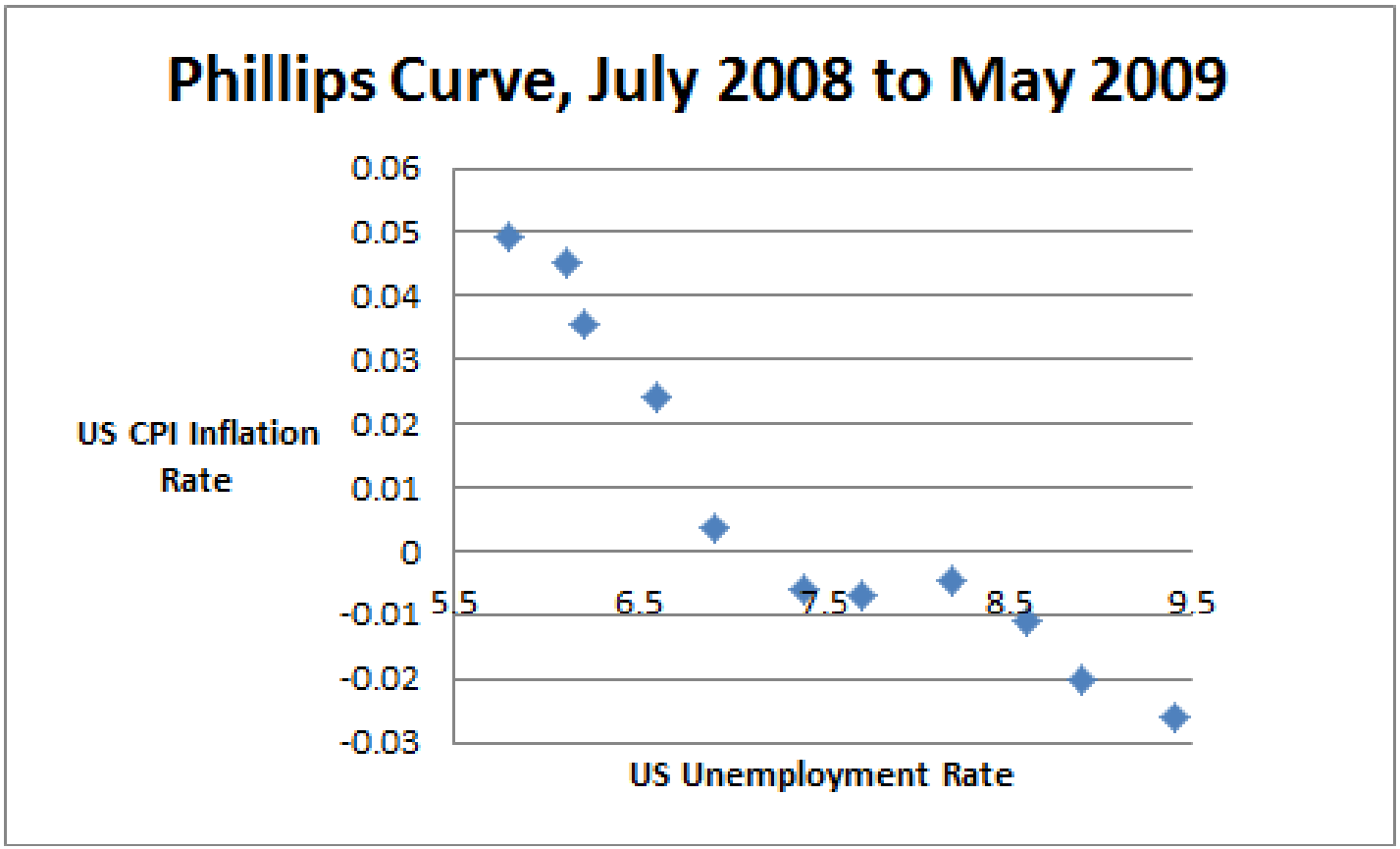


Figure: Phillips Curve During US Stock Market Crash & Great Recession

Great Depression % Change Dow Jones Industrials

July 2008 to May 2009

Figure: Great Recession Stock Crash from July 2008 to May 2009

Rare Events & Lost Decades

- Consider US "*rare events*" of
- 1. Great Depression, 2. Great Recession, &
- 3. "*lost decade*" of 1970's stagflation.
- Great Depression has Phillips curve,
- for Three years!
- starting from May 1929, going to May 1933.

Great Depression 3-year Phillips Curve

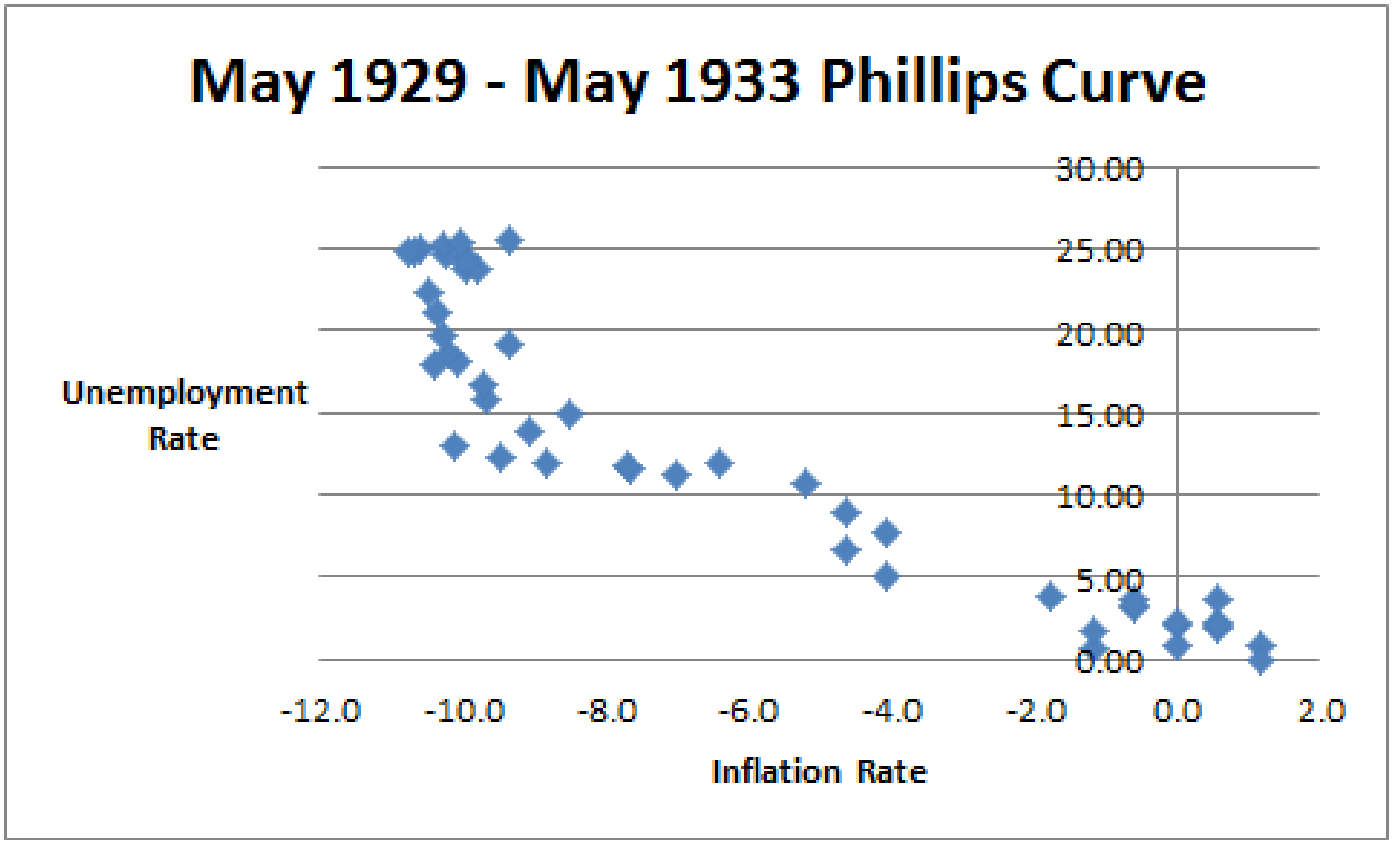


Figure: US Phillips Curve During Great Depression

Relation between Stock Prices and Phillips Curves

- Dow Jones Stock average percentage change from year ago,
- for same period of May 1929 to May 1933.
- Strong negative correlation between Phillips Curve &
- broad stock price measure.
- Shows how decline in inflation rate correlated with decline in asset values.
- This is idea in Irving Fisher's theory of debt-deflation.
- Asset price deflation can lead to aggregate price level deflation.

Great Depression Percentage Change In Stock Prices

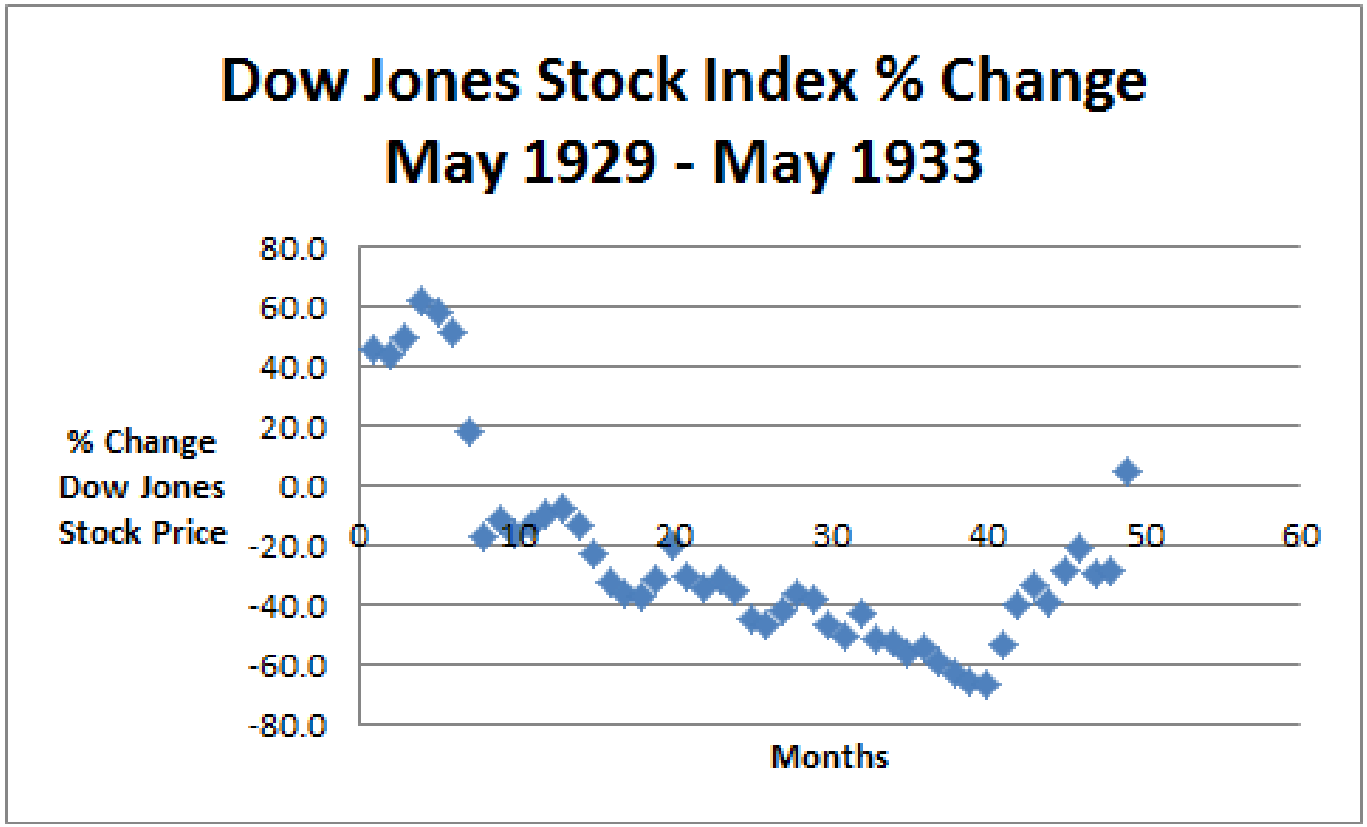


Figure: Dow Jones Industrial Average Percentage Change in Great Depression

Application: Turning Point of the Great Depression

- The US Bank Collapse and Government Response
- Bank Holiday of March 1933
- Gold and Money
- The Day After Gold: Deposit Insurance Enacted
- Irving Fisher with the Last Word
- 'Point 39. Those who imagine that Roosevelt's avowed reflation is not the cause of our recovery but that we had "reached the bottom anyway" are very much mistaken' (Fisher, 1933, p. 346).

Summary

- 3 different crisis periods in US history:
  - Great Depression of 1930's, Great Recession from 2008,
  - & Vietnam war period of 1970's stagflation.
  - Lost Decades related to Bank Crises?
- Oil shocks "cause" of inflation of 1970's? Debunked this.
  - Empirical results imply money supply growth caused inflation
  - & in turn caused oil price increases, rather than reverse causality.
- Oil shock theory presented in terms of Keynesian Based
  - supply-side, cost-based, shifts back in aggregate supply (AS);
  - such that AS caused by cost of production,
  - & Price is Nominal, not real as in Microeconomics:
  - internally inconsistent with Economic theory.
- Alternative: So-called oil shocks caused by inflation,
  - & collapse of Bretton Woods monetary gold standard.

Summary Part 2

- Demand side shocks discussed similar to Supply Side:
  - Keynesian Theory of govt increasing Output, Revised,
  - for AS-AD, but with strange Nominal price.
  - Called "*demand-side management*"; government increases spending,
  - end recessions, "smooths out" business cycle fluctuations.
  - Too much government spending causes inflation; using Nominal P:
  - to Explain Vietnam era stagflation (high inflation & low real GDP growth).
- Alternative theory of stagflation: Lost Decade of printing money
  - to pay for Vietnam War, with War-related Recessions;
  - with high inflation that Long Run Growth Theory implies
  - acts as a "tax" that lowers the economy's growth rate.
- Inflation & economic growth discussed via "Phillips curve".
  - Using evidence & theory:
  - how inflation rate & unemployment rate negatively correlated
  - during certain time sequences in US history.

Summary Part 3

- Idea arose of empirical "trade-off" government could Exploit:
  - increase inflation rate & so lower unemployment rate.
- Exploiting Phillips curve trade-off cast in doubt by
  - Expectations theory : LR "vertical" Phillips curve, equilibrium
  - move along SR Phillips curves, if unexpected inflation change.
- 3 Crisis periods of Great Depression, Great Recession
  - & Vietnam war era seen through Phillips curves;
  - & comparison to same-time declines in stock market values.
- May support inflation effect being caused by debt-deflation
  - that Fisher describes for Great Depression, & crisis periods.
- Role of banking: bank crisis can be from stock market crash,
  - & coincide with declining inflation & rising unemployment.
  - Phillips curves during such periods may reflect crisis forces,
  - decline of goods (asset) prices relative to labor.
  - Can be complementary with Expectations theory of Phillips curve.
- Application: Great Depression, Vietnam era, post 2008 bank laws.

Appendix: Depression's 1930's US Banking Acts; +2008

- On May 12, 1933, the Emergency Farm Mortgage Act
- May 27 Executive order Farm Credit Administration (FCA).
- May 27, 1933, The Securities Act of 1933 enacted.
- June 6, 1934, Securities Exchange Act of 1934 enacted,
- established Securities and Exchange Commission.
- On June 13, 1933, The Home Owners Loan Act.
- June 16, 1933 The Farm Credit Act of 1933.
- June 26, 1934, Federal Credit Union Act passed
- June 28, 1934, National Housing Act of 1934.
- Banking Act of 1935 made FDIC permanent.
- Fort Knox, Kentucky, built in 1936 to stock of US gold reserves.

Brief 2008 Comparison to 1930's

- February 13 US Economic Stimulus Act of 2008,
- June 30 Supplemental Appropriations Act of 2008,
- July 30 Housing and Economic Recovery Act of 2008,
- October 3 Emergency Economic Stabilization Act of 2008.

Questions

1. Name three economic crisis periods in US history and characterize each in terms of key economic factors such as real GDP growth, inflation, and unemployment.
2. How would you define an oil price shock, and how do such shocks enter theories of economic crisis and inflation?
3. What factors have been shown empirically to be determinants of oil price movements, and what kind of empirical evidence has been used in this regard?
4. What evidence is there on the effect of inflation on the real GDP growth rate in the long run, and what is the theory that explains such evidence?
5. Explain the theory of how oil price shocks affect aggregate output and inflation, as based on a nominal theory of the aggregate price of output; critique this theory.
6. What is the oil price shock theory of stagflation?

Second Half

1. What was the Bretton Woods monetary system, and how does its ending relate to the oil price shock theory of stagflation?
2. What is a Phillips curve?
3. Explain the expectations theory of the Phillips curve?
4. What relation exists in evidence between periods in which Phillips curves are found and periods in which stock market crashes occur?
5. Describe and explain a banking based theory of economic crises?
6. How are rare events and lost decades sometimes related in theories of economic crisis?
7. What role did banking legislation play in the 1930's Great Depression?