

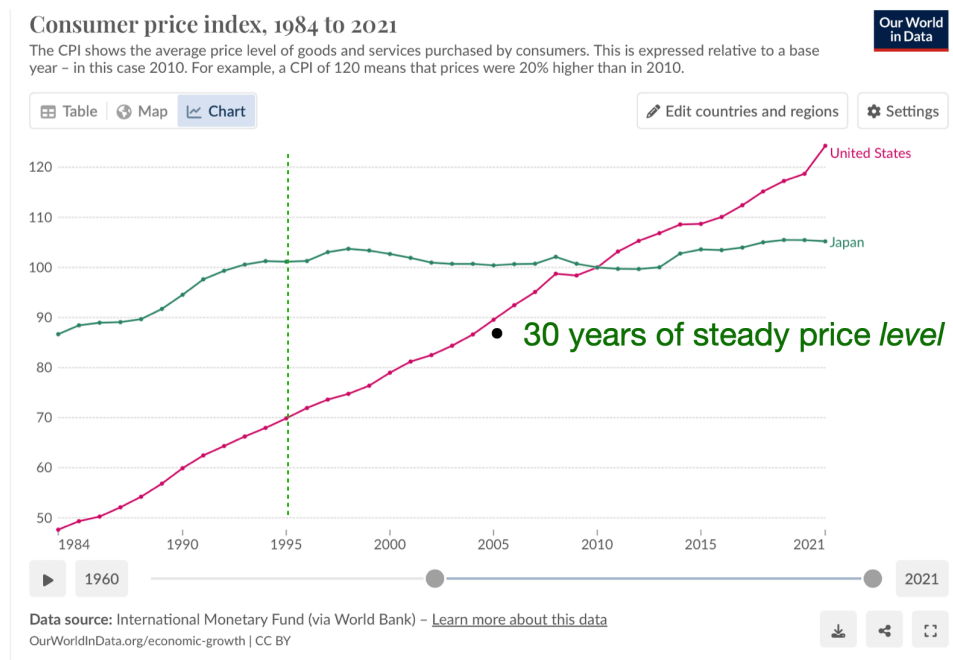
Inflation, Monetary and Fiscal Policy, and Japan

John H Cochrane¹

1. A perfect monetary policy outcome

The standard narrative for Japan says that an asset price “bubble” burst, financial turmoil brought down the economy, the Bank of Japan lowered interest rates but got stuck at zero. A “liquidity trap” or “deflation trap” then set in, and despite valiant efforts of fiscal stimulus, unconventional monetary policy (QE, forward guidance, negative rates, long term bond price setting), Japan remained mired in secular stagnation for 30 years. Only with the arrival of the covid “supply shock” did inflation unanchor from the perverse no-price-change psychology that had set in, finally allowing Japan to return to a healthier 2% inflation which will at last allow a return to growth. (For an eloquent exposition, see Shinichi 2024.)

I offer—really remind us, as the observation is not new—an alternative narrative. In this narrative, the BoJ and monetary affairs is not to blame for 30 years of lost growth, which may be good news. But the BoJ is also much less powerful to be the engine of revitalized Japanese growth, which is not always welcome news to a central bank.

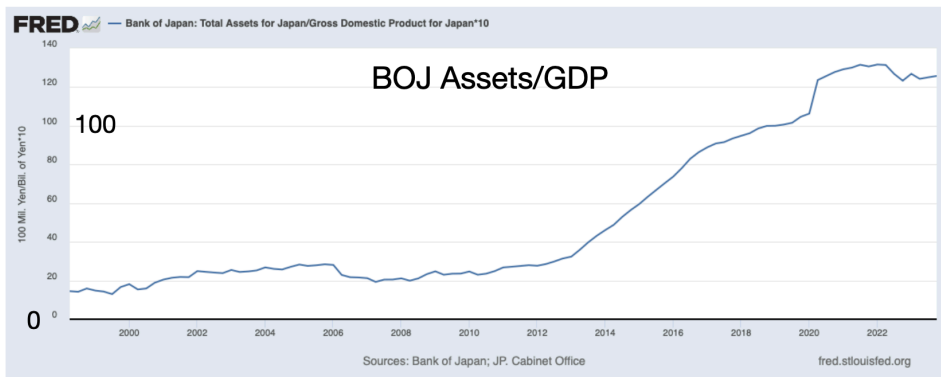
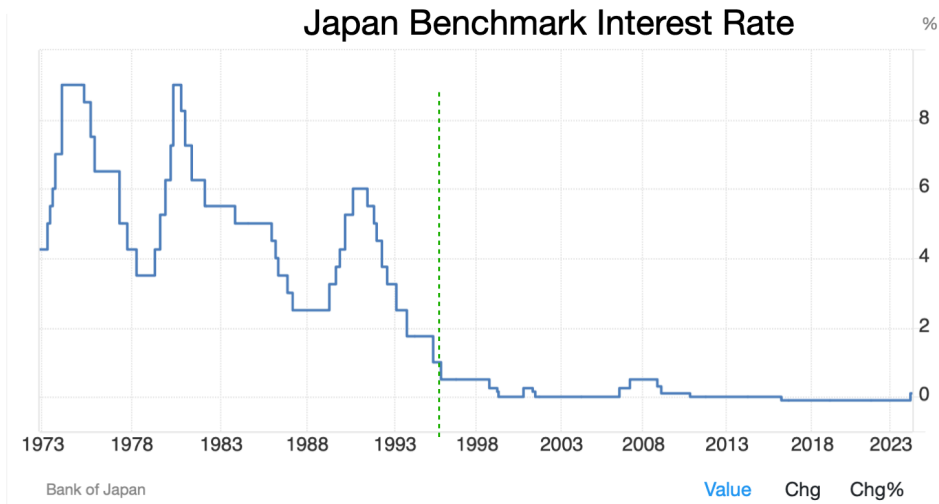


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I start with a radical claim. *Japan has, for 30 years since the mid 1990s, had the most perfect monetary policy outcomes the world has ever seen.*

Not only has there been no inflation, the price level has been steady. When the US Congress or the EU commission said unto the Fed and the ECB, “price stability,” this is likely what they had in mind, not 2% inflation, with the price level forgetting past mistakes.

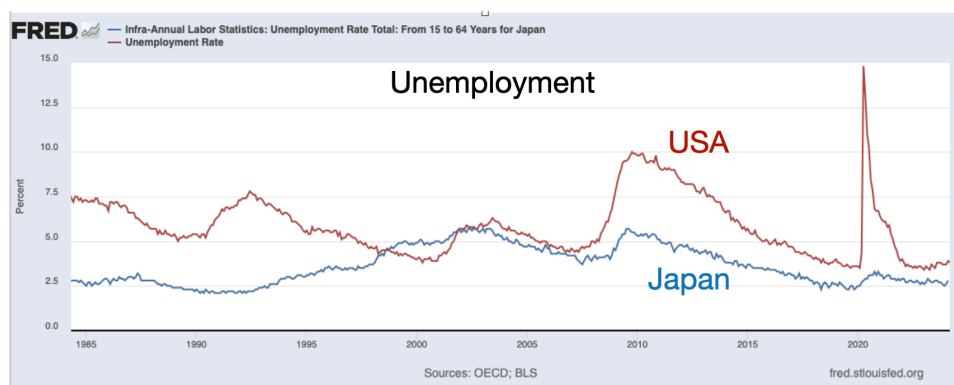
Interest rates have been zero, as Milton Friedman’s optimal quantity of money recommends. At zero interest rates, people waste no time economizing on cash. More importantly, financial institutions do the same. There is no incentive to create run-prone interest-bearing money such as overnight repurchase agreements.



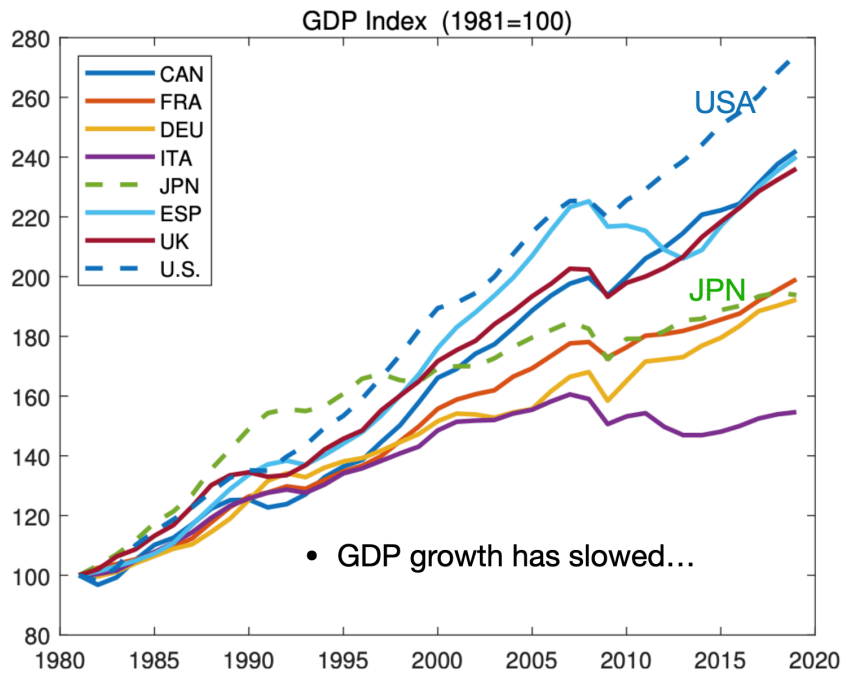
Japan is satiated in liquidity. The BOJ balance sheet is over 100% of GDP. Money is oil in the car. It's optimal to drive the car full of oil, if you can do it without causing inflation. Japan has done so.

A steady price level was not the announced policy of the Bank of Japan, nor the desire of the many American economists who came before me to criticize it. But, as the great Mick Jagger once proclaimed, “you cant always get what you want. But if you try sometimes, you just might find, you get what you need.” The outcome has been nearly perfect even if that was not officially intended.

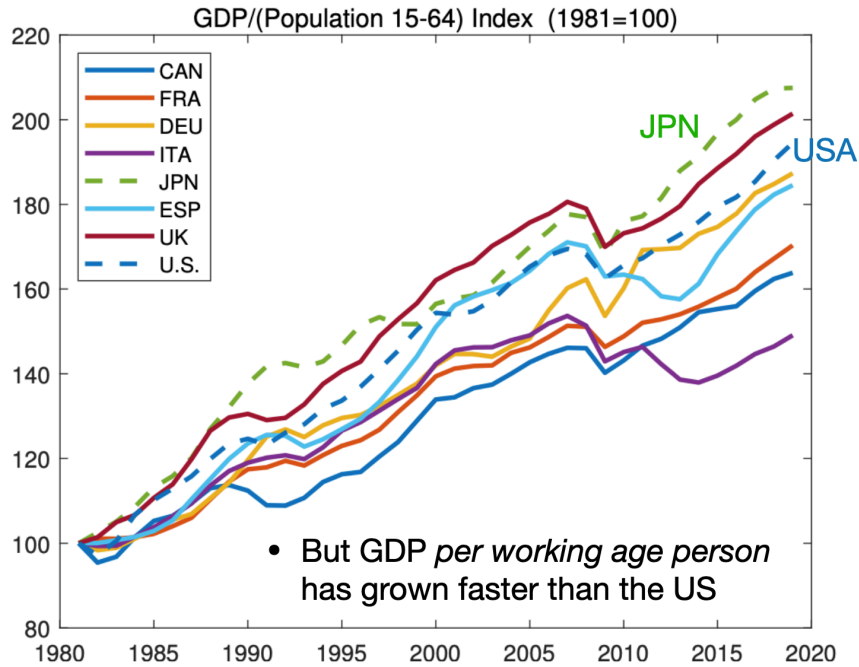
What of the supposed 30 years of stagnation supposedly brought on by the deflationary pressure of the zero bound? On basic principles, monetary non-neutrality doesn't last 30 years. If there is a 30 year growth problem, it's a growth problem, microeconomic not macroeconomic. The recent inflationary episode in the US shows that sticky price nominal-real interactions happen on the time scale of a year or two, not thirty. There is no sign of perpetual lack of demand. Japan's unemployment rate has been below that of the US the entire time.



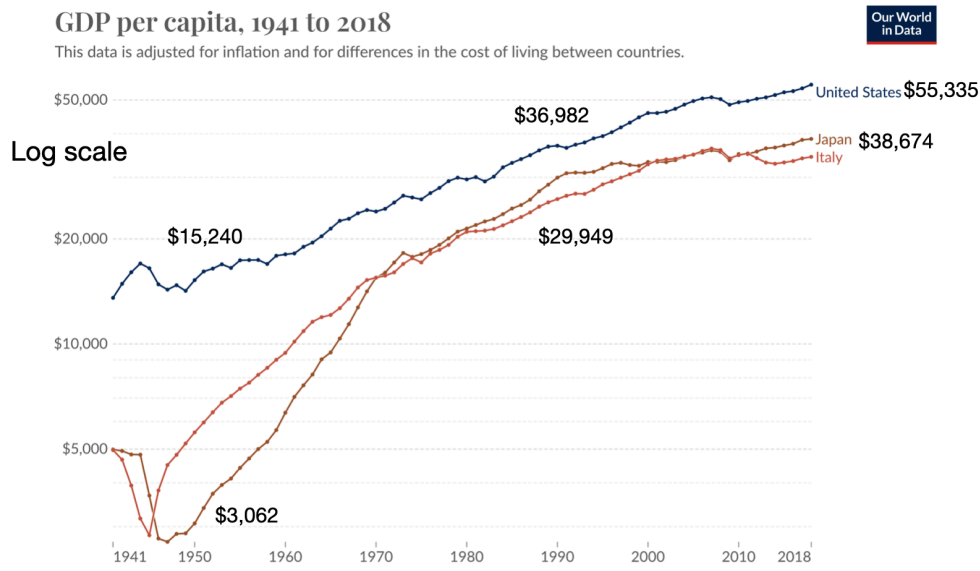
Yes, Japan's GDP growth has slowed, showing less growth than the US. But Japan's GDP *per working age person* has grown *faster* than in the US. (Shirakawa 2023; Fernández-Villaverde, Ventura, and Yao, 2024.) Japan's total GDP is growing slowly simply because its population is declining. Perhaps Milton Friedman (1968) should have extended his list of things that monetary policy cannot do. Monetary policy cannot create or retard long-run growth. And monetary policy certainly cannot induce people to have babies!



Source: Fernandez-Villaverde, Ventura, and Yao, 2024, "The Wealth of Working Nations"



Source: Fernandez-Villaverde, Ventura, and Yao, 2024, "The Wealth of Working Nations"



I do not mean to say all Japanese economic policy is perfect. After WWII Japan had a rapid period of catch-up growth. That hit an inflection point in 1973. Japan's per-capita GDP came closest to the US in 1991, peaking 16% below the US. On either per capita or per working age person basis, Japan got stuck substantially below the US level of output per worker, and remains in the general territory of Italy. (I use GDP per capita here and below because I don't have easy access to the GDP per working age person data.) Japan's productivity growth has been slower than the US (which itself has slowed down). But productivity growth is not a lack of demand problem.

With a well-educated, industrious, and thrifty population, homogenous society, the lack of pockets of isolated poverty and dysfunction, and general cleanliness, safety, and order that stupefy American tourists, Japan should have passed the US, as Singapore has. Still, Japan is 29th on the World Bank's ease of doing business index, well behind the US 6. *The easiest way for Japan to lower its debt to GDP ratio is to raise its GDP.* And that takes microeconomic reform, not macroeconomic machination.

Growth Economics is clear: Each country catches up to the productivity frontier, until its level of microeconomic inefficiency stops it. That too, however, is something monetary policy can do nothing about.

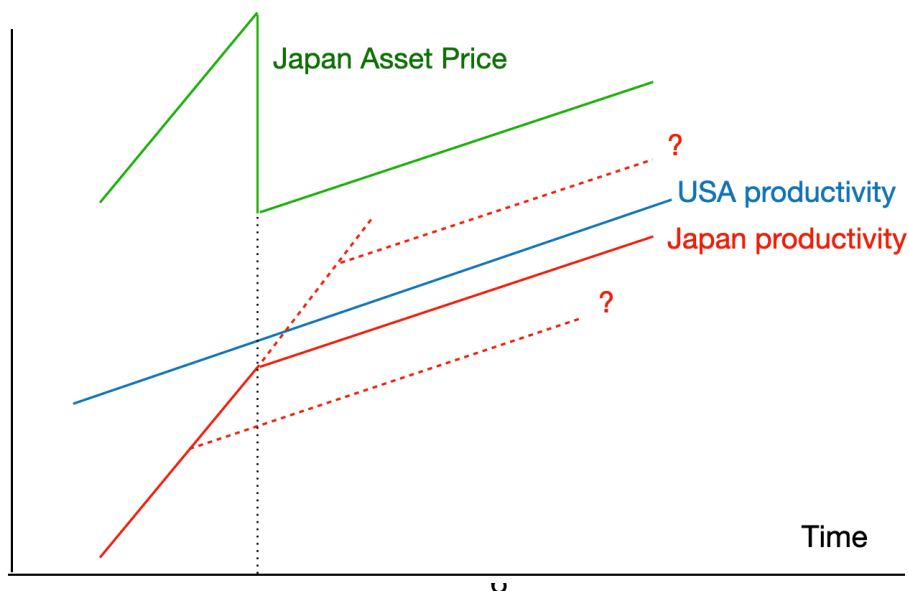
The end of catch-up growth suggests an answer to another common complaint about Japan, that it had a “bubble” and 30 year slump as a result. The transition from “catch up” to “frontier - level inefficiency” growth can cause prices to crash, not necessarily the other way around.

Suppose a country starts with 1/5 of the US GDP per capita. It enters a period of “catch-up” growth, adopting successful “frontier” institutions and rapidly investing. Eventually, however, “catch-up” growth must end. The formerly poor country reaches the technological frontier, minus whatever “level” effect its microeconomic inefficiencies allow it. After that, it grows only at the “frontier” growth rate.

It might get stuck in the “middle income trap,” like Brazil, 75% below US GDP per capita. It might continue, as Germany and Western Europe did, reaching 20% below US levels before plateauing. It might reach the US level. The US hardly has perfect microeconomic institutions, and I estimate it’s easily possible to reach 40% or more above US levels by adopting free-market growth-oriented policies. Singapore hints at that possibility, rising 20% above the US. (I leave out the darker possibilities, of then sinking into zero growth sclerosis like Italy, or disasters like Venezuela and North Korea.)

While the country keeps growing at high “catch-up” rates, everyone (except the usual chorus of doomsaying US commentators) knows the fast growth will stop at some point, but nobody knows for sure when. Asset prices reflect the possibility that growth keeps going. When the country hits its microeconomic barrier, and starts growing at the frontier rate, asset prices no longer include the option for greater growth, and collapse.

Bubble or expiring growth options?



To make this story concrete,² let the frontier growth rate be g_l and the high catch-up growth rate be g_h , and think of the price of a consumption claim. The price-consumption ratio in the low-growth state is $pc_l = 1/(r - g_l)$, where r is the expected return, the same for all countries. While the country is growing quickly, each year there is a probability λ that growth will revert to the frontier growth rate. I work out in the appendix that the price-consumption ratio while the country is growing quickly at g_h is

$$\frac{pc_h}{pc_l} = \left(\frac{r - g_l + \lambda}{r - g_h + \lambda} \right).$$

For example, with $r = 4\%$, $g_h = 8\%$, $g_l = 2\%$ and $\lambda = 5\%$ (20 years of growth on average), we have

$$\frac{pc_h}{pc_l} = \left(\frac{4 - 2 + 5}{4 - 8 + 5} \right) = 7.$$

Stock prices with high growth are *7 times higher* than with low growth. When the economy finds its limit and starts growing at the frontier rate, the stock price falls to one seventh its original value! With a smaller 6% per year catch-up growth rate,

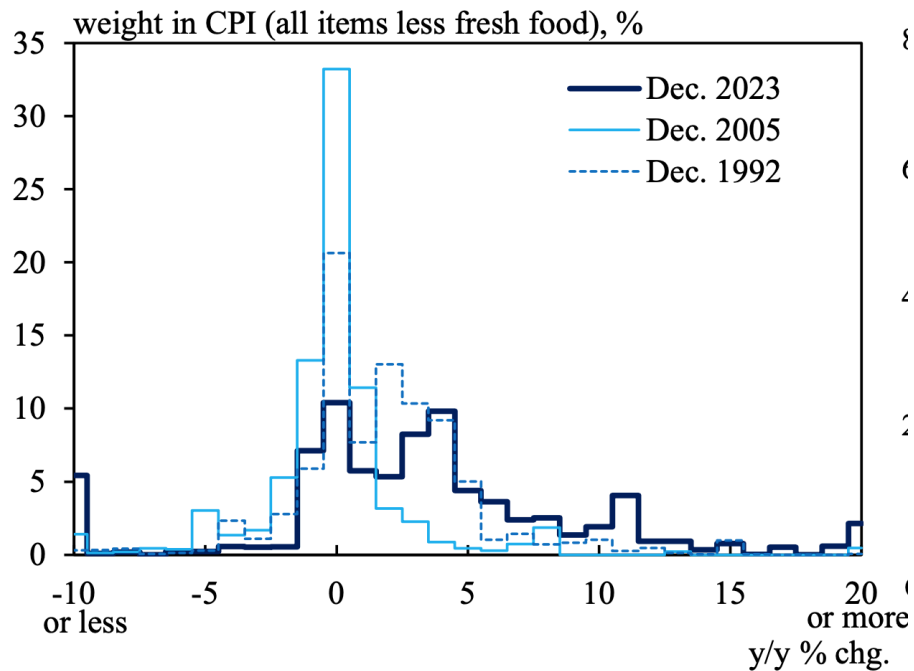
$$\frac{pc_h}{pc_l} = \left(\frac{4 - 2 + 5}{4 - 6 + 5} \right) = 7/3 = 2.3$$

The stock market still falls in half.

In sum, I offer a plausible counter-narrative, based on simple growth theory rather than complex Keynesian macro. Japan switched from catch-up growth to frontier growth, at a level reflecting microeconomic inefficiencies typical of Europe. Asset prices fell. Interest rates hit zero and the inflation rate stopped. The BoJ was handed a golden opportunity, which it took. The zero interest, steady price level monetary Nirvana is hard to get to. To get there directly, a central bank has to wait out adverse temporary dynamics. Alan Greenspan talked about getting to the zero inflation ideal opportunistically in this way. Japan then lived 30 years of optimal monetary policy outcomes. And the real economy continued to follow real, “supply” driven forces, as it must in the long run.

² This story is not original. I heard it in casual conversation, but I don’t remember who I was talking to or what paper they were citing. If anyone knows the correct citation, please write.

Distribution of price changes (CPI all items excl. fresh food and rent)



Source: Kakuho, Hogen, Otaka, and Sudo (2024).

As I learned at the conference (Kakuho, Hogen, Otaka, and Sudo 2024), Japan developed a “no price change norm,” in which most businesses do not change prices and customers expect no price changes. Most of the conference discussion thought this a terrible thing, and celebrated the return of inflation to break that norm.

This too may be regretted. We all wish expectations to be “anchored.” Zero is a much clearer anchor than 2%. If I say “inflation is 2%, I’m raising prices 2%,” my customers will react, “well, your supplier’s inflation, your city’s inflation, your wage inflation is less than 2%, inflation is mismeasured, what about core/supercore/ex housing, etc.; you’re trying to take my money.” Zero is zero.

The expectation of no price level change is much stronger than an expectation that inflation will somehow get back to 2% by central bank resoluteness, It applies to individual goods, not just the average.

So, a steady price level and a widespread zero price change norm for individual goods is much stronger anchoring than an inflation target. If Japan manages to join the rest of the world at a hoped-for 2%, the BoJ may well regret finally getting what it wants rather than what it needs!

2. Inflation and Fiscal Theory

My main task is to apply fiscal theory of the price level. I'll start by explaining how it neatly describes US experience, and then consider how Japan might fit as well.³

The fiscal theory of the price level states simply that prices adjust so that the real value of debt equals the present value of primary surpluses.

$$\frac{B_{t-1}}{P_t} = E_t \sum_{j=0}^{\infty} \frac{s_{t+j}}{R_{t,t+j}}$$

or, linearized,

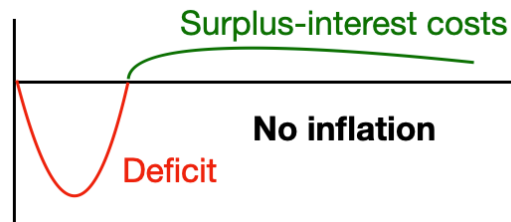
$$v_t = E_t \sum_{j=0}^{\infty} \rho^j (\tilde{s}_{t+1+j} - r_{t+1+j})$$

Where B is debt, P is price level, R is real return, s is real primary surplus, v is the log real value of debt, ρ is a constant of linearization a bit below one, \tilde{s} is the surplus scaled by the steady state real value of debt, and r is the log return.

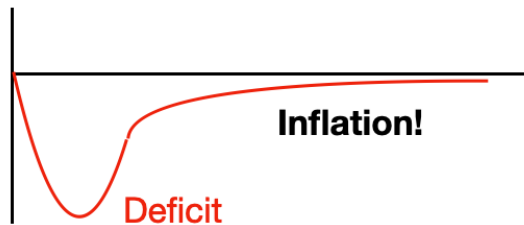
It's just asset pricing applied to the government. Inflation results when there is more debt than people think the government can or will repay by a long stream of primary surpluses, less interest costs.

The asset pricing analogy quickly dissipates common criticisms. No, surpluses need not be “exogenous,” anymore than coupons and dividends are “exogenous.” No, this is not an “intertemporal budget constraint,” any more than Tesla must by budget constraint raise dividends if a bubble sends up its stock price.

³ I draw here on *The Fiscal Theory of the Price Level*, “Expectations and the Neutrality of Interest Rates,” “Fiscal Narratives for US inflation,” and “Fiscal Histories,” all on [my website](#).



As you can quickly see, *fiscal theory does not imply a mechanical relationship between debt or deficits and inflation*. Normal, responsible fiscal policy consists of borrowing in bad times, followed by repayment in good times, with no change to the present value of surpluses. We expect to see governments frequently run big debts and deficits with no inflation at all.



Inflation only comes when people believe part of an addition to debt will not be repaid. They try to get rid of nominal debt. The only way to do so is to try to buy goods and services until the price level rises to inflate away sufficient debt.



Inflation can come, seemingly out of nowhere, as it often does, with no debt or deficit, if people lose faith in the government.

I do not envision that people sit around the kitchen table making forecasts of government finances 30 years in the future. Inflation results from debt without faith in the fundamental soundness of institutions, that the government will get around to paying off debt sooner or later.

There is no magic debt / GDP ratio past which debt is “unsustainable” and inflation breaks out. Countries that can pledge responsible structural fiscal policies can borrow a lot, and pay it off over decades. Countries that cannot have experienced debt crises with very little debt/GDP.

The present value also highlights that discount rates, equivalently interest costs on the debt matter. The linearized version of the present value formula makes this implication stark. Interest costs enter symmetrically with surpluses. One percentage point of interest costs is the same as one percentage point of deficit to debt ratio. (We can also view debt as an undercounted present value of the total surplus, including interest costs.)

The analogy to asset pricing should also help us to avoid repeating 50 years of hard-won understanding. You cannot prove that price is not the present value of dividends by noticing that Tesla’s price is a lot higher than forecasts of its earnings would seem to justify. Absent arbitrage there exists a discount factor such that, etc., and agents have more information than we do. You cannot prove that debt is not the present value of surpluses just by noticing that Japan’s debt to GDP ratio is pretty high.

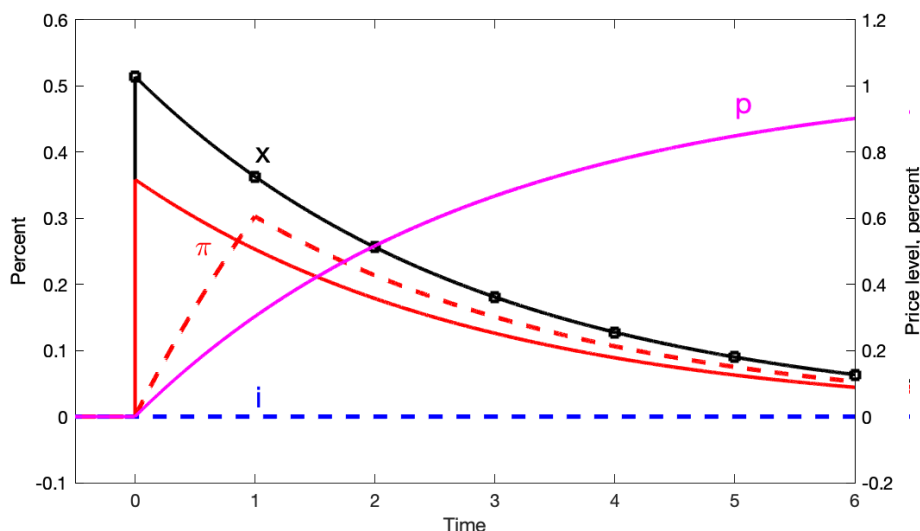
Now, consider what happens when the government suddenly gives people \$5 trillion dollars of money or debt, 30 percent of outstanding debt, but only has credible plans to pay back about half that amount. I call that decline in present value of surpluses a “fiscal shock.” In this simple slide the theory predicts that prices jump up 15%.

But we know prices are sticky. So let’s turn to fiscal theory with sticky prices. I just add fiscal theory to a totally standard new-Keynesian model. I give the model a fiscal shock, and suppose the central bank leaves interest rates alone.

(The model is, in standard notation,

$$\begin{aligned}
 x_t &= E_t x_{t+1} - \sigma(i_t - E_t \pi_{t+1}) \\
 \pi_t &= \beta E_t \pi_{t+1} + \kappa x_t \\
 \rho v_{t+1} &= v_t + i_t - \pi_{t+1} - \tilde{s}_{t+1} \\
 0 &= \lim_{T \rightarrow \infty} E_t \rho^T v_T
 \end{aligned}$$

The plot is the response to a 1% decline in surplus.)

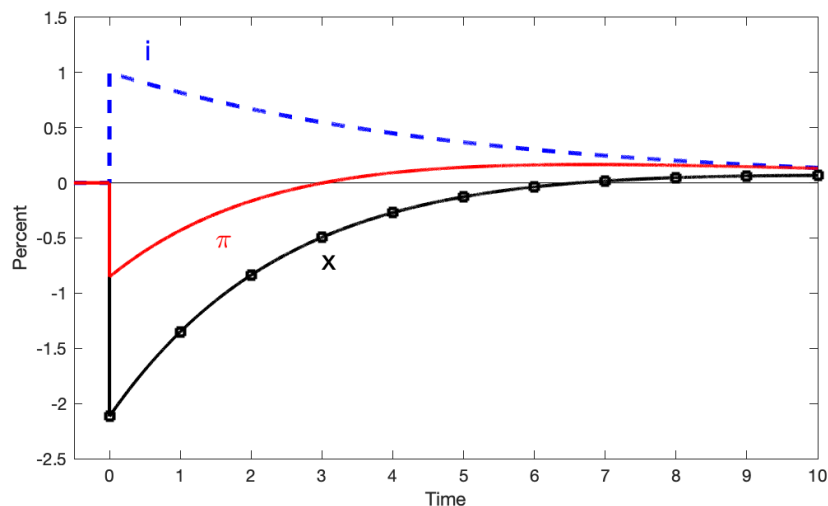


Rather than a sudden price level jump, we get a slow price level rise. *Inflation* jumps up, then slowly declines. Bondholders lose money from a long period of low real rates, interest rates below inflation, rather than from an overnight price-level jump.

In reality, inflation often builds slowly rather than jump upward. In most events, there are several shocks. The extent of the fiscal shock only became known slowly through time. We also measure inflation year over year, as shown in the dashed line, which gives an apparent slow rise in inflation. And of course this is a very simplified model, without habits, capital, and adjustment costs, all of which draw out responses.

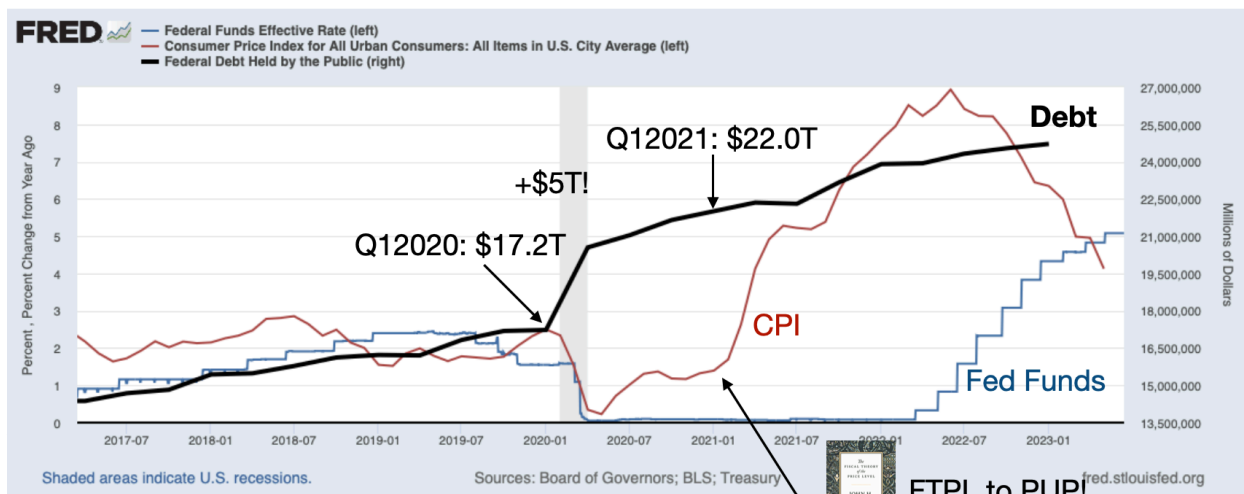
Inflation goes away all on its own here, with no high interest rates and no recession. There was a one time fiscal shock. Once sufficient debt has been inflated away, there is no need for more inflation.

Next, what if the central bank wakes up and raises interest rates? I present the results of such a monetary policy shock. (This model includes long-term debt.) Crucially, here I do not assume any contemporaneous fiscal shock. Surpluses stay constant. This is what the central bank can do on its own. Almost all current models pair a fiscal tightening, some of the last graph upside down, with a monetary tightening. They assume at a minimum that fiscal authorities raise taxes to pay extra interest costs on the debt. I ask here what central banks can do on their own without such help, which may not be forthcoming.



Higher interest rates lower inflation and output. However, they raise inflation in the long run. A form of “unpleasant arithmetic” holds here, and quite generally.⁴ The central bank can only move inflation around over time. This is a pretty normal-looking plot. Nobody would notice the slight long-run rise as something else would have happened by then. But the mechanism is utterly different from standard central bank doctrine, that higher rates depress aggregate demand and through a Phillips curve depress inflation.

In the fiscal theory model, it is a great and good thing for the central bank to react to inflation in this way. By raising interest rates in response to the fiscal shock, the central bank smooths the inevitable inflation over time. Since output depends on inflation relative to future inflation, that smoothing reduces output volatility. A Taylor rule, with a coefficient just below one, is a very robust policy. The Taylor rule seems to always be the answer, even as the questions change. It brings stability to old-Keynesian models, determinacy to new-Keynesian models, and low volatility to fiscal theory models.



Having seen these graphs, you know how I'm going to interpret recent US history. Our government did indeed send people \$5 trillion of money with no clear plans to pay it back. Inflation promptly surged, seemingly out of nowhere, just like the simulation.

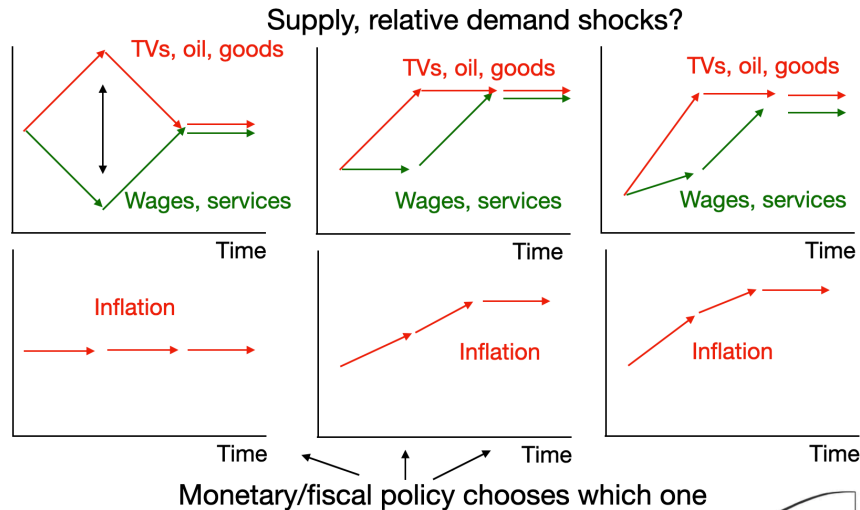
Conventional theory says that once inflation is 8 percentage points above interest rates, inflation will spiral upward until interest rates substantially exceed inflation, and drive it back down with a 1980s style recession. Fiscal theory says inflation would go away on its own, absent new fiscal shocks. Inflation goes away a bit faster if central banks react, though at the cost of a slightly more persistent inflation. That also seems to be just where we are.

It's not that easy of course. Why this time and not 2008? One has to do a historical analysis to believe that it is at least plausible that this time people did not expect about half that debt to be repaid by surpluses or lower interest costs, and last time they did. My papers include that narrative, but in the interests of time I won't repeat it here. This narrative is not proof, but that fiscal theory has even a plausible story, one so simple, and one that gets the quantities right for both the rise and fall of inflation, is pretty novel.

This inflation surge has huge implications for economics and economic policy, which have not been digested yet. For 13 years in the US and EU and 30 in Japan the policy consensus focused on "inadequate demand," "secular stagnation," the idea that we just needed more stimulus to get the economy moving. Borrow or print a few trillion dollars of money, they said, spread it around and prosperity will follow. In the same period, with ultra-low interest rates, large deficits, and low inflation, " $r < g$ ", Modern Monetary Theory and other doctrines spread proclaiming that government debt is a free lunch, never needing to be repaid. MMT preached that "there is always slack" in the US economy, so one never need worry about stimulus causing inflation. Borrow or print a few trillion dollars of money, they said, and don't worry about paying it back.

Well, in 2021 we did exactly what this consensus asked. And we got inflation. That is an important lesson. There was genuine uncertainty about what would happen, in the 2010s, if a massive fiscal-monetary stimulus were attempted. Now we know. "Demand" bashed in to the brick wall of supply, and surprisingly soon. If you want more economic growth now, there is no alternative but incentives and microeconomic efficiency; growth. If you want to borrow and do not wish to cause inflation, you must have a plan for paying it back. Economics is back to

normal. Washington has not woken up to this slap-in-the-face lesson, perhaps because it interrupts such pleasant dreams. It seems like Tokyo is more awake.



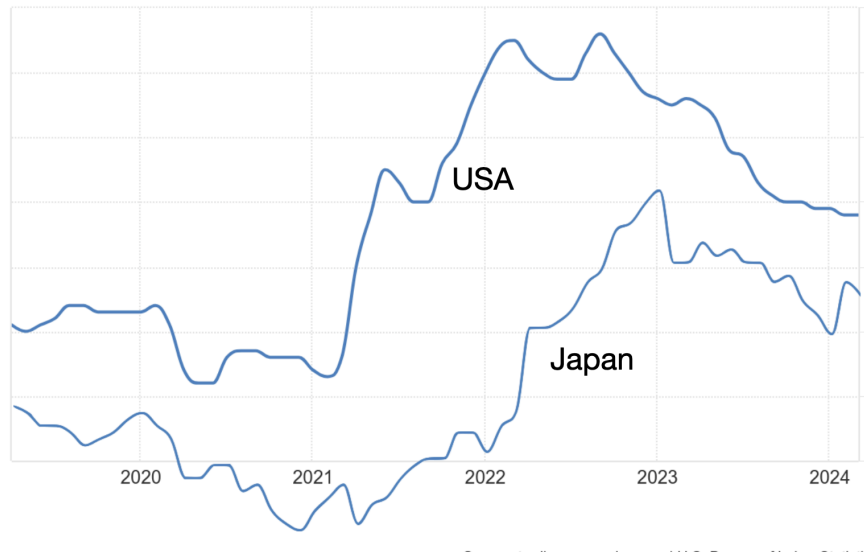
- Supply and relative demand shocks are *relative* price shocks
- To cause inflation, they must be accommodated.
- All models in which “supply shocks cause inflation” add money supply, interest rate, or fiscal accommodation.



I leave out here “supply shocks,” and the less serious greed, price-gouging, monopoly, and shrikflation excuses for inflation, as I do not see that we need them. Supply shocks in particular are fundamentally shocks to *relative* prices, not to the price level. To generate inflation rather than a transitory spike in relative prices, monetary or fiscal policy must accommodate supply shocks with more demand. New-Keynesian models with supply shocks do that with both larger money supply and larger “passive” fiscal policy changes. (This is true, for example, of Balke and Zarazaga 2024 and Smets and Wouters 2024, who estimate new-Keynesian models with fiscal theory and estimate substantial “supply shock” effects on inflation.) Then the supply shock really is just the occasion for a monetary-fiscal expansion, the carrot in front of the monetary-fiscal horse that pulls the inflation cart. The same supply shock with no accommodation has no inflationary effect. Why then call it a “supply shock” rather than a “supply induced demand shock,” which it is? We might as well call it a “covid shock,” as the original shock was the pandemic, not to supplies. OK, covid led to behavior and policies that shut down the economy, the government responded with huge fiscal stimulus, and we got inflation. Is that a “covid shock” that causes inflation? No. Covid induces fiscal and monetary policies that cause inflation.

3. Japan vs. US inflation

Japan has had less inflation than the US in this episode. Given Japan's famous debt to GDP ratio, how can that be?



First, it's not obvious that Japan really has had lower inflation than the US. Japan's inflation started later, but also peaked later. The unexpected *rise* of inflation, and hence what fraction of debt was inflated away is actually about the same. But different measures differ, and we can at least ask why Japan's inflation was not much worse.

In the simplest case, flexible prices and short-term debt, fiscal theory states

$$\frac{B_t}{P_{t+1}} = E_{t+1} \sum_{j=0}^{\infty} \beta^j s_{t+1+j}.$$

Taking innovations and rearranging,

$$\begin{aligned} \frac{B_t}{P_t} (E_{t+1} - E_t) \left(\frac{P_t}{P_{t+1}} \right) &= (E_{t+1} - E_t) \sum_{j=0}^{\infty} \beta^j s_{t+1+j} \\ (E_{t+1} - E_t) \left(\frac{P_t}{P_{t+1}} \right) &= (E_{t+1} - E_t) \sum_{j=0}^{\infty} \beta^j \left(\frac{s_{t+1+j}}{B_t/P_t} \right). \end{aligned}$$

Unexpected inflation is equal to the change in expected surpluses *divided by initial debt*. With sticky prices and long-term debt, this describes the overall price level increase in the episode.

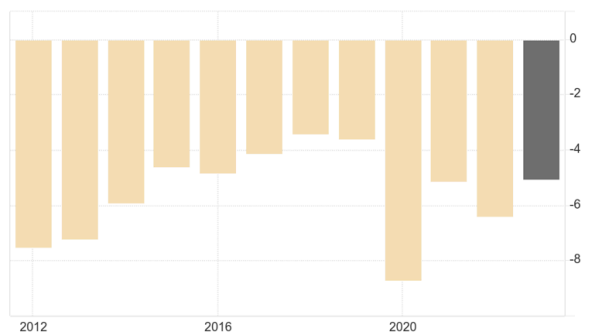
So, why might a country have less inflation than another?

- First, obviously, a country might have less deficit, the initial series of negative s_{t+j} .
- Second, a country might promise to repay more of that deficit; the same initial negative s_{t+j} might be paired with greater subsequent positive s_{t+j} . When we expand the model to include time varying interest costs (important!), subsequently lower interest costs have the same effect as higher subsequent surpluses.
- Third, and most importantly, more debt B/P means the same stream of deficits and surpluses $\{s_{t+j}\}$ generates less inflation.

Read that again. Yes, *more* debt means that deficits have *less* inflationary effect. At 100% debt to GDP, 1% inflation inflates away 1% of GDP debt and pays for a 1% of GDP unfunded deficit. At 200% debt to GDP, 1% inflation inflates away 2% of GDP debt, and pays for 2% of GDP unfunded deficit; equivalently, 0.5% inflation inflates away the same 1% of GDP unfunded deficit. A \$1000 loss lowers Tesla's stock price by 1/557,160,000. It lowers the value of a \$2,000 food truck business by 50%.

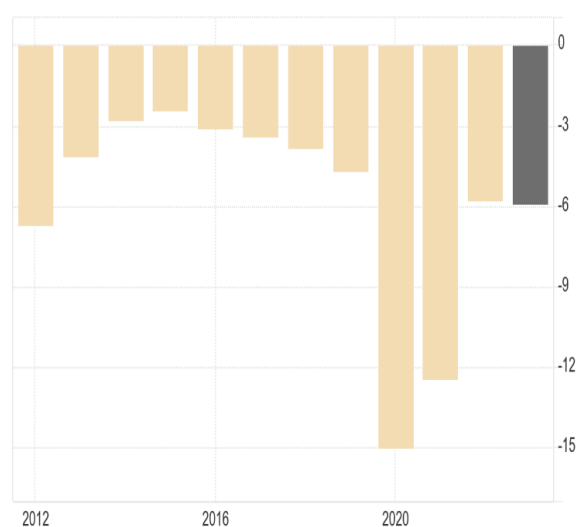
Your intuition that more debt must be dangerous for inflation reflects the correct intuition that more debt relative to GDP means that the government is closer to its fiscal limits, so that raising surpluses might be a lot harder. Countries with lower debt and more fiscal space find it easier to promise surpluses to fund a given deficit. But for a *given* path of surpluses, more debt means less inflation.

JP Government Budget - percent of GDP

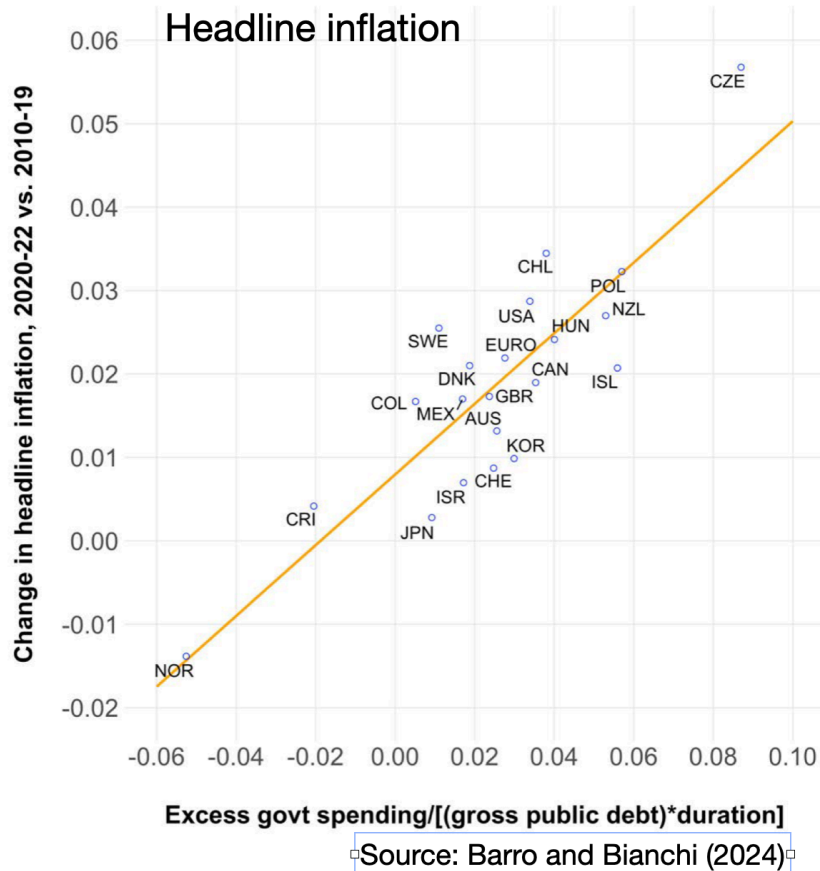


Source: tradingeconomics.com | Ministry of Finance, Japan

US Government Budget - percent of GDP

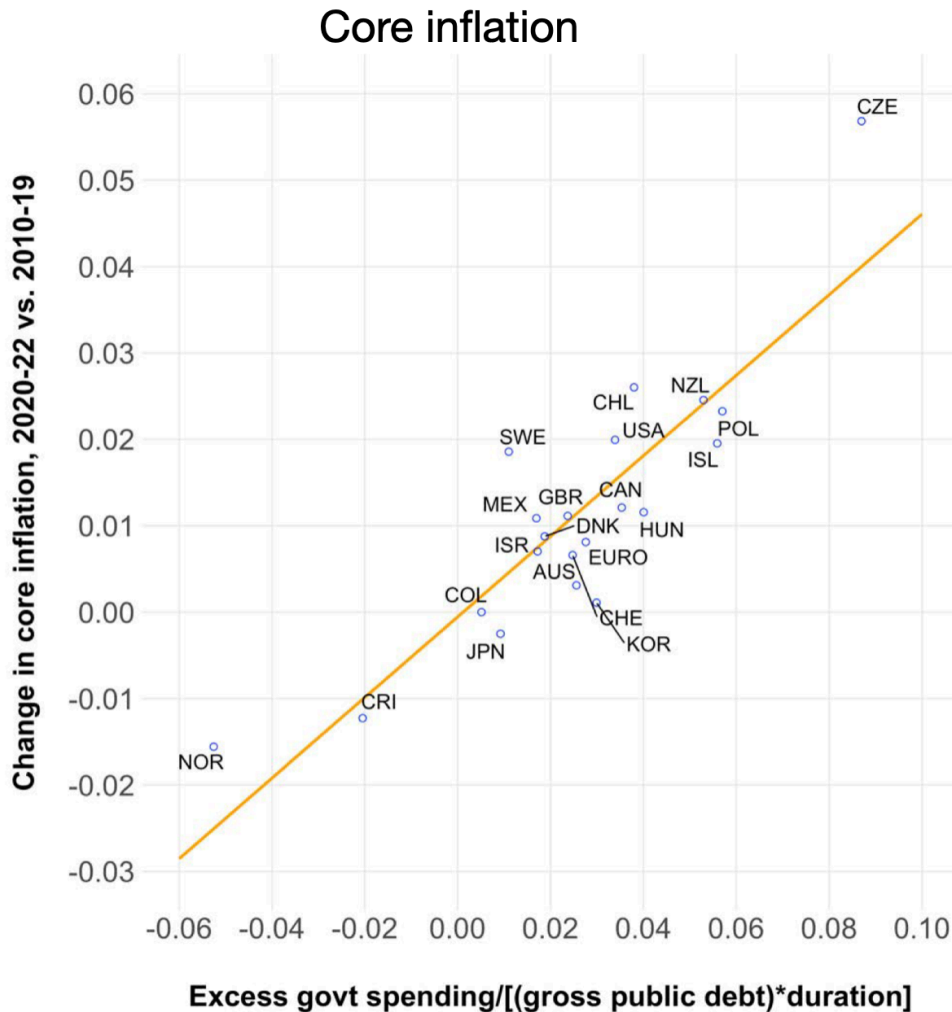


So, why did Japan have less inflation (if it did)? Well, first of all, Japan ran deficits about half the size of the US in the pandemic.



Second, looking across countries, Barro and Bianchi (2024) find that covid-era inflation lines up beautifully with deficits *scaled by the value of debt*. Barro and Bianchi also correct for duration. Longer duration like stickier prices allows a given surplus shock to be reflected in inflation that occurs after the 2020-2022 window. Japan lies comfortably on the line linking the other countries.

That all countries lie on a line with a slope of about half means that all countries are expected to repay about half of their covid deficits. Variation in that fraction is one source of variation of countries about the line.



In sum, reading Barro and Bianchi, Japan had less inflation in 2020-2022 because it did less covid spending, because it had much longer-term debt than other countries allowing 2023 and further on inflation to devalue some of its debt, because it has a lot more debt in the first place, and, slightly (deviation from the line) because Japan is expected to pay back a slightly larger fraction of its covid era spending.

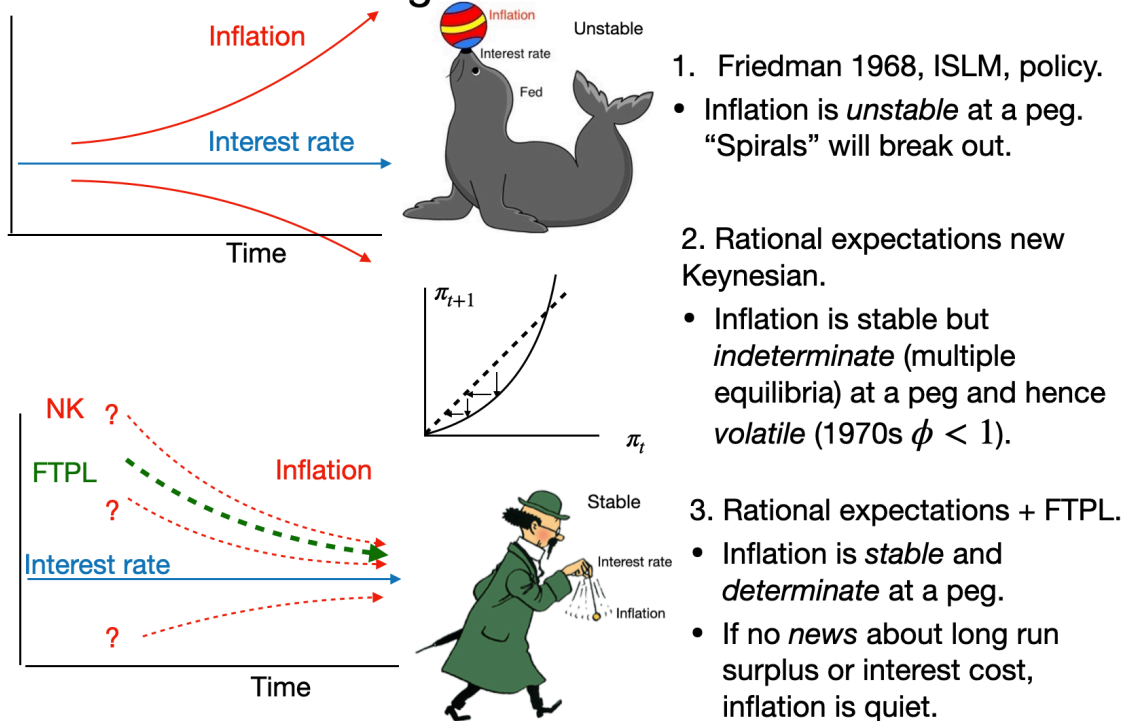
4. Japan provided crucial experiments

Japan's 30 years at the zero bound, with huge QE, also provided the world with a crucial experiment that decisively lets us distinguish theories of inflation.

The most classic theory of inflation under an interest rate target, unifying Milton Friedman (1968), ISLM adaptive or "anchored" expectations models, and the verbal doctrines espoused

uniformly by central banks, policy institutions and commentators (though unpublishable in any contemporary academic journal) states that inflation is *unstable* under an interest rate peg. The central bank must swiftly move interest rates in response to inflation, like a seal balancing a ball on its nose, to keep inflation from spiraling away. If the bank fails to do that, as alleged of the 1970s, or if the bank is constrained from such movement, as occurs at the zero bound, an inflation or deflation “spiral” will develop. At the zero bound, a small deflation means a high real interest rate, that lowers aggregate demand, lowers output, creates more deflation, and around we go without limit.

The great theories of inflation



1. Friedman 1968, ISLM, policy.
 - Inflation is *unstable* at a peg. “Spirals” will break out.

2. Rational expectations new Keynesian.
 - Inflation is stable but *indeterminate* (multiple equilibria) at a peg and hence *volatile* (1970s $\phi < 1$).

3. Rational expectations + FTPL.
 - Inflation is *stable* and *determinate* at a peg.
 - If no news about long run surplus or interest cost, inflation is quiet.

When Japan hit the zero bound in 1994, and when the US and Europe did so in 2008, the central bank and policy community widely and correctly, given the logic of this theory of inflation, warned of a spiral to come and urged heroic efforts to avoid it.

New-Keynesian theory developed since the early 1990s uses rational expectations. These models are universal in the equations of central bank and academic research, though not always in the words describing those equations. These models use rational expectations. They predict that inflation is *stable* at a peg or zero bound, but *indeterminate*. There can be multiple

equilibria, and excess volatility as the economy bounces uncontrollably between multiple equilibria. This is not a small technical issue. Given that inflation is stable, multiple equilibrium volatility is the central new-Keynesian complaint of 1970s monetary policy. In this theory, the Taylor rule worked in the 1980s by eliminating multiple equilibria (Clarida, Gali and Gertler 1999, 2000). New Keynesians warned loudly, and correctly given the model, that any return to the zero bound would lead to more such volatility (Benhabib Schmitt-Grohé and Uribe 2001, 2002).

Adding fiscal theory to new-Keynesian rational expectations models, we at last obtain a theory of inflation under interest rate targets that is consistent with current institutions (interest rate targets rather than money supply control, central banks do not make explosive off-equilibrium threats). It says inflation is both *stable and determinate* under an interest rate peg. Inflation surprises come from fiscal surprises, so inflation will also be *quiet* (the opposite of volatile) if there is no bad fiscal news — if people expect deficits to be repaid eventually.

This stability and quiet works much like an exchange rate peg. We all understand how an exchange rate peg can nail down the exchange rate and relative price levels, if a government is fully committed to the peg and always provides the necessary fiscal resources to back the peg. Pegs unravel when they do not have that fiscal backing. The proposition of stability at an interest rate peg requires the same backing. Most observed interest rate pegs until 1994, and especially those referenced by Friedman (1968), did not have that backing. Indeed, governments imposed interest rate pegs as a suite of financial-repression measures intended to lower interest costs of a stressful fiscal situation.

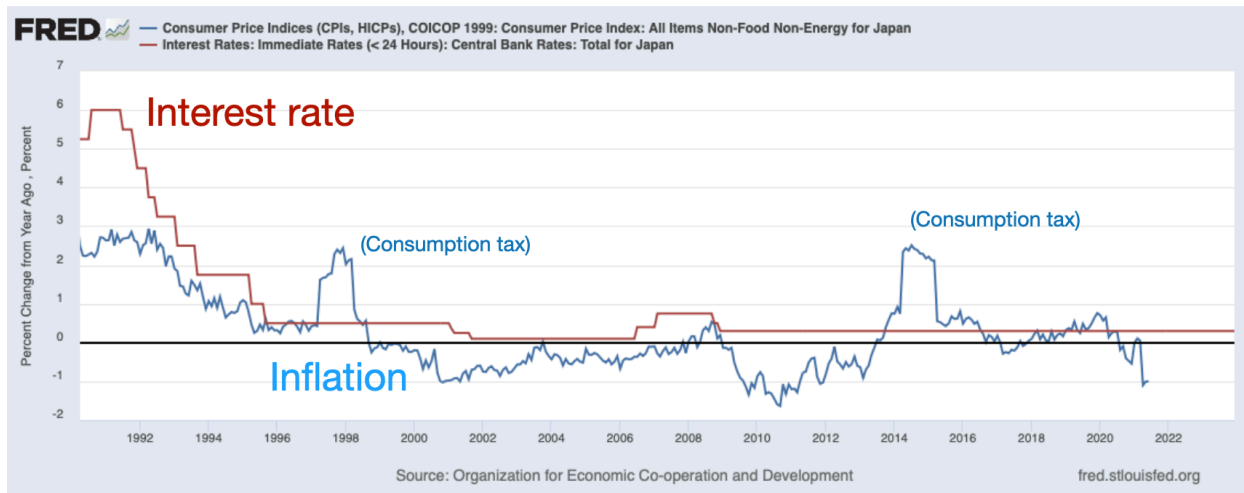
Until 1994, we genuinely did not know the answer to this central question. What happens at an interest rate peg or zero bound, not undertaken to paper over fiscal problems or in the depths of a Great Depression? Given existing economic theory and experience, worries were justified.

Japan ran the experiment. It stayed at the zero bound for 30 years. Inflation just batted within a percent or two of the zero bound, perhaps the quietest price level the world has ever seen. No spirals, no multiple equilibria. Those theories are simply wrong.

Fiscal theory adds insight. A “deflation spiral” raises the payoffs to bondholders, or equivalently lowers nominal tax revenues but not nominal payments due to bondholders. The government must respond to deflation with fiscal austerity, higher taxes and lower spending, to pay this windfall to bondholders. In deflation spiral models, the government does so, though usually only in the footnotes that mumble something about lump-sum taxes. But nobody

expects our governments to respond to *deflation* with *austerity*. Governments respond with stimulus, and helicopter money, with a string of negative primary surpluses. Given that expectation, deflation can't happen.

Japan: 30 years of stable, quiet inflation at ZLB.



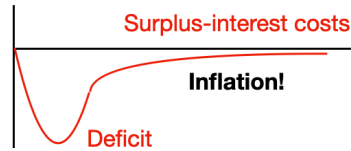
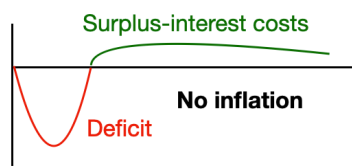
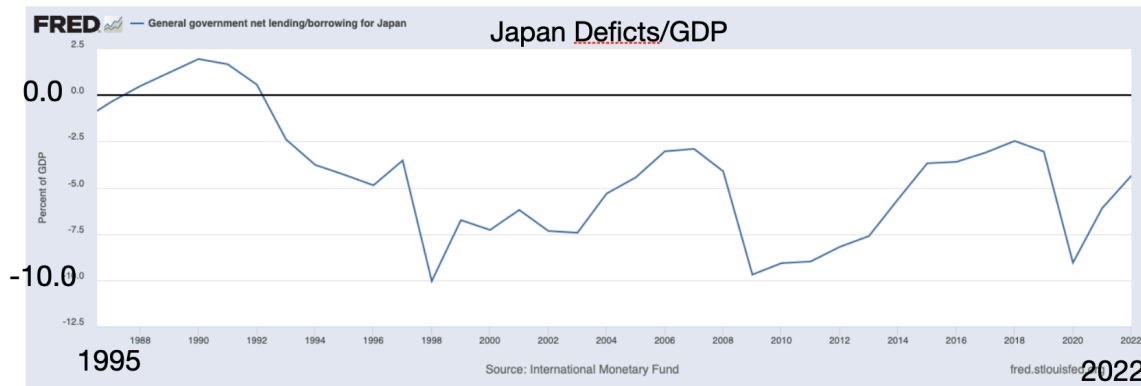
This experiment is crucial for the great question of monetary policy: Why do central banks have a 2% inflation target, not zero, and not a price level target? The main reason, as of 1992, was fear of a tipping point, that the zero bound represented a dangerous entry to a “deflation spiral,” a repeat of the great depression “liquidity trap” and so forth. Japan’s experience proves that this fear, valid as of 1992, is unfounded. *Zero inflation is possible and does not lead to deflation spirals. Fear not.*

(The second reason is the idea that 2% inflation allows greater stimulus by lowering nominal rates in recessions, a version of the theory that wearing too-small shoes during the day makes it feel so good to take them off at night. I also disagree with this analysis, but that’s beside the point today of what we can learn from Japan.)

Now, the asterisk is crucial. A peg or zero bound is stable and quiet *if* there is no bad fiscal news, if people think deficits will be repaid. The proposition is only that a peg or zero bound *can* be stable and quiet, *if* these fiscal preconditions hold.

Japan is also the classic case of ineffective fiscal stimulus.—Even immense fiscal stimulus does not cause a boom in aggregate demand (I would add, with Ricardian expectations, that

the new debt would be repaid). Large amounts of infrastructure spending did not lead to strong growth — and a huge debt to GDP.



No fiscal news? Which is it?

Doesn't the large expansion stretch the fiscal preconditions? Yes, but stretch, not violate. Remember, what matters in fiscal theory is debt *relative* to expected repayment, and low interest costs count in that expectation as well.

Many of my compatriots who flew here with a deflation spiral mindset, and advocating even more fiscal stimulus, impolitely pointed out that Japan never fully committed to the idea that it would not repay debt, a commitment needed to create stimulus and inflation. To create inflation you must threaten unsustainable debt. As soon as sustainability looked to be an issue, there goes Japan raising consumption and other taxes again! It is very hard to shake a reputation for long-term sober fiscal policy, especially if you don't really want to do it. That criticism, together with a global era of very low real interest rates, explains why these big deficits did not cause inflation.

I take a different lesson: Japan's 30 years of massive deficits, combined with a thrifty reputation for responsible repayment, show that Ricardian equivalence really does hold, that flow deficits have no effect if people expect repayment, that Keynesian fiscal stimulus is pointless.

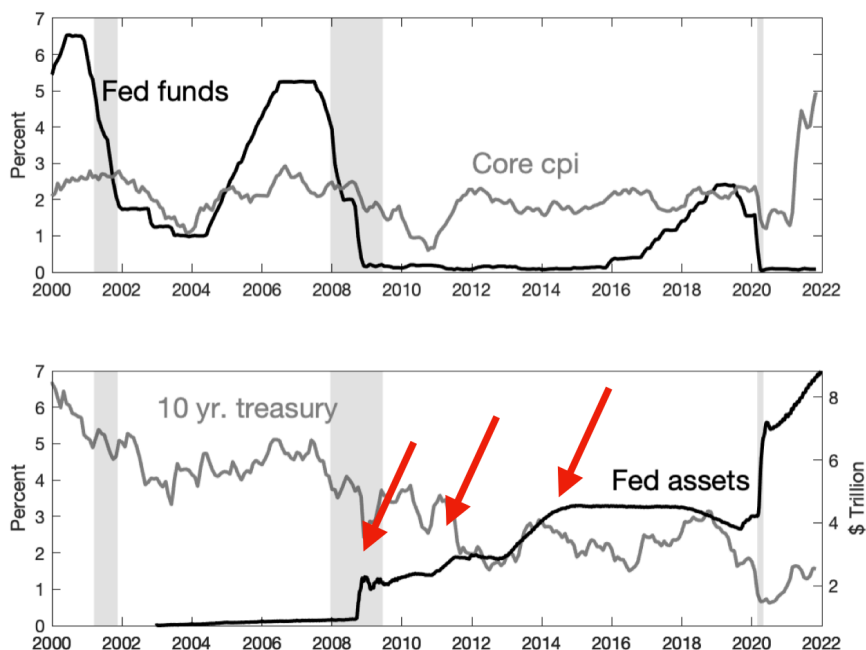
I emphasize: fiscal theory says you get inflation if debt exceeds faith in a country's long run ability and will to repay. There is no hard and fast debt/GDP limit. Argentina has debt crises at 40% debt to GDP. Japan lasted a decade at over 200%.

$$MV = PY \text{ vs } \frac{B + M}{P} = E \sum \beta^j s_{t+j}$$

Japan also offers us an immense and decisive experiment to distinguish fiscal theory from the most classic theory of inflation, monetarism. One can also object in theory, that monetarism requires central banks to control the money supply. If they target interest rates, monetarism predicts an unstable price level. But we have an even simpler and dramatic test before us.

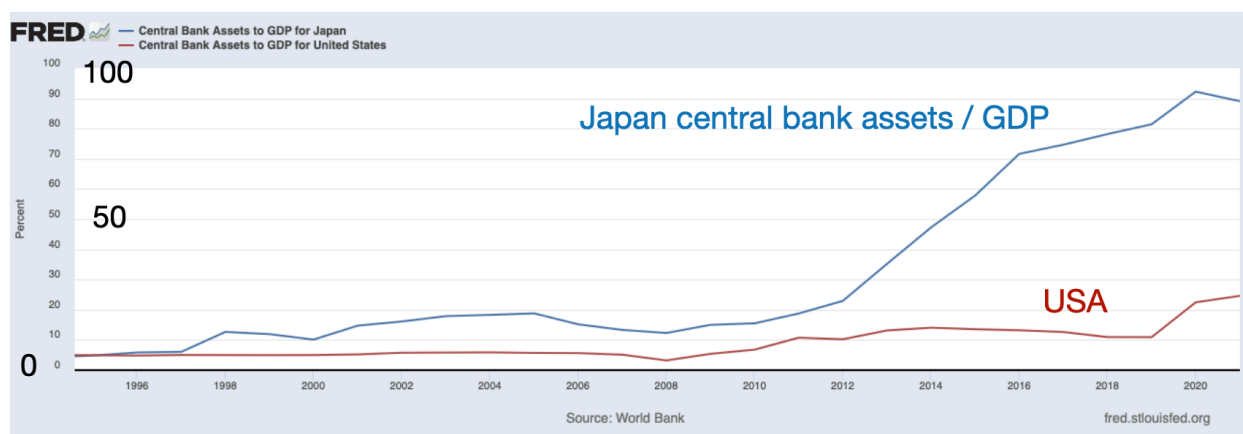
Monetarism and fiscal theory agree that if the government drops \$5 trillion of cash on people, and they have no expectation of future taxes to soak up this money, you get inflation. That's a rise in the money supply but also a fiscal transfer, an unfunded deficit. The question is, what happens if the government gives people \$5 trillion of cash, but *takes away* \$5 trillion of treasury debt? Monetarism says that this gives the *exact same* inflation in both cases, as only the money supply matters. Fiscal theory says, to first order, there is no effect on inflation. (I hedge with "to first order" as if money pays less interest than bonds there is a small seignorage effect, and QE also shortens the maturity structure of debt.)

QE M in the US ZLB era



Would someone please run the experiment? The US just did: First, about \$4 trillion in QE which had *no effect at all* on inflation, and then \$5 trillion covid spending, about \$3 trillion of which monetized, which promptly produced about 15% cumulative inflation.

This is notable, because of the immense size of the experiment. Reserves used to be \$10-\$50 billion. \$4 trillion is a bomb, not a firecracker. It should have set off Zimbabwean levels of inflation, and here we are arguing about 10 basis points of announcement effects in long term bond prices.



Was that not enough? Japan offers an even larger experiment. The BOJ's monetization is close to 100% of GDP, where even the Fed can only get to about 25%.

These are as decisive experiments as we get in economics. We often fret about subtle econometric tests, with little correlations and argue whether t or F statistics on an impulse response function are significant. We argue about identifying assumptions and model specifications. Stability, determinacy, and the effect of QE vs covid spending are massive simple tests of the basic robust doctrines of each theory, not remediable by small changes. Thank you Japan!

The combination of a zero bound, complete satiation in liquidity via an immense balance sheet, and a completely stable inflation for 30 years unseat the central tenets of standard doctrine spanning Friedman and ISLM policy analysis. It is *possible* to live the Friedman optimal quantity of money. Pretty much nobody thought this was true before Japan did it. Per ISLM analysis, Inflation or deflation spirals would break out. Per monetarism, the immense quantity

of money would cause hyperinflation. Though Friedman described the “optimal quantity of money” as a zero interest rate and satiation in money, he never advocated a peg at zero, preferring instead a $k\%$ money growth rule with low and posit

5. Fiscal Limits on Monetary Policy, Debt Sustainability and Future Inflation

Large debts, and poor plans for repaying them, also are a constraint on monetary policy. In the last great disinflation in the US, 1980, the debt/GDP ratio was 25%. It is now 100%. All of these influences are four times larger — and the fiscal limits on monetary policy were already evident in that episode.

This is a first-order effect. In the US, with 100% debt to GDP, each 1 percentage point rise in the real rate is 1 percentage point rise in interest costs, which raises the deficit 1 percent of GDP. That’s a lot. In Japan, with 250% debt to GDP, the same 1 percentage point rise in interest rate costs 2.5% of GDP more deficit!

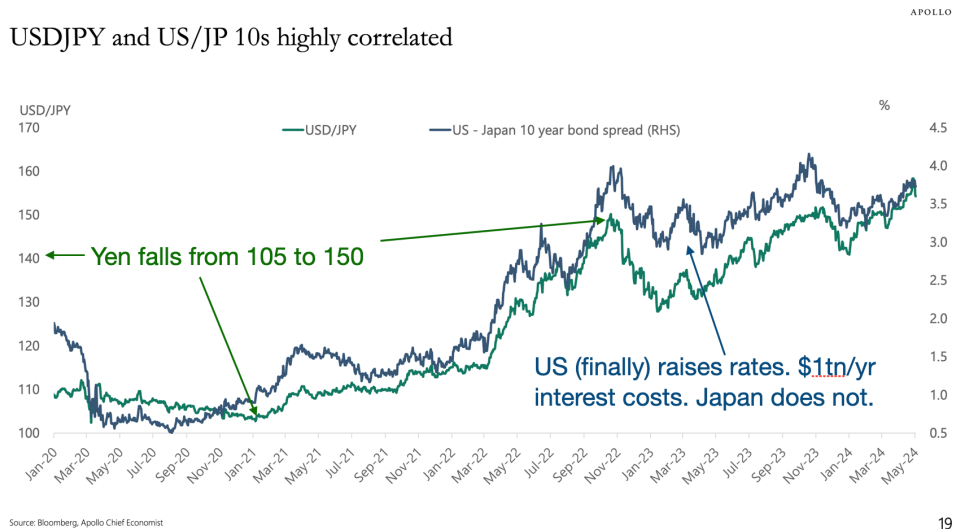
Higher interest rates have knock-on fiscal effects. US bank regulators let banks load up on long-term bonds while the Fed was preparing to raise rates. When rates go up, banks go down. Monetary authorities may fear raising rates as a result. This “financial dominance” is also basically a fiscal effect, since bank failures will occasion fiscal bailouts, which have to come from the same empty pot.

Higher interest rates cause recessions, which cause more stimulus, bailouts, and social programs. This is not an unintended consequence. In standard macro, it is the essential mechanism by which higher rates cool inflation; it is a feature not a bug. Higher rates lower demand, that lowers output, and via the Phillips curve that lowers inflation, all with “long and variable lags.” But it also is another fiscal impact of monetary policy.

In contemporary macroeconomic (not fiscal theory!) models, fiscal policy automatically tightens to pay these costs. If fiscal policy does not or cannot tighten, interest rates lose their power to lower inflation. If another bout of inflation comes, as the last one did, from fiscal policy, higher interest rates will just be gas on the fiscal fire. Central banks in fiscally constrained economies may turn out to be a lot less powerful than we think.

These limitations may already be playing out. The Bank of Japan has not raised interest rates anything like as much as the US Fed has done. The yen has lost a third of its value. Is the BoJ

nervous about the fiscal and financial consequences of raising interest rates? The ECB owns a lot of Italian (160% debt to GDP) and other sovereign debts. If it raises interest rates, those countries may again be in trouble. The ECB is now directly involved as it owns so much sovereign debt, and is committed to buying more to keep sovereign spreads low. If inflation rises again, will it be able to raise rates, and will doing so lower inflation? The US Fed must certainly be aware of the \$1 trillion in interest costs that the Treasury is now paying, and its own large mark-to-market losses which mean less money flowing back to the Treasury, to say nothing of the large number of banks in a similar position without the ability to print money.



Sustainability

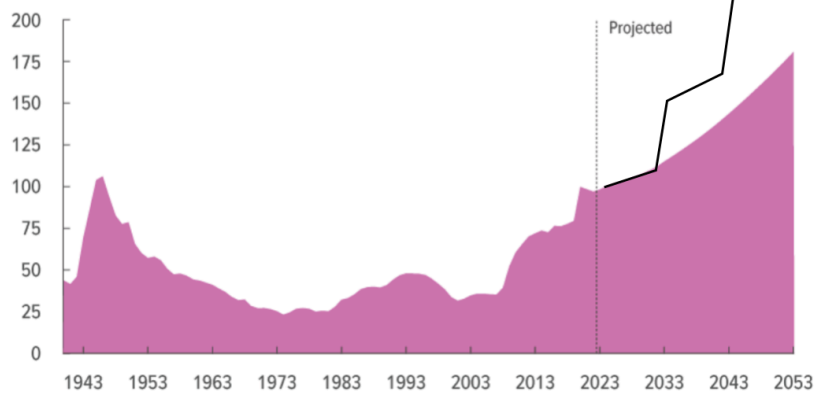
Of course, I cannot close without some mention of the debt “sustainability” question.

I start with the situation in the US. The CBO projection, of ever rising debt to GDP and perpetual large primary deficits is not sustainable. This won't happen. We know that. We only don't know how the world will be different: more tax revenue, less spending, inflation, default, growth?

The CBO projections are optimistic. They are not forecasts, conditional expectations. They enshrine parts of current law that everybody knows will change. More importantly, they assume that nothing bad ever happens again. Notice the past debt ramped up in big waves during 2008 and 2020. The future will look more like my line, ramping up again in the next crisis and the one after that. Except it won't, because that is even more unsustainable.

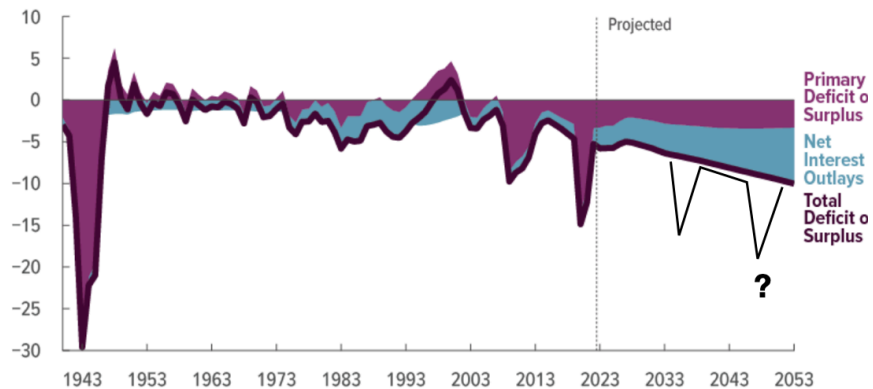
Federal Debt Held by the Public

Percentage of GDP



Deficits

Percentage of GDP



The US and Japan do not have *debt* problems, they have *spending* problems. Japan, and the Victorian UK before her, showed that 150% or 200% debt to GDP is possible, *if* people have confidence in a sober fiscal policy with steady small surpluses that can repay it. The US problem is spending in excess of tax revenue. Even if we defaulted on or inflated away all our debt today, we would still have a yawning fiscal gap — and a worse problem, because nobody would lend the US any money at all. Raising tax rates to European levels will give the US European growth. I see spending reform — we waste gargantuan amounts of money — tax reform — more revenue at lower rates — and above all pro-growth microeconomic policy as the only solution.

Our bond prices are still low. Clearly markets have faith that the US will in the end take these simple steps to fiscal sobriety after we have tried everything else.

In the meantime, I see the big imminent danger not in these projections, but in the potential loss of fiscal space to borrow in the next crisis. If China invades Taiwan, another pandemic breaks out, or some other crisis happens, the US will want to borrow and print a tremendous amount of money. With no plan to pay it back, markets may refuse, producing inflation much more quickly this time than last time, and limiting the US ability to marshal resources necessary to fight the crisis. Debt crises always need a spark. Debt is just the gas on the floor. Debt and so far unreformed long-run spending plans make the system fragile.

Every time I give a fiscal theory talk, someone says “well, what about Japan?” Let me briefly suggest some standard answers, though I hope to learn much more at this conference.

That Japan has a large debt to GDP and so far little inflation is not a “test” of the fiscal theory of the price level relative to other theories. That the US has a large debt to GDP and poor deficit projections, only a little inflation so far, and moderate long-term bond prices, is not a “test” of the fiscal theory of the price level. If only economic theories could be so swiftly defeated by armchair analysis.

First, who is to say that people do not expect Japanese debt to be repaid, or for my own great country to enact simple and sensible reforms before the CBO’s projections bear out and a debt crisis hits? Again, debt sustainability depends on debt relative to expected future ability and will to repay, which includes interest costs. None of our indebted countries are past the *ability* to repay. Indeed, the squishiness of expected future surpluses, like that of expected future dividends, actually makes it very hard to find testable implications of present value analysis — which makes it very hard to find armchair rejections.

Second, debt sustainability is a necessary feature of *all* macroeconomic models. Old Keynesian, new Keynesian and monetarist models all include the same condition that the value of government debt equals the present value of surpluses. They just imagine different mechanisms for this equation to hold. If it does not hold, if we could say with certainty that the present value of surpluses is not equal to the value of debt, then all the other theories are in just as much trouble as fiscal theory. Unsustainability is not a test of fiscal theory *in favor of* monetarist, old or new Keynesian theory.

Third, there is much new work involving $r < g$, liquidity values of government debt, overlapping generations and other frictions that makes present values technically hard. I won’t address this today, other than to say that most of this doesn’t undermine fiscal theory, and much of what

seems to be wrong. A simple example: Suppose a government finances itself only with non-interest-bearing money. Well, the rate of return on government debt, negative of the inflation rate, is less than the growth rate. If you try to discount surpluses with that, they seem to blow up. Yet we all know government debt is not a free lunch; if that government prints more money to finance deficits, it gets more inflation. Liquidity values of government debt can lead one astray in the same way.

So how has Japan gotten away with such huge debt to GDP for so long? How about the US? Bondholders, somehow think they will be repaid, but bond markets never see crises coming. If they did, the crisis just happened.

A few answers, and a few ways that Japan might actually be safer than the US, pop up. First, consider debt:

- Japan's debt is overwhelmingly held by domestic (85%) investors. These are also more passive than foreign financial institutions and central banks who hold much US debt, and might dump it. The ultimate holders are elderly Japanese people, notoriously more thrifty than Americans, who would have sold this debt and gone on a round-the-world cruise long ago.
- Japan has an estate tax, which kicks in at 10,000,000 yen, about \$66,000. Some of that debt is coming back.
- The Japanese government and central bank have a lot of assets, so the actual net debt is only about 160% of GDP. Still "only" as large as Italy is not much comfort. Japan as a country has run decades of trade surpluses, accumulating foreign assets. The US has done the opposite.
- Japan's debt has a longer maturity than the US. That means it takes more time for higher interest costs to hit the budget, and makes Japan less prone to roll over problems. Both our central banks have rather dramatically shortened this maturity, however, and higher interest costs are starting to bite.
- Low interest costs. We economists love present values, but politicians and to some extent markets think in terms of costs. If the monthly payments are low, they carry on. I think in fact this accounts for the large increase in debt. If markets are charging plus or, better, minus one percent, why not borrow a huge quantity? Low interest costs have made debt sustainable. Of course whether they will continue to do so is the big question. Higher interest costs can make debt quickly unsustainable. (See also Chien, Cole, and Lustig 2024.)

The underlying problem is, again, not debt, but the yawning projections of future deficits. Those come primarily from a rapidly aging population, sharply declining birthrates, making pay-as-you-go pension and healthcare promises unsustainable. Which country is in more trouble?

The US has an alternative source of people — immigration, if the US will only reform its chaotic immigration system to allow in “economic migrants,” young people who want to come, work, and pay taxes.

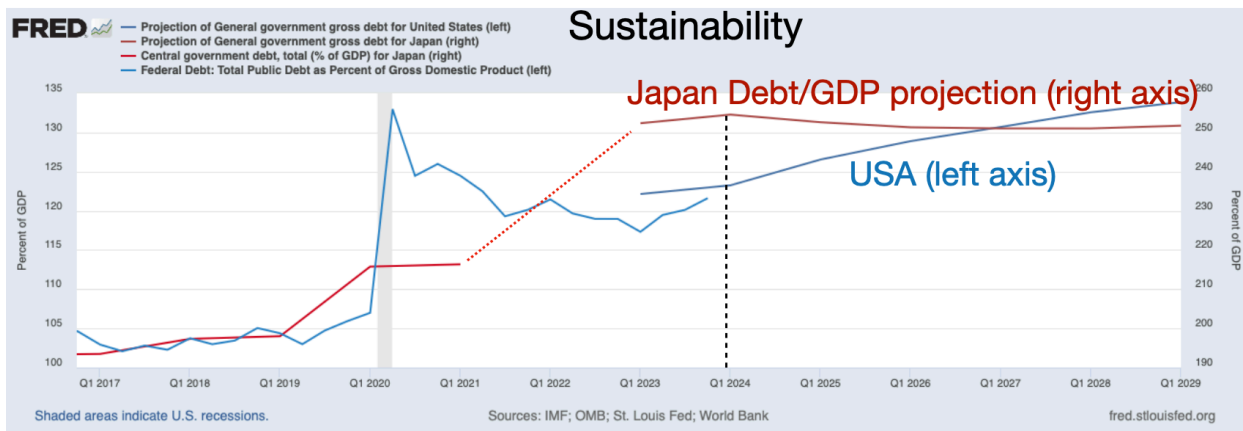
Japan has recently increased its consumption tax. Every time I mention “consumption tax” in the US, an outcry follows — old people paid income and social insurance taxes when young, how dare you tax them again when they want to spend the money when they are old. Japan did this seamlessly!

More generally, the US social insurance programs were pitched as and promised to be a “savings” program. You get out what you put in. They are slowly becoming pure transfer programs, but that transition is politically extremely painful. For example, eliminating the income cap on social security contributions in the US would admit it is no longer a savings program, and just a transfer from rich to less rich. That is not entirely an easy switch, as doing so also multiplies the disincentives of the programs. But it is the natural direction that closing the gap may go. My understanding is that Japan’s programs were always transfer programs, so Japan does not face that limitation.

This seems to me an argument for the most important underlying question, which society will have the social and political cohesion to undertake the simple reforms that are needed to put our tax system and social programs on a sustainable basis?

I venture there is a greater faith in the general function and long run responsibility of fiscal policy in Japan than the US, a greater reverence for repaying debt. Do not count on the US not to default, when it comes down to checks for voters vs. principal and interest to Wall Street and foreign central bankers.

Perhaps I’m just a starry-eyed foreigner and too aware of US political dysfunction, but I’ll chalk that one up to Japan.



As some evidence, I plot the best projections for Japanese debt that I could easily find, and contrast with the US CBO projections above. Apparently Japan has converging fiscal projections.

As more evidence, here are some with some pictures from the [Japanese Public Finance Fact Sheet](#), Ministry of Finance. The MoF says essentially the same things I have said. I got hopeful by this report, but conference participants inform me that the MoF has been sounding this alarm for years with little effect. The CBO has been sounding similar alarms in the US, but the Treasury department has not, so I still find hope that an important voice in Japanese official policy understands the issues so clearly.

Imbalance between Benefits and Burdens

- ✓ In Japan, there are no assurance of the tax revenue to compensate the increase in social security expenditures, the imbalance between benefits and burdens remains, which undermines the sustainability of the scheme.

limited policy options caused by the lack of fiscal buffer

- ✓ The fiscal buffer for flexible responses will be limited in case economic crisis or large-scale natural disaster occurs.

Increased Risk, such as a losing confidence in the government bond and depreciation of the national currency

Assumption that “ $r < g$ lasts forever” is too optimistic

- ✓ Interest rates had mostly been higher than the nominal growth rates in the past. Assuming that interest rates will continue to be less than the nominal growth rate is too optimistic.
- ✓ Therefore, it is necessary to assume that interest rates is at least as high as the nominal growth rate.

Primary surplus is needed to steadily reduce the debt-to-GDP ratio

- ✓ Even though interest rate is lower than nominal growth rate, the debt-to-GDP ratio is unlikely to decline if the large amount of additional bonds is issued by the primary balance deficit in each year.

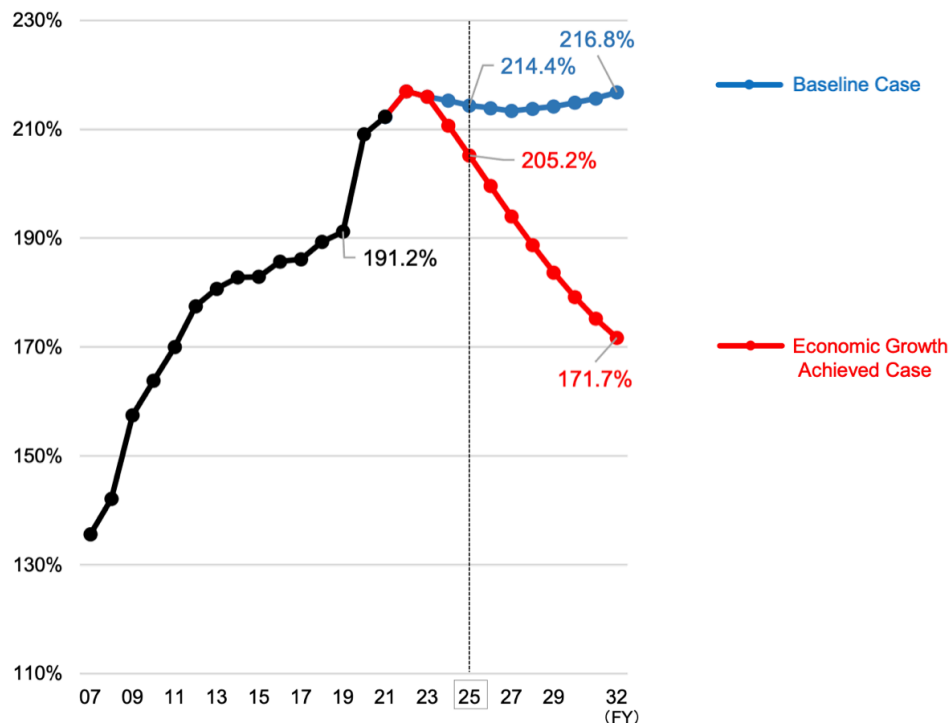
Confidence in Japan’s public finance is a prerequisite for taking advantage of low interest rates

- ✓ Confidence in government bonds and the market’s stable absorption of the government bonds is attributed to the results of efforts of fiscal consolidation. It puts the cart before the horse to argue that “efforts of fiscal consolidation is unnecessary because government bonds is trusted”.
- ✓ A loss of confidence in government bonds will have a negative impact on confidence in the currency and financial conditions of financial institutions. Even if debt is denominated in its own currency, there is risk of capital flight.

Japan’s fiscal deficit stems from structural factors

- ✓ Japan’s fiscal deficit stems from a structural increase in social security expenditures due to a low birthrate and aging population.
- ✓ The structural challenge of ensuring the sustainability of the social security system should not be left unresolved in the name of “flexible fiscal responses”.

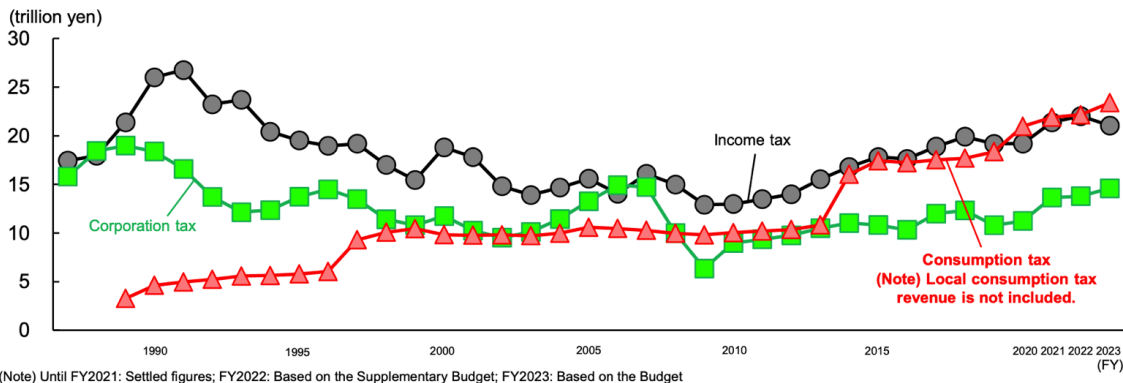
<Outstanding Debt (% of GDP)>



Why is consumption tax used for social security?

- Its revenue is stable and unlikely to be affected by economic conditions.
- It is neutral in relation to economic activities, and does not concentrate burden on certain people such as the working generation

Consumption tax is an appropriate way of funding financial resources for social security.



Solving the long run fiscal problem.

Solving the long run fiscal gap faces some straightforward tradeoffs.

One may say “just raise taxes,” but tax rates are already high. If a government spends 40% of GDP, the average tax rate is 40%, and for everyone who pays less someone pays more. Distortions are proportional to the square of the tax rate. It is common to say we are on the left hand side of the Laffer curve, but that calculation usually considers only static labor/leisure tradeoffs. The consideration for our fiscal situation is 20 to 50 years or more of growth, and incentives to save, invest, innovate, get education and training, and so forth. Long run growth may be more affected by tax rates than a one-year labor/leisure tradeoff suggests.

Some social program cost cutting measures, such as raising the retirement age to match an older and healthier population, are economically straightforward, but politically difficult. A better way out involves social program reform — improving the large disincentives that pervade US social programs. That can help more people at lower cost. I don’t know anything about disincentives in Japanese social programs to say if this will help.

Some people will get less. I think it’s possible to give less to people who don’t really “need” it, recognizing that all transfers embody value judgments beyond the expertise of economists. I think it’s possible to improve incentives so that more people don’t “need” social program help. Remember, almost all the money goes to “middle class,” not “poor” people.

But in the end, our governments made a deal with the retiring generation: We will put in pay as you go old-age assistance. You have babies so there are workers to pay for your retirement. We embarked on a social version of the ancient practice of relying on children for one's old age, rather than the apparently more modern practice of investing in physical capital to support one's old age. But we forgot that the *individual* incentive to have children in that system is eliminated when we rely on our collective children to support us in old age. Why raise children to support someone else's old age? The generation of current workers, naturally, didn't keep their end of the bargain. Our societies will simply not be able to provide as many pays-as-you-go transfer benefits as we thought.

In sum, tax *reform* — lower marginal rates, larger base, such as a consumption tax — social program *reform* — fewer disincentives to work and over-use health care — and overall microeconomic reform to raise long-run GDP growth are the straightforward answer to the fiscal problem.

Moreover we live in a time of great promise. AI and biotech offer a chance at a new wave of growth. But we also live in a time of great peril. Industrial policy, the new nationalist mercantilism, tariffs and subsidy wars, can explode budgets and cut off growth.

Our spending problems are internal, not external. Letting this fester to cause a debt crisis would be a massive self-inflicted disaster. Let us hope our societies live through the fragile period and do not fall apart in this preventable way.

References

- Balke, Nathan S. and Carlos E. Zarazaga, 2024. "Quantifying Fiscal Policy's Role in U.S. Inflation" Manuscript, https://bpb-us-w2.wpmucdn.com/people.smu.edu/dist/a/1609/files/2024/04/Quantifying_Fiscal_Contribution_to_US_Inflation_3_2024-81aa51c1758669d0.pdf
- Chien, LiLi, Harold L. Cole, and Hanno N. Lustig, 2024, "What about Japan?" Stanford University Graduate School of Business Research Paper No. 4620159 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4620159; <https://www.nber.org/papers/w31850>

Cochrane, John H. 2023. *The Fiscal Theory of the Price Level*. Princeton: Princeton University Press.

Cochrane, John H. 2024a. "Fiscal Narratives for US Inflation." Manuscript. <https://www.johnhcochrane.com/research-all/sims-comment>

Cochrane, John H. 2024b. "Expectations and the Neutrality of Interest Rates." Review of Economic Dynamics 53, 194-223. <https://doi.org/10.1016/j.red.2024.04.004>

Fernández-Villaverde, Jesús, Gustavo Ventura, and Wen Yao, 2024. "The Wealth of Working Nations." Manuscript, https://www.sas.upenn.edu/~jesusfv/Wealth_Working_Nations.pdf

Furukawa Kakuho, Yoshihiko Hogen, Kazuki Otaka and Nao Sudo 2024. "On the Zero-Inflation Norm of Japanese Firms." Manuscript.

Shirakawa, Masaaki 2023. "Time for Change." *Finance and Development*, International Monetary Fund. (March) <https://www.imf.org/en/Publications/fandd/issues/2023/03/POV-time-for-change-masaaki-shirakawa>

Smets, Frank and Raf Wouters, 2024. "Fiscal backing inflation and US business cycles" Manuscript https://www.hoover.org/sites/default/files/2024-04/-_SW24.pdf

Uchida, Shinichi, 2024. "Price Dynamics in Japan over the Past 25 Years." Manuscript.