



Budget Model

Can Higher Inflation Help Offset the Effects of Larger Government Debt?

Summary: Higher inflation reduces the real value of the government's outstanding debt while increasing the tax burden on capital investment due to lack of inflation indexing. Increasing the current annual inflation target regime from 2 percent to 3 percent inflation reduces debt while lowering GDP.

Key Points

- We project that permanently increasing the current 2 percent annual inflation target to 3 percent reduces the real obligation of current federal debt by 7 percent by 2051, though implicit obligations such as Social Security benefits remain unchanged. While much of the tax code is indexed to inflation, effective tax rates on capital income are not fully indexed and increase with inflation.
- Less real debt encourages capital formation while higher effective tax rates discourages capital formation. Putting the pieces together, increasing the annual inflation target from 2 to 3 percent reduces the capital stock by 1 percent by 2051 and GDP by 0.3 percent relative to the current-law baseline with a 2 percent inflation target.
- If the annual inflation target were increased to 5 percent, the capital stock falls by 3 percent and GDP by 1 percent by 2051, relative to baseline.

Introduction

Through the first three quarters of 2021, measured consumer price inflation has been higher than anticipated by professional forecasters: expectations for average annual CPI inflation were around 2 percent,¹ yet September CPI was 5.4 percent, about the same rate as has held since May.² Currently high inflation may be temporary (or "transitory") as pandemic-related supply chain issues and reallocation frictions limit the household sector's attempt to spend down accumulated financial savings driven by large fiscal deficits. However, recent surveys³ have noted an increase in medium-term inflation expectations.

Inflation has two main effects on the government's budget and the economy. First, unexpectedly high inflation works as a "soft default" on current government debt since the real value of the debt asset is repriced under new inflation expectations. This reduction in real debt reduces capital crowd-out and increases investment. Second, the U.S. tax code has various elements which are not automatically adjusted for inflation. As nominal incomes rise, nominal thresholds apply at lower real levels and usually increase the tax liability to taxpayers. Additionally, capital income faces a higher real tax burden, as taxes generally apply to nominal, not real, returns on investment. Real tax revenues rise with inflation which generates an ambiguous effect on macroeconomic output: future deficits are reduced, but the after-tax return on investment falls.

In frictionless markets, all prices instantly adjust to unexpected inflation, so there are no real effects other than a one-time wealth transfer from the devaluation of the existing stock of government debt. In the real world, however, some prices can be "sticky" in that they do not adjust quickly.⁴ During a recession, for example, businesses tend to lay off workers to reduce labor rather than reduce wages which are "sticky" in a downward direction. For this reason, the Federal Reserve has targeted a small positive inflation target so that employers maintain employment and production rather than lay off workers in response to downward fluctuations in business revenue.

Currently, the Federal Reserve's monetary policy framework sets a long-run inflation target of 2 percent. Higher long-run inflation as a policy choice has been recently debated⁵ for the purpose of giving more room for monetary policy away from the zero-interest rate lower bound.

We explore scenarios where this target is raised to 2.5, 3, 4, or 5 percent so that inflation expectations become immediately fixed to the target and assets reprice as a consequence. For this projection, we assume that commodity prices and wages reprice continuously in nominal terms so that there are no additional economic distortions which would lower economic output. In practice, additional distortions may be quite significant as higher inflation increases price uncertainty and price dispersion. So, the reductions in the capital stock size and GDP that we report would likely be even larger with these additional distortions.

Debt Devaluation

Inflation reduces the real wealth of people who hold dollars and other fixed nominal return assets such as non-indexed U.S. Treasury debt. In well-functioning financial markets, if price inflation is expected, then the price of these types of assets accounts for inflation so that the real return of the asset is maintained. However, holders of existing debt suffer an unexpected loss in real value with a surprise inflation. Savers and investors cannot be repeatedly "tricked" with surprise inflation each year, so surprise inflation is not a long-term policy tool.

The large majority of currently outstanding federal government debt is fixed in nominal terms. As of 2021, only about 7.5 percent of the debt was issued as inflation-linked bonds.⁶ The longer the duration of the debt, the more it is affected by a permanent increase in inflation. The government pays the non-indexed debt's coupon payments and principal with nominal dollars as per the contracted terms at issuance until the debt matures.⁷ The real value of the debt asset declines with higher inflation since the income received by the debt-holders has lost real purchasing power. Unexpected inflation, therefore, effectively transfers wealth from debt-holders to the government and, as such, functions as a tax whose size is proportional to the amount of outstanding debt. This wealth transfer also applies to U.S. government debt held by foreigners. At the end of the first quarter of 2021,

total non-indexed U.S. federal debt held by foreign investors was \$6.4 trillion. We estimate that the total real liability of current federal debt decreases by 4 percent, 7 percent, 13 percent, and 19 percent for unexpected inflation of 2.5, 3, 4, and 5 percent, respectively.

Private sector nominal fixed-return assets and liabilities include mortgages, corporate bonds, bank savings deposits, and many other financial instruments. As these financial instruments become revalued, transfers of real wealth result within the private sector. For this analysis, we abstract from these transfers and focus on the wealth transfer from the private sector (and foreign investors) to the U.S. federal government.

Tax Effects

Inflation directly affects the real level of tax revenues through two main channels: (1) non-indexed elements of the tax code and (2) an increased tax burden on capital income.

The first channel involves “bracket creep,” the process by which nominally specified values in the tax code fall when the price level rises. Unindexed tax bracket thresholds in a progressive tax system are one such example; fixed nominal credit values are another. Most elements of the U.S. individual income tax are indexed to Chained CPI-U, providing protection against increases in the general price level. There remain several elements, however, that are not adjusted for inflation under current law. These provisions include the Net Investment Income Tax (NIIT) threshold, the Child Tax Credit value, and the exclusion thresholds for tax on Social Security retirement benefits, among others.

The NIIT imposes a tax liability on capital income for taxpayers with income above a certain nominal level which is not indexed under current law. With higher nominal incomes from inflation, this tax begins to apply to more taxpayers at lower real incomes. The Child Tax Credit is a refundable tax credit which phases out at nominal income levels which are not indexed. The credit amount itself is not indexed, so the real value of the credit declines with inflation. As with the NIIT, higher nominal incomes from inflation reduces the application of this credit to taxpayers at lower real incomes. Social Security retirement benefits are excluded from personal income tax below certain nominal thresholds. Since these thresholds are not indexed under current law, higher inflation implies an increased tax liability for retirees.

A second key channel through which inflation affects real tax liability involves taxes on capital income. Capital gains are one such example. The tax code imposes a tax liability when an asset is sold for a higher nominal price than the purchase price (the “cost basis”). Because cost basis is not indexed under current law, inflation reduces the real value of the cost basis even as the nominal sales price increases. Since the nominal basis price is fixed, the difference between sales price and basis increases faster than the rate of inflation,⁸ and so the capital gains tax liability rises in real terms.

Similarly, the tax code allows for a “cost recovery schedule” over which firms can deduct the purchase price of capital goods. Since these deductions are often spread over several years and are expressed in nominal terms, inflation erodes the real tax benefit of depreciation deductions. (Under current law until 2023, most investment expenses are immediately deductible and thus unaffected by inflation; this “bonus depreciation” is scheduled to phase out starting in 2023.) A similar dynamic applies to business loss carryforwards: the value of nominal losses deductible against future taxable income declines with inflation.

Finally, inflation affects the tax treatment of interest income and expense. Per the Fisher Effect, nominal rates of return generally move with inflation as investors demand higher nominal returns to offset the impact of expected inflation. Holding the real interest rate constant, a higher inflation rate increases the real tax burden on interest income, as nominal interest income is generally taxable to households and businesses. For the businesses and households who borrow, however, interest expense is partially deductible. An increase in the nominal interest rate as a result of inflation increases the real tax benefit of allowable interest deductions. [Previous research](#) has shown that these effects largely cancel out.

Table 1 shows our estimates of the long-run budget effects of higher levels of inflation. We decompose the effects into the two channels described above, with a further decomposition of the price appreciation category into capital gains and depreciation deductions.

Table 1: Budget effects of various inflation target scenarios

Change in revenues, share of GDP

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Channel	2.5%	3%	4%	5%
Capital gains tax	0.02%	0.03%	0.05%	0.07%
Depreciation deductions	0.05%	0.10%	0.19%	0.28%
Bracket creep	0.03%	0.05%	0.11%	0.17%
Total	0.09%	0.18%	0.36%	0.51%

Assuming no change to underlying real macroeconomic activity, we estimate that tax revenues grow in real terms under higher levels of price inflation. Under the current law baseline, we project federal revenue to be roughly 17.1 percent of GDP in 2031; under the 3 and 4 percent inflation scenarios, this figure rises to 17.3 percent and 17.5 percent, respectively. Real loss in the value of depreciation deductions raises the largest fraction of new revenue relative to baseline.

These estimates account for avoidance responses. Any first-order increase in real government revenues resulting from higher inflation would be partially offset by behavioral responses. A broad literature of empirical research shows that investors are sensitive to changes in capital gains taxation: realizations fall when the tax rate rises, and vice versa. Because a higher rate of inflation (holding real price appreciation fixed) leads to a higher effective tax on capital gains, investors may react by choosing to defer more capital gains and/or realize gains less frequently.⁹ In a positive interest rate environment, investors can lower their effective tax rate on capital gains by deferring realization (and avoid taxation altogether by deferring until death). Under most circumstances, the tax benefit of deferral *increases* with the rate of inflation, holding real price appreciation constant.¹⁰

Expenditure Effects

We assume that government expenditures rise in nominal terms with inflation, so the government's real spending remains unaffected by the nominal price path. Almost all large spending programs, for instance Social Security benefits, are indexed to cost-of-living, so this assumption seems reasonable. The Census updates the Federal Poverty Line (FPL) every year, so programs linked to the FPL, such as Medicaid and the Head Start preschool program, change their eligibility requirements and spending accordingly.

Estimated Economic Effects

Using the PWBM dynamic model, we implement reductions in the real value of government debt for each inflation scenario. This reduction of the government's liability necessarily reduces the real value of the debt asset to households and foreign investors in the model, making them poorer. Due to the decreased value of business depreciation deductions, the real value of existing capital declines, reducing wealth of business equity holders.

Lower real debt for the government reduces the size of the real interest expense in the government's budget and reduces the deficit. Higher tax revenues from non-indexed portions of the tax code also improve the budget. These effects reduce the crowding-out of real capital investment by debt and therefore increase capital investment. However, inflation raises the effective tax on capital and reduces depreciation deductions. These effects work in the opposite direction, reducing the benefit of investment. We find that the net effect of an unexpected inflation increase reduces the capital stock, implying that the impact generated by a higher effective tax on capital dominates. The drop in capital stock makes each worker less efficient and hence the average hourly wage declines.

The reduction in the real value of government debt and wealth of business equity holders reduces the wealth of households. This effect prompts individuals to work more. At the same, the lower wage level reduces incentive to work. We find that, in all the modeled inflation scenarios, labor hours first drop and then increase relative to baseline. This pattern implies that the substitution effect dominates in the first few years, but as individuals become poorer, the wealth effect causes households to increase their labor hours.

Table 2 shows the long-run macroeconomic effects of permanently higher inflation scenarios where the Federal Reserve's monetary policy framework increases the long-run inflation target by 0.5, 1, 2, and 3 percentage points. We caution that the macroeconomic results do not account for distortions caused by higher price uncertainty, sticky prices, and other inefficiencies resulting from a higher inflation regime. Importantly, the experiment assumes that the target inflation rate is maintained and that economic actors internalize this fixed inflation expectation.

Table 2: Macroeconomic effects of various inflation target scenarios

Percent change from current policy[DOWNLOAD DATA](#)

- 2.5 percent inflation target
- 3 percent inflation target
- 4 percent inflation target
- 5 percent inflation target

2.5 percent inflation target

Year	GDP	Capital Stock	Hourly Wage	Hours Worked	Government
					Debt
2031	-0.2	-0.5	-0.2	0.0	-4.2
2041	-0.2	-0.6	-0.2	0.1	-3.7
2051	-0.1	-0.5	-0.2	0.1	-3.2

3 percent inflation target

Year	GDP	Capital Stock	Hourly Wage	Hours Worked	Government
					Debt
2031	-0.4	-1.1	-0.3	-0.1	-7.9
2041	-0.3	-1.0	-0.4	0.1	-7.0
2051	-0.3	-1.0	-0.5	0.2	-6.2

4 percent inflation target

Year	GDP	Capital Stock	Hourly Wage	Hours Worked	Government
					Debt
2031	-0.7	-2.0	-0.6	-0.1	-15.0
2041	-0.7	-2.0	-0.7	0.0	-13.5
2051	-0.6	-2.0	-0.8	0.2	-11.9

5 percent inflation target

Year	GDP	Capital Stock	Hourly Wage	Hours Worked	Government Debt
2031	-1.0	-2.9	-0.8	-0.2	-20.2
2041	-1.0	-3.0	-1.1	0.1	-18.4
2051	-1.0	-3.0	-1.1	0.2	-16.4

In the first scenario, long run inflation goes up unexpectedly by 0.5 percentage points. This increase generates a reduction in the real value of government debt, which goes down by 4.2 percent in 2031, 3.7 percent in 2041, and 3.2 percent in 2051 relative to the current baseline. Real deficits decrease due to the increase in revenue from non-indexed portions of the tax code and lower real interest rate expenses. Note that the percent decrease in government debt relative to baseline is lower as time goes by—a mathematical consequence of baseline debt growing. The lower debt level in the higher inflation scenario alleviates the crowding out of real capital. However, the increase in the effective capital tax rate offsets this effect and the capital stock is relatively lower by 0.5 percent in 2031, 0.6 percent in 2041, and 0.5 percent in 2051. Lower capital decreases the average hourly wage, which is 0.2 percent lower. Hours worked remain unchanged by 2031, and go up by 0.1 percent in 2041 and 2051. GDP is lower by 0.2 percent in 2031 and 2041. And GDP is lower by 0.1 percent in 2051, relative to baseline.

The other inflation scenarios are qualitatively similar to the first scenario, though the magnitudes of the economic effects increase with the magnitude of the change in inflation. Thus, we estimate that, while unexpectedly higher inflation improves the government's budget, inflation's effects through the U.S. tax code produce lower macroeconomic output.

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- For instance, forecast CPI in 2021 Q2 was 2.37 percent for one year and 2.30 percent for ten years and the 2020 Q2 forecast was 1.86 percent for one year and 2.14 percent for ten years. ([Survey of Professional Forecasters, Philadelphia Fed](#)) ↩
 - <https://www.bls.gov/cpi/> ↩
 - For instance, <https://www.newyorkfed.org/newsevents/news/research/2021/20210913> ↩
 - Price adjustment frictions, as a result of inflation, benefit certain sectors at the expense of others. According to the Cantillon effect, the first recipients of new money benefit at the expense of later recipients. The usual order is financial markets, followed by commodity markets and businesses, followed by labor earnings. ↩
 - See discussions at [Brookings](#) and [PIIE](#). ↩

6. Based on PWBM calculations using [US Treasury Monthly Statements](#) data. ↩
7. We estimate the devaluation of U.S. Treasury debt by treating it as a single bond with a maturity of 6.3 years, which we estimate to be the average maturity of current non-indexed debt, and coupon payments equal to the estimated interest paid during that time. ↩
8. Only with a zero cost basis does the capital gains liability rise at the rate of inflation. ↩
9. Corporations may also react to higher inflation by shifting shareholder payouts away from buybacks and toward dividends in order to reduce shareholder tax liability. We do not model this behavior; to our knowledge, there is no empirical research quantifying this type of substitution elasticity. ↩
10. For further discussion, refer to [this report](#) from the Congressional Budget Office. ↩