

Federal Budget Policy with an Aging Population and Persistently Low Interest Rates

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The federal budget is on an unsustainable path. Federal debt has surged in the past decade and is now larger relative to gross domestic product (GDP) than at any time in US history except for the period around the end of World War II. Moreover, the Congressional Budget Office (2016b) projects that debt will rise substantially further relative to GDP if current laws and policies are not changed, increasing from about 75 percent today to about 140 percent 30 years from now, as shown in Figure 1. For comparison, federal debt averaged 39 percent of GDP during the past 50 years.

Some observers have argued that the projections for high and rising debt pose a grave threat to the country's economic future and also mean that the government has less fiscal space to respond to recessions or other unexpected developments, so they urge significant changes in tax or spending policies to reduce federal borrowing. In stark contrast, other observers have noted that interest rates on long-term federal debt are extremely low and have argued that such persistently low interest rates justify additional federal borrowing and investment, at least for the short and medium term.

Our analysis of this controversy focuses on two main issues: the aging of the US population and interest rates on US government debt. It is generally understood that these factors play an important role in the projected path of the US

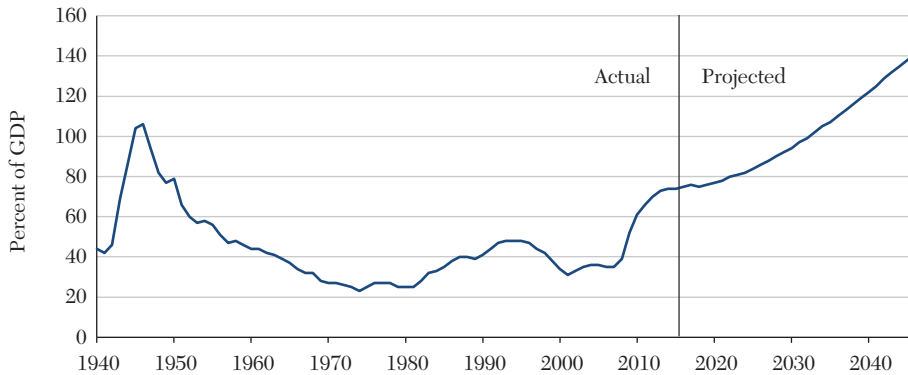
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Figure 1
Federal Debt Held by the Public



Source: Congressional Budget Office (2016b).

debt-to-GDP ratio. What is less recognized is that these changes also have implications for the *appropriate* level of US debt.

Economists and policymakers have anticipated for some time that rapid growth in the share of Americans over age 65 would sharply raise spending for Social Security, Medicare, and certain other federal programs relative to GDP. Indeed, population aging and a projected increase in per-capita healthcare spending now explain more than all of the projected growth in noninterest federal spending over the next few decades. However, population aging also reduces the share of the population in the labor force, which lowers feasible consumption relative to what it would be otherwise; we show in this paper that the optimal social response to population aging would be higher national saving—the sum of private saving and public saving (or dissaving)—over the next decade equal to about 1 percent of GDP.

Both market readings and detailed analyses by a number of researchers suggest that Treasury interest rates are likely to remain well below their historical norms for years to come, which represents a sea change for budget policy. We argue that many—though not all—of the factors that may be contributing to the historically low level of interest rates imply that both federal debt and federal investment should be substantially larger than they would be otherwise.

We conclude that, although significant policy changes to reduce federal budget deficits ultimately will be needed, they do not have to be implemented right away. Instead, the focus of federal budget policy over the coming decade should be to increase federal investment while enacting changes in federal spending and taxes that will reduce deficits gradually over time.

Implications of the Projected Increase in Federal Debt

Stabilizing federal debt relative to GDP would require substantial changes in policies; returning the debt-to-GDP ratio to its historical average would require

even larger changes. Holding down debt relative to GDP would have significant economic advantages in the long run.

The Projected Path of Federal Debt

The so-called baseline projections of the Congressional Budget Office are conditioned on the assumption that current law (generally) persists and that annual appropriations (which currently account for one-third of noninterest federal spending) grow at the same pace as GDP after the next 10 years. (For a full description of the policy assumptions underlying the baseline projections, see CBO 2016b.)

In those projections, federal deficits rise to nearly 5 percent of GDP by 2026, and federal debt held by the public reaches 86 percent of GDP that year.¹ By 2046, debt is projected to reach 141 percent of GDP and to be on a rising trajectory. The driving factor behind the projected run-up in deficits and debt is growth in federal spending for older Americans and for health care that is not fully offset by reductions in other spending or increases in revenues. In particular, noninterest spending is projected to increase from nearly 20 percent of GDP today to more than 22 percent by 2046. By our calculations, the aging of the population alone will more than account for that rise, generating an increase in Social Security and Medicare spending relative to GDP of roughly 2½ percentage points during that period (Elmendorf and Sheiner 2016). In addition, growth in federal healthcare spending per beneficiary will almost certainly exceed growth in GDP per person, as healthcare spending throughout the US economy has done for many decades. Meanwhile, projected revenues edge up from a little more than 18 percent of GDP in 2016 to a little more than 19 percent in 2046, primarily because growth in inflation-adjusted income will push taxpayers into higher tax brackets. Growing noninterest deficits are accompanied by growing interest payments, which are projected to jump from about 1.5 percent of GDP to nearly 6 percent, owing to increases in both debt and interest rates.

Of course, such projections are highly uncertain. Future productivity, interest rates, healthcare costs, life expectancy, and other factors might differ from current forecasts. As one illustration of this uncertainty, the Congressional Budget Office's projections of debt under alternative assumptions about the key demographic and economic inputs to its projections range between 93 percent and 196 percent of GDP in 2046. In addition, the baseline projections incorporate some changes in policies that may prove politically unpalatable. For example, nondefense appropriations have shown no trend relative to GDP during the past 50 years—perhaps because many items they cover, like highways, have demands that grow with GDP. However, those appropriations are currently constrained by statutory caps first enacted in 2011, and those caps imply that such appropriations will be smaller relative to GDP in each year after 2018 than in any year in that earlier half-century. If nondefense appropriations are ultimately increased relative to that projection, then larger changes in other tax and spending policies will be needed to put the budget on a sustainable path.

¹Congressional Budget Office (2010) addresses broader measures of the federal government's financial position. Those measures tend to follow roughly the same contour as debt held by the public.

Many other nations also face the challenge of high and rising public debt, and the budgetary pressure of population aging is an important factor for many of them. According to data from the International Monetary Fund (2016) on government debt net of financial assets for all levels of government in 2015, US debt equaled 80 percent of GDP, and several other countries were in very similar positions: France, at 88 percent; Spain, 80 percent; and the United Kingdom, 80 percent. Those figures are high relative to the historical experience of all of those countries. By this measure, current debt burdens are smaller relative to the United States in Germany (48 percent) and Canada (26 percent) but larger in Japan (125 percent) and Italy (113 percent).²

Although no one knows how much debt is “too much,” debt cannot increase indefinitely relative to GDP, as it almost surely would in the United States (and many other countries) without significant changes in spending and tax policies. Therefore, policy changes will be needed at some point.

Optimal Policy in Response to Rising Debt

According to the Congressional Budget Offices’s (2016b) projections, the debt-to-GDP ratio in 30 years would equal the ratio today if the country adopted immediate and permanent spending cuts, tax increases, or a combination of both equal to 1¾ percent of GDP. With current US GDP equal to roughly \$18 trillion, such changes would amount to \$315 billion today and would grow with GDP. Returning the debt-to-GDP ratio in 30 years to its earlier 50-year average could be achieved through immediate, permanent policy changes equal to almost 3 percent of GDP, or a combination of \$540 billion in spending cuts and tax increases today. Of course, if the changes were phased in slowly, even larger changes would be needed later.

The most common argument for holding down the debt-to-GDP ratio is that doing so would lead to greater national savings in the long run, and the higher level of savings would lead to more capital, higher productivity, and higher wages and incomes. In the Congressional Budget Office’s modeling, each \$1 reduction in federal debt raises national saving by 57 cents in the long run—an amount that is less than a dollar because private saving would be diminished by the decline in interest rates that would result from less debt and by other factors (CBO 2014a). However, the tax increases or spending cuts that would reduce federal debt would lower output and private saving in the short run if the Federal Reserve was unable to reduce interest rates enough to offset the contractionary change in fiscal policy. If hysteresis effects on output and employment are significant—that is, if short-term changes in aggregate demand generate lasting changes in the supply of labor, capital, or technological progress, and therefore sustainable output and employment—then the “short run” might have echoes over time.

Another argument for holding down the debt-to-GDP ratio is that doing so would put the government in a better position to deal with unexpected developments. For example, if an economic downturn warranted an increase in spending or decrease in

²Japan’s gross debt is much larger—roughly 250 percent of GDP—but is offset by significant holdings of assets. For the United States, gross debt for all levels of government was 105 percent, offset by government financial assets (mostly in the state and local sector) equal to 25 percent of GDP.

taxes to spur economic activity, the resulting rise in debt from a level that is already unusually high might cause long-term interest rates to move up sharply, which would limit the effectiveness of such a policy. The surge in federal debt from 35 percent of GDP in 2007 to 74 percent in 2015, and the fact that some analysts wanted fiscal policy to be even more expansionary during those years, illustrates why fiscal space is desirable. As another example, if interest rates increased significantly or trend growth deteriorated significantly, a government with lower debt could make smaller and more gradual changes in taxes and spending than a government already facing higher debt. Auerbach (2016) showed that risk-averse taxpayers would be willing to forego some consumption now to protect themselves against greater reductions in consumption later if the fiscal situation turned out worse than expected.³

A further argument for acting promptly to hold down the debt-to-GDP ratio is that doing so would enable policy changes to be made gradually, so that households, businesses, and state and local governments would not be forced to respond suddenly to cope with the associated changes in income and incentives. Following that logic, for example, most proposals that would cut benefits for older Americans do not include cuts for people already receiving benefits or on the cusp of receiving benefits. Indeed, an increase in the full retirement age for Social Security that was enacted in 1983 was phased in so slowly that it will not be fully in place for new beneficiaries until 2022.

Implications of Population Aging

Population aging affects the growth of federal debt for any given budget policies, and it also has implications for the *optimal* amount of debt and thus for *optimal* policies. Our framework for analysis is a standard Solow-style model of economic growth with a society that aims to maximize the present discounted value of its well-being into the indefinite future (for a description of the Solow model used by the Congressional Budget Office, see CBO 2014b). This approach follows that in Cutler, Poterba, Sheiner, and Summers (1990) and Elmendorf and Sheiner (2000); a more detailed analysis underlying the conclusions described here appears in Elmendorf and Sheiner (2016). We begin by considering the macroeconomic implications of aging and then turn to the budgetary implications.

³Uncertainty about future interest rates and economic growth rates appears to be the primary reason that US Treasury interest rates have been less than the growth rate of the economy for long historical periods. Ball, Elmendorf, and Mankiw (1998) argued that the marginal product of capital has exceeded, on average, the growth rate of the economy—that is, the economy has been dynamically efficient—but the risk premium has been large enough to push Treasury rates below the growth rate. In that circumstance, there is a “deficit gamble” available to society: Letting debt run up for a period and then restoring primary budget balance would be good for current generations and *probably* not hurt future generations, because debt would *probably* decline again relative to GDP without further policy action. However, that gamble might fail through an increase in interest rates or faltering of growth rates. Moreover, because future policy changes would tend to be needed when growth was low, the policy changes would be especially costly in terms of social welfare. Therefore, Ball, Elmendorf, and Mankiw concluded, the expected value of this gamble from the standpoint of future generations was negative.

Macroeconomics of Population Aging

Population aging in the United States is attributable to two factors: a drop in fertility after the “baby boom” that followed World War II and continued increases in longevity. Both factors are reducing the number of workers relative to the total population, which implies a decline in per capita GDP for any given amount of capital, productivity, and labor force participation. Lower fertility (but not increased longevity) has also reduced the growth of the labor force, which has reduced the saving required to equip new workers with any given amount of capital. Together, those two factors will reduce sustainable per capita consumption a few decades from now by roughly 11 percent relative to what it would be if the population were not aging. Consumption will still be higher in the future, just not as high as it would be if the age distribution of the population was unchanged.

Society could respond to this gradual reduction in sustainable consumption (relative to what would happen in the absence of aging) in various ways. Society could simply allow actual consumption to fall in line with sustainable consumption, which would leave current consumption unaffected but cause future consumption to decline by 11 percent. However, society could instead decrease current consumption, and increase saving and investment, in order to build up its capital stock—which would allow future consumption to decline by less than 11 percent.

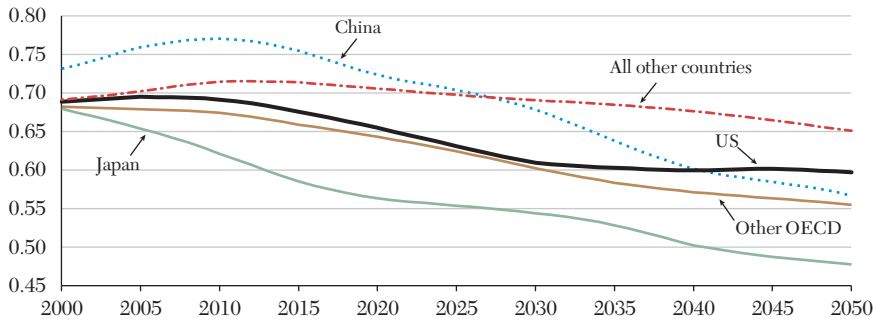
Using a plausibly calibrated growth model and welfare function for society, we estimate that the United States should build up its capital stock over the next decade or two, relative to what would be optimal in the absence of population aging, and then decrease the capital stock later to buffer the decline in consumption.⁴ However, the optimal increase in saving turns out to be relatively small: Optimal consumption falls by 4 percent initially and 9 percent over the next two decades, and the maximum increase in the capital–labor ratio is just 6 percent. Optimal saving over the coming decade is higher by roughly 1½ percent of GDP.

Those estimates are based on modeling the United States as a closed economy, but estimates based on an open-economy model are (perhaps surprisingly) similar. We use the same calibrated growth model and welfare function for the United States and add a comparable growth model and welfare function for the rest of the world, allowing for free capital flows between countries (an admittedly extreme assumption).

Based on demographic projections from the World Bank, the ratio of workers to population will decline considerably over the coming decades in each major segment of the world economy outside this country, as shown in Figure 2. Relative to the pattern in the United States, the ratio of workers to population in the rest of the world is expected to fall less sharply in the next few decades and more sharply thereafter, in part because labor force growth will fall even lower in other countries than in the United States. With aging in the rest of the world proceeding at roughly the same rate as aging in the United States, the results of our modeling that includes

⁴That finding differs from the conclusions in Cutler, Poterba, Sheiner, and Summers (1990) and Elmendorf and Sheiner (2000), which—using the same approach—found that the optimal response in 1990 and 2000 to *future* population aging was to *reduce* saving and increase consumption. However, now that the demographic transition has begun, the optimal response in 2016 is to raise saving and decrease consumption.

Figure 2

Ratio of Workers to Population*(ratio of those 15–64 to total population)*

Source: World Bank (demographic inputs); National Transfer Accounts and Census (consumption weights for support ratios); authors' calculations.

Note: "Other OECD" includes all countries in the OECD other than the United States and Japan. "All other countries" includes all the countries in the world other than China and the OECD. Support ratios for "Other OECD" and "All other countries" calculated using 2013 GDP-per-worker weights.

the rest of the world are close to our results for the United States alone: Optimal consumption falls by a little over 3 percent initially and 8 percent over the next two decades, and the maximum increase in the capital–labor ratio is 3 percent. Optimal saving over the coming decade is higher by roughly $\frac{3}{4}$ percent of GDP.

Budgetary Implications of Population Aging

To achieve the desired rise in national saving in response to population aging, one natural approach is to increase federal saving (or decrease federal dissaving). If private saving did not respond to changes in the federal budget, the optimal increase in national saving could be achieved by reducing the federal deficit by 1 percent of GDP—an amount that is about one-twentieth of projected federal spending or revenue and about one-quarter of projected deficits over the coming decade. However, private saving *would* respond to such budgetary changes, because spending cuts or tax increases would affect income and interest rates in ways that would tend to decrease private saving. Moreover, population aging might directly lead to an increase in private saving (as people increase saving in response to longer life expectancy), and population aging might lead to an increase in saving by state and local governments (through responses to projected growth in Medicaid expenditures or looming obligations for retiree pensions or health care, as discussed by Novy-Marx and Rauh 2014 and Lutz and Sheiner 2014). Thus, the implied deficit reduction could be larger or smaller than the optimal change in national saving.

Our analysis of population aging does not include some potentially important considerations. First, our modeling incorporates no change in labor force participation at given ages as the population grows older. Sheiner (2014) calculates that a gradual increase in labor force participation at given ages cumulating to 11 percent

Figure 3
Yield on Treasury Securities



Source: Federal Reserve.

would fully offset the effects of aging on sustainable per capita consumption, and at least some increase in participation at given ages seems likely as life expectancy rises. Second, we have not discussed the benefits of smoothing tax rates over time to minimize deadweight losses. This consideration increases the desirability of raising taxes sooner rather than later (unless deficit reduction would be achieved solely through cuts in projected spending). However, in Elmendorf and Sheiner (2016), we show that this smoothing consideration is not quantitatively important for the issue at hand. Third, our modeling assumes that resources are fully employed at all times, that is the economy never has recessions. But in the real world, in changing fiscal policy to achieve long-term goals, one should make gradual changes rather than sharply increasing saving, which might inadvertently cause a recession.

Implications of Persistently Low Interest Rates on Federal Debt

Interest rates on both short-term and long-term federal debt are now very low by historical standards despite the continuing economic expansion, the onset of tightening in monetary policy by the Federal Reserve, expectations of fiscal expansion under the new president, and the surge in outstanding federal debt since 2007. As illustrated in Figure 3, Treasury yields rose dramatically between the mid-1960s and early 1980s as inflation climbed, and then reversed course equally dramatically as inflation fell. However, even with inflation fairly stable in the 1990s and 2000s before the financial crisis, yields on federal debt continued to fall significantly. Unsurprisingly, yields fell notably further during the crisis and severe recession that followed, as the Federal Reserve cut short-term interest rates and investors sought a safe haven in turbulent markets. More surprisingly, yields have rebounded only to a limited extent in the past several years in spite of the factors just mentioned.

To explain low rates and assess their likely persistence, a number of researchers at institutions like the Federal Reserve, the International Monetary Fund, and the Bank of England, as well as noted economists like Larry Summers, Ben Bernanke, and Paul Krugman have reviewed or attempted to quantify the impact on interest rates of a wide range of factors.⁵ Those analyses have generally concluded that interest rates will increase over the next several years but remain significantly below their average levels of the past few decades. For example, the Congressional Budget Office (2016) projects that the yield on 10-year Treasury notes will average 4.3 percent over the next 30 years, compared with 5.8 percent during the 1990–2007 period of low inflation and fairly stable economic and financial conditions. Also, the median forecast of the federal funds rate “in the longer run” by members of the Federal Open Market Committee (FOMC) is 3 percent, compared with a 4.4 percent average during the 1990–2007 period (Federal Reserve 2016). Interest rates in other countries are also expected to be significantly lower in coming years than in the past. The International Monetary Fund (2016) projects that the real long-term interest rate on government securities—represented by a weighted average of rates on 10-year securities from different countries—will be 0.2 percent at the end of this decade, compared to a 1998–2007 average of 2.4 percent.

To be sure, the outlook for interest rates on federal debt is highly uncertain: Projecting factors that affect interest rates and quantifying their influence on rates is difficult, and financial market participants and economic forecasters may have overreacted to the experience since the financial crisis. Federal budget policy should allow for the risk that rates rise substantially in the years ahead. But both market prices and published analyses imply that a more likely outcome is low rates for an extended period.

We turn to documenting the implications of persistently low Treasury interest rates for federal debt dynamics. Then we examine the implications of low Treasury interest rates for optimal federal debt in two cases: when rates are low because the marginal product of private capital is low; and when those rates have fallen relative to the marginal product of private capital. We further explore the implications of low interest rates for countercyclical federal budget policy and for federal investment.

Implications for Federal Debt Dynamics of Persistently Low Interest Rates

For any given paths of federal revenues and noninterest spending, persistently low interest rates reduce future debt. Between 2013 and 2016, the Congressional Budget Office revised downwards its projection of average 10-year Treasury note rates over the following 30 years by about 1 percentage point. Moreover, CBO (2016) estimated that, if interest rates on federal debt were 1 percentage point lower than the agency expects during the next 30 years, federal debt would be smaller by more than 30 percent of GDP at the end of that period.

⁵Examples include Bean, Broda, Ito, and Kroszner (2015), Bernanke (2015a, b, c, d), CBO (2014a), Council of Economic Advisers (2015), Federal Reserve Board (2015), Hamilton, Harris, Hatzius, and West (2015), International Monetary Fund (2014), Krugman (2015), Rachel and Smith (2015), Summers (2013a, 2014, 2015a, b), and Thwaites (2015).

However, the dynamics of federal debt are also affected significantly by the rate of economic growth, for which projections have also been revised downwards over the past few years. With the baby boom generation heading into retirement and the labor force participation rate among working-age women roughly stabilizing after increasing sharply for a few decades, the US labor force will grow much more slowly in the next few decades than in the past few decades. Moreover, disappointing productivity growth in recent years has led the Congressional Budget Office and other analysts to lower their expectations for future productivity gains. Between 2013 and 2016, CBO's downward revision to projected growth during the next 30 years raised the projected ratio of debt-to-GDP 30 years ahead by roughly 15 percentage points.

Implications for Optimal Federal Debt of a Lower Marginal Product of Private Capital

One of the reasons that interest rates will probably be lower in the next few decades than in previous decades is that the marginal product of private capital—the return to additional private investment—will probably be lower. Many different factors may play a role in reducing the marginal product of capital, and they have different implications for budget policy.⁶

First, the marginal product of capital may decline because of population aging. Slower growth in the labor force as the baby boom generation retires, if not accompanied by a corresponding reduction in investment, raises the amount of capital per worker and pushes down its marginal return. As we explained above, the government should respond to aging by decreasing current consumption and *increasing* current national saving and investment (causing the capital–labor ratio to rise), which it can accomplish by issuing less debt than otherwise.

Second, the marginal product of private capital may be held down by slower economic growth stemming from slower growth in total factor productivity.⁷ Slower productivity growth diminishes the return to additional national saving—in other words, it raises the price of future national consumption relative to current consumption—which implies that the government should decrease saving. However, slower productivity growth also means that future generations will not be as much better off relative to current generations as they would be otherwise, which implies that the government should increase saving. Using the same growth model and welfare function that we applied to aging, we estimate that, on balance, the government should respond to lower productivity growth by *slightly* increasing national saving, which it can accomplish by issuing slightly less debt than otherwise.

⁶ For more discussion of the factors listed in the following paragraphs, see Bernanke (2005), Caballero, Farhi, and Gourinchas (2008, 2015), CBO (2016a), Dynan, Skinner, and Zeldes (2004), Furman (2015b), Mericle and Struven (2016), and Summers (2014, 2015a, b).

⁷ As noted earlier, economic growth will also be slower than in the past because of a leveling off in women's labor force participation after sharp increases in the 1970s through 1990s. To the extent that the previous increases reflected increasing opportunities for women in the labor force or shifts in social norms, the implications for federal budget policy of the leveling off in participation are similar to the implications of slower productivity growth.

Third, the marginal product of capital may be held down by an increase in private saving that raises the amount of capital per worker. For households, increasing income inequality pushes up personal saving because of the greater saving propensity of higher-income people; for businesses, a high level of profits relative to national income is supporting business saving. On the other hand, the downward trend of the personal saving rate during the past few decades suggests that factors other than increasing inequality have had larger effects on private saving, and in coming years the retirement of the baby boomers will shift more people from their years of peak saving to years of lower saving or dissaving. If Americans choose to save more privately because of a shift in their preferences, the government should *not* try to undo that choice by issuing additional debt, and perhaps the government should accommodate the shift in preferences by issuing less debt than otherwise.

Fourth, the marginal product of private capital will probably be held down by increased capital inflows. Slow growth in many economies around the world and consequent declines in the return on investment in those countries appear to be sustaining a so-called global savings glut—even though some observers have expected that emerging market economies, at least, would choose to invest more at home in response to strong domestic investment opportunities and an already high level of overseas assets. With a savings glut, the return to additional US national saving is lower and the government should decrease saving, which it can accomplish by issuing more debt than otherwise.

Fifth, the marginal product of private capital may be held down by a decline in the capital intensity of production arising from the growing importance of sectors that use little physical capital and by a continuing drop in the price of information technology that allows any given amount of inflation-adjusted investment to be achieved with a smaller amount of nominal investment. Those changes diminish the demand for capital, which means that the return to additional national saving is lower. As a consequence, the government should decrease national saving, which it can accomplish by issuing more debt than otherwise.

How should one weigh these various factors that may be reducing the marginal product of capital? The first (population aging) was covered in our earlier discussion of the implications of aging; the second (slower economic growth stemming from slower growth in total factor productivity) looks quantitatively unimportant in our modeling; the third (an increase in private saving) is probably not an important part of the explanation for low interest rates given that private saving has decreased over the past decade; and the fourth and fifth explanations (increased capital inflows, a decline in the capital intensity of production) suggest that the government should issue additional debt. Therefore, we conclude that the decline in the marginal product of private capital apart from the effect of aging implies that the government should decrease national saving relative to what it would be otherwise, which the government can accomplish by issuing more debt than it would otherwise.

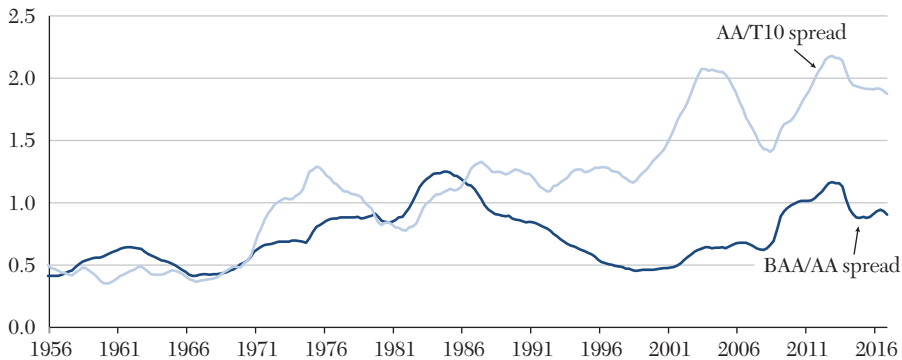
If the marginal product of private capital will be lower than in the past, the marginal product of public capital probably will be lower as well, but not as much

lower. Among the factors that will reduce the return to private capital, some will also reduce the return to public capital (for example, slower labor force growth diminishes the value of additional spending for education in the same way as it diminishes the value of additional business equipment), but others will not (for example, inflows of foreign capital to businesses and increases in private saving in response to aging do not increase public capital). Therefore, the return to public capital relative to the return to private capital will probably increase, so federal investment in physical and human capital should increase. We return to this issue below.

Recent patterns of business investment and capital income do not provide clear evidence that the marginal product of private capital has already declined. On the one hand, a drop in the marginal product of physical capital could explain why investment has not increased markedly in the past few years despite the very low cost of funds and presumably some pent-up need for capital following weak investment during the downturn—but on the other hand, investment may also be held down by lingering concerns about the strength of demand for goods and services, uncertainty about future tax policy, or other factors. In addition, measured investment during the past several years does not imply an increase in capital per worker of the sort implied by some of the explanations for a declining marginal product. Capital income is now a historically high share of national income, but that fact does not have clear implications for the marginal product of capital: the relationship between the capital share and the marginal product depends on the production function, and the capital share may be high because of factors that are not captured in standard production functions and that have different possible implications for the marginal product. For example, measured capital income probably includes some returns to human and intangible capital, which may have increased in relative importance over time; firms may be receiving greater monopoly rents; globalization or changes in social norms may be allowing firms to capture a larger share of total product; and nondiversifiable investment risk may have increased, with the average return on capital rising to compensate.

One possibility that is related but not identical to the possibility of a declining marginal product is that desired saving in this country has increased in recent years but investment demand is so insensitive to the cost of capital that the quantity of investment has not increased much and instead the return on assets has been pushed down. A small response of investment to an increase in desired saving, and consequent downward pressure on returns, would be consistent with some of the empirical literature (for example, Tevlin and Whelan 2003; Kothari, Lewellen, and Warner 2014; Pinto and Tevlin 2014; Banerjee, Kearns, and Lombardi 2015) and with evidence that firms' hurdle rates for returns on new investments tend to be insensitive to the cost of capital and have not fallen in the past several years (Sharpe and Suarez 2014)—but not consistent with other parts of the empirical literature (for example, see Cummins, Hassett, and Hubbard 1994; Gilchrist and Zakrajsek 2007). If desired saving has increased but the quantity of investment has not increased much, the result would be a drop in interest rates on private bonds, an increase in price-earnings ratios on equities, low business interest

Figure 4

BAA to AA and AA to 10-year Treasury Spreads*(percentage points; five-year moving average)*

Source: Bloomberg; Federal Reserve.

Note: “T10” means 10-year Treasury notes. The widening spread between the yields on 10-year Treasury notes and BAA-rated corporate debt since 1980 can be attributed entirely to an increase in the spread between the yield on AA-rated debt and the yield on Treasury debt with little change, on net, in the spread between the BAA and AA yields.

payments, and high profits—all of which are true today. The implications of this scenario for federal budget policy are the same as the implications of a declining marginal product caused by increased capital inflows: because an increase in desired saving is not finding a productive use through private investment, both federal debt and federal investment in physical and human capital should be higher than otherwise.

Implications for Optimal Federal Debt of a Larger Difference Between the Marginal Product of Private Capital and the Yield on Treasury Debt

Interest rates on federal debt also may be lower than in the past because those rates have fallen relative to the marginal product of private capital. One possibility is that the perceived risk of private capital has increased or the price of that risk has increased. The financial crisis, severe recession, and slow recovery certainly represent a stark change from the so-called “Great Moderation” of the economy between the mid-1980s and mid-2000s. But that story cannot explain the down-trend in yields on US Treasury debt before the financial crisis, nor is it consistent with the fact that the widening spread between the yields on 10-year Treasury notes and BAA-rated corporate debt since 1980 can be attributed entirely to an increase in the spread between the yield on AA-rated debt and the yield on Treasury debt with little change in the spread between the BAA and AA yields, as shown in Figure 4.

If interest rates on federal debt are lower because people perceive that the risk of private capital or the price of that risk have increased, the price of future national consumption relative to current consumption has not changed on a risk-adjusted basis. Therefore, the federal government should not try to change national

saving by changing the amount of debt it issues.⁸ The larger difference between the average returns on private securities and Treasury securities would increase the average gain for the government of issuing debt in order to purchase private securities, but because that larger difference reflects greater risk or a higher price on risk in this scenario, the government should not follow this strategy unless the federal government's ability to bear risk, relative to that of the private sector, has increased as well. In addition, the risk-adjusted return to public capital relative to private capital is unchanged in this scenario, so federal investment should not change.

A different possibility is that factors besides changing assessments of risk or the price of risk may have increased the demand for federal debt. Global GDP has been increasing more rapidly than US GDP, so total foreign demand for the safety and liquidity of Treasury securities has probably increased significantly even apart from any reassessment of risk. In addition, financial regulations now require certain institutions to maintain greater amounts of capital and liquidity than before the financial crisis, and federal debt is valuable for satisfying those requirements. Of course, the supply of Treasury securities has more than doubled in the past eight years, which one might expect to have offset any increase in demand for those reasons. But some analysts have argued that the supply of assets *perceived* as safe has actually fallen (Caballero and Farhi 2014).

If interest rates on federal debt are lower because factors other than changes in the perceived risk, or the price of risk, of private assets have increased the demand for federal debt, the implications for federal debt are subtler. The government's ability to borrow more cheaply from domestic investors—who currently hold about half of federal debt—represents an implicit tax on those investors who own federal debt. This phenomenon is sometimes termed “financial repression” (as in Reinhart and Sbrancia 2011). The government's ability to borrow more cheaply from foreign investors—who currently hold roughly the other half of federal debt—represents an opportunity to extract resources from nonresidents at lower cost than otherwise. Increasing federal debt is the optimal response when considering both groups, because the resulting higher interest rates would return the implicit tax on domestic investors toward its previous level (which would be appropriate if the previous level was chosen optimally) and because the greater amount of borrowing would increase the extraction of resources from foreign investors (which makes sense because the cost of extraction is lower than it was previously).

However, in this scenario, there is no change in the return on private assets and therefore no change in the price of future national consumption relative to current consumption—which means that the federal government should not try to change national saving. Moreover, the risk-adjusted return to public capital relative to private capital is unchanged, so federal investment in physical and human

⁸That conclusion would not necessarily hold, though, if an increase in government debt would reduce the risk premium on private assets, perhaps by diminishing fears of secular stagnation. We discuss the issue of secular stagnation later.

capital should not change. What, then, should the additional funds from issuing more federal debt be used for?

If other considerations do not disallow as inappropriate, the funds should be used for federal purchases of private financial assets, because then neither national saving nor public investment would be altered; in addition, the resulting increase in risk-taking on the federal government's balance sheet would be appropriate because the spread between the returns on private securities and Treasury securities is greater in this scenario without any change in perceived risk or its price. Yet federal purchases of private financial assets may not be appropriate, perhaps because of the difficulty of the government's purchasing and holding assets neutrally across companies and sectors. In that case, the additional funds raised by issuing more debt should be used for higher federal spending (both nonfinancial investment and consumption) and lower taxes, although the distortions created from these policies mean that less additional debt should be issued than if private financial assets were being purchased.

Implications of Persistently Low Interest Rates for Countercyclical Federal Budget Policy

Persistently low interest rates on federal debt—for whatever reason—will limit the ability of monetary policy to counteract future recessions. In each of the past three economic downturns, the Federal Reserve has cut the federal funds rate by more than 5 percentage points. However, the federal funds rate is highly unlikely to reach 5 percent for the foreseeable future, so when the next recession occurs, the Federal Reserve will be unable to ease monetary policy nearly as much as it has in the past.⁹

How should federal budget policy respond? Part of the answer is that federal debt should be higher, on average. Additional outstanding debt would tend to raise interest rates, which would give the Federal Reserve more room to cut the funds rate when recessions hit. Moreover, additional debt would increase the amount of government securities the Federal Reserve could purchase to achieve quantitative easing.

Another part of the answer is that federal debt should vary more over the business cycle. To achieve that greater variation, policymakers should build automatic fiscal stabilizers that are more powerful than the existing stabilizers and that respond rapidly to changing conditions, and policymakers should enact further spending increases and tax cuts when conditions warrant.

Suppose that interest rates were not just persistently low and sometimes close to zero, but instead were stuck close to zero on an ongoing basis—or, in other words, suppose that the Federal Reserve was not just constrained from reducing the federal funds rate enough to achieve full employment periodically, but was constrained

⁹The Federal Reserve has other potential ways to strengthen its response to future recessions. For example, it could do more quantitative easing, lower the federal funds rate below zero, or raise inflation (and thus the funds rate) before the next downturn. But many observers think those approaches would be less potent than traditional monetary policy or present difficulties of their own. See, for example, Cúrdia and Ferrero (2013) and Yellen (2015).

continually. In that setting, aggregate demand would be so weak that output would fall below its potential even with a funds rate near zero.

Summers (2013b, 2014, 2015a, b) and others have deemed such a situation as “secular stagnation” and have argued that it can occur because of weakness in either domestic demand or foreign demand for US goods and services (see also Bernanke 2015a, b, c, d; Krugman 2015; Teulings and Baldwin 2014). For example, if foreigners’ demand for US assets increased because of stagnation in other countries, the resulting inflow of funds would push up the exchange value of the dollar and reduce US net exports; in the words of Caballero, Farhi, and Gourinchas (2015), when interest rates are extremely low around the world, “lower global output ... rebalances global asset markets ... [as] liquidity traps emerge naturally and countries drag each other into them.” Secular stagnation also can be self-reinforcing within a country, because weakness in output relative to potential tends to reduce inflation, which raises inflation-adjusted interest rates if nominal rates are stuck near zero. Whether the US economy will experience secular stagnation in coming years is unclear. Although economic growth has been tepid in the past few years, the unemployment rate has declined considerably, implying that a federal funds rate just above zero, a considerable amount of quantitative easing, and ongoing federal deficits have caused actual output to increase more rapidly than potential output. Still, with interest rates expected to be low for years to come—in this country and others—secular stagnation is clearly a risk.

If interest rates were stuck close to zero on an ongoing basis, federal debt should be higher than otherwise. However, that situation would not continue indefinitely: rising federal debt would ultimately tend to increase interest rates, in part by raising the perceived riskiness of that debt.

Implications of Persistently Low Interest Rates for Federal Investment

As we explained above, many of the reasons for persistently low interest rates on federal debt imply that federal investment in physical and human capital should be higher than would otherwise be optimal. Assessing whether such investment should be increased *from current levels* requires a broader assessment of the marginal costs and benefits of that investment, which lies beyond the scope of this paper. However, under the current limits on annual appropriations, federal nondefense investment as classified by the Office of Management and Budget (2016)—which includes infrastructure investment, research and development, and some support for education and training—will soon fall to the smallest percentage of GDP in at least half a century. Therefore, just maintaining the historical levels of such investments would require a significant increase relative to what will occur under current law.

Generally, the federal government should undertake all investments for which the risk-adjusted social return is greater than the social cost of the required resources. The social return of an investment includes the increment to GDP arising from the investment as well as benefits that are not measured in GDP such as better air quality or a longer life expectancy. The social cost of an investment depends on the value of private investment that is crowded out and the

deadweight loss from the distortionary taxation needed to finance it. This criterion is different from whether a public investment would raise GDP by enough to “pay for itself” through extra tax revenue because that criterion counts on the benefit side only the tax revenue generated as a result of the investment, and counts on the cost side the budgetary cost rather than the value of lost private investment and the deadweight loss of financing. (For contending views on whether public investments pay for themselves in a budgetary sense, see DeLong and Summers 2012, Congressional Budget Office 2016, and Summers 2016.) However, the more tax revenue that a federal investment generates, the less distortionary taxation is required to finance it and, thus, the lower is the social cost (all else equal).

The question of how an investment should be financed—through borrowing, or through higher taxes or lower spending of other sorts—is separate from whether the investment should be undertaken. How best to finance an investment depends on whether the federal government is trying to increase national saving at the time the investment is made. Federal investment that is financed by borrowing leaves public saving unchanged (because the extra saving in the form of the investment offsets the dissaving seen in the larger budget deficit) and probably raises private saving a little (because the additional federal borrowing raises interest rates)—thereby raising national saving a little. Federal investment that is financed by tax increases or spending cuts increases national saving more notably because public saving increases (through the investment) and private saving is essentially unchanged (because changes in federal spending have little direct effect on private consumption and changes in taxes induce roughly corresponding changes in private consumption in the long run). Therefore, if the government believes that national saving is already optimal, it should finance worthwhile investments (those with a social return greater than the social cost) through borrowing, while if the government wants to increase national saving, it should finance those investments by raising taxes or cutting other spending. We emphasize, however, that the decision about whether to undertake a public investment should depend only on the net social return and not on the means of financing, which should be decided separately based on the optimal amount of national saving. Similarly, concerns about fiscal space should affect how federal investments are financed but should not affect whether specific investments are made—except in cases where federal investment boosts tax revenue sufficiently to increase fiscal space.

The social return to federal investment is difficult to assess and likely varies significantly across investments. Returns to highways, for example, have been the subject of research for decades, while returns to many other types of investments have not. Moreover, returns vary considerably within categories; improving key highway links has a higher return than building “bridges to nowhere.” And some types of federal spending not traditionally classified as investment have an element of investment. For example, certain benefits for lower-income families have been shown to increase the future earnings of their children (for an overview of recent research on such investments, see Furman 2015a and Butcher 2017). Improving the selection of federal investments through more rigorous analysis could increase the average return.

Conclusion

The ratio of federal debt to GDP will almost surely continue to rise unless the country makes significant changes in spending programs, the tax code, or both. Because federal debt is already historically high relative to GDP, and because regaining fiscal space would enhance the government's ability to respond to unexpected events, one might presume that those spending reductions and tax increases should be implemented sooner rather than later. The economic effects of the aging of the US population reinforce the case for reducing deficits quickly.

However, that conventional wisdom overlooks the implications of persistently low interest rates on federal debt: not only do low rates slow the accumulation of debt for given paths of revenues and noninterest spending, they also imply (for many possible explanations of low rates) that both federal debt and federal investment should be higher than they would be otherwise. As a result, the policy changes that will be needed to put federal debt on a sustainable trajectory in the long run should *not* be implemented now, although *enacting* changes now would give households, businesses, and state and local governments time to adjust. For example, a combination of gradual reductions in Social Security and Medicare spending (such as through phased changes in the Social Security benefit formula and in income-related Medicare premiums), increases in taxes, and significantly higher federal investment during the next decade could allow federal debt to rise further relative to GDP over the decade but then to level out or decline relative to GDP in later years. Another implication of persistently low interest rates is that monetary policy will be less effective at responding to recessions and therefore federal budget policy should be more strongly countercyclical than it has been in the past. For example, if laws were changed so that payroll tax rates and the federal share of Medicaid spending depended explicitly on cyclical conditions, automatic fiscal stabilizers would counter future economic downturns more effectively.

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