

Chapter 5.1: Fiscal Policy

Chapter 4 brought a lot of math into our analysis. Math helps us find a definitive answer to particular questions and scenarios. However, it is important to make sure that we do not become so mathematically driven in our analysis that we forget that policy decisions are made by people who do not have access to a straightforward table about the economy.

In the first part of chapter 5, we will move away from the modeling that was at the core of our analysis last chapter and describe the basics of fiscal policy. As we move through the chapter, remember that our goal will remain the same as it was in chapter 4 (and was first brought up in chapter 3): full-employment equilibrium. Whenever in doubt, it is safe to assume that policy makers want to move the economy closer to $Y\text{-bar}$.

What is Fiscal Policy?

There are many different policies that exist that can alter the level of output in the economy. It is important to make sure we create tractable categories of policies to make sure we do not become overwhelmed with all the possible actions that can be carried out.

For our purposes, we will assume that there are two main groups of policy makers: the Federal Government and the Federal Reserve. The Federal Government in the US is made up of Congress and the President. Moving forward, when we use the term "Government", think of Congress and/or the President. The budget and policies that the Government passes are defined as [Fiscal Policy](#).

Question 5.1: Fiscal Policy

Which of the following policies do you associate with the Federal Government (Congress and the President)?

A

Changing the amount of spending on National Defense.

B

Reducing taxes for low-income individuals.

C

Increasing the interest rate on 30-year mortgages.

D

Decreasing the amount of government bonds available in financial markets.

When we think about the types of actions that Congress or the President can take, you may be thinking about laws being passed. This is correct. What often comes out of passing laws is a change in government spending, such as National Defense. Changes in taxes are often a focal point of debates in Congress.

Both changes in government spending and changes in taxes are examples of fiscal policy. Answers (A) and (B) in question 5.1 are specific examples of how government expenditures and taxes can be altered. The last two answers in question 5.1 are examples of monetary policy, which is carried out by the Federal Reserve, which we will cover in chapter 6.

The implicit assumption has been made that the government wants to move the economy towards the full-employment level of output, $Y\text{-bar}$. This means that if the economy is producing above the full-employment level of output, the government will take actions that decrease equilibrium output. In the case where the economy is producing below the full-employment level of output, the economy can be thought of as in a recession and the government will attempt to increase the equilibrium level of output.

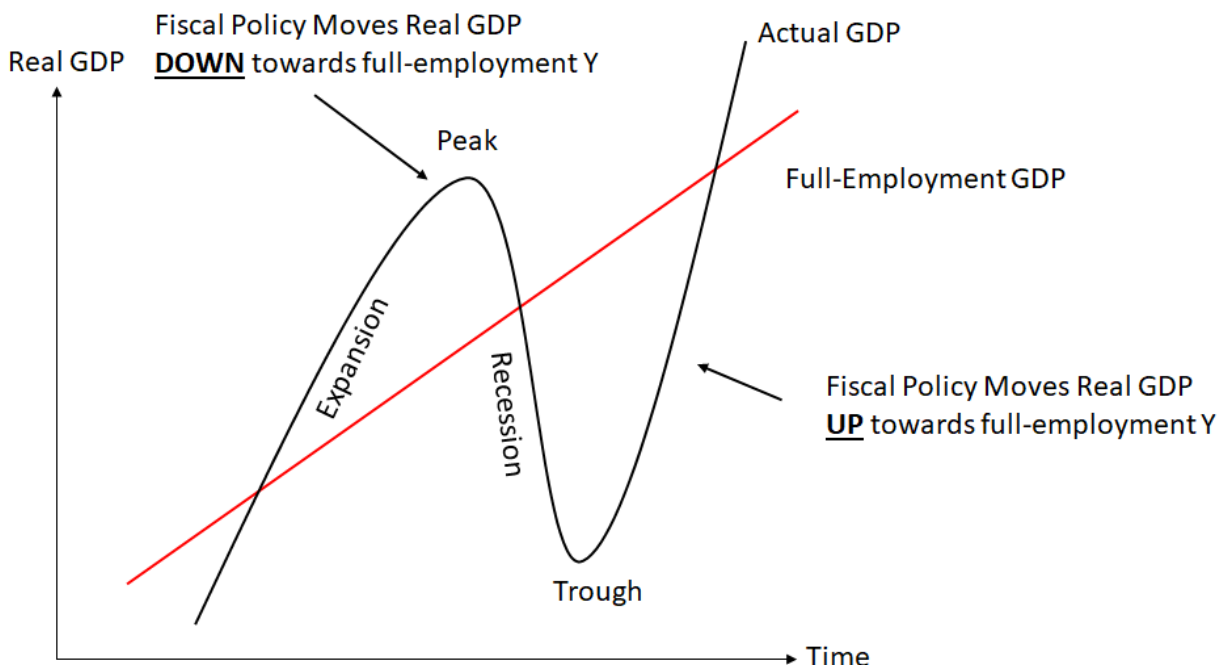


Figure 5.1.01

The figure above visually shows the idea that the government wants to carry out **Counter-Cyclical Fiscal Policy**. Counter-cyclical fiscal policy is the concept described above that says that the government will enact policies that move the economy closer to full-employment output. In other words, they will counter the business cycle. In the graph above, when the actual GDP is above the full-employment GDP, counter-cyclical fiscal policy will move output down towards the red line. When the actual output is below the full-employment level of output, counter-cyclical fiscal policy will aim to increase equilibrium output.

Incorporating Fiscal Policy into our Analysis

Now that we have a better handle on who carries out fiscal policy, let's figure out how it factors into our analysis. It turns out, we have already covered fiscal policy in chapter 4, it just happened to be in the context of changes in components of aggregate expenditures. Question 5.1 reiterated this concept and shows that there are two main ways that fiscal policy can influence output: changes in government spending (G) and change in taxes (T).

Recall our aggregate expenditure equation from last chapter:

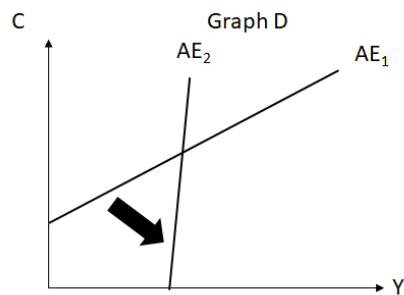
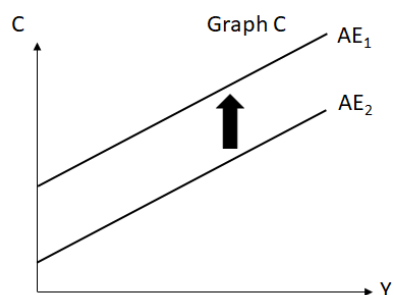
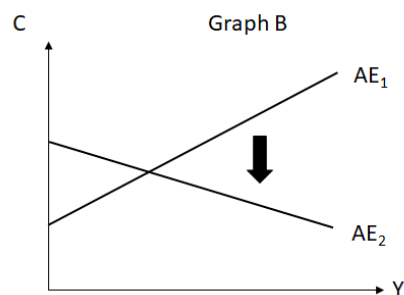
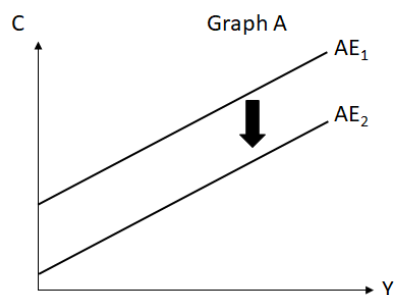
$$AE = C + I^P + G + NX$$

$$AE = AC + mpc * (Y - T) + I^P + G + NX$$

Because fiscal policy is defined as a change in G or a change in T , it has a direct influence on our aggregate expenditure curve. In chapter 4.3, we learned how a change in these components can shift our AE curve and there is a multiplicative effect on the equilibrium level of output. For every additional dollar spent on G , there is a $(1/1-mpc)$ dollar increase in the equilibrium Y . An additional dollar in taxes obtained by the government changes the equilibrium level of Y by $(-mpc/1-mpc)$.

Let's review how G and T can shift the AE curve, but now think about the role of counter-cyclical fiscal policy.

5.2: Counter-Cyclical Fiscal Policy 1



The economy is operating above the full employment level of output. Which of the following graphs is consistent with the idea of a counter-cyclical policy being carried out?

A

Graph A

B

Graph B

C

Graph C

D

Graph D

Question 5.3: Counter-Cyclical Fiscal Policy 2

The economy is operating above the full employment level of output. Which of the following actions are consistent with the idea of a counter-cyclical policy being carried out?

A

Increase G

B

Decrease G

C

Increase T

D

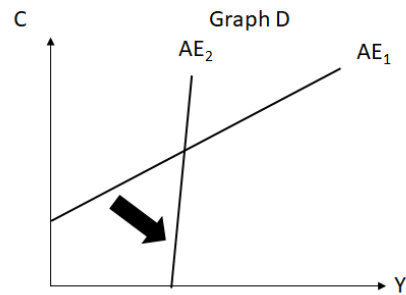
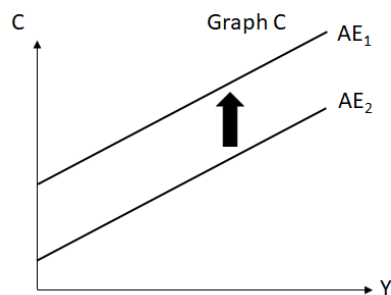
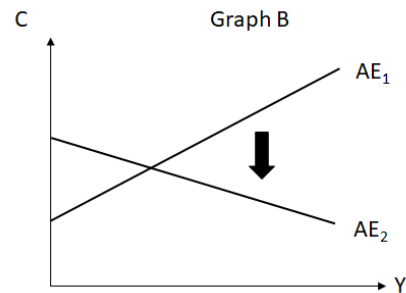
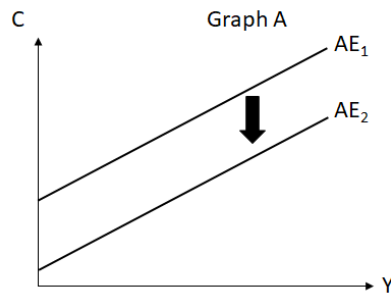
Decrease T

In question 5.2, you need to recognize that the economy is producing above the full-employment level of output and any fiscal policy action should decrease equilibrium output. Because fiscal policy directly impacts the aggregate expenditure curve, fiscal policy can be used in this scenario to decrease aggregate expenditures, shifting down the AE curve (graph A).

Now that you know that policy makers want to decrease the AE curve, we can start to think about the different actions that can make that happen. In simple terms, the government wants to decrease spending. They have two levers in which this can happen: decreasing government spending (G) or decreasing the amount of disposable income ($Y - T$) by increasing taxes (T). Both of these policy actions will cause the aggregate expenditure curve to decrease. Fiscal policy that decreases the equilibrium level of output is also called [contractionary fiscal policy](#).

Let's take a look at what should be done when there is a recession and production is below the full-employment level of output.

Question 5.4: Counter-Cyclical Fiscal Policy 3



The economy is operating below the full employment level of output. Which of the following graphs is consistent with the idea of a counter-cyclical policy being carried out?

A

Graph A

B

Graph B

C

Graph C

D

Graph D

Question 5.5: Counter-Cyclical Fiscal Policy 4

The economy is operating below the full employment level of output. Which of the following actions are consistent with the idea of a counter-cyclical policy being carried out?

A

Increase G

B

Decrease G

C

Increase T

D

Decrease T

Questions 5.4 and 5.5 present the opposite situation depicted in questions 5.2 and 5.3. The economy is operating below the full-employment level of output. This means that the government wants to carry out actions that will increase aggregate spending in the economy. In other words, they want to shift up the aggregate expenditure curve (graph C). There are two ways the government can shift up the AE curve: increase G or decrease T. Both of these policies will have multiplicative effects on the overall level of output and both policies will increase total production in the economy, moving us closer to a full-employment level of output. Fiscal policies that increase the equilibrium level of output are also called [expansionary fiscal policy](#).

In theory, the government can control the level of production in the economy by altering government expenditures or taxes, and eventually the aggregate expenditure curve. While this makes fiscal policy sound like an easy solution for any economy not operating at $Y\text{-bar}$, it sounds a little too good to be true. Assuming that fiscal policy can be carried out quickly and smoothly, it can certainly move us closer to $Y\text{-bar}$. However, there are many limitations that we need to identify in order to better understand the constraints surrounding fiscal policy. Before we get to those constraints, let's take a quick look at some specific categories of fiscal policy.

Discretionary Fiscal Policy vs. Automatic Stabilizers

Categorizing fiscal policy into changes in government spending (G) and changes in taxes (T) is convenient, since it fits nicely into our analysis of aggregate expenditures. A shortcoming of having such broad categories is

that we do not learn much about an example of specific fiscal policies that are commonly enacted.

Fiscal spending is broken up into discretionary and non-discretionary fiscal policy. **Discretionary fiscal policy** is classified as changes in government spending or taxation that are decided upon by the government on an annual basis. A lot of the things that we associate with government spending falls into discretionary spending: national defense, education, highway infrastructure and parks are allocated different amounts of funding every year. Changes in the marginal tax brackets would also fall under discretionary fiscal policy.

Non-discretionary fiscal policies are also called **automatic stabilizers**. Automatic stabilizers are automatically occurring fiscal policies that are enacted in response to changes in the level of production. For example, when the economy is in a recession, tax revenue is lower as households move into lower tax brackets. This automatic reduction in taxes will increase take-home income and the aggregate expenditure curve. If the economy is producing above the full-employment level of output, there will be a reduction in unemployment benefits, causing the level of G and AE to decrease automatically.

Moving forward, we will simplify our analysis and focus mainly on discretionary fiscal policy. Changing automatic stabilizers involves changing long-standing institutions such as Social Security and Medicare. Changes to discretionary spending are frequent. For example, altering the national defense budget often causes tension, but that does not prevent the resources dedicated to national defense from changing every year.

The chart below provides a graphical look at the spending that the government plans to carry out in 2017 (from the Congressional Budget Office). Roughly 60% of the estimated \$4 trillion in spending is non-discretionary spending. Of the remaining discretionary spending, about 50% is defense

spending and 50% is non-defense spending. This means that about 15% of total spending by the government goes towards national defense.

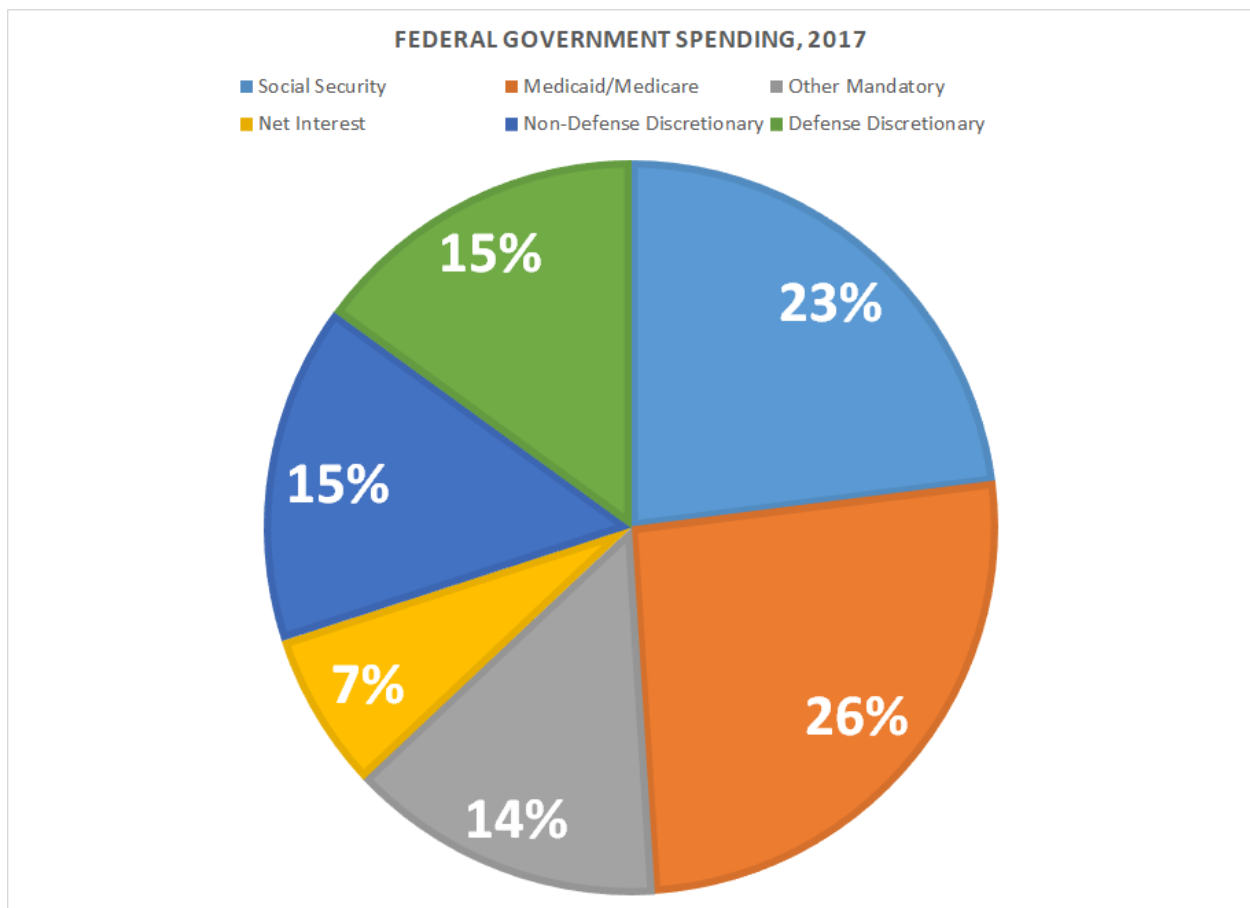


Figure 5.1.02

In order to pay for the \$4 trillion in 2017, the government draws money from taxes. Tax revenue falls into a few general categories that many of you are probably very familiar with. Income taxes are responsible for nearly 45% of the total tax revenue. Corporate taxes make up around 15% of tax revenue and social insurance taxes is responsible for another 35%. The remaining revenue comes from tariffs on imports and excise taxes, which are taxes on individual goods such as gasoline and cigarettes.

Although the government has the discretion to change the tax brackets, once the tax brackets are set, they lose discretion over how much revenue they can generate. Taxes fluctuate noticeably with economic activity.

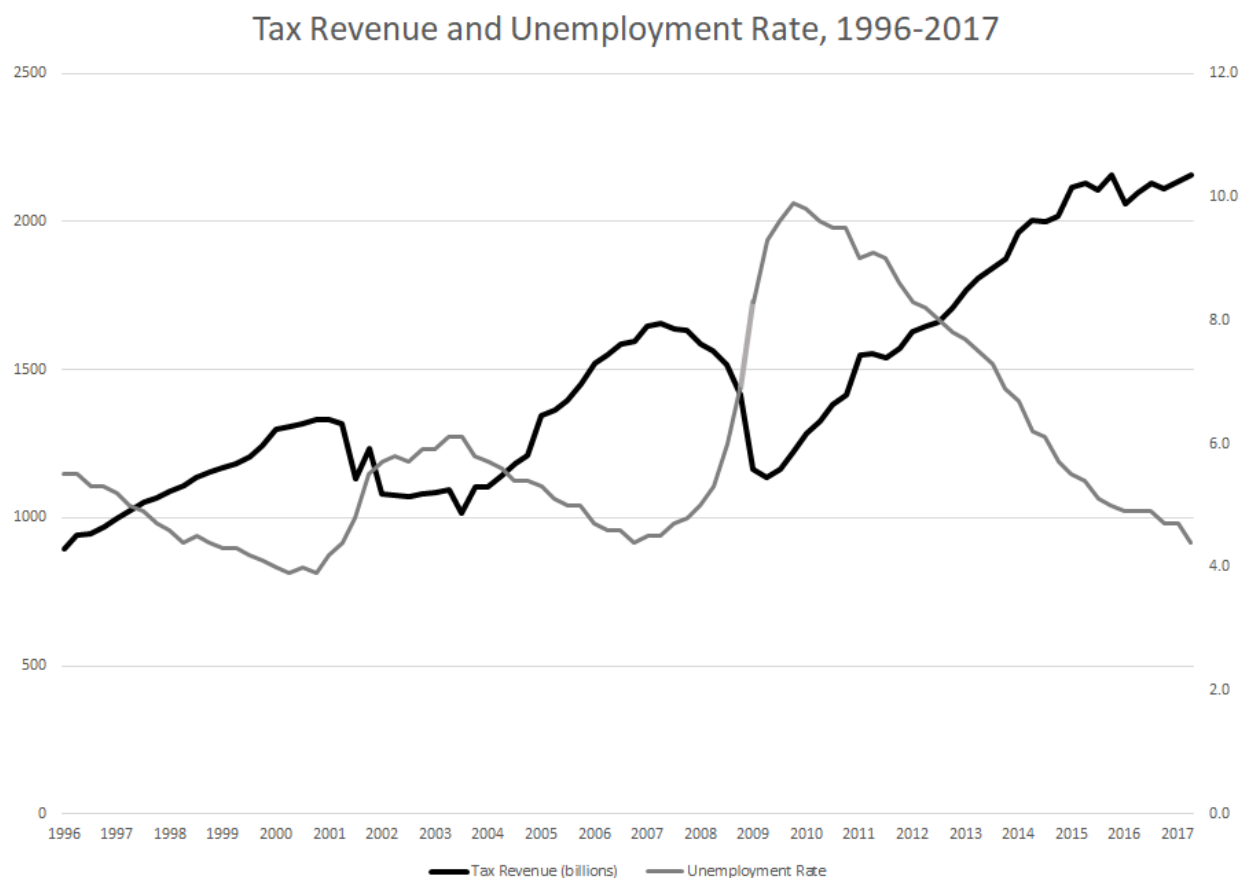


Figure 5.1.03

The graph above shows how tax revenue (black line) fluctuates with the unemployment rate (gray line) between 1996 and 2017. As the unemployment rate rises, the tax revenue falls, since incomes decrease. Since the Great Recession ended in 2009 and unemployment has decreased, there has been a consistent rise in tax revenues that coincides with a decrease in the unemployment rate.

Problems with Fiscal Policy

Imagine that the economy is in a recession. The government decides they want to carry out expansionary fiscal policy, which counters the recession. How exactly does this work? In a smooth world, one branch of Congress creates a bill that increases spending. That bill is sent to the other branch of Congress. Any changes made and agreed upon must then be sent back to the

original branch of Congress that created the bill. Once both branches agree on exactly the same bill, it is sent to the President, who signs it into law.

From there, it takes more time to figure out who the government will contract for the project. For example, if more money is going to be given to the parks system, which parks will be given money? Will the money be used to improve infrastructure or hire more workers? If it is used to improve infrastructure, who will be hired to make those improvements?

Our simple increase in government spending got out of hand pretty quickly there. And that is assuming that the two branches of Congress quickly agree on a bill and it is not vetoed! If that is our best-case scenario, then what problems are likely to be encountered when carrying out fiscal policy?

Fiscal Policy Problems

Can you think of some problems associated with carrying out fiscal policy?

Responses

Reply

Ordered by

Newest Responses

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Government Expenditure Problems

In examining potential problems with fiscal policy, let's first focus on issues related to enacting changes in government spending by looking at a real-world problem. Cincinnati, Ohio is a quintessential Midwestern city that sits along the Ohio River. Just south of the river lies Kentucky. Like most river cities, there are many bridges that run up-and-down the river, with a high concentration of bridges near the city.



Figure 5.1.04

A major issue facing the city right now is the Brent Spence Bridge. The Brent Spence Bridge is a double-decker bridge where I-71/I-75 runs over the Ohio River. The bridge is not in good shape: the quality of the highway is low with potholes scattered throughout and there is no emergency lane, exacerbating problems when an accident occurs on the bridge.



Although there are many bridges in the US that are in need of repair, a unique fact surrounding the Brent Spence Bridge is that over 4% of GDP goes across

the bridge every year! Literally \$1 out of every \$25 in production in the US will be on that bridge at some point in a given year! Unsurprisingly, the Department of Treasury has named replacing the bridge one of [America's top infrastructure projects](#).

The low quality of the bridge is not new. So why has it not been replaced already? One of the reasons is that implementing fiscal policy is not very easy. A few years ago, former President Barack Obama talked at the bridge and was joined by Kentucky Senator Rand Paul. In his speech, he mentioned how the replacement of the bridge was being held up by the former Speaker of the House, John Boehner (from southern Ohio) and Senate Majority Leader, Mitch McConnell (from Kentucky). Two of the most powerful individuals in Congress at one point were directly connected to the Brent Spence Bridge, but no progress was made to replace the bridge!



Part of the problem that came with replacing the bridge was, where was the money going to come from? President Obama had wrapped the bridge into a bigger stimulus proposal, which did not sit well with Senator Mitch McConnell.

Here is Senator McConnell explaining his problem with funding the bridge through a stimulus plan.



In addition to the political disagreements surrounding the bridge, there are also disagreements among citizens about whether replacing the bridge is truly a priority. The local news in Cincinnati highlighted the two sides of the argument a few months ago.



What does all of this tell us? There is a clear problem with the Brent Spence Bridge and while there is a general agreement that it needs to be fixed, the actual implementation of fiscal policy is not as easy as shifting our aggregate expenditure curve. Let's classify the primary issues surrounding enacting changes in government spending (G).

Time Lag: A theme underlying the Brent Spence Bridge example is that the relatively straightforward process of passing a bill that was laid out earlier is rarely seen in practice. Creating a bill that changes G takes a lot of time. Agreeing on the language of the changes takes even longer. In our analysis in the previous chapter, we assumed that the government can respond quickly to a reduction in output by increasing spending. This swift action can happen, but is unlikely.

Implementation: Assume that Congress and the President happen to pass a bill that provides funding for a new bridge spending in a timely and efficient manner. This is a great first step, but what is next? The government has to figure out who is going to build the bridge. Do they give the contract to the construction company who can build a bridge for the lowest cost? Or should

they look for the highest quality construction company? How can they even differentiate between a high- and low-quality company? With all this uncertainty, maybe it will make sense to just go with someone's cousin. The cousin's company may not be the best, but at least they are related to someone in the government...

After deciding on who builds the bridge, it takes a lot of time for that multiplier we discussed last chapter to filter through the economy. Furthermore, if a disproportionate share of money ends up in the hands of a high-income individual, they may have a lower marginal propensity to consume than the average individual, reducing the total effect of the spending increase.

Securing funding is just the start. The time it takes to implement spending can cause significant delays in our movement towards a new equilibrium.

Irreversibility: Now assume that the government decides to build a new bridge as a way to inject money into a local economy because output is below full-employment output ($Y\text{-bar}$). The bridge will use resources from nearby and increase incomes in a variety of industries. However, it takes years from the time that the bridge is proposed during a recession to the time it is completed. By the time the bridge is halfway completed, it is not unreasonable to think the economy may have recovered on its own due to natural forces in the economy pushing it towards full-employment. Any additional money spent on the bridge is pushing the economy beyond full-employment output.

As we will see in the next few chapters, this can lead to inflation. Despite the costs of continuing to build the bridge, it does not make sense to stop construction of the bridge when it is halfway done. Pictures of half-completed bridges would look worse than the abandoned projects we saw in Las Vegas during the Great Recession!

There are certainly other problems surrounding changes in government spending that we could discuss, but these points above gives us a good sense of why changing G in reality is more difficult than we first proposed.

Tax Revenue Problems

5.6: Tax Cut Poll

The government decides they want to carry out expansionary fiscal policy by cutting taxes. They can only cut taxes for one income bracket. Which group should pay fewer taxes?

A

The rich (incomes more than \$350,000 per year)

B

The upper-middle class (incomes between \$100,000 and \$350,000 per year)

C

The middle class (incomes between \$50,000 and \$100,000 per year)

D

The lower class (incomes between \$30,000 and \$50,000 per year)

E

The poor (less than \$30,000 per year)

Given the problems associated with changing government spending, let's explore whether or not changing taxes is a more efficient way of carrying out fiscal policy. The poll above gets to the heart of tax policy debates: who should benefit from tax cuts?

What makes this question so difficult is that there is not a single correct answer. First consider giving tax cuts to the poor. The primary benefit of doing this is that low-income individuals are more likely to spend the tax cut and multiply the tax cut through the economy. In other words, they have a high marginal propensity to consume (mpc). An individual who makes \$30,000 per year pays \$4,000 annually in taxes. Reducing their tax burden can have a meaningful impact on spending.

However, if only tax cuts are given to the poor, then it may not be possible to increase spending enough to bring the economy back to full-employment

equilibrium. So let's look at the other extreme and explore what the benefits and costs of giving tax breaks to the rich are.

Imagine that tax cuts are given to individuals making over \$1 million per year. These individuals pay approximately \$350,000 per year in taxes! A small reduction in the tax rate can lead to a large decrease in the tax bill. Assuming that the rich individuals have a high mpc, this strategy could help increase overall spending and lead to more income for poor individuals.

If the rich individuals do not spend their tax break and instead invest in firms that hire more workers, the tax cut could also be beneficial to low-income workers. However, it is possible that a rich individual that gets a tax break will simply invest the money into something that generates more income for themselves, but does not necessarily create more jobs. In this scenario, the tax break just turns into less tax revenue for the government without additional spending in the economy.

Income groups between the poor and rich likely have attributes of both of the extreme groups. Choosing one of those groups in the poll above suggests that you noticed the benefits of cutting taxes in the extreme groups, so choosing a group in the middle grabs some of benefits associated with both the poor and rich.

An additional constraint when discussing tax policy has to do with the fact that politicians are always looking to get reelected. This means that they will put a lot of weight on cutting taxes for the group that is the most influential in allowing them to keep their job. While this strategy may serve them well personally, it does not necessarily reflect the best outcome for society.

One final problem with tax cuts has to do with *forward-looking behavior*. Households that receive a tax break during a recession may view the tax break as a transfer of money from a bad economic state to a good economic state.

The tax break received during the recession will be taken back when the economy recovers.

General Problems with Fiscal Policy

Overall, changes in government spending and taxes have limitations specific to each category. Because there is a large time-lag and there are many actors involved in fiscal policy, monetary policy (chapter 6) is often looked to when a quick policy change is needed. Enacting monetary policy only involves a dozen or so policy makers, none of which are ever up for reelection. In the case where monetary policy can move the economy to the same outcome as fiscal policy, it does not make sense to "double-up" and enact both monetary and fiscal policy. Doing so would cause policy makers to overshoot the full-employment equilibrium.

However, the discussion above would have a very different tone if fiscal policy was "free". Every dollar that the government spends on a bridge is a dollar that they are not spending on education. A dollar spent on any project must be funded by either taxes or a loan. Decreasing taxes means that the government has less revenue, which is needed to make purchases.

In the next section, we will discuss the consequences of the costs of fiscal policy, but you may already be familiar with the general problems associated with the government spending more than they bring in through taxes. When the government spends too much, they run a deficit. The deficit is the amount that the government needs to borrow to honor all of their spending commitments. The amount borrowed adds to the national debt. Small fluctuations in the national debt are not noticed by the average household. However, during the Great Recession, there was a large increase in spending and a reduction in taxes that led to a significant increase in the deficit and debt. The next section will go into detail about the consequences of a large increase in the deficit and national debt.

Fiscal Policy during the Great Recession

Although fiscal policy is difficult to implement, the Great Recession presented fiscal policy makers with a new challenge. In 2008, the US economy was facing the worst economic situation since the Great Depression in the 1920s!

Because of the significant decline in economic output and reduction in confidence about the economy, there were two major fiscal bills that were implemented by the government: the Trouble Asset Relief Program (TARP, the bank bailout bill) and the American Reinvestment and Recovery Act (ARRA, the Stimulus Package). Both of these programs should be understood as they played a big role in the recovery from the Great Recession.

Troubled Asset Relief Program (TARP)

Recall from chapter 2 when we discussed the housing market, how there was chaos in the financial markets during the Great Recession. Banks had packaged mortgage backed securities and sold them to investors, effectively passing off the risk of subprime mortgages. Compounding the problem was the excessive amount of *credit default swaps*, which provided insurance for people purchasing those mortgage backed securities.

After the collapse of the financial market, the government felt it was necessary to keep large financial institutions operating. Although bailing out banks may have been a controversial move, the government believed letting certain institutions go bankrupt would have been more detrimental than not intervening.

The Troubled Asset Relief Program itself contained a handful of provisions. Overall, \$700 billion in "troubled assets" were authorized to be purchased by the US Treasury. This meant that the government essentially bought the subprime mortgages that precipitated a large part of the financial crisis.

Of the \$700 billion in TARP funds available, about \$400 billion was used to stabilize the financial markets. This included purchases of stocks in banks such as Goldman Sachs, JP Morgan and Wells Fargo. American Insurance Group (AIG), which had insured many credit default swaps, were loaned \$40 billion. Both Citigroup and Bank of America were loaned \$45 billion and General Motors and Chrysler were given loans that totaled approximately \$75 billion.

Because the TARP funds were not subsidies for the companies to keep, but rather loans or stock purchases, the government did not lose money (estimates are uncertain) on TARP once the loans were paid back. This does not mean that TARP was not without controversy. There is evidence that community banks owned by black individuals were less likely to receive TARP funds.

American Reinvestment and Recovery Act (ARRA)/Stimulus Package

Unlike TARP, the American Reinvestment and Recovery Act (ARRA), also referred to as the stimulus package, was a direct change in government spending (G) and taxes (T). The goal of ARRA was to speed up the recovery from the Great Recession. In total, the total amount government spending increases and tax reductions totaled \$787 billion.

Here is a quick video of former President Obama talking about the motivation of the ARRA:



And take a look at this video for an overview of the components of the ARRA:



There were many components of the stimulus package. Of the \$787 billion, \$288 billion, about 1/3rd, went towards tax cuts. Another \$150 billion

went towards healthcare and \$90 billion was put towards education. Infrastructure and energy spending increased by \$140 billion and social welfare programs received \$82.5 billion.

Consequences of the Stimulus Package

With so much money being spent by the government in a single act, it is worth investigating how effective the stimulus package was. We can tie the stimulus back to the multiplier equations we learned about in the previous chapter. In past examples, we have used marginal propensity consume estimates of 0.75, 0.8 and 0.9. While those mpc values may be accurate in good economic times, they are probably a bit too high immediately following a recession.

Assume that the marginal propensity to consume just following the recession was 0.5. Let's figure out how big the government expenditure and tax multipliers should be, and how much the stimulus package was estimated to increase GDP, assuming a conservative mpc of 0.5.

5.6: Stimulus Package Government Expenditure Multiplier

Assume that the mpc for all government spending in the ARRA was 0.5. The stimulus package increased government spending by \$500 billion. What is the change in equilibrium output expected from the increase in government spending?

A

\$50 billion

B

\$500 billion

C

\$1000 billion

D

\$2000 billion

5.7: Tax Multiplier

Assume that the mpc for all tax cuts in the ARRA was 0.5. The stimulus package decreased taxes by \$250 billion. What is the change in equilibrium output expected from the decrease in taxes?

A

\$250 billion

B

\$500 billion

C

\$1000 billion

D

\$2000 billion

In question 5.6, the expenditure multiplier can be calculated as $1/(1-\text{mpc})$, where mpc is 0.5. This makes the expenditure multiplier, $1/0.5$, which is equal to 2. For every dollar the government spends, the GDP increases by \$2.

Government spending increased by approximately \$500 billion as a result of the stimulus package. Combining the change in G of \$500 billion with the multiplier of 2 yields a total increase in equilibrium GDP of \$1000 billion, or \$1 trillion, according to our estimates,.

Now turn to question 5.7 and take a look at the tax multiplier when the mpc is 0.5. The tax multiplier is calculated as $-\text{mpc}/(1-\text{mpc})$. Plugging in 0.5 for the mpc yields a multiplier of $-0.5/0.5$, which is just -1. This means that for every dollar in tax cuts that the government made, the equilibrium GDP is expected to increase by one dollar. While this is not a big multiplier compared to our previous calculations, it does make it straightforward to see that a \$250 billion tax cut should increase the equilibrium GDP by \$250 billion.

In questions 5.6 and 5.7, we used the lowest mpc we have seen to estimate that the stimulus package would have a government expenditure multiplier around 2 and a tax multiplier around -1. So what were the size of the multipliers in reality. A [2012 CBO report](#) estimated surprisingly low multipliers from the ARRA.

The table above shows the CBO's multiplier estimates of provisions of the ARRA one year after implementation. Because many of the provisions in the

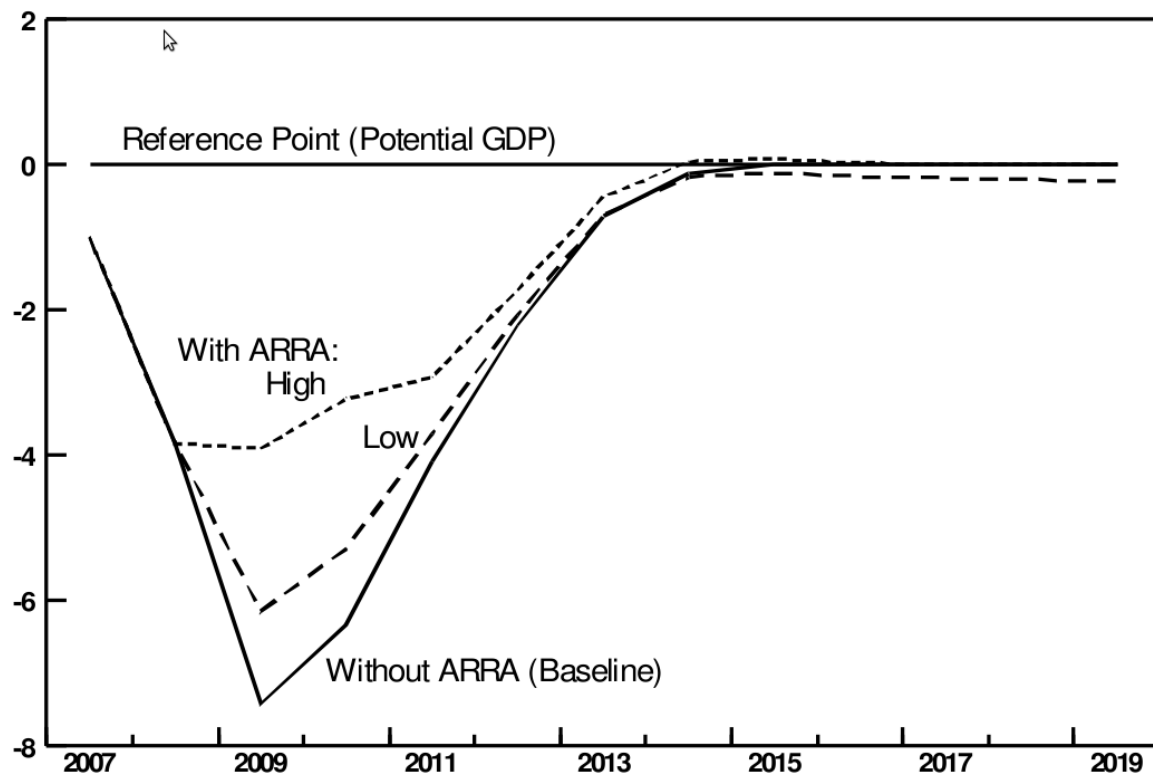
ARRA were transfer payments, the change in overall GDP from a change in government spending was less than \$1 according to lower bound estimates!

Tax multipliers had lower bound estimates of 0.1 to 0.3 (negative signs are dropped). This is equivalent to an mpc estimate of around 0.1, much lower than our conservative estimate of 0.5. In fact, tax cuts for higher income individuals through the ARRA had an upper bound estimate of 0.6. This would suggest that the mpc for these individuals maxed out around 0.4.

With multipliers lower than we have been estimating, it begs the question, was the stimulus package worth it? Did it do anything to help the economy recover? These are difficult questions to answer since it involves estimating what the world would look like without the stimulus packages. If you continue to take economics, you may have the opportunity to take a time-series econometrics course, which will introduce you to the tools used to create the CBO figure below.

Figure 1. Difference Between Potential GDP in CBO's Baseline and Actual GDP Without and With the Impact of the American Recovery and Reinvestment Act of 2009

(Percentage difference in the fourth quarter of each year)



Source: Congressional Budget Office.

Figure 5.1.05

In the figure, the horizontal line at 0 represents full-employment GDP. The graph itself represents the deviation from full-employment after 2007. The solid black line is what the CBO estimated the GDP to be without the stimulus package. Without the stimulus package, the GDP would have been nearly 8% below the full-employment level of GDP in 2009.

The dashed line shows the deviation from If the low multiplier estimates of the stimulus package are accurate. In this scenario, the GDP is 6% below full-employment output instead of 8%. The dotted line uses the high multiplier estimates and shows that the GDP only decreased 4% below the full-employment level by 2009.

What makes these estimates difficult is that it is hard to attribute changes in spending directly to the stimulus package. However, there is evidence that even in the most conservative models, the stimulus package prevented GDP from falling further than it would have.

At the same time, the ARRA came at a cost of nearly \$1 trillion. In order to assess whether or not the ARRA was worth it, we need a better understanding of the consequences associated with an increase in our deficit and debt. And the next section will do just that!

Chapter 5.2: Deficits and Debts

Our previous section discussed the details surrounding fiscal policy. The section ended with a discussion about the ARRA, or stimulus package, that was enacted during the Great Recession. There is evidence that the \$1 trillion spending package helped the economy recover from the Great Recession. However, it came at a high cost. How does that high cost impact our economy in the future? Through an increase in the deficit and the national debt.

The terms deficit and debt are thrown around often in the news, so it is important to make sure we recognize what the terms mean and how much weight we should assign to changes in the deficit and the debt.

5.8: National Debt Importance

On a scale of 1-10, how important is the national debt? Assume that 1 is not important at all and 10 is the most important issue facing the country.

A

1 (not important at all)

B

2

C

3

D

4

E

5

F

6

G

7

H

8

I

9

J

10 (most important issue facing our nation)

Deficits, Surpluses and Debts

Theoretically, we have seen that changing G or T can alter our Aggregate Expenditure (AE) curve and move our equilibrium to the full-employment level of output, $Y\text{-bar}$. Even if we assume that the government can smoothly change G or T , and implement those changes efficiently, altering government spending or changing the amount of tax revenue is not free. Just like a firm that generates revenue and spends on production, the government is spending on goods and services (G) after generating revenue (T). If the amount of spending by the government is larger than the tax revenue, the government will have to borrow money in order to pay for all of their purchases.

In the event that the government is spending more than the level of taxes, $G > T$ and the government is running a **budget deficit**. The size of the budget deficit can be quickly calculated as:

$$\text{Budget Deficit} = G - T$$

In 2015, the United States government spent \$3.687 trillion and generated \$3.249 trillion in tax revenue. The government had a deficit of $3.687 - 3.249 =$

0.438 trillion = \$438 billion. In order for the United States government to pay for all of their purchases, \$438 billion had to be borrowed.

There are years where the United States government has run a **budget surplus**, where the amount of tax revenue is greater than the amount of government spending, $T > G$.

$$\text{Budget Surplus} = T - G$$

When the government has money leftover after paying for all of their purchases, it is possible to pay fully back lenders who funded deficits in the past. Below, we will discuss how the government is not obligated to pay back lenders just because there is a budget surplus.

The deficits and surpluses from the U.S. Office of Management and Budget are shown in the figure below. Between 1998 and 2001, the United States ran a budget surplus. In every other year since 1970, the United States has run a budget deficit.

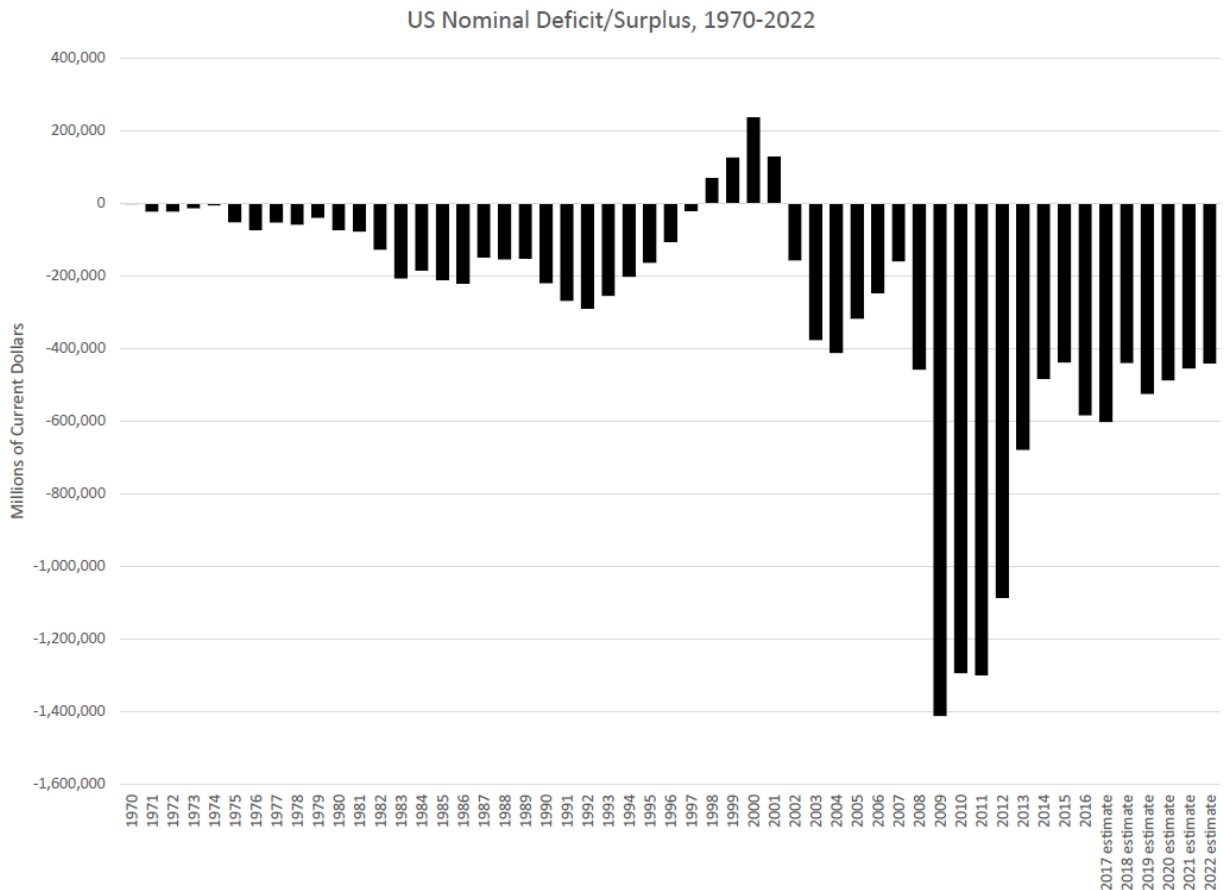


Figure 5.2.01

In the years that the government runs a deficit and borrows money to fund their spending, the size of the **national debt** grows. The debt is the total amount of money that the government owes to lenders.

The relationship between the deficit and debt can be illustrated in a simple example. Imagine a government begins year 1 with no debt. In year 1, $G - T = 100$, which means that the government has a budget deficit of 100. The government borrows 100 in order to pay for the G not covered by Taxes (T).

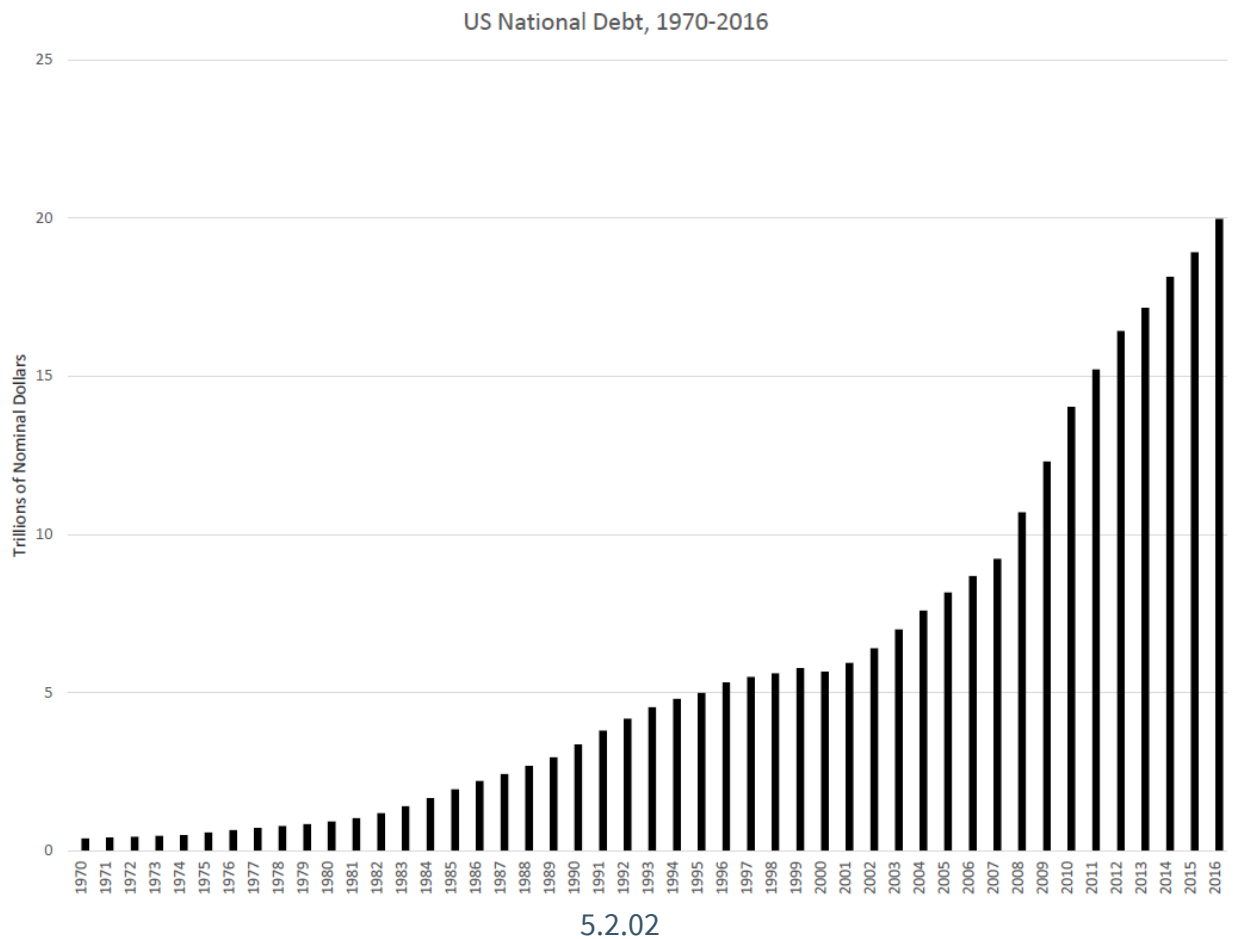
In year 2, the government starts the year with a debt of 100. Imagine that in year 2, $G - T = 150$. The government deficit in year 2 means that the government borrows 150 to pay for the G not covered by Taxes (T). After year 2, the debt is 250. This is calculated from the original 100 in debt plus the 150 deficit.

When the government runs a surplus in year 3, assume that the additional surplus is used to reduce the debt. In year 3, the government runs a surplus and $T - G = 50$. Another way to think about this is that $G - T = -50$ and there is a "negative deficit", which is a surplus. This surplus is used to pay down the 250 debt that existed at the start of the year and at the end of year 3, the debt is reduced 200.

In 2015, the US Government ran a deficit of \$438 billion. This means that \$438 billion was borrowed by the government in order to cover the shortfall in 2015 and the nation debt increased by \$438 billion. By borrowing, the government was able to pay for goods and services in 2015 that were not covered by tax revenue, but owe an additional \$438 billion to lenders. After adding the amount the government has borrowed to lenders throughout the history of the country, the US Government owes over \$20 trillion to lenders! The video below shows the growth in the national debt. A current version of the debt clock is available at <http://www.usdebtclock.org/> and shows that we owe \$20.5 trillion!



It is natural to be concerned about the large size of the debt. Equally concerning is the trend in the national debt over the past few decades. Data from US Treasury below shows a noticeable increase in the debt since 2002, with a particularly large increase during the Great Recession in 2008-2010. This is not surprising given the large deficit that the US had during these years. In fact, if we were to create a line graph of the debt, the slope of the line during a given year would be equivalent to the size of the deficit. (Don't think too much about this if you have not taken calculus, but for those that are helped by advanced math, the slope of the national debt is the deficit.)



The thought of the US government holding a debt of \$20.5 trillion makes even the most free-spending individuals pause! Fortunately, the \$20.5 trillion figure is misleading for a number of reasons. Lets talk about some *National Debt*

Facts below so we can separate "fake news" about the debt from actual problems caused by a rising national debt.

National Debt Facts

Fact 1: We owe less than \$20.5 trillion to lenders

Approximately 25% of the \$20.5 trillion we see on the debt clock is considered intra-governmental borrowing. Approximately \$5 trillion of the debt has been borrowed from government trust funds, such as the Medicare and Social Security trust funds. This is debt that the US Government does not have to pay to private lenders.

To understand intra-governmental borrowing, imagine that in 2017, the government runs a deficit of \$500 billion. In order to make up the \$500 billion shortfall, the government can go out and look for private or foreign investors such as households, firms or other countries.

Another option is to see if money is available in other parts of the government. The Social Security Trust Fund was created when the Social Security system was created in the 1930s. In the early years of the program, more money was being put towards the program than was being paid out. The extra money was put in a trust fund and allowed to earn interest. Today, there is nearly \$3 trillion in the trust fund. This money is needed to make Social Security payments, but the government has also borrowed from the trust fund.

The amount borrowed from the trust fund is included in the \$20.5 trillion US debt clock from the link above. However, the borrowing is inherently different than borrowing from outside the government. Terms of repayment, such as interest are different than borrowing from a private lender.

The amount that the US Government owes to the private lenders is called **public debt**. The public debt in the US is approximately \$15.2 trillion

since there is roughly \$5 trillion in intra-governmental debt added to most debt clocks.

Here is a way to think about public debt. Consider the Jones family. They owe \$1,000 to private lenders. This comes from Mr. and Mrs. Jones owing money on a home and personal loans. It also includes the student loans of one child, Johnny. Assume another child, Sally, does not have any debt. Johnny needs some cash to help repair his car, so he borrows \$100 from Sally. The amount the family owes outside lenders is still \$1,000, but after that debt is paid, Johnny will still owe Sally \$100. If we wanted to estimate the debt for the family, we could say that there is \$1,100 in total debt, but \$100 of the debt is from within the family (intra-governmental debt) and the remaining \$1,000 is owed to private lenders (public debt).

Fact 2: The nominal size of the debt is not relevant to economists

It's not everyday you can save \$5 trillion in a few paragraphs, but *Fact 1* already allowed us to remove \$5 trillion from the debt clocks above. However, the level of public debt is over \$15 trillion, which still sounds like a lot of money!

It turns out that only looking at the amount of money the government owes is not very informative. The nominal size of the of public debt in the US of \$15 trillion does not provide any information about the ability to pay back the debt. In order to understand how debilitating the debt is, the size of the debt needs to be compared to the amount of money available to actually pay off the debt.

This concept is best seen by looking at the debt of a specific individual. Imagine that after two friends graduate college, both have \$50,000 in student loans. This is their personal debt. One individual gets an entry level job after graduation that pays \$50,000 per year. In order to pay off their debt in one

year, the individual would have to put 100% of their income towards the loan. Paying off the loan in one year is not feasible in this case, which makes the new graduate a risky borrower. It is hard to imagine a bank willing to give him good terms on a car loan if he has trouble making ends meet already. Another way to think about this situation is that the personal debt is equivalent equal to 100% of his income.

The other individual was an economics major (and had a LOT of luck) and after graduation landed a job paying \$100,000 per year. This individual still owes \$50,000 in student loans, but the burden of the loan is significantly less than her friend. It is possible for this highly paid student to pay off her loans in one year and still have money left over for basic needs. In fact, she would have \$50,000 left to spend over the course of the year if she committed to paying off her students loans in a single year. This is because we can think of her personal debt as being equivalent to 50% of her income.

Both students have the same debt size, but it turns out that their debt-to-income ratio (debt divided by income) is a more informative statistic regarding their debt burden. The same principle applies to the national debt. All we need to remember is that the Gross Domestic Product in a country is equivalent to income in the country.

In the United States, the national debt in 1945, after World War II, was \$260 billion, about half of the current *deficit*. At that time though, the nominal GDP was less than the national debt and sat at approximately \$230 billion. If every US citizen in 1945 put all of their annual income towards paying of the national debt, the debt still would not be paid off within the year. We can also start to think about the problems that would come from people not spending any of their income on anything other than paying off a loan! Even though the US debt in 1945 of \$260 billion seems low compared to the \$20.5 trillion we owe today, the burden of the debt was higher in 1945 compared to today.

The best way to evaluate the burden of the debt is to look at the debt-to-income ratio of a country, just like we did with the two recent college graduates. Instead of using a new income variable, we can continue to think of GDP as being equivalent to income. Specifically, we want to examine the *debt-to-nominal GDP ratio*, since the nominal GDP is the actual income that households take home. Prices of general goods and services may rise over time, but the amount that needs to be paid back on debt stays the same, so we do not need to adjust for changes in overall prices.

In order to calculate the debt-to-nominal GDP ratio, the definition is in the name. We are just dividing the national debt by nominal GDP:

Debt-to-Nominal GDP Ratio: Debt/Nominal GDP

5.9: Debt-to-GDP Ratio 1

In 1945, the national debt was \$260 billion and the nominal GDP was \$230 billion. What was the debt-to-GDP ratio in 1945?

A

0.88

B

0.99

C

1.13

D

1.49

5.10: Debt-to-GDP Ratio II

In 2016, the national debt was \$14.44 trillion and the nominal GDP was \$18.87 trillion. What was the debt-to-GDP ratio in 2016?

A

0.43

B

0.77

C

0.87

D

1.31

Even though the national debt in 2016 is significantly more than in 1945, the debt-to-GDP ratio is quite a bit lower. This means that the burden of the debt in 2016 is much lower than it was in 1945. However, the figure below reports debt-to-GDP ratios since the 1940s. Between the start of the Great Recession in 2007 and today, the debt-to-GDP ratio has nearly doubled and is projected to continue rising for the next decade.

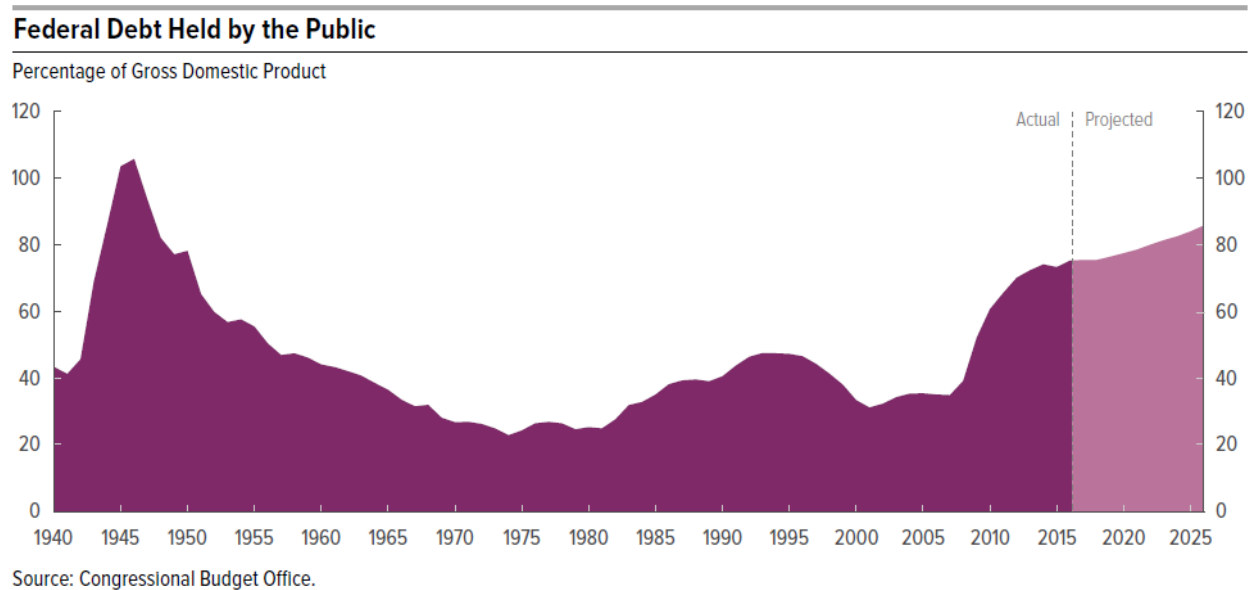


Figure 5.2.03

Although the nominal size of the debt is not directly relevant to policy makers, the recent growth in debt-to-GDP is concerning. A growth in the debt-to-GDP ratio does represent increasing difficulty in paying off the debt. But a clock that measures that the debt-to-GDP ratio is less flashy than the debt clocks showing \$20.5 trillion. Take a look at <http://www.usdebtclock.org/world-debt-clock.html> to see the current debt-to-GDP clock...it does not change often!

Fact 3: The National Debt does not have to be paid back

The first two facts may have done a little bit to calm fears about the quickly rising debt clock. However, saying the national debt is "only \$15 trillion" and the debt-to-GDP ratio is 0.77 does not necessarily allow us to rest easy about the debt.

Fact 3 packs a big punch: the US Government does not have to pay back the national debt! This seems like a pretty important piece of information that is not often discussed when the news covers the debt.

How can it be that the government never has to pay back the debt? Start by assuming that the US government needs to borrow \$1 million. No intra-government money is available, so the government turns to other lenders. The government has to provide some incentive to lenders in order to generate \$1 million.

In a very basic world, the government will create a **bond** and sell that bond to a lender for \$1 million. For our purposes, think of a bond as a promise to pay back the owner \$1 million in the future. Attached to the bond is an interest rate that will entitle the bond owner to an annual interest payment in return to giving up \$1 million today. Assume that the interest rate on the bond is 5%.

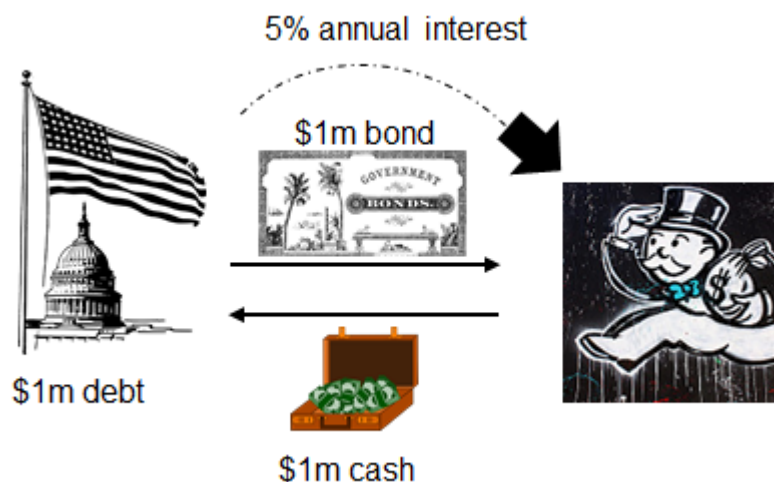
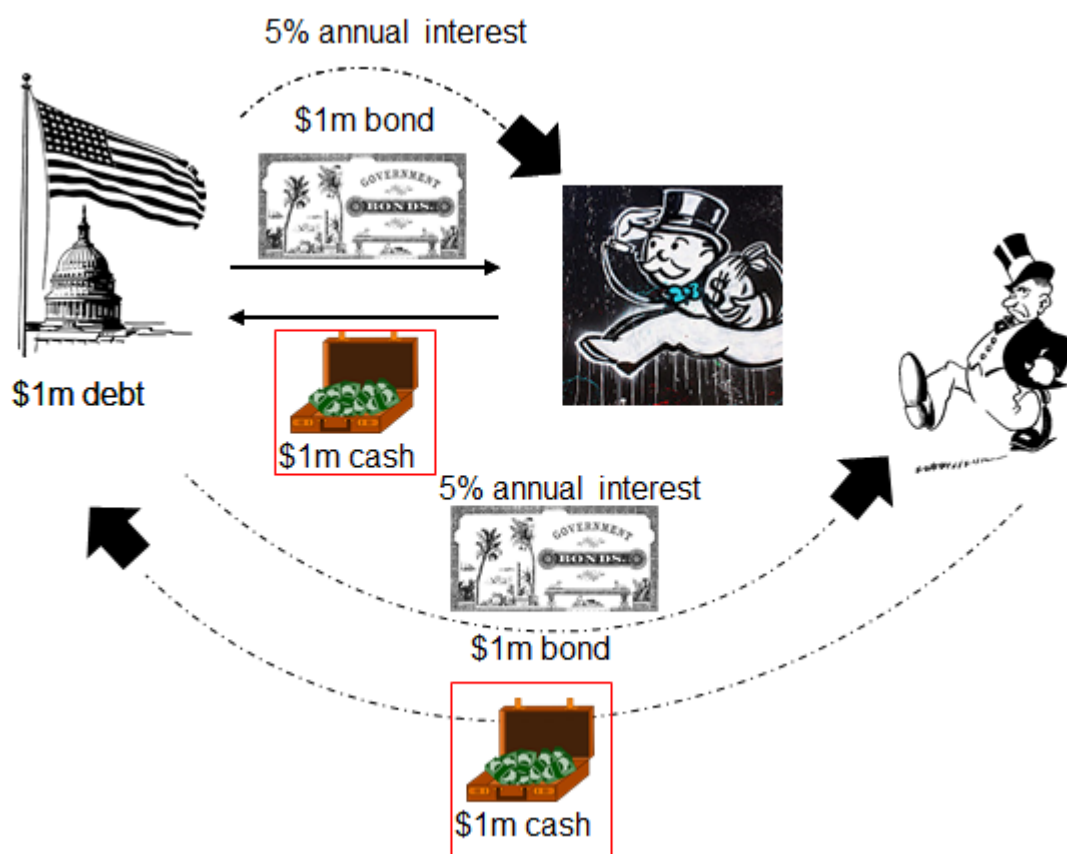


Figure 5.2.04

In the figure above, the government has a national debt of \$1 million. The government creates a bond that it sells to an investor looking to get a return

on an investment (the investor above is Rich Uncle Pennybags from the Monopoly board game). The investor also gets an annual interest payment of 5% for as long as the investor holds the bond. The government gets \$1 million that it uses to purchase goods and services.

Now imagine that the investor wants to invest in a new start-up company and he needs the \$1 million back. But the government already spent his money! Where can the government find \$1 million now? They need to look for another investor and roll over the debt.



Figure

5.2.05

In order to get the first investor (Uncle Pennybags) the \$1 million he is owed, the government finds another investor (lets call him Mr. Moneycase for reference) that is willing to buy a \$1 million bond that comes with a 5% annual interest payment. The government takes the \$1 million that Mr. Moneycase paid and uses that cash to pay back Uncle Pennybags. Now the government

makes annual payments to Mr. Moneycase, while Uncle Pennybags has his original investment back. The total amount of debt the government owes is the same as it was at the start of the scenario. This is what is an example of **rolling over debt**.

As long as the government can make their annual interest payments and find investors, they can operate indefinitely with debt. Part of what makes this process work is that the government and countries in general are long-lasting entities that seem as though they will exist forever. If a country had plans to stop existing, then investors would not lend money to the government.

Another reason that rolling over debt into the foreseeable future is possible is because investors trust that the government will be able to make interest payments and find additional investors if necessary. When investors do not believe that a country is stable enough to be able to make interest payments, lending money to that government is unappealing. In the case of the United States, and most developed countries, there is no reason to think that the countries will cease to exist and that the governments will become so unstable that they cannot make interest payments.

If the government does not have to pay back the debt, is there a problem with the increasing debt clocks we saw earlier? Potentially.

When the government borrows money from Uncle Pennybags or Mr. Moneycase, they have to make annual interest payments on the bonds that investors are holding. For now, we will keep our bond payments simple and say that when the interest rate on debt bonds are 5%, the annual size of interest payments by the government are 5% of the total debt.

In the scenario above, the debt is \$1 million and the interest rate is 5%, which means that the total size of annual interest payments equal \$50,000. This comes from the following equation:

$$\text{Interest Payment} = \text{Interest Rate} \times \text{National Debt}$$

As the national debt rises, the interest payment that the government must make also increases. In our simple example, doubling the national debt to \$2 million would increase the annual interest payments to \$100,000. The size of the annual interest payment needs to be paid by the government in order to hold the debt. Where does this payment come from? Income taxes of the citizens. The government must tax the incomes of citizens (nominal GDP) enough to cover the interest payment on the debt.

Continue to consider that the government that borrowed from Uncle Pennybags and then rolled over the debt to Mr. Moneycase has a nominal GDP of \$5 million. Remember that the nominal GDP is the amount of actual dollars that citizens take home (not adjusted for inflation). From the \$5 million in income, the government has to generate \$50,000 in taxes every year when the national debt is \$1 million and the interest rate is 5%.

In order to hold the debt, what is the minimum tax rate needed to generate \$50,000?

$$\text{Minimum Tax Rate} = (\text{Interest Payment} / \text{Nominal GDP}) \times 100$$

$$\text{Minimum Tax Rate} = [(\text{Interest Rate} \times \text{National Debt}) / \text{Nominal GDP}] \times 100$$

Using our minimum tax rate equation, the tax rate must be,

$$(\$50000 / \$5000000) \times 100 = 1\%$$

If the government is only going to pay the \$50,000 interest on their \$1,000,000 debt, they must tax their citizens 1%. Remember, this is only to pay interest on the debt and everything that is bought by the government comes from borrowed money.

When the national debt rises to \$2,000,000 and the nominal GDP remains at \$5,000,000, the debt-to-GDP ratio increases from 0.20 to 0.40. The interest

payments will rise from \$50,000 to \$100,000 and the minimum tax rate will increase to $(\$100,000/\$5,000,000) \times 100 = 2\%$.

Before trying out some problems, notice that another way to depict the minimum tax rate equation is:

$$\text{Minimum Tax Rate} = (\text{Debt}/\text{Nominal GDP}) \times \text{Interest Rate} \times 100$$

A rising debt will not increase the minimum tax rate if the nominal GDP rises at the same rate. The minimum tax rate moves with the debt-to-GDP ratio.

Chapter 5.10: Interest on the Debt

The government of Peculiar, Missouri is currently holding a debt of \$1000. The nominal GDP is currently \$4000. In order to hold debt, Peculiar is paying 5% annual interest on bonds. What is the annual interest payment on bonds?

A

0

B

50

C

100

D

150

Hopefully after going through question 5.10, you are saying to yourself, I just need to multiply the interest rate by the size of the debt to get the annual interest payment. After doing this, you will get $\$1000 \times 0.05 = \50 .

In the question above, Peculiar, Missouri has to find \$50 every year in order to hold their debt of \$1000. The way that Peculiar generates enough money to pay for the interest on the debt is by taxing the income of citizens. How much does Peculiar have to tax their citizens? This depends not only on the size of the interest payment, but also on the total amount of income in Peculiar (nominal GDP).

5.11: Minimum Tax Rate

The government of Peculiar, Missouri is currently holding a debt of \$1000. The nominal GDP is currently \$4000. In order to hold debt, Peculiar is paying 5% annual interest on bonds. What is the minimum tax rate needed to hold this debt?

A

1%

B

1.25%

C

1.5%

D

2%

To generate enough money to pay interest on the debt, Peculiar has to set the tax rate to be at least, $(\$50/\$4000) \times 100$, which is 1.25%.

Facts 2 and 3 run together and ultimately convey similar points. The Debt-to-GDP ratio is the most relevant statistic when it comes to the national debt. Above, we described the Debt-to-GDP ratio as a measure of the debt burden and talked about it in terms of an individual with the same level of debt but a changing income. That concept still holds true, but our minimum tax rate analysis gets to the heart of why the Debt-to-GDP ratio matters.

Growth in the Debt-to-GDP ratio will lead to an increase in the minimum tax rate. Reducing the Debt-to-GDP ratio is associated with a reduction in the minimum tax rate. Regardless of what the Debt-to-GDP ratio is, as long as the government can make interest payments, they can hold debt indefinitely.

Fact 4: Interest Payments are Not Equivalent to Government Expenditures

From our first three facts, you may have become less concerned about the national debt. However, this section is meant to present you with facts, not try to convince you that the national debt is a good thing.

Let's return to our investor who purchased a \$1 million government bond and is receiving 5% interest on that bond every year. An ideal setting for the government would be if that individual turned around and spent that money on local goods and services, leading to an increase in spending and output in the economy.

While that scenario sounds great for the government, the individual with more than a \$1 million sitting around may have something else in mind:

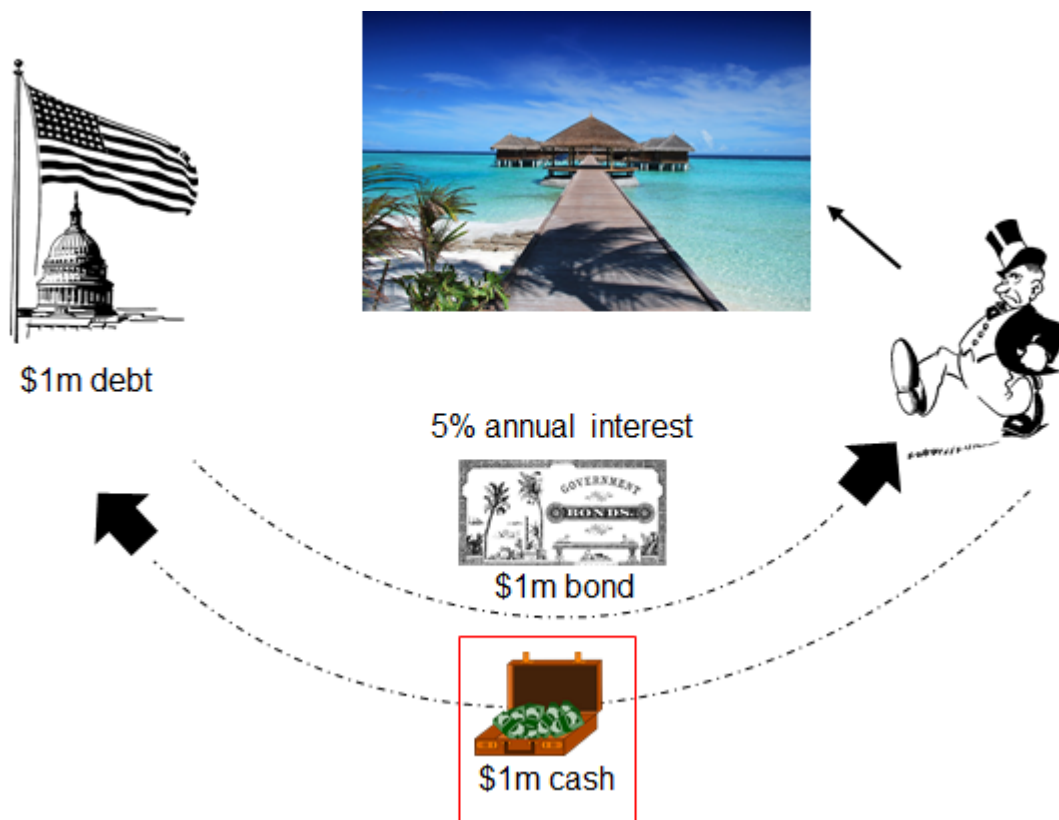


Figure 5.2.06

There are no conditions on what the interest payment must be spent on. If the investor takes their interest payment and rents out an over-water bungalow in the South Pacific, that means that the money goes straight out of the government's hands and into the hands of the locals in the South Pacific. This is great for the citizens in the South Pacific, but it does not help stimulate the home country's economy.

To get a better sense of why this scenario is relevant, take a look at the table below showing which countries own US debt.

Over 43.3% of the US national debt is held by foreign investors, with China and Japan holding a little over 8% of the total debt each. The interest payments going to foreign investors immediately leave the economy and are very unlikely to have any positive impact on the US economy.

There are often concerns that "China owns too much debt". It is true that China owns a noticeable fraction of US debt, but ownership of the debt cannot exactly be used as leverage. The only way that China would gain leverage would be if the US could not make their interest payments. In the case that China wants to get rid of their bonds, they will end up selling their bonds to other countries and investors. In 2015, China actually sold \$180 billion in bonds, but it did not have an impact US-China relations or fiscal policy in general.

The fact that so many foreign investors own US debt shows that there is a lot of confidence in the US being able to make interest payments on their debt and have a relatively low interest rate on the debt. This is in stark contrast to Greece in early 2010s. During this time period, there was uncertainty as to whether Greece would be able to pay back creditors. Consequently, the Greek government had to offer extremely high interest rates on their government bonds in order to offset the risk associated with lenders not being paid back.

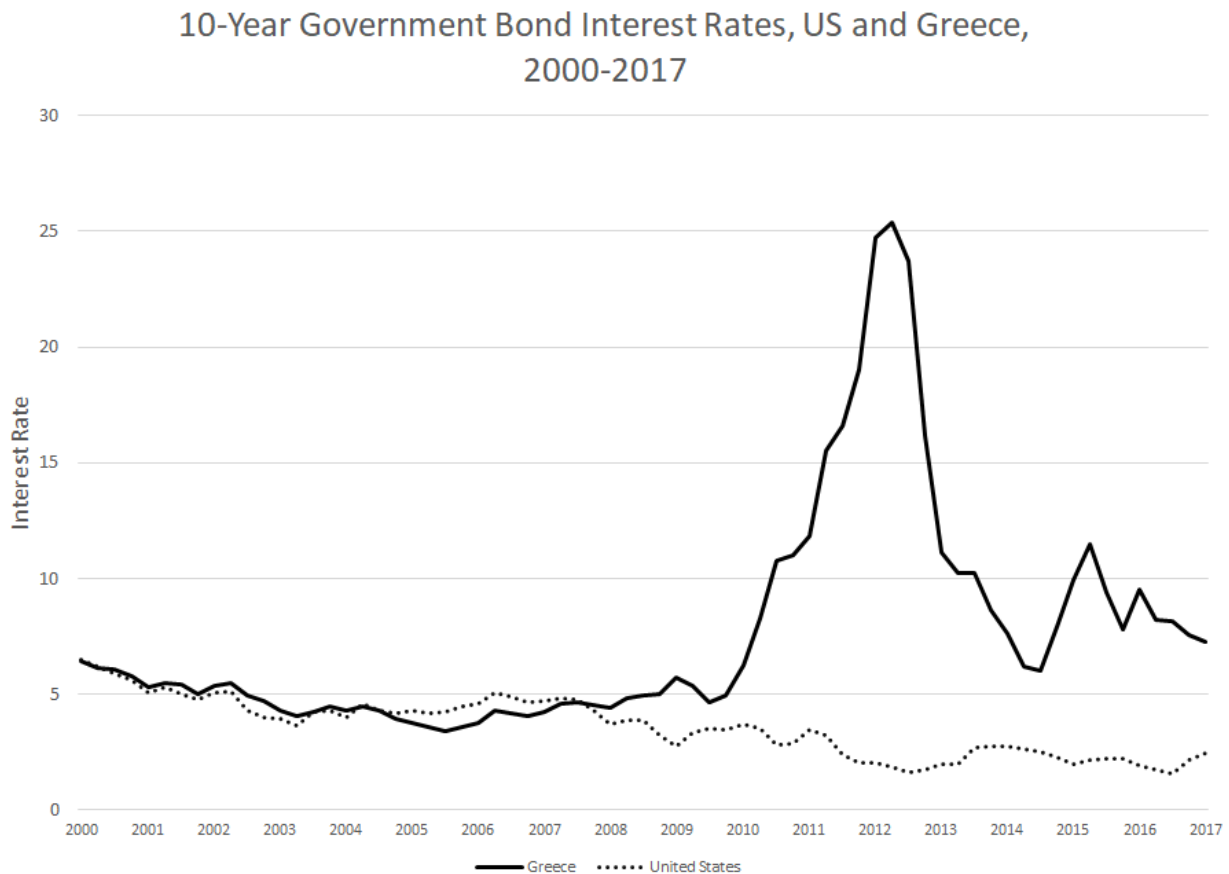


Figure 5.2.07

In the graph above, the 10-Year Government Bond rate in Greece and the US was approximately the same between 2000 and 2008. The interest rate on the bonds was around 5%. When the Great Recession started, the US interest rate dropped to around 4% and continued to decrease due to actions taken by the Federal Reserve (next chapter).

Greece's interest rate increased up to 25% by 2012! This is a very high interest rate for a government bond and suggests that there was a lot of uncertainty surrounding whether or not Greece could actually pay their creditors back. Many foreign investors bought Greek bonds and are now receiving a high return on their investment. Unfortunately for Greece, many of those interest payments are leaving the country immediately and being spent elsewhere making it difficult for their economy to grow.

Aggregate Expenditures and the National Debt

Now that we have a handle on what the deficit and the debt are, we can incorporate it into our aggregate expenditure model. The primary take-away from the facts above is that the Debt-to-GDP ratio is an important statistic surrounding our assessment of debt. The Debt-to-GDP ratio reflects the tax burden caused by the national debt.

Small change in the Debt-to-GDP ratio will not have a noticeable impact on tax rates. Our calculations above tell us what the minimum tax rate needs to be and the actual tax rate is often well above that minimum tax rate. Additionally, the US government is not operating in such a way that a one percentage point increase the Debt-to-GDP ratio will make paying interest on the debt difficult. However, the recent passage of the stimulus package has led to a noticeable increase in the Debt-to-GDP ratio, with the Debt-to-GDP ratio increasing from around 40% in 2007 to roughly 80% today.

5.12: National Debt and Aggregate Expenditures

When the Debt-to-GDP ratio increases significantly, this will eventually cause

A

the aggregate expenditure curve to increase because more government spending is taking place.

B

the aggregate expenditure curve to increase because taxes will need to decrease.

C

the aggregate expenditure curve to decrease because less government spending is taking place.

D

the aggregate expenditure curve to decrease because taxes will need to increase.

A significantly higher Debt-to-GDP ratio means that more tax revenue is needed to cover interest payments on the debt. The rising Debt-to-GDP ratio in question 5.12 means that taxes will increase and this will lead to a reduction in the aggregate expenditure curve.

There will be a time-lag on all of these actions that needs to be recognized. Imagine that today, the government enacts a second stimulus package that increases G and reduces T . This will lead to an increase in the aggregate expenditure curve and equilibrium level of output. The figure below shows a stimulus package being implemented that increases AE and brings the economy back to the full-employment level of output, \bar{Y} .

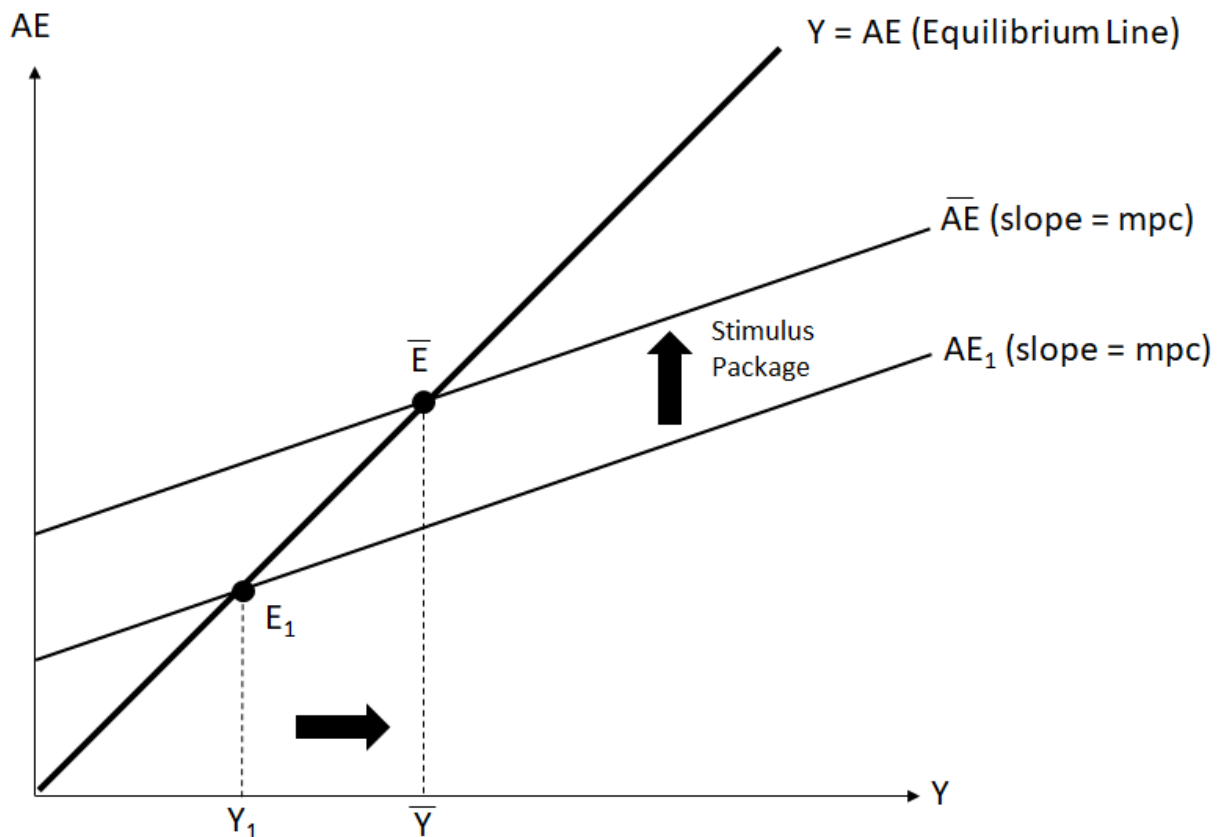


Figure 5.2.08

Because the stimulus package increased the deficit and national debt significantly, there will need to be an increase in taxes in order to make interest payments on the debt. We have already discussed what an increase in taxes will do to the aggregate expenditures curve. The reduction in take-home income will cause the aggregate expenditure curve to decrease and move the equilibrium level of output back below \bar{Y} , assuming nothing else in the economy changes.

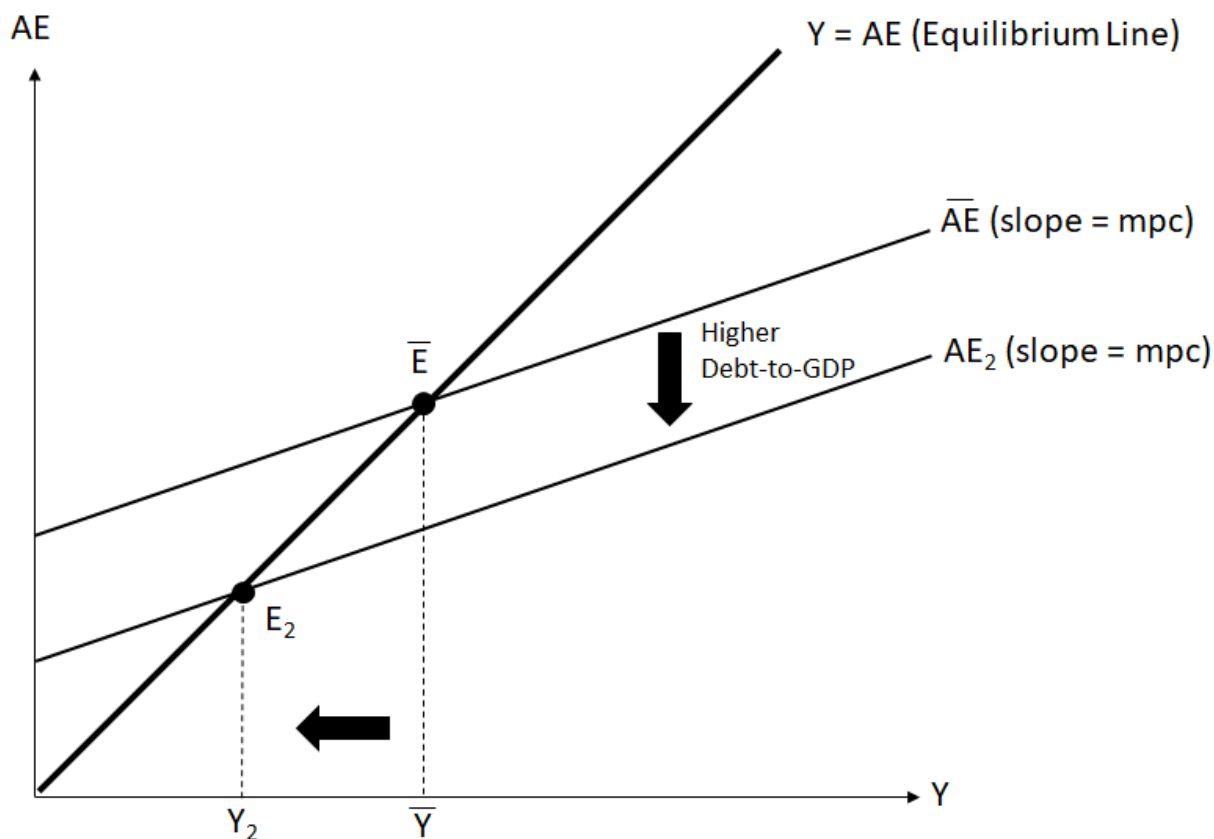


Figure 5.2.09

The big question that remains is, what can be done about the national debt? It has increased more than the GDP in recent years and policy makers should know the consequences of different policies that aim to decrease the national debt.

In order to better see the potential consequences of the national debt, we can decompose the minimum tax rate. The minimum tax rate from above is the interest payment divided by the nominal GDP. Breaking that down further, the interest payment is the interest rate times the size of the debt where the debt is sum of all the deficits ($G - T$). The nominal GDP can be depicted as the real GDP, Y , times the price level, P .

$$\text{Minimum Tax Rate} = \frac{\text{Interest Rate} \times \sum_i (G_i - T_i)}{P \times Y}$$

From the decomposed minimum tax rate equation any change that decreases the right side of the equation will decrease the minimum tax rate. In the numerator, the first term is the interest rate, which the government does not have control over.

The Greek letter sigma, Σ , is a mathematical operator that says the debt is the sum of all the deficits over time. Decreasing G or increasing T will decrease the minimum tax rate, but it comes at the cost of a reduction in the aggregate expenditure curve. In other words, reducing the deficit will decrease the future tax rate, but it also causes cyclical unemployment in the short-run.

The denominator has separated nominal GDP into real GDP, Y , and the price level, P . A quick-and-easy way to decrease the minimum tax rate is to increase prices. Doubling prices will double nominal GDP and cut the minimum tax rate in half. This solution should not sit well with you, doubling the nominal GDP without changing production is not indicative of a healthy economy. We will see the problems associated with rising prices in more detail in the next chapters.

The final component of the minimum tax rate is the real GDP, Y . An increase in real GDP will lead to more jobs and a reduction in the minimum tax rate. The long run, classical economists who believed that "letting it [the economy] be" was the best strategy have some support for their stance here. If the full-employment level of production is slowly growing over time without government intervention, due to technological advancements for example, then there will be a reduction in the minimum tax rate.

The best way to improve issues surrounding the national debt is a bit predictable: increase output, Y . The government can let growth in the economy happen naturally or give it a boost by changing G or T . Because there is a cost to fiscal policy, it is important for policy makers need to ensure that the return to higher levels of G or lower levels of T do not increase the Debt-to-GDP ratio.