Tools of Budget Analysis
(Chapter 4 in Gruber’s textbook)

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GOVERNMENT BUDGETING

**Debt**: The amount borrowed by government through bonds to individuals, firms, or foreign governments. Debt is a *stock*

**Deficit**: government’s spending + interest payments on debt minus government revenues in a given year. A negative deficit is called a surplus. Deficit is a *flow*

Evolution of debt from year to year:

\[ \text{Debt}_{t+1} = \text{Debt}_t + \text{Deficit}_t = \text{Debt}_t \cdot (1+r_t) + \text{Spending}_t - \text{Revenue}_t \]

with \( r_t \) interest paid on government debt

Primary Deficit = Spending - Revenue

In 2016: US Federal debt is around 75% of GDP, US deficit is 3.2% of GDP

US government owns assets worth about 80% of GDP
3.0 percent of GDP. Revenues were nearly unchanged, edging up by $17 billion (or 0.5 percent), while outlays (with adjustments to exclude the effects of the timing shifts) rose by $125 billion (or 3.4 percent).

In total, debt held by the public increased by $1.1 trillion in 2016, reaching 77 percent of GDP—about 4 percent–age points higher than the amount recorded in 2015, marking the highest ratio since 1950. Debt increased both because of the rise in the budget deficit and for other reasons. For example, about $200 billion of that increase stemmed from payments to the G-Fund of the Thrift Savings Plan, which were made to compensate for amounts that were not invested during the previous debt-ceiling impasse. Another $155 billion stemmed from an increase in the cash balance held by the Treasury.

Revenues

Total revenues rose by just $17 billion (or 0.5 percent) in 2016, decreasing from 18.2 percent of GDP in 2015 to 17.8 percent. The biggest change was in collections of corporate income taxes: Such receipts decreased by $44 billion (or 13 percent), from 1.9 percent of GDP in 2015 to 1.6 percent in 2016. That was the lowest percentage of GDP since 2012 and below the average of 2.0 percent of GDP over the past 50 years. Part of the decline stemmed from the enactment in December 2015 of the Consolidated Appropriations Act, 2016 (Public Law 114-113), which extended—retroactively and prospectively—certain tax rules, including those that allowed businesses with large amounts of investments in equipment to immediately deduct from their taxable income 50 percent of the costs of those investments. CBO estimates that the retroactive extension of those provisions for tax year 2015, followed by a prospective extension for 2016, resulted in some revenue reductions that normally would have happened in 2015 occurring in 2016 instead. Another part of the decline may reflect taxable profits that were lower in calendar year 2016 than they were during 2015. The reasons for the decline will become clearer as detailed information from corporate income tax returns becomes available over the next two years.

Receipts from individual income taxes, the largest source of revenues, rose by just $5 billion (or less than 1 percent), and therefore fell as a share of the economy, from 8.6 percent of GDP in 2015 to 8.4 percent of GDP in 2016. However, that percentage in 2016 was still higher than in any year since 2001, except for 2015. The slow growth in those receipts in 2016 resulted from the offsetting effects of different types of payments.

During that impasse, which took place between March and November 2015, the Treasury took a number of “extraordinary measures” to borrow additional funds without breaching the debt ceiling, including disinvesting the Thrift Savings Plan’s G Fund. Once the debt limit was raised in November 2015, the G Fund was made whole (with interest).
The aging of the population is already a significant issue: The population age 65 and older is projected to grow by 39 percent through 2027, whereas the population ages 20 to 64 is projected to grow by just 3 percent. In CBO's baseline, projected spending for people age 65 or older in five large programs—Social Security, Medicare, Medicaid, and military and federal civilian retirement—increases from about 37 percent of all federal noninterest spending in 2017 to about 45 percent in 2027. In addition, health care costs per beneficiary (after adjusting for the aging of the population) are projected to grow faster than the economy over the long term, contributing to growth in spending for Medicare and Medicaid in particular. The effects on the federal budget of the aging population and rapidly growing health care costs are already apparent over the 10-year horizon—especially for Social Security and Medicare—and will grow in size beyond the baseline period. Unless laws governing fiscal policy were changed—that is, spending for large benefit programs was reduced, increases in revenues were implemented, or some combination of those approaches was adopted—debt would rise sharply relative to GDP after 2027.2

CBO's current projections for the coming decade have changed little since its previous publication of 10-year projections in August 2016.3 Deficits under current law are now projected to be just $6 billion higher between 2017 and 2026 (the 10-year projection period CBO used last year). Relative to CBO's previous set of projections, deficits are lower in the first half of the period (by a cumulative $131 billion) and higher in the second half (by $136 billion). All told, the cumulative deficit over the 10-year period is projected to total $8.6 trillion, or 3.8 percent of GDP, which is unchanged from August.

A Review of 2016

In fiscal year 2016, the budget deficit rose for the first time in a number of years, totaling $587 billion—about one-third more than the $438 billion shortfall recorded in 2015. As a percentage of GDP, the deficit increased from 2.4 percent in 2015 to 3.2 percent last year, the first such increase since 2009. Part of the increase in the deficit is attributable to the shifting of certain payments from fiscal year 2017 into fiscal year 2016 (because October 1, 2016, fell on a weekend). Even without that shift of $41 billion in payments, the budget shortfall would have increased in 2016, amounting to $546 billion, or

Deficits as a percentage of gross domestic product are projected to exceed their 50-year average for most of the 2017–2027 period as spending for Social Security, Medicare, and interest on the federal debt rises faster than revenues.

Source: Congressional Budget Office.
Payroll tax receipts decline by 0.1 percentage point of GDP, primarily because of the expected increase in the share of wages going to higher-income taxpayers.

Corporate income tax receipts as a share of GDP also fall by 0.1 percentage point between 2017 and 2027.

Outlays

In CBO's projections, outlays remain near 21 percent of GDP for the next few years, which is higher than their average of 20.3 percent over the past 50 years. Later in the coming decade, the growth in outlays would exceed growth in the economy, and, by 2027, outlays would rise to 23.4 percent of GDP. That increase reflects significant growth in mandatory spending and interest payments, which is offset somewhat by a decline in discretionary spending as a share of GDP. More specifically, CBO's baseline includes the following projections:

- Outlays for mandatory programs increase as a share of GDP by 2.4 percentage points from 2017 to 2027—mainly because of the aging of the population and rising per capita health care costs. Social Security and Medicare account for nearly all of that increase.
- Because of rising interest rates and, to a lesser extent, growing federal debt held by the public, the government's interest payments on that debt rise sharply over the next 10 years—nearly tripling in nominal terms and almost doubling relative to GDP.
- Discretionary spending drops from 6.3 percent of GDP in 2017 to 5.3 percent in 2027—a smaller percentage relative to the size of the economy than in any year since 1962 (the first year for which comparable data are available).

Debt Held by the Public

As deficits accumulate in CBO's baseline, debt held by the public rises from 77 percent of GDP ($15 trillion) at the end of 2017 to 89 percent of GDP ($25 trillion) by 2027. At that level, debt held by the public would be the largest since 1947 and more than twice the average over the past five decades in relation to GDP (see Summary Figure 1).

Beyond the 10-year period, if current laws remained in place, the pressures that contributed to rising deficits during the baseline period would accelerate and push debt up even more sharply. Three decades from now, for instance, debt held by the public is projected to be nearly twice as high, relative to GDP, as it is this year—and a higher percentage than any previously recorded.

Such high and rising debt would have serious negative consequences for the budget and the nation:

- Federal spending on interest payments would increase substantially as a result of increases in interest rates, such as those projected to occur over the next few years.
THE US FEDERAL PROCESS

Taxes, spending, and debt ceiling are decided by Congress and the President

New law requires majority vote both in House and in Senate along with President’s signature (veto power)

In recent years, Senate vote requires 60/100 super-majority (due to filibuster)

Two forms of spending:

**Entitlement spending**: Mandatory funds for programs for which funding levels are automatically set by the number of eligible recipients, not the discretion of Congress (ex: medicare, social security)

**Discretionary spending**: Optional spending set by appropriation levels each year, at Congress’s discretion (ex: defense)
Table 1-1.
CBO’s Baseline Budget Projections, by Category

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<td><strong>Total</strong></td>
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<td>3,404</td>
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<td>3,733</td>
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<td>4,649</td>
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</tbody>
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| **Outlays** |      |      |      |      |      |      |      |      |      |      |      |      |          |          |
| Mandatory | 2,429 | 2,484 | 2,585 | 2,764 | 2,925 | 3,097 | 3,329 | 3,455 | 3,583 | 3,827 | 4,076 | 4,305 | 14,700 | 33,946 |
| Discretionary | 1,184 | 1,209 | 1,210 | 1,238 | 1,257 | 1,284 | 1,315 | 1,340 | 1,367 | 1,405 | 1,439 | 1,475 | 6,304 | 13,330 |
| Net interest | 241 | 270 | 295 | 332 | 380 | 435 | 492 | 550 | 604 | 657 | 714 | 768 | 1,934 | 5,228 |
| **Total** | 3,854 | 3,963 | 4,091 | 4,334 | 4,562 | 4,816 | 5,135 | 5,346 | 5,554 | 5,890 | 6,228 | 6,548 | 22,938 | 52,504 |
| On-budget | 3,078 | 3,157 | 3,227 | 3,409 | 3,575 | 3,761 | 4,008 | 4,143 | 4,271 | 4,524 | 4,774 | 5,000 | 17,980 | 40,692 |
| Off-budget | 776 | 806 | 864 | 925 | 987 | 1,055 | 1,127 | 1,204 | 1,283 | 1,366 | 1,454 | 1,548 | 4,958 | 11,812 |

| **Deficit (-) or Surplus** |      |      |      |      |      |      |      |      |      |      |      |      |          |          |
| On-budget | -587 | -559 | -487 | -601 | -684 | -797 | -959 | -1,000 | -1,027 | -1,165 | -1,289 | -1,408 | -3,528 | -9,426 |

| Debt Held by the Public | 14,168 | 14,838 | 15,416 | 16,092 | 16,845 | 17,704 | 18,721 | 19,776 | 20,858 | 22,078 | 23,430 | 24,893 | n.a. | n.a. |

**Memorandum:**

| Gross Domestic Product | 18,403 | 19,157 | 19,926 | 20,661 | 21,378 | 22,168 | 23,037 | 23,948 | 24,899 | 25,889 | 26,917 | 27,985 | 107,171 | 236,809 |
Budget Policies and Deficits at the State Level

Balanced budget requirement (BBR): Law forcing a government to balance its budget each year (spending = revenue).

ex-post BBR: government needs to balance its budget by the end of each fiscal year

ex-ante BBR: government needs to submit/pass a balanced budget at the start of each fiscal year, or both (easier to evade with rosy predictions)

California has ex-ante BBR: recession lowered tax revenue and forced cuts in government spending (plans to have rainy fund)
Govts have agencies evaluating effects of proposed reforms on govt deficit (Congressional Budget Office in the US)

**Static scoring**: A method used by budget modelers that assumes that government policy changes only the distribution of total resources, not the amount of total resources.

**Dynamic scoring**: A method used by budget modelers that attempts to model the effect of government policy on both the distribution of total resources and the amount of total resources.

Example: tax decreases on the rich, static scoring assumes no effect on GDP, dynamic scoring incorporates effects on growth

Static scoring is safest in the absence of good empirical estimates of growth effects (dynamic scoring can be manipulated by ideologues). Paul Ryan pushed for dynamic scoring.
**Intertemporal Government Budget Constraint**

Policy debates have traditionally focused on the extent to which this year’s governmental spending exceeds this year’s governmental revenues.

The existence of implicit obligations in the future, however, suggests that this does not capture the full picture.

**Intertemporal budget constraint:** An equation relating the present discounted value of the government’s obligations to the present discounted value of its revenues.

\[ PDV \text{ of Tax Payments} = PDV \text{ of All Future Govt Spending} + \text{Current Govt Debt} \]
BACKGROUND: PRESENT DISCOUNTED VALUE

For govt, spending $F$ now has the same cost as spending $F \cdot (1 + r)$ next year with $r$ interest rate on government debt.

Present discounted value (PDV): The value of each period’s dollar amount in today’s terms.

Govt spends $F_1$, $F_2$, $F_3$, ... in each future year, then the PDV is computed as:

$$PDV = \frac{F_1}{(1 + r)} + \frac{F_2}{(1 + r)^2} + \frac{F_3}{(1 + r)^3} + ...$$

If $F_1 = F_2 = .. = F$ then

$$PDV = \frac{F}{1 + r} \left[ 1 + \frac{1}{(1 + r)} + \frac{1}{(1 + r)^2} + ... \right] = \frac{F}{1 + r} \cdot \frac{1}{1 - \frac{1}{1+r}} = \frac{F}{r}$$

Paying $F$ in perpetuity is equivalent to paying $F/r$ upfront.
ALTERNATIVE MEASURES OF LONG-RUN GOVERNMENT BUDGETS

Long-run Fiscal Imbalance

If the government continues with today’s policies, how much more will the government spend than it will collect in taxes over the entire future?

Example: In 2003 alone, the government added roughly $20 trillion to the fiscal imbalance (due to tax cuts and medicare prescription drug benefit of Bush administration)
PROBLEMS WITH LONG-RUN FISCAL MEASURES

The fiscal imbalance calculations are fairly tenuous:

1) They depend critically on many assumptions about future growth rates in costs and incomes, and the interest rate used for discounting

⇒ Those assumptions become heroic for long-distance future (example: how will health care costs evolve?)

2) The calculations also assume that government policy remains unchanged (but if big imbalance arises, then government will typically be forced to act and fix it)

⇒ Makes most sense to consider a time window that is longer than 1 year but less than infinity
CBO projects that economic activity will expand at a pace this year and next that will lower the unemployment rate and place upward pressure on inflation and interest rates.

PROBLEMS WITH LONG-RUN FISCAL MEASURES

Some programs are easier to project than others.

Example: social security retirement benefits are easier to project than medicare benefits

Social security benefits depend on demography and longevity (slow moving variables) ⇒ Social security does fairly reliable 75 year projections

Medicare depends on growth of health care costs that have been growing very fast (before the Great recession) ⇒ such a rate of growth is not sustainable for ever so making a long-run projection based on those rates is not meaningful

CBO makes budget projections over the next 10 years in its official budget projection
Figure 1-6.

Population, by Age Group

The number of people age 65 or older in the United States—now more than twice what it was 50 years ago—is expected to grow by more than one-third over the next 10 years. Thus, enrollment in Social Security’s Old-Age and Survivors Insurance program and Medicare will continue to rise.

Source: Congressional Budget Office.

This figure shows actual data through calendar year 2014, the most recent year for which such data are available.
High and rising federal debt would reduce national saving and income in the long term; increase the government’s interest payments, thereby putting more pressure on the rest of the budget; limit lawmakers’ ability to respond to unforeseen events; and increase the likelihood of a fiscal crisis.

Source: Congressional Budget Office. For details about the sources of data used for past debt held by the public, see Congressional Budget Office, *Historical Data on Federal Debt Held by the Public* (July 2010), www.cbo.gov/publication/21728.

The extended baseline generally reflects current law, following CBO’s 10-year baseline budget projections through 2027 and then extending most of the concepts underlying those baseline projections for the rest of the long-term projection period (in this case, through 2047).
### Table 1-1.

#### CBO’s Baseline Budget Projections, by Category

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<th>Actual, 2016-2027</th>
<th>Total 2018-2027</th>
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#### In Billions of Dollars

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<td>987</td>
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<td>1,127</td>
<td>1,204</td>
<td>1,283</td>
<td>1,366</td>
<td>1,454</td>
<td>1,548</td>
<td>4,958</td>
<td>11,812</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Deficit (-) or Surplus</th>
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</thead>
<tbody>
<tr>
<td>On-budget</td>
<td>-587</td>
<td>-559</td>
<td>-487</td>
<td>-601</td>
<td>-684</td>
<td>-797</td>
<td>-959</td>
<td>-1,000</td>
<td>-1,027</td>
<td>-1,165</td>
<td>-1,297</td>
<td>-1,408</td>
<td>-3,528</td>
<td>-9,426</td>
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<thead>
<tr>
<th>Debt Held by the Public</th>
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<tbody>
<tr>
<td></td>
<td>14,168</td>
<td>14,838</td>
<td>15,416</td>
<td>16,092</td>
<td>16,845</td>
<td>17,704</td>
<td>18,721</td>
<td>19,776</td>
<td>20,858</td>
<td>22,078</td>
<td>23,430</td>
<td>24,893</td>
<td>n.a.</td>
<td>n.a.</td>
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<th>Memorandum:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Gross Domestic Product</td>
<td>18,403</td>
<td>19,157</td>
<td>19,926</td>
<td>20,661</td>
<td>21,378</td>
<td>22,168</td>
<td>23,037</td>
<td>23,948</td>
<td>24,899</td>
<td>25,889</td>
<td>26,917</td>
<td>27,985</td>
<td>107,171</td>
<td>236,809</td>
</tr>
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</table>
Short-Run Effects of the Govt on the Macroeconomy

Keynesian theory (IS-LM macro model): More government spending or tax cuts stimulates the economy in the short-run [and conversely]

Short-run stabilization: Govt can use taxes and spending policies to smooth the peaks and troughs of the business cycle

Automatic stabilization: Policies that automatically alter taxes or spending in response to economic fluctuations to offset changes in household consumption levels (ex: unemployment insurance, progressive taxation, corporate profits tax)

Discretionary stabilization: Policy actions taken by the government in response to business cycle (ex: Fiscal stimulus with Spring 2008 rebate checks, 2009-12 Obama stimulus, unemployment insurance extensions)

⇒ Ability to run deficits in recessions is a great tool for short-run business cycle stabilization (but need to reduce debt during good times to keep ability to run deficits when needed)
% changes in annual real govt spending and changes in real GDP, 33 EU countries, 2010-11, 2011-2, 2012-3 (=99 dots). Source: Krugman NYtimes blog, January 6, 2015
LONG-RUN EFFECTS OF GOVERNMENT DEBT

In the long-run, government debt affects the capital market where savers meet investors

savings = investment + new govt debt

With more government debt, if savings do not change, less funds available for investment: investment decreases

Two mitigating factors:

1) In an open economy, investment or govt debt can be funded with foreign savings

2) If individuals are forward looking, they understand that higher debt implies high taxes later on and hence they save more to be able to pay higher taxes later on [Ricardian equivalence but not much empirical support]
CONCLUSION

The deficit has been a constant source of policy interest and political debate over the last decade

Short-run: should the govt spend more and increase deficit to stimulate the economy?

Long-run: should the govt address long-term deficits by reforming retirement and health care benefits?

International evidence shows that austerity during the Great Recession worsens the recession

Health care cost growth has slowed down sharply since 2008, substantially improving the long-term Federal budget outlook
REFERENCES

Jonathan Gruber, Public Finance and Public Policy, 2016 Worth Publishers, Chapter 4

Congressional Budget Office “The Budget and Economic Outlook: Fiscal Years 2017 to 2027”, January 2017 (web)
