Lecture 13: Government Expenditures

See Barro Ch. 12

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Where are we? Taking stock

- We have a model of the business cycle with money
- We can talk about how shocks to productivity A impact wages, real interest rates r, labor supply, capital utilization, unemployment.
- We can talk about how shocks to money impact real behavior (it doesn't, so far) and nominal variables like nominal interest rates i, the price level P, and inflation π
- So far we've mostly left the government out
- But government is a big deal, and we'll start talking about how government expenditures and taxes impact behavior

The plan

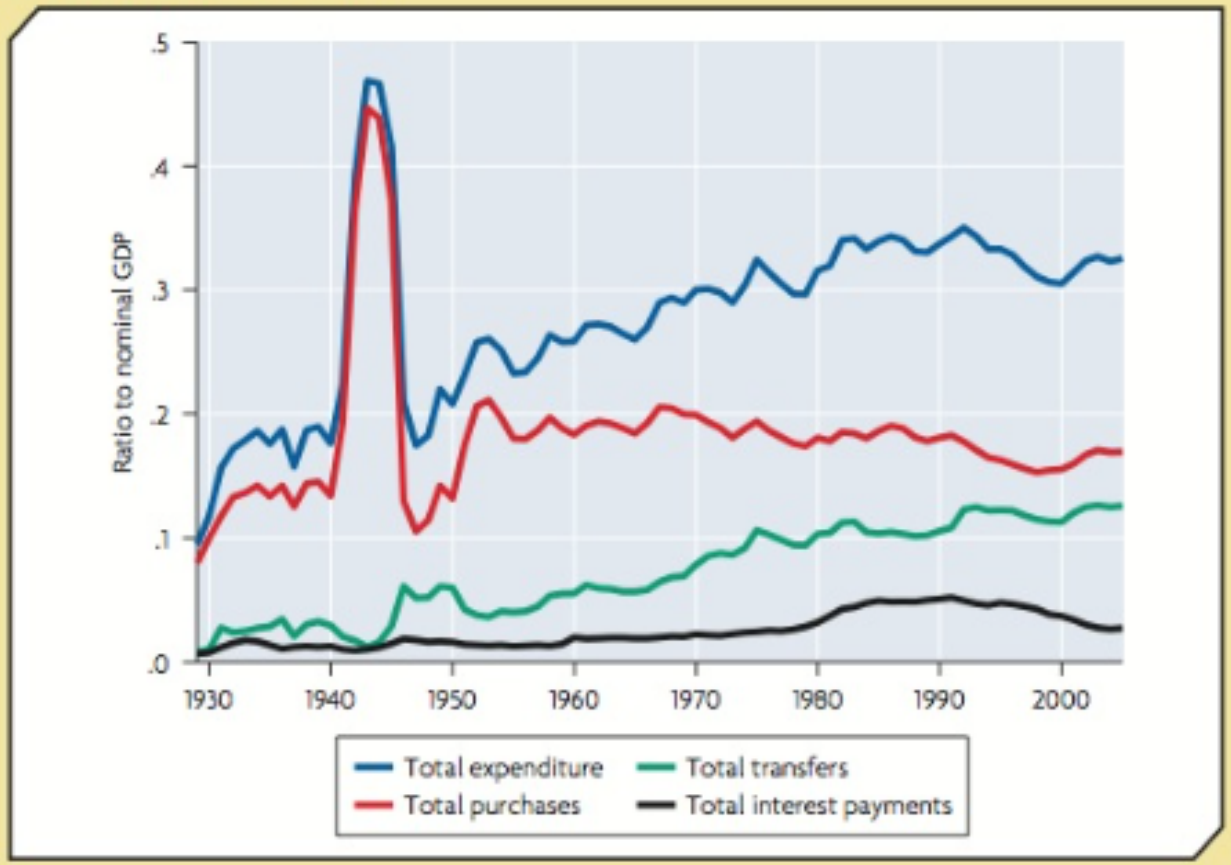
- Talk a little about what's actually happened in U.S. expenditures
- Introduce government spending into the household budget constraint

Government Expenditure

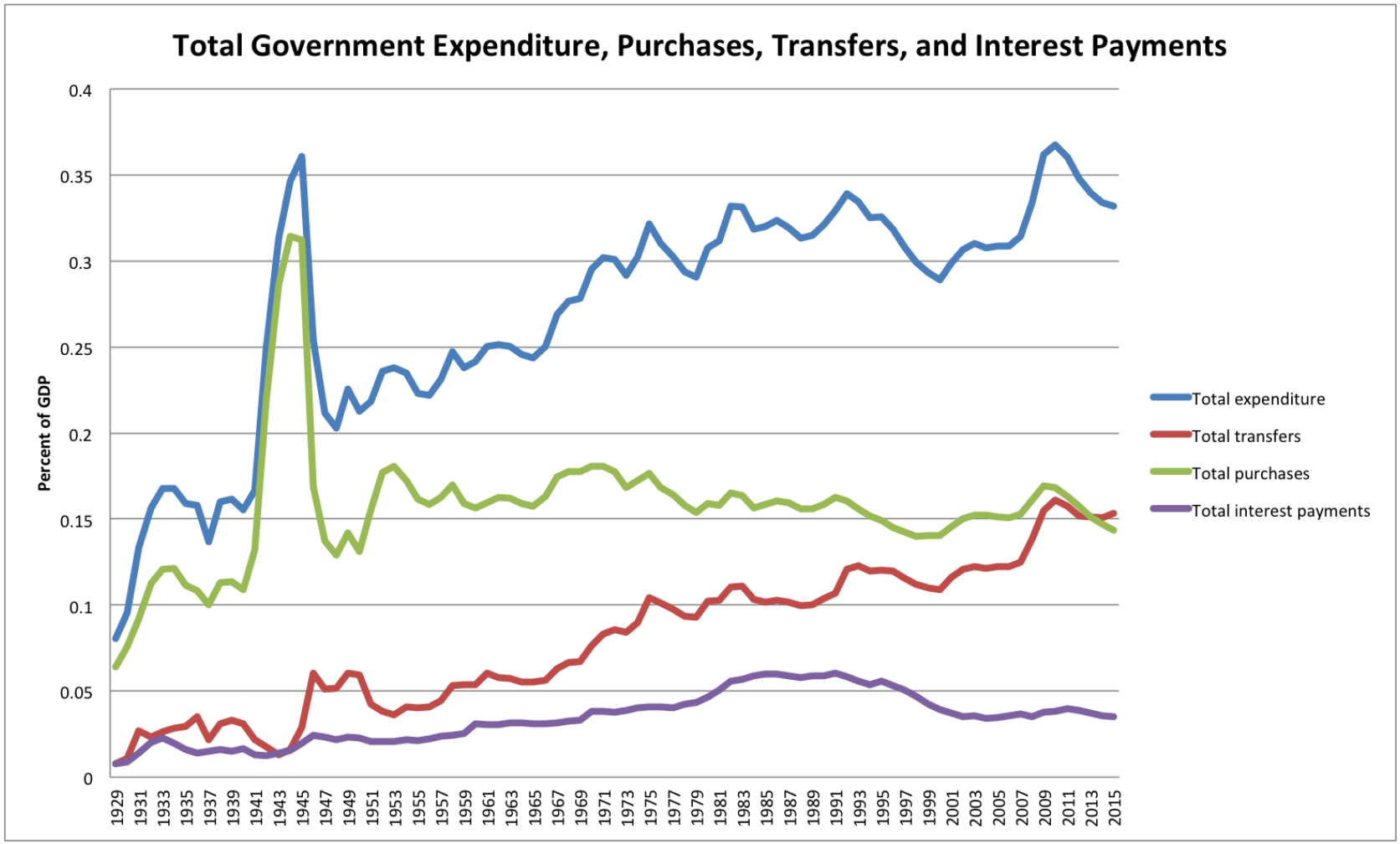
- It's convenient to break down government expenditure into three categories:
  1. Government purchases of goods and services (52%)
  2. Transfer payments (40%)
  3. Interest payments (9%)
- Government expenditures have increased as a fraction of GDP over time
- But each component has seen different rates of growth

Government Expenditures by Category

Figure 12.1 *Total Government Expenditure, Purchases, Transfers, and Interest Payments*



Government Expenditures by Category (Update)



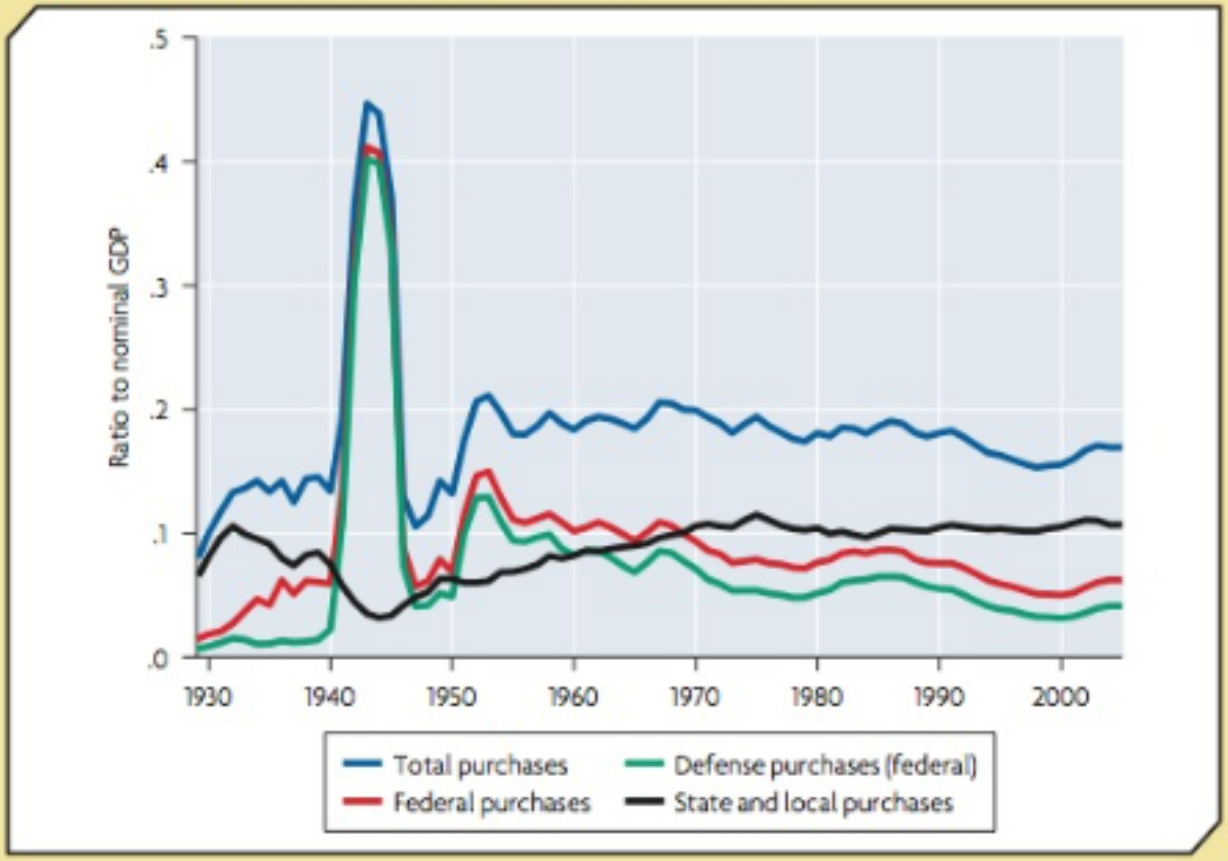
Thinking about components

- When thinking about the U.S. budget, it's useful to think about what makes up most categories

- Purchases can be broken down into:
  - Federal purchases
    - Federal defense
  - State and local purchases
- Transfers can be broken down into:
  - Federal transfers
  - State and local transfers
- Transfers can be further broken down into the big three:
  - Medicare
  - Medicaid
  - OASDI (Social Security and disability)

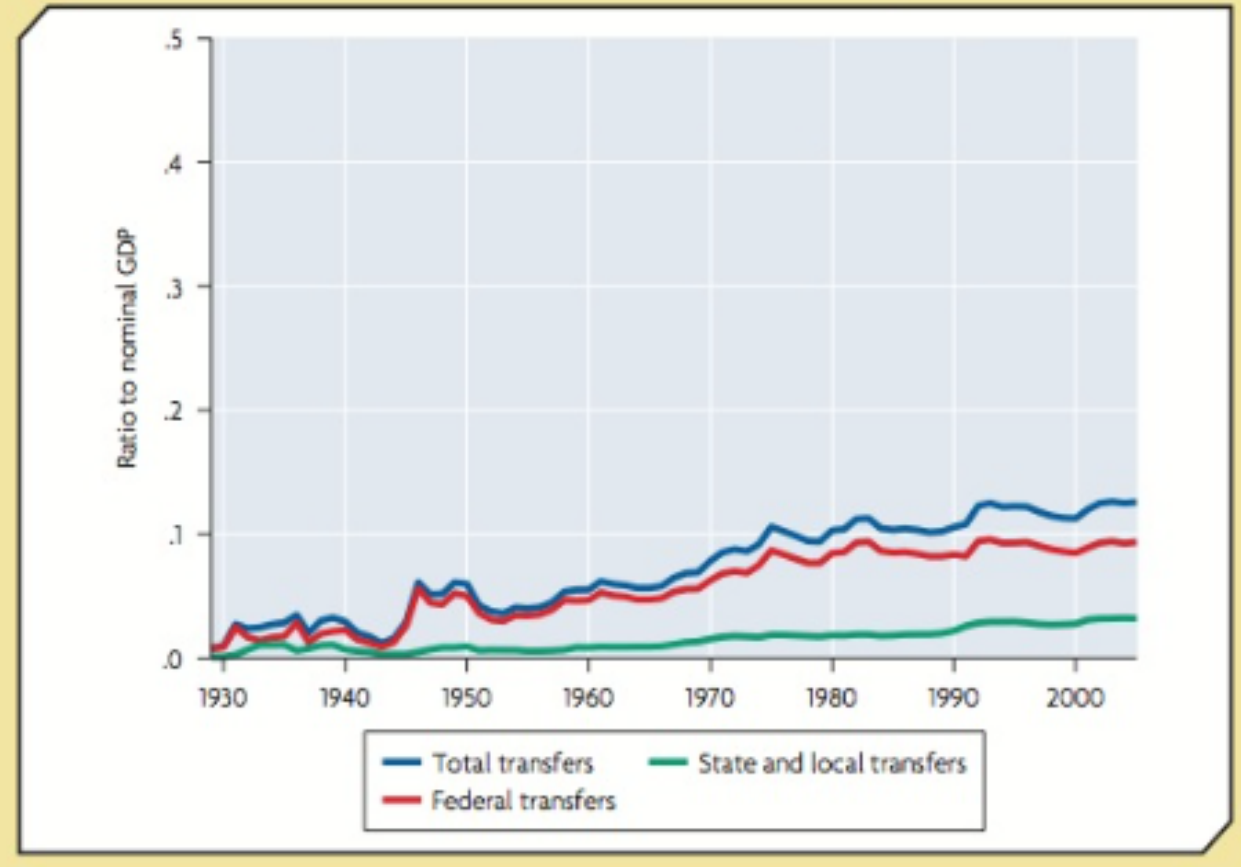
Government Purchases

Figure 12.2 *Breakdown of Government Purchases*



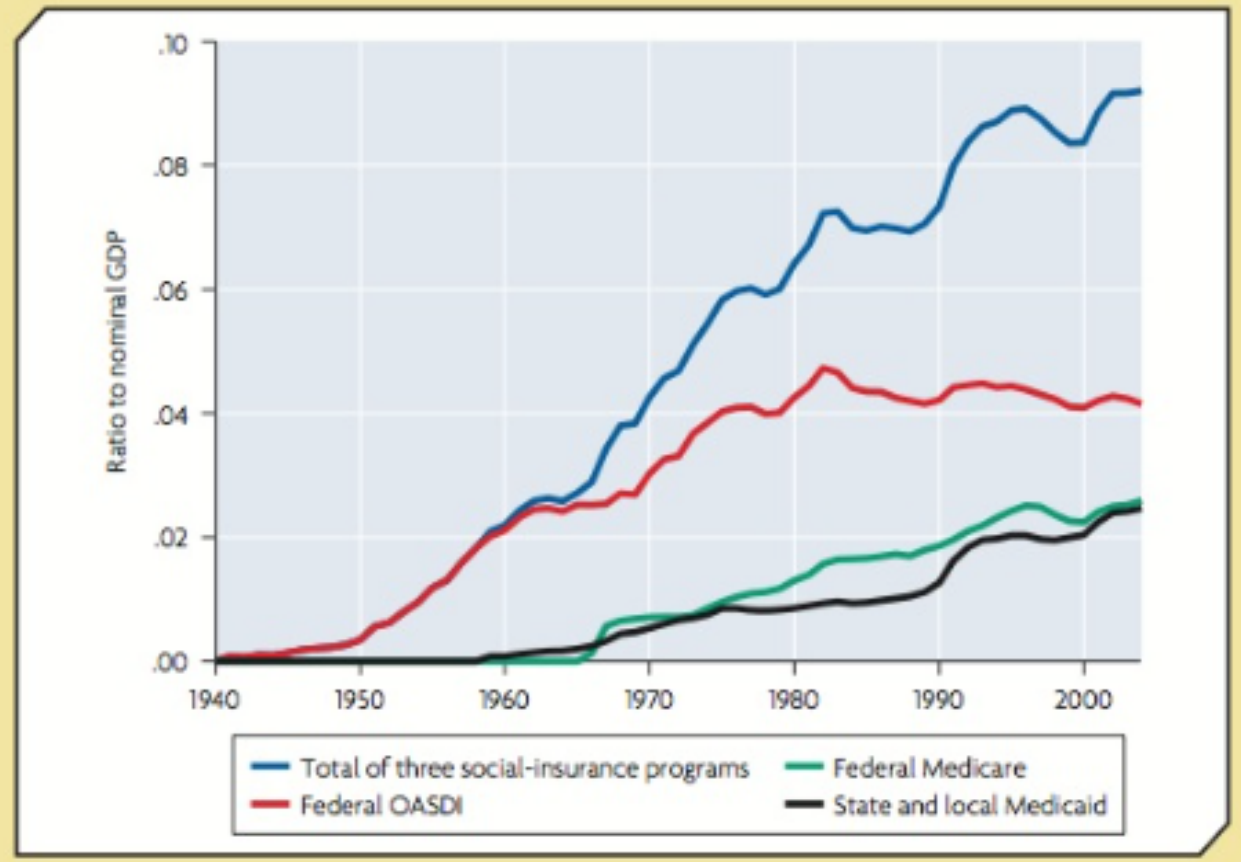
Government Transfer Payments

Figure 12.3 *Breakdown of Government Transfer Payments*



Government Transfer Payments: The Big Three

Figure 12.4 *Transfer Payments for Social Security, Medicare, and Medicaid*



Thinking about the Government's Budget Constraint

- The government will have two sources of revenue in real terms:
  1. A **lump sum** tax T, that doesn't vary by behavior ($2000/household, in real terms, for instance)
  2. Real seniorage revenue from printing money, $\frac{M_t - M_{t-1}}{P_t}$
- The government spends money on purchases G and real transfers V.
- So the budget constraint is:

$$G_t + V_t = T_t + \frac{M_t - M_{t-1}}{P_t}$$

- Printing money isn't a big deal for most governments, so we'll simplify this:

$$G_t + V_t = T_t$$

New one-period household budget constraint

- We had the budget constraint (assuming zero inflation for now, so $i = r$)

$$C_t + \frac{\Delta B_t}{P} + \Delta K_t = \frac{w_t}{P} L_t + r\left(\frac{B_t}{P} + K_t\right)$$

- Now the government will tax households at T and transfer money to them as V

$$C_t + \frac{\Delta B_t}{P} + \Delta K_t = \frac{w_t}{P} L_t + r\left(\frac{B_t}{P} + K_t\right) + V_t - T_t$$

- Where before the RHS was "real income" now it's "real disposable income."

- We can combine this budget constraint with future budget constraints again to get the net present value budget constraint.

New many-period household budget constraint

- We had the NPV budget constraint

$$C_1 + \frac{C_2}{1+r_1} + \frac{C_3}{1+r_2} + ... = (1+r_0)\left(\frac{B_0}{P} + K_0\right) + \frac{w_1}{P}L_1 + \\ + \frac{\frac{w_2}{P}L_2}{1+r_1} + \frac{\frac{w_3}{P}L_3}{1+r_2} + ...$$

- Now we just have the net present value of all taxes and transfers:

$$C_1 + \frac{C_2}{1+r_1} + \frac{C_3}{1+r_2} + ... = (1+r_0)\left(\frac{B_0}{P} + K_0\right) + \frac{w_1}{P}L_1 + \\ + \frac{\frac{w_2}{P}L_2}{1+r_1} + \frac{\frac{w_3}{P}L_3}{1+r_2} + ... + (V_1 - T_1) + \frac{(V_2 - T_2)}{1+r_1} + \frac{(V_3 - T_3)}{1+r_2} + ...$$

- This is incredibly simple: we're just discounting all expenditures and revenues, adding one set of terms...
- But it has an very powerful prediction! (What?)

Prediction

- Let's say the government gives a big tax cut in period 1 (or even a big transfer) and finances it with tax hikes in all future periods
- What happens to my behavior?

$$\overbrace{(V_1 - T_1)}^{\uparrow} + \underbrace{\frac{(V_2 - T_2)}{1 + r_1}}_{\downarrow} + \underbrace{\frac{(V_3 - T_3)}{1 + r_2}}_{\downarrow} + \underbrace{\frac{(V_4 - T_4)}{1 + r_3}}_{\downarrow} + \ldots$$

- My NPV budget constraint hasn't changed!
- So my consumption behavior won't change.
- I just save the tax cut and have a little extra money to pay for the higher taxes in future periods

Permanent Changes in Government Purchases-I

- We want to think about how the economy changes when there are permanent changes to G
- What happens to household behavior? Recall that spending+transfers=taxes.

$$G + V = T$$

- But the household side only cares about $V - T$, so we can write:

$$V - T = -G$$

- When spending (G) goes up, households are either transferred less ($V \downarrow$) or taxed more ($T \uparrow$).
- Let's ignore labor for now, assume it's perfectly inelastic

Permanent Changes in Government Purchases-II

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- Y stays the same, and the increase in G is met with an equal decrease in C

Permanent Changes in Government Purchases-III

- Permanent increases in government spending don't impact interest rates because it doesn't impact MPK
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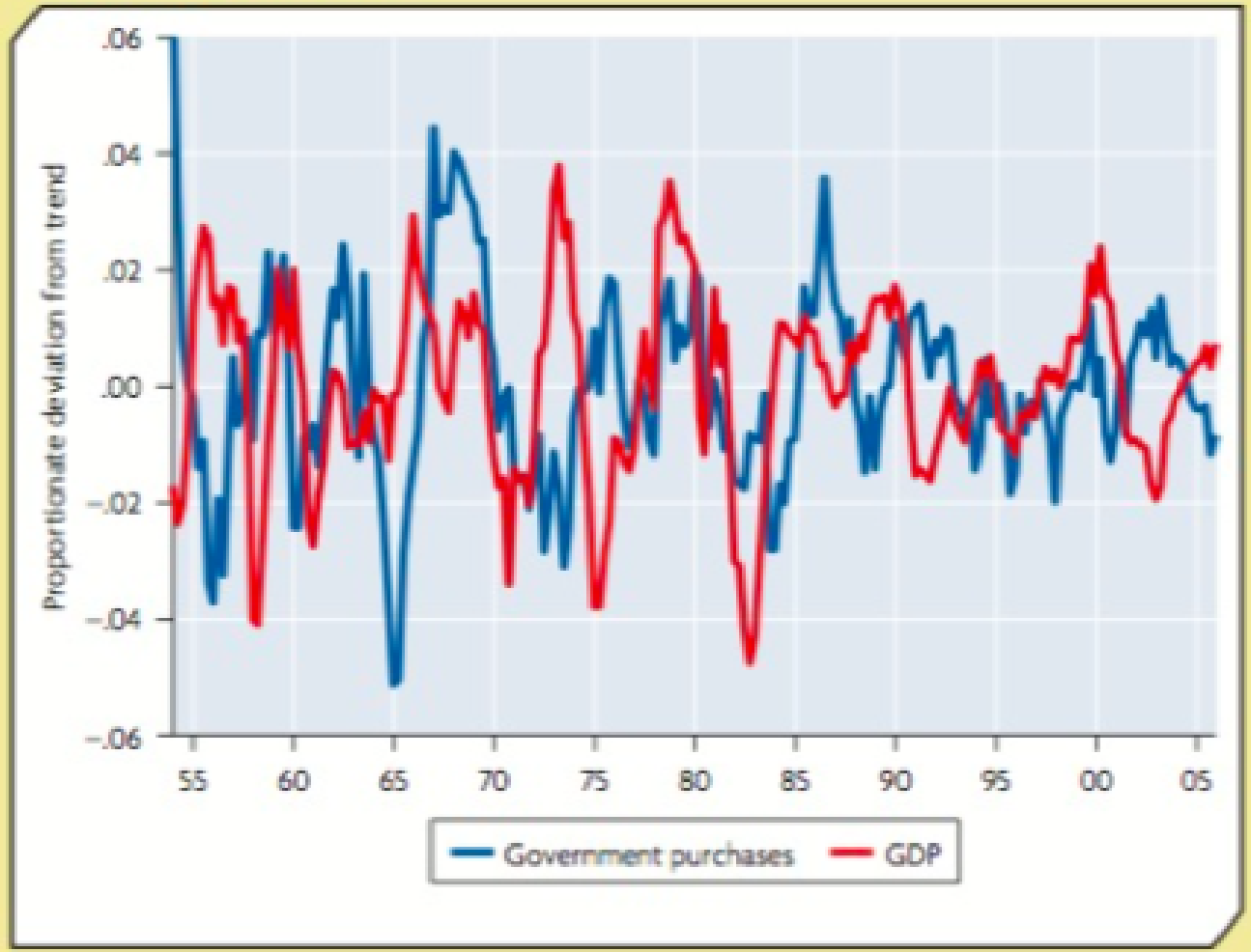
- We have an incredible conclusion: permanent increases in government spending G don't impact real GDP!
- Permanent increases in government spending **do** decrease consumption, at a 1-1 rate.
- Permanent increases in government spending do not decrease investment at all.
- This is the basic idea of "crowd-out."

Permanent Changes in Government Purchases-Empirics

- So our prediction is that permanent increases in G shouldn't impact GDP at all
- One (unsatisfactory) way to look at this is to look at the time-series correlation between government spending and real GDP over the business cycle

Permanent Changes in Government Purchases-Empirics

Figure 12.7 *Cyclical Behavior of U.S. Real GDP and Government Purchases*



Permanent Changes in Government Purchases-Empirics

- So our prediction is that permanent increases in G shouldn't impact GDP much (at all)
- One way to look at this is to look at the correlation between government spending and real GDP
- There is very little correlation between government spending and real GDP (slightly negative)
- This is a confirmation of our hypothesis
- Anybody see any problems with this?

Temporary Changes in Government Purchases-I

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- My income has gone down by \$1 but I only want consumption to go down by \$0.05
- Consequently, reduce investment (save less/borrow) by \$0.95 this period
- Then, increase investment (save more/pay off debt) by \$0.05 more each period, decreasing consumption by \$0.05.

Summarizing our Results so far

How do government purchases impact aggregates?

G change $(+1)$	$\Delta(V-T)$	ΔC	ΔI	Δw	Δr	ΔL	$\Delta \kappa$
Permanent Increase	-1	-1	0	0	0	0	0
Temporary increase (1st period only)	-1	$-\frac{1}{N}$	$\frac{N-1}{N}$	0	0	0	0
Temporary increase (all other periods)	-1	$-\frac{1}{N}$	$\frac{1}{N}$	0	0	0	0

- Where N is the number of periods you're smoothing over.
- This is easy to remember!
  - People want to smooth. If they can (temporary shocks to income) then they do through through reducing savings/investment.
  - If they can't (permanent shocks) then they do so through reducing consumption.

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  - War!
- Let's look at WWI, WWII, Korean War, and the Vietnam War

Four Wars from an Economic Standpoint

Aggregates as a percent of Trend

Category	WWI	WWII	Korean War	Vietnam War
Defense Purchases	697%	317%	25%	15%
% of trend real GDP	16%	44%	3%	1%
Real GDP	8%	36%	3%	2%
Consumption	-5%	0%	0%	1%
Gross Investment	-28%	-51%	0%	1%
Government (nondef)	0%	-19%	3%	1%
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Takeaways & Failure

GDP vs. Defense Purchases (level)
(billions of 1996 dollars)

Category	WWI	WWII	Korean
Defense Purchases	\$84	\$537	\$56
GDP	\$42	\$433	\$49

- Real GDP goes up
- But by less than military purchases
- Consequently other parts of GDP must go down (which?)
  - In WWI, investment, consumption
  - In WWII, investment, government
- Our big failure is that real GDP goes up while our model predicts it shouldn't move at all!

Why did we fail?

- When we did our analysis, we fixed labor supply
- Fixing labor supply made it so income effects of being taxed didn't increase labor supply, which would impact capital markets, and change our entire analysis
- Employment shoots up during wartime: $+8\%$, $+17\%$, $+1\%$, $+1\%$ above trend for each war.
- This is a big deal!
- Why does labor supply shoot up?

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3. Family planning: people put off children, work instead

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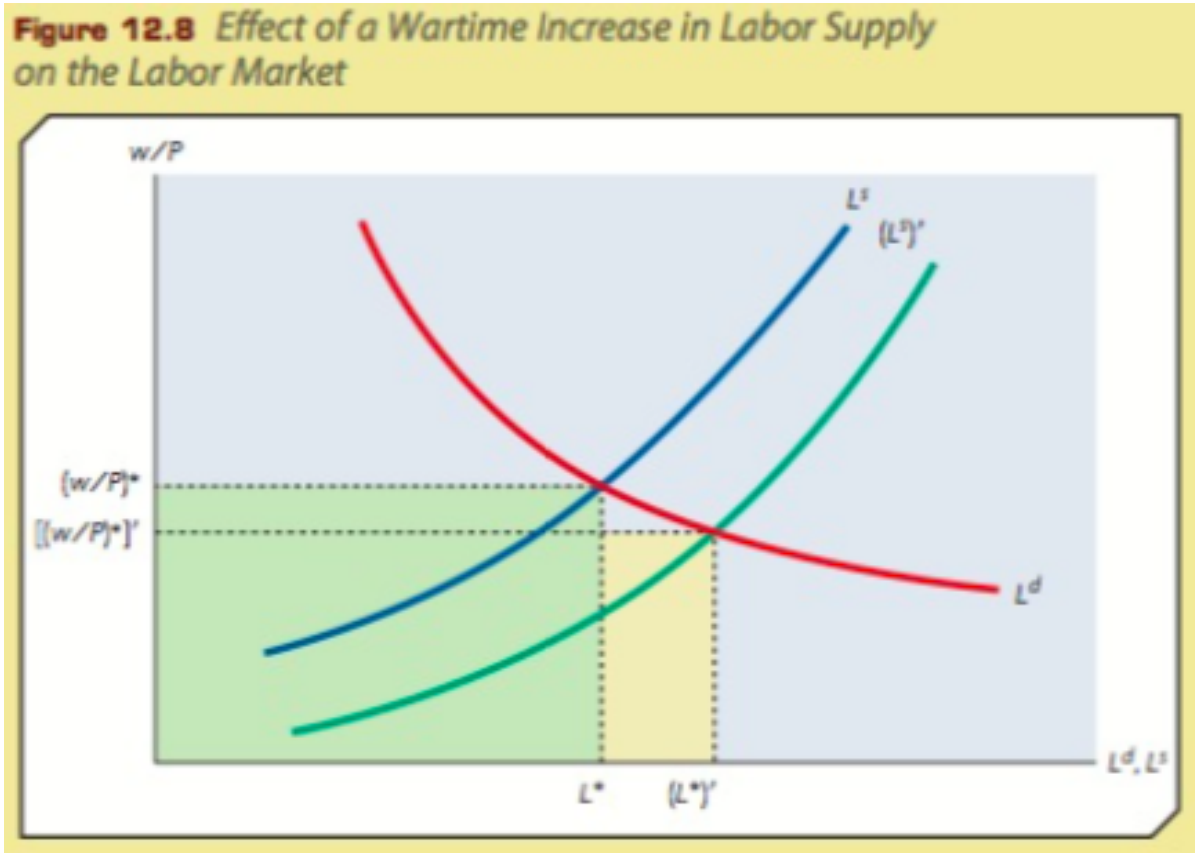

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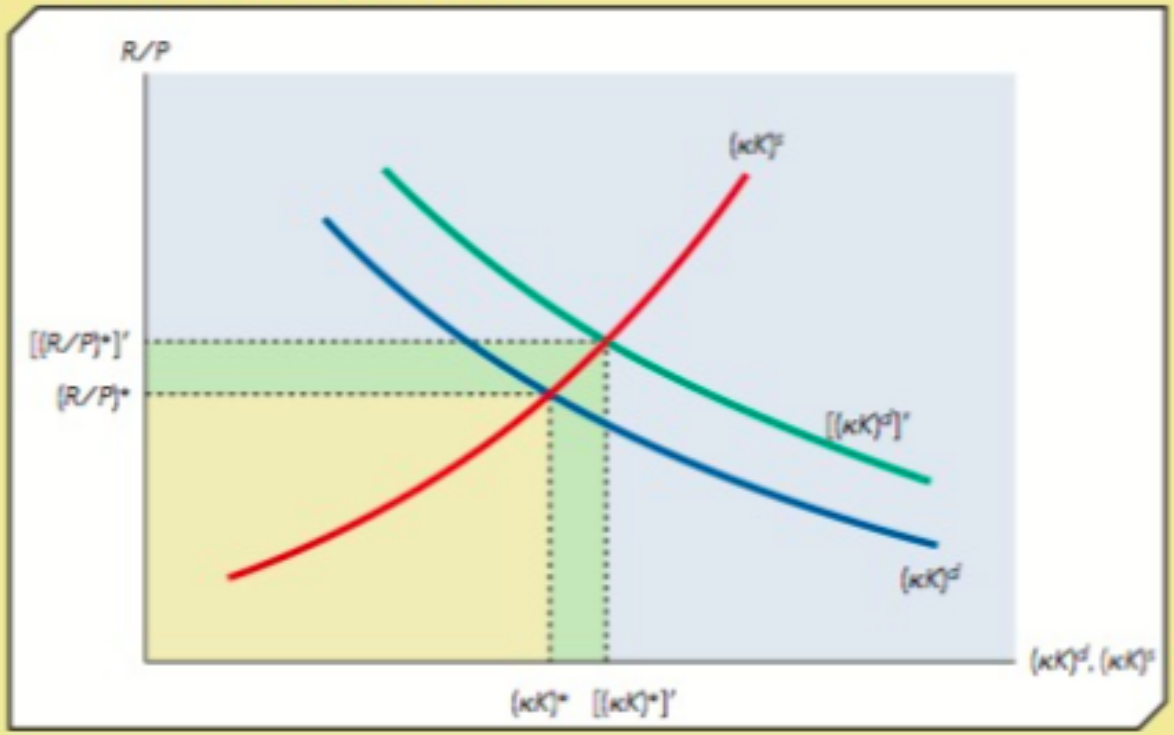
- What about capital markets? What should happen when labor supply increases?

Labor supply increases, so capital demand increases too!

Figure 12.9 *Effect of a Wartime Increase in Labor Input on the Market for Capital Services*



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- However, interest rates clearly fall to extremely low levels: ~10% in WWI, -4% in WWII
- This again represents a failure and poses questions for our equilibrium model that are ongoing today