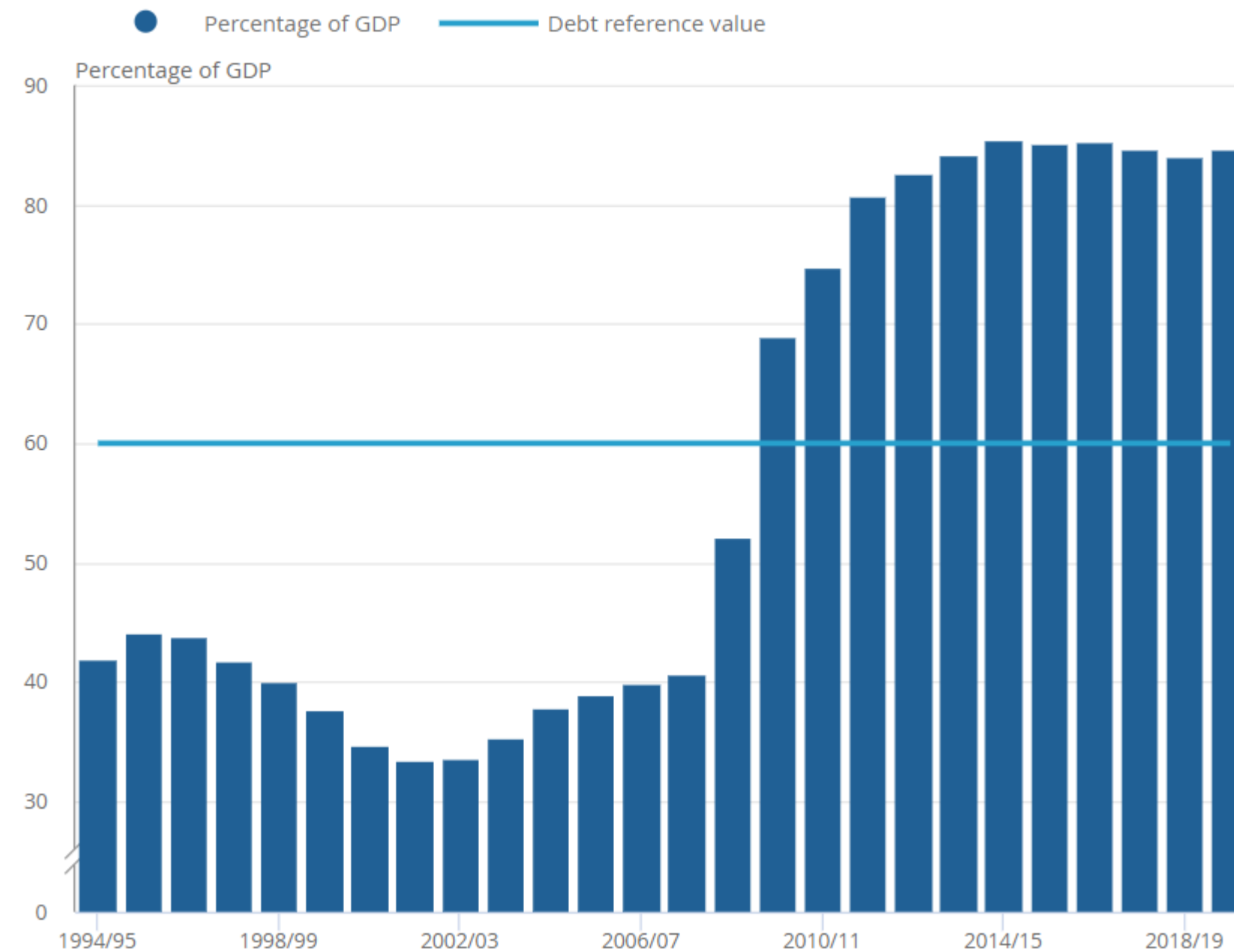# Macro for Policy

Government debt

Lecturer: Dr. Tatsuro Senga
School of Economics and Finance

Agenda

1. **Government Economic Activity in the UK**

2. Dynamic Theory of Taxation (Ricardian equivalence)

3. FTPL

4. MMT

Debt to GDP ratio in the UK

"Figure 1: General government gross debt has been above the 60% of GDP reference value since the financial year ending 2010 (ONS)
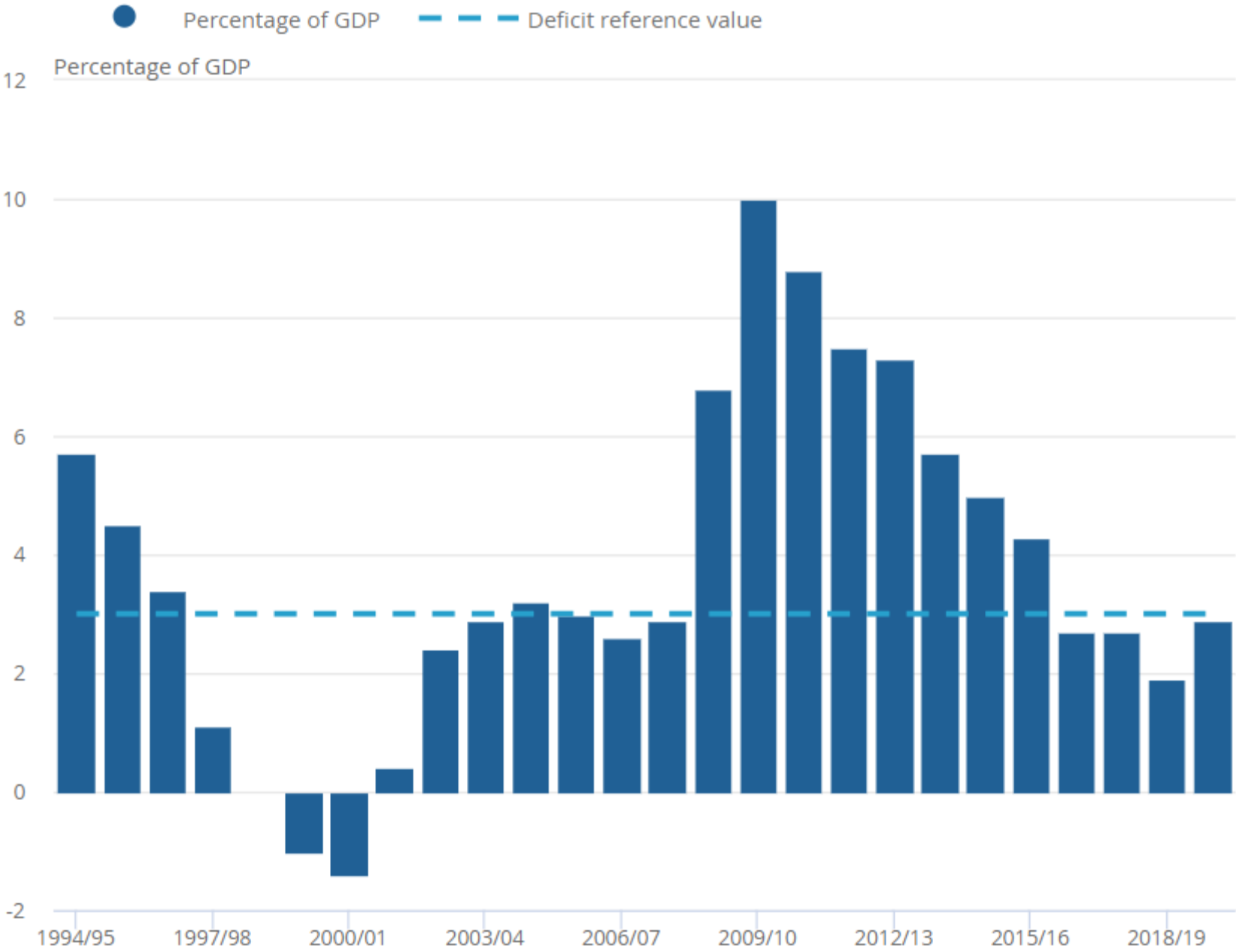
Deficit to GDP ratio in the UK

Figure 2: For the first time since the financial year ending 2004, general government deficit has been below 3% of GDP for four consecutive years (ONS)

Agenda

1. Government Economic Activity in the UK

2. **Dynamic Theory of Taxation (Ricardian equivalence)**

3. FTPL

4. MMT

The government budget constraint

- Government budget constraint:

$$G_t + (1 + r)B_{t-1} = B_t + T_t$$

- Rewriting the above:

$$G_t - T_t + rB_{t-1} = B_t - B_{t-1}$$

- Towards intertemporal budget constraint:

$$G_1 = T_1 + B_1$$

$$G_2 + (1 + r)B_1 = T_2 + B_2 \ - - \rightarrow \ B_1 = \frac{T_2 + B_2 - G_2}{1 + r}$$

$$G_1 = T_1 + \frac{T_2 + B_2 - G_2}{1 + r} \ - - \rightarrow \ G_1 + \frac{G_2}{1 + r} = T_1 + \frac{T_2}{1 + r} + \frac{B_2}{1 + r}$$

The government budget constraint (continued)

$$G_1 + \frac{G_2}{1+r} + \cdots + \frac{G_T}{(1+r)^{T-1}} = T_1 + \frac{T_2}{1+r} + \cdots + \frac{T_T}{(1+r)^{T-1}} + \frac{B_T}{(1+r)^{T-1}}$$

$$G_1 + \frac{G_2}{1+r} + \cdots + \frac{G_T}{(1+r)^{T-1}} = T_1 + \frac{T_2}{1+r} + \cdots + \frac{T_T}{(1+r)^{T-1}}$$

$$\sum_{t=1}^{T} \left(\frac{1}{1+r}\right)^{t-1} G_t = \sum_{t=1}^{T} \left(\frac{1}{1+r}\right)^{t-1} T_t$$

$$\sum_{t=1}^{\infty} \left(\frac{1}{1+r}\right)^{t-1} G_t = \sum_{t=1}^{\infty} \left(\frac{1}{1+r}\right)^{t-1} T_t$$

Ricardian Equivalence

- Consider two-period problem:

$$G_1 = T_1 + B_1$$
$$(1 + r)B_1 = T_2$$

- Two policies:

$$T_1 = G_1 \qquad B_1 = T_2 = 0$$
$$T_1 = 0 \qquad B_1 = G_1 \qquad T_2 = (1 + r)B_1 = (1 + r)G_1$$

$$G_1 = T_1 + \frac{T_2}{1 + r}$$

Private agents: consumption

$$\max_{\{c_1,c_2\}} [u(c_1) + \beta u(c_2)]$$

such that

$$c_1 + \frac{c_2}{1+r} = e_1 - T_1 + \frac{e_2 - T_2}{1+r} + A$$

alternatively,

$$c_1 + \frac{c_2}{1+r} + T_1 + \frac{T_2}{1+r} = e_1 + \frac{e_2}{1+r} + A$$

- Two policies:

$$T_1 = G_1 \quad T_2 = 0 \quad ---\to \quad T_1 + \frac{T_2}{1+r} = G_1$$

$$T_1 = 0 \quad T_2 = (1+r)G_1 \quad ---\to \quad T_1 + \frac{T_2}{1+r} = G_1$$

Private agents: savings

$$c_1 + s = e_1 - T_1$$
$$c_2 = e_2 - T_2 + (1 + r)s$$

- (C_1^*, C_2^*) Two policies:

$$C_1^* + s^* = e_1 - T_1 \quad ---\rightarrow \quad C_1^* = e_1 - T_1 - s^*$$
$$C_1^* + s' = e_1 \quad ---\rightarrow \quad C_1^* = e_1 - s'$$

$$s' = s^* + T_1$$

Ricardian Equivalence states that any policy reform that only changes the timing of taxes, leaving the present discounted value of taxes paid by each household unchanged has no effect on aggregate consumption.

Key is that a government budget constraint must be satisfied.

Assumptions

The Ricardian approach to budget deficits amounts to the statement that the government's fiscal impact is summarized by the present value of its expenditures. Given this present value, rearrangement of the timing taxes—as implied budget deficits—have no first-order effect on the economy. — Barro (1989)

- No Redistribution of the Tax Burden Across Generations

- Lumpsum-taxes

- Absence of Binding Borrowing Constraint

Agenda

1. Government Economic Activity in the UK

2. Dynamic Theory of Taxation

3. **FTPL**

4. MMT

FTPL (Fiscal theory of price level)

The real value of government debt equals the present value of real primary surpluses

$$\underbrace{\frac{B_t}{P_t}}_{\text{real value of debt}} = E_t \sum_{j=0}^{\infty} \left(\frac{1}{1+r}\right)^j \left(\frac{T_{t+j} - G_{t+j}}{\underbrace{P_{t+j}}_{\text{real surplus}}}\right)$$

What determines the overall level of prices? What causes inflation?

- Key is coordination of fiscal and monetary policy

FTPL (Fiscal theory of price level)

Ricardian: deficit will be financed by increasing future taxes and cutting spending

$$\underbrace{\frac{B_t}{P_t}}_{\text{real value of debt}} = E_t \sum_{j=0}^{\infty} \left(\frac{1}{1+r}\right)^j \underbrace{\left(\frac{T_{t+j} - G_{t+j}}{P_{t+j}}\right)}_{\text{real surplus}}$$

FTPL: price level adjust to restore the equality

$$\underbrace{\frac{B_t}{P_t}}_{\text{real value of debt}} = E_t \sum_{j=0}^{\infty} \left(\frac{1}{1+r}\right)^j \underbrace{\left(\frac{T_{t+j} - G_{t+j}}{P_{t+j}}\right)}_{\text{real surplus}}$$

Price level adjustment

Traditional ideas:

    Fiscal policy: Ricardian (increase tax rates and cut spending)

    Monetary policy: active (setting price level)

FTPL:

    Fiscal policy: Non-Ricardian (no need to adjust tax and spending)

    Monetary policy: (passive)

How would price level change?

Government bonds are net wealth?

$g_t + c_t = y_t$ in the economy:

$$\frac{B_t}{P_t} = E_t \sum_{j=0}^{\infty} \left(\frac{s_{t+j}}{1+r}\right)^j = \sum_{j=0}^{\infty} \left(\frac{\tau_{t+j} - g_{t+j}}{1+r}\right)^j \quad \Leftrightarrow \quad \frac{B_t}{P_t} + E_t \sum_{j=0}^{\infty} \left(\frac{y_{t+j} - \tau_{t+j}}{1+r}\right)^j = E_t \sum_{t=0}^{\infty} \left(\frac{c_{t+j}}{1+r}\right)^j$$

would be the households' budget constraint.

Households (creditors) may view government bonds as net wealth.
    - other better alternative asset choice rather than holding government bonds?

Default is not assumed

- How should we expect if $B_0 = 100\ trillion$ and $\sum_{t=0}^{\infty} \left(\frac{s_t}{1+r}\right)^t = 50\ trillion$?

$$\frac{B_0}{P_0} =? \sum_{t=0}^{\infty} \left(\frac{s_t}{1+r}\right)^t$$

Instead of price adjustment, should we expect default?
 - Transversality condition is assumed here.
 - "the possibility of default, which is never necessary on nominal debt (because the government can print the money the debt promises), but does sometimes occur." (Sims, 2018 Jackson Hole)

Otherwise (Uribe, 2006):

$$(1-d)\frac{B_0}{P_0} = \sum_{t=0}^{\infty} \left(\frac{s_t}{1+r}\right)^t, \qquad \text{where } d \text{ is the default rate}$$

Agenda

1. Government Economic Activity in the UK

2. Dynamic Theory of Taxation

3. FTPL

4. **Helicopter money/MMT**

MMT (Modern Monetary Theory)

PLANET MONEY

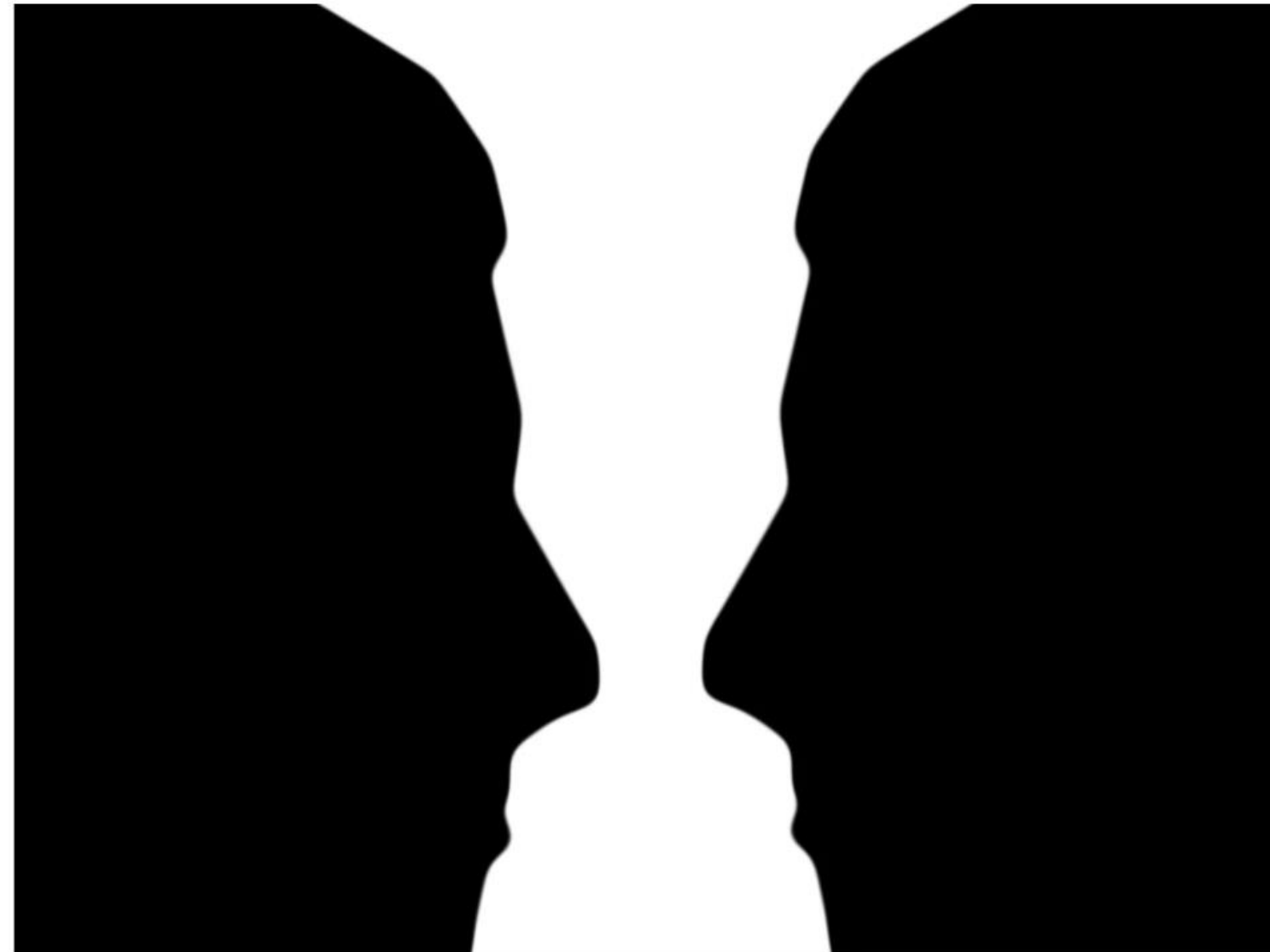Episode 866: Modern Monetary Theory

September 26, 2018 · 8:03 PM ET

SALLY HELM   ALEX GOLDMARK

SUBSCRIBE

22-Minute Listen   + PLAYLIST

MMT (Modern Monetary Theory)

Live session

Should we worry about government deficit?

https://www.vox.com/future-perfect/2019/4/16/18251646/modern-monetary-theory-new-moment-explained

MMT says "no" and the reasons are:

1. Government should never have to default as it can create its currency (as long as it issues it).
    - Argentina or Greek?

2. Government can issue debt as much as needed, not being constrained by the size of the household assets.

3. Monetary policy is useless, so let's introduce job guarantees.

Helicopter money

"Let us suppose now that one day a helicopter flies over this community and drops an additional $1,000 in bills from the sky, which is, of course, hastily collected by members of the community. Let us suppose further that everyone is convinced that this is a unique event which will never be repeated." (Milton Friedman, "The Optimum Quantity of Money," 1969)

"an expansionary fiscal policy—an increase in public spending or a tax cut—financed by a permanent increase in the money stock. To get away from the fanciful imagery, for the rest of this post I will call such a policy a Money-Financed Fiscal Program, or MFFP." (Bernanke, 2016)

https://www.brookings.edu/blog/ben-bernanke/2016/04/11/what-tools-does-the-fed-have-left-part-3-helicopter-money/#cancel

Live session

Helicopter money and Covid-19

Helicopter money: The time is now

Jordi Galí 17 March 2020

The measures many countries are taking to contain the spread of coronavirus, while necessary, are bound to have a direct impact on the economy. This column argues that rather than raising taxes and/or increasing government debt to finance the necessary fiscal programmes, the time has come for 'helicopter money' – direct, unrepayable funding by the central bank of the additional fiscal transfers deemed necessary.

A **A**

Jordi Galí
Senior Researcher, CREI,
Professor, Universitat Pompeu
Fabra; research Professor,
Barcelona GSE; Research Fellow,
CEPR

The rapid spread of the coronavirus in many countries constitutes a major challenge to their health systems. Under all realistic scenarios, an overwhelming number of human lives will be lost, partly as a result of the inability to provide proper intensive care to all patients that need it. This has led many governments to attempt to slow down the rate of infection through a number of measures, including home confinement, travel restrictions, closing of restaurants and theatres, suspension of sports events, and so on.

Those measures, while necessary, are bound to have a direct impact on the economy, operating through different channels.[1]

- First, they will have a direct effect on production and sales in many sectors, where activity will collapse partly or completely during the emergency, either as a result of supply disruption (due to the unavailability of inputs, labour or otherwise) or a fall in demand (due to the forced change in consumption patterns resulting from health-related measures).

Related

The political economy of COVID-motivated helicopter drops
Eran Yashiv

COVID-19: Europe needs a catastrophe relief plan
Agnès Bénassy-Quéré, Ramon Marimon, Jean Pisani-Ferry, Lucrezia Reichlin, Dirk Schoenmaker, Beatrice Weder di Mauro

Helicopter money as a policy option
Lucrezia Reichlin, Adair Turner, Michael Woodford

Fiscal stimulus via 'helicopter tax credits'
Biagio Bossone, Marco Cattaneo

Helicopter money: Today's best policy option
Biagio Bossone, Thomas Fazi, Richard Wood

Don't Miss

The ghost of Smoot-Hawley tells why America isn't too big to avoid retaliation
Mitchener, O'Rourke, Wandschneider

Independent Ireland: A centennial perspective
Ó Gráda, O'Rourke

US inflation: Set for take-off?
Ball, Gopinath, Leigh, Mishra, Spilimbergo

Events

The Policy Implications of Recent Globalization Research - 3
2 - 2 June 2021 / Online /

Helicopter money: The time is now (Galí, 2020)

"such a strategy would only transfer the problem to governments, which would need to raise taxes (thus increasing the burden of households or firms, counterproductively) or to borrow in capital markets and increase their debt burdens (and be forced to raise taxes in the future). Even if the EU were to relax the restrictions on that further borrowing, it would be a risky strategy given the high debt ratios (above 100% of GDP in some cases) in many of the most affected countries, with the consequent risks of a debt crisis and an immediate rise in spreads."

"An eventual massive purchase of the newly issued debt by the central bank through an expanded quantitative easing programme would certainly facilitate its absorption but would not prevent the increase in governments' debt ratios, with the risks of putting some countries' public finances on an unsustainable path."

Live session

"Fortunately, there is an alternative to a strategy based on higher taxes and/or more government debt in order to finance such an emergency fiscal programme, albeit one that has remained a taboo among most economists and policymakers – namely, direct, unrepayable funding by the central bank of the additional fiscal transfers deemed necessary, an intervention commonly known as 'helicopter money'."

Monetazation –v- QE

Inflation, interest rate and government debt and deficits

The impact of government debt and deficits:

On interest rates <--- a classic IS-LM model [shift the IS curve to the right]

On inflation   <--- Phillips curve [low unemployment will lead to high inflation]

(Long-term) Interest rate and government debt

NEW EVIDENCE ON THE INTEREST RATE EFFECTS OF BUDGET DEFICITS AND DEBT

Thomas Laubach
Goethe University Frankfurt

Abstract
Estimating the effects of government debt and deficits on Treasury yields is complicated by the need to isolate the effects of fiscal policy from other influences. To control for the effects of the business cycle, and associated monetary policy actions, on debt, deficits, and interest rates, this paper studies the relationship between long-horizon forward rates and future federal government deficits and debt as projected by the Congressional Budget Office. For the entire 30-year sample for which these projections are available, the estimated effects of government deficits and debt on interest rates are statistically significant and economically relevant: about 25 basis points per percentage point increase in the projected deficit/GDP ratio, and 3 to 4 basis points for the debt/GDP ratio. Under plausible assumptions the parameter estimates are shown to be consistent with predictions from the neoclassical growth model. (JEL: E6, H6)

"a percentage-point increase in the projected deficit-to-GDP ratio raises the 5-year-ahead 10-year forward rate by 20 to 29 basis points"

Inflation and government debt

US inflation: Set for take-off?
Ball, Gopinath, Leigh, Mishra, Spilimbergo, 2021

Figure 2 US inflation: No puzzle in COVID-19 crisis

A. Phillips curve for median CPI inflation

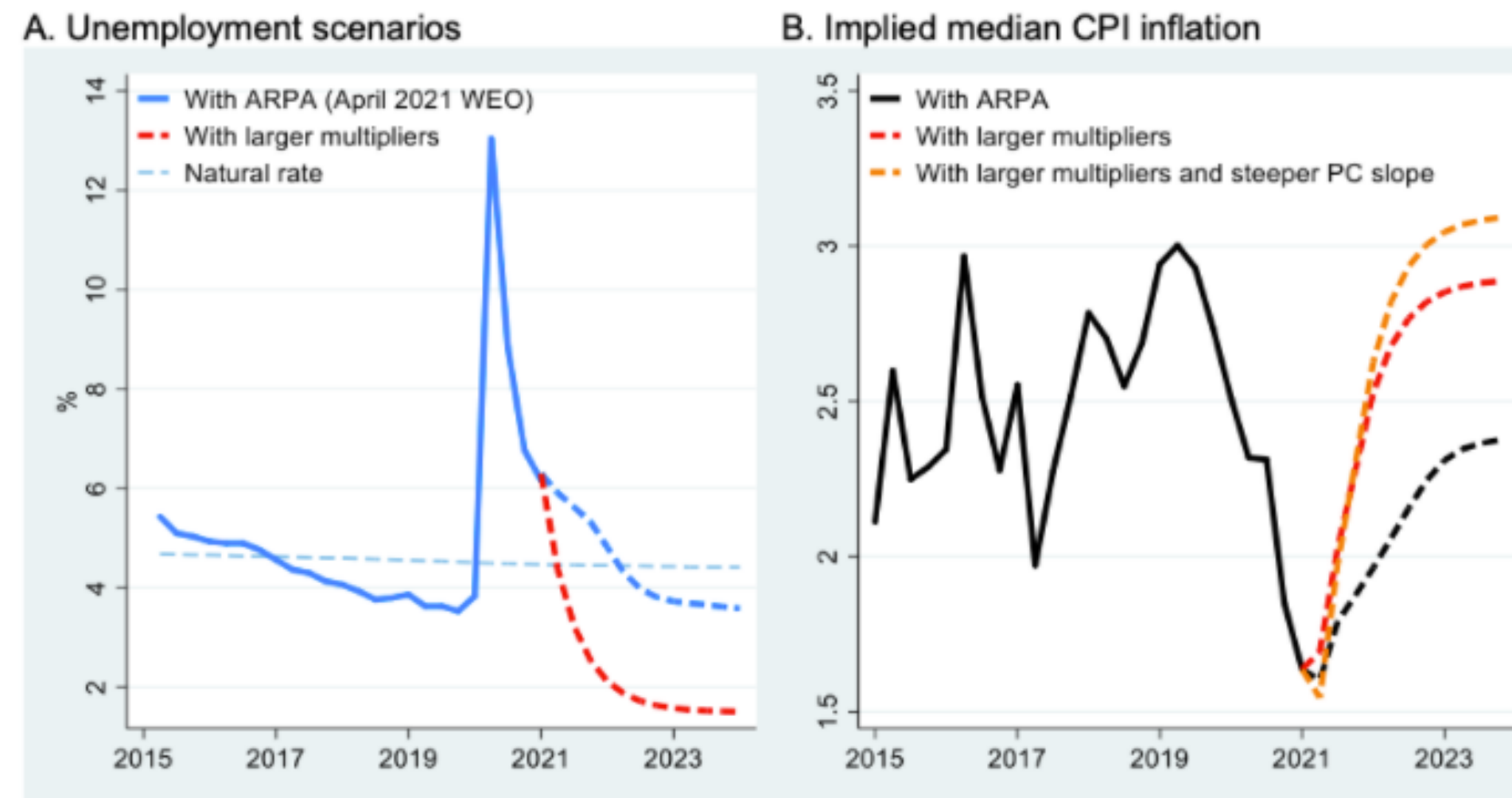**B. Phillips curve without temporary layoffs**
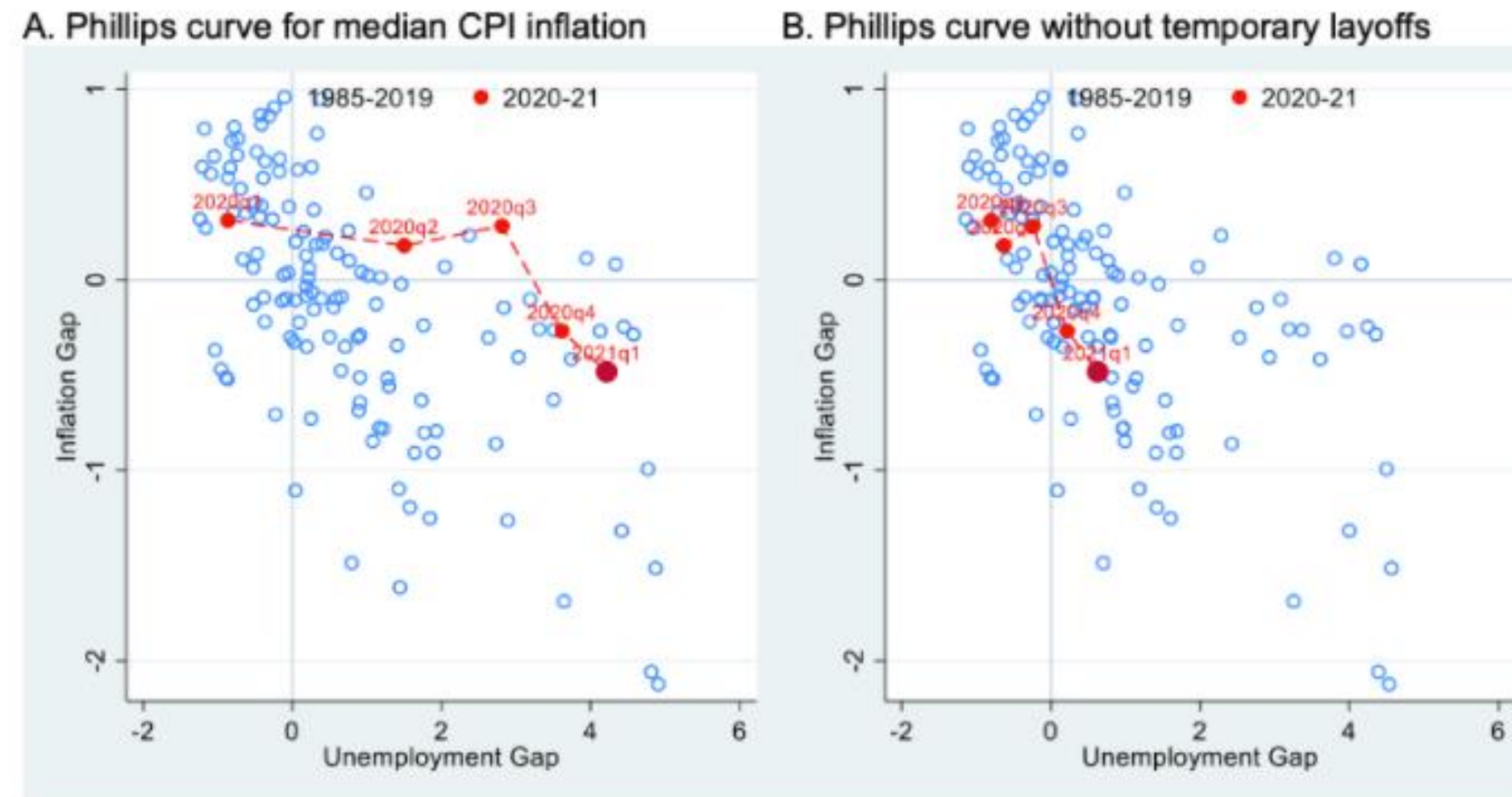
Note: Inflation gap = inflation – long-term SPF forecast. Unemployment gap = unemployment – CBO natural rate, 4-quarter average.

"A one percentage point fall in the unemployment rate should raise median CPI inflation by 0.24 percentage points"

US inflation: Set for take-off?
Ball, Gopinath, Leigh, Mishra, Spilimbergo, 2021

Figure 3 US inflation could rise to 2.5% or more by 2023

A. Unemployment scenarios

- With ARPA (April 2021 WEO)
- With larger multipliers
- Natural rate

B. Implied median CPI inflation

- With ARPA
- With larger multipliers
- With larger multipliers and steeper PC slope

Note: WEO = IMF *World Economic Outlook.* ARPA = American Rescue Plan Act. PC = Phillips curve.

1. the unemployment rate falling to 3.6% by 2023, about 0.8pp below the CBO natural rate
2. the unemployment rate falls to 1.5% Blanchard's (2021) scenario

1. Government Economic Activity in the UK

2. Dynamic Theory of Taxation (Ricardian equivalence)

3. FTPL

4. MMT

Queen Mary
University of London