

DEBT REVENUE AND THE SUSTAINABILITY OF PUBLIC DEBT

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*4th of November 2022
CBO Panel of Advisors meeting
Washington DC (virtually)*

Debt revenue

- An accounting identity:

$$\underbrace{\text{IncreasePublicDebt}}_{\dot{b}_t} = \underbrace{\text{ReturnDebtHolders}}_{r_t b_t} - \underbrace{\text{PrimaryBalance}}_{s_t}$$

- Rewrite it as:

$$\dot{b}_t = \underbrace{-(m_t - r_t)b_t}_{\text{DebtRevenue}} - s_t + m_t b_t$$

- **Debt revenue:** The discount the government gets in borrowing rate relative to other borrowers in the economy. It saves future taxes to repay a debt that grows at a lower rate than market rate. Can be realized if make public loans at market rates. Can be implicit if fund a transfer, households can borrow less, they will have debt revenue left over after paying taxes to pay public debt in the future.

Intertemporal analysis

- Integral version of the differential equation when GDP grows at rate of g_t , and given an initial Debt/GDP, requires:
 - (i) primary balances as a ratio of GDP to stay finite,
 - (ii) a terminal limit condition that in the limit $E(m) > E(g)$

$$\bar{m}_t = \int_0^t m_s ds / t$$

$$\frac{b_0}{y_0} = \mathbf{E}_0 \int_0^{\infty} e^{-(\bar{m}_t - \bar{g}_t)t} \left(\frac{s_t}{y_t} \right) dt + \mathbf{E}_0 \int_0^{\infty} e^{-(\bar{m}_t - \bar{g}_t)t} \left(\frac{(m_t - r_t)b_t}{y_t} \right) dt$$

- In words, the intertemporal budget constraint:

$$Debt/GDP = EPV_{m-g}(PrimaryBalance/GDP) + EPV_{m-g}(DebtRevenue/GDP)$$

Classic analyses of debt sustainability

- In expected risk-adjusted terms, with complete and efficient capital markets $E(e^{-(m-g)}(m-r))=0$. So debt revenue is zero and conventional equation:

$$Debt/GDP = EPV_{r-g}(PrimaryBalance/GDP)$$

- Classic analysis:** if balances too low, either default or austerity
 - Measure Debt/GDP: net/gross, social security, contingent liabilities

Table 1. Average Fiscal Cost of Contingent Liability Realizations

Type of Contingent Liabilities	Number of Episodes	Number of Episodes with Identified Fiscal Costs	Avg. Fiscal Costs (% GDP)	Maximum Fiscal Costs (% of GDP)
Financial Sector	91	82	9.7	56.8
Legal	9	9	7.9	15.3
Subnational Government	13	9	3.7	12.0
SOEs	32	31	3.0	15.1
Natural Disaster(s)	65	29	1.6	6.0
Private Non-Financial Sector	7	6	1.7	4.5
PPPs	8	5	1.2	2.0
Other	5	3	1.4	2.5
Total	230	174	6.1	56.8

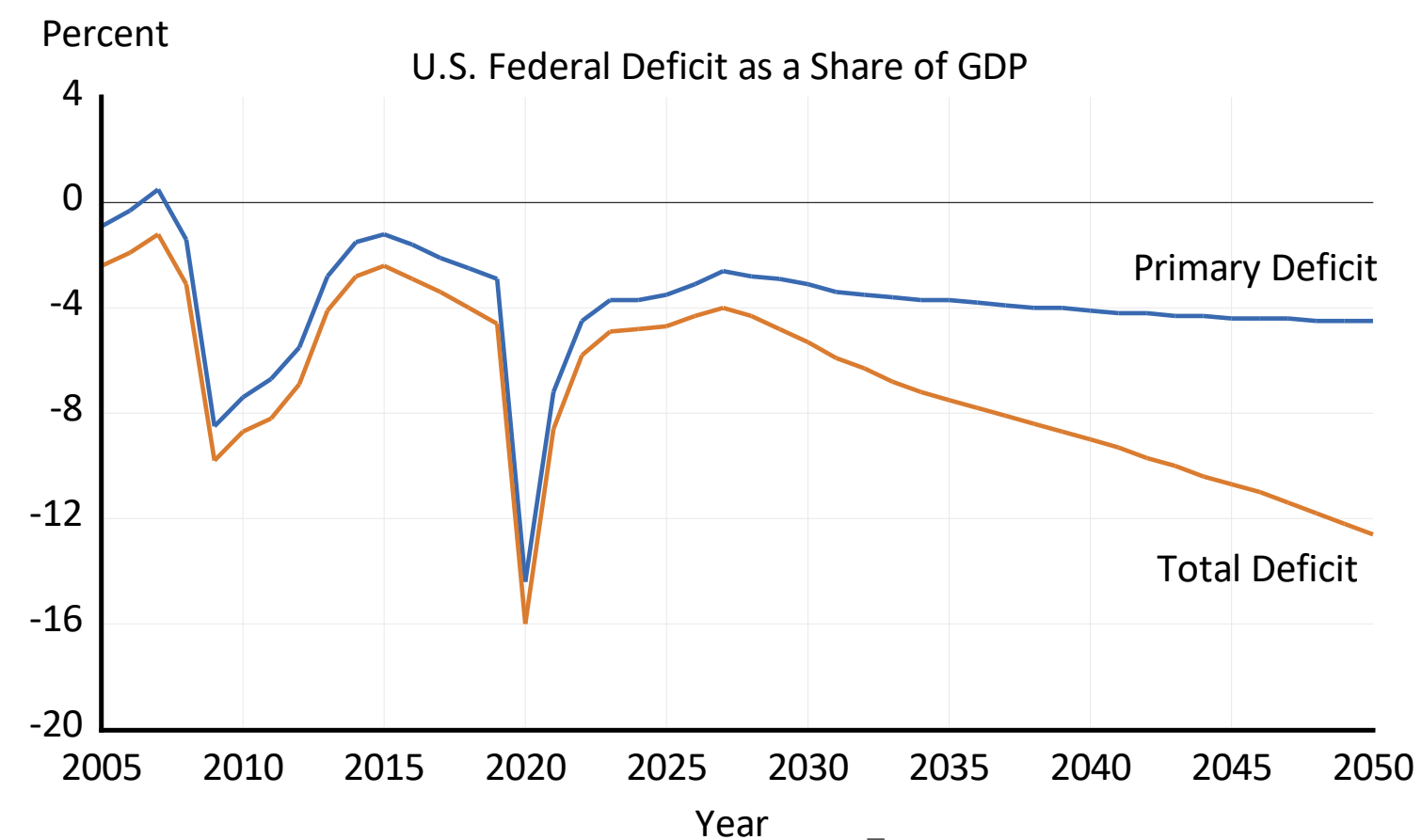
Source: Authors' calculations

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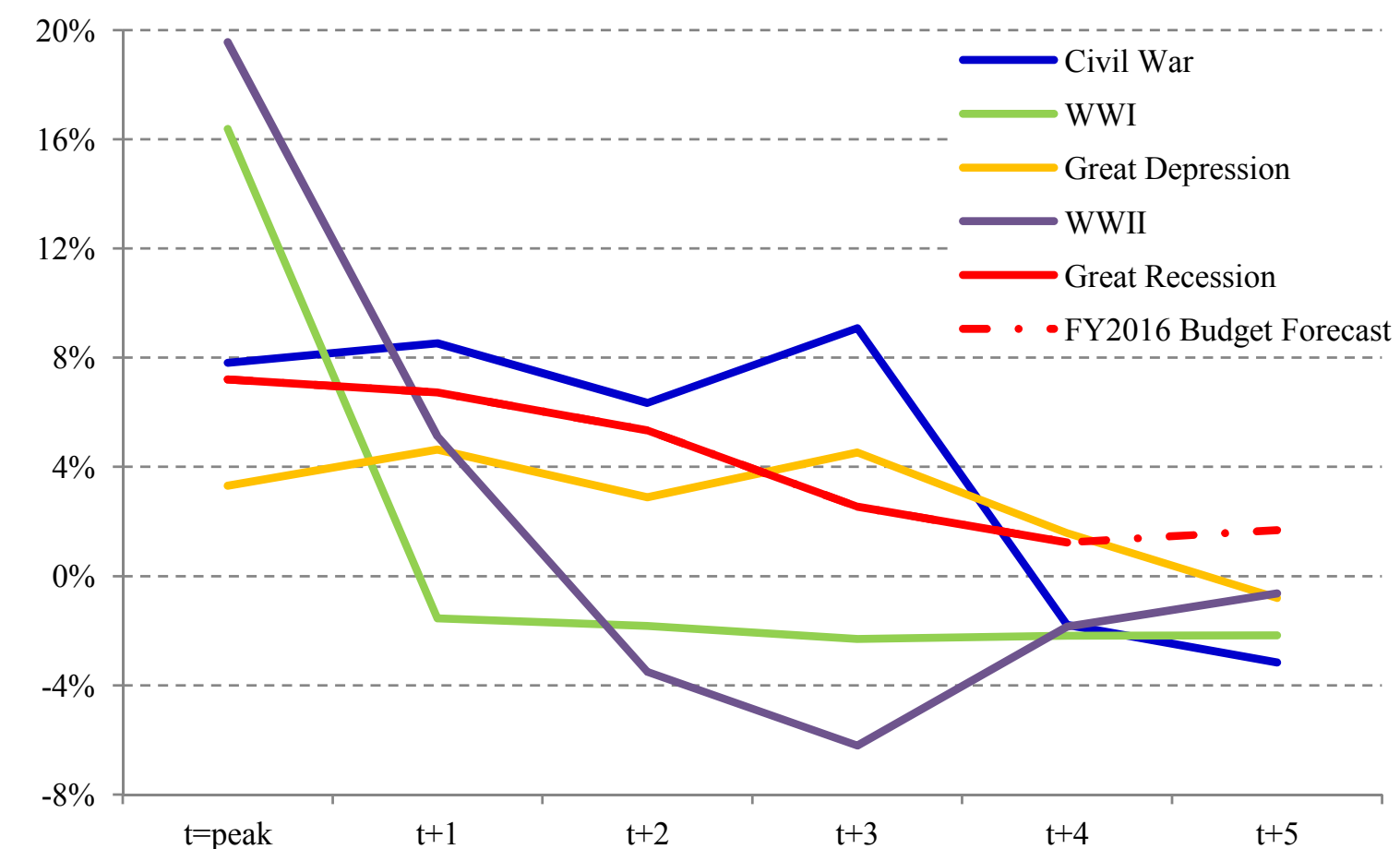
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Figure 2: U.S. Government Deficits after Debt Crises



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 - Models of Laffer curves: max of RHS, model dependent focussed on tax

Classic analyses of debt sustainability

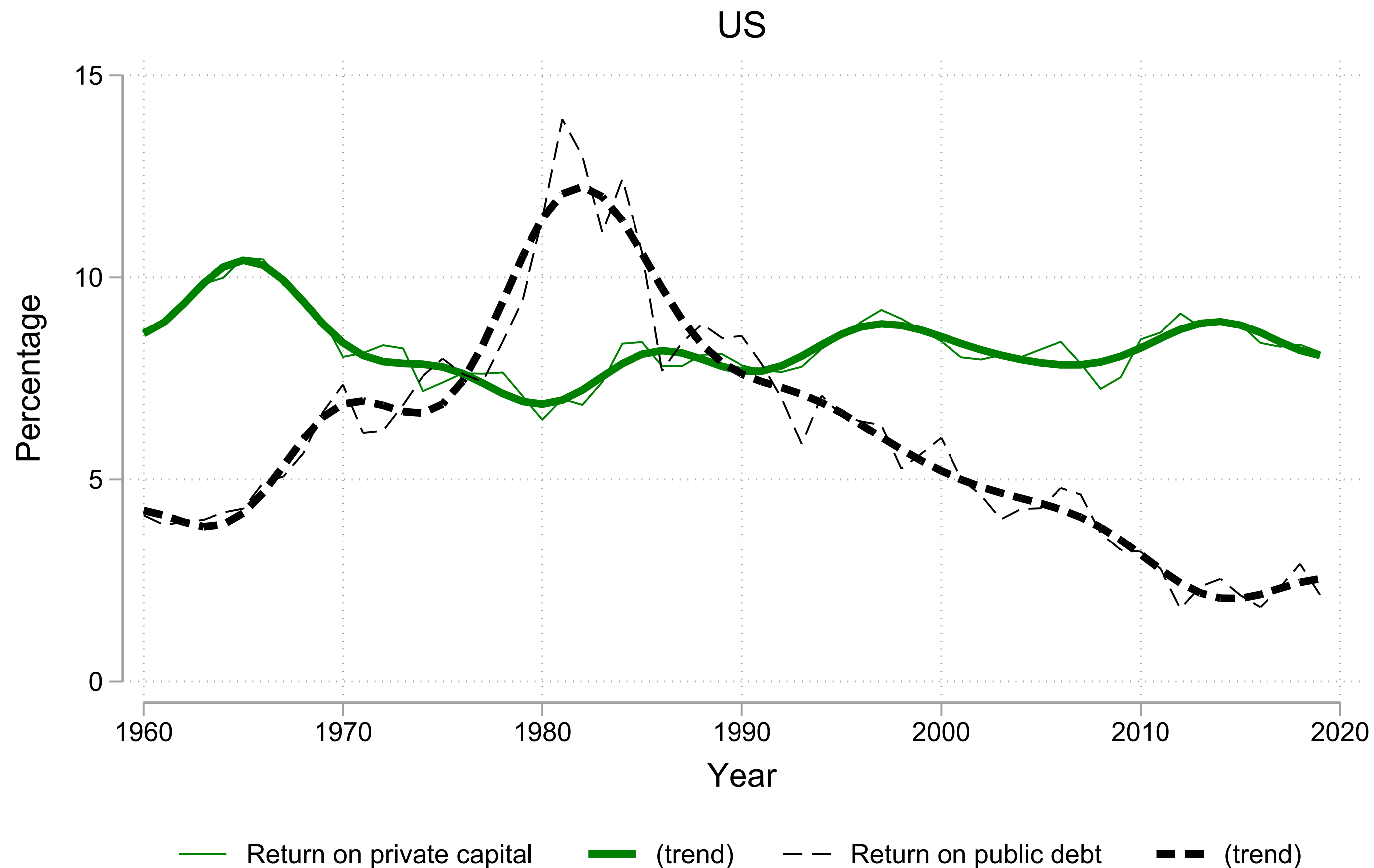
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- Classic analysis: **trade-offs**
 - Austerity: raise balances, while lowering g
 - Structural reforms: raise g , while lowering balances, and uncertain
 - Default: lowers debt, but raises r , multiple equilibrium
 - Inflation: unexpected lowers debt, expected $r-g$ same, risk premium raises r .

To keep doing it must discount by $m > r$

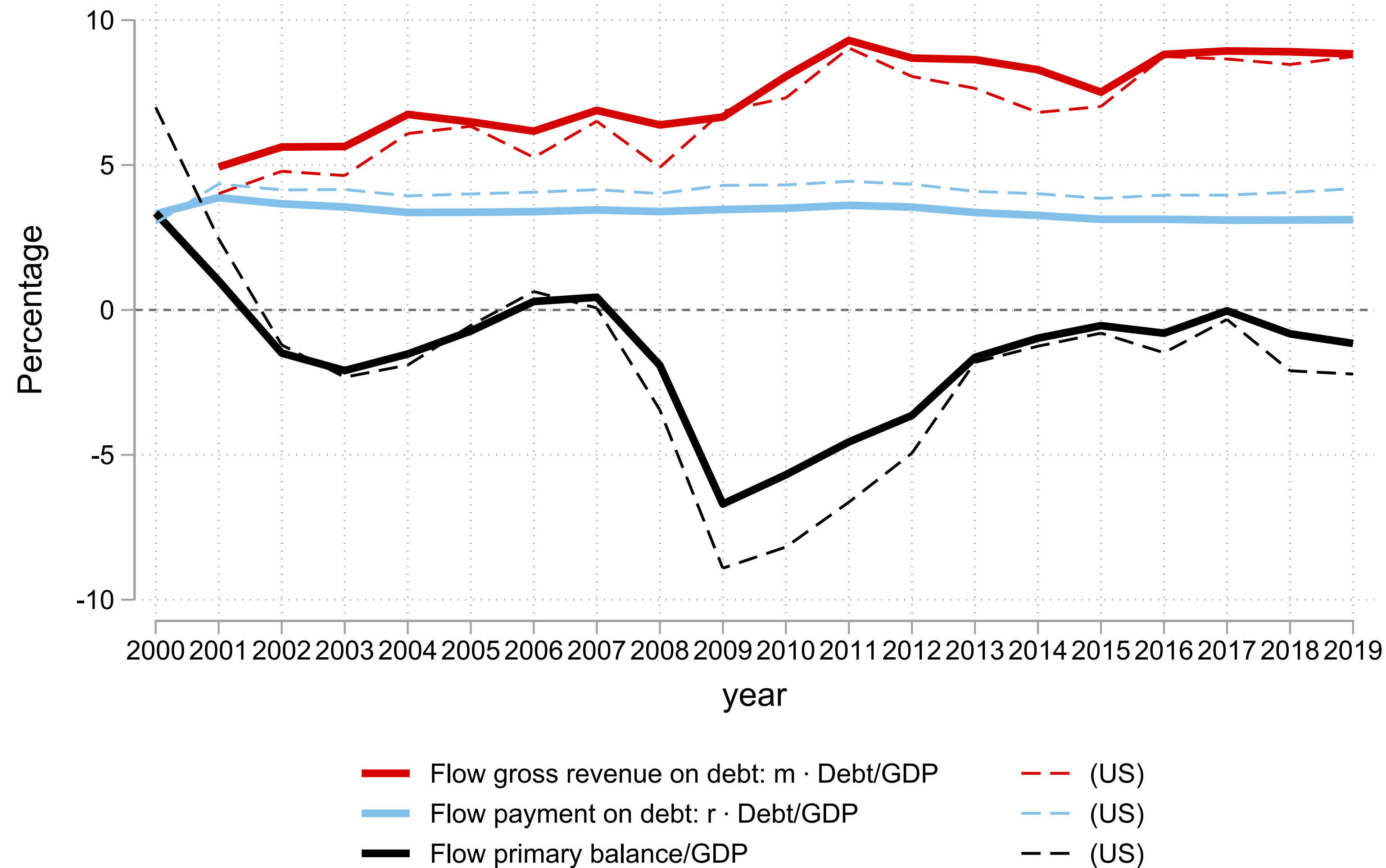
- (ii) a terminal limit condition that in the limit $E(m) > E(g)$



- $r < g$ is the norm across G-7
- Fall in r is a rise in wedge between private investment returns and government bond returns
- Government bonds have become increasingly “special”.

Debt revenue became the dominant revenue

Figure 1: The flow budget components as a ratio of GDP for the G-7 countries and the US



- G7: average 3.8%, latest at 6%
- US: average 3% and latest at 6%
- Present value: 95% of GDP, backs debt
- Actual and forecasted primary balances: negative or zero

Measuring m

- Ramsey formula $g = \theta(m - \rho)$ with $g = \rho = 2\%$, $\theta = 0.5 \implies m = 6\%$ plus inflation
- Capital payments (have adjusted for (i) the relative price of investment, (ii) depreciation, (iii) self-employment, (iv) cross-country differences (v) public capital stocks, (vi) capital gains, (vii) corporate taxes, (viii) the weight of real estate, (ix) intangibles, and (x) marginal versus average returns)
- Broad financial returns (not narrow, Modigliani-Miller)

Table 1: Average nominal annual returns (2000-20) in the US for measures of m and r

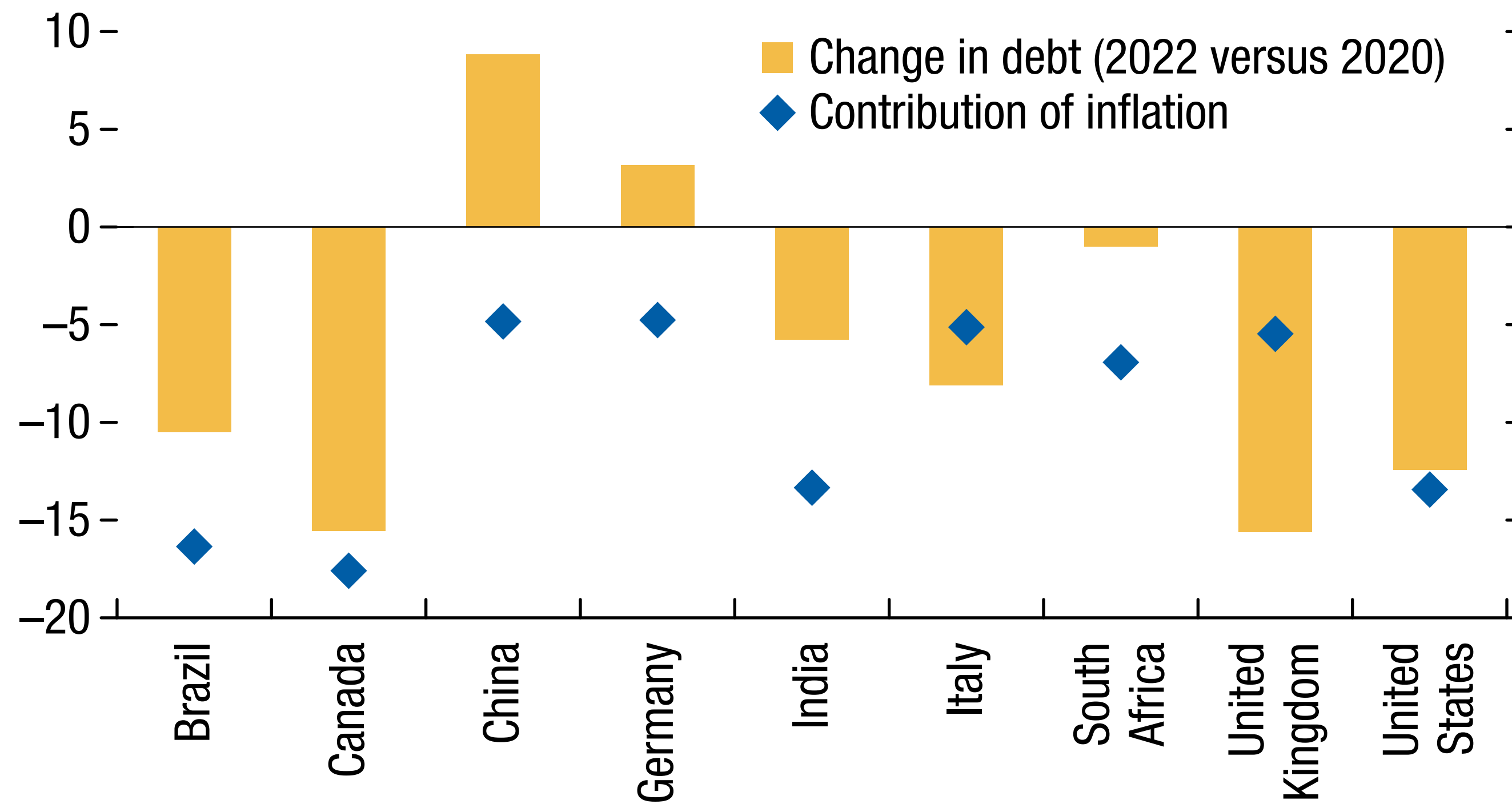
Measure	%
Return on private investment / Marginal Product of Capital (m)	
Income Measure	
(i) Ratio of Payments to Capital and the Capital Stock	8.2
(i-a) with adjustment for intangible capital formation	8.0
(i-b) including proprietors' labor income	10.5
(ii) (i) minus corporate taxes	7.4
(iii) (ii) minus rent payments	6.2
(iv) (iii) plus capital gains	7.1
Financial Measure	
(v) Wilshire 5000 stock market index	7.0
(v-a) S&P 500 stock market index	6.6
(vi) BBB-rated bonds	6.7
(vi-a) AAA-rated bonds	5.9
(v) Housing	8.2
(vi) Interbank rate	2.2
Return on government bonds (r)	
(i) Return on Treasuries of average maturity	4.1
(ii) Yield on 1-year Treasuries	1.6

Why is there a debt revenue?

- **Debt revenue**: present value of supplying the service flow that makes public debt special, driven by discount, or wedge, or premium $m-r$
- **Where does premium come from?**
 - Is it all risk increase? Jiang-Lustig-VanNieuwerburgh-Xiaolan paradox.
 - Is it still there after make it equivalent? Yes, but why do it..
 - Public debt is a store of value. (population aging)
 - Public debt is a safe haven. (scars of financial crisis)
 - Public debt provides collateral. (growing financial regulation)
 - Public debt is liquid. (well beyond seignorage)

New policy tradeoffs: inflation

Figure ES.3. Effect of Inflation Shock on the Debt Ratio, Selected Countries, 2022 versus 2020
(Percent of GDP)



Sources: IMF, World Economic Outlook database; and IMF staff calculations.

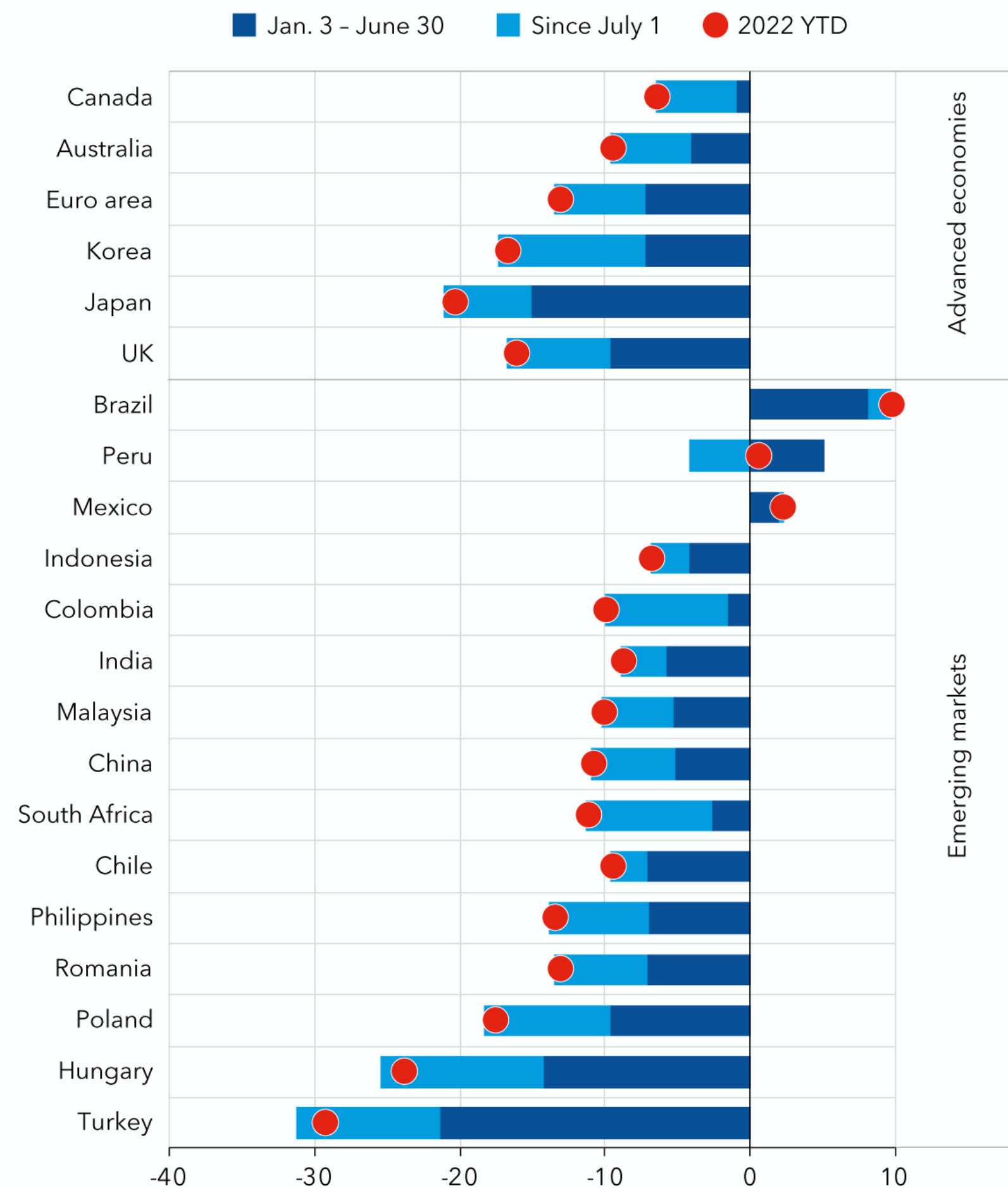
- Price stability keeps debt sustainable
- Keeps main source of risk on debt returns low
- Independent inflation-targeting central banks maximize debt revenue.
- Gains of 2022 are done, now come losses from risk premium and cost of central bank losses

New policy tradeoffs: debt competition

Dollar surge

For many countries, the weakening of their currencies relative to the US dollar has made the inflation fight harder.

(exchange rates vis-à-vis US dollar, percent change)



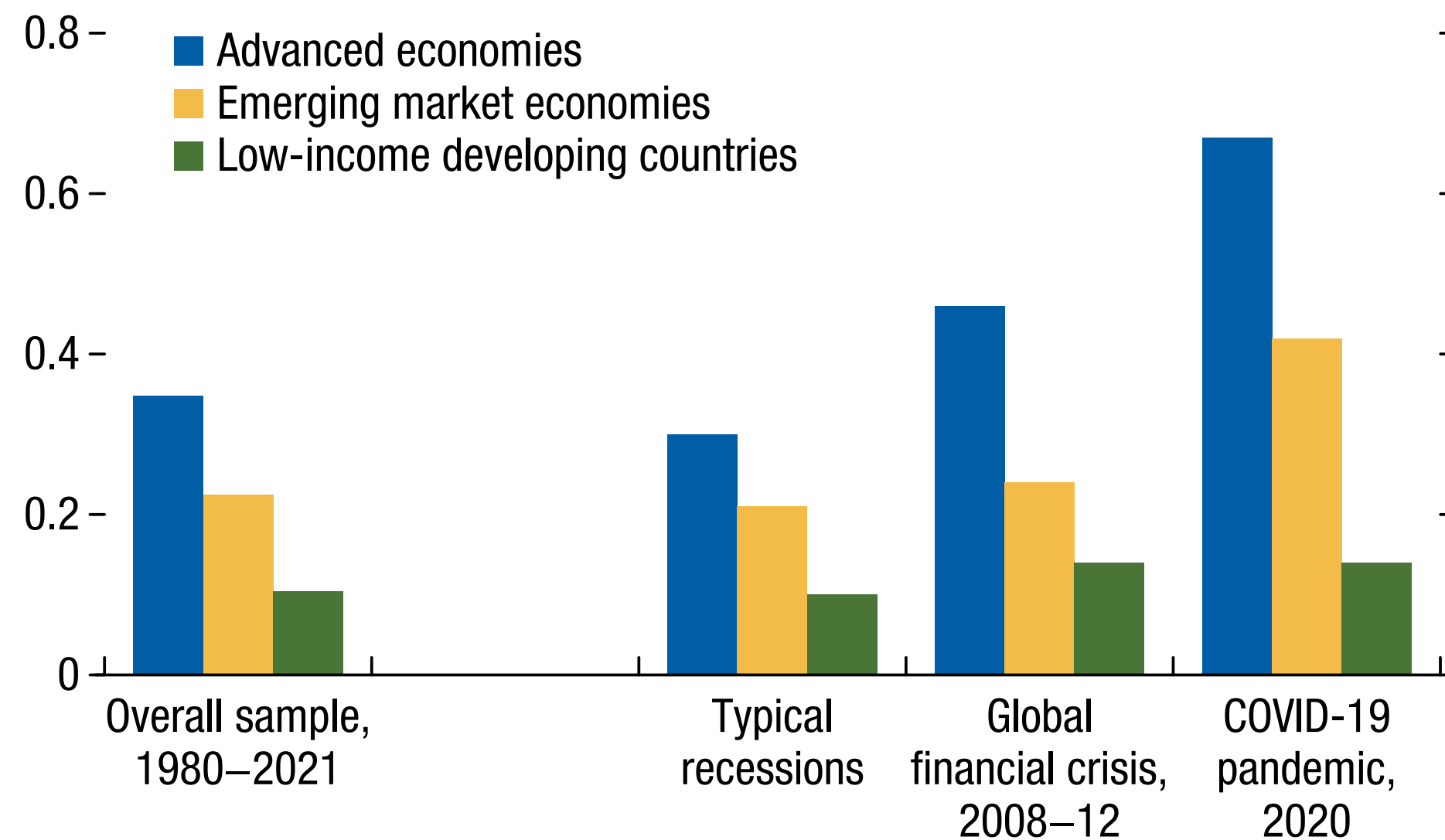
Source: Haver Analytics and IMF staff calculations.
Note: As of October 4, 2022.

IMF

- Spillover across borders
 - Debt revenue of the US is holding up
 - Debt revenue elsewhere is shrinking
 - Debt revenue for most countries is fickle.
 - US exorbitant privilege as the safe harbor
- Public debt crowds out and in private debt
 - Financial development lowers debt revenue
 - Crowd in: if public debt increases collateral needed for private debt.
 - Crowd out: Financial repression as coerced debt, raise debt revenue, present biases.

New policy tradeoffs: debt management

Figure 1.2. Fiscal Responses in Large Crises
(Estimated coefficients)



Source: IMF staff estimates (see Online Annex 1.1).

Note: The figure shows the average of time-varying coefficients by country income groups, based on panel regressions estimated on the sensitivity to GDP growth of the deficit-to-GDP ratio from 1980 to 2021. Typical recessions are defined as periods when individual countries' growth rates are below their own average levels over the previous three years.

- **Higher elasticity:** as supply of debt rises, its specialness reduces.
- **Larger deficits in recessions:** to provide stores of value, collateral, liquidity or safety, useful for investment.
- **Larger deficits at ZLB:** paying for themselves
- **Stronger fiscal reaction function:** pay debts faster to preserve specialness
- **Richer fiscal reaction function:** also affect riskiness of debt, and so safety premium
- **Policy goals:** maximizing debt revenue is not maximizing social welfare

Conclusions

- **Classic debt sustainability literature focuses on PV surpluses**
 - Many insights used to build forecasts, develop fiscal councils, think of austerity and runs on crises
 - But to rescue this term need to discount by m , not r in light of the $r < g < m$ trend.
- **Just as large, arguably more relevant in the last twenty years, is debt revenue**
 - $m-r$ gap from store of value, safety, collateral, liquidity
 - Different policy considerations and trade-offs: what keeps debt special?
- **Short term challenges**
 - US: preserving Treasury market, questions on the fight against inflation
 - EMs: fiscal crisis or austerity in the horizon but where?
 - Debt revenue could motivate financial repression.