

Fiscal Dominance in OECD Inflation in the COVID Crisis

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Fiscal Dominance

- Earlier study argued surge of inflation 2020-2023 in OECD countries reflected fiscal deficits associated with surge in government spending associated mostly with COVID-related transfer payments.
- By inflating away real public debt, inflation—unanticipated as of 2019—effectively source of real government revenue, corresponding to partial debt default.
- Analogous to financing of government outlay during war (as in Lucas-Stokey 1983).

Government Intertemporal Budget Constraint

Centerpiece is government's intertemporal budget constraint:

$$(1) \quad \frac{B_t}{P_t} = T_t - G_t + \frac{(T_{t+1} - G_{t+1})}{1+r} + \frac{(T_{t+2} - G_{t+2})}{(1+r)^2} + \dots$$

- B_t : nominal market value short- and long-term public debt, start of period t.
- P_t : price level start of period t.
- T_t, G_t : real taxes, real primary spending period t.
- r : constant real interest rate assumed in exposition.
- Assumes no-Ponzi condition for long-term financing.
- Stock of real government bonds equals p.v. of real primary surpluses.

Spending Surge

- Crisis, such as COVID pandemic (or war), leads to unexpected surge in G_{t+i} , $i = 0, \dots, M$. If real GDP, Y_t , grows at constant rate $g=r$ from t to $t+M$, present value of extra G can be written as:

$$(2) \quad Y_t \cdot \left[\Delta \left(\frac{G_t}{Y_t} \right) + \Delta \left(\frac{G_{t+1}}{Y_{t+1}} \right) + \dots + \Delta \left(\frac{G_{t+M}}{Y_{t+M}} \right) \right]$$

- where $\Delta(G/Y)$ relative to prior expectation. Assume temporary surge—empirically mainly 2020-2021. In exposition, changes unanticipated before period t ; then fully known. Empirical results better when we assume anticipated path of G unfolded as actual G realized for 2020, 2021.

Government Bonds

- Use simplifying assumptions about structure of nominally-denominated public debt. Coupon and principal payments uniform out to maximum debt maturity, T .
- Reaction to surge in spending assumed to be surge in inflation rates, $\pi_{t+1}, \dots, \pi_{t+T}$, above target, π^* , with π^* fixed. Shifts in inflation rates, when anticipated, appear in nominal interest rates and lower market value of bonds outstanding. Effectively pays for all or part of increase in present value of real spending.
- Assume monetary authority arranges path of inflation dictated by fiscal considerations. Do not detail this process. Fiscal & monetary authorities cooperate (or monetary authority follows lead of fiscal).

Required Inflation Rate

- Assume higher inflation rate, π_{t+i} , constant at $\pi > \pi^*$ (out to maturity, T). Result for change in market value of public debt is approximately

$$(3) \quad \Delta B \approx -B_t^* \cdot \frac{1}{2} T \cdot (\pi - \pi^*)$$

- where B_t^* is initial public debt, $T/2$ is debt duration. Negative value of ΔB corresponds to boost in inflation rate, $\pi > \pi^*$. Given ΔB , larger initial public debt or debt duration associates with smaller $\pi - \pi^*$.

Formula for Inflation Rate

- If higher inflation “financed” 100% of surge in government expenditure, magnitude of real value $\Delta B/P_t$, where ΔB in (3), would equal present value of increase in real spending from (2). Allow inflation to pay for fraction η of spending surge; fraction $1-\eta$ paid for by cuts in spending beyond $t+M$ or increases in current or future government revenue.
- Results in key expression for inflation rate relative to target:

$$(4) \quad \pi - \pi^* = \eta \cdot \left[\Delta \left(\frac{G_t}{Y_t} \right) + \Delta \left(\frac{G_{t+1}}{Y_{t+1}} \right) + \dots + \Delta \left(\frac{G_{t+M}}{Y_{t+M}} \right) \right] / \left[\left(\frac{B_t^*}{P_t Y_t} \right) \cdot \left(\frac{T}{2} \right) \right]$$

- $T/2$ represents duration of outstanding stock of public debt. Eq. (4) implies non-negative slope coefficient, η . π rises with ΔG , falls with B^* , $T/2$. Eq (4) provides functional form for empirical work.

State-Contingent Public Finance

- $\eta=0$ when surge in government spending matched by expectations of offsetting cuts in spending further in future or increases in current and future government revenue. Corresponds to standard intertemporal public finance in sense of government always respecting constraint that increase in today's real primary deficit balanced by corresponding reductions in future real primary deficits (all measured as real present values).
- $\eta=0$ holds in most circumstances, with $\eta>0$ applying only during economic emergencies, such as COVID crisis or war. Discussion fits with state-contingent fiscal-deficit policies of Lucas/Stokey (1983) in context of wartime, notably WWII. Upshot is fiscal deficits and inflation not much related during "normal" economic times but could be closely connected during unusual events. Perspective fits with empirical application to OECD countries in context of COVID crisis.

Ukraine-Russia War

- Model says inflation rate reacts to composite government-spending variable, which equals cumulative surge in ratios of government spending to GDP divided by initial debt-GDP ratio and average debt maturity.
- Empirical application allows for additional effect from Ukraine-Russia War (2022-2023). Countries that share common border with Ukraine or Russia found to have higher inflation rates than otherwise predicted.

Data

- **CPI Inflation rates**
 - Headline and core CPI inflation rates from OECD.STAT.
- **Government spending**
 - Data from IMF (mostly WEO) on ratio of general govt spending exclusive of interest payments to GDP.
- **Quantities of public debt**
 - Data from IMF (mostly WEO) on ratio of general govt gross public debt to GDP.
 - Adjustment for amounts denominated in foreign currency or inflation-linked form?
 - Net versus gross debt?
 - Treatment of central bank?

Data

- **Duration of public debt**
- Data from OECD on “average remaining maturity” of general govt gross public debt (also BIS). Refers to principal payments, not coupons. Approximation to calculate duration of debt, using formula that factors in stated maturity along with current and lagged nominal interest rates on government bonds.
- **Euro-area data**
- Weighted averages of 17 countries with Euro area viewed as single economy.
- **Proximity to war in Ukraine**
- Assembled information related to distances and trade shares. Empirically, results best with simple dummy variable for whether country shares common border with Ukraine or Russia (8 OECD countries).

Identification

- Estimation assumes composite govt-spending variable exogenous with respect to inflation.
- Uses annual time series of inflation 2010-2023 for each country. Includes country fixed effects (picking up constant inflation target for each country) and year fixed effects (picking up effects on global inflation each year).

Empirical Setup

- Sample comprises 37 OECD countries (all except Turkey), 20 outside Euro zone, 17 Euro. Because of common currency, single central bank, single exchange rate with countries outside Euro area, mostly a single short-term nominal interest rate, lots of mobility across borders, main setting treats Euro zone as single economy.
- For 21-economy sample, means of $\frac{G_{t+i}}{Y_{t+i}}$ are .360 in 2019, .414 in 2020, .391 in 2021, .364 in 2022, .370 in 2023.
- Pattern suggests rise in spending ratio temporary; after 2 years, ratio back to pre-crisis level in 2019. Measure full spending surge for 2020-2023 accordingly as sum of primary spending ratios for 2020 and 2021, each expressed relative to ratio for 2019. To construct composite government-spending variable, divide spending surge by ratio of public debt to GDP in 2019 and by duration of debt in 2019. Variable equals zero for 2010-2019.
- Before, used full spending surge to explain inflation for all years 2020-2023. Better to allow gradual evolution. 2020 inflation depends on one-half spending surge 2020, 2021 inflation depends on full spending surge 2020 plus one-half 2021, inflation 2022-23 depends on full spending surge.

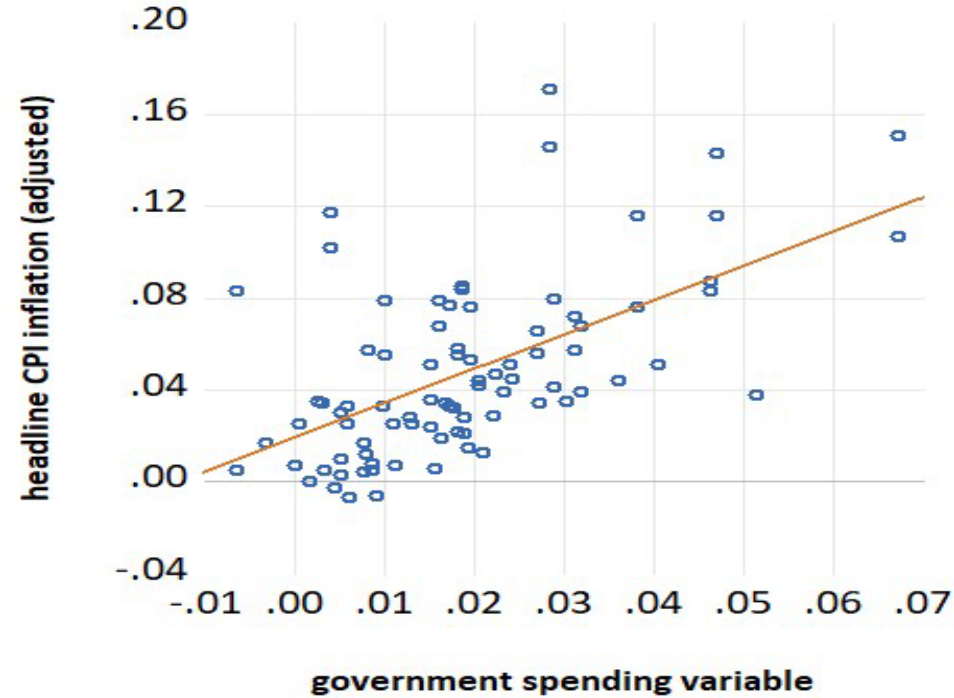
**Table 1: Regressions for Annual
CPI Inflation Rate, 2010-2023,
21 economies, including Euro aggregate**

	(1)	(2)	(3)	(4)
	Headline CPI		Core CPI	
	single coefficients	annual coefficients	single coefficients	annual coefficients
Constant	0.0215*** (0.0010)	0.0216*** (0.0010)	0.0183*** (0.0008)	0.0180*** (0.0008)
Excess govt spending/(gross debt*dur) 2020	0.964*** (0.123)	1.173** (0.543)	1.004*** (0.100)	1.580*** (0.433)
Excess govt spending/(gross debt*dur) 2021	--	0.694*** (0.236)	--	0.952*** (0.188)
Excess govt spending/(gross debt*dur) 2022	--	1.120*** (0.186)	--	1.282*** (0.149)
Excess govt spending/(gross debt*dur) 2023	--	0.950*** (0.186)	--	0.711*** (0.149)
Border Ukraine/Russia 2022	0.039*** (0.006)	0.029*** (0.009)	0.024*** (0.005)	0.010 (0.007)
Border Ukraine/Russia 2023	--	0.048*** (0.009)	--	0.039*** (0.007)
R-squared	0.80	0.80	0.79	0.80
s.e. of regression	0.013	0.013	0.012	0.013

OLS with country & year fixed effects, s.e.'s in parentheses. Dependent variable is inflation rate for each year.

***significant at 1%, **significant at 5%, *significant at 10%

Headline CPI Inflation versus Govt Spending Variable, 2020-2023, 21 Economies, including Euro zone



Empirical results on government spending

- Estimated coefficients of govt-spending variable in col. 2 significantly positive for each year, insignificantly different from each other, close to 1.0.
- Overall estimate 0.96 (s.e.=0.12), significantly positive, insignificantly different from 1. Suggests roughly all of spending surge financed by unanticipated inflation.
- Results for core CPI mostly similar to those for headline CPI.
- Ukraine-Russia border dummy positive, significant. Omitting this variable has minor effects on estimated coefficients of govt-spending variable.

Euro-zone countries entered separately

- In Table 2, with 37 countries, first G-variable same as Table 1. Each Euro country has Euro-area weighted average. Second G-variable for Euro-zone country is individual G variable relative to Euro-area average. If inflation in individual Euro country depends on fiscal effects only through Euro aggregate, then second coefficient equals zero. If coefficients on two G variables equal, inflation in Euro-area country depends on own fiscal variable in same way as non-Euro country.
- Estimated coefficient on second variable significantly different from zero but small: 0.27 (0.08) headline, 0.13 (0.06) core. Implies inflation in Euro-zone country depends mainly on Euro-area aggregate, with possible small effect from individual G variable. (Individual Euro effect turns out to come only from 2022.)
- Results contrast with model in which fiscal effects on inflation work only through impact of G on aggregate demand.
- Main conclusion is aggregating Euro-zone countries into one economy satisfactory for analyzing main effects of fiscal stimulus on inflation rates. (Does not mean that Euro zone is “fiscal area.”)

Table 2: Regressions for Annual CPI Inflation Rate, 2010-2023, 37 countries, including Euro countries separately

	(1)	(2)
	Headline CPI	Core CPI
Constant	0.0200*** (0.0008)	0.0164*** (0.0006)
Excess govt spending/(gross debt*duration)	0.902*** (0.118)	0.952*** (0.092)
Excess govt spending/(gross debt*duration): Euro area	0.270*** (0.076)	0.131** (0.059)
Border Ukraine/Russia	0.043*** (0.004)	0.027*** (0.003)
R-squared	0.83	0.80
s.e. of regression	0.013	0.010
Regressions by OLS with country & year fixed effects, s.e.'s in parentheses. Dependent variable is inflation rate for each year. First spending variable includes Euro area aggregate for each of 17 Euro countries. Second has individual Euro country value less Euro aggregate.		
***significant at 1%, **significant at 5%, *significant at 10%		

US States Entered Separately

- In many respects, relation of US states to US central government analogous to relation of Euro-zone countries to overall Euro zone. US states share common currency, single central bank, single exchange rate with countries outside US, mostly a single short-term nominal interest rate, lots of mobility across borders. However, US states are more of a fiscal union (with common federal taxation) than Euro countries.
- Check for fiscal effects separately for each US state, as we did for Euro-area countries. Working on details of data, but preliminary results in Table 3.
- Estimated coefficients on US states deviation from US aggregate differ insignificantly from zero.

Table 3: Regressions for Annual CPI Inflation Rate, 2010-2023, including Euro countries and US states separately

	(1)	(2)
	Headline CPI	Core CPI
Constant	0.022*** (0.004)	0.020*** (0.004)
Excess govt spending/(gross debt*duration)	0.791*** (0.131)	0.959*** (0.123)
Excess govt spending/(gross debt*duration): Euro area	0.229*** (0.085)	0.080 (0.078)
Excess govt spending/(gross debt*duration): US states	-0.117 (0.164)	-0.136 (0.161)
Border Ukraine/Russia	0.056*** (0.004)	0.032*** (0.004)
R-squared	0.71	0.63
s.e. of regression	0.014	0.013

Regressions by OLS with country & year fixed effects, s.e.'s in parentheses. Dependent variable is inflation rate for each year. Inflation variable for US states uses PCE deflator. First spending variable includes Euro area aggregate for each of 17 Euro countries and US aggregate for each of 51 US states plus District of Columbia. Second has individual Euro country value less Euro aggregate. Third has individual US state value less US aggregate.

***significant at 1% **significant at 5% *significant at 10%

Current Research

- Working on data for application to U.S. states. Various indicators of state inflation available; PCE deflator may be best. Challenges with measuring state public spending (including federal spending directed to each state), public debt, duration of public debt. Does federal govt provide some guarantees on state-level debt?
- This type of research can be carried out at the regional level for other countries. Need data on regional inflation, govt spending, etc.
- Results with 2024 added are similar. However, eventually, effects of COVID-related spending surge in 2020-2021 on inflation have to diminish.
- Policy implications: was it mistake to have inflation surge, contingent on paths of government spending?