# The Two-Period Model

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# Evolution of Government Spending



Gov Consumption / GDP (Real), Blue = Advanced

# Inflation



Inflation Rate in Brazil (IPCA)
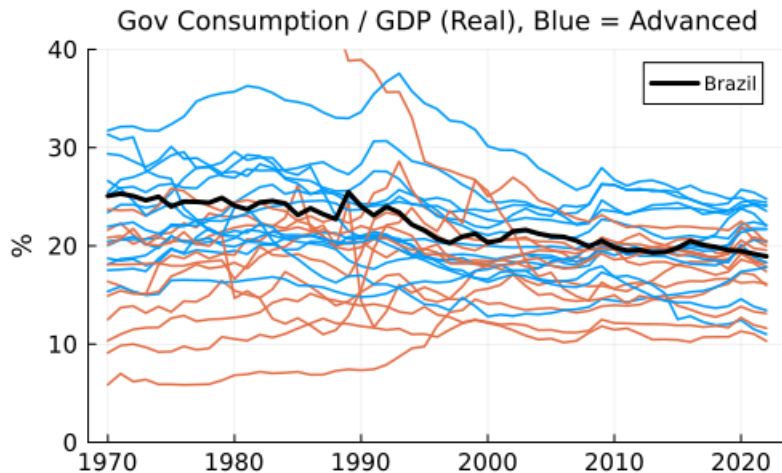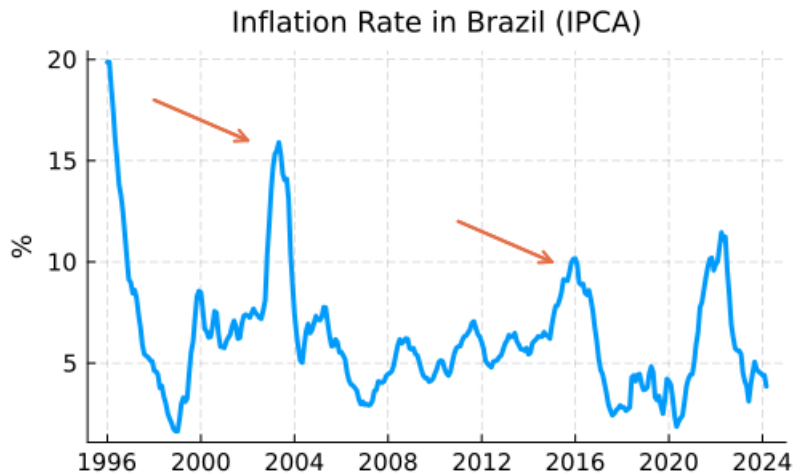
# Course Content

1. The Two-Period Model
2. Production + Marginal Taxation
3. Uncertainty and Income Insurance
4. Overlapping Generations and Pension
5. Classical Monetary-Fiscal Interactions
6. Fiscal Theory of the Price Level
7. Fiscal Multipliers
8. Brazilian Case

# Grading

- 20% - Four problem sets
  - Dynamic programming
- 30% - Group project (06/17)
  - Up to 3 students / group
  - Fiscal policy issue relate to Brazil
  - Slides + Presentation (no paper)
- 50% - Exam (06/24)
  - Theory, not empirics

# The Two-Period Model

- Government issues real debt

$$b_{-1} = q_0 b_0 + \tau_0 - g_0 \qquad b_0 = \tau_1 - g_1$$
$$\implies \boxed{b_{-1} = \tau_0 - g_0 + q_0 \left( \tau_1 - g_1 \right)}$$

- Households, utility $u(c_0) + \beta u(c_1)$

$$q_0 a_0 + c_0 = a_{-1} + y_0 - \tau_0 \qquad c_1 = a_0 + y_1 - \tau_1$$
$$\implies \boxed{a_{-1} = c_0 + \tau_0 - y_0 + q_0 \left( c_1 + \tau_1 - y_1 \right)}$$

- No borrowing: $a_0 \geq \underline{a} = -(y_1 - \tau_1)$      (*natural limit*, same as $c \geq 0$)
- Intertemporal choice: (Euler) $q_0 u'(c_0) = \beta u'(c_1)$
- Market-Clearing: $y = c + g$

# Kormendi (1983)

$$\Delta PC_t = a_0 + a_1\,\Delta Y_t + a_2\,\Delta GS_t + a_3\,\Delta W_t + a_4\,\Delta TR_t$$
$$+ a_5\,\Delta TX_t + a_6\Delta RE_t + a_7\Delta GINT_t + a_8\Delta GB_t + u_t$$

- *Standard* approach: $GS = 0$     $TX, RE, GINT \neq 0$     $GB > 0$
- *Consolidated* approaches: the opposite, with $GB = 0$.

TABLE 5[a]

| | 1931–76 | 1931–76 | 1931–40/ 1947–76 | | | | |
|---|---|---|---|---|---|---|---|
| $Y_t$ | .29 | .32 | .33 | $TX_t$ | .07 | – | – |
| | (.04) | (.02) | (.02) | | (.08) | | |
| | [7.3] | [14.8] | [14.1] | | [0.9] | | |
| $Y_{t-1}$ | .07 | .06 | .05 | $RE_t$ | .10 | – | – |
| | (.02) | (.02) | (.02) | | (.11) | | |
| | [3.3] | [3.0] | [2.2] | | [0.9] | | |
| $GS_t$ | −.23 | −.23 | −.21 | $GINT_t$ | 1.15 | – | – |
| | (.02) | (.02) | (.06) | | (.91) | | |
| | [−12.8] | [−13.2] | [−3.5] | | [1.3] | | |
| $W_t$ | .025 | .028 | .032 | $GB_t$ | −.055 | −.036 | −.032 |
| | (.008) | (.008) | (.009) | | (.018) | (.015) | (.020) |
| | [3.0] | [3.4] | [3.5] | | [−2.9] | [−2.4] | [−1.6] |
| $TR_t$ | .83 | .78 | .74 | $R^2$ | .911 | .902 | .910 |
| | (.15) | (.14) | (.009) | | | | |
| | [5.6] | [5.6] | [3.5] | | | | |

# Modigliani and Sterling (1986)

- The Life-Cycle Hypothesis: $C_t = c\left[A_t + \sum_i m_i q_i (Y_{t+i} - T_{t+i})\right]$

$$C_t = a + b_0\, A_t + b_1\, G_t + \sum_i c_i\, (Y_{t-i} - T_{t-i}) + \sum_i d_i\, D_{t-i}$$

- RE: $b_1 = -b_0$, $\sum_i d_i = -\sum_i c_i$
- LCH: $b_1 \approx 0$, $\sum_i d_i \approx 0$

# Modigliani and Sterling (1986)

TABLE 1 — ESTIMATES OF THE AGGREGATE CONSUMPTION FUNCTION, 1952–84[a,b]

| Independent Variables | | $(1)^c$ | $(2)^c$ | $(3)^c$ | (4) |
|---|---|---|---|---|---|
| Constant | $a$ | −0.38 | −0.45 | −0.436 | −0.436 |
| | | (0.06) | (0.12) | (0.052) | (0.061) |
| Net Worth ($A$) | $b_0$ | 0.023 | 0.027 | 0.022 | 0.022 |
| | | (0.005) | (0.005) | (0.004) | (0.005) |
| Government Debt ($G$) | $b_1$ | 0.073 | 0.106 | 0.096 | 0.096 |
| | | (0.024) | (0.033) | (0.021) | (0.031) |
| Net National Product ($Y$) | $\Sigma c_{1i}$ | 0.922 | 0.901 | 0.928 | 0.931 |
| | | (0.020) | (0.041) | (0.017) | (0.070) |
| Net Taxes ($T$) | $\Sigma c_{2i}$ | −0.922 | −0.901 | −0.928 | −1.081 |
| | | (0.020) | (0.041) | (0.017) | (0.151) |
| Deficit ($D$) | $\Sigma d_i$ | 0.171 | 0.115 | 0.187 | – |
| | | (0.082) | (0.086) | (0.069) | |
| Government Expenditure ($E$) | $\Sigma d_i^*$ | – | – | – | 0.146 |
| | | | | | (0.136) |
| Transfers ($TR$) | $\Sigma t_i$ | – | 0.005 | – | |
| | | | (0.102) | | |
| Transitory Taxes ($T^*$) | $\Sigma h_i$ | – | – | 0.633 | 0.645 |
| | | | | (0.182) | (0.339) |
| SE | | 0.015 | 0.014 | 0.012 | 0.013 |
| Log Likelihood | | 96.33 | 98.50 | 103.44 | 103.88 |
| D-W | | 1.43 | 1.73 | 1.92 | 1.90 |

# Parker et al. (2013)

- 2008 US Economic Stimulus Act: \$600 to \$1200 checks

$$C_{i,t+1} - C_{i,t} = \beta_0' \, \text{Month}_{i,t+1} + \beta_1' X_i + \beta_2 \, ESP_{i,t+1} + u_{i,t+1}$$

TABLE 2—THE CONTEMPORANEOUS RESPONSE OF EXPENDITURES TO ESP RECEIPT AMONG ALL HOUSEHOLDS

| | Food OLS | Strictly nondurables OLS | Nondurable spending OLS | All CE goods and services OLS | Food OLS | Strictly nondurables OLS | Nondurable spending OLS | All CE goods and services OLS |
|---|---|---|---|---|---|---|---|---|
| *Panel A. Dollar change in spending* | | | | | | | | |
| ESP | 0.016 | 0.079 | 0.121 | 0.516 | | | | |
| | (0.027) | (0.046) | (0.055) | (0.179) | | | | |
| I(ESP) | | | | | 10.9 | 74.8 | 121.5 | 494.5 |
| | | | | | (31.7) | (56.6) | (67.2) | (207.2) |

| | Food OLS | Strictly nondurables OLS | Nondurable spending OLS | All CE goods and services OLS | Food 2SLS | Strictly nondurables 2SLS | Nondurable spending 2SLS | All CE goods and services 2SLS |
|---|---|---|---|---|---|---|---|---|
| *Panel B. Percent change in spending* | | | | | *Panel C. Dollar change in spending* | | | |
| ESP | | | | | 0.012 | 0.079 | 0.128 | 0.523 |
| | | | | | (0.033) | (0.060) | (0.071) | (0.219) |
| I(ESP) | 0.69 | 1.74 | 2.09 | 3.24 | | | | |
| | (1.27) | (0.96) | (0.94) | (1.17) | | | | |

*Notes:* All regressions also include a full set of month dummies, age, change in the number of adults, and change in the number of children following equation (1). Reported standard errors are adjusted for arbitrary within-household correlations and heteroskedasticity. The coefficients in panel B are multiplied by 100 so as to report a percent change. The last four columns report results from 2SLS regressions where the indicator variable for ESP receipt and the other regressors are used as instruments for the amount of the ESP. All regressions use 17,478 observations except for the first two columns of panel B which have only 17,427 and 17,475, respectively.

# Frame title

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# References I

Kormendi, R. C. (1983). Government Debt, Government Spending, and Private Sector Behavior. *The American Economic Review*, 73(5):994–1010.

Modigliani, F. and Sterling, A. (1986). Government Debt, Government Spending and Private Sector Behavior: Comment. *The American Economic Review*, 76(5):1168–1179.

Parker, J. A., Souleles, N. S., Johnson, D. S., and McClelland, R. (2013). Consumer Spending and the Economic Stimulus Payments of 2008. *American Economic Review*, 103(6):2530–2553.