FISCAL AND MONETARY INTERACTIONS

APRIL 9, 2012

MONETARY POLICY AND FISCAL POLICY

- ❑ **Monetary policy and fiscal policy occur simultaneously**
  - ❑ **Conduct of one places *restrictions* on what the other can achieve**

- ❑ **Different classes of "interactions" between fiscal and monetary policy**

- ❑ **Policy coordination (explicit or implicit)**
  - ❑ **Fed and Treasury coordination of policy actions amidst crisis**
  - ❑ **European coordination(?) on sovereign debt crises**

- ❑ **Political pressures on central banks**

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- ❑ **Political pressures on central banks**

- ❑ **Budget constraint effects (aka balance sheet effects)**
  - ❑ **Central bank balance sheet ultimately under the control of the legislative body because legislative body charters the central bank**
  - ❑ **Macroeconomic analysis has the most to say about this type of fiscal-monetary interaction**

MONETARY POLICY AND FISCAL POLICY

- ❑ **Chapter 7: studied fiscal policy in isolation from monetary policy**
  - ❑ **Illustrated some core issues of fiscal policy (i.e., lifetime budget constraint of government, Ricardian Equivalence)**

- ❑ **Chapter 14: studied monetary policy in isolation from fiscal policy**
  - ❑ **Illustrated some core issues of monetary policy (i.e., neutrality debate, long-run monetarist link between money growth and inflation)**

- ❑ **Monetary policy and fiscal policy don't occur in vacuums isolated from each other**
  - ❑ **Both occur simultaneously**
  - ❑ **The conduct of fiscal policy can place *restrictions* on what monetary policy can do, and vice-versa**

- ❑ **Chapter 15: Interactions between fiscal and monetary policy**
  - ❑ **Focus on dynamic unfolding of events**
  - ❑ **Main idea: budget constraints/balance sheets of one policy authority affect the other policy authority**

MONETARY POLICY AND FISCAL POLICY

❑ **Representative consumer will be "in the background," not the focus, of analysis in Chapter 15**
   ❑ **No explicit utility maximization problems, etc.**
   ❑ **But we know where optimal choices of c_t and M_t/P_t etc. come from…**

❑ **Focus will just be on government actions**

❑ **An infinite-period framework**

❑ **Two distinct "sides" of the government**
   ❑ **Fiscal authority – i.e., Congress/Treasury**
      ❑ **Controls government spending g_t**
      ❑ **Collects taxes T_t (will assume only lump-sum taxes throughout)**
      ❑ **Issues (sells) new bonds (for financing needs)**

   ❑ **Monetary authority (aka central bank) – i.e., Fed**
      ❑ **Controls money supply of economy…**
      ❑ **…by engaging in open-market operations**

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      ❑ **Receives "profits" from central bank (because it legally charters C.B.)**

Balance sheet linkage between fiscal and monetary policy
   ❑ **Monetary authority (aka central bank) – i.e., Fed**
      ❑ **Controls money supply of economy…**
      ❑ **…by engaging in open-market operations**
      ❑ **Turns over any "profits" it earns to fiscal authority**

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FISCAL AUTHORITY

❑ **Fiscal authority budget constraint in period *t***

$$P_t g_t + B_{t-1}^T = T_t + P_t^b B_t^T + RCB_t$$

<u>Total outlays in period *t*</u>   <u>Total inflows in period *t*</u>

❑ **B^T_t: the TOTAL quantity of (one-period) bonds (each with *FV* = 1) Congress *sells* in period *t*, each of which has price P^b_t**

❑ **B^T_{t-1}: the TOTAL quantity of (one-period) bonds (each with *FV* = 1) that Congress must *repay* in period *t***

❑ **RCB_t: *r*eceipts (profits) turned over from the *c*entral *b*ank to the fiscal authority in period *t***

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OPEN MARKET FOR BONDS

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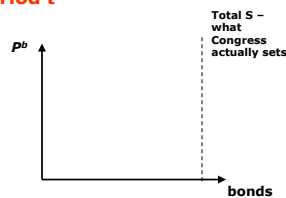
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❑ **Fiscal authority budget constraint in period *t+1***

$$\underbrace{P_{t+1} g_{t+1} + B_t^T}_{\text{Total outlays in period } t+1} = \underbrace{T_{t+1} + P_{t+1}^b B_{t+1}^T + RCB_{t+1}}_{\text{Total inflows in period } t+1}$$

Total outlays in period *t+1*   Total inflows in period *t+1*

❑ **And so on for *t+2*, *t+3*, etc.**

MONETARY AUTHORITY

❑ **Monetary authority budget constraint in period *t***

$$\underbrace{P_t^b B_t^M + RCB_t}_{\text{Total outlays in period } t} = \underbrace{B_{t-1}^M + M_t - M_{t-1}}_{\text{Total inflows in period } t}$$

Total outlays in period *t*   Total inflows in period *t*

Fed does not issue its own bonds; it transacts using fiscally-issued bonds on the open market

❑ B_t^M: the quantity of (one-period) bonds (each with *FV = 1*) Fed _buys on open market_ in period *t*, each of which has price P_t^b

❑ B_{t-1}^M: the payoffs of (one-period) bonds (each with *FV = 1*) that Fed _receives_ in period *t*

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❑ RCB_t: **profits turned over by the central bank to the fiscal authority in period *t***

❑ $M_t - M_{t-1}$: **the _change_ in the money supply engineered by the central bank during the course of period *t***

  ❑ M_t **and M_{t-1} individually are stock variables, but $M_t - M_{t-1}$ is a flow variable**

❑ **Monetary authority budget constraint in period *t+1***

$$P_{t+1}^b B_{t+1}^M + RCB_{t+1} = B_t^M + M_{t+1} - M_t$$

❑ **And so on for period *t+2*, *t+3*, etc.**

CONSOLIDATED GOVERNMENT BUDGET

❑ **Can view two sides of the government as one consolidated entity**

$$P_t^b B_t^M + RCB_t = B_{t-1}^M + M_t - M_{t-1} \qquad\qquad P_t g_t + B_{t-1}^T = T_t + P_t^b B_t^T + RCB_t$$

Combine by eliminating RCB_t

$$P_t g_t + B_{t-1}^T - B_{t-1}^M = T_t + P_t^b (B_t^T - B_t^M) + M_t - M_{t-1}$$

❑ B^T **is the total quantity of fiscally-issued bonds…**

❑ **…of which B^M is purchased by the central bank on the open market**

❑ **→ $B^T - B^M$ is total quantity of fiscally-issued bonds held by the private sector (consumers, mutual funds, domestic investors, foreign investors, etc.) – i.e., the quantity available on the open market**

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CONSOLIDATED GOVERNMENT BUDGET

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Combine by eliminating *RCB_t*

$$P_t g_t + B_{t-1}^T - B_{t-1}^M = T_t + P_t^b (B_t^T - B_t^M) + M_t - M_{t-1}$$

   ❑ **B^T is the total quantity of fiscally-issued bonds...**
   ❑ **...of which B^M is purchased by the central bank on the open market**
   ❑ **→ $B^T − B^M$ is total quantity of fiscally-issued bonds held by the private sector (consumers, mutual funds, domestic investors, foreign investors, etc.) – i.e., the quantity available on the open market**

❑ **Define $B = B^T − B^M$ as bonds held by the private sector**
   ❑ **What really matters for policy actions and interactions**
   ❑ **Consolidated flow government budget constraint (GBC)**

$$P_t g_t + B_{t-1} = T_t + P_t^b B_t + M_t - M_{t-1}$$

CONSOLIDATED GOVERNMENT BUDGET

❑ **Consolidated flow government budget constraint highlights the short-run limits that fiscal policy places on monetary policy and vice-versa**

$$P_t g_t + B_{t-1} = T_t + P_t^b B_t + M_t - M_{t-1}$$

❑ **All analysis from the perspective of the beginning of period *t***

❑ **Fiscal policy in period *t* is a particular setting for all three of its instruments (g_t, T_t, B_t)**
   ❑ **Fiscal policy has three instruments (aka policy tools)**

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CONSOLIDATED GOVERNMENT BUDGET

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  - ❑ **Fiscal policy has three instruments (aka policy tools)**

- ❑ **Monetary policy in period *t* is a particular setting for all one of its instruments (M_t)**
  - ❑ **Monetary policy has one instrument (aka policy tool)**

- ❑ **(Problem Set 2: A policy is defined by unique settings for each available instrument)**

ACTIVE VS. PASSIVE POLICY

- ❑ **Definition: A policy authority is active if *every instrument* at its disposal can be completely freely chosen, without any concern for the consolidated government budget constraint**
  - ❑ **Active authority does not engage in policy in such a way as to make sure the consolidated government budget balances**

- ❑ **Definition: A policy authority is passive if *not every instrument* at its disposal can be completely freely chosen, without any concern for the consolidated government budget constraint**
  - ❑ **Passive authority must engage in policy in such a way as to make sure the consolidated government budget balances**

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  ❑ Passive authority must engage in policy in such a way as to make sure the consolidated government budget balances

$$P_t g_t + B_{t-1} = T_t + P_t^b B_t + M_t - M_{t-1}$$

i.e., how will *equality* of the consolidated budget be achieved?

❑ At beginning of period t, B_{t-1} and M_{t-1} are fixed (assume no default)

❑ **Fiscal authority sets g_t, B_t, and T_t**

❑ **Monetary authority sets M_t**

Question: How will "consistency" between them be guaranteed?

Two possibilities...

ACTIVE FISCAL/PASSIVE MONETARY POLICY

❑ Suppose fiscal authority sets all of its policy instruments (all *three* of them) without concern for the consolidated flow GBC

  ❑ **Fiscal authority is active**

❑ Monetary authority must *react* by setting M_t to ensure the consolidated GBC holds

  ❑ **Monetary authority is passive**

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- ❑ **Game-theoretic undertones**
  - ❑ **Fiscal authority is the "dominant" policy-maker**
  - ❑ **Fiscal authority is the "leader"**
  - ❑ **Monetary authority is the "lagging" policy-maker**
  - ❑ **Monetary authority is the "follower"**

- ❑ **Policy pressure (by fiscal authority on monetary authority) is implicit and (largely...) through market forces**
  - ❑ **Current situations facing the Federal Reserve? The ECB?**
  - ❑ **And in developing countries?...**

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ACTIVE MONETARY/PASSIVE FISCAL POLICY

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  - ❑ **Fiscal authority is passive...**
  - ❑ **...because it cannot set _all three_ of its instruments freely**

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ACTIVE VS. PASSIVE POLICY

- ❑ **Which regime describes the U.S.? The euro area?**
  - ❑ **Matter of a lot of debate**
  - ❑ **Maybe there's "regime switching" – i.e., each authority "takes turns" being the follower and the leader**
    - ❑ **Through the rise and fall of political power?**
    - ❑ **Through the ascendancy of strong central bankers?**

- ❑ **Game theory a compelling way to study monetary-fiscal interactions (more advanced course)**

- ❑ **Core issue: there are _limits_ or _restrictions_ that each policy-setting authority places on the actions of the others**

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- ❑ **Analysis so far: the period-*t* choices of one policy authority restrict the choices of the other policy authority in period *t***

- ❑ **A more realistic view: the period-*t* choices of one policy authority may restrict the choices of the other policy authority in period *t* and/or period *t*+1 and/or period *t*+2 and/or period *t*+3, ...**

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FISCAL AND MONETARY INTERACTIONS: PRESENT-VALUE ANALYSIS

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ACTIVE VS. PASSIVE POLICY

❑ **Core issue: there are _limits_ or _restrictions_ that each policy-setting authority places on the actions of the other**

❑ **Analysis so far: the period-*t* choices of one policy authority restrict choices of other policy authority _in period t_ (i.e., in short run)**

$$P_t g_t + B_{t-1} = T_t + P_t^b B_t + M_t - M_{t-1}$$ **Period-*t* consolidated GBC**

❑ **A more realistic view: the period-*t* choices of one policy authority may restrict the choices of the other policy authority in period *t* and/or period *t*+1 and/or period *t*+2 and/or period *t*+3, …**

❑ **Emphasizes that the limits may not be realized immediately, but can occur later (in the economy's/government's lifetime)**

❑ **Requires analyzing the present discounted value (PDV) version of the consolidated GBC (aka lifetime consolidated GBC)**

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DERIVING THE LIFETIME CONSOLIDATED GBC

$$P_t g_t + B_{t-1} = T_t + P_t^b B_t + M_t - M_{t-1}$$ **Period-*t* consolidated GBC**

↓ **Divide by P_t to put in real terms**

$$g_t + \frac{B_{t-1}}{P_t} = \frac{T_t}{P_t} + \frac{P_t^b B_t}{P_t} + \frac{M_t - M_{t-1}}{P_t}$$

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SEIGNORAGE REVENUE

$$P_t g_t + B_{t-1} = T_t + P_t^b B_t + M_t - M_{t-1} \qquad \text{Period-}t\text{ consolidated GBC}$$

Divide by P_t to put in real terms

$$g_t + \frac{B_{t-1}}{P_t} = \frac{T_t}{P_t} + \frac{P_t^b B_t}{P_t} + \underbrace{\frac{M_t - M_{t-1}}{P_t}}_{sr_t}$$

❑ **Definition**: **seignorage revenue** is the real quantity of resources the government raises for itself through the act of money creation
   ❑ **Abbreviate sr_t**

❑ **Printing money is a source of income for the government!**
   ❑ **Generally unimportant in the U.S. (less than 1% of government revenue) and other developed countries**
   ❑ **But can be important in developing countries (because of poorly-developed tax collection systems and corruption)**
   ❑ **Plays an important role in how fiscal-monetary interactions impact exchange rate systems (Chapter 16, which we will not study)**

DERIVING THE LIFETIME CONSOLIDATED GBC

$$P_t g_t + B_{t-1} = T_t + P_t^b B_t + M_t - M_{t-1} \qquad \text{Period-}t\text{ consolidated GBC}$$

Divide by P_t to put in real terms

$$g_t + \frac{B_{t-1}}{P_t} = \frac{T_t}{P_t} + \frac{P_t^b B_t}{P_t} + sr_t$$

REAL value of government debt that must be repaid at start of period t

Define $b_t = B_t/P_t$, $t_t = T_t/P_t$, and rearrange terms

$$\frac{B_{t-1}}{P_t} = sr_t + \left(t_t - g_t + P_t^b b_t \right) \qquad \text{Period-}t\text{ consolidated GBC}$$

Revenue generated by monetary authority actions   **Revenue generated by fiscal authority actions**

$$\frac{B_t}{P_{t+1}} = sr_{t+1} + \left(t_{t+1} - g_{t+1} + P_{t+1}^b b_{t+1} \right) \qquad \text{Period-}t\text{+1 consolidated GBC (same thing, just update subscripts)}$$

DERIVING THE LIFETIME CONSOLIDATED GBC

$$P_t g_t + B_{t-1} = T_t + P_t^b B_t + M_t - M_{t-1}$$ **Period-*t* consolidated GBC**

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DERIVING THE LIFETIME CONSOLIDATED GBC

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Revenue generated by monetary authority actions   Revenue generated by fiscal authority actions

$$\frac{b_t}{1+\pi_{t+1}} = sr_{t+1} + \left(t_{t+1} - g_{t+1} + P_{t+1}^b b_{t+1} \right)$$ **Period-*t*+1 consolidated GBC** (same thing, just update subscripts)

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DERIVING THE LIFETIME CONSOLIDATED GBC

$$P_t g_t + B_{t-1} = T_t + P_t^b B_t + M_t - M_{t-1}$$

Period-*t* consolidated GBC

Divide by *P_t* to put in real terms

$$g_t + \frac{B_{t-1}}{P_t} = \frac{T_t}{P_t} + \frac{P_t^b B_t}{P_t} + sr_t$$

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Period-*t+1* consolidated GBC
(same thing, just update subscripts)

Complete mathematical derivation in Chapter 15

Combine

Use Fisher equation

Substitute in *t*+2 and *t*+3 and *t*+4, etc.... budget constraints

Use Fisher equation

Combine

LIFETIME CONSOLIDATED GBC

$$\frac{B_{t-1}}{P_t} = \sum_{s=0}^{\infty} \frac{t_{t+s} - g_{t+s}}{\Pi_{s=1}^{\infty}(1+r_{t+s})} + \sum_{s=0}^{\infty} \frac{sr_{t+s}}{\Pi_{s=1}^{\infty}(1+r_{t+s})}$$

Present-value consolidated GBC

REAL value of government debt that must be repaid at start of period *t*

❑   **The period-*t* real value of maturing government debt must be repaid by...**

$$\left(\frac{B_{2011}}{P_{2012}} \right) = (tax_{2012} - g_{2012}) + \frac{tax_{2013} - g_{2013}}{1 + r_{2013}} + \frac{tax_{2014} - g_{2014}}{(1 + r_{2013})(1 + r_{2014})} + \frac{tax_{2015} - g_{2015}}{(1 + r_{2013})(1 + r_{2014})(1 + r_{2015})} + \ldots$$

Real value of maturing government debt at start of 2012

PDV of fiscal surpluses/deficits in 2012 and beyond

$$+ sr_{2012} + \frac{sr_{2013}}{1 + r_{2013}} + \frac{sr_{2014}}{(1 + r_{2013})(1 + r_{2014})} + \frac{sr_{2015}}{(1 + r_{2013})(1 + r_{2014})(1 + r_{2015})} + \ldots$$

PDV of seignorage revenue in 2012 and beyond

LIFETIME CONSOLIDATED GBC

$$\frac{B_{t-1}}{P_t} = \sum_{s=0}^{\infty} \frac{t_{t+s} - g_{t+s}}{\Pi_{s=1}^{\infty}(1+r_{t+s})} + \sum_{s=0}^{\infty} \frac{sr_{t+s}}{\Pi_{s=1}^{\infty}(1+r_{t+s})}$$

Present-value consolidated GBC

<u>REAL</u> value of government debt that must be repaid at start of period *t*

Present-discounted value of all fiscal surpluses starting in period *t*

Present-discounted value of all seignorage revenues starting in period *t*

- ❑ **The period-*t* *real* value of maturing government debt must be repaid by…**
- ❑ **…either period-*t* <u>and/or later</u> fiscal surpluses (*t – g* is real fiscal surplus in any given year – recall from Chapter 7)**
- ❑ **…or year-*t* <u>and/or later</u> seignorage revenues…**
- ❑ **…or both**

Real value of maturing government debt at start of 2012

$$\left(\frac{B_{2011}}{P_{2012}}\right) = (tax_{2012} - g_{2012}) + \frac{tax_{2013} - g_{2013}}{1 + r_{2013}} + \frac{tax_{2014} - g_{2014}}{(1+r_{2013})(1+r_{2014})} + \frac{tax_{2015} - g_{2015}}{(1+r_{2013})(1+r_{2014})(1+r_{2015})} + \ldots$$

$$+ sr_{2012} + \frac{sr_{2013}}{1+r_{2013}} + \frac{sr_{2014}}{(1+r_{2013})(1+r_{2014})} + \frac{sr_{2015}}{(1+r_{2013})(1+r_{2014})(1+r_{2015})} + \ldots$$

PDV of fiscal surpluses/deficits in 2012 and beyond

PDV of seignorage revenue in 2012 and beyond

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LIFETIME CONSOLIDATED GBC

$$\frac{B_{t-1}}{P_t} = \sum_{s=0}^{\infty} \frac{t_{t+s} - g_{t+s}}{\Pi_{s=1}^{\infty}(1+r_{t+s})} + \sum_{s=0}^{\infty} \frac{sr_{t+s}}{\Pi_{s=1}^{\infty}(1+r_{t+s})}$$

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<u>REAL</u> value of government debt that must be repaid at start of period *t*

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- ❑ **…or both**
- ❑ **"Or later" implies rolling over maturing debt**
  - ❑ **Borrowing anew to repay debt that is due**

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$$\left(\frac{B_{2011}}{P_{2012}}\right) = (tax_{2012} - g_{2012}) + \frac{tax_{2013} - g_{2013}}{1 + r_{2013}} + \frac{tax_{2014} - g_{2014}}{(1+r_{2013})(1+r_{2014})} + \frac{tax_{2015} - g_{2015}}{(1+r_{2013})(1+r_{2014})(1+r_{2015})} + \ldots$$

$$+ sr_{2012} + \frac{sr_{2013}}{1+r_{2013}} + \frac{sr_{2014}}{(1+r_{2013})(1+r_{2014})} + \frac{sr_{2015}}{(1+r_{2013})(1+r_{2014})(1+r_{2015})} + \ldots$$

PDV of fiscal surpluses/deficits in 2012 and beyond

PDV of seignorage revenue in 2012 and beyond

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LIFETIME CONSOLIDATED GBC

$$\underbrace{\frac{B_{t-1}}{P_t}} = \sum_{s=0}^{\infty} \frac{t_{t+s} - g_{t+s}}{\Pi_{s=1}^{\infty}(1+r_{t+s})} + \sum_{s=0}^{\infty} \frac{sr_{t+s}}{\Pi_{s=1}^{\infty}(1+r_{t+s})}$$

Present-value consolidated GBC

REAL value of government debt that must be repaid at start of period *t*　　**Present-discounted value of all fiscal surpluses starting in period *t***　　**Present-discounted value of all seignorage revenues starting in period *t***

❑　The period-*t **real*** value of maturing government debt must be repaid by…

❑　…either period-*t **and/or later*** fiscal surpluses (*t – g* is real fiscal surplus in any given year – recall from Chapter 7)

❑　…or year-*t **and/or later*** seignorage revenues…

❑　…or both

❑　**"Or later" implies rolling over maturing debt**

　　❑　**Borrowing anew to repay debt that is due**

❑　**Key idea: present value consolidated GBC indicates that both fiscal adjustment and money creation policies can be used to pay government debt**

❑　**But money creation may spark inflation (monetarism)**

　　❑　**Expansion of money supply → value of each unit of money falls (i.e., price of goods rises)**

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LIFETIME CONSOLIDATED GBC

REAL value of government debt that must be repaid at start of year *t*　**=**　**PDV of all current and future fiscal surpluses starting in year *t***　**+**　**PDV of all current and future seignorage revenues starting in year *t***

❑　**Key idea: present-value consolidated GBC shows that government debt can be paid for by…**

　　❑　**Fiscal adjustment (a real payment…)**

　　❑　**Money creation policies (a nominal payment…)**

❑　**Money creation typically sparks inflation (Friedman effect)**

　　❑　**Expansion of money supply → value of each unit of money falls (i.e., price of goods rises)**

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RICARDIAN VS. NON-RICARDIAN POLICY

❑ **In considering dynamic (i.e., over many periods) interactions between fiscal and monetary policy, most relevant case is usually when fiscal authority is active (i.e., the "leader")**

❑ **Definition: A Ricardian fiscal policy is in place if the fiscal authority sets its planned *sequence* of tax and spending policy to ensure that present-value consolidated GBC balances**

❑ **Definition: A non-Ricardian fiscal policy is in place if the fiscal authority sets its planned *sequence* of tax and spending policy without regard for whether present-value consolidated GBC balances**

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❑ **What matters is**
   ❑ **The fiscal authority's entire plan for t_t, t_{t+1}, t_{t+2}, t_{t+3}, t_{t+4}, ...**
   ❑ **The fiscal authority's entire plan for g_t, g_{t+1}, g_{t+2}, g_{t+3}, g_{t+4}, ...**
   ❑ **Whether _and_ when the monetary authority "reacts" to what the fiscal authority chooses**

RICARDIAN CHANGES IN FISCAL POLICY

$$\underbrace{\frac{B_{t-1}}{P_t}}_{} = \underbrace{\sum_{s=0}^{\infty} \frac{t_{t+s} - g_{t+s}}{\Pi_{s=0}^{\infty}(1+r_{t+s})}}_{} + \underbrace{\sum_{s=0}^{\infty} \frac{sr_{t+s}}{\Pi_{s=0}^{\infty}(1+r_{t+s})}}_{}$$

Present-value consolidated GBC

REAL value of government debt that must be repaid at start of period *t*　**Present-discounted value of all fiscal surpluses starting in period *t***　**Present-discounted value of all seignorage revenues starting in period *t***

❑ **Start of analysis:**
  ❑ **Fiscal authority has in place entire planned *sequence* for *t* and *g***
  ❑ **Monetary authority has planned *sequence* for *sr* (i.e., money creation)**

❑ **Fiscal authority then changes the precise timing of *t* collection but does so in a Ricardian way**
  ❑ **i.e., makes sure it changes *t* collection so as to satisfy the present-value consolidated GBC**

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  ❑ **i.e., makes sure it changes *t* collection so as to satisfy the present-value consolidated GBC**

❑ **Question: What is the impact on monetary policy (i.e., on *sr* collection)?**
  ❑ **NONE, because fiscal policy is being conducted in Ricardian way**
  ❑ **(The basis for Ricardian Equivalence from Chapter 7...)**

FISCAL THEORY OF INFLATION (FTI)

$$\frac{B_{t-1}}{P_t} = \sum_{s=0}^{\infty} \frac{t_{t+s} - g_{t+s}}{\Pi_{s=0}^{\infty}(1+r_{t+s})} + \sum_{s=0}^{\infty} \frac{sr_{t+s}}{\Pi_{s=0}^{\infty}(1+r_{t+s})}$$

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❑ **Fiscal authority then changes the precise timing of *t* collection but does so in a non-Ricardian way**

❑ **Question: What is the impact on monetary policy (i.e., on *sr* collection)?**
  ❑ If monetary authority alters its plan for *sr* (i.e., money creation), it has "reacted" ("passive") to ensure present-value consolidated GBC holds

❑ **Money-creation leads to inflation (monetarist link of Chapter 14)**
  ❑ → Terminology "Fiscal Theory of Inflation"

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FISCAL THEORY OF THE PRICE LEVEL (FTPL)

$$\underbrace{\frac{B_{t-1}}{P_t}}_{} = \underbrace{\sum_{s=0}^{\infty} \frac{t_{t+s} - g_{t+s}}{\Pi_{s=0}^{\infty}(1+r_{t+s})}}_{} + \underbrace{\sum_{s=0}^{\infty} \frac{sr_{t+s}}{\Pi_{s=0}^{\infty}(1+r_{t+s})}}_{}$$

Present-value consolidated GBC

REAL value of government debt that must be repaid at start of period t · **Present-discounted value of all fiscal surpluses starting in period t** · **Present-discounted value of all seignorage revenues starting in period t**

❑ **Start of analysis:**
  ❑ Fiscal authority has in place entire planned *sequence* for t and g
  ❑ Monetary authority has planned *sequence* for sr (i.e., money creation)

❑ **Fiscal authority then changes the precise timing of t collection but does so in a non-Ricardian way**

❑ **Question: What is the impact on monetary policy (i.e., on sr collection)?**
  ❑ If monetary authority does **not** alter its sr plan...

FISCAL THEORY OF THE PRICE LEVEL (FTPL)

$$\underbrace{\frac{B_{t-1}}{P_t}}_{} = \underbrace{\sum_{s=0}^{\infty} \frac{t_{t+s} - g_{t+s}}{\Pi_{s=0}^{\infty}(1+r_{t+s})}}_{} + \underbrace{\sum_{s=0}^{\infty} \frac{sr_{t+s}}{\Pi_{s=0}^{\infty}(1+r_{t+s})}}_{}$$

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❑ **Start of analysis:**
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  ❑ Monetary authority has planned *sequence* for sr (i.e., money creation)

❑ **Fiscal authority then changes the precise timing of t collection but does so in a non-Ricardian way**

❑ **Question: What is the impact on monetary policy (i.e., on sr collection)?**
  ❑ If monetary authority does **not** alter its sr plan...
  ❑ **...the entire adjustment must come via a change in the period-t price level**

❑ **A ONE-TIME change in prices, not a sustained increase in prices**
  ❑ Burst of inflation in short run, then quickly settles back to steady state

MONETARY-FISCAL INTERACTIONS

- ❑ **Does Congress act in a way to ensure long-run budget balance?**
  - ❑ **Sometimes seems yes...sometimes seems no...**

- ❑ **If not, then inflationary finance (FTI or FTPL) an important concern**

- ❑ **"When" would effects of inflationary finance be felt in economy?**
  - ❑ **Timing not at all clear**

- ❑ **FTI: effects of inflationary finance felt as a long and sustained (though not necessarily very sharp) rise in inflation**
  - ❑ **In period t _and/or_ in future periods**

- ❑ **FTPL: effects of inflationary finance felt as a short-lived but very sharp rise in inflation**
  - ❑ **A _one-time_ (i.e., in period t) change in prices, but no further inflation in future periods**

- ❑ **Many historical episodes in developing countries of FTPL**
- ❑ **Little (?) empirical evidence for developed countries**

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