“Keynesian Cross” or “Multiplier” Model

The Real Side and Fiscal Policy
Assumptions

• Ignore **Aggregate Supply**
  – Assume prices or inflation fixed for business-cycle analysis, *the Business Cycle Assumption* (1-4 year horizon)
  – Hence all variables are real
  – Flat/non-vertical aggregate supply curve used for short-run analysis

• **No financial markets** (simplicity, not realism)

• Also *ignore rest of the world* (ditto)
  – Autarky or Closed economy
Equilibrium Output

• Determined where desired spending equals production
  – Therefore need to determine aggregate demand (spending)
Sources of Aggregate Demand

1. Private households (consumption)
2. Firms (investment)
3. Government (direct spending/government consumption)
Keynesian Consumption Function

• Consumption is part autonomous, part induced (by disposable income)

• Algebraically $C = C_0 + cY^D$
  
  – $C_0$ "starvation consumption" (low),
  
  – $c$ is marginal propensity to consume (MPC ≈ 0.9)
  
  – $Y^D$ is disposable income

• Modeling consumption is the same as modeling savings
Investment

• Assume investment is fixed temporarily (i.e., ignore present value)
  – Will soon add cost of capital, financial markets
Fiscal Policy

- Government does four macro things:
  1. Spends directly (G)
  2. Makes transfers
  3. Collects taxes
  4. Issues or retires treasuries (bonds)
Direct Government Spending (G)

• Approximately 20% of typical economy
  – Health
  – Education
  – Defense, Infrastructure, ...
Indirect Government Spending

• Government often makes Transfers (Tr) to groups
• Often bigger than direct government spending
  – Old
  – Poor
  – Unemployed
  – Debt-Holders
  – Agriculture, ...
Government Budget Constraint

• Total Spending = Total Revenues
• Transfers + G = taxes + debt issuance + seigniorage
  – Ignore seigniorage for now
• Model taxes simply as proportional to income
  – Taxes = tY
  – Income and VAT are big taxes for rich countries
  – Empirically, Taxes >> Debt Issuance ( >> Seigniorage)
• Assume Transfers (Tr) and G both exogenous (!)
Equilibrium: The Math

• Consumption is $C = C_0 + cY^D = C_0 + c(Y - tY + Tr)$
  
  $$= (C_0 + cTr) + c(1-t)Y$$

• $Y = C + I + G$

• $\Rightarrow Y = C_0 + cTr + c(1-t)Y + I_0 + G_0$

• $\Rightarrow Y(1 - c(1-t)) = C_0 + cTr + I_0 + G_0$

• $\Rightarrow Y = \frac{1}{1 - c(1-t)}(C_0 + cTr + I_0 + G_0) \text{, “multiplier model”}$
The Multiplier Model

• Output is the product of multiplier and autonomous spending
  – Keynesian Multiplier: \(1/(1 - c(1-t)) \approx 2\)
  – Autonomous Spending: \([C_0 + cTr + I_0 + G_0]\)
• “Induced” spending leads to non-trivial multiplier
• Multiplier answers question “If autonomous expenditures rise for some exogenous reason, how much does total real income rise in equilibrium?”
The Keynesian Cross

Algebraically

\[ Y = \frac{1}{1 - c(1-t)} (C_0 + cTR + I_0 + G_0) \]
Logic of Multiplier

• Multiplier works through induced effects on consumption
  – $Y = C + I + G$; as RHS rises, $Y$ rises, ... but then $C$ rises ... so $Y$ rises ... so $C$ rises ...
  – Any rise in income exceeds initial change (e.g., in investment) because recipients of extra (investment) income consume part (most) of this extra income

• Any rise of autonomous spending/multiplier => income rises

• Note: $I = S$ in equilibrium
Automatic Stabilizers

• Taxes lower value of multiplier
• Transfers (e.g., to unemployed) raise spending during bad times, lower them during good
• Both are “Automatic Stabilizers” that are counter-cyclic (reduce the volatility of business cycles)
  – Note: no discretionary (fiscal) policy necessary
  – Note: most shocks are good, so automatic stabilizers are also “fiscal drag”
Inventories

• Inventories both a buffer and a signal here
  – In equilibrium, change in inventories (not level) is zero
Inventory Cycle

• Relevant for out-of-equilibrium
  – rise at beginning of expansion (*intended* to restore low inventories)
  – fall at end of expansion (*intended* to shed big inventories)
  – But also: rise at beginning of recessions (sales *unexpectedly* low)
  – And: fall at end of recession (sales *unexpectedly* high)
Expansionary Demand Shock

• Direct or Indirect *Discretionary* Government Spending Shock (financed by bonds) increases autonomous spending
  – Same for increase in Autonomous Investment

• Aggregate Spending and Output rise through Multiplier
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Government Budget Naturally Cyclic

• As income changes (for whatever reason), budget deficit/surplus changes automatically
  – tax revenues fall in recessions; transfers rise
• Hence can “cyclically adjust” budget deficit: deficit reflects both “structural” and “cyclic” components
• For balance over the cycle, should run surplus during booms
  – Otherwise “pro-cyclic” fiscal policy; fiscal contraction during recessions exacerbates recessions
  – Ex: EMU and “Growth and Stability Pact”
  – Ex: most sub-national governments have balanced budgets
Graphically

Bad shock hits (recession)

Gov’t transfers rise, revenues fall: deficit

Cut gov’t spending or raise taxes, or both

Long-run trend, balanced budget

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Debt Crises Stylized Facts

• Banking, Sovereign Debt, FX Crises inter-related
• Reinhart and Rogoff (AER 2011) stylized facts:
  1. Public borrowing surges before sovereign debt crises (loose fiscal policy and “hidden/implicit” debt)
  2. Private debt surges before banking crises (loose credit, hence boom)
  3. Banking crises precede/coincide with sovereign debt crises (bad banks nationalized)
  4. Banking and Foreign Exchange crises often coincide
  5. Maturities shorten as crises approach

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Key Takeaways

• Keynesian Multiplier
• Fiscal policy affects business cycles
• Business cycles affect government budget