“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≈.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 $C = C_0 + cY^D = C_0 + c(Y - tY + Tr)$

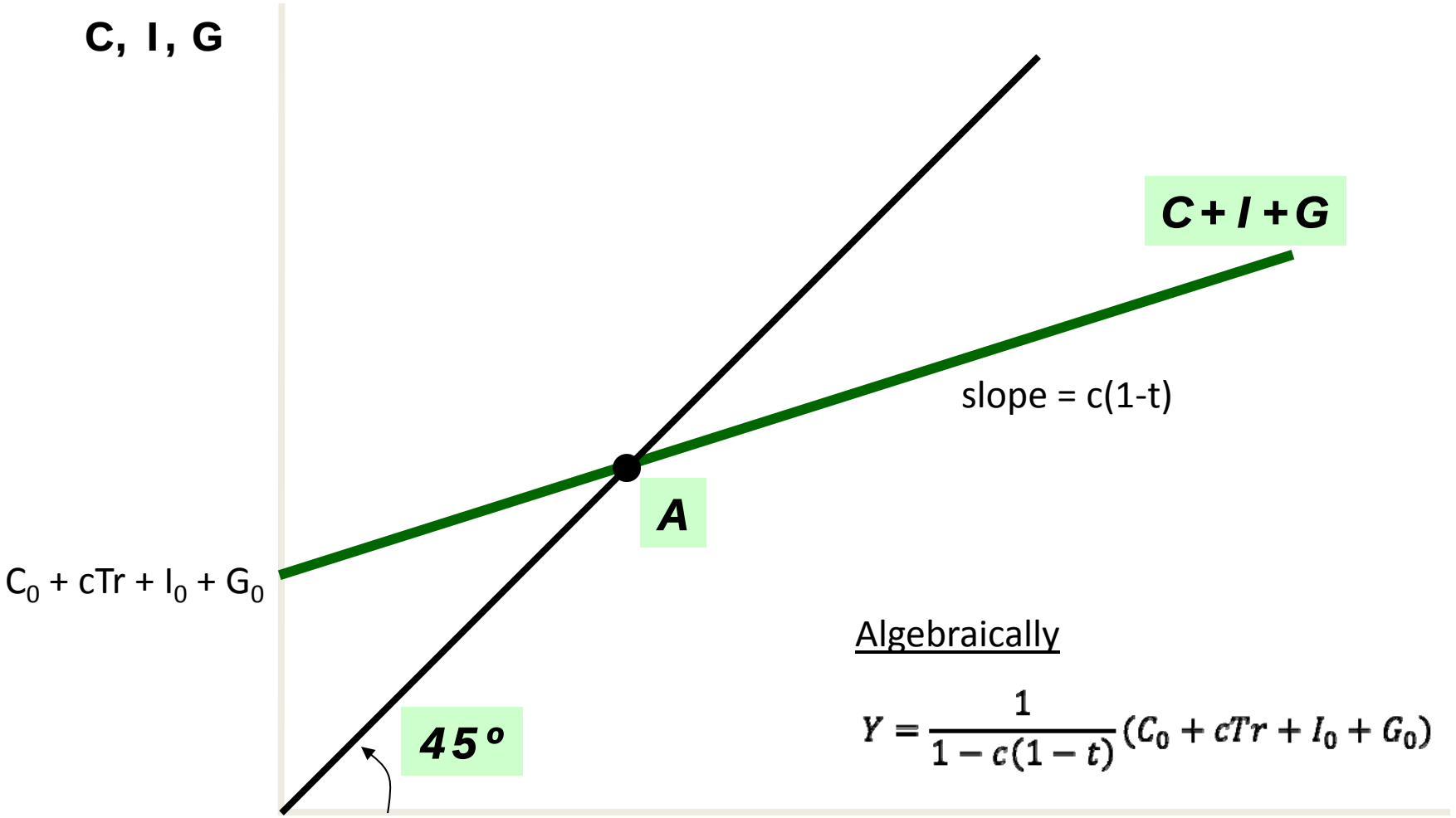
  $= (C_0 + cTr) + c(1-t)Y$

- $Y = C + I + G$
- $\Rightarrow Y = C_0 + cTr + c(1-t)Y + I_0 + G_0$
- $\Rightarrow Y(1 - c(1-t)) = C_0 + cTr + I_0 + G_0$
- $\Rightarrow Y = \frac{1}{1-c(1-t)}(C_0 + cTr + I_0 + G_0)$, "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

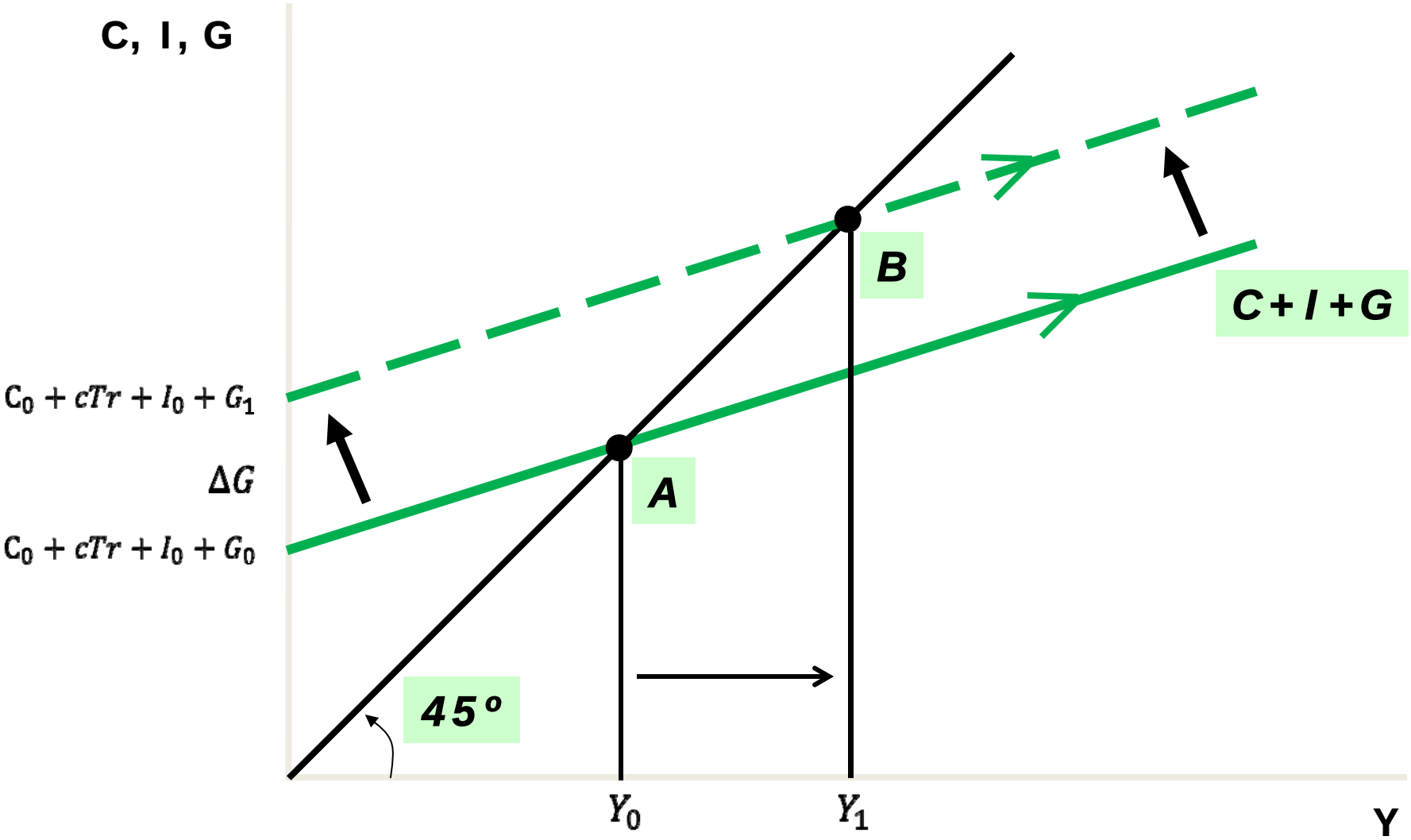
- Inventories both a buffer and a signal here
  - In equilibrium, change in inventories (not level) is zero

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

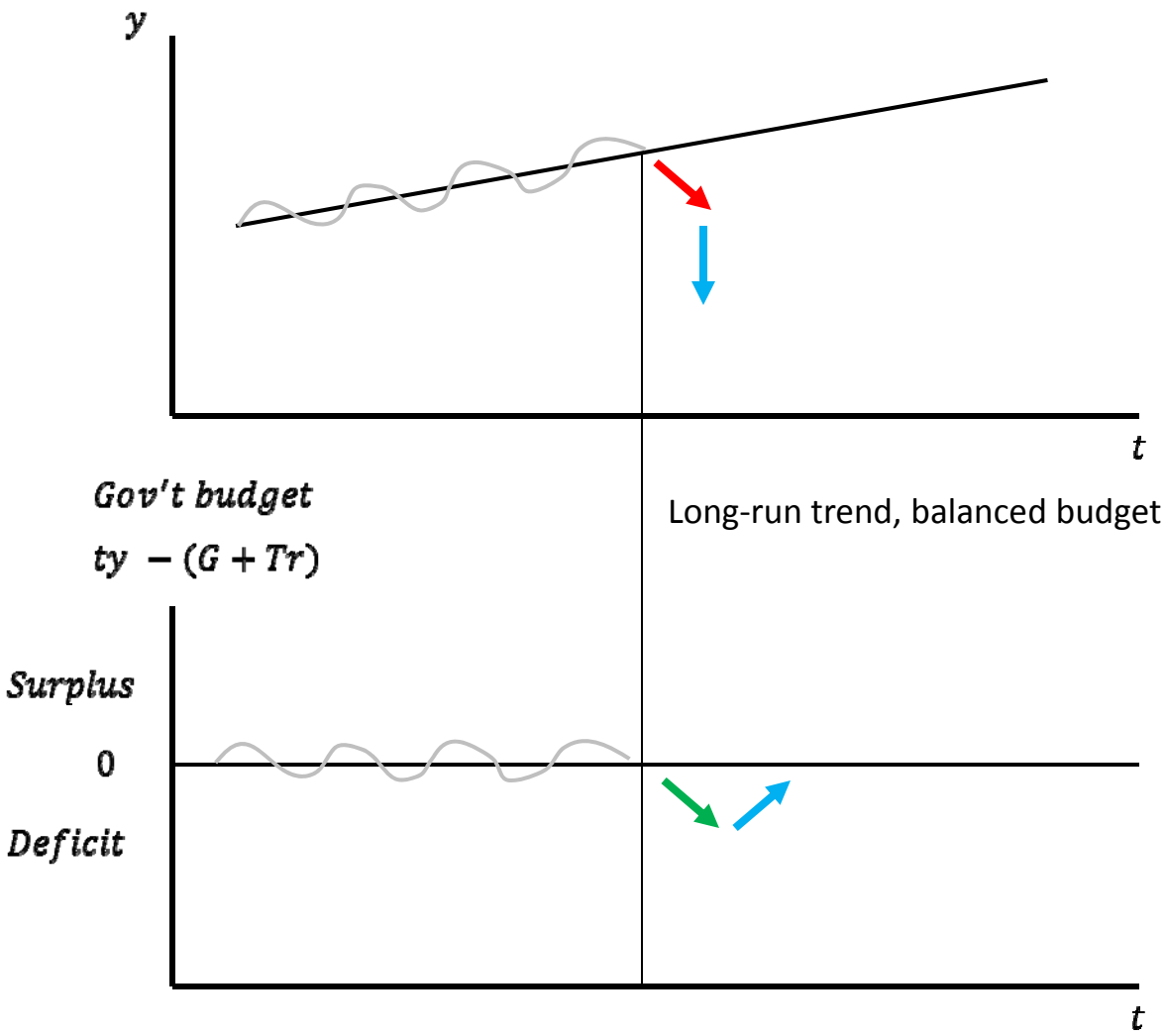
- Direct or Indirect *Discretionary* Government Spending Shock (financed by bonds) increases autonomous spending
  - Same for increase in Autonomous Investment
- Aggregate Spending and Output rise through Multiplier


C, I, G
$C_0 + cTr + I_0 + G_1$
ΔG
$C_0 + cTr + I_0 + G_0$
B
C + I + G
A
45°
Y_0
Y_1
Y

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

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

Key Takeaways

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