Who picks the rate, and who picks the output?

The money market joins the goods market: where IS and LM cross, and how much the Bank lets a spending rise grow.

1 Money demand

cash the island wants

- **Money demand** (L) = cash wanted for shops and wages · output ↑ ⇒ more cash · rate ↑ ⇒ less cash (cash pays no interest, bonds do)
- `L = 0.4 × Y − 40 × i` · +$100M of output ⇒ +$40M cash · +1 point of rate ⇒ −$40M cash · money supply **$200M** (Macro 7)
- Too little cash ⇒ people sell bonds ⇒ **rate ↑** · too much ⇒ they buy bonds ⇒ rate ↓

OUTPUT ($M)	900	1,000	1,100
Cash wanted at 5%	160	200	240
Rate that clears $200M	**4%**	**5%**	**6%**

2 LM curve

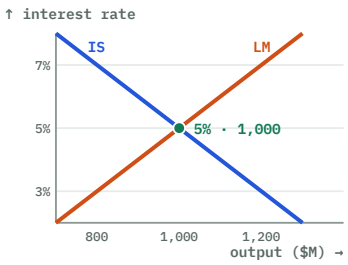
money market in balance

- **LM curve** = every pair (rate, output) where money demand = money supply · "L" liquidity (demand), "M" money (supply) · slopes **up**
- `0.4 × Y − 40 × i = 200` ⇒ `40 × i = 0.4 × Y − 200` ⇒ `i = 0.01 × Y − 5` · general: `i = 0.01 × Y − money ÷ 40`
- Money +$40M ⇒ LM **down** 1 point · money −$40M, or cash wanted +$40M ⇒ LM **up** 1 point

3 IS–LM

both markets at once

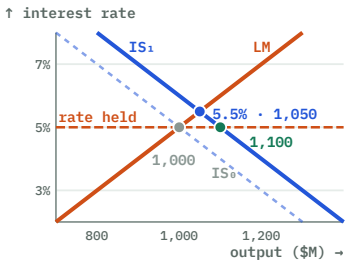
- IS goods market: `Y = 1,500 − 100 × i` (Lesson 2) · LM money market · crossing = both in balance: **5% · $1,000M**
- Solve: put LM into IS ⇒ `Y = 1,500 − Y + 500` ⇒ `2 × Y = 2,000` · check each answer on both curves
- John Hicks, English, "Mr. Keynes and the 'Classics'", *Econometrica*, **1937** · Alvin Hansen, American, *A Guide to Keynes*, **1953** (spread it)



4 Crowding out

what the Bank decides

- Treasury G +$20M ⇒ IS → 100 · **money fixed** ⇒ crossing slides up LM ⇒ **5.5% · $1,050M** ⇒ I 150 → 140 ⇒ −10 × 5 = **−$50M**
- **Crowding out** = more G ⇒ rate ↑ ⇒ private investment ↓ · run backwards (G −20 ⇒ 4.5% · $950M · I +10) = crowding in
- **Modern central bank** = sets the rate, supplies the money wanted ⇒ LM **flat** · G +20 at 5% ⇒ **$1,100M**, nothing crowded out · needs money 240 (+$40M of bonds)
- Bank buys $40M of bonds alone ⇒ LM down ⇒ **4.5% · $1,050M** · Fed (US central bank) announces rate decisions at once since 4 Feb **1994** · David Romer, American, *Journal of Economic Perspectives* **2000**



5 Shift or slide

which curve moves

- IS SHIFTS spending changes at every rate: G, taxes, confidence · LM SHIFTS money, or cash wanted, changes at every output
- SLIDE what the rate and output do **after** a shift: along the curve that did not move
- G +20 and Bank sells $40M (money 160) ⇒ `i = 0.01 × Y − 4` ⇒ **6% · $1,000M** · I 130 (−20) = **full crowding out**

6 Policy mix

two buildings, one output

- **Policy mix** = what the Bank and the Treasury do together · today deficit $20M (spends 120, taxes 100)
- To $1,100M: **A** G +20, rate held 5% ⇒ I 150, deficit 40 · **B** rate cut to 4% ⇒ I 170, deficit 20 · which is better = values, not the model
- 2020: Fed target **0–0.25%** (from 1–1.25%, 15 Mar 2020) · US deficit **4.6%** of GDP (2019) → **14.9%** (FY 2020 = Oct 2019–Sep 2020; CBO = US Congress budget office) · pandemic too ⇒ effects debated
- Watch out: today's central bank **picks the rate**; it does not fix the money and wait · crowding out is not always half: none, half or all, set by the Bank

Eleven ideas behind the big picture · 1 Spending decides output · 2 A lower interest rate means more spending: the IS curve · **3 The Bank picks the rate; the IS curve then picks the output**