Lesson 8: IS Curve and MP Curve

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1 Chapter 9: The IS (Investment and Savings) Curve

The IS Curve shows us the real interest rate (r) that places the goods market (I = S) inro equilibrium for any level of output (Y).

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# TODO make IS curves
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1.1 Consumption (Lesson 5)

$$C = \overline{C} + MPC(Y - \overline{T}) - cr$$

Where c is how responsive consumption is to changes in the real interest rate (r)

1.2 Investment (Lesson 6)

$$I = \overline{I} - dr_i = \overline{I} - d(r + \overline{f})$$

Where r_i is the real interest rate on investment.

$$r_i = r + \overline{f}$$

$\overline{f}$ ~ financial frictions (risk)

- cost of borrowing cause by barriers to effectively determine risk

1.3 Government Purchase and Taxes

$$G = \overline{G}$$
$$T = \overline{T}$$

1.4 Net Exports

$$NX = \overline{NX} - xr$$

If real interest rate in the US increases, then US investments have greater return, so interanational investors want to invest in the US. This creates a need for the US dollar (demand), the US dollar will become stronger and it costs more to produce in the US and NX will go down. You would also be able to import more.

1.5 IS Equation

$$Y = C + I + G + NX$$
$$Y = \overline{C} + MPC(Y - \overline{T}) - cr + \overline{I} - d(r + \overline{f}) + \overline{G} + \overline{NX} - xr$$
$$Y = \overline{C} + MPCY - MPC\overline{T} - cr + \overline{I} - dr - d\overline{f} + \overline{G} + \overline{NX} - xr$$
$$Y - MPCY = \overline{C} - MPC\overline{T} - cr + \overline{I} - dr - d\overline{f} + \overline{G} + \overline{NX} - xr$$
$$Y(1 - MPC) = \overline{C} + \overline{I} + \overline{G} + \overline{NX} - MPC\overline{T} - d\overline{f} - cr - dr - xr$$
$$Y = \frac{\overline{C} + \overline{I} + \overline{G} + \overline{NX} - MPC\overline{T} - d\overline{f} - cr - dr - xr}{(1 - MPC)}$$
$$Y = \frac{1}{(1 - MPC)}(\overline{C} + \overline{I} + \overline{G} + \overline{NX} - MPC\overline{T} - d\overline{f}) - r(\frac{c + d + x}{1 - MPC})$$

Spending Multiplier is $\frac{1}{1-MPC}$ (how overall GDP changes when autonomous spending changes)

Autonomous spending is $\overline{C} + \overline{I} + \overline{G} + \overline{NX}$.

1.5.1 Insert GRAPH

```
# TODO repeat IS curve
```

Slope is $-\frac{1-MPC}{c+d+x}$

1.6 Shifts (to GDP)

ΔG, a change in government purchases

- Positive effect
- Multiplier $\frac{1}{1-MPC}$

ΔT, a change in government taxes

- Negative effect
- Multiplier $\frac{MPC}{1-MPC}$

ΔA_0, a change in autonomous spending ($\overline{C}, \overline{I}, \overline{NX}$)

- Positive effect
- Multiplier $\frac{1}{1-MPC}$

Δf, a change in financial friction (risk)

- Negative effect
- Multiplier $\frac{d}{1-MPC}$

2 Chapter 10: The MP Curve (Monetary Policy)

Recall that the Federal Reserve sets a target range for the Federal Funds Rate. Currently (April 11, 2019) the range is between 2.25 and 2.50%. This is 225 basis points to 250 basis points.

Hows does the Federal Reserve try to enforce these policies?

Old:

- Control overall Money Supply
- Open Market Operations
- Reserve requirements
- Discount policy

New:

- Interest on Reserves
- Reverse Repos (Repurchasing Agreement)

2.1 MP Curve

The MP curve will show a relationship between real interest rate (r) and inflation (π), with respct to monetary policy. How are r and π related? Fisher eq:

$$r = i - \pi$$

Taylor Principle states that CB (Central Bank) should increase nominal interest rate by more than what you expect your inflation rate (π) to be. This means when inflation increases, so should real interest rate.

2.2 MP Curve Equation

$$r(\pi)$$
$$r = \overline{r} + \lambda\pi$$

$\overline{r}$ is autonomous or exogenous component of the CB's decision to set the real interest rate.

λ dictates how responsive real interest rate to a change in inflation $\Delta\pi$

Example: $r = 1.0 + 0.5\pi$

NOTE that 2% or 2 percent will be denoted 2 in the model.

```
# TODO graph MP Curve
```

2.3 Monetary Policy/Federal Reserve Language to know:

- Tighten monetary policy means raising the real interest rate (r)
  - Contractionary
- Ease monetary policy means lowering the real interest rate (r)
  - Expansionary

1. Movement along MP Curve
   - Δr in response to $\Delta \pi$
   - Achieve "stable prices"
   - MP during "normal times" (not a lot of other stuff going on than changing prices)
2. Shift of the MP Curve
   - Δr by changing $\overline{r}$
   - π is stable but there is Δr
   - Ex: 2007, 2008, recently

```
# TODO MP/IS Curve side by side
```