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Study Notes

Impossible Trinity and the Mundell-Fleming Model

Introduction

- Macroeconomic policy trilemma, also called the impossible trinity, means that a country must **choose between free capital mobility, exchange-rate management and an independent monetar**y policy. Only two of the three are possible.
- A country that wishes to fix its currency's value and has an interest-rate policy free from outside influence cannot allow capital to flow freely across its borders.
- The articulators of the concept in the 1960s were **J. Marcus Fleming and Robert A. Mundell.**
- **China** faced this trilemma when the exchange rate was fixed but the country was open to cross-border capital flows, it cannot have an independent monetary policy.
- Similarly, **Britain** has this trilemma when it chose free capital mobility and wanted monetary autonomy it had to allow its currency to float.

The Concept

- The concept is derived from the academic works of Canadian economist Robert Mundell and British economist Marcus Fleming in the early 1960s.
- This principle is frequently called 'the **Unholy Trinity**,' the '**Irreconcilable Trinity**,' the 'Inconsistent trinity' or the Mundell-Fleming 'trilemma'. This is a concept in international economics which states that it is **impossible to have all three** of the following at the same time:
  i. a fixed foreign exchange rate;
  ii. free capital movement (absence of capital controls);
  iii. an independent monetary policy.

Example

- Assume that the world interest rate is at 5%. Suppose the home central bank tries to set the domestic interest rate at a rate lower than 5%, for example at 2%. In that case, there will be depreciation pressure on the home currency, because investors would want to sell their low-yielding domestic currency and buy higher-yielding foreign currency. If the central bank also wants to have free capital flows, the only way it could prevent the home currency's depreciation is to sell its foreign currency reserves. Since the foreign currency reserves of a central bank are limited, once the reserves are depleted, the domestic currency will depreciate.
- Hence, all three of the policy objectives cannot be pursued simultaneously. A central bank has to forgo one of the three objectives. Three out of three are not possible, but two out of three are not bad.

The Mundell-Fleming Model

- The *Mundell-Fleming* model integrates international trade and finance into macroeconomic theory.
- This approach was developed in the early 1960s by the Canadian economist *Robert Mundell* (winner of the 1999 Nobel Prize in economics) and the British economist *J. Marcus Fleming* (1911–1976). Both authors were members of the IMF's research department.

- They independently **extended the traditional Keynesian model to an open economy set-up** in which the capital and goods markets are internationally integrated. The resulting research constitutes the original version of the *Mundell-Fleming* model (*Mundell* 1963; *Fleming* 1962). The model states that, in the long run, a central bank that hopes to conduct independent monetary policy must choose between maintaining a fixed foreign exchange rate and allowing the free movement of capital.
- For instance, a central bank that chooses to increase the total money supply by adopting a loose monetary policy cannot hope to maintain the foreign exchange value of its currency unless it resorts to restricting the sale of domestic currency in the currency market.

Basic set-up

- The model is an extension of the IS-LM model.
- The traditional IS-LM model deals with the economy under autarky (or a closed economy), whereas the *Mundell-Fleming* model tries to describe an open economy.
- Typically, the *Mundell-Fleming* model portrays the **relationship between the nominal exchange rate and an economy's output** (unlike the relationship between interest rate and the output in the IS-LM model) in the short run.
- The *Mundell- Fleming* model has been used to argue that an economy cannot simultaneously maintain a fixed exchange rate, free capital movement, and an independent monetary policy.
- The traditional model is based on the following equations.

$$Y = C + I + G + NX \text{ (The IS Curve)}$$

Where Y is GDP,

C is consumption,

I is investment,

G is government spending, and

NX is net exports.

$$\frac{M}{P} = L\ (i,\ Y) \text{ (The LM Curve)}$$

Where M is the money supply,

P is the average price,

L is liquidity, i is the interest rate, and Y is GDP

$BoP = CA + KA$ *(The BoP Curve (Balance of Payments))*

Where CA is the current account and

KA is the capital account

IS components

$C = C(Y - T, i - E(\pi))$

Where C is consumption,

Y is GDP,

T is taxes,

i is the interest rate,

$E(\pi)$ is the expected rate of inflation

$I = I(i - E(\pi), Y_{-1})$

Where I is investment,

i is the interest rate,

$E(\pi)$ is the expected rate of inflation,

Y_{-1} is GDP in the previous period

$G = G$

Where G is government spending, an exogenous variable

$NX = NX(e, Y, Y^*)$

Where NX is net exports,

e is the real exchange rate,

Y is GDP,

Y^* is the GDP of a foreign country

BoP components

$CA = NX$

Where CA is the current account and

NX is net exports

$KA = z(i - i^*) + k$

Where z is the level of capital mobility,

i is the interest rate,

i^* is the foreign interest rate,

k is capital investments not related to i, an exogenous variable

- A critical **assumption** of the model is the **equalization of the local interest rate to the global interest rate.**

Changes in money supply

- An increase in the money supply shifts the LM curve downward. This directly reduces the local interest rate and forces the local interest rate to lower than the global interest rate. This depreciates the exchange rate of local currency through capital outflow. Hot money flows out to take advantage of higher interest rates abroad, so currency depreciates. This leads to the shifting of the IS curve (Y = C + I + G + NX) to the right, where the local interest rate equalizes with the global rate. A decrease in the money supply causes the exact opposite of the process.

Changes in government spending

- An increase in government expenditure shifts the IS curve to the right. The shift causes the local interest rate to go above the global rate. The increase in local interest causes capital inflow, making the local currency stronger than foreign currencies. A strong exchange rate also makes foreign goods cheaper compared to local goods. This encourages greater import and discourages export and hence lower net export. As a result, the IS returns to its original level, where the local interest rate is equal to the global interest rate. The level of income of the local economy stays the same. The LM curve is not at all affected. A decrease in government expenditure reverses the process.

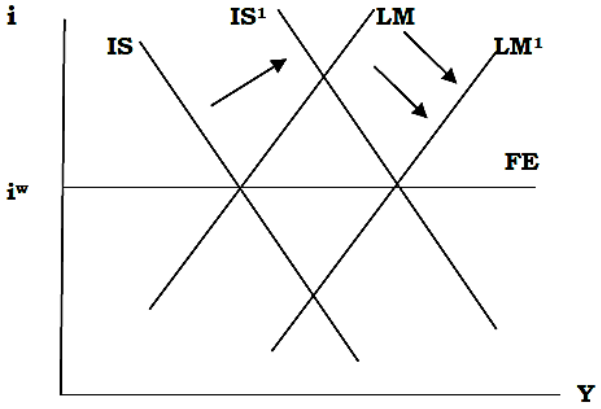
Changes in global interest rate

- An increase in the global interest rate causes upward pressure on the local interest rate. The pressure subsides as the local rate closes in on the global rate. When a positive differential between the global and the local rate occurs, holding the LM curve constant, capital flows out of the local economy. This depreciates the local currency and helps boost net export.
- Increasing net export shifts the IS to the right. This shift continues to the right until the local interest rate becomes as high as the global rate. A decrease in the global interest rate causes the reverse to occur.

Changes in money supply

- Under the fixed exchange rate system, the local central bank only changes the money supply to maintain a specific exchange rate.
- Suppose there is pressure to depreciate the domestic currency's exchange rate because the supply of domestic currency exceeds its demand in foreign exchange markets. In that case, the local authority buys a domestic currency with foreign currency to decrease the domestic currency's supply in the foreign exchange market. This returns the domestic currency's exchange rate to its original level.
- Suppose there is pressure to appreciate the domestic currency's exchange rate because the currency's demand exceeds its supply in the foreign exchange market. In that case, the local authority buys a foreign currency with domestic currency to increase the domestic currency's supply in the foreign exchange market. This returns the exchange rate to its original level. A

revaluation occurs when there is a permanent increase in the exchange rate and hence, a decrease in the money supply. Devaluation is the exact opposite of revaluation.



An increase in government spending forces the monetary authority to flood the market with local currency to keep the exchange rate unchanged.

- The local monetary authority in the framework of a fixed system controls the exchange rate. To maintain the exchange rate and eliminate pressure from it, the monetary authority purchases foreign currencies with local currency until the pressure is gone, i.e., back to the original level. Such action shifts the LM curve in tandem with the direction of the IS shift. This action increases the local currency supply in the market and lowers the exchange rate—or rather returns the rate to its original state. In the end, the exchange rate stays the same but the general income in the economy increases.
- If the global interest rate increases above the domestic rate, capital flows out to take advantage of this opportunity. Hot money flows out of the economy. This would depreciate the home currency, so the central bank may buy the home currency and sell some of its foreign currency reserves to offset this outflow.
- This decrease in the money supply shifts the LM curve to the left until the domestic interest rate is the global interest rate. The opposite occurs if the global interest rate declines below the domestic rate. Hot money flows in, and the home currency appreciates. The central bank offsets this by increasing the money supply (selling domestic currency, buying foreign currency), the LM curve shifts to the right, and the domestic interest rate becomes the global interest rate.

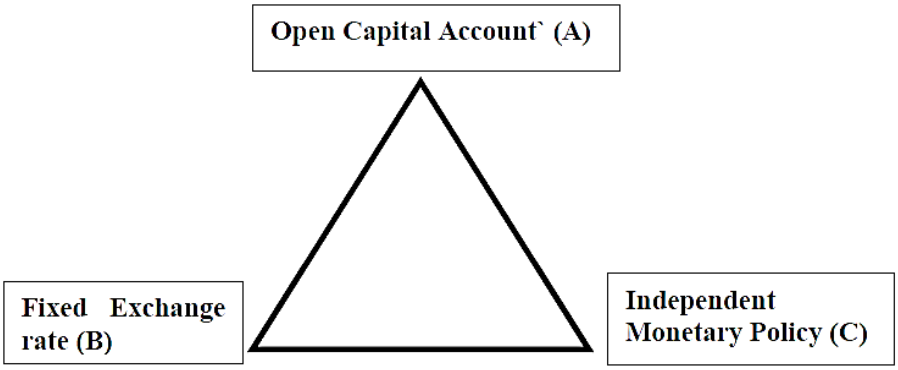
Differences from IS-LM

- Some of the results from this model differ from the IS-LM because of the open economy assumption.
- The result for a large open economy on the other hand falls within the result predicted by the IS-LM and the *Mundell-Fleming* models. The reason for such a result is that a large open economy has both the characteristics of autarky and a small open economy.
- In the IS-LM, the interest rate is the key component in making both the money market and the goods market in equilibrium.

- Under the *Mundell- Fleming* framework of a small open economy, the interest rate is fixed and equilibrium in both markets can only be achieved by a change in the nominal exchange rate.

Example

- A much-simplified version of the Mundell-Fleming model can be illustrated by a small open economy, in which the domestic interest rate is exogenously predetermined by the world interest rate (r=r*).
- Consider an exogenous increase in government expenditure, the IS curve shifts upward, with LM curve intact, causing the interest rate and the output to rise (partial crowding out effect) under the IS-LM model.
- Nevertheless, as the interest rate is predetermined in a small open economy, the LM^1 curve (of exchange rate and output) is vertical, which means there is exactly one output that can make the money market in the equilibrium under that interest rate.
- Even though the IS^1 curve can still shift up, it causes a higher exchange rate and the same level of output (complete crowding out effect, which is different in the IS-LM model).
- This example makes an implicit **assumption of a flexible exchange rate**.
- The Mundell-Fleming model can have completely **different implications under different exchange rate regimes**.
- For instance, monetary policy becomes ineffective under a fixed exchange rate system, with perfect capital mobility. An expansionary monetary policy resulting in an outward shift of the LM curve would in turn make capital flow out of the economy. The central bank under a fixed exchange rate system would have to intervene by selling foreign money in exchange for domestic money to depreciate the foreign currency and appreciate the domestic currency. Selling foreign money and receiving domestic money would reduce real balances in the economy, until the LM curve shifts back to the left, and the interest rates come back to the world rate of interest i*.



The "Impossible trinity" of Capital, Money and exchange

In terms of the Figure above, the following are the options:

i. **"A"**: A stable exchange rate and free capital flows (but not an independent monetary policy because setting a domestic interest rate that is different from the world interest

rate would undermine a stable exchange rate due to appreciation or depreciation pressure on the domestic currency).

ii. **"B"**: An independent monetary policy and free capital flows (but not a stable exchange rate).

iii. **"C"**: A stable exchange rate and independent monetary policy (but no free capital flows, which would require the use of capital controls).

- Mundell was of the view that the effects of monetary and fiscal policy in an open economy depend on capital mobility. In particular, he has highlighted the importance of exchange rate systems. Under floating exchange rates, monetary policy is a powerful tool; fiscal policy is powerless. Under fixed exchange rates, fiscal policy is effective.