## *Quantity Theory of Money: Growth Framework*

From Quantity Theory of Money:

$P_{US} = M_{US}/(L_{US}Y_{US})$

Taking rates of growth:

$\pi_{US} = \%\Delta M - \%\Delta L - \%\Delta Y$

The intuition may be easier seen as

$\%\Delta M = \pi_{US} + \%\Delta L + \%\Delta Y$

The equation states that money growth must go either into higher money demand, higher prices, or higher output.

## *Assumptions of the Quantity Theory of Money*

In the long run

1. The demand for money (L) is constant
2. The growth rate of output is independent of the growth rate of the money supply; i.e. the growth rate of output depends on real factors such as population growth and productivity growth and the not money supply growth.

If we assume L to be constant, $\%\Delta L = 0$

Let the growth rate of output be denoted as g and the growth rate of the money supply denoted as $\mu$

Therefore

$$\pi_{US} = \%\Delta M_{US} - \%\Delta Y_{US}$$

$$\pi_{US} = \mu_{us} - g_{us}$$

Inflation = money growth minus output growth

Likewise

$$\pi_{EUR} = \mu_{EUR} - g_{EUR}$$

## *Combining Quantity Theory of Money and Relative PPP*

From Relative PPP

$\%\Delta E_{\$/€} = \pi_{US} - \pi_{EUR}$

Exchange rate depreciation = inflation differential

From Quantity Theory of Money

$\pi_{US} = \mu_{us} - g_{us}$

$\pi_{EUR} = \mu_{EUR} - g_{EUR}$

Combining Relative PPP and Quantity Theory:

$\%\Delta E_{\$/€} = (\mu_{us} - g_{us}) - (\mu_{EUR} - g_{EUR})$

$\%\Delta E_{\$/€} = (\mu_{us} - \mu_{EUR}) - (g_{US} - g_{EUR})$

Exchange rate depreciation = money growth differential minus output growth differential

## *Relative PPP and Fixed Exchange Rates*

From Relative PPP

$\%\Delta E_{\$/FGN} = \pi_{US} - \pi_{FGN}$

Under Fixed Exchange Rates (Assume the foreign country is fixed to the dollar)

$\%\Delta E_{\$/FGN} = 0$

Therefore

$\pi_{US} = \pi_{FGN}$

This is one of the advantages of fixed exchange rates:  the country fixing its exchange rate will in the long run have the same inflation rate as the currency it is fixed to.

## *Fixed Exchange Rates will Constrain Monetary Policy.*

$\%\Delta E_{\$/fgn} = (\mu_{us} - \mu_{FGN}) - (g_{US} - g_{FGN})$

$0 = (\mu_{us} - \mu_{FGN}) - (g_{US} - g_{FGN})$

Solving for $\mu_{FGN}$

$\mu_{FGN} = \mu_{us} - (g_{US} - g_{FGN})$

The constraint that fixed exchange rates places on monetary policy is known as a nominal anchor.

## *Types of Nominal Anchors:*

1. Exchange rate target
2. Money supply target
3. Inflation target
4. Nominal interest rate target

## *Practice Problem*

Assume that output growth is 6% in South Korea and 1% in Japan. Money supply growth is 10% in South Korea and 2% in Japan. Assume that L is fixed.

a. What is the inflation rate in the two countries?

b. What is the growth in the exchange rate ($\%\Delta E_{JPN/SK}$) ?

c. What money supply growth rate should South Korea set if it wants to fix its exchange rate to the Japanese Yen?

## *Practice Problem Solution*

Assume that output growth is 6% in South Korea and 1% in Japan. Money supply growth is 10% in South Korea and 2% in Japan. Assume that L is fixed.

a. What is the inflation rate in the two countries?
Inflation is equal to money supply growth minus output growth.
$\pi_{JPN} = \mu_{JPN} - g_{JPN} = 2 - 1 = 1$
$\pi_{SK} = \mu_{SK} - g_{SK} = 10 - 6 = 4$

b. What is the growth in the exchange rate ($\%\Delta E_{JPN/SK}$) ?
The exchange rate changes in the long run by the inflation differential:
$\%\Delta E_{JPN/SK} = \pi_{JPN} - \pi_{SK} = 1 - 4 = -3$

c. What money supply growth rate should South Korea set if it wants to fix its exchange rate to the Japanese Yen?
If South Korea wants to have fixed exchange rates it must have the same inflation rate as Japan. It does this by adjusting its money supply growth.
$\pi_{SK} = \mu_{SK} - g_{SK}$
$\mu_{SK} = \pi_{SK} + g_{SK}$
$\mu_{SK} = 1 + 6 = 7$

## *Empirical Evidence*

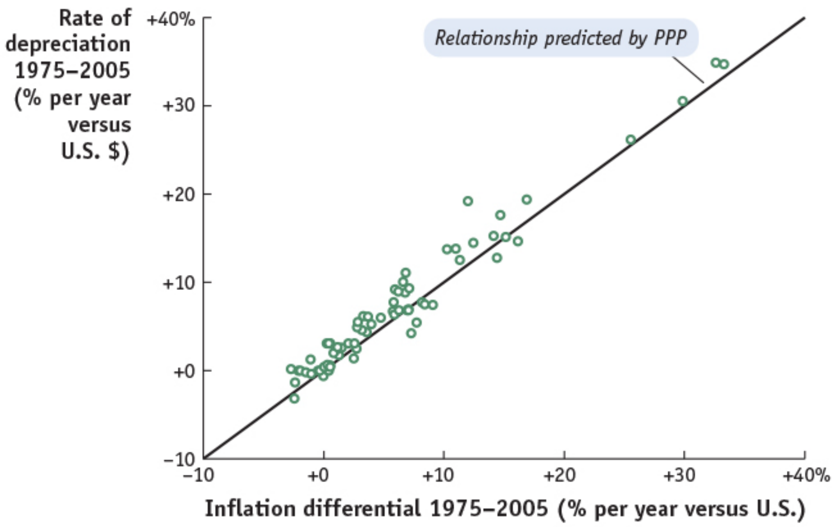


**Figure 14.2**
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*Data from: IMF, International Financial Statistics.*