MONETARY TRANSMISSION MECHANISM

WORKSHOP ON MONETARY AND EXCHANGE RATE POLICY
BANGKOK, THAILAND
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Overview

I. Theories of Monetary Transmission Mechanisms

II. Monetary Transmission Channels

III. Implementing Monetary Policy

IV. Summary

I.A Theories of Monetary Transmission Mechanism: The Demand View

Central hypothesis:

• Difference between demand and supply (output gap) drives inflation

• Monetary policy cannot affect supply (potential output)—long-run neutrality of money

• Monetary policy can affect demand, mainly through interest and exchange rates

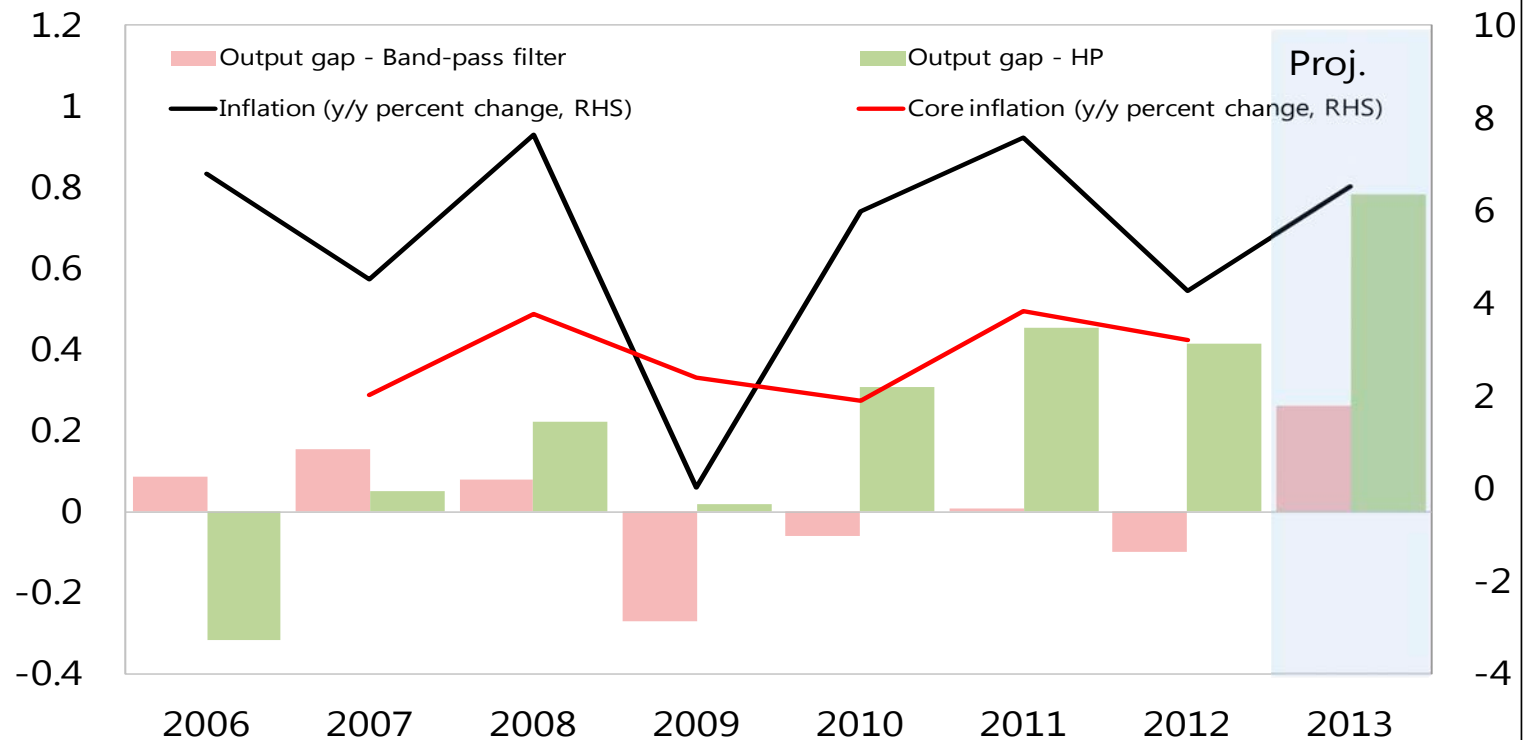• Keeping demand aligned with supply is central task for monetary policy
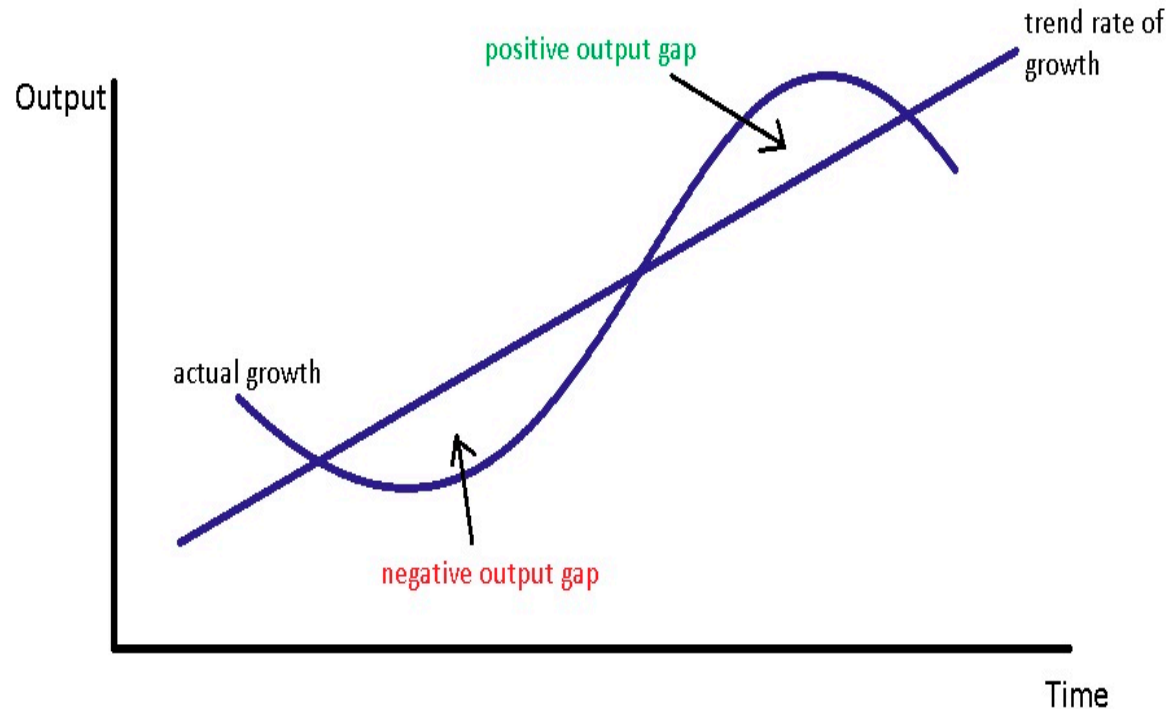
Demand View:
Output Gap & Inflation in Lao PDR

Output Gap and Inflation
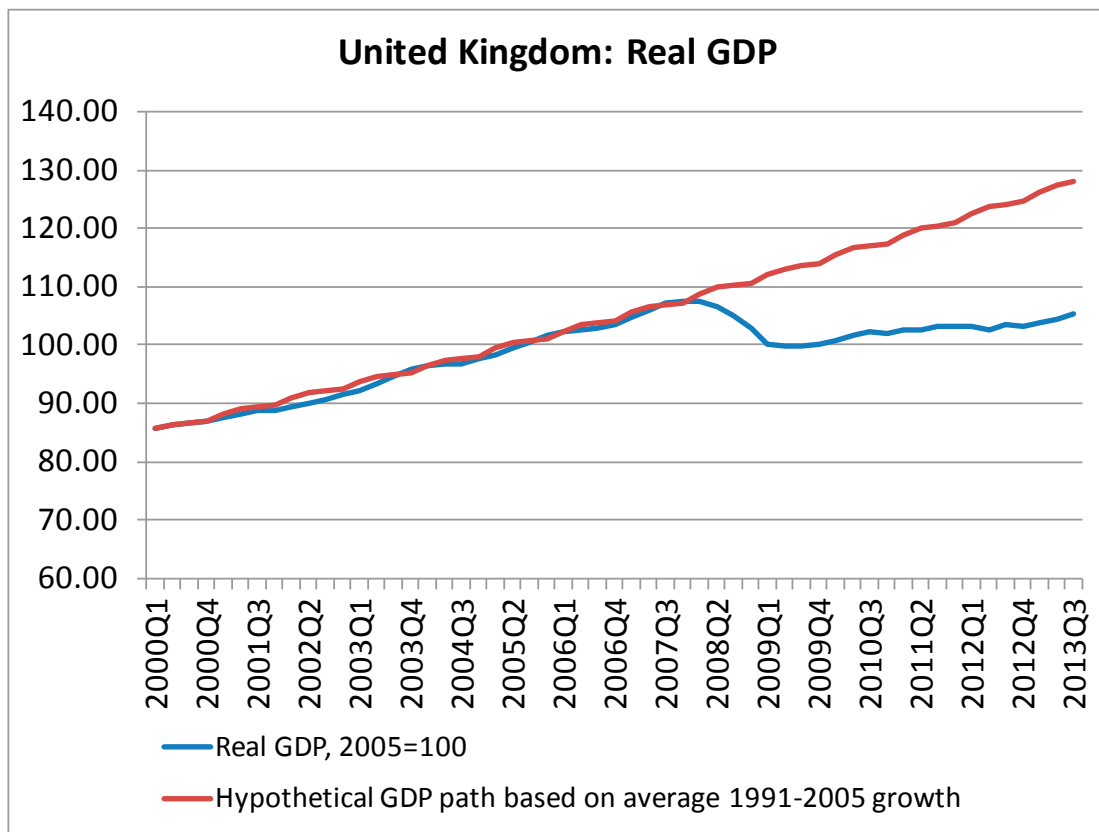(In percent of potential GDP)

Sources: Country authorities; and IMF staff estimates.
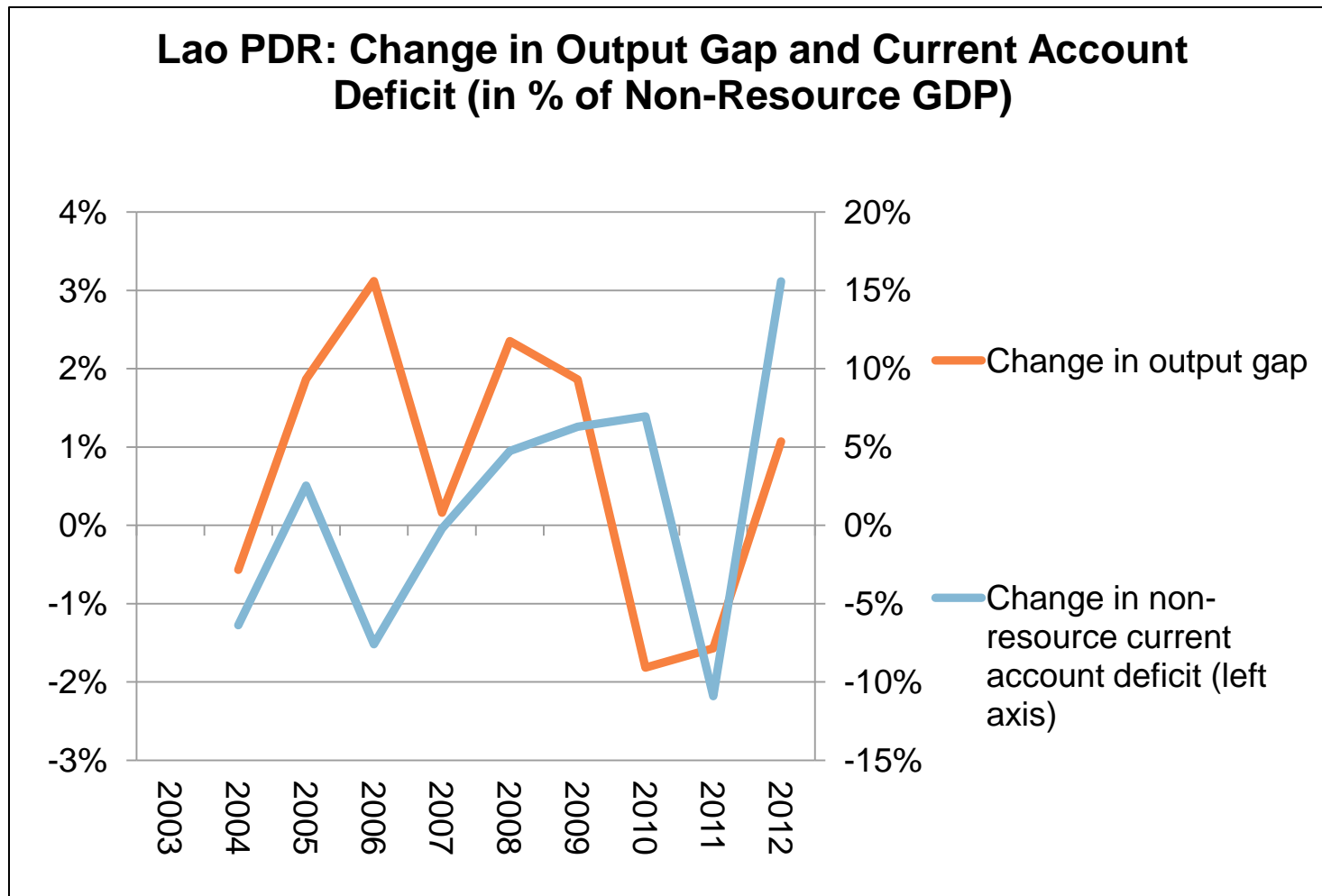
Demand View: Some Pitfalls

Practical considerations:

• Measurements of output gap are highly uncertain

• Separation of supply potential from demand conditions may not be as sharp as postulated by demand view

• Impact of output gap on inflation is often not very large and difficult to pin down empirically

United Kingdom: Real GDP

Real GDP, 2005=100

Hypothetical GDP path based on average 1991-2005 growth

Demand View: Link to Current Account

Lao PDR: Change in Output Gap and Current Account Deficit (in % of Non-Resource GDP)

Demand View: Demand Factors

• What are the main demand factors in your countries?

• How can you measure demand conditions in your countries?

# I.B Monetarist View of Monetary Transmission Mechanism

Central hypothesis:

• Difference between money demand and supply drives inflation

• Monetary policy can control money supply

• Money demand is reasonably stable

• Keeping money supply aligned with money demand is central task for monetary policy

During the Weimar hyperinflation epidemic, a wheelbarrow full of paper money could only buy a single loaf of bread.
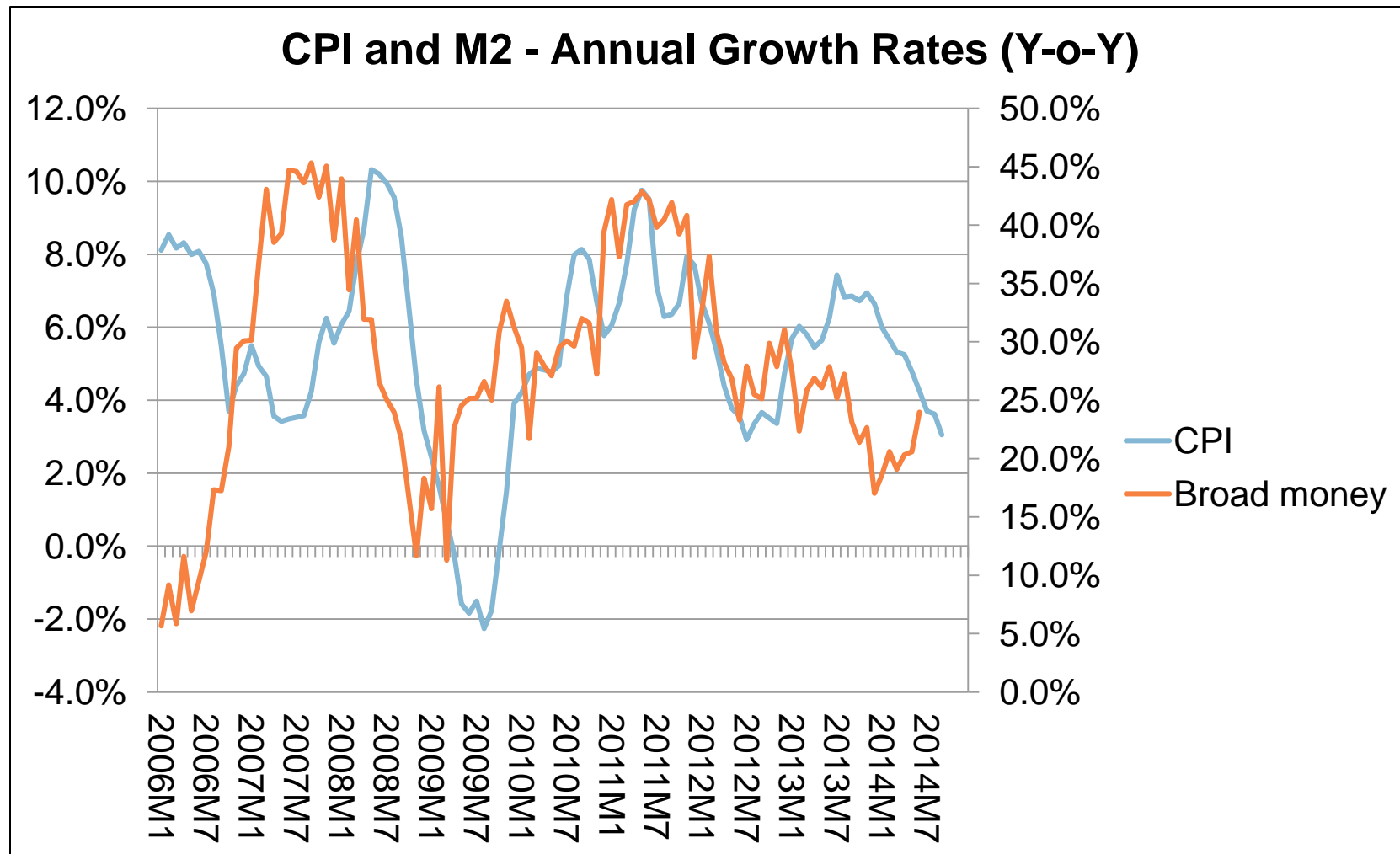
Annual Reserve Money Growth & Inflation in Myanmar

Reserve Money & Headline CPI (Y-o-Y Change in %)
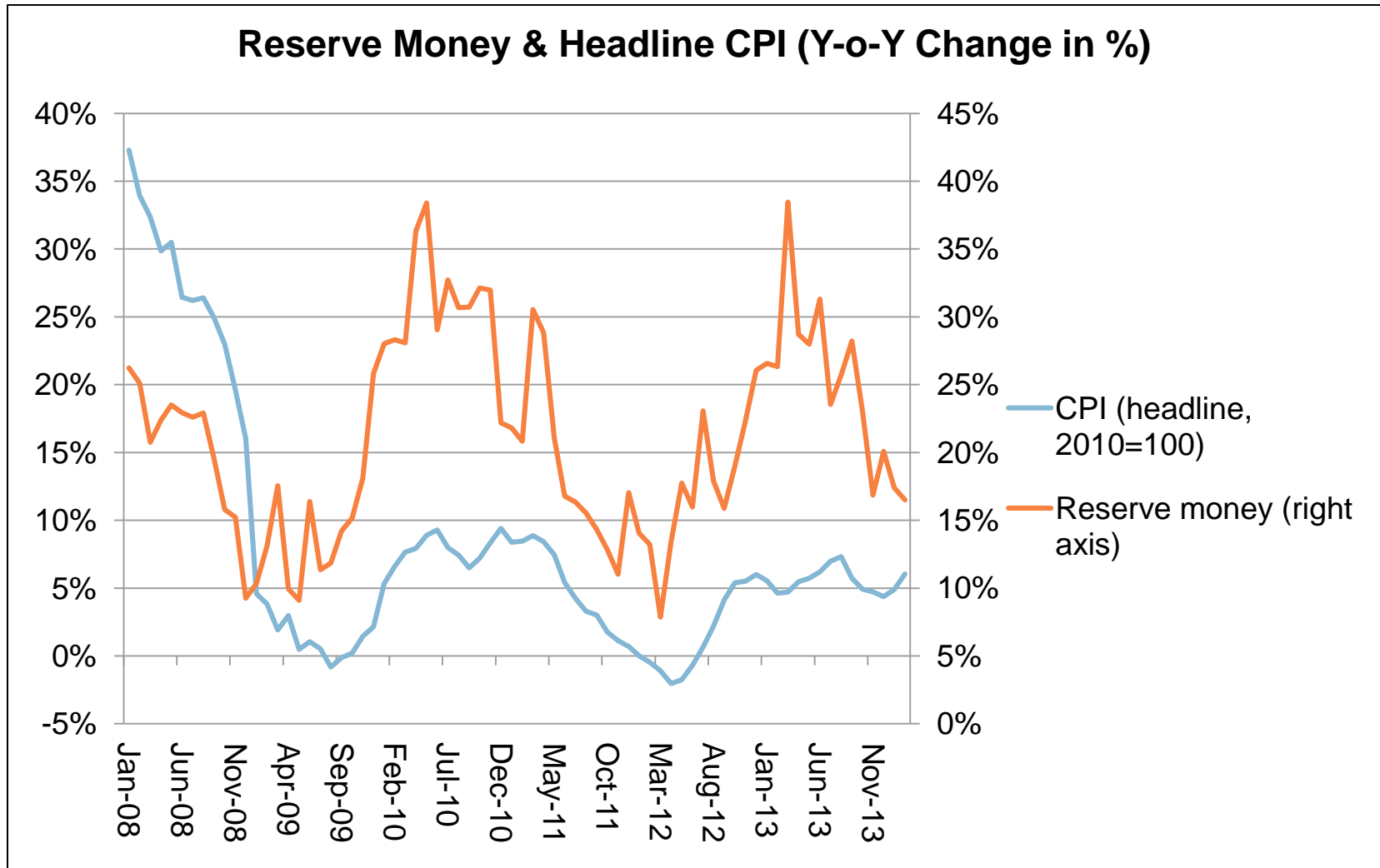
Annual Broad Money Growth & Inflation in Lao PDR

CPI and M2 - Annual Growth Rates (Y-o-Y)

Money Demand

The private sector holds money:

- to finance economic transactions
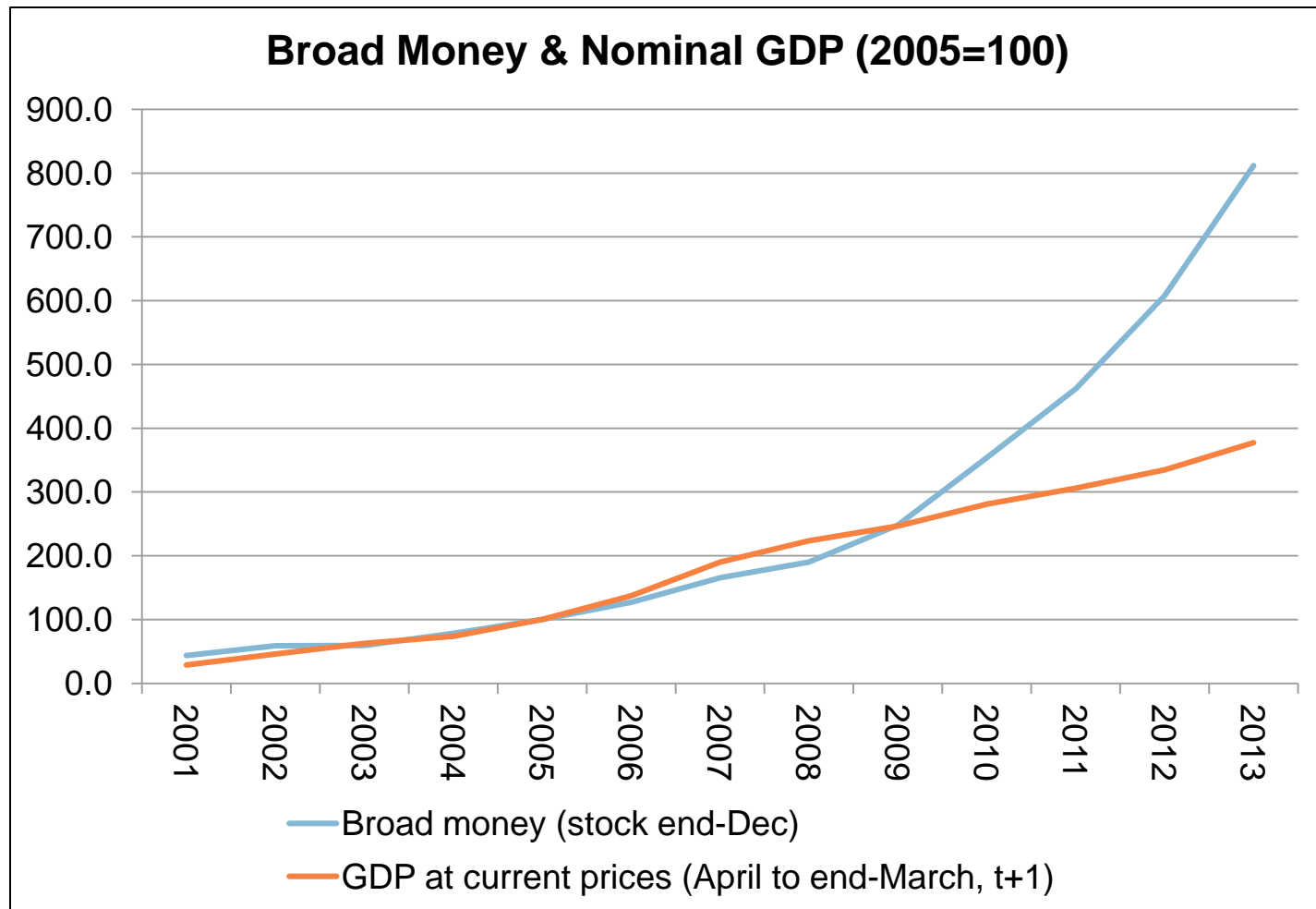- to save
- to hold liquid assets

The demand for money depends upon:

- real output (real money demand)

- prices (nominal money demand)

- payment technology/financial sector development
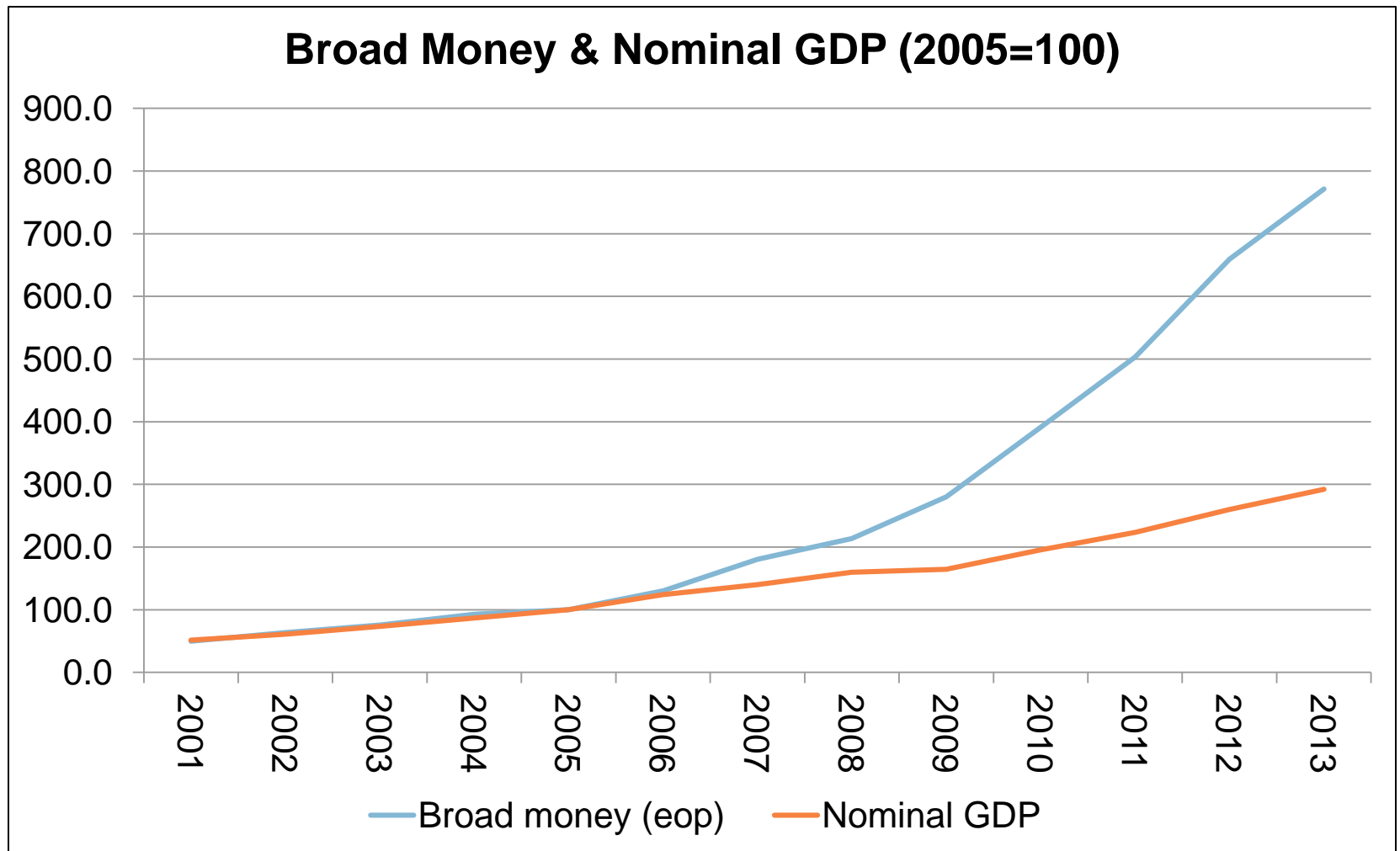- interest rates

$$MD = F(Y, P, i)$$

Money Demand: Broad Money & GDP in Myanmar

Broad Money & Nominal GDP (2005=100)

Money Demand: Broad Money & GDP in Lao PDR

Broad Money & Nominal GDP (2005=100)

Legend: Broad money (eop) — Nominal GDP

Money Demand: Velocity

Velocity provides a link between broad money and GDP based on Quantity Theory of Money:

- $M*V = P*Q$

    - $P \rightarrow$ Price level

    - $Q \rightarrow$ Real level of economic activity

    - $P*Q \rightarrow$ Nominal level of expenditures (nominal GDP)

    - $M \rightarrow$ Money stock (typically M2)

    - $V \rightarrow$ Velocity: $V = P*Q/M = GDP/M$

        The **velocity** of **money** is the frequency at which one unit of **currency** is used to purchase domestically-produced goods and services within a given time period. In other words, it is the number of times one dollar is spent to buy goods and services per unit of time.

        Example: amount of money (M) is 1,000 kip and economic transactions (GDP) are 2,000 kip within a year $\rightarrow$ velocity is 2 (GDP/M), i.e., each kip is used twice in a year for transactions

    - $M*V \rightarrow$ Nominal monetary expenditures

- Quantity theory says that nominal monetary expenditures ($M*V$) have to equal nominal level of expenditures resulting from economic transactions ($P*Q$) $\rightarrow$ this is an identity that has to be true by definition
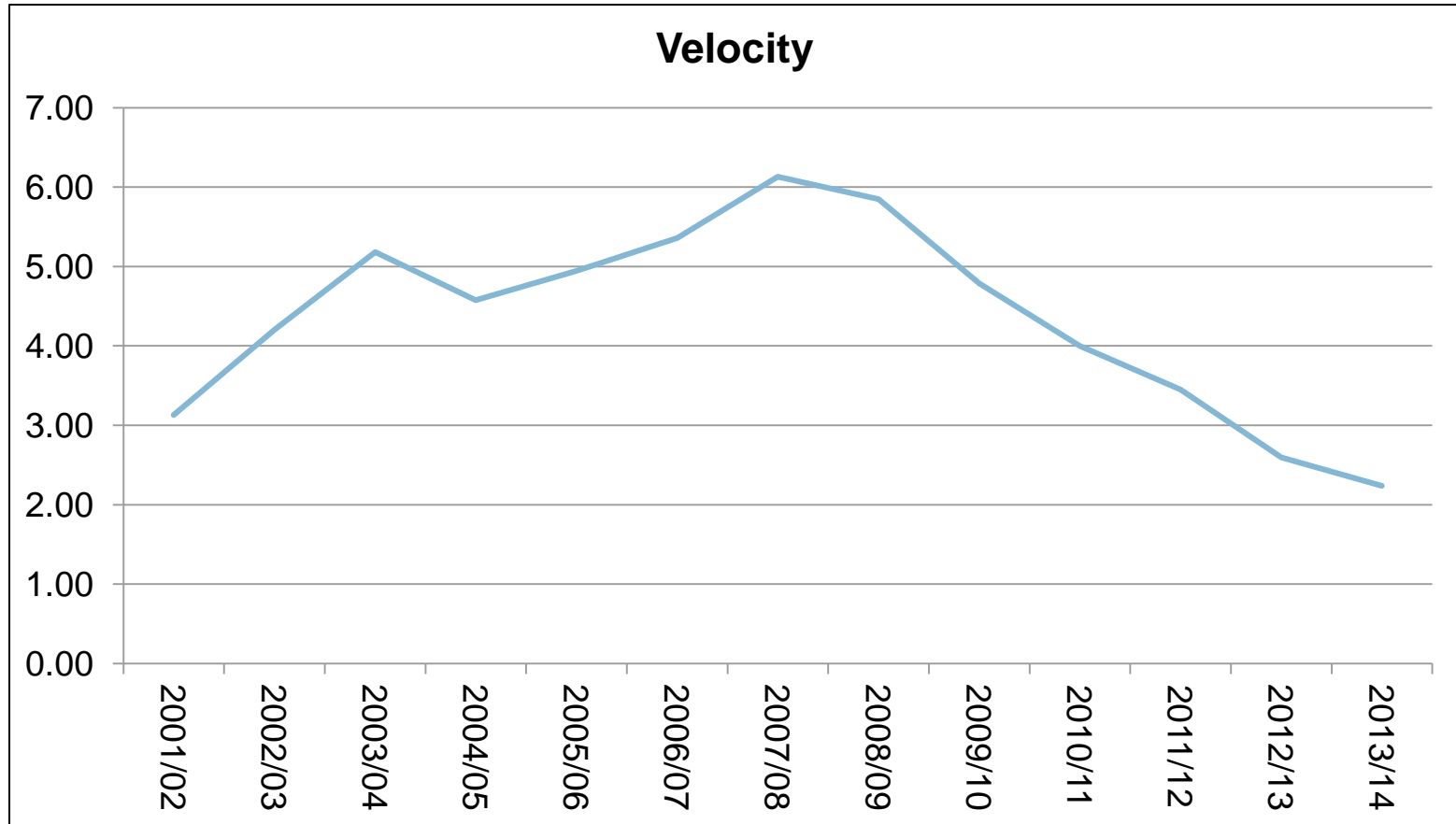
Money Demand: Velocity

The circulation of money:
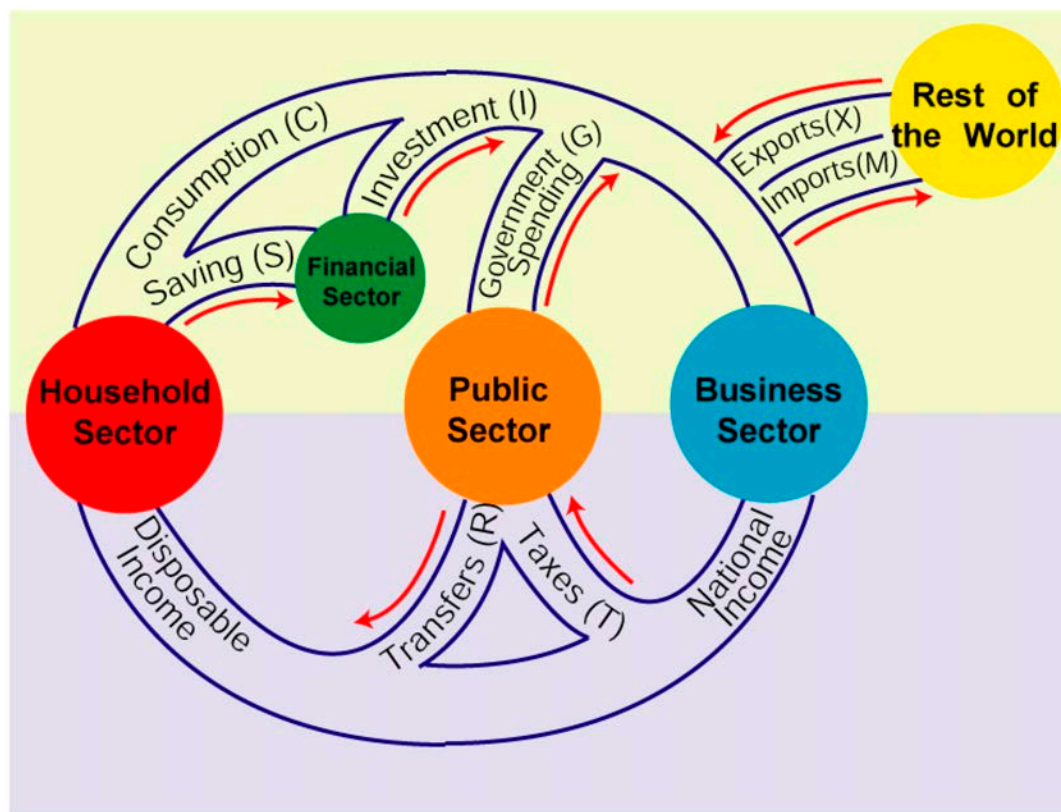
Velocity says how often a unit of currency circulates within a given time period (typically a year).
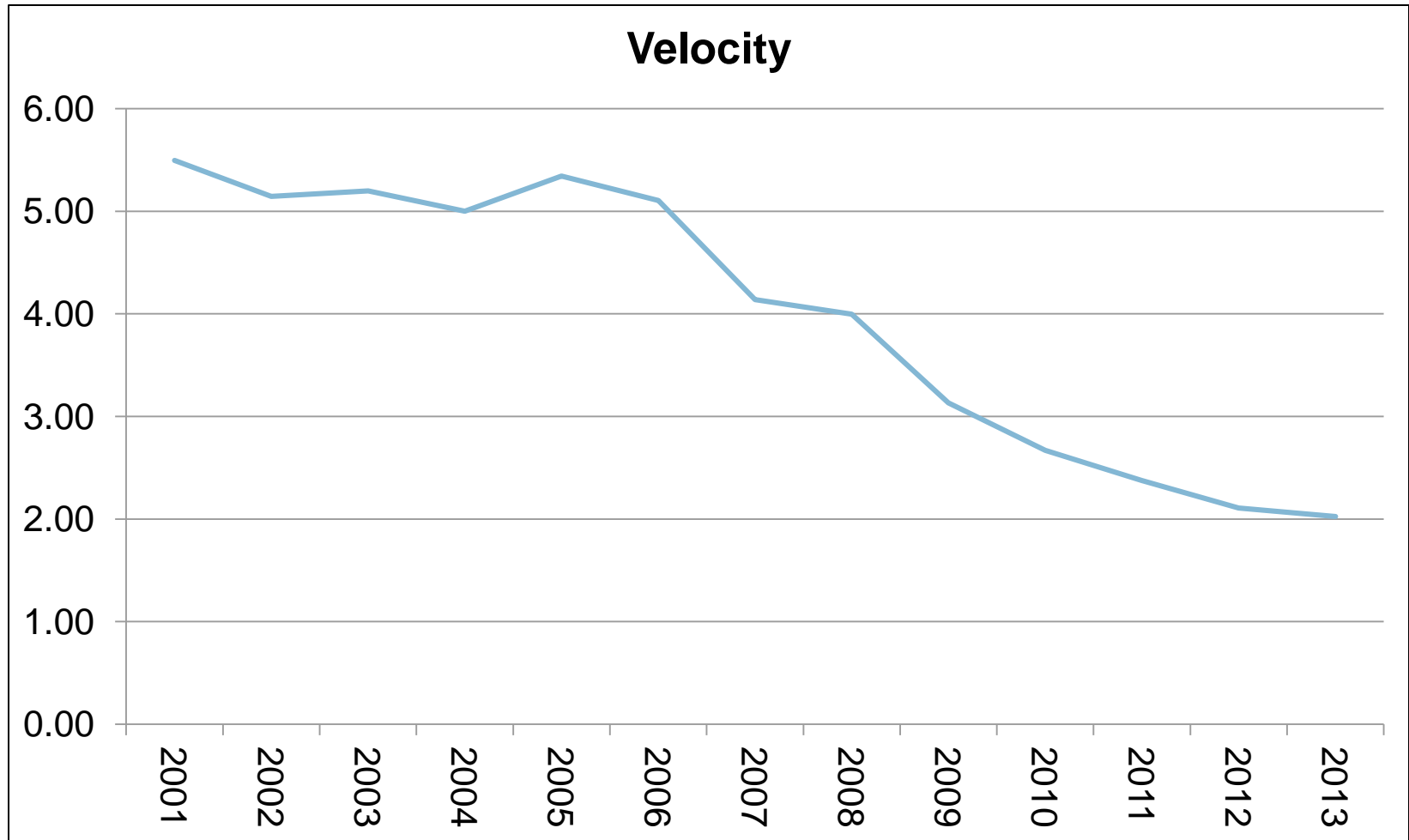
Money Demand: Velocity in Myanmar

Velocity

Money Demand: Velocity in Lao PDR

Velocity & Financial Programming

Objective is to determine a path for broad money growth that is consistent with the inflation objective:

- To do so, reformulate the quantity equation in growth rates (Δ) as follows:

$$\Delta M \approx \Delta P + \Delta Q - \Delta V = \Delta GDP - \Delta V$$

- For (i) a GDP growth projection (ΔGDP) and (ii) a velocity projection (ΔV), this equation provides you with the money growth target consistent with money demand.

Financial Programming: Money Targets

The key inputs for implementing a money-targeting approach are:

• Nominal GDP growth projection (which requires inflation and real GDP projections), and

• Velocity projection

❑ Why did velocity decline so much in recent years in both Lao PDR and Myanmar?

❑ Does this pose risks for the monetary program (or macroeconomic stability more broadly)?

❑ Where do you see velocity in the next few years?

II.A Monetary Transmission Channels: The Exchange Rate

Central hypothesis:

• (Real) exchange rate matters for demand conditions

• (Real) exchange rate matters for competitiveness and external sector

• (Nominal) exchange rate pass through matters for inflation

Exchange Rate Channel: Real Effects

- <u>Real effects</u>: Given price stickiness, changes in the nominal exchange rate lead to changes in the relative price of domestic and foreign goods. Consider a depreciation of the domestic currency:

  - ✓ In the domestic market, this tends to lead to <u>expenditure switching</u> away from foreign goods and toward domestic goods.

  - ✓ In foreign markets, domestic firms gain <u>competitiveness</u>.

  - ✓ But both effects depend on pricing strategy of import/export firms. Plus, import-intensity of domestic production matters.
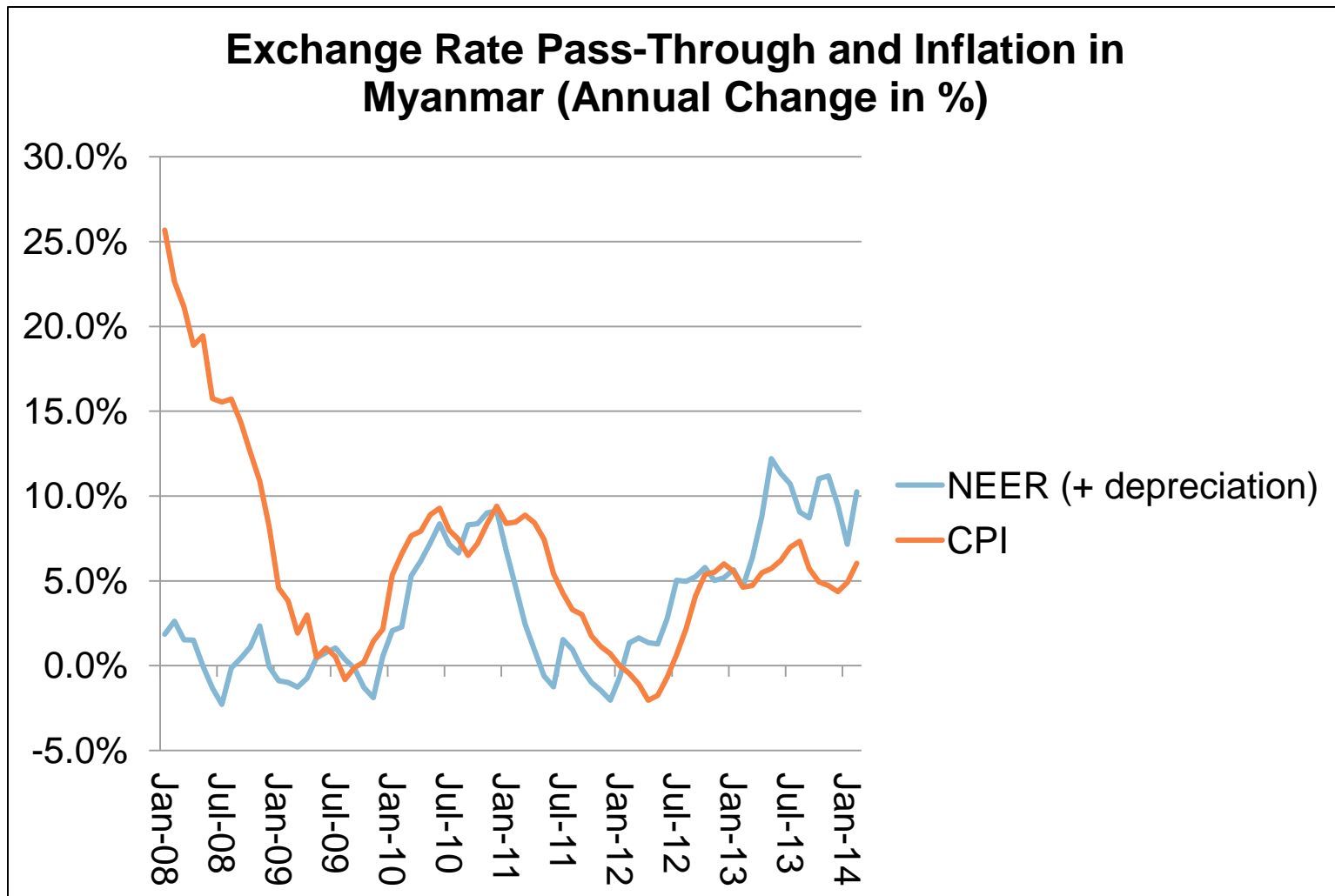
Exchange Rate Channel: Real Effects

REER and Current Account Balance in Lao P.D.R.
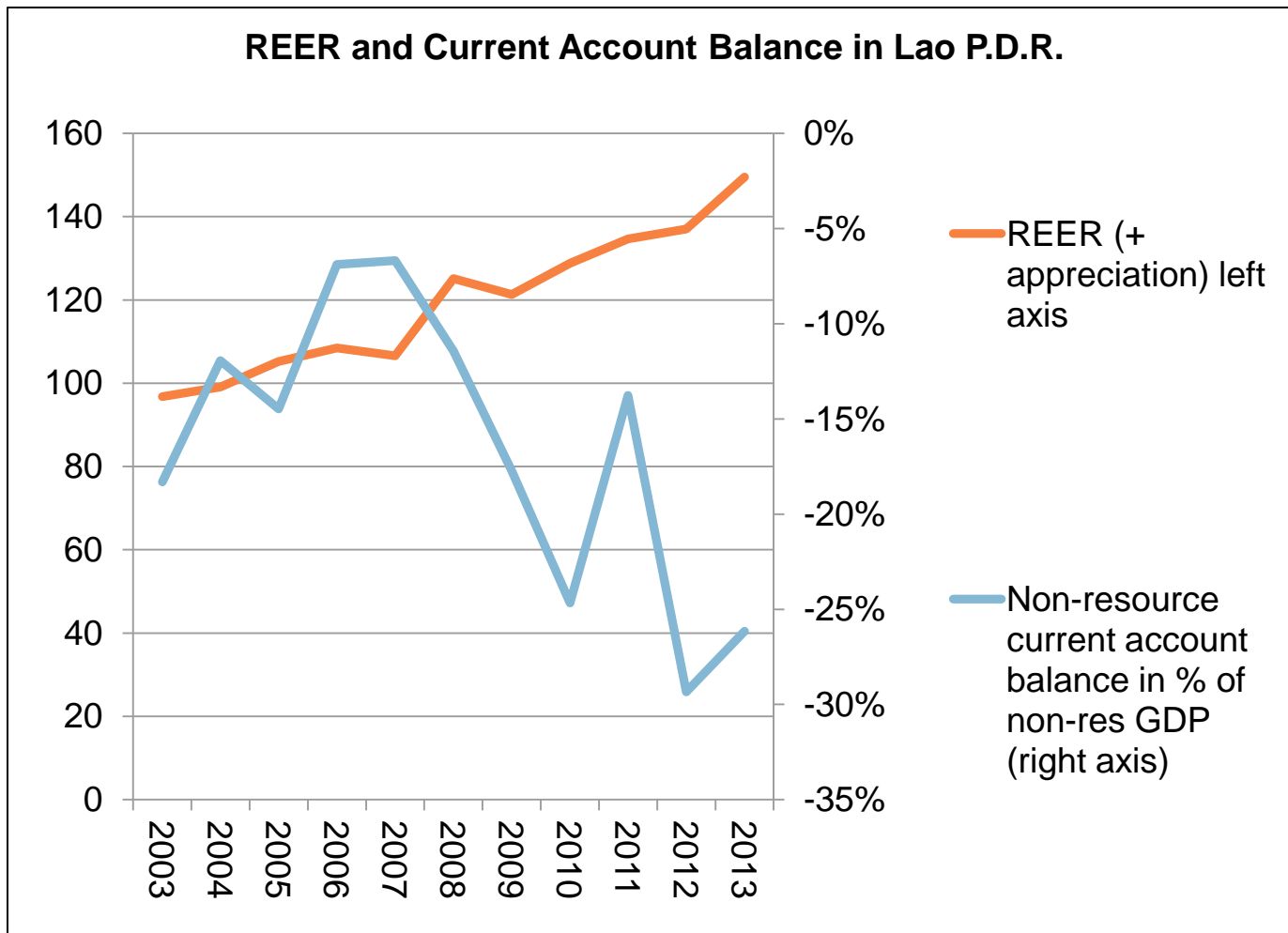
Exchange Rate Channel: Inflation Effects

Exchange Rate Pass-Through and Inflation in Myanmar (Annual Change in %)

Determination of Exchange Rates

- General principle: demand and supply of foreign exchange (link to external sector)

- With capital mobility, uncovered interest parity matters: exchange rate depends on interest rate differential (domestic versus foreign interest rates), risk premium, and exchange rate expectations:

  - ✓ An increase in domestic interest rate relative to foreign rate makes domestic investments more attractive, leading to capital inflows that appreciate the exchange rate

  - ✓ An increase in risk premium makes domestic investment less attractive, which tends to discourage capital inflows and depreciate the exchange rate

  - ✓ Expectations matter

II.B Interest Rate Channels

Central hypothesis:

• Central bank has control over short-term nominal interest rates through management of liquidity conditions (OMOs)

• This gives it some influence over long-term interest rates in both nominal and (to a lesser extent) real terms

• Long-term real interest rates matter for aggregate demand

WisdomTimes.com

Why Do Interest Rates Matter?

- Interest rates are the cost of borrowing and have a direct impact on consumer expenditure (particularly durables), housing and corporate investment.

- Interest rates are the return on saving and the opportunity cost on consumer spending.

- It is the real interest rate that determines savings/ investment decisions.

Real Interest Rates

- The real interest rate—i.e., the cost of borrowing in real terms (or in terms of purchasing power)—is the interest rate adjusted by the inflation rate between the time a loan is made and the time is repaid.

$$r_t = i_t - E_t \pi_{t+1}$$

- With stable inflation expectations, real rates will follow nominal rates.
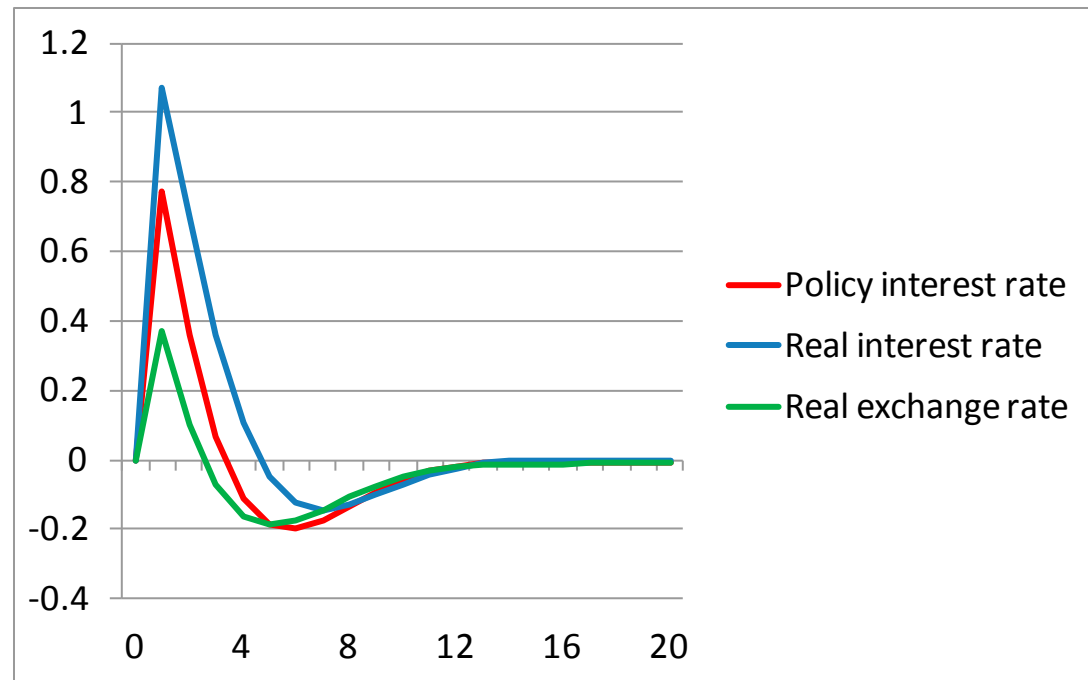
Simulating Effects of Increase in Policy Interest Rate in a Standard Model

Simulating effects of a discretionary increase in policy rate:

Starting point is increase in policy rate by about 1 percentage point in period 1—this affects both the real interest and exchange rates:

- Real interest rate increases (by more than policy rate)

- Real exchange rate appreciates

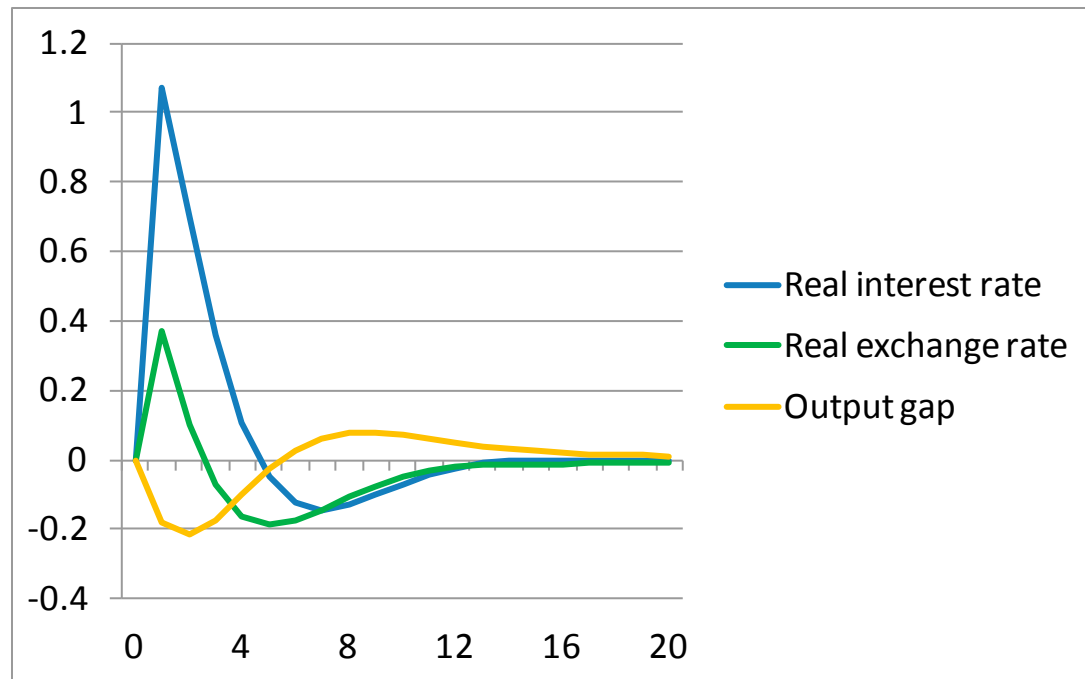# Simulating Effects of Increase in Policy Interest Rate in a Standard Model

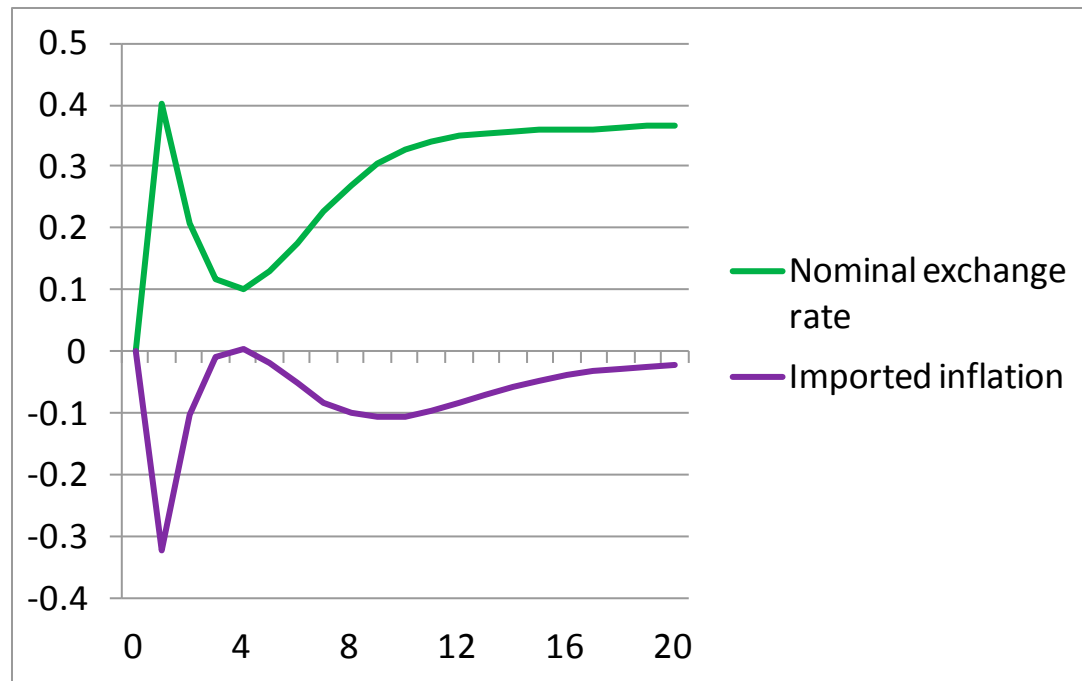**Simulating effects of a discretionary increase in policy rate:**

Increase in real interest rate and real appreciation dampen aggregate demand, leading to a negative output gap:

Simulating Effects of Increase in Policy Interest Rate in a Standard Model

Simulating effects of a discretionary increase in policy rate:

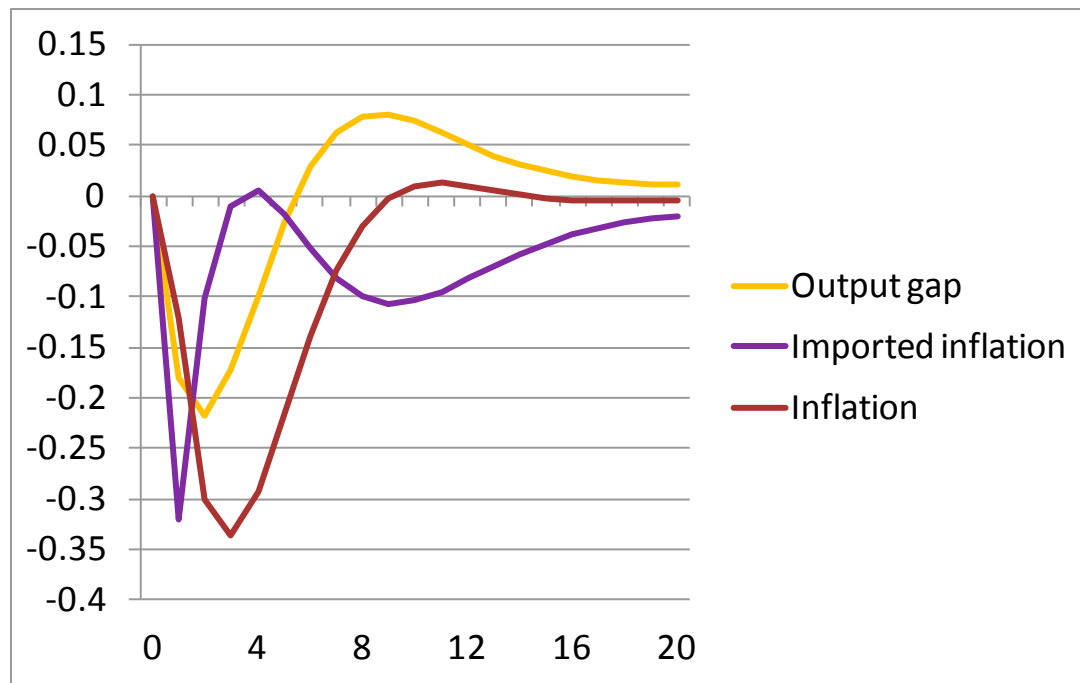The nominal appreciation reduces imported inflation rates:

Simulating Effects of Increase in Policy Interest Rate in a Standard Model

Simulating effects of a discretionary increase in policy rate:

Overall inflation falls due to the output gap having become negative and the reduction in imported inflation:

Simulating Effects of Increase in Policy Interest Rate in a Standard Model

Summary of monetary transmission mechanism in standard model:

- Change in policy rate affects real interest and real exchange rates

- These affect aggregate demand conditions

- Changes in the exchange rate affect imported inflation

- Both aggregate demand conditions and imported inflation impact overall inflation

II.C Credit Channel

Central hypothesis:

• Bank lending depends (i) on interest rates and (ii) on economic conditions more generally

• Monetary policy affects economic conditions, which amplifies its direct effect on bank lending via interest rates

Credit Channel: Two Mechanisms

- Two mechanisms amplify the direct interest rate effect on bank lending:

  ➢ Policy tightening tends to reduce the net worth of businesses and individuals, making it harder for them to qualify for loans at any interest rate, thus reducing spending and price pressures — *balance sheet channel*

  ➢ Policy rate hikes also make banks less profitable in general and thus less willing to lend — *bank lending channel*

Credit Channel: When Does It Matter?

- Factors raising the importance of the credit channel:
  - ➢ High dependence upon bank credit
  - ➢ Low development of domestic capital markets
  - ➢ Inadequate legal protection of creditors
- Empirically, the relative availability of bank credit may be a useful predictor of future investment and output.
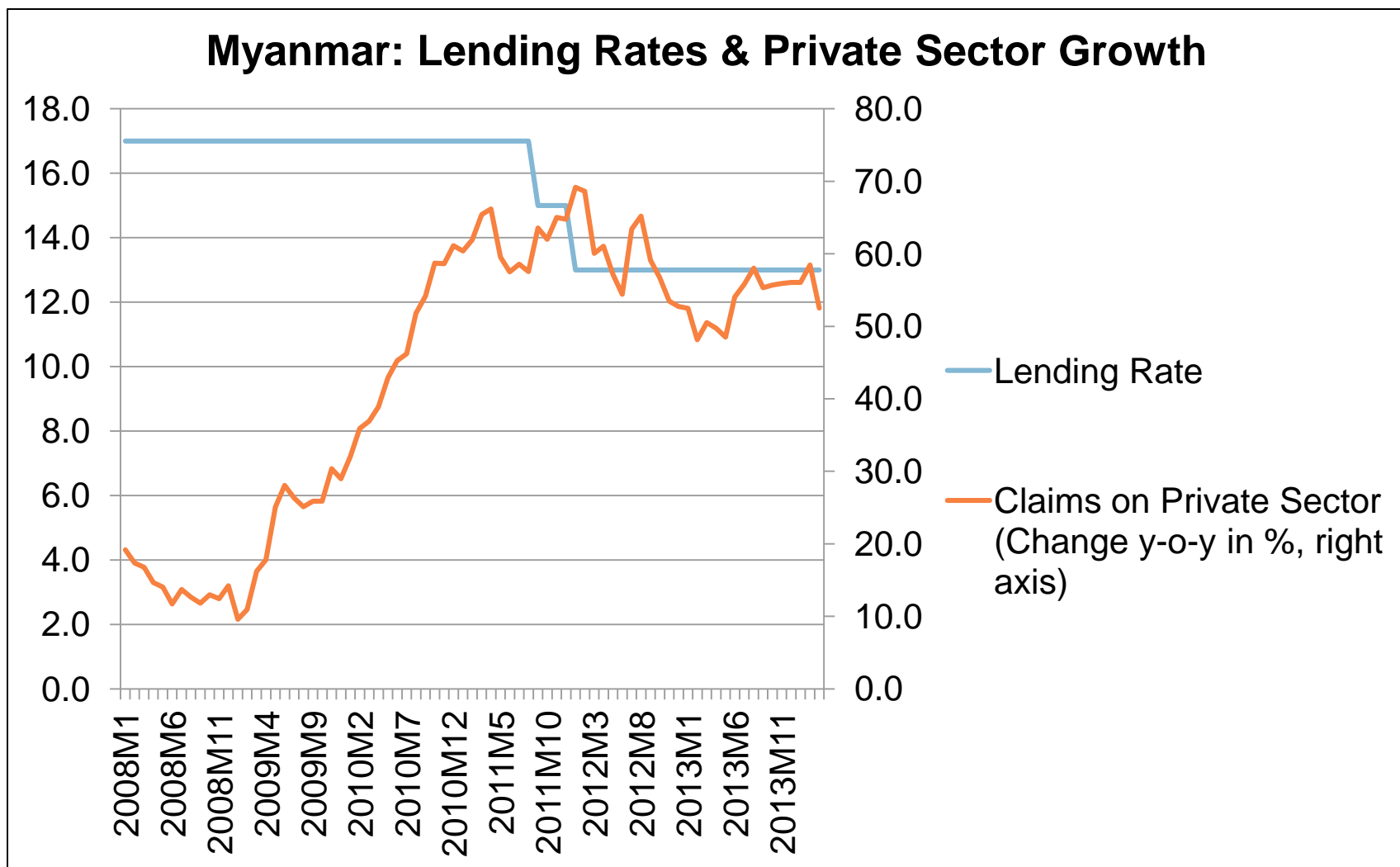
Credit Rationing

- Banks ration credit through non-price (interest rate) mechanisms
  - Important channel in countries like Lao PDR or Myanmar that regulate interest rates, thereby making it necessary for banks to resort to non-price criteria in its lending decisions
  - Credit rationing severs the link between interest rates and lending conditions, i.e., interest rates have little information content

Myanmar: Lending Rates & Lending

Myanmar: Lending Rates & Private Sector Growth

Legend:
- Lending Rate
- Claims on Private Sector (Change y-o-y in %, right axis)

II.D Asset Price Channel

Central hypothesis:

• Monetary policy influences asset prices through its management of liquidity conditions

• Asset prices—especially real estate and equity prices—affect demand through private consumption and business investment

• They also impact the balance sheets of banks and businesses

Asset Prices: Effects on Household Consumption

Equity and real estate prices affect:

➢ Household wealth and hence consumption (wealth effect)

➢ Household's borrowing capacity to finance current consumption.

Real Estate Prices

Real estate prices can affect aggregate demand through three channels:

- wealth effect from increases in household wealth, leading to increase in consumption

- balance sheet effect on banks (increases in property values used as collateral for bank loans mean that banks have fewer loan losses and more capital. More capital means they can engage in more lending and I increases.)

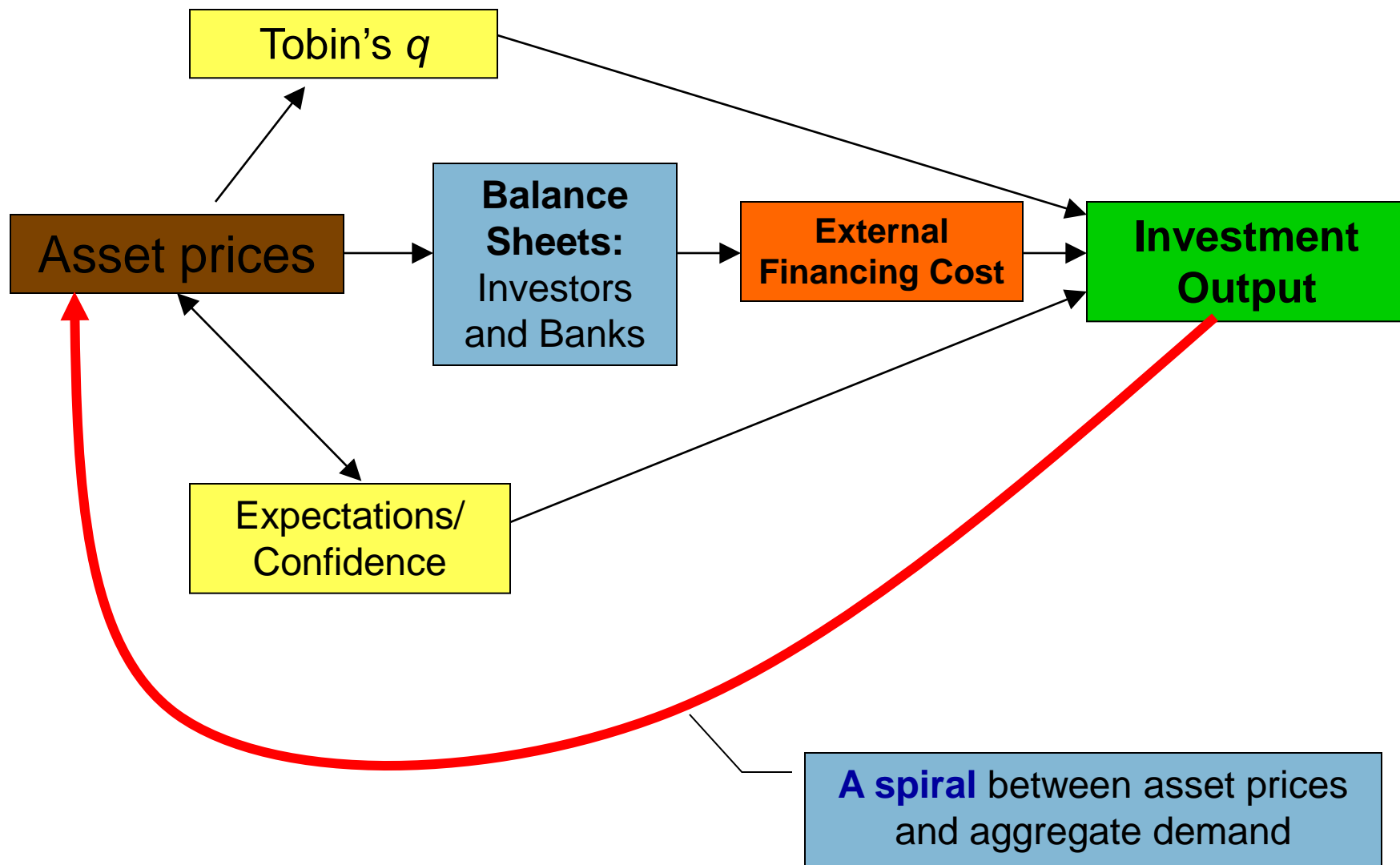- Direct effect on housing expenditure

Asset Prices: Effects on Business Investment

- Equity prices affect corporate investment via Tobin's q:
  - ➢ Investment increases when the market value of a firm relative to its replacement cost rises.

- Corporate balance sheet effect: The net worth of a firm affects the cost of capital
  - ➢ Changes in collateral values affect eligibility for bank loans and thus investment.

- Bank balance sheet effect: Banks' capital position and lending capacity declines when the net worth is adversely affect by declines in asset price $\Rightarrow$ credit crunch.

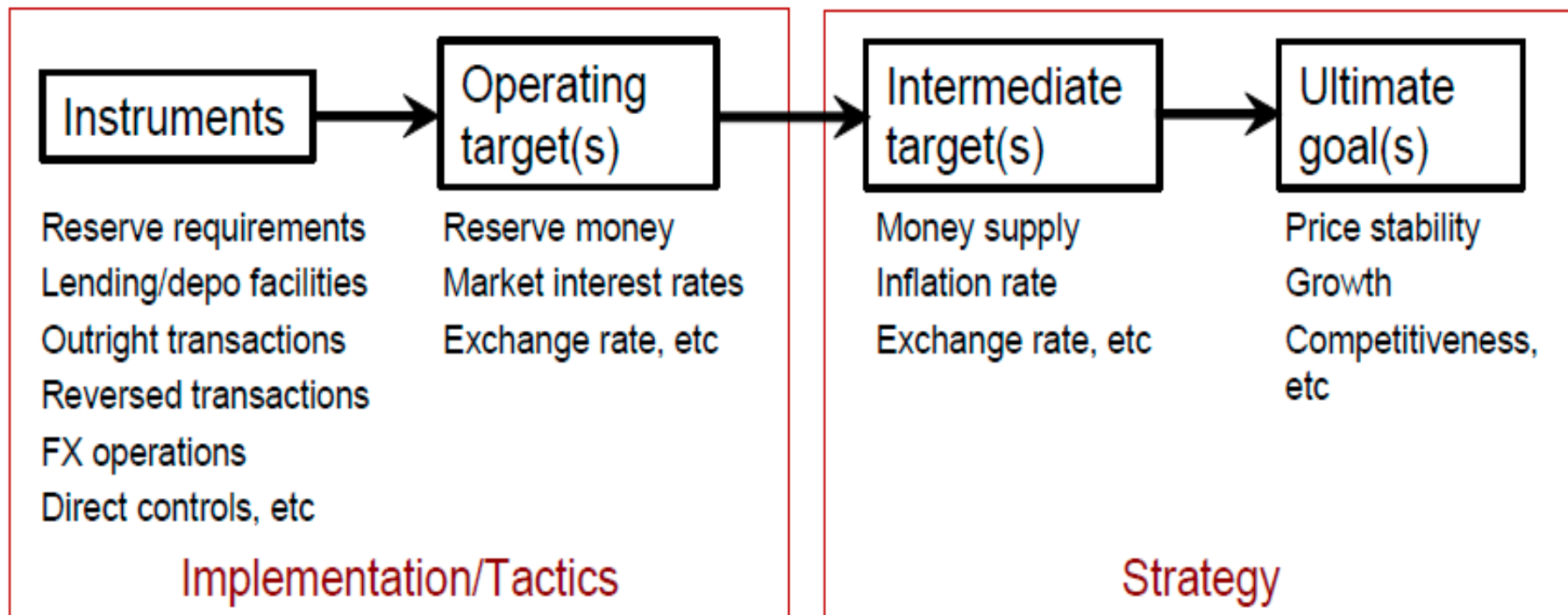# Asset Price Channel: Financial Accelerator

Tobin's *q*

Asset prices

Balance Sheets: Investors and Banks

External Financing Cost

Investment Output

Expectations/ Confidence

A spiral between asset prices and aggregate demand

III Implementing Monetary Policy

Instruments	→	Operating target(s)	→	Intermediate target(s)	→	Ultimate goal(s)
Reserve requirements		Reserve money		Money supply		Price stability
Lending/depo facilities		Market interest rates		Inflation rate		Growth
Outright transactions		Exchange rate, etc		Exchange rate, etc		Competitiveness, etc
Reversed transactions						
FX operations						
Direct controls, etc						

Implementation/Tactics   Strategy

Why Short-Term Interest Rates as Policy Instrument?

1. **Easily Observable**: changes send clear signal of changes in policy
2. **Financial Stability:** avoid fluctuating interest rates
3. **Predictable Effects:** transmission mechanism from changes in interest rate to economy are relatively well understood

But: Effective interest rate policy requires preconditions that are not yet given in Lao PDR and Myanmar. Putting these in place is the topic of the Regional Workshop on Monetary Operations next week.

Implementing Interest Rate Policy

Key issues:

A. Implementation of interest rate policy by the central bank

B. Linkage between short- and long-term interest rates
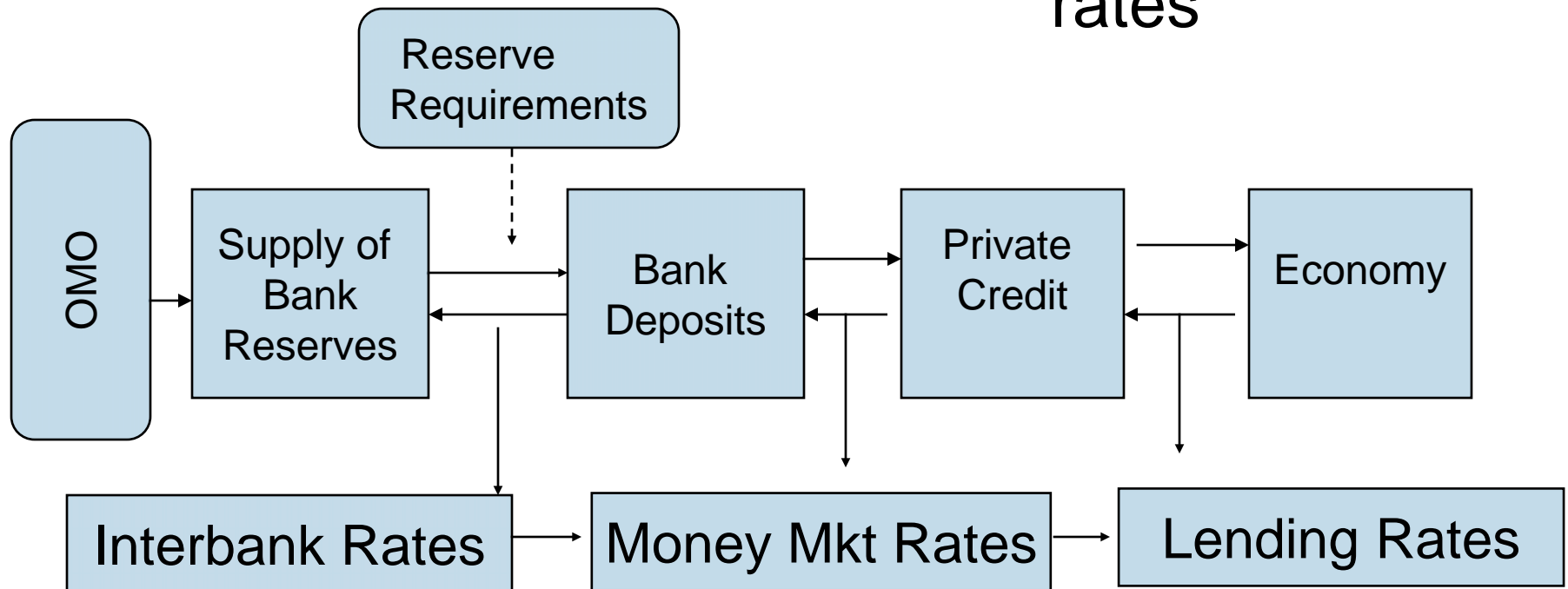
III.A Implementing Interest Rate Policy: Overview

Tools

a. Open Market Operations
b. Standing Facilities
c. Reserve Requirements

Effectiveness

d. Pass through from policy rate to money market rates

III.A.a Open Market Operations (OMOs)

OMO: Central bank will buy (repo) bills to add liquidity to level of reserve deposit and sell (reverse repo) bills to drain liquidity.

**How much** liquidity is provided or drained through OMOs?

Depends on target:

• Quantitative target (reserve money) → OMOs are calibrated to reach target

• Interest rate target → OMOs need to meet liquidity demand that materializes at the targeted interest rate

"And this is where we adjust the interest rate."
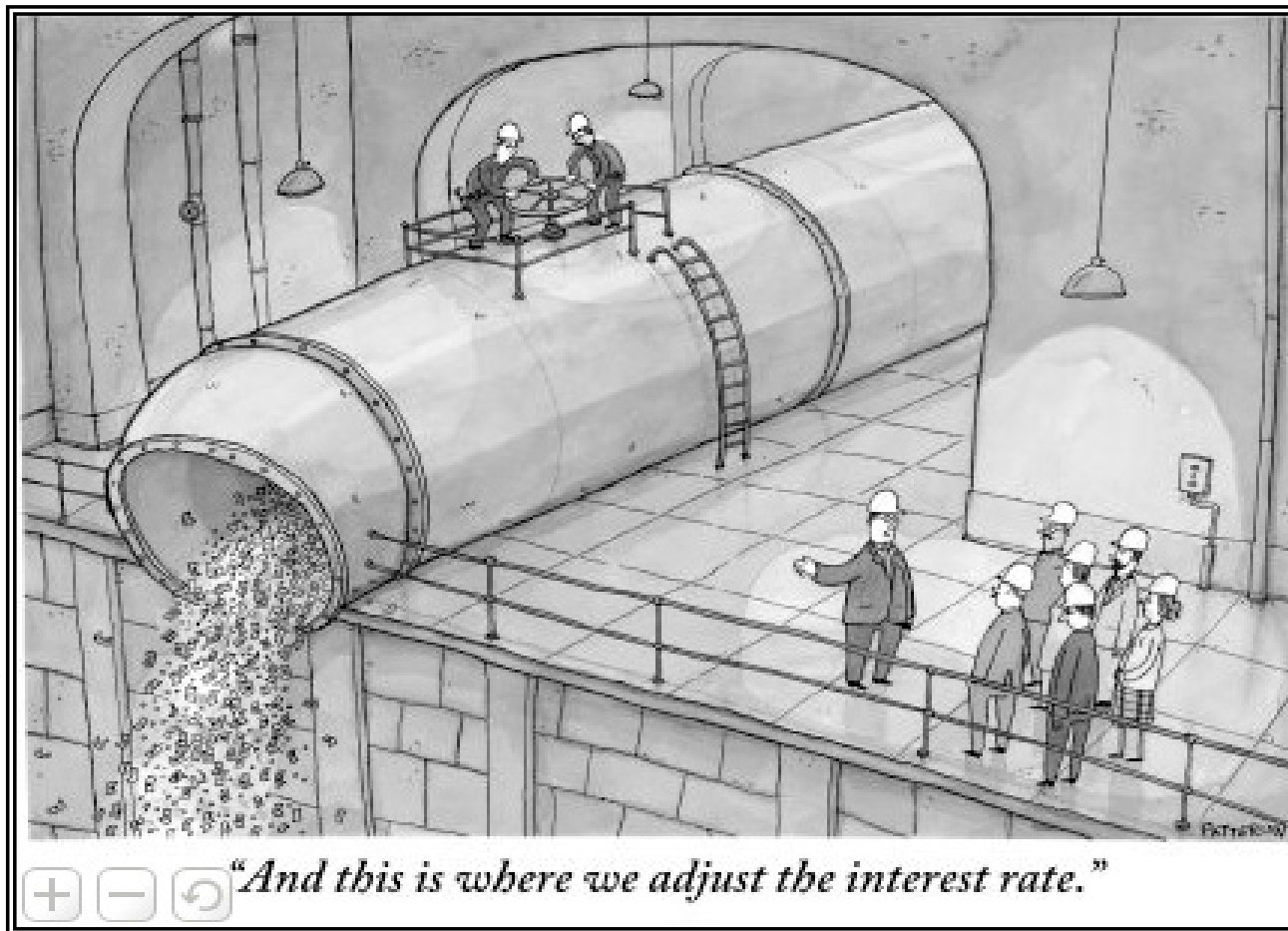
OMOs and the Interbank Market

- □ Commercial Banks lend reserves to one another to meet liquidity shortfalls.

- □ Rate is market determined and governed by laws of supply and demand for reserves.

- □ Central bank controls the supply of reserves and, if skillful, can determine interbank rates

i^{IB}

S

D
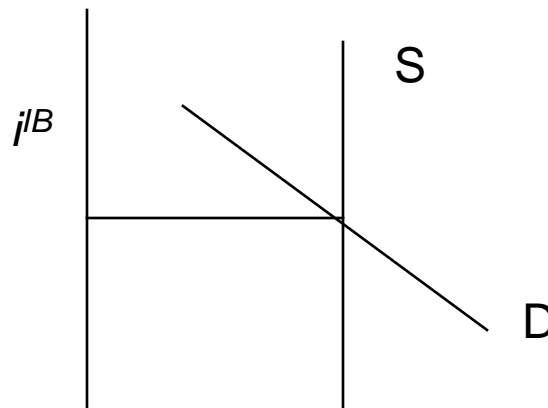
# Example of Thailand: Interbank Rate Follows Policy Rate
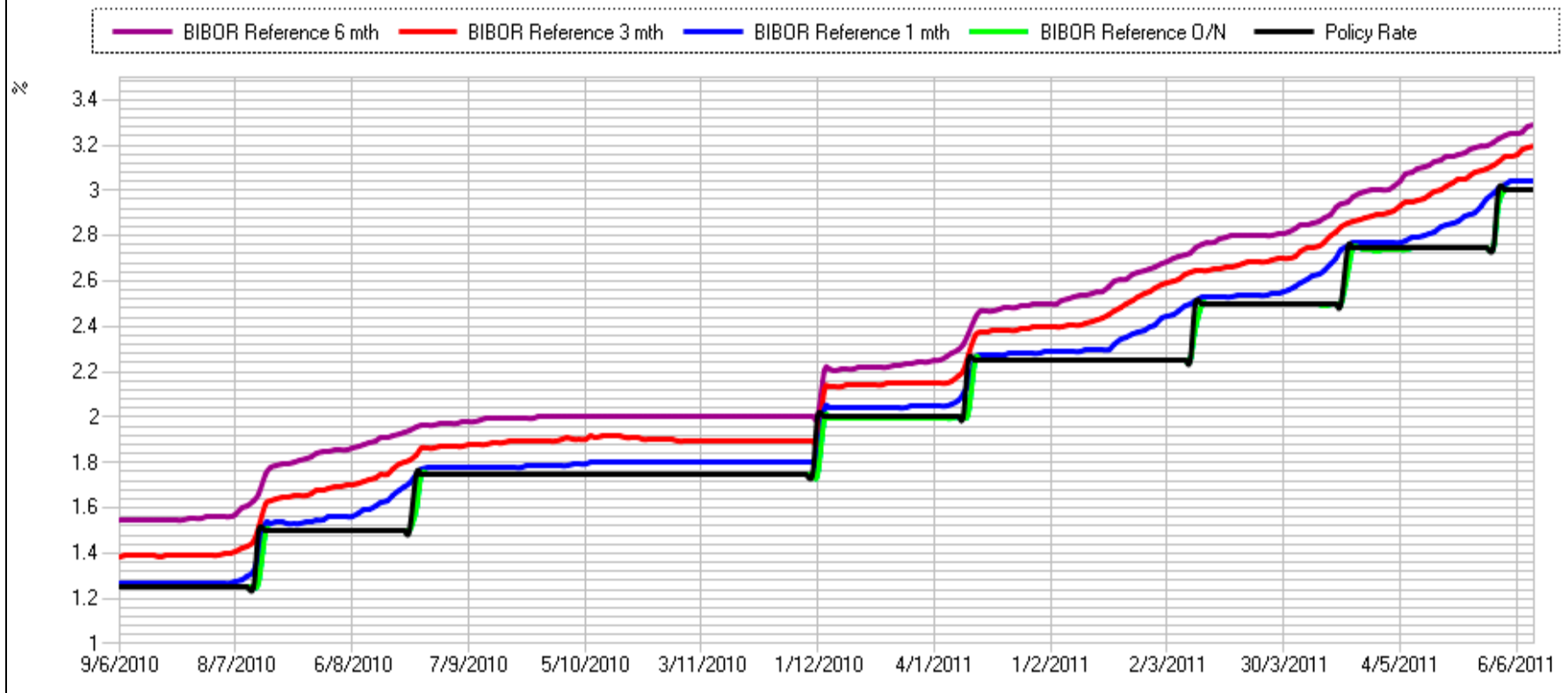
III.A.b Standing Facilities

- Loan Facility: Commercial banks can borrow reserves overnight at a fixed premium to policy rate.

- Deposit Facility: Commercial banks can deposit reserves overnight at a fixed discount to policy rate.
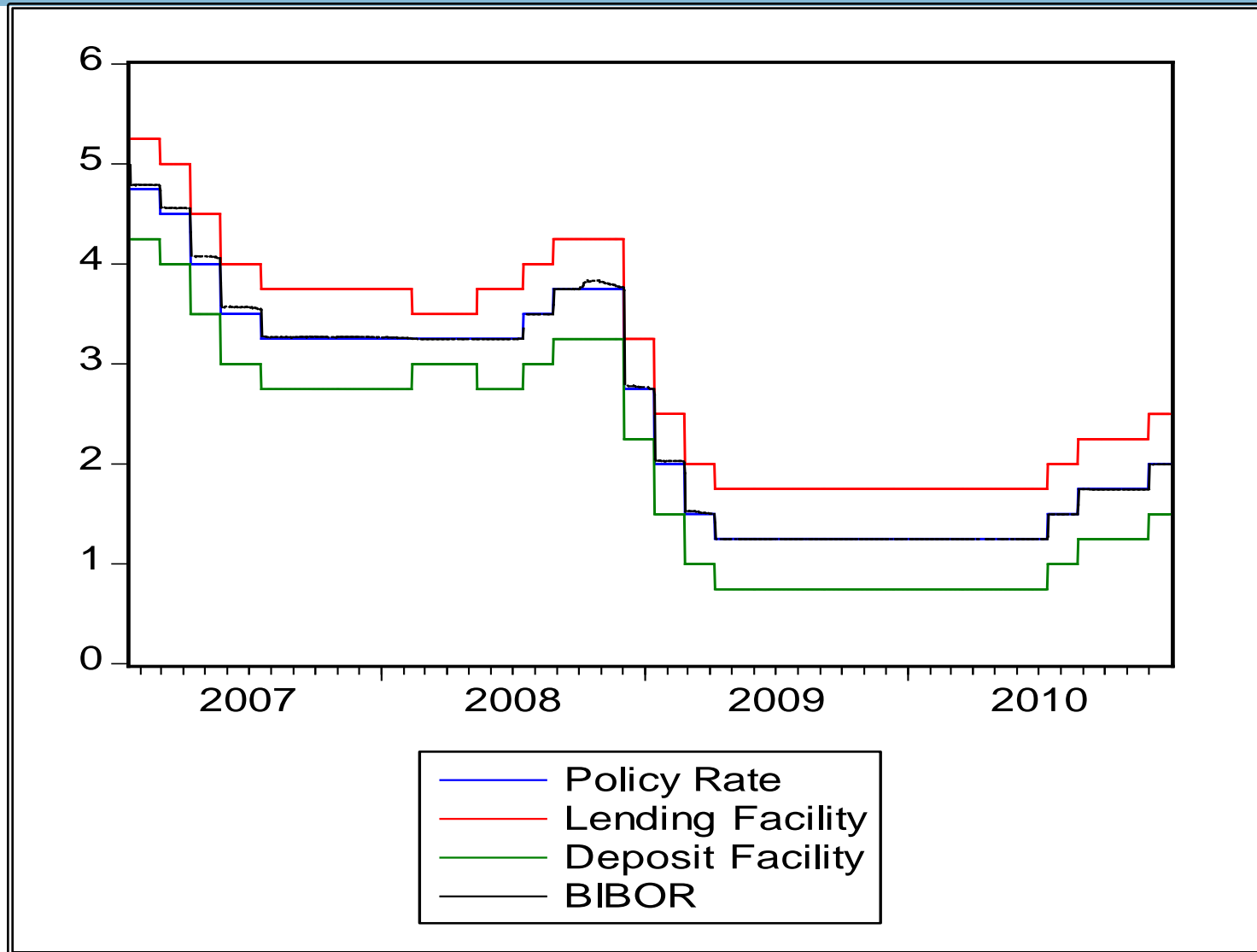
These opportunities keep interbank rate within narrow band of the policy rate.

Figure 2: Interest rate corridor

Interest rate

Cap (Lending facility)

Policy rate

Money market rates

Floor (Deposit facility)

Time
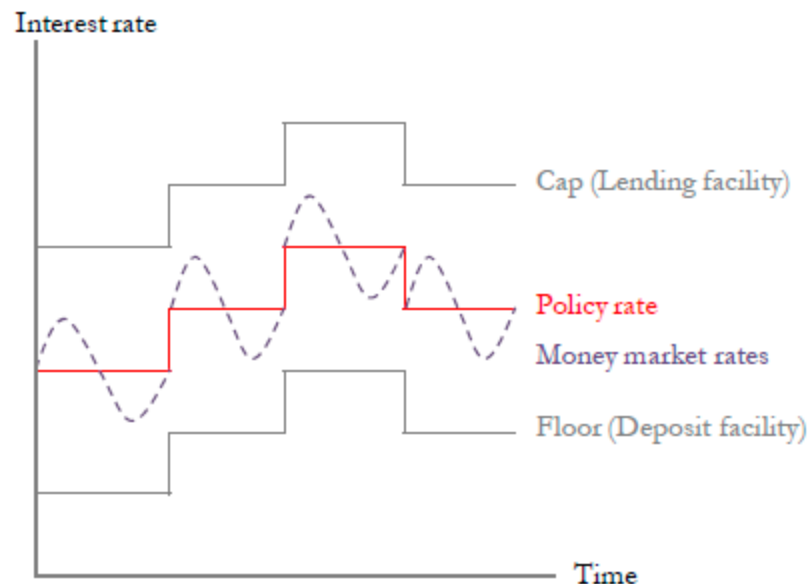
Bank of Thailand Corridor:
It Works in Practice

III.A.c Reserve Ratios

❑ Another instrument is the *required reserve ratio* to control the level of system wide liquidity:

• When banks must keep a certain amount of reserves for each dollar of deposit, the total amount of liquidity available to banks for lending, purchases of securities, etc will be limited.

• Hence, this instrument complements those OMOs that are designed to drain liquidity.

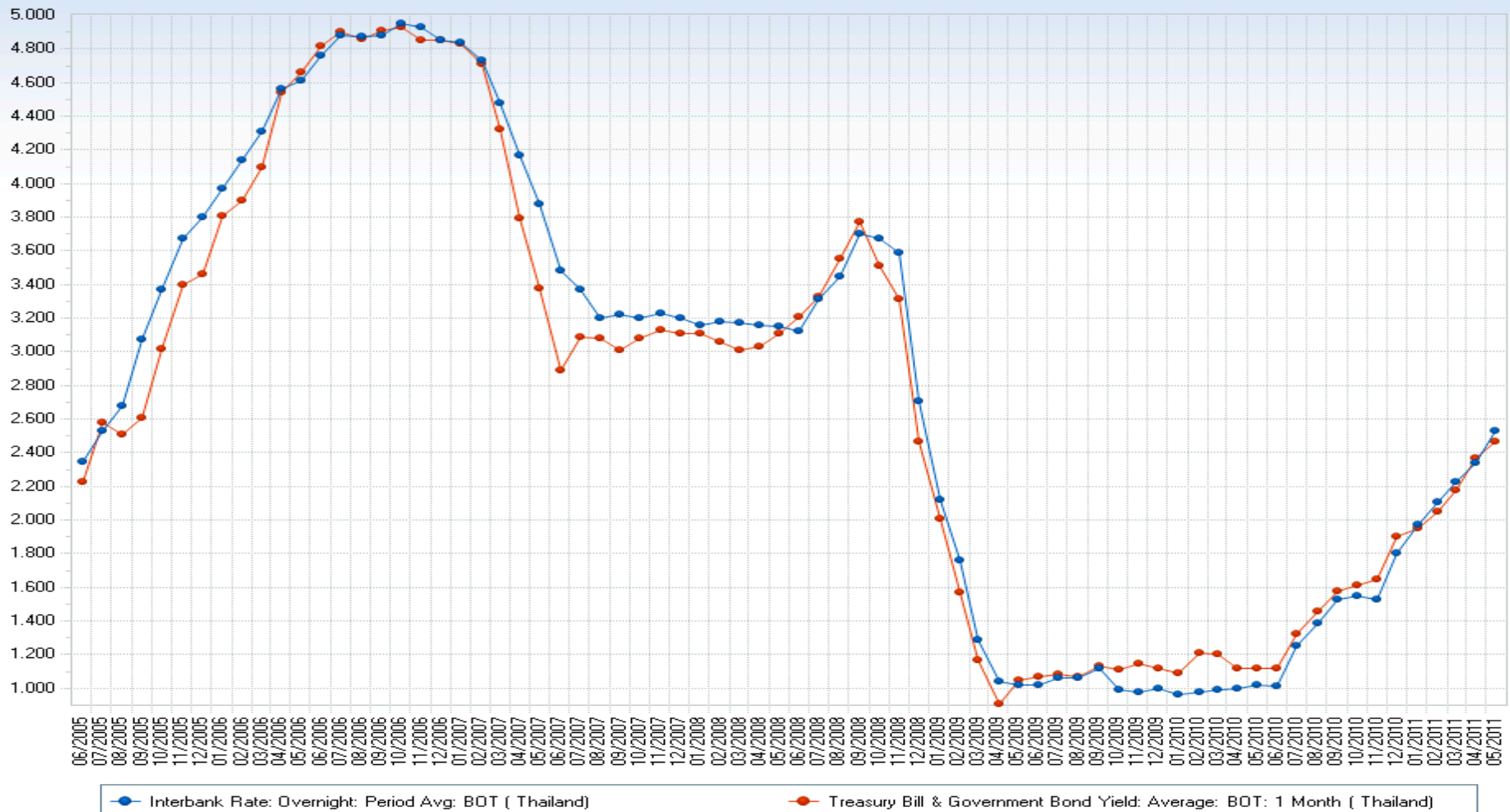# III.A.d Pass Through from Policy Rates to Money Market Rates

Interbank Rates and the Money Market

- Money market: Debt markets w/ maturity less than 1 year: CP, T-bills, NCDs, repos.

- Interbank market: steers rates in the broader money market through arbitrage.

  - If $i^{IB} < i^{MM}$, borrow in interbank market, lend in money market;
  - if $i^{IB} > i^{MM}$, then reverse.

Thailand: Money Market Rate closely follows Interbank Rate (and Bank of Thailand has close control over Interbank Rate)

How Does the Pass-Through of Policy Rates to Money Market Rates Work Across Countries?

Table: Correlation between changes in discount rate and changes in money market rate

	Contemporaneous Correlation	Short-term Effect	Long-term Effect	R^2	Number of Countries
Advanced	0.29	0.81	0.96	0.32	24
Emerging	0.30	0.74	0.59	0.93	26
LIC's	0.23	0.29	0.40	0.31	30

An increase in the policy rate by one percentage point is associated with a 0.81 percentage point increase in the money market rate in advanced countries within one month, but only with a 0.29 percentage point increase in LICs

Source: IMF WP 10/223 "Monetary Transmission in Low Income Countries"

Why Not an Interest Rate Target?

- International pass-through results from policy rate to money market rates show that this works well in advanced and emerging market economies, but less so in low-income countries

- If the transmission of policy rates to other market interest rates is weak, the entire interest rate transmission mechanism is likely to be weak, suggesting that quantity-based operating targets (e.g., reserve money) might be more appropriate

- Why is the pass through weaker in low-income countries?
  - ✓ Implementing fine tuning operations for the link from policy rate to interbank rates requires liquid interbank markets and sophisticated transactions technology
  - ✓ Pass-through from the interbank market to the money market requires competitive, unsegmented money market

III.B Linkage Between Short- and Long-Term Interest Rates

Key issues:

a. Transmission to long-term yields

b. Transmission to long-term lending rates

III.B.a Transmission to Long-Term Yields

□ Long-term interest rates are expected average of future short-term rates (plus liquidity premium)—this is called The Expectation Hypothesis of Term Structure:

$$i_{today}^{10yr} = \frac{i_{today}^{1yr} + i_{nxt\_yr}^{1yr} + i_{in2yrs}^{1yr} + i_{in3yrs}^{1yr} + \dots + i_{in9yrs}^{1yr}}{10} + L^p$$

• Put another way, the long-term interest rate can also be thought of as a sequence of (expected) short-term rates (over which the central bank has considerable influence, at least in many advanced and emerging market economies)
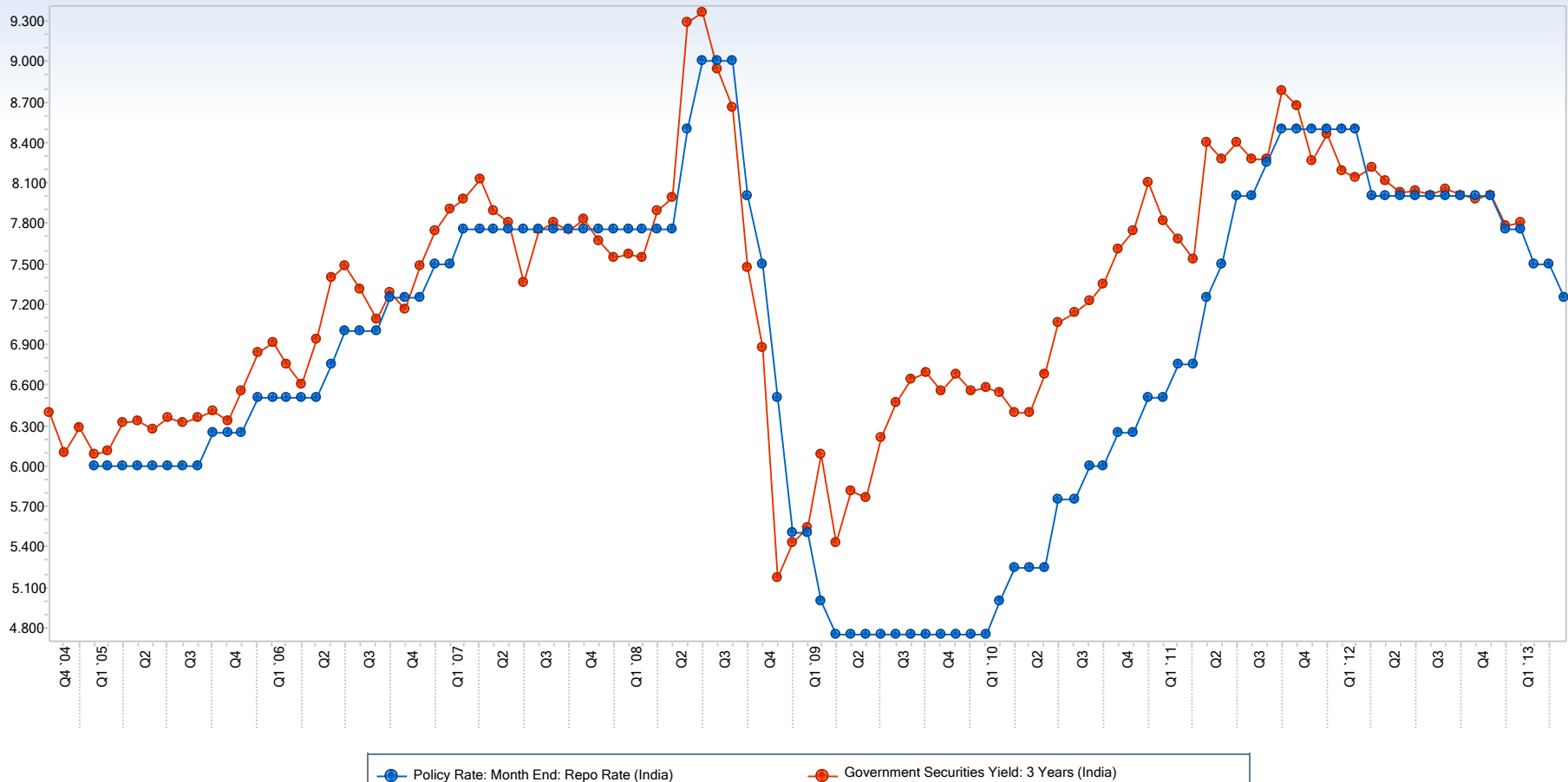
Expectations Matter

- Market rates (short- and long-term) do not always move in tandem with policy rates:

- Expected policy changes are incorporated in today's prices (e.g., future changes in monetary policy, fiscal consolidation or debt crisis).

- Expectations about the real equilibrium interest rate can change (e.g., an increase in productivity would increase the real equilibrium real interest rate)

- If inflation expectations ↑ → long-term rates ↑.

- If the maturity premium or exchange risk change → long-term interest rates are affected.

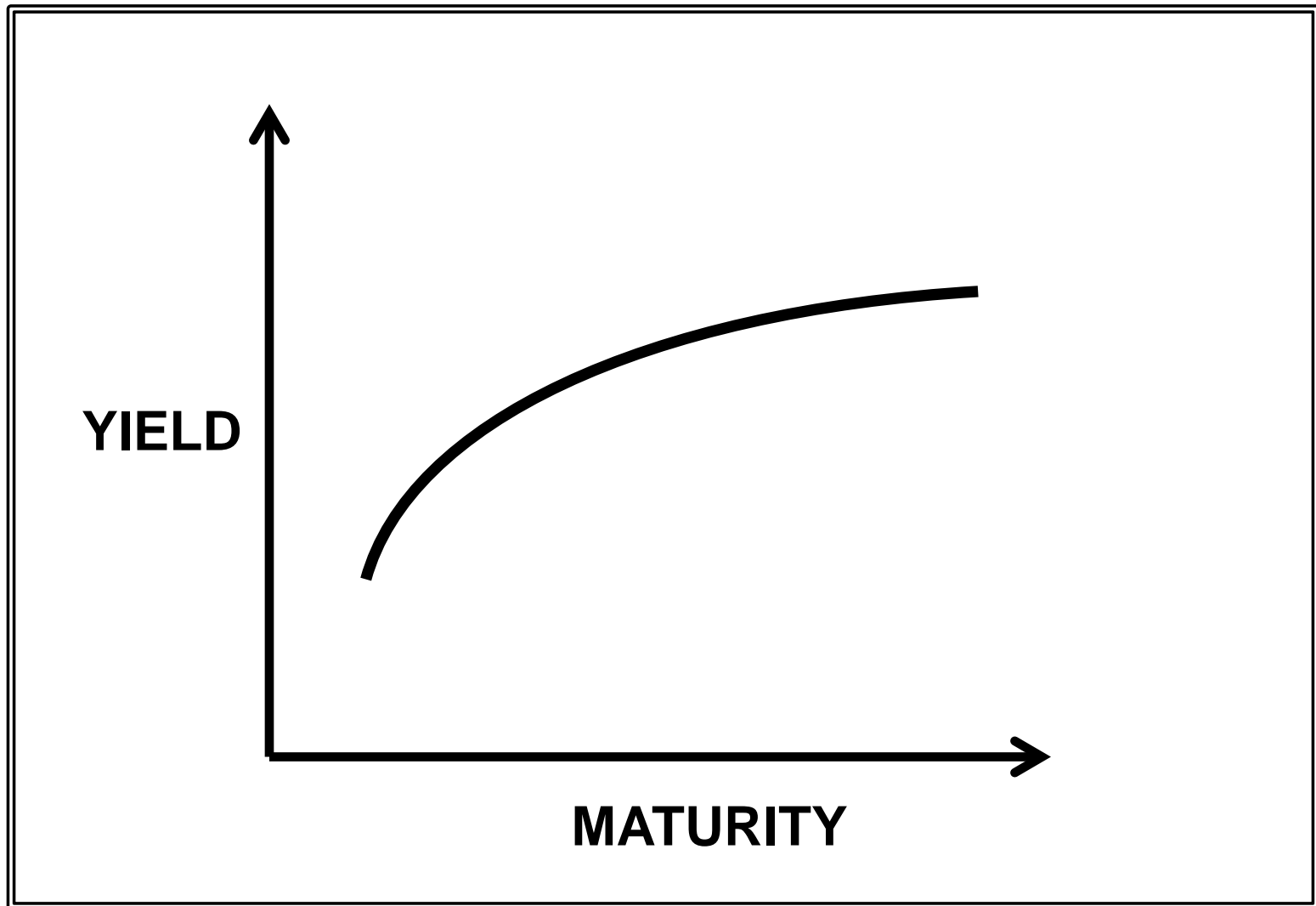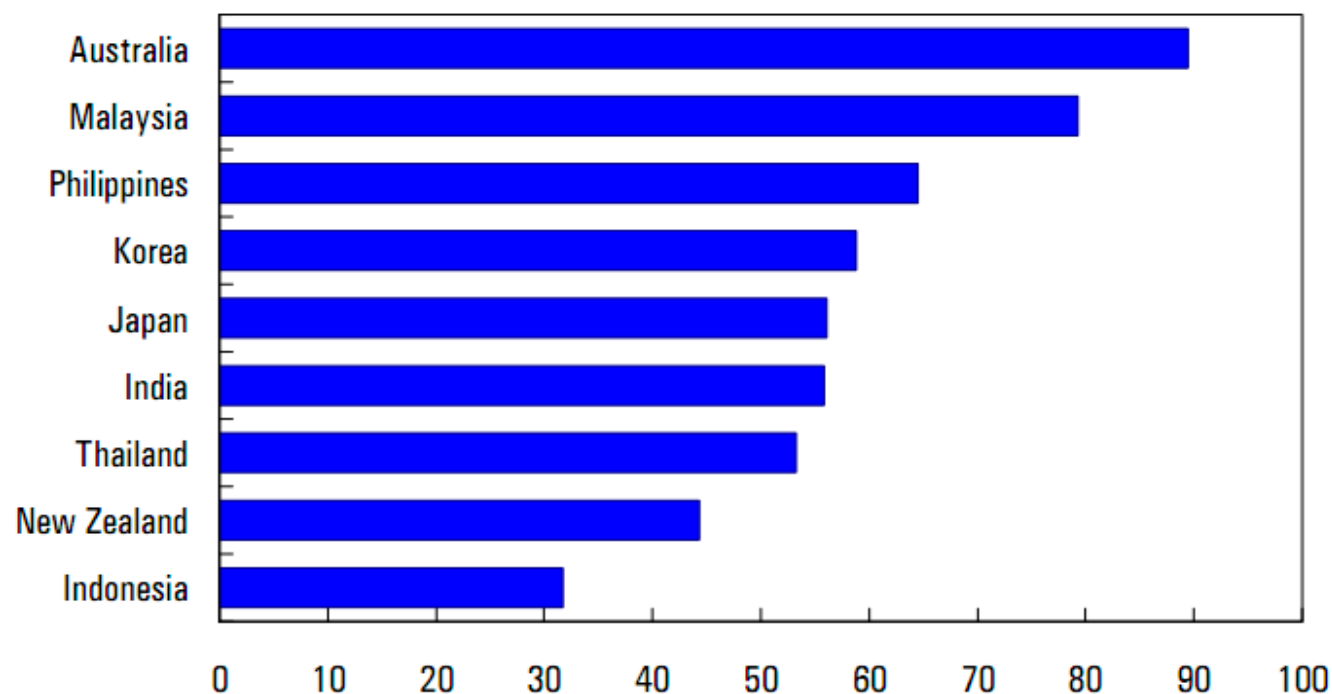# Example of Reserve Bank of India: Monetary Policy & Long Rate

Normal Yield Curve

III.B.b Transmission to Long-term Lending Rates

IMF Regional Outlook, October 2009

International Evidence on Pass Through to Lending Rates

Table: Correlation between changes in money market rate and changes in lending rate

	Contemporaneous Correlation	Short-term Effect	Long-term Effect	R-squared	Number of Countries
Advanced	0.34	0.20	0.36	0.41	24
Emerging	0.37	0.37	0.58	0.65	27
LIC's	0.17	0.10	0.30	0.16	43

Authors conclude that the links between the policy instrument controlled by central banks and the mechanism for transmission in LICs may actually be relatively loose and unreliable.

Source: 2010 IMF

Factors Impeding Interest Rate Pass Through

1. Nature of existing contracts (floating vs. fixed interest rates)

2. Financial market development

3. Competition in Banking Sector

4. Binding interest rate controls and/or non-price mechanisms for allocating credit

5. Central Bank credibility/Institutional quality

IV Summary

Most dominant channels of monetary policy transmission: central bank views

Latin America	
Argentina	Interest rates, money growth and nominal exchange rate innovations (under an environment of low inflation).
Chile	Direct interest rate, exchange rate, credit and expectations channel.
Colombia	Expectations, cost push, aggregate demand and exchange rate channel.
Mexico	Nominal interest rate.
Asia	
China	Mainly credit channel.
Hong Kong SAR	Direct cost of capital effect.
India	Money growth, interest rate and credit channel.
Malaysia	Credit, interest rate, exchange rate and asset price channel.
Philippines	Base money, interest rate and exchange rate channel.
Singapore	Exchange rate channel.
Thailand	Interest rate, exchange rate and asset price channel.
Central Europe	
Czech Republic	Interest rate and exchange rate channel.
Hungary	Exchange rate channel.
Poland	Interest rate and exchange rate channel.