EMERGING CAPITAL MARKETS

Lecture 7. Evaluating Country Economic Performance: Stabilization I

Dr. Edilberto Segura
Partner & Chief Economist, SigmaBleyzer
Chairman, Advisory Board, The Bleyzer Foundation

January 2012

V1

Outline

I. Country Economic Analysis & Management

II. Macroeconomic Stabilization

A. Relation between Internal and External Stability

1. Fiscal Budget balances, Current Account Balances, and Savings-Investment Balances.
2. Expenditures (Absorption) and Foreign Debt

B. Introducing Money Demand and Supply

l. The Monetary Balance-Sheet, Money Demand and Supply

C. Introducing Domestic Credit and the Financial Sector: Monetary Programming of the IMF-World Bank

1. Original Polak Model on Monetary Programming
2. Extended Monetary Programming of the IMF
3. The Original World Bank's RMSM
4. The Merged IMF-World Bank Model: RMSM-X Model

D. Size of a "Sustainable" Fiscal Deficit

E. Monetary Policy and Inflation Targeting (IT)

F. Rules of Thumb for Economic Sustainability

I. Country Economic Analysis

- The performance of the capital markets (stocks and bonds) of an EM is affected by the soundness/strength of its economy.
- Therefore, a successful investor in EMs must be able to analyze systematically the economic conditions of these countries.
- A sound economy is one that has both macroeconomic **stability** and sustainable economic **growth.**
  - **Macroeconomic Stability** is defined by stable prices with low inflation (internal stability), and a stable foreign exchange rate (external stability).
  - **Sustainable Economic Growth** is defined by a high rate of GDP growth that can be maintained over a long time.
- Solid macroeconomic stability and sustainable GDP growth are the two key factors affecting the performance of the stock exchange and bonds in an EM.

Assessing Country Economic Performance

To assess country performance, two sets of issues need to be reviewed:

(1) Actual Results in key Economic Areas:

a. Actual Internal and External Stability
- Internal Stability as shown by the domestic Inflation Rate
- External Stability of Foreign Exchange Rate & Balance of Payments
- Level of Foreign Debt in relation to GDP, Exports & Reserves

b. Actual Economic Growth
- GDP Growth Rates and structure of sources of growth
- Saving Rates and Investment Rates
- Total Factor Productivity Growth and international competitiveness

(2) **The Adequacy of the Policy and Institutional Framework to Sustain Future Economic Results:**

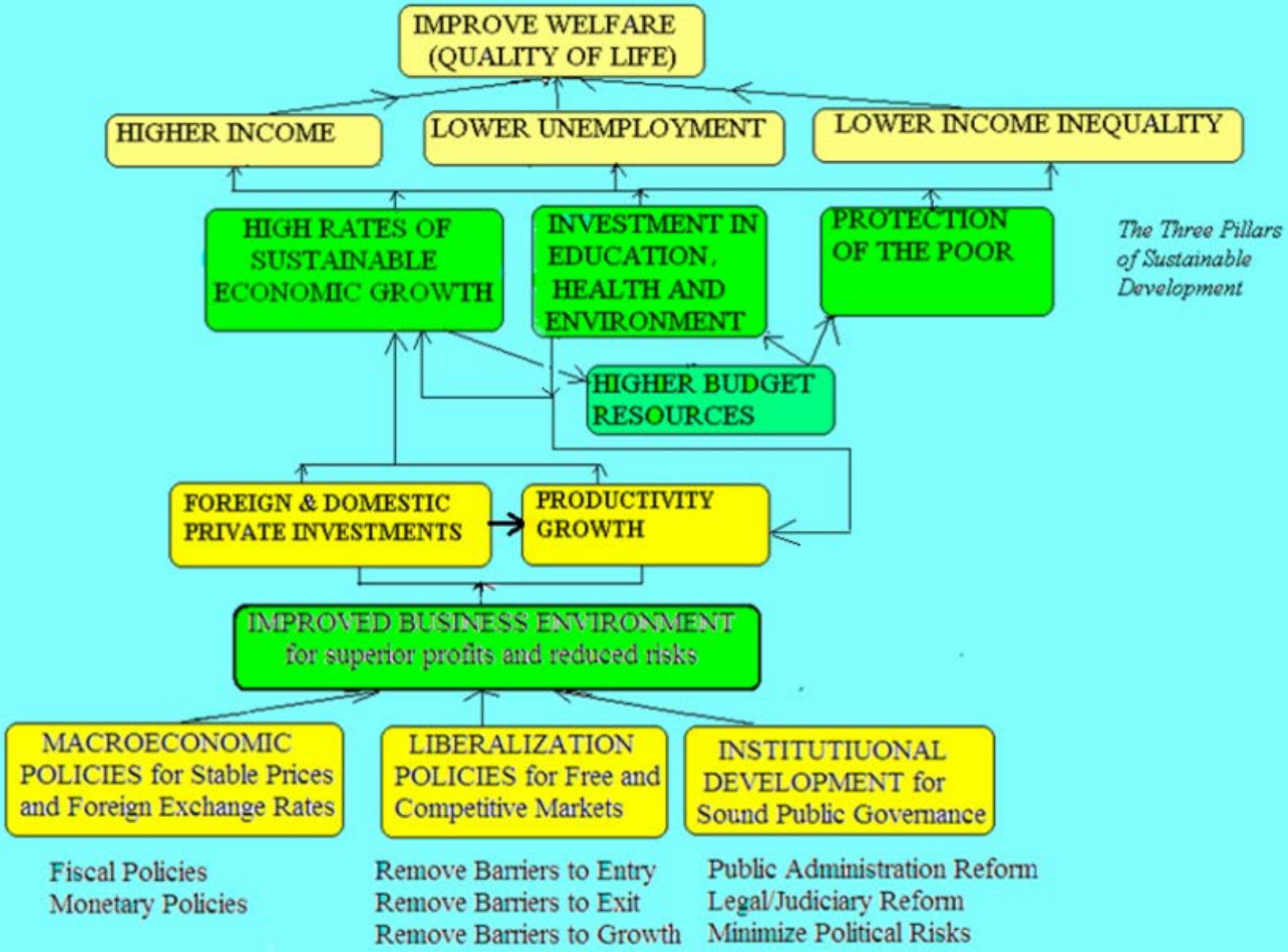
a. Policies to sustain internal and external economic stability; and

b. Policies to sustain economic growth, which depends on policies regarding (i) economic liberalization, and (ii) public governance and institutional development.

- **Economic Stabilization Programs** have been sponsored by the IMF and have been practiced since the early 1950's to deal with balance-of-payment disequilibrium that had led to large devaluations and high inflation.
- However, in the early 1980's, following the Debt Crises of 1982, there was wide recognition that stabilization programs alone were failing to bring back sustainable economic stability.
- This was because of its failure to remove deep-rooted structural economic and social distortions.
- That is, the balancing of fiscal budgets and B/P accounts alone were not sufficient to bring long-term stability and recovery.
- In order to remove these economic and social distortions, many Emerging Markets implemented Government programs to remove structural distortions in order to encourage investments and accelerate growth.

- **Structural Adjustment Programs** were designed to achieve sustainable economic growth. They added two new elements to macroeconomic stabilization programs:
  1. **Economic Liberalization**: These are policies to provide freedom to do business in a competitive environment (Stage 1 reforms) – In a market economy, the "motivator" is the freedom to make profits, whereas the "control system" is strong competition that discourages power abuse.
  2. **Institutional Development and Public Governance**: Reform of the State and Legal Systems to ensure policy implementation and to make policy changes sustainable over time (Stage 2 reforms).

Economic Reform and Adjustment



Determinants of an Improved Business Environment

(I) Macroeconomic Stabilization Policies:

- Fiscal Policies under which the Government's fiscal budget has a deficit that can be financed by borrowings on a sustainable basis (normally no more than 3% of GDP).
- Monetary Policies, under which the creation of money (money supply) will not exceed the demand for money (which is affected by income, prices and interest rates).

(II) Structural Adjustment

(A) Liberalization of the Economic Environment

- Liberalization of the Formation and Operation of Enterprises
- Liberalization of the Closure of Failing Enterprises
- Liberalization of Product Markets: Pricing and Trade
- Liberalization of Factor Markets: Capital/Financial, Labor and Land Markets

(B) Sound Institutions and Public Governance

- Sound & efficient Government services without corruption
- Stable and predictable legal environment
- Low political risks.

II. Macroeconomic Stabilization

- Macroeconomic instability increases the risk of doing business: with unstable prices (high inflation) and unstable exchange rates, it is not possible to do financial plans and project profits.
- Investors will require significantly higher rates of returns to compensate for the risks of instability in prices and foreign exchange.
- As a result of this high risk premium, few projects would qualify for investments, reducing the overall level of investments and growth.
- **Macroeconomic stabilization programs are based on the IMF's Monetary Approach to the Balance of Payments, which has three elements:**

  A. The first element focuses on the government's **fiscal budget policies** and the relationship between internal stability and external stability: there is a close accounting relation between the size of **fiscal budget deficits**, overspending by the private sector, and **current account deficits.**

B. The second element introduces the **monetary sector**. If **money supply** (which is controlled by the Central Bank) exceeds **money demand** (the amount of money that people want to hold), then people will attempt to get rid of this excess money by spending it in local goods (contributing to inflation) or importing foreign goods (leading to balance-of-payment deficits).

C. The third element introduces **Net Domestic Credit** and the **financial/banking sector**: The excess growth of Net Domestic Credit over growth in money demand will equal the deficit in the **balance of payments**.

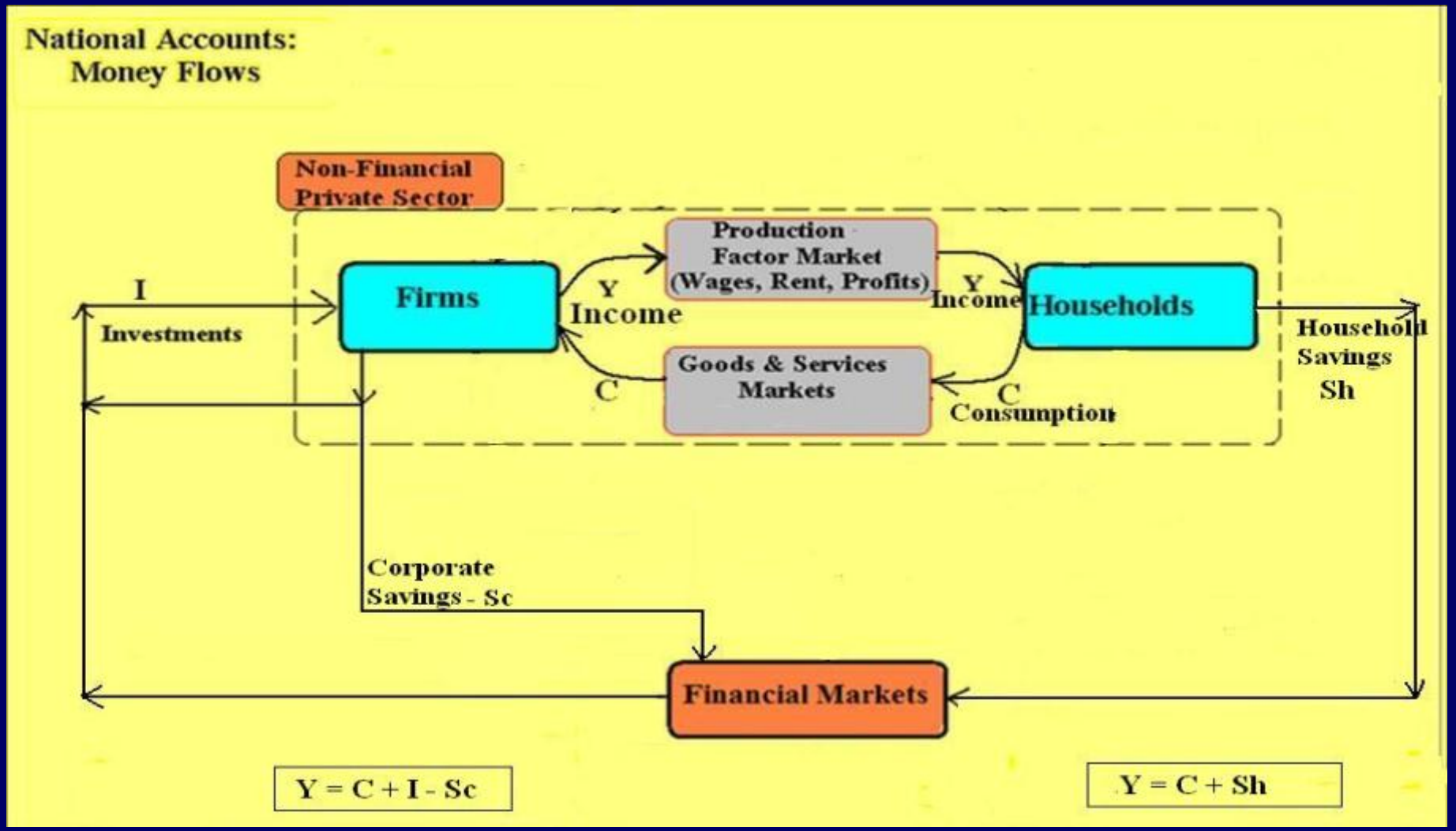
- The aim of the IMF's **Monetary Programming is to determine the** fiscal and monetary policies (particularly the size of the fiscal budget deficit, the growth in money supply and the level of domestic credit by the banking sector) that are "***consistent***" with the country's objectives for (i) GDP growth, (ii) level of inflation, and (iii) level of international reserves.

A. Relationship among Fiscal Budget Balances, Current Account Balances and Savings-Investments Balances

Definitions:

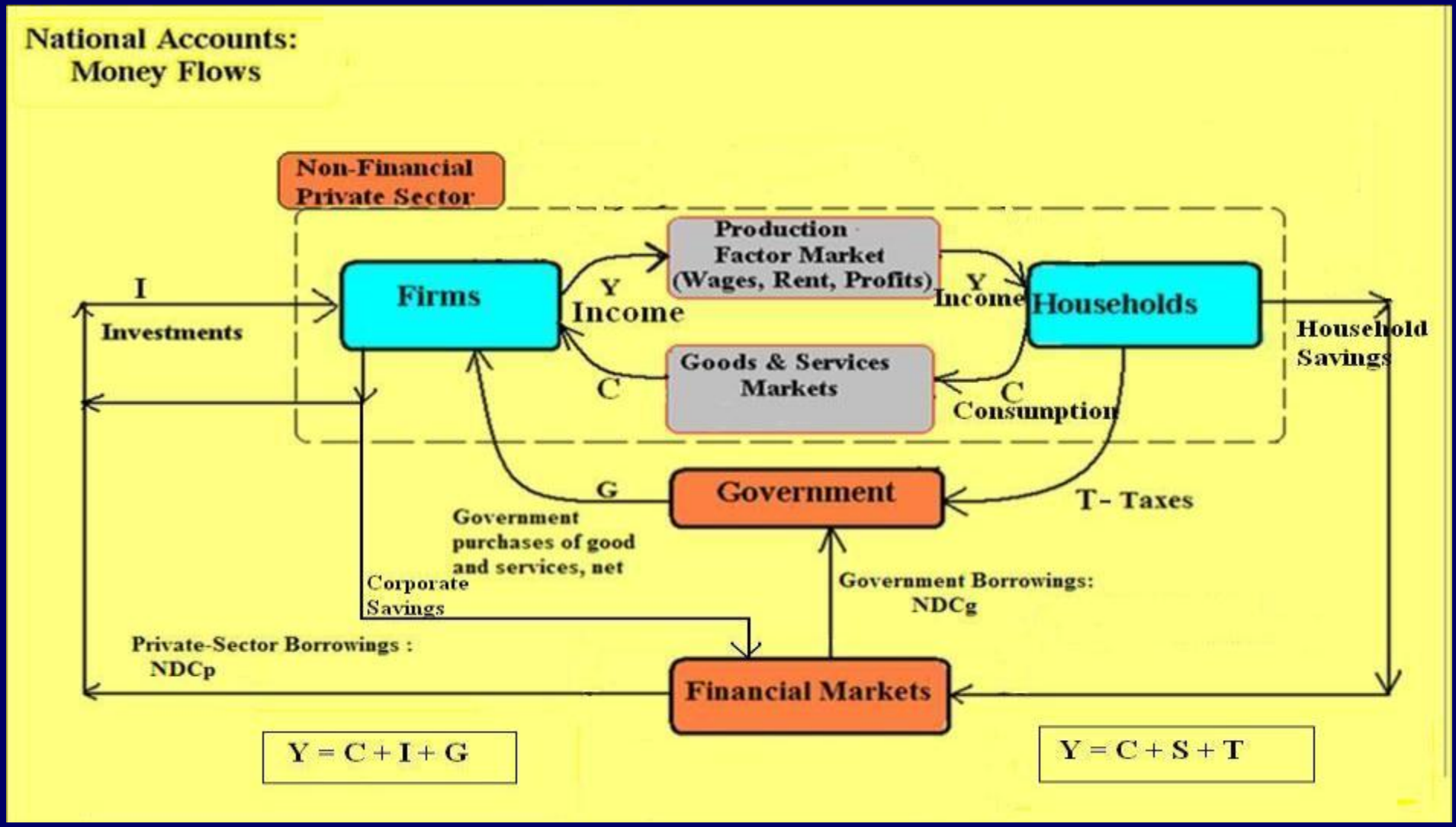
Y	=	Gross Domestic Product (**Y**ncome)
Y_d	=	Gross **D**isposable Income (C + S)
C	=	**C**onsumption, private
I	=	**I**nvestment, private
G	=	**G**overnment Expenditures
X	=	E**X**ports
J	=	Imports
S	=	**S**avings, private, corporate and households
T	=	**T**axes
TR_f	=	Net **TR**ansfers Received from Abroad (**f**oreign)
Y_f	=	Net Factor **I**ncome from Abroad (**Y**ncome **f**oreign)
R	=	International **R**eserves
K	=	Foreign **K**apital
A	=	**A**bsorption (Expenditures)
CAB	=	**C**urrent **A**ccount **B**alance

An economy's Money Flow without the Government and External Sectors:



$Y = C + I - Sc;\ Y = C + Sh \longrightarrow C + I - Sc = C + Sh \longrightarrow I = Sc + Sh \longrightarrow I = S$

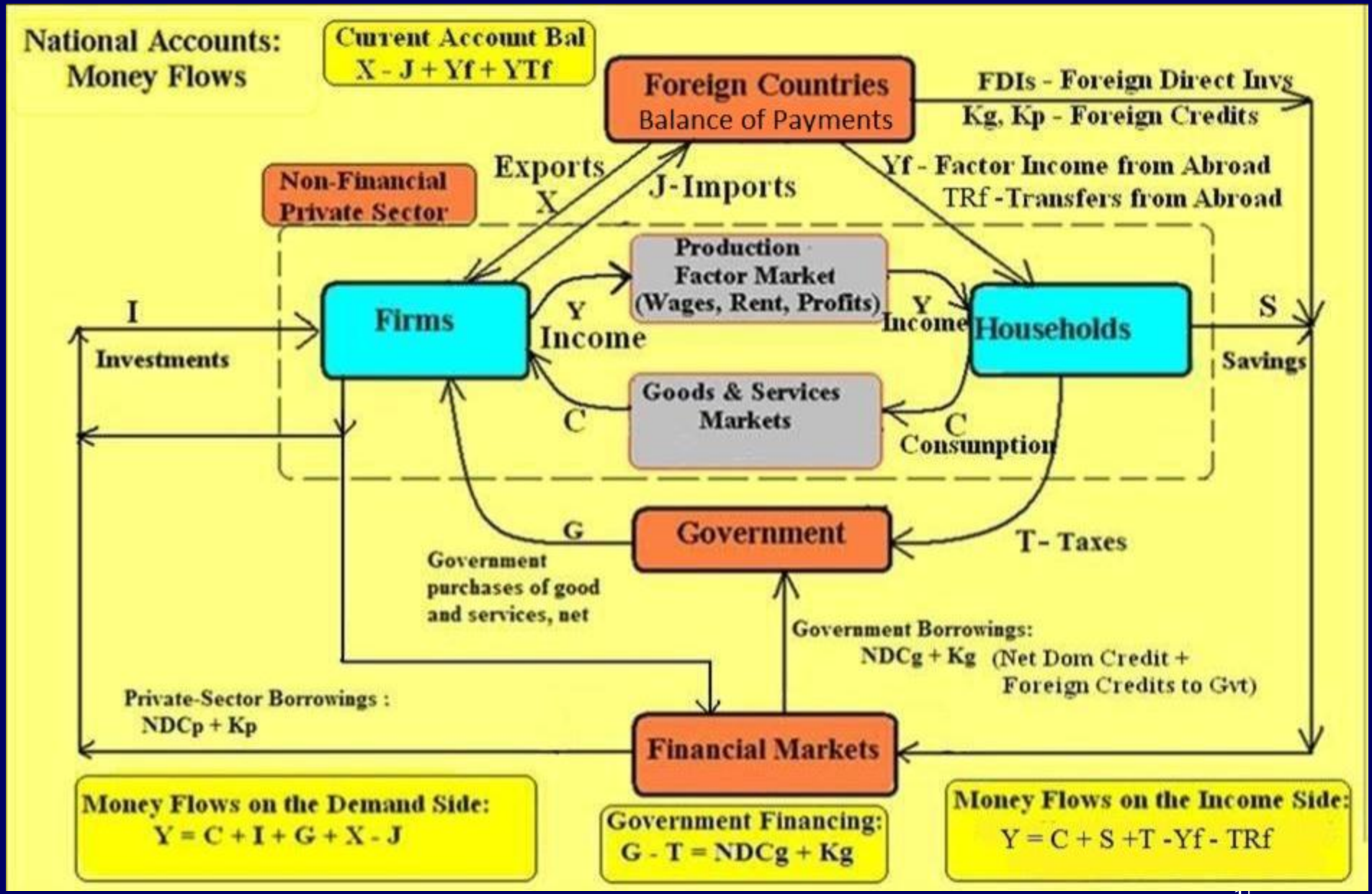
An economy's money flow, with government but without the external sector.



$Y = C + I + G = C + S + T \rightarrow (I - S) = (T - G)$

(10 - 10) = (6 – 6)
G↑ by 2, then I↓ or S↑
(8 – 10) = (6 – 8)

An economy's money flow, with government and external sector.



Francois Quesnay, Tableu Economique, 1758; Simon Kuznets, National Income, 1929-1932; 1934 (ed Kharkiv)

(1) On the expenditure side: $AD \Rightarrow Y = C + I + G + X - J$

(2) On the Income (supply) side: $AS \Rightarrow Y = C + S + T - Y_f - TR_f$

Since Aggregate Demand must equal Income, then (1)=(2); or

$$C + I + G + X - J = C + S + T - Y_f - TR_f$$

Then:

$$\frac{\mathbf{X - J + Y_f + TR_f}}{\textbf{Current Account Balance (CAB)}} = \frac{\mathbf{(S - I)}}{\textbf{Private Sector Balance (PSB)}} + \frac{\mathbf{(T - G)}}{\textbf{Fiscal Budget Balance (FBB)}}$$

If PSB=0, Current Account Balance = Fiscal Budget Balance

A Fiscal Deficit will yield an equally-sized CA Deficit

If FBB=0, Current Account Balance = Private Sector Balance

A Private Sector Deficit will yield an equal CA Deficit

All Savings (private sector, Gvt and foreign savings) must equal Investments for equilibrium in the goods market ($\mathbf{I = \Sigma S}$)

IMF studies show that a fiscal budget improvement of 1% of GDP improves the CAB by ½ of 1%, due to lower imports from lower domestic demand and rise of exports due to a weaker currency.

1. Current Account Deficits & Excessive Expenditures.

(1) $Y = C + I + G + X - J$

(2) $Y = C + S + T - Y_f - TR_f = Y_d + T - Y_f - TR_f$ where $Y_d = C + S$

$Y_d + T - Y_f - TR_f = C + I + G + X - J$

$Y_d - [(C + I) + (G - T)] = X - J + Y_f + TR_f = CAB$

(C + I) = Expenditures of Private Sector = Private Absorption
(G - T) = Excessive Govt. Expenditures = Govt. Absorption

Current Account Balance = Y_d - [Priv. Abs + Govt Abs]

Current Account Balance = Y_d - Absorption

- **The excess of absorption (expenditures) over disposable income will be reflected as a deficit in the current account of the B/P.**
- To correct a B/P deficit, you need to reduce Exp. or increase Y_d.
- A devaluation would improve the B/P if it leads to an increase in income ($\mathbf{Y_d}$) that is greater that an increase in expenditures (Abs), including those expenditures generated by the higher income.

2. Expenditures (Absorption) and Foreign Debt

- If FDIs are constant, the Current Account Deficit can be financed by:
  (i) a reduction in International Reserves (R), or
  (ii) an increase in Foreign Debt (K), assuming constant FDIs.

$$\mathbf{CAB = X - J} + Y_f + TR_f = \mathbf{-\Delta R + \Delta K}$$

since: $\mathbf{CAB = Y_d - Absorption}$

therefore: $\mathbf{Y_d - Absorption = -\Delta R + \Delta K}$

- **If expenditures (Absorption) are too high compared to Disposable Income, then: International Reserves would be falling or Foreign Debt would be increasing.**
- To maintain International Reserves and avoid excessive Foreign Debt, expenditures (Absorption) should be reduced, normally by cutting Government expenditures, increasing tax revenues (reducing the fiscal budget deficit) or reducing private expenditures.

- All these identities are useful relationships to identify fiscal budget policies.
- But they provides limited guidance to monetary policy decisions. For this purpose, we need to add a number of accounting and behavioral relationships relating to the Financial/Monetary Block.

B. Introducing Money Demand and Supply

In order to use the previous macroeconomic identities to define more specific fiscal and monetary Stabilization Policies, we need to introduce some key monetary and behavioral relationships concerning the Monetary Sector, including Money Demand and Money Supply.

Abbreviations:

M^d	=	Money Demand: the amount of money that people want to hold (Liquidity preference).
M^s	=	Money Supply: the amount of money issued by the monetary and banking sectors
P	=	Prices
E	=	Exchange Rate
i	=	Interest rates
NDC_p	=	Net Domestic Credit to Private Sector
NDC_g	=	Net Domestic Credit to Government
OIN	=	Other Investments, Net

Balance Sheet of the Monetary Sector

A key monetary relationship is the balance-sheet of the Monetary Sector (Central Bank and Commercial banks): its Financial Assets (International Reserves, Net Domestic Credit and Net Other Investments) will equal its Financial Liabilities (Money Supply) plus Equity:

$$M^s + \text{Equity} = R + NDCg + NDCp + NOI$$

If Equity and ONI are fixed, then: $\Delta M^s = \Delta NDC + \Delta R$

Central Bank Balance Sheet

Int. Reserves	Monetary Base Currency in Circ Req. Reserves
Net Domestic Credit to Govt	
Other Investmts.	Equity

Commercial Banks Balance Sheet

Req. Reserves in Central Bank	Demand Deposits Time Deposits CDs
Net Domest Credit to Private Sector	
Other Investmts.	Equity

Consolidated Monetary Sector

Int. Reserves	Currency in Circ. Demand Deposits Time Deposits CDs (M2, M3)
Net Domestic Credit to Governmnet	
Net Domestic Credit to Private Sector	Equity
Other Investments, Net	

(Measures of Money Supply)

The Demand for Money and the Supply of Money

- A key proposition is that in an economy, people have a demand function for real money - **M^d** (currency in circulation and bank deposits), or have a "liquidity preference", which depends on real economic variables, such as the level of real income, real interest rates, rates of inflation, etc.
- This demand for money is determined, not by the monetary policy of the authorities, but by the public.
- On the supply side, there is an amount of money which is partly determined by the monetary authorities **(M^s)**, through their discount rates, open market operations (trading of government securities) & reserve requirements.
- It is a key proposition that while money supply is influenced by monetary authorities, money demand is independent and determined by the people.
- This leads to a second proposition: when money supply exceeds money demand, the monetary balances of people exceeds their liquidity preference. Then, people will try to bring them down by spending the excess money in the purchase of local goods (which raises their prices) or in imported goods (which will put pressures on the balance of payments).
- Therefore, the Central Bank can reduce inflation and improve the balance of payments just by putting the monetary brakes to reduce money supply.

Formulation of the Demand for Money

- People will demand money ($\mathbf{M^d}$) to facilitate their purchasing of goods and services, which in turn will depend on their real income **(Y).**
- Therefore, money "demanded" for transactional purposes will be:

$$\mathbf{M^d = f(Y)}$$

- But this is not the whole story, since total money demand would also depend on how much money people will be willing to hold for asset/speculative purposes.
- This will be a function of the cost & risks of holding money – versus other financial assets -- which depends on the level of nominal interest rates (i), inflation (P), and the exchange rate (E).
- Furthermore, according to Fisher, nominal interest rates is: $r + P^e$
- The demand for money (M^d) will depend on the level of real income (Y), the level of real interest rates (r), the current and expected price levels (P, P^e), and the exchange rate (E):

$$\mathbf{M^d = f(Y, r, P, P^e, E)} \text{ and in equilibrium } = \mathbf{M^s}$$

- This relationship also implies that inflation (P) depends not only of today's $\mathbf{M^s}$ but also on 'expectations" of future inflation (Cagan).

Excess Money Supply and Inflation

- The Quantity Theory of Money provides and early analysis of how "excessive" money supply can lead to price increases or inflation.
- It was first described by Copernicus (1526), the Salamanca School (1550), and Jean Bodin (1560) -- the last two to explain high inflation in Spain in the 1500's due to excessive silver from Mexico & Peru.
- John Locke (1692), David Hume (1748) and John Stuart Mills (1848) described precisely the relation between money supply and the value of money transactions.
- It was formulated as an equation by Irving Fisher (1911) and reformulated in its modern version by Milton Friedman (1956).
- The main points can de described as follows:
  - In the economy there are 100 monetary units (M), which are spent exclusively in the purchase of goods.
  - In this economy the quantity of goods sold (Q) is 100 goods per year.
  - Then, the price of each good sold (P) will be 1 monetary unit (P).
  - Later on, the government prints money and the amount of money goes to 200 monetary units, but there are still 100 goods sold.

– Then the price of each good will be 2 monetary units: a 100% inflation rate.

Therefore: $\mathbf{M = P \times Q}$

– Since this assumed a transaction velocity of money of 1, generalizing to a velocity different to one (**Vt**) - which implies a changing Money Demand, we get the formulation of the Quantitative Theory of Money:

$\mathbf{M \times Vt = P \times Q}$

– Since the amount sold (Q) is proportional to the amount produced (Y):

$\mathbf{M \times V = P \times Y}$ where V is now the income velocity of money.

– Considering changes: $\mathbf{(1+\Delta M) \times (1+\Delta V) = (1+\Delta P) \times (1+\Delta Y)}$

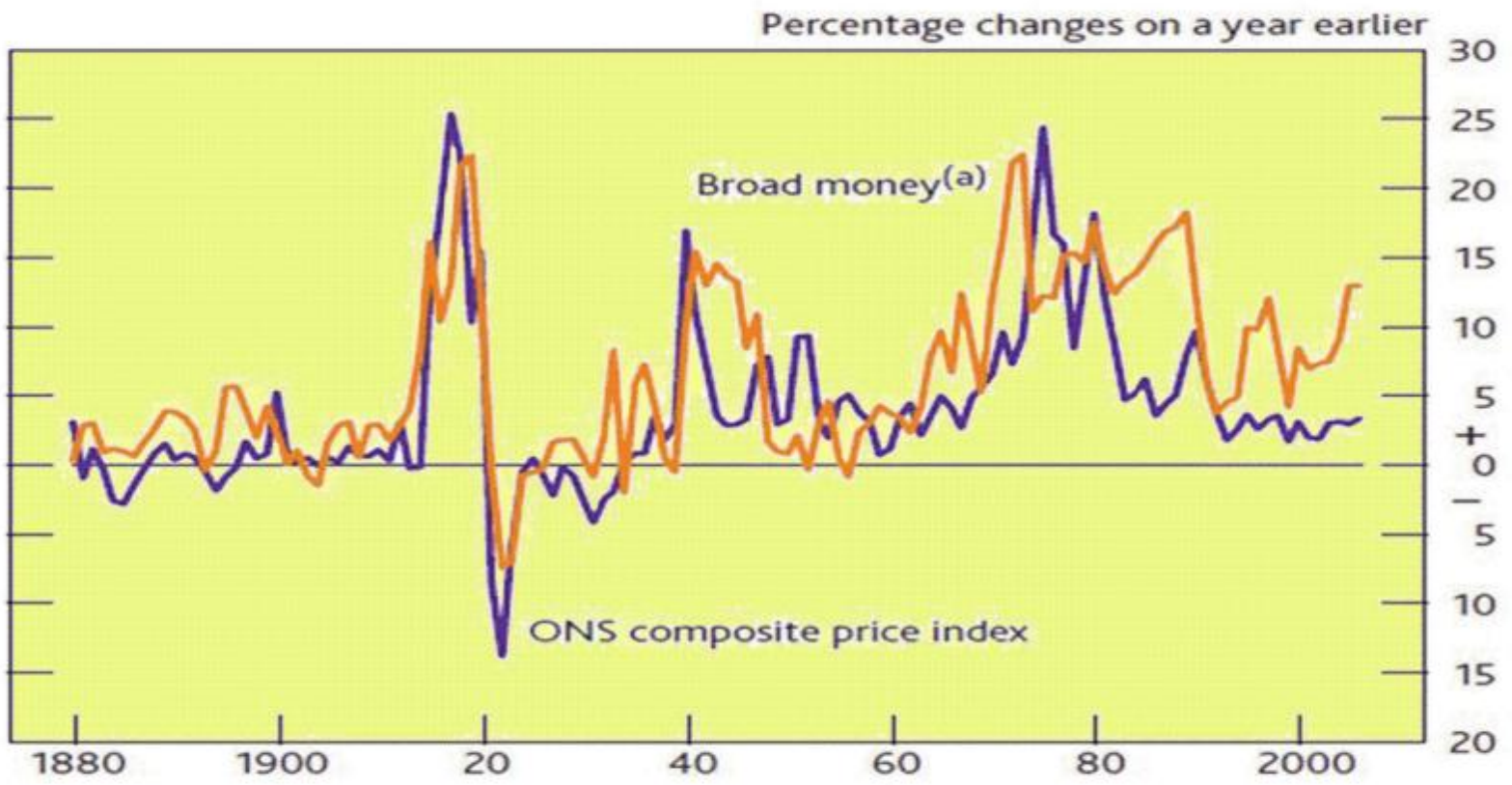
– or: $\Delta P = f(\Delta M, \Delta V, -\Delta Y)$

if Money demand and Production are constant ($\Delta V=0$; $\Delta Y=0$);

then $\Delta P = f(\Delta M)$

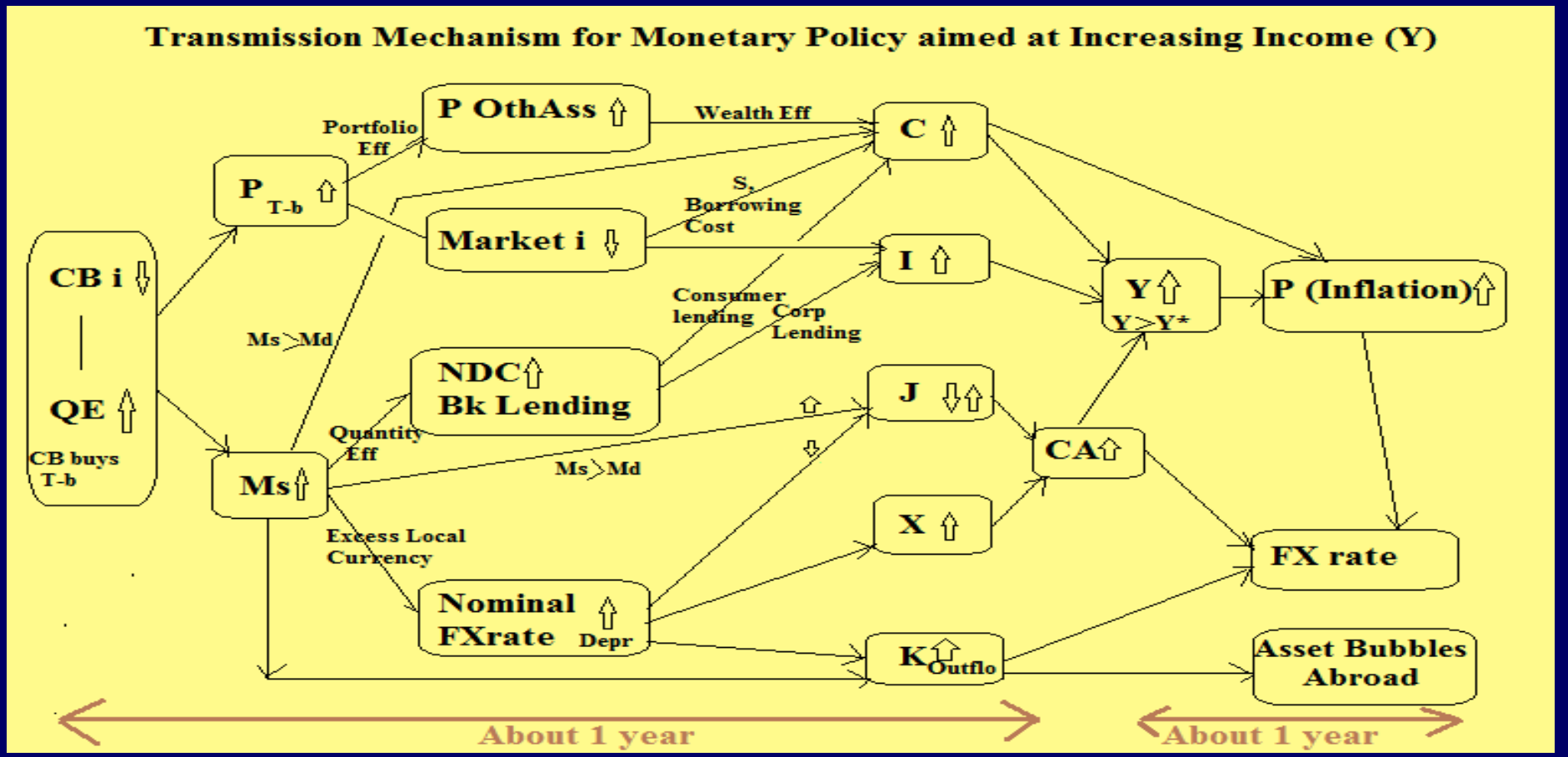
- In this case, inflation will be generated only by increases in money supply.
- In the case that Y (real GDP) grows by 3%, money demand is constant (velocity is constant), and the amount of money in the economy grows by 20%, and then inflation will be 16.5%, (ie, 1.20/1.03).

- Indeed, in most countries there have been close historical relationships between increases in money supply and inflation:

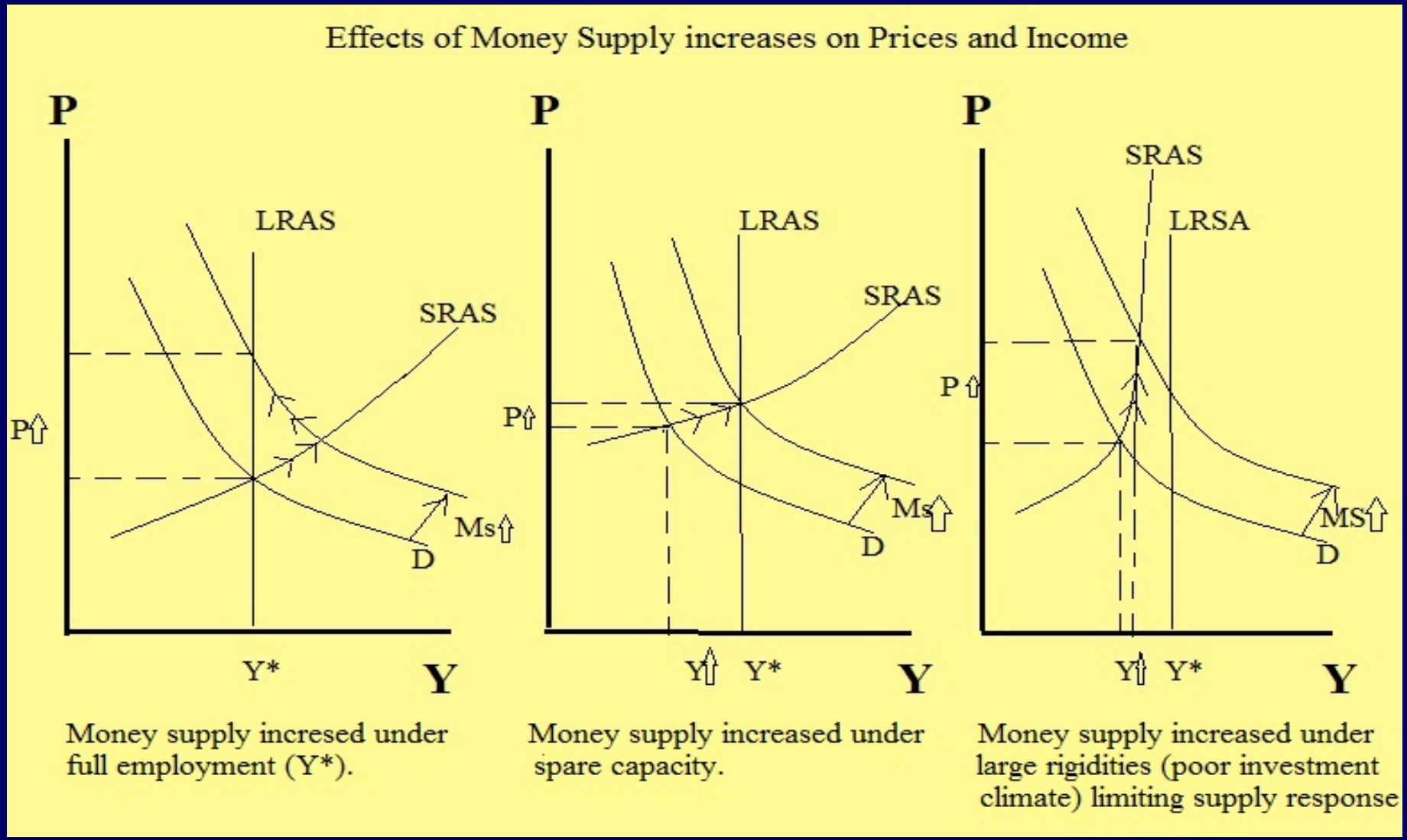


But the relationship between money supply changes and inflation is not automatic: In the UK, a 1% decline in interest rates will increase money supply rapidily; but will produce a 0.2%-0.3% GDP increase in one year, and a 0.2%-0.4% increase in inflation after two years.

These relationships are called the monetary transmission mechanism:

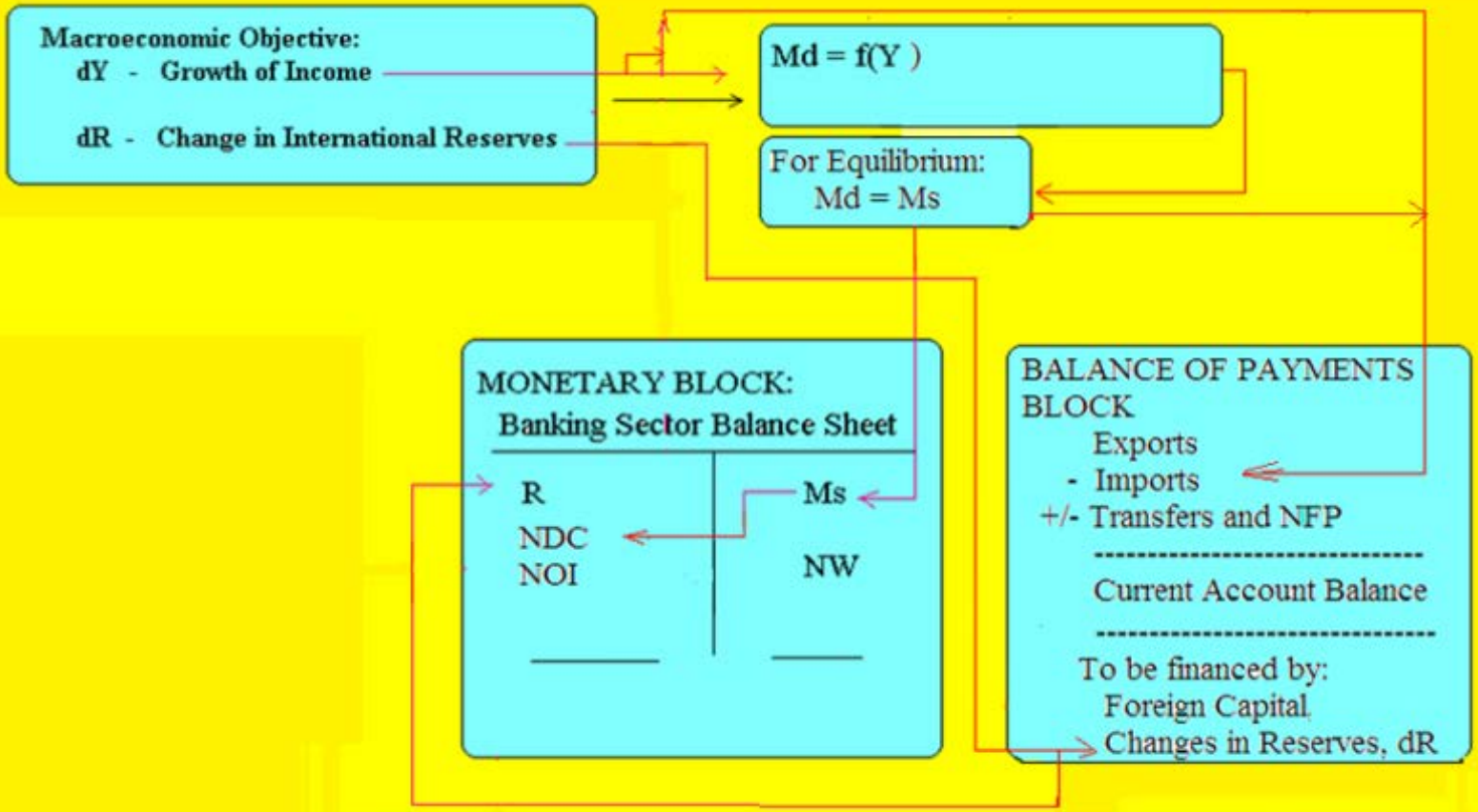


- The effect of money supply increases on prices (inflation) and income (GDP) will also depend on whether the economy is (i) at full capacity, (ii) has spare capacity, or (iii) has supply rigidities:



C. Introducing Domestic Credit and the Financial Sector

The *Original Polak Model for Monetary Programming*



For the economic system to be in equilibrium:

Money Supply should not exceed money demand; otherwise, people will try to get rid of this excess money by spending it into non-tradables (raising inflation) or in tradables (leading to a CA deficit and lower Reserves).

IMF Performance Criteria: In order to maintain a pre-determined level of International Reserves (which is necessary for the credibility of fixed exchange rates, there should be a limit on the size of Net Domestic Credit

C1. Introducing Domestic Credit and the Financial Sector: The Original Polak Model on Monetary Programming

- *The original IMF Monetary Programming (developed in 1957) was designed to resolve and prevent Balance of Payments crises.*
- *It focused on the Monetary/Banking block and Balance of Payments block, ignoring the Government and Private Sector blocks.*
- The objective was the level of Reserves, given an income growth.
- It assumed fixed exchange rate regimes - the regimes in the time.
- Reserves are key to credibility of fixed ERRs (Krugman [1979])
- Control over net domestic credit expansion is the key to stabilize the level of reserves and therefore the Balance of Payments.
- Described by Four Equations (1) to (4):
  - $\Delta M^s = \Delta M^d$ (1)
  - $\Delta M^s = \Delta NDC + \Delta R$ (2)
  - $\Delta M^d = f(\Delta Y) = v^{-1}\Delta Y \qquad v > 0$ (3)
  - $\Delta R = X - J + \Delta K = X - \alpha Y + \Delta K \qquad \text{since } J = \alpha Y$ (4)
- *Also: If $\Delta M^s > \Delta M^d$ then: (1) $\Delta P\uparrow$, $\Delta J\uparrow$, $\Delta X\downarrow$ and $\Delta R\downarrow$ and also (2) people will consume excess money in tradables: $\Delta J\uparrow$ & $\Delta R\downarrow$*

Focus of the Polak Model:

To determine the effects of changes of net domestic credit on reserves.

Using (1), (2), and (3), one gets:

$$\Delta R = \Delta M^{s} - \Delta NDC = \Delta M^{d} - \Delta NDC$$

$$\Delta R = v^{-1}\Delta Y - \Delta NDC$$

- ➔ Reserves will decline (B/P deficit) when increases in net domestic credit (ΔNDC) exceeds increases in nominal money demanded (ΔM^{d}), which in turn depends on the rate of income growth (ΔY) .
- ➔ Reserves stable if growth of domestic credit ⇒ nominal output growth
- ➔ If Y grows, M^{d} will grow and NDC can grow somewhat with R stable. But if NDC grows over and above grow in M^{d}, then R will fall.

Management of net domestic credit is crucial in obtaining BOP objective:

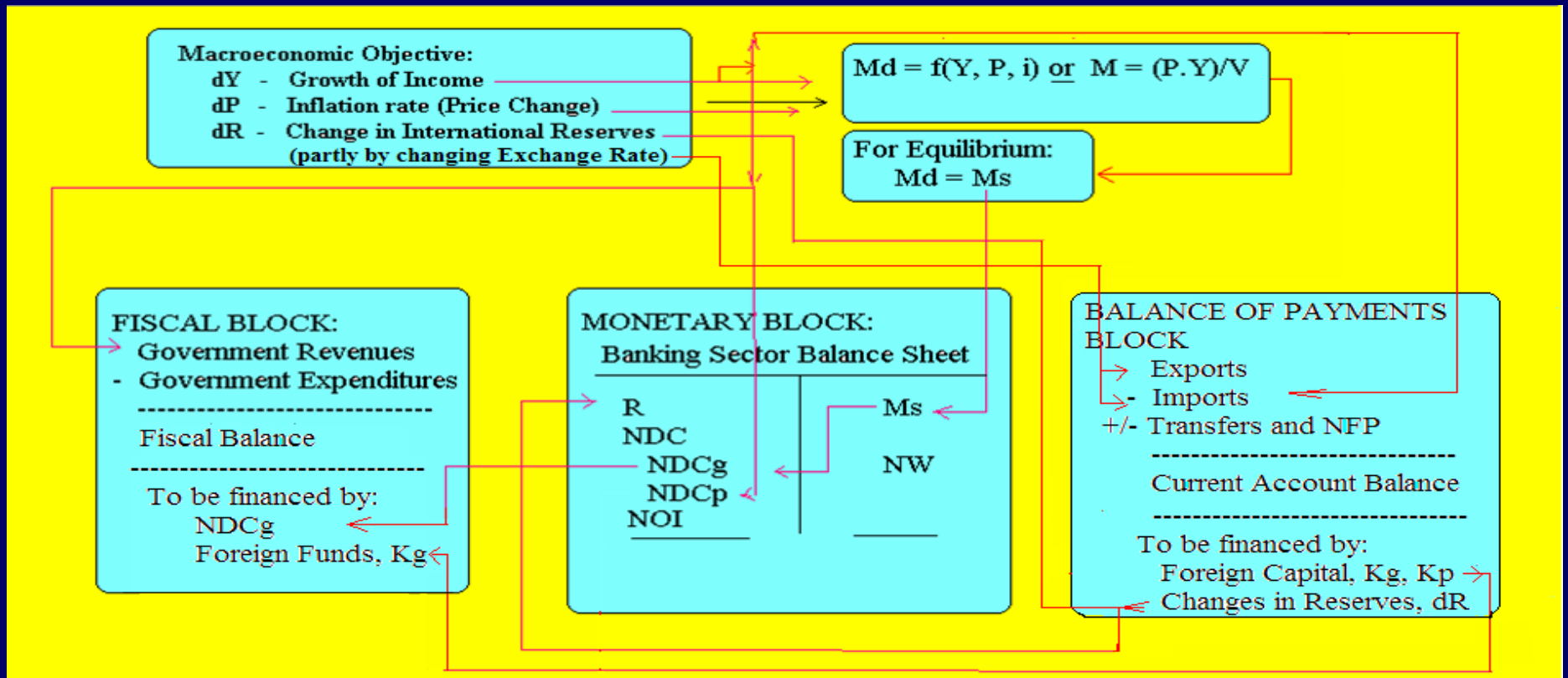
$$\Delta NDC = v^{-1}\Delta Y_{target} - \Delta R_{target}$$

- Given a target level of income growth (ΔY), and a target level of reserves (ΔR) one can estimate the required change in NDC
- This allows policy makers to estimate a credit ceiling, i.e. Net Domestic Credit growth is a performance criterion in IMF programs

➢ Transmission channels: Assuming that Y↑ J↑ CAB deteriorates R↓ then, if: NDC↓ M^{s}↓ $M^{d}>M^{s}$ i↑ I↓ AD↓ J↓ CAB improves R↑; also as: i↑ K↑ R↑ ∴ ⇒ A reduction of NDC lead to improved B/P

C2. Extended Monetary Programming of the IMF

- In the 1970's, the model introduced the effects of changes in Prices & Exchange Rates (given the abandonment of fixed exchange rates in 1973.)
- It also introduced the Government's fiscal block:
  Govt Revenues (T) – Govt Expenditures (G) = Fiscal Balance = NDCg + Kg



For the economic system to be in equilibrium:
Money Supply should not exceed money demand; otherwise, inflation will be up, imports up, & reserves down
The Fiscal Deficit can not exceed the amount financed by NDCg and K.

IMF Performance Criteria: (i) Maximum Size of Fiscal Deficit; (ii) Ceilings on Public Sector Borrowings
(iii) Minimum Level of International Reserves (adj. in exchange rates)

Maximum Domestic Credit to the Government

Taking the Balance Sheet of the Banking Sector:

$$Ms + NW = R + NDC_p + NDC_g + OIN$$

$$\Delta Ms = \Delta R + \Delta NDC_p + \Delta NDC_g, \quad \text{-since NW \& OIN are fixed.}$$

- ΔMs is defined from its identity to money demand, given interest rates and targets on inflation and income.
- ΔR is a target and is defined by the outcome of the Balance of Payments.
- ΔNDC_p is defined by the requirements for working Cap/income growth of the private sector.

- Therefore, **ΔNDC_g** will be the residual amount.
- This residual amount, Net Domestic Credit to Govt., is all the lending from domestic sources that can be given to the Government if the country were to have equilibrium in the money markets (inflation at target level).
- The size of a "consistent" fiscal deficit will depend on the amount of financing available: the amount of ΔNDC_g plus any additional foreign loans that the Government may obtain.

$$T - G = NDCg + Kg$$

This model is still widely used by the IMF. BUT: it ignores equilibrium in the non-financial private sector (good markets -- I and S)

C3. The Original World Bank's RMSM (Revised Minimum Standard Model)

- Developed in the early 1970s (Chenery & Strout) with the objective of making explicit the link between medium-term growth and equilibrium in the goods markets
  - Economic Growth is the key target, along with the level of Reserves (to avoid BOP crisis).
  - It is forward looking focused on the savings-investment gap.
  - But it ignored the monetary and financial sectors.
- Assumptions & Growth Theory behind the RMSM:
  - Linear positive relation between investment and output growth rates (Harrod–Domar, endogenous growth models). Emphasis on capital accumulation and its effects on Income through an Incremental Capital-Output ratio (which can vary in the future).
  - Additional foreign flows go to investment (Chenery and Strout [1966] model)

Five relationships define the RMSM model:

- National income identity:

$$y = y_{-1} + \Delta y = C^p + I + G + (X - J) \qquad (1)$$

- Private consumption:

$$C^p = (1 - s)(y - T) \qquad (2)$$

$0 < s < 1$: marginal propensity to save

T = taxes

- Investment:

$$I = \Delta y / \sigma \qquad (3)$$

σ: *inverse of the* incremental capital-output ratio

- Imports:

$$J = \alpha y \qquad 0 < \alpha < 1 \qquad (4)$$

- Balance-of-payments identity:

$$X - J = \Delta R - \Delta K \qquad (5)$$

The structure of RMSM:

Target variables: $\Delta y, \Delta R$ *(Macroeconomic Objectives)*

Exogenous variables: X

Policy instruments: $G, T, \Delta K$

Predetermined: y^{-1}

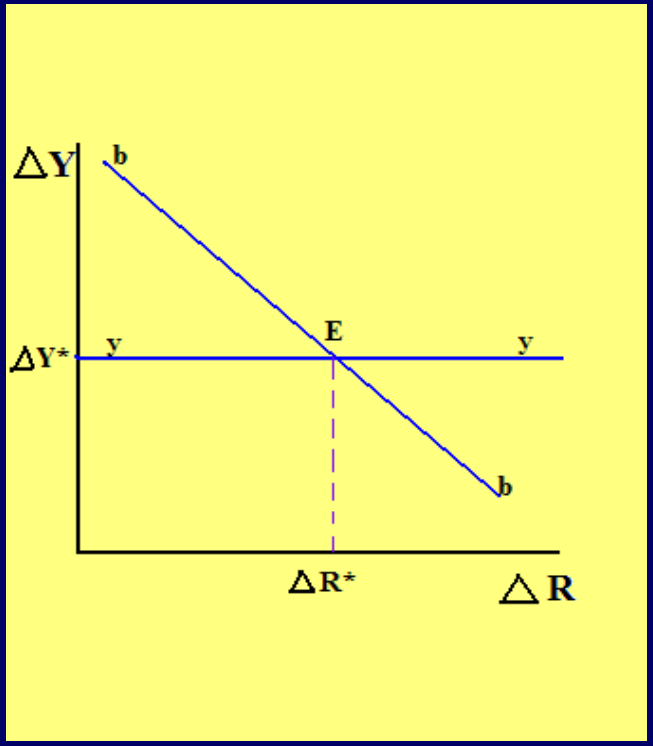
Parameters: *ICOR* (σ^{-1}), *marginal propensity to save* (s), *and import elasticity* (α)

Endogenous variables: I, C^{p}, J

Target equations (derived by substitutions):

$$\Delta y = \frac{(s + \alpha)y_{-1} + (1 - s)T - (X + G)}{\sigma^{-1} - (s + \alpha)} \qquad (yy)$$

$$\Delta R = X - \alpha(y\text{-}1 + \Delta y) + \Delta K \qquad (bb)$$



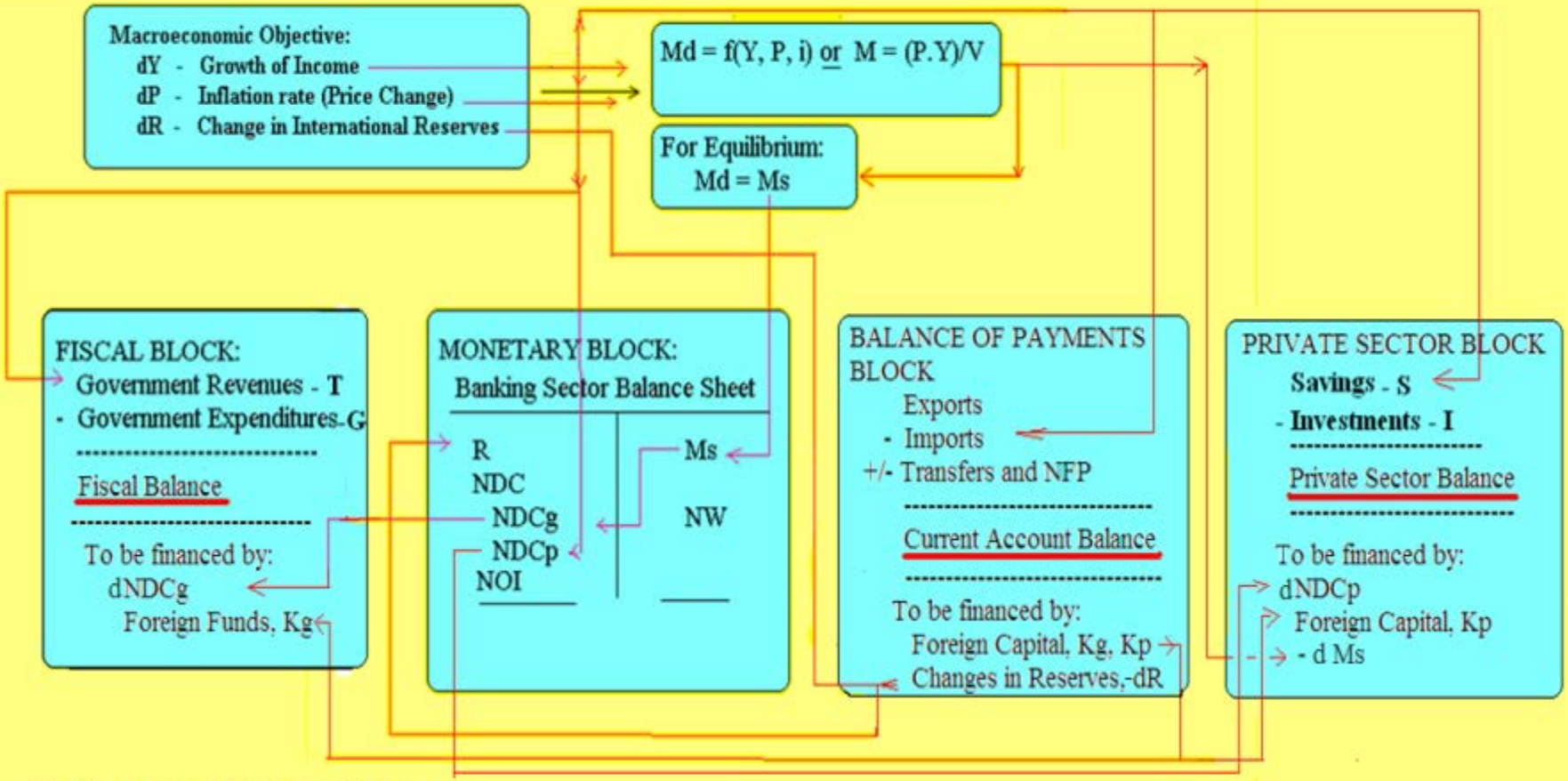
These two Equations can be solved (i.e. a numerical Δy and ΔR can be obtained) in a Simultaneous Mode or in a Recursive Mode:

- Simultaneous mode: The first equation will give Δy (growth rate) for a given y_{-1}, X, and the policies T and G. Then substituting this Δy into the second equation, will give ΔR for a given ΔK (or viceversa).
- Recursive or Programming mode: Set targets for income growth and ΔR and given y_{-1}, X, T and G, through recursive (iterative) solution, calculate ΔK = financing needs. Alternatively, can use same approach to get G [if $Y = f(G, J)$, we can reverse it for $G = f^{-1}(Y_{target}, J)$].

Criticisms of RMSM:

- Difficult to identify the binding constraint a priori.
- Assumes that import constraint as essential for income growth and investments; however, the foreign trade gap can also be closed by exports increases, thereby providing foreign exchange necessary for investment.
- Neglects relative prices and induced substitution effects among production factors (and their possible impact on exports).
- Incomplete: a growth-oriented model with emphasis on a small number of real variables but no government side and no monetary side, hence no use of huge literature on this relation.

C4. Merged IMF-World Bank RMSM+X Model



For the economy to be in equilibrium:

1. **Money supply should not exceed money demand. Otherwise the inflation rate will be higher than dP**
2. **The Fiscal Deficit can not exceed the amount financed by NDCg and Kg**
3. **The Private Sector Deficit can not exceed the amount financed by NDCp, Kp and dMs**
4. **The Current Account Deficit can not exceed amounts financed by K and dR**

These four relations implies that the national identities hold: AD= AS= Y= C+I+G+X-J= C+S+T-TR ; $\Rightarrow$

$$(X - J + TR) = (S - I) + (T - G)$$

$$CAB = PSB + FBB$$

$$(Kg+Kp-dR) = (dNDCp+Kp-dMs)+(dNDCg+Kg)$$

$$dMs = dNDC + dR$$

The IMF Performance criteria include: (i) Maximum size of the fiscal deficit;
(ii) Ceiling on public sector borrowings;
(iii) Minimun international reserves of three months of imports

C4. The Merged IMF-World Bank Model: The RMSM-X Model

- Adds the World Bank's RMSM to the IMF's Monetary Programming model.
- It covers the four major blocks: Monetary, Govt., B/P, and private sector.
- As in the IMF Extended model, relative prices and the exchange rate affect imports and domestic absorption.

Basic Model Equations:

(1) Money supply and domestic credit

$$\Delta M^{s} = \Delta NDC^{p} + \Delta NDC^{g} + \Delta R,$$

with $\Delta NDC^{p} = \theta \Delta Y$ *(Credit proportion for working capital)*

and $\Delta R = E\, \Delta R^{*}$

(2) Money demand

$$\Delta M^{d} = v^{-1} \Delta Y$$

(3) Flow equilibrium of the money market

$$\Delta M^{s} = \Delta M^{d}$$

(4) Government budget financing constraint

$$G - T = \Delta NDC^{g} + \Delta K^{g}$$

(5) Balance of payments

$$\Delta R = X - J + \Delta K$$

with: $\Delta K = E\,\Delta K^{*}$, *and: X is* exogenous.

Nominal imports: $J = J_{-1} + (Q_{J-1} - \eta E_{-1})\Delta E + E_{-1}(\alpha \Delta y + \eta \Delta P_D)$

With (Q) as import volume, (η) price elasticity of imports and (α) income elasticity of imports (see Note 1).

(6) Changes in investments, output and prices

$I/P = \Delta y/\sigma$ where I is Nominal Investment & σ^{-1} is the ICOR

$Y = Py$ where Y & y are Nominal & Real Income

$$\Delta Y = Py - P_{-1}y_{-1} = Py - P_{-1}(y - \Delta y) \approx \Delta P y_{-1} + P_{-1}\Delta y$$

and: $\Delta P = \delta \Delta P_D + (1 - \delta)(\Delta E + \Delta P^{*})$ *(weighting P and P*)*

Where:

δ is the relative weight of domestic goods in the price index

(1- δ) is the proportion of imports (devaluation pass-through effect).

ΔP is domestic inflation and depends on the weighted domestic prices (P_D) and foreign prices (P*)

ΔP^{*} is foreign inflation which is thereafter assumed to be zero.

(7) Private sector budget constraint:

Starting from the national income identities:

$$AD = Y = C^p + I + G + (X - J)$$

$$AS = Y = C^p + S + T - Y_f - TR_f$$

Since AD = AS: $(I-S) + (G-T) = -(X - J + Y_f + TR_f) = CAB$

Since CAB = ΔK - ΔR: $(I-S) + (G-T) = \Delta K - \Delta R$

Since: $\Delta K = \Delta K^p + \Delta K^g$

and: $\Delta R = \Delta Ms - \Delta NDC$

$\Delta Ms = \Delta Md$

$\Delta NDC = \Delta NDC^g + \Delta NDC^p$

Then:

$$(I-S) + (G-T) = \Delta K^p + \Delta K^g - \Delta Md + \Delta NDC^g + \Delta NDC^p$$

Since $(G-T) = \Delta K^g + \Delta NDC^g$ from equation (4)

Then:

$$\mathbf{I - S = \Delta NDC^p + \Delta K^p - \Delta M^d = \Delta NDC^p + \Delta K^p - \Delta M^s}$$

Which defines the private sector budget constraint: The excess of private investments over private savings must be financed from net domestic credit to the private sector (ΔNDC^p), foreign capital for the private sector (ΔK^p), and/or by a reduction in money supply.

Model Consistency

- Another way of looking at the above is to combine the Government and Private Sector budget constraints in equations (4) & (7) to give the overall budget constraint for the economy (or savings-investment balance). This balance relates total savings (public and private) and investments to domestic & foreign financing (ΔNDC^{g}, ΔNDC^{p}, ΔM^{d} and ΔK^{p}).
- In fact, with some transformations, we obtain the sum of equations (4) and (7) as the following:

$$(I-S) + (G-T) = \Delta NDC + \Delta K - \Delta Md$$

Since $\Delta NDC = \Delta Ms - \Delta R$ and $\Delta Md = \Delta Ms$, then:

$$(I-S) + (G-T) = \Delta K - \Delta R = CAB$$

As we saw earlier, this last equation implies that the Monetary and National Income identities do hold (that is, $\Delta M^{d} = \Delta Ms$ and that AS = AD; **I = Σ S**:

$$AD = AS = Y = C^{p} + G + I + (X - J) = C^{p} + S + T - Y_{f} - TR_{f}$$

Footnote 1: Imports under the RMSM-X

$$J = E\,Q_J \qquad (\text{with } P^*_J = 1)$$

J: imports in nominal terns; Q_J : import volume; E : nominal exchange rate

- Changes in import volume depend on the change in real income (Δy) and the relative price of domestic and foreign goods:

$$\Delta Q_J = \alpha \Delta y + \eta[\Delta P_D - (\Delta E + \Delta P^*)]$$

$\eta > 0$: import elasticity to relative price changes.

- Nominal value of imports: $\Delta J \cong Q_{J-1}\Delta E + E_{-1}\Delta Q_J$

so that: $J = J_{-1} + (Q_{J-1} - \eta E_{-1})\Delta E + E_{-1}[\alpha \Delta y + \eta(\Delta P_D - \Delta P^*)]$

- With Q_{J-1} relatively small, a devaluation in the nominal exchange rate ($\Delta E > 0$) will lower the nominal value of imports, improve the trade balance and thus increase official reserves.
- The last term of the equation can be dropped if we assumed that foreign inflation is small.

Structure of the Merged Model:

Target Variables: $\Delta y, \Delta P_D, \Delta R$

Endogenous Variables: $\Delta Y, \Delta NDC^p, \Delta M, \Delta P, \Delta J, T$

Exogenous Variables: $X, \Delta K = \Delta K^p + \Delta K^g$

Policy Instruments: $\Delta NDC^g, \Delta E$, and G

Predetermined: y_{-1}, P_{-1}

Parameters: money velocity (ν), devaluation pass-through (δ), coefficient of credit proportion for working capital (θ), price elasticity of imports(η), income elasticity of imports (α), incremental capital-output ratio(σ^{-1}), marginal propensity to save (s).

Solution of the Merged Model:

- Objective is to relate targets, exogenous variables, and policy instruments to find the equilibrium values for $\Delta y, \Delta P_D$ and ΔR (in which Md=Ms and I=ΣS).
- Starting with the private sector budget constraint (7) in the Basic Model,

  $S - I = \Delta M^d - \Delta NDC^p - \Delta K^p$ But since $S = Y - C^p - T$:

  Then: $(Y - C^p - T) - I = \Delta M^d - \Delta NDC^p - \Delta K^p$

  Since $C^p = (1 - s)(Y - T)$ where s is the marginal propensity to save.

  Then: $I = s(Y_{-1} + \Delta Y - T) + \Delta NDC^p + \Delta K^p - \Delta M^d$ but since $\Delta M^d = v^{-1}\Delta Y$

  Then: $I = s(Y_{-1} + \Delta Y - T) + \Delta NDC^p + \Delta K^p - v^{-1}\Delta Y$
- Re-arranging and using credit to private sector, $\Delta NDC^p = \theta\Delta Y$, and assuming $\boldsymbol{\tau = s + \theta - v^{-1}}$ is positive (or $v(s + \theta)>1$), we obtain the target equations of the Merged Model by substitutions in the Basic Model equations.

Target Equations of the RMSM-X Model

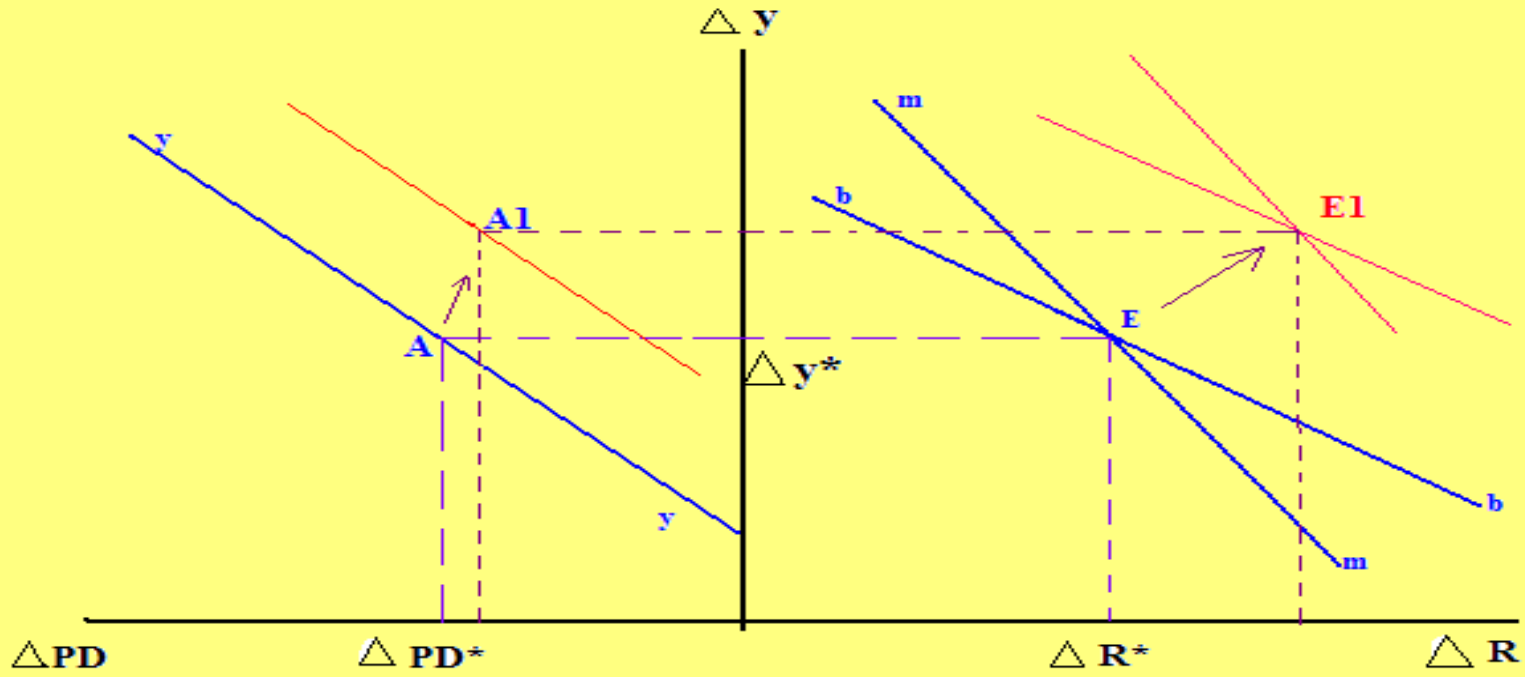
$$(1)\quad \Delta P_D = \frac{-\kappa + (\sigma^{-1} - \tau)\Delta y}{\delta \tau y_{-1}} - (1 - \delta)\delta^{-1}\Delta E \qquad (yy)$$

where: $\kappa = sY_{-1} + (1 - s)T - G + \Delta K + \Delta NDC^g$

$$(2)\quad \Delta R + (\tau - s)(y_{-1}\delta \Delta P_D + \Delta y) = -(\tau - s)\, y{-}1\, (1 - \delta)\, \Delta E - \Delta NDCg \qquad (mm)$$

$$(3)\quad \Delta R = X - J_{-1} - (Q_{J-1} - \eta E_{-1})\Delta E - E_{-1}(\alpha \Delta y + \eta \Delta P_D) + \Delta K \qquad (bb)$$

- Equation (1) relates ΔP_D and Δy based on equilibrium in the goods market (equation (7) of the Basic Model with I=ΣS) (the yy curve in the chart)
- Equation (2) relates ΔR and Δy based on equilibrium in money markets (equation (3) of the Basic Model with Md=Ms) (the mm curve in the chart)
- Equation (3) also relates ΔR and Δy but based on equilibrium in the balance of payments (equation (5) of the Basic Model) (the bb curve in the chart)
- These equations can be solved in a simultaneous or in a recursive basis.
- From these equations, one can see that a change in the policy instruments (G, ΔNDCg and ΔE) changes the equilibrium solution for Δy, ΔP_D and ΔR



Equilibrium in the RMSM-X Model

- The above chart shows the simultaneous solution for the RMSM-X at equilibrium points E-A (giving Δy^*, ΔP_D^* and ΔR^*)
- If the decision makers want to change the solution from points E-A to points E1- A1, this can be achieve through a combination of changes in the exogenous policy variables G, ΔNDCg and ΔE.
- But to achieve final equilibrium, all these policy variables need to be adjusted.

Principles of Recursive (Programming) Solution

- Income growth (Δy), domestic price level (ΔP_D), and reserves (ΔR) are targets.
- Policy Instruments are the government budget (G), the exchange rate (ΔE), and net credit to the government (ΔNDC^g)
- To increase output, lower inflation, and increase reserves $\Rightarrow$ reduce government spending, G, devalue exchange rate, E *or* lower NDC^g.
- ***Other examples of analysis:***
- Increasing NDC (domestic credit) to achieve higher growth will just result in higher inflation: $\delta y/\delta NDC > 0$; *but* $\delta P_D/\delta NDC > 0$
- To get higher reserves, reduce income growth and/or domestic credit, and devalue: $\delta R/\delta y < 0$; $\delta R/\delta NDC < 0$;
- To achieve higher reserves, lower Government spending:

$$\delta R/\delta G < 0$$

General characteristics of the RMSM-X model:

- Consists of four economic sectors: the public sector, the private sector, the consolidated banking system, and the external sector.
- Each sector is subject to its own budget constraints.
- National accounts, derived via aggregation of the sectoral budget constraints, serve to close the RMSM-X model.
- Two types of financial assets (money and foreign assets) in a standard model. For middle-income countries, some models include bonds.
- The money demand function frequently follows Polak Model in assuming constant income velocity of money.
- Some models disaggregate the banking system structure: instead of M^s = NDC + R, M^s is rather obtained as the product of the **monetary base** and a **constant money multiplier**.
- Imports consist of several categories with the demand for imports a function of the real exchange rate and either real GDP or gross domestic investment (for imports of equipment).
- Consumption is generally assumed to depend only on disposable income -- thereby excluding consumption-smoothing effects.
- Investments is based on a simple ICOR formula

Steps to Carry out Monetary Programming

(1) Evaluate Economic Problems: nature/source of imbalances.

(2) Identify exogenous factors: world economy/trading partners.

(3) Set preliminary targets for the objectives of the country in terms of (a) GDP growth, (b) inflation and (c) level of International Reserves and set a preliminary policy package for other variables.

(4) Formulate a monetary program: money demand, banking sector.

(5) Prepare a balance of payment forecast: exports, imports, capital.

(6) Prepare a fiscal budget forecast: Govt revenues, expenditures.

(7) Prepare the private sector block balance, calculating investment requirements, given estimates of ICOR and income growth rate.

(8) Ensure consistency of forecasts with accounting and behavioral identities, through a recursive (iterative) process until you reach a fully consistent program, including external financing from IFIs.

(9) Review the conditionality attached to required external financing (IMF, IBRD), and decide how to monitor the program: prior actions, performance criteria, structural benchmarks, reviews.

Policy Options if the RMSM-X Model shows a Fiscal Gap

- If the fiscal deficit is higher that the amount of financing available, the Government has only four alternative policy options:
  1. To reduce Government expenditures
  2. To increase Government revenues
  3. To change other conditions in the economy to yield a larger volume of financing to the Government, such as: reduce credit to the private sector, increase money demand (by increasing growth, reducing interest rates and allowing higher inflation).
  4. To print money, which will lead to inflation.
- The "quality" of the measures to be taken to achieve a reduction in the deficit and achieve equilibrium is fundamental for the economic, social and political sustainability of the program.

Measures to Improve the Fiscal Budget:

Goal: To achieve and sustain Price stability and Foreign Exchange stability, through the elimination of Fiscal Deficits.

- Improve Government Revenues:
  - Improve Tax Structure -- Introduce VAT, excise taxes
  - Increase the Tax Base -- Tax all sectors, inc. agriculture
  - Improve Tax Administration -- focus on large taxpayers
  - Eliminate Tax Exemptions -- Eliminate privileges/subsidies
  - Improve Cost Recovery of Public Services - Inc. Power tariffs
- Improve Management of Public Expenditures:
  - Reduce Current Expenditures of Government -- Reduce Government Size
  - Improve Treasury Operations -- introduce Information systems
  - Reform the Pension System -- introduce fully funded systems
  - Eliminate Subsidies to Public Enterprises
- Decentralize Public Services to local Governments
  - Transfer responsibilities and financing to local Govts.

EGYPT's RMSM-X MODEL

Market for goods and services: GDP = CP + CG + IP + IG + X - M

Money Supply M2 = DTG + DTO + DTP + CUP

DTG = (I +gDTG) * DTG-l

DTO = (1 +gDTO) * DTO1

DTP = (I +gDTP) * DTP,

CUP = (I +gCUP) * CUP.,

Money Demand: M2 = pGDP *GDP / v

Bond market ABP = aBG

Domestic credit market CR = CRG + CRP + CRO

Foreign credit market AFT = AFGI + APGU + AFM + AFO + AF

Exchange Rate: e = pGDP - pM + ADDe0

Deflator for Consumer Exp: $p^{cp} = (p^{GDP}GDP + P^{m}M - p^{x}X - p^{1}l)/ CP$

Private consumption: CP = + gSIYb + j22(inCP_, - ao - a,InYD)

Export market : XV=00 + #3GDP + (32(pXm-pG6P)

Total imports: M = MFO + MOC + MCA + MIN + MPE + MNF

MFO = MFO, * (CPICP,)F * (q/q-1)OF

MOC = MOC-. * (CPICP-1) oc * (qIq/q)'Oc *XtI.X.I)"

MCA = MCA1 . (111,/)" * (q/9q_t),CA

MIN = MIN * (GDPIGDP,)EGDP * (q/q-)VJN

MPE = (1 +gMPE) MPE_,

MNF = (1+gMNF) MNF-,

Government Revenues: TD + TI + NTR + NTRpaut - Cg - PFg – iPYMTg - SUB – GASC = Ig + NKIg + AREXPg + dDTDg – KOG - DIVo - INVRECt - KTpg - dAFg - dCRg - AFdsocsec - dBpg

Government Consumption: CG = (1 'gCG)' CG.,

Government Investments IG = v * (GDP * pGDP) /pl

Commodity Price projections: pMFO = e ' pMFO

pMOC = e'pMOC

pMCA = e pMCA

pMIN = e pMlN

Expenditures deflator: II = pMCA4Psc *pGDP(-sca

Private Expend Deflator: pCP = (pGDP*GDP +pM.M -pX.X -p!I1)/ CP

Reserves: RES = caMC/12

Foreign capital KFS = (I-6)KFS_. + KF,

FS = pl [(I-5) KF-1 + K_

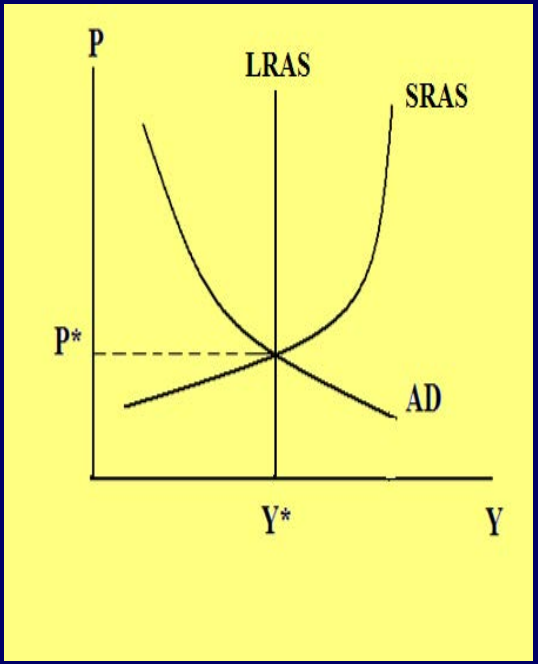
FS = Pl [(l -5)FS-X + F.]

Profit Rermitances: PRM = USLIBR * FS + ADDPRM

Investments: ICOR = I^{-1} /(y - y^{-1})

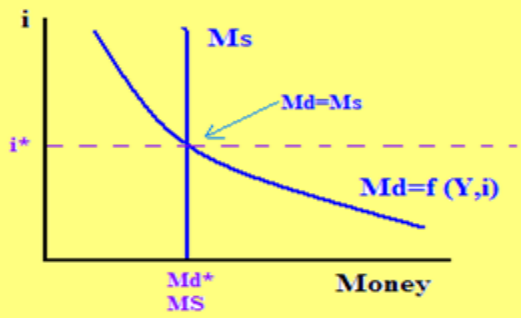
Aggregate Demand-Aggregate Supply (AD-AS) Models

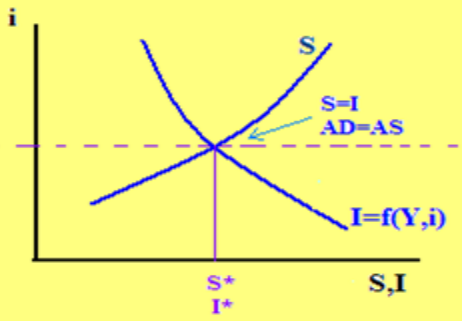
- The Typical RMSM-X model has a very simple Aggregate Supply (ICOR; AS=Y= C+S+T-Y_f-TR_f). It ignores the effects on the supply of goods of such factors as domestic prices, labor wages, employment levels, level of capacity utilization, and the effects of total factor productivity growth.
- AD-AS models with more elaborated Supply Functions have been used to permit setting a relationship between AS and Prices. They also include more elaborated effects of Prices on Money Demand and Aggregate Demand.

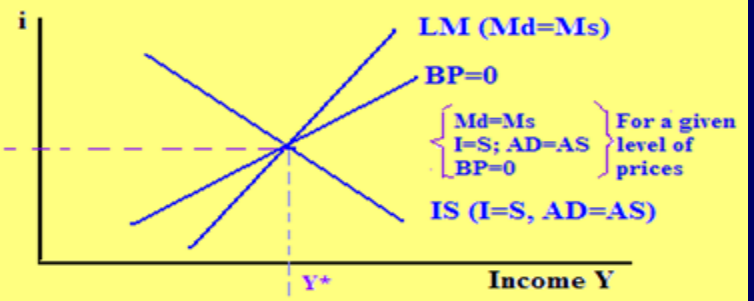


- Overall equilibrium occurs where AD=AS, thereby establishing the equilibrium level of Income and Prices (Y*,P*), and the wage rate, the level of employment, along with the values of all the other economics variables obtained from the RMSM-X model.
- But due to poor supply-side data in EMs, these AD-AS models are only occasionally used by the IFIs.

Note : The RMSM-X model seeks equilibrium in the money markets (Md=Ms), the goods market (I=ΣS, AD=AS), the BoP, and the Government accounts. It is a variant (and competitor) of the original IS-LM/Mundell-Fleming model (shown below) for open economies, but with ΔY-ΔR and ΔY-ΔP$_D$ in the axis.



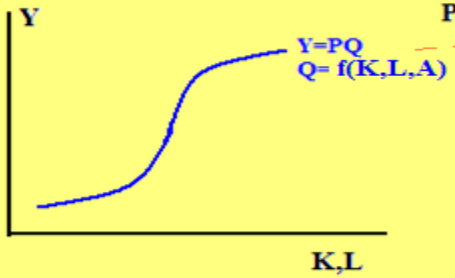


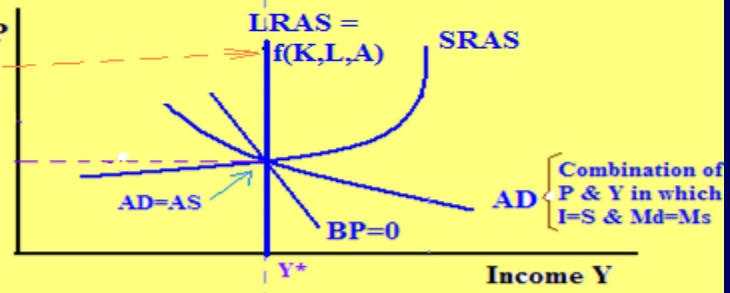


Ms↓ i↑ I↓ Y↓ S↓ →With new Y*

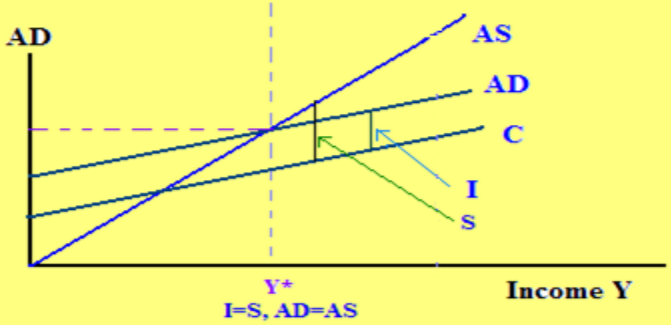
But: Y↓ Md↓ i↓ I↑ Y↑

On the long-term, back to equilibrium.





The equilibrium income level Y* may not coincide with full employment income Yf. In this case, Keynes postulated that the government should increase I (i.e.,G) until Yf is reached.
Hopefully, interest rate would not vary due to a liquidity trap. The IS-LM curves would just move to the right, at highest levels of Md, Ms, I and S.



The IS-LM/Mundell-Fleming Model

Use of the Monetary Programming Model to Derive Consistent Equilibrium Exchange Rates

1. From the Monetary Block (in local currency): $\Delta R = \Delta Ms - \Delta NDC$
2. From the B/P Block (in $): $\Delta R = (X-J) + Y_f + TR_f + \Delta FDI + NFB - CBB$
3. From the Real Sector: $GDP = C + I + G + E\ (X - J)$

$$\Delta Ms - \Delta NDC = E\ \{(X-J) + Y_f + TR_f + \Delta FDI + NFB - CBB\} \qquad (1)$$

$$E = \frac{\Delta Ms - \Delta NDC}{(X-J) + Y_f + TR_f + \Delta FDI + NFB - CBB} \qquad (2)$$

To introduce equilibrium in the real sector:, from equation (1):

$$\Delta Ms - \Delta NDC = E\ (X-J) + Se\{Y_f + TR_f + \Delta FDI + NFB - CBB\}$$

Since: $E\ (X - J) = GDP - C - I - G$, then:

$$\Delta Ms - \Delta NDC = (GDP - C - I - G) + E\ \{Y_f + TR_f + \Delta FDI + NFB - CBB\}$$

And:

$$E = \frac{\Delta Ms - \Delta NDC - (GDP - C - I - G)}{Y_f + TR_f + \Delta FDI + NFB - CBB} \qquad (3)$$