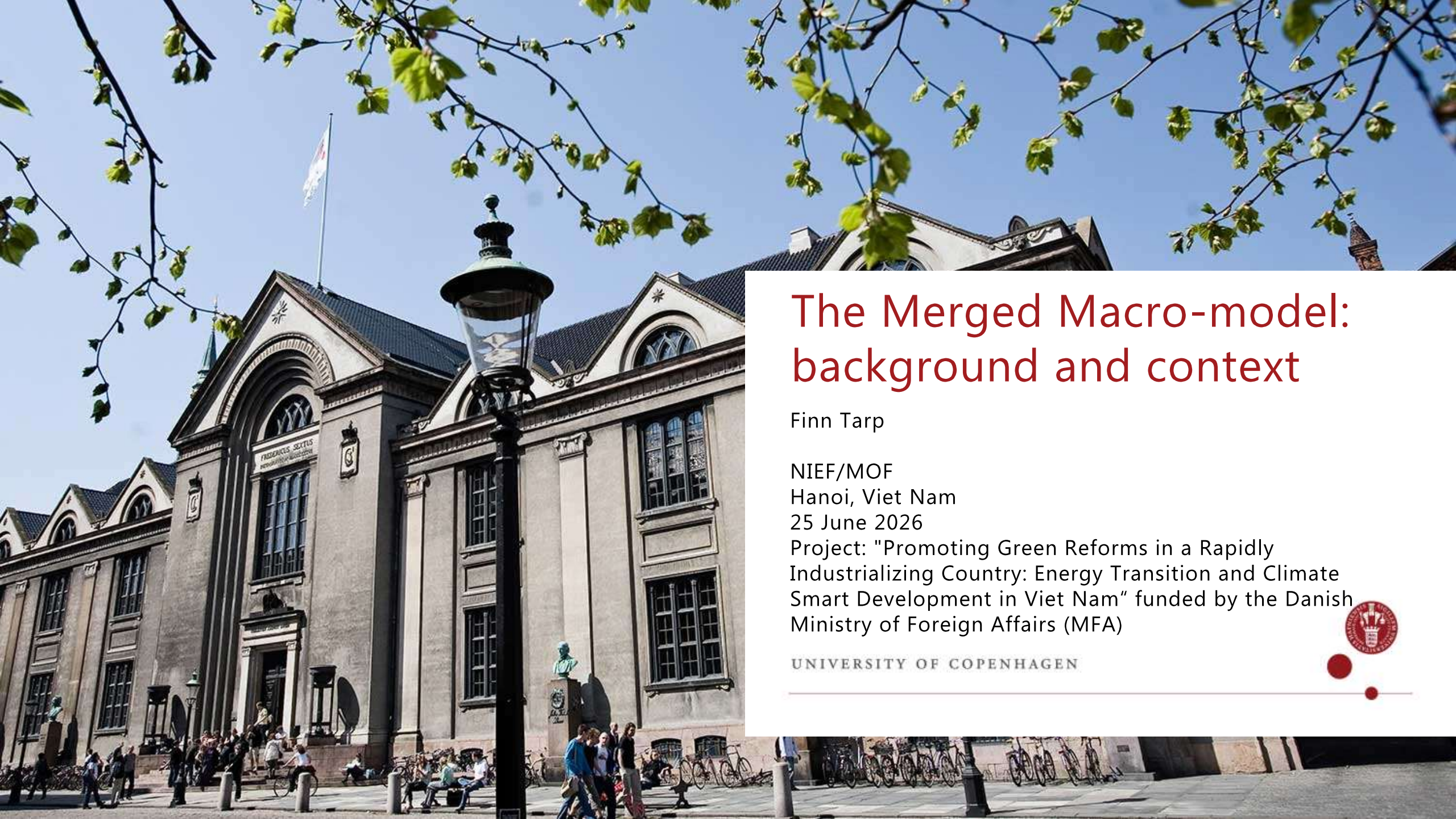




The Merged Macro-model: background and context

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Project: "Promoting Green Reforms in a Rapidly
Industrializing Country: Energy Transition and Climate
Smart Development in Viet Nam" funded by the Danish
Ministry of Foreign Affairs (MFA)

UNIVERSITY OF COPENHAGEN



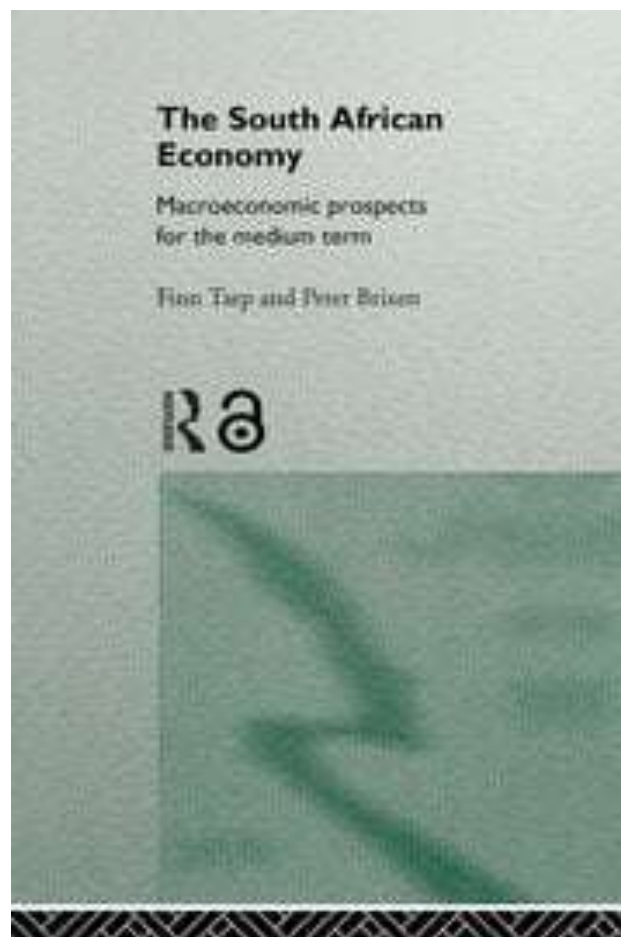
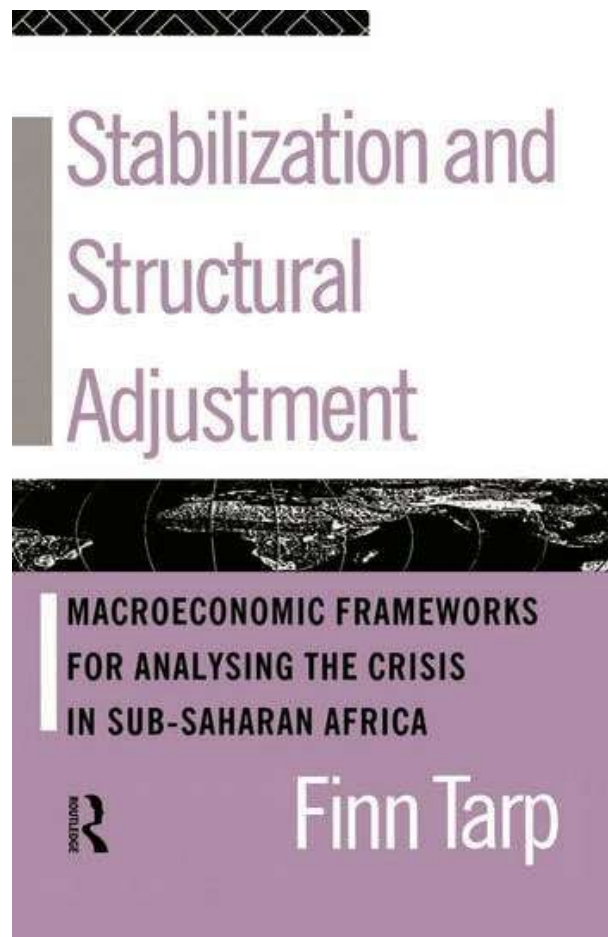
The 14th National Party Congress

- Viet Nam at a crucial ‘fork in the road’
- Goal: Become an upper-middle income country by 2030, and a developed high-income country (HIC) by 2045
- But some signs of falling into ‘the middle-income trap’
- Guiding Party resolutions focus on:
 - (i) streamlining the Party-State apparatus ([Resolution 60/NQ-TW](#)),
 - (ii) reform of legal and governance systems ([Resolution 66/NQ-TW](#)),
 - (iii) promotion of a private sector-led economy ([68/NQ-TW](#)),
 - (iv) science, technology, and digital transformation ([57/NQ-TW](#))
 - (v) deeper international integration ([59/NQ-TW](#)), including raising the importance of foreign affairs within the Party, and
 - (vi) [Resolution 79/NQ-TW](#) for development of the state-owned economy 2026-2030 period
- Viet Nam has also set an ambitious goal to achieve 10% average annual growth for the 2026-2030 period
- This high-growth target, highlighted by top leadership, focuses on driving industrialization, digital transformation, and infrastructure development
- Highly ambitious
- Analysts must help clarify what it would take in the context of consistent macroeconomic projections considering:
 - Investment needs
 - Financing (from different sources)
 - And what we know about the Vietnamese economy when it comes to key characteristics and parameters

Some modelling questions

- What kind of data and models are around?
- As an aside: Do we have an inventory in Viet Nam?
- I know of:
 - Data frameworks: SUT, IOT, SAM
 - Multiplier models
 - CGE models (static)
 - And macro-econometric models
- What type of model do we need to address the kinds of questions just referred to
- Investment needs
- Financing (from different sources)
- A real-monetary macro-model
- Is there a useful tool available?

Some earlier work



- The 2003 Merged Model for Viet Nam
- Model documentation and interactive excel workbook available
- The Vietnamese Socio-economic Development Plan (SEDP) Revisited: Application of the 2003 Merged Model for Viet Nam – detailed study available

Model documentation includes



The 2003 Merged Model equations for Viet Nam



Initialization and calibration based on a financial 2003 SAM framework and an auxiliary 2002-3 data set



Describes four main sectors of the model, including (i) goods market and private sector budget, (ii) government budget, (iii) money market, and (iv) balance of payments



Demonstrates initialization and solution of individual (exogenous and endogenous) variables



Calibration of parameter values presented and the validity of the calibrated model parameters for the creation of future economic projections discussed with reference to historical time series data



Benchmark growth paths for four (intermediate target) focal variables, including real government consumption, government domestic credit, private domestic credit, and private net foreign debt, discussed with reference to historical time series data

2007 application: SEDP 2006-10



Sets out a so-called 'SEDP Base Scenario', based on constant calibrated Merged Model parameter values



The base scenario turned out to be internally inconsistent, the four model-specific focal variables did not match with each other



Dynamic (time-dependent) adjustments to parameter values subsequently allows for the derivation of the 'SEDP Consistent Scenario', which internally consistent



Necessary parameter adjustments provide an indication of the structural assumptions underlying the SEDP development plan



Specifies underlying economic assumptions (think!)

Fast forward to 2025

- Developments after the 2007 work:
- Data updating plus ESAM, CGE applications – but what happened to the merged macro model?
- The Danish Ministry of Foreign Affairs (MFA) approved new project with UCPH-DERG, NIEF, IPSS and ISPAE
- 2 years
- Key elements
- Data
- Two models:
 - Updated merged model
 - Dynamic CGE
- Policy papers

Point of Departure

- Simpler is better!
- The minimum: An economy with four sectors:
 1. The private sector (P)
 2. Government (G)
 3. The monetary system (MS)
 4. Rest of the world (ROW)
- Which are the budget constraints of these sectors - remember throughout:
 - Savings plus loans = increase in physical and financial assets
 - Income from production plus net transfers = expenditures plus savings
 - Examples (with reference to P, G, MS and ROW) – see next slide

Examples of budget constraints

Private sector (savings + loans = increase in assets):

$$S_p + \Delta DC_p = I_p + \Delta M + \Delta NPB_g + \Delta NFA_p$$

$$\Rightarrow S_p - I_p = \Delta M + \Delta NFA_p + \Delta NPB_g - \Delta DC_p$$

Government (savings + loans = increase in assets):

$$S_g + \Delta DC_g + \Delta NPB_g = I_g + \Delta NFA_g$$

$$\Rightarrow (S_g - I_g) = \Delta NFA_g - \Delta NPB_g - \Delta DC_g$$

Monetary system (has neither income nor savings) (assets = liabilities):

$$\Rightarrow \Delta DC + \Delta R = \Delta M$$

Foreign sector savings (having netted out external sector borrowing) = decrease in assets:

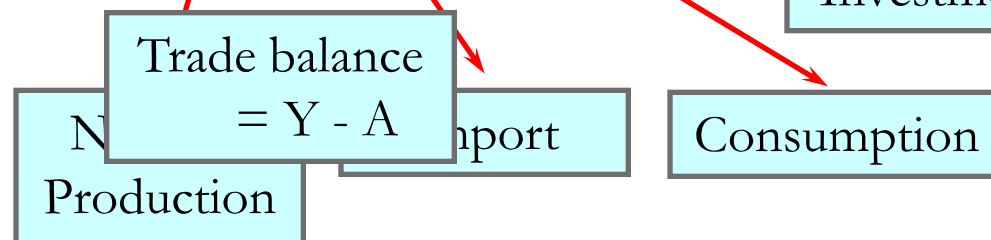
$$S_f = -(\Delta NFA_g + \Delta NFA_p + \Delta R)$$

$$\Rightarrow \text{Current account } CA = X - Z - INP + NTR = \Delta NFA + \Delta R$$

Now we turn to key Basic Macroeconomic Accounting Identities (1)

Material balance:

- $Y - Z = C + I + X$
- $X - Z = Y - (A = C + I)$



Y = Production
 C = Consumption
 I = Investment
 X = Export
 Z = Import
 A = Absorption

Basic Macroeconomic Accounting Identities and Economic Policies (2)

- **Material balance:**
- $Y + Z = C + I + X$
- $X - Z = Y - (C + I)$
- $X - Z = Y - A$

- **Savings-investment gap:**
- $X - Z = Y - A = S - I$

Y = Production

C = Consumption

I = Investment

X = Export

Z = Import

A = Absorption

Basic Macroeconomic Accounting Identities and Economic Policies (3)

- Material balance:**

- $Y + Z = C + I + X$
- $X - Z = Y - (C + I)$

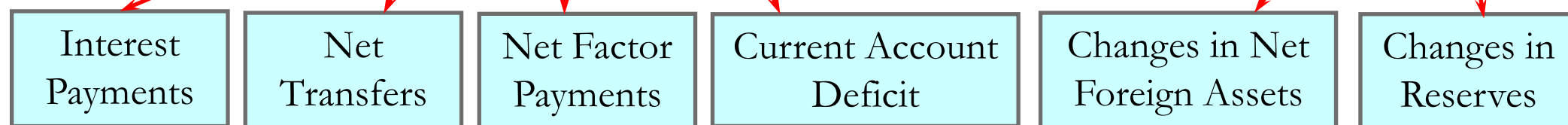
Y = Production
C = Consumption
I = Investment
X = Export
Z = Import

- Savings-investment gap:**

- $X - Z = S - I$

- Balance of payments:**

- $X - Z = (INP - NTR - NFP) + CURBAL = (INP - NTR - NFP) + \Delta NFA + \Delta R$



Basic Macroeconomic Accounting Identities and Economic Policies (4)

- **Material balance:**

- $Y + Z = C + I + X$
- $X - Z = Y - (C + I)$

- **Savings-investment gap:**

- $X - Z = S - I$

Y = Production
C = Consumption
I = Investment
X = Export
Z = Import

- **Balance of payments:**

- $\Delta M + \Delta DC + \Delta R = (INP - NTR - NFP) + \Delta NFA + \Delta R$

- **Monetary balance:**

- $\Delta R = \Delta M - \Delta DC$

III: Thinking about macro policy

POLICY NOTES & DISCUSSION (WHAT TO DO WHEN IMBALANCES ARISE)

Goods that are consumed or invested (A) must come from domestic production or ROW. If production not big enough $\Rightarrow Z > X$ means resource balance vis-à-vis ROW negative. Is A too high or is incentive to export too low? Or try increase Y ? etc.

$$1. \quad C + I = Y + Z - X \text{ (or } Y = C + I + X - Z = A + X - Z)$$

$$2. \quad X - Z = Y - A$$

If savings ($S = Y - C$) is too low we cannot finance I , and either foreign financial resources must close $S-I$ gap or savings must increase - financial policies (interest increases) and liberalization often in focus (also squeeze I - but be careful!)

$$3. \quad (Y - C) - I = S - I$$

$$4. \quad S - I = (S_p - I_p) + (S_g - I_g)$$

Government and fiscal policy as the cause and solution, how finance government deficit? Is a balanced budget required?:

$$5. \quad (S_g - I_g) = \Delta NFA_g - \Delta NPB_g - \Delta DC_g$$



POLICY NOTES - CONTINUED

Monetary balance and policy: inflow of real resources from ROW depends on CA (debt relief, foreign aid can help close)

$$6. CA = X - Z - (INP - NTR) = \Delta NFA + \Delta R$$

Next equation similar to equation 5 but for private sector (note ΔM because people hold money)

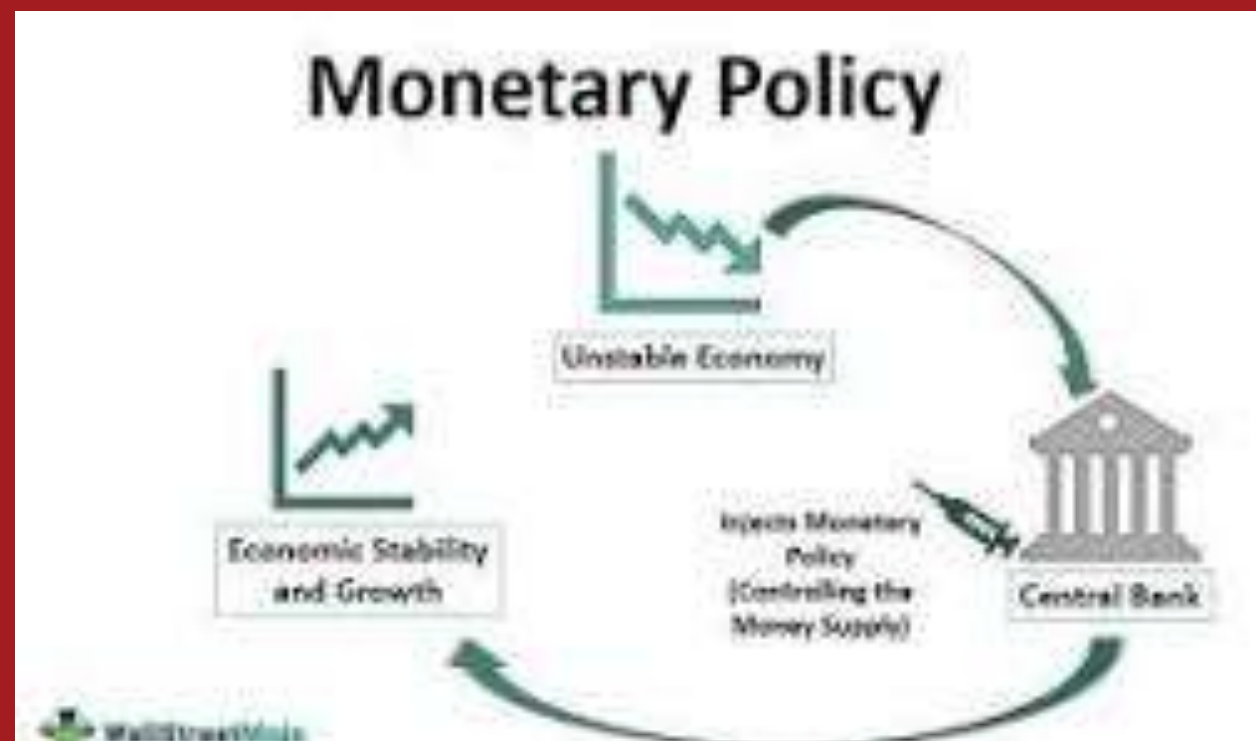
$$7. Sp - Ip = \Delta NFAp + \Delta NPBg + \Delta M - \Delta DCp$$

Lack of balance between absorption and production can lead to inflation so problem may be too liberal credit expansion

$$8. (Sg - Ig) + (Sp - Ip) = \Delta NFA + \Delta M - \Delta DC$$

International reserves will fall if credit expansion bigger than monetary demand – so how to address BOP problems

$$9. \Delta R = \Delta M - \Delta DC$$



THINK VIET NAM TODAY

- We need to achieve 10% growth
- We need investment resources
- We need to finance investment
- Domestic policy (think closed economy) – what can be done?
- Open economy (what is added?)
- The role of disaggregation (agri, industry, services)
- Additional financial and real resources can be mobilised
- What if we add the “green reform dimension”

IV. Data framework: from SUT, IO to SAMs

What is a SUT and IO?

- **SUTs** describe how products (goods and services) are brought into an economy
- Either as a result of domestic production or imports from other countries in the supply table
- And how those same products (intermediate consumption; final consumption by households, non-profit institutions serving households, and general government; gross capital formation, and exports) are used in the use table
- **IO** functions as a double-entry matrix (of widely varying size depending on the level of aggregation)
- Breaking down the economy by rows and columns
- Columns (inputs) are read vertically, and they show *what* raw materials, services, and labour an industry purchases from other sectors to produce its own goods
- Rows (outputs) are read horizontally, and they show *whom* an industry sells its products to (either as “intermediate inputs” for other businesses or to “final demand” like households and exports)

Moving on to SAMs

- SUTs and IOTs provide a detailed picture of the structure of the economy but they do not show the interrelationship between Gross Value Added (GVA), final uses and incomes.
- By extending SUTs with institutional sector accounts, the entire circular flow of income can be shown in a **SAM**.
- A SAM is a means of presenting national accounts data in the form of a matrix
- So, the SAM is a square matrix in which each account is represented by a row and a column
- Each cell shows the payment from the account of its column to the account of its row
- The SAM allows for extensions of the national accounts, providing for a fuller understanding of the socioeconomic system that captures the interdependencies of institutional groups
- In other words, SAMs provide both a conceptual framework and a detailed data system
- A SAM can support analyses of socioeconomic policy issues and it can also be used to evaluate the socioeconomic impact of exogenous changes.

The SAM data framework

- SOCIAL ACCOUNTING MATRICES (SAMs)
 - Overview – the basic idea
 - The individual cells
 - Macroeconomic accounting identities in a SAM context

Simple Open Economy Real SAM

	GOODS	AGENTS	S-I	ROW
GOODS		C	I	$E \cdot X$
AGENTS	GDP			
S-I		S		$E \cdot \text{CURR}$
ROW	$E \cdot Z$			

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acct.	-	S_h	S_g	-	S_f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expendi- ture	Expenditure	Invest- ment	ROW	

Additional variables

S_h = Private Savings

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acct.	-	S_h	S_g	-	S_f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expendi- ture	Expenditure	Invest- ment	ROW	

Additional variables

S_g = Government Savings

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acct.	-	S_h	S_g	-	S_f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expendi- ture	Expenditure	Invest- ment	ROW	

Additional variables

T = Tax Payments

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acct.	-	S_h	S_g	-	S_f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expenditure	Expenditure	Investment	ROW	

Additional variables

S_f = Foreign Savings

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acc.	-	S_h	S_g	-	S_f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expendi- ture	Expenditure	Invest- ment	ROW	

Additional variables

G = Government Spending

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acc.	-	S _h	S _g	-	S _f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expendi- ture	Expenditure	Invest- ment	ROW	

Accounting Identities:

Mat. Bal.

$$Y + Z = C + G + I + X$$

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acc.	-	S_h	S_g	-	S_f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expendi- ture	Expenditure	Invest- ment	ROW	

Accounting Identities:

Income

$$\mathbf{C + T + S_h = Y}$$

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acc.	-	S_h	S_g	-	S_f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expendi- ture	Expenditure	Invest- ment	ROW	

Accounting Identities:

Govt. Budget

$$\mathbf{G} + \mathbf{S_g} = \mathbf{T}$$

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acc.	-	S_h	S_g	-	S_f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expendi- ture	Expenditure	Invest- ment	ROW	

Accounting Identities:

Saving-Investment

$$\mathbf{I} = \mathbf{S_h} + \mathbf{S_g} + \mathbf{S_f}$$

Social Accounting Matrices (SAMs)

			<u>Expenditures</u>			
<u>Receipts</u>	1	2	3	4	5	Total
1. Suppliers	-	C	G	I	X	Demand
2. Households	Y	-	-	-	-	Income
3. Government	-	T	-	-	-	Receipts
4. Capital Acc.	-	S_h	S_g	-	S_f	Savings
5. Rest of World	Z	-	-	-	-	Imports
Total	Supply	Expendi- ture	Expenditure	Invest- ment	ROW	

Accounting Identities:

Trade Balance **$X + S_f = Z$**

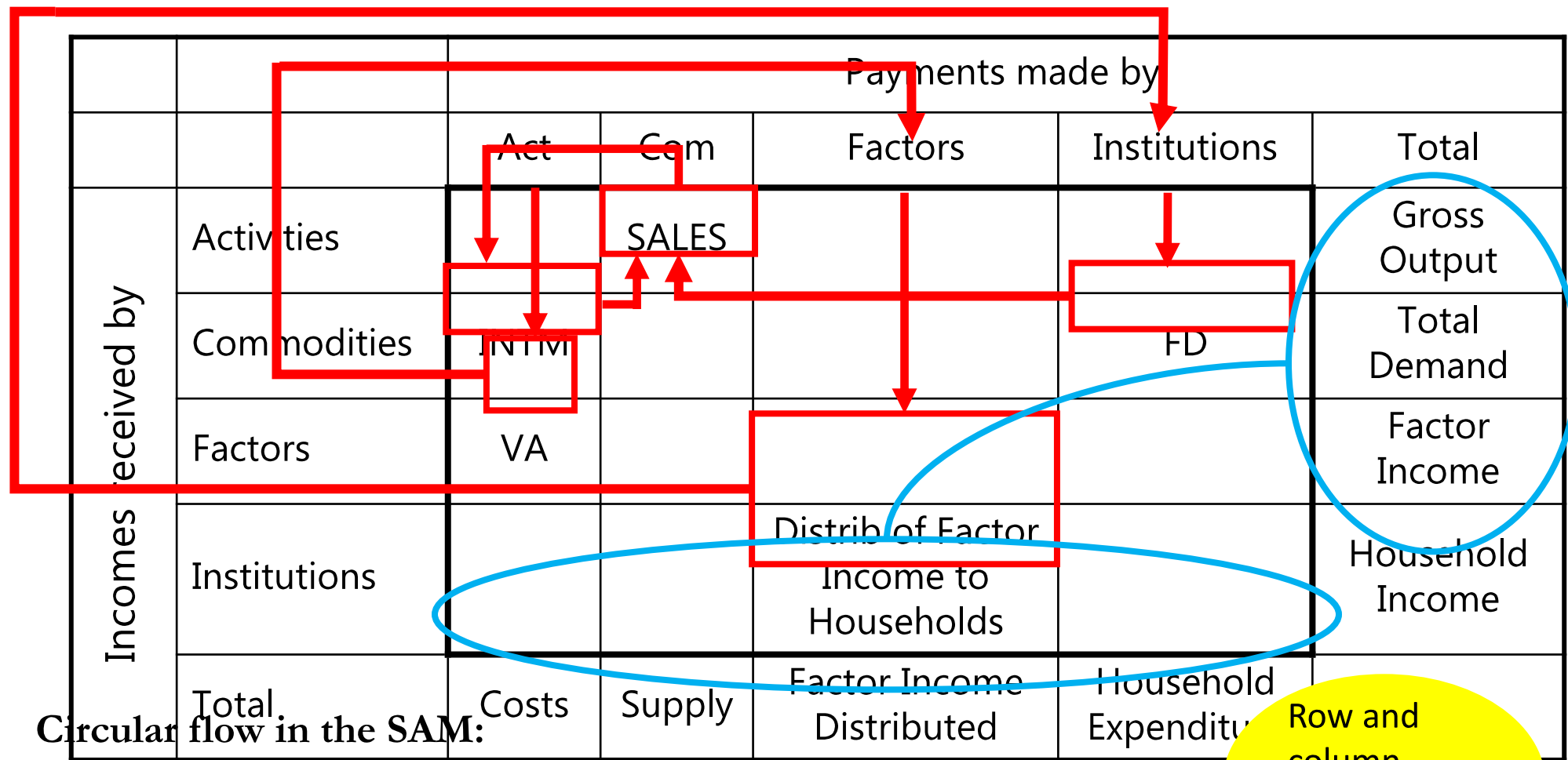
Standard SAM Accounts

- Productive Activities/Industries/Sectors
- Products/Commodities/Markets
- Factors of production
- Institutions
- Accumulation/Savings-Investment

Further disaggregation of **ALL** of these accounts

START: A SIMPLE SOCIAL ACCOUNTING MATRIX FRAMEWORK (no Savings=Investment)

SAM: note distinction between activities and commodities (from IO to SUT)



Activities pay Factors which pay Households which pay Commodities which pay Activities

Row and column totals must be equal

A Standard MacroSAM and National Accounts

- Remember GDP can be calculated in 3 ways
- Here we do the same in the context of a Standard MacroSAM
- "Standard" means commonly used by many SAMs → more complicated!
- Many other descriptives can be derived

	ACT	COM	FAC	HHD	GOV	ACC	ROW	TOTAL
ACT		Domestic Sales						Activity Incomes
COM	Intermediate inputs			C Private consumption	G Government consumption	I Gross Capital Formation	E Exports	Total Demand
FAC	VA added						Fact. Incomes Received	Factor Incomes
HHD			Income Distribution		Transfers to Households		HHD Foreign receipts	Household Incomes
GOV	T_a Net Taxes on Production	T_c Net taxes on products		Direct taxation			Govt. Foreign receipts	Govt. Income
ACC				Private Savings	Government Savings		Foreign Savings	Total Savings
ROW		M imports	Fact. Incomes paid abroad	Private For. transfers	Govt. Foreign transfers			Foreign Payments
TOTAL	Costs	Supply	Use of Factor Income	Use of HHD income	Use of Govt. Income	Total Investment	Foreign Receipts	

- SAM is consistent with National Accounts
- Can derive various measures of GDP

GDP @ factor cost

$$GDP_{fc} = VA$$

GDP @ basic prices

$$GDP_{bp} = VA + T_a$$

GDP income measure @mrk pr

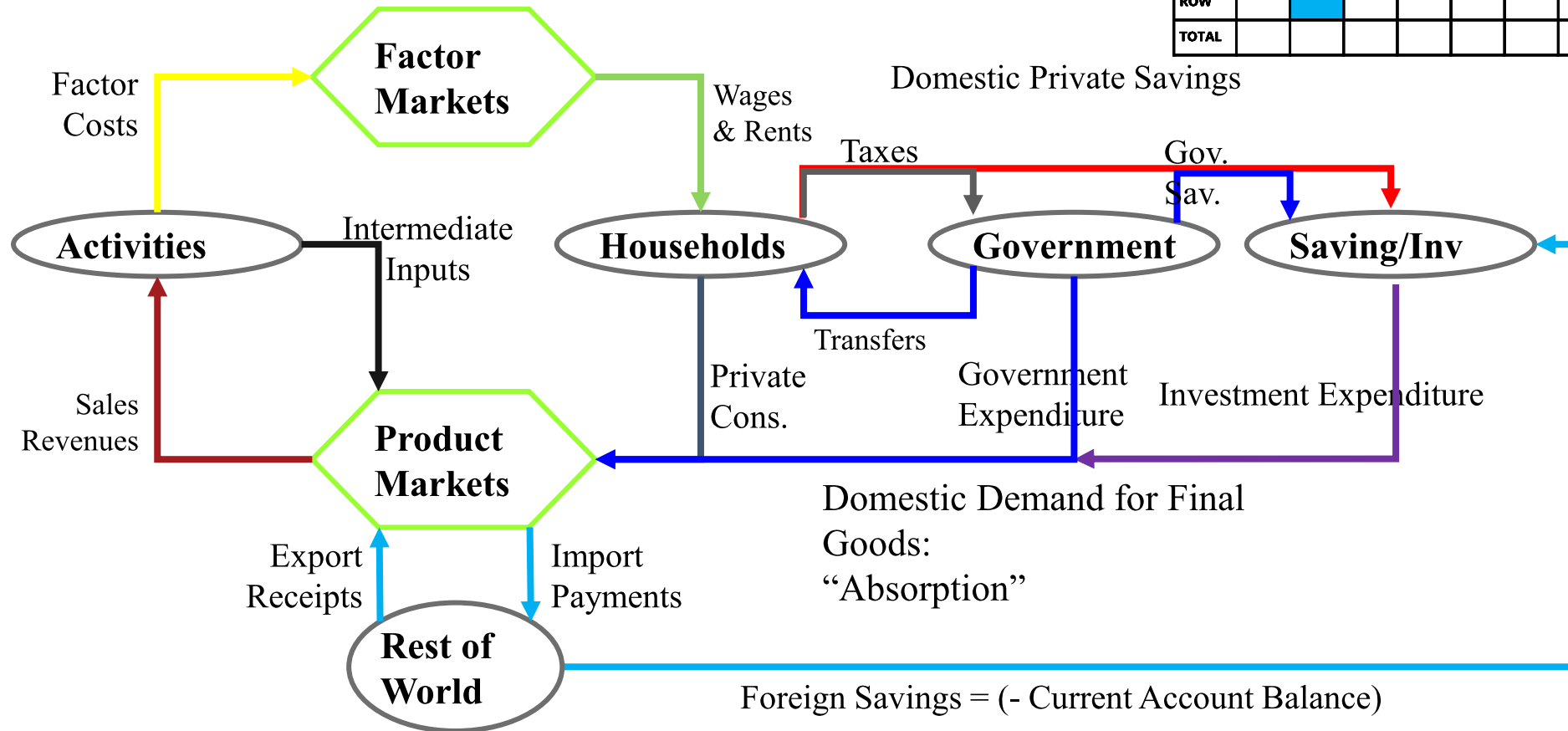
$$GDP_{mp} = GDP_{bp} + T_a + T_c$$

GDP expenditure measure @mrk pr

$$GDP_{mp} = C + I + G + X - M$$

Circular Flow of Income

	ACT	COM	FAC	HHD	GOV	ACC	ROW	TOT
ACT								
COM								
FAC								
HHD								
GOV								
ACC								
ROW								
TOTAL								



SAMs and Modelling (to reiterate)

- SAMs form the basis for more advanced economy-wide **multiplier** and **CGE** modelling
- SAMs are **models** in their own right
 - Stylized representation of the economy
 - SAM exploration
 - SAMs often used on their own for impact or multiplier analysis (matrix algebra)

Some intermediate conclusions (1)

- Identities (which can be set up in SAM matrix) are useful for identifying potential problems and economic policies to address imbalances
- Note adjustment will take place in any case – but planned/managed or ad hoc?
- What is to be preferred?)

Some intermediate conclusions (2)

- Accounting is **NOT** causality
- Economic policy if production is close to capacity
- Economic policy if production is below capacity
- Next steps – the IMF and World Bank analytical models

V. The IMF and the World Bank models

The Empty IMF Framework

- **FP** revolving around key accounting identities, in particular:

- $Y = (C + I) + (X - Z)$ National Account

- $(X - Z) - (INP - NTR - NFP) = CURBAL = \Delta R + \Delta NFA$ External Balance

- $\Delta R = \Delta M - \Delta DC$ Monetary Balance

- $Sg - Ig = \Delta NFAg - \Delta NPBg - \Delta DCg$ (focus on public sector (or fiscal) balance)

Fiscal Balance

Is this a model? Ex ante gaps will close ex post. But how? Where are the **causal relations** and is BOP essentially a monetary phenomenon?

MABOP: Summing up (i)

Fundamental **assumptions**:

1) $y = \bar{y}$ (real output is exogenous, may be growing over time), and $Y = P\bar{y}$ (and assume $P = (1-\vartheta)P_d + \vartheta e\bar{P}_f$)

2) $M_d v = P\bar{y}$ (money demand is a constant share of nominal income (stable relationship))

3) $M_d = M_s$ (money demand and supply balance)

Money supply = international reserves (R) + domestic credit (DC).

4) $M_s = R + DC$

Change in foreign reserves (ΔR) can be represented as follows:

5) $\Delta R = \frac{1}{v}(\Delta P y_{-1} + P_{-1} \Delta y) - \Delta DC$

MABOP: Summing up (ii)

Note also:

$$6. \Delta R = \bar{X} - Z + \Delta \bar{F}$$

$$7. Z = mY = m(Y_{-1} + P_{-1}\Delta y) + my_{-1}\Delta P$$

These two gives the following expression for ΔR

$$8) \Delta R = (\bar{X} - \Delta \bar{F}) - m(Y_{-1} + P_{-1}\Delta y) - my_{-1}\Delta P \text{ (when } \Delta DC \text{ we can solve (8) and (5) for } \Delta R \text{ and } \Delta P. \text{ But not independent as we only have one policy variable } \Delta DC \text{ and two targets. Introduce } \Delta e \text{ and above definition of } P, \text{ i.e. } P = (1-\vartheta)P_d + \vartheta e\bar{P}_f$$

Final result after introducing the exchange rate (two equations with two **targets**, ΔR and ΔP , and two **policy** variables, Δe and ΔDC):

$$10) \Delta R = (\gamma_0 + \gamma_1 \Delta e - \Delta DC) + \gamma_2 \Delta P_d$$

$$11) \Delta R = (\rho_0 + \rho_1 \Delta e) - \rho_2 \Delta P_d$$

FP in practice

- (i) Level of international reserves and price targets
- (ii) Projecting exogenous variables
- (iii) Are resulting imports realistic – if too small the gap must be closed – exchange rate devaluation
- (v) Calculate money demand
- (vi) Calculate domestic credit expansion – targets for public and private sector (former often the residual)
- (vii) Is domestic credit to government realistic given budgets – bring into balance
- (viii) Agree on programme and implementation monitoring

FP discussion



Domestic failure behind need for adjustment (where is rest of world?)



The importance of growth as integral part underestimated



Structural constraints and price rigidities



Crowding in or out?



Social dimensions?



New approaches

World Bank and Growth Programming (revised minimum standard model - RMSM)

- **Key accounting identities:**

- $Y = C + I + X - Z$
- $Y = C + S$
- $S - I = X - Z$

- **Key assumptions:**

- Output is targeted (exogenous)
- Capital-output ratio treated as historic or technological constant ($k = K/y$)
- X exogenous and Z depends on output

RMSM summing up

$$1) \Delta y = \Delta y^*$$

$$2) I = k\Delta y^*$$

$$3) X = \bar{X}$$

$$4) Z = my$$

Solve with C as residual from $y = C + I + X - Z$ (one gap model 5. $C = y - I - \bar{X} + Z$)

But may not be realistic: so, suppress trade gap instead

$$6) C_p = (1-s)(y-T)$$

$$7) C = (C_p + C_g) = y - I - \bar{X} + Z$$

$$8) \Delta R = \Delta R^*$$

With closure $\Delta F = Z - \bar{X} + \Delta R^*$. But is ΔR^* controlled by government? How complete model: introduce exchange rate adjustment to affect Z

Growth programming in practice

- (i) Fix growth targets (by sector) and changes in international reserves
- (ii) Estimate capital-output ratio and import parameter, export projection
- (iv) How much consumption feasible – alternatively how much external financing needed
- (v) If imports are constrained then iterate until consistent projection

RMSM discussion



Constant capital-output ratio



No behaviour (except imports and consumption)



No relative prices in simple model – including exchange rate



Inflow of resources positive – but is building up debt always positive?

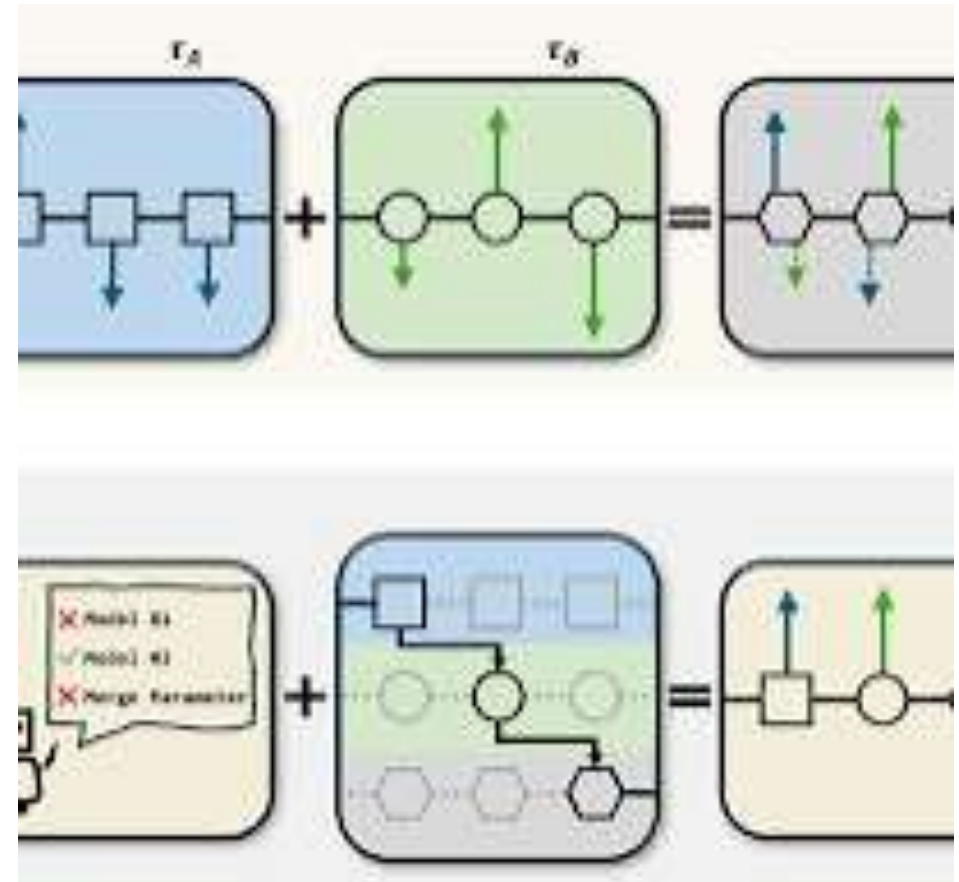


Distributional issues

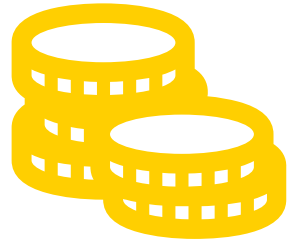
VI: Conclusion

The Merged Model

- Merged Model combines
 - 1) World Bank's Revised Minimum Standards Model
 - 2) IMF's Financial Programming Model
- Aggregate Framework which includes
 - a) Material Balance
 - b) Government Budget
 - c) Balance of Payments
 - d) Money Market



Merged Model Structure and the SAM Data Base



The Social Accounting Matrix (SAM) data base includes

Real Sector SAM
Financial Sector SAM



Real Sector Aggregation Level

Goods Demand/Supply: One Account
Agents Current Budget: Two Accounts
• Private/Public sector
Agents Capital Budget: Two Accounts
• Private/Public sector
Rest of the World: One Account

Summing-up remarks

- Identities are useful for identifying potential problems and economic policies to address imbalances – but accounting is **not** causality
- Two simple models used in practice – the IMF and World Bank analytical models, and their influence – we merge them
- Looking into the future in Viet Nam starting by identifying potential challenges in a coherent analytical framework



What's next – Programme Agenda

- Wednesday 8 July: Model framework and background
- Go through World Bank RMSM and IMF FP models, background (motivation), mathematics and intuition.
- Show how they are combined into the Vietnam Macro Model (VMM).
- Demonstrate how the model including its variables work and interact.
- Thursday 9 July: Code setup and running the model
- Assist participants installing and setting up the programming language Julia
- Go through basic Julia code.
- Demonstrate to participants how to run the model in Julia and for them to try it out and understand what each part of the code does.
- Friday 10 July: Update the model (Changing data + new base year)
- Show participants how to update the model with new data.
- Identify and experience standard pitfalls hit when updating the database and what to do.
- Tuesday 14 July: Shocks and extensions to the model
- Show how to shock the model
- Experimenting with various shocks.
- Extending the model.