Economic Dynamics

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Lecture 3: Simple Keynesian Dynamics (open economy)

Oct 1, 2020

Professor
ISM University, Lithuania

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UNIVERSITETET I BERGEN

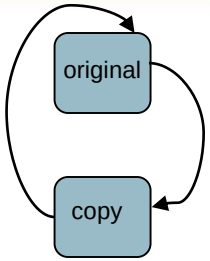
System Dynamics Group

Lectures: Thursdays, 16:30-17:30

Sep 17	Introduction to Dynamic Modeling
Sep 24	Simple Keynesian Dynamics (closed economy)
Oct 1	Simple Keynesian Dynamics (open economy)
Oct 8	Where are the Prices?
Oct 15	Where is the Money?
Oct 16-28	—- autumn break—-
Oct 29	Economic Instability
Nov 5	Policy Dynamics (closed economy)
Nov 12	Policy Dynamics (open economy)
Nov 19	Dynamics of Economic Growth
Dec 7	Submit Final Exam Project

lab dates to be announced, by **Alina Novik** and **Marianna Oliskevych**

Assignments



1. Copy & Connect

- Copy and paste Model 3.8,
  so that the 'copy' is below the 'original'.
- Connect the two models with feedback loops,
  so that one country's imports are the other country's exports.
  If you do this correctly, net exports for both should be zero initially. This is ***Model 3.8b***.
- Shock the 'original' with a 100 euro/year demand increase in year 60.
- Calculate the multiplier for 'original' in 3.8b. Compare with Model 3.8 (slide 5). Why different?
- This is a model of two open economies trading with each other, using the same currency!
  - Can you think of any useful purpose for a trade model with one currency?
  - Suggest how currencies & an exchange rate variable could be added to the model.
  - What would 'cause' an exchange rate to change? XR = f(?,?, ?)
  - What variables would be affected directly by an exchange rate? ? = f(XR)

2. Read chapter 6 in Shone: re: inflation

- study carefully sections 6.1 - 6.2 (pp. 110-115)
- skim the rest of the chapter

Keynesian Model: closed economy

Closed (Model 3.5 in Shone textbook)

$E = C + I + G$

$C = a + bY_d$

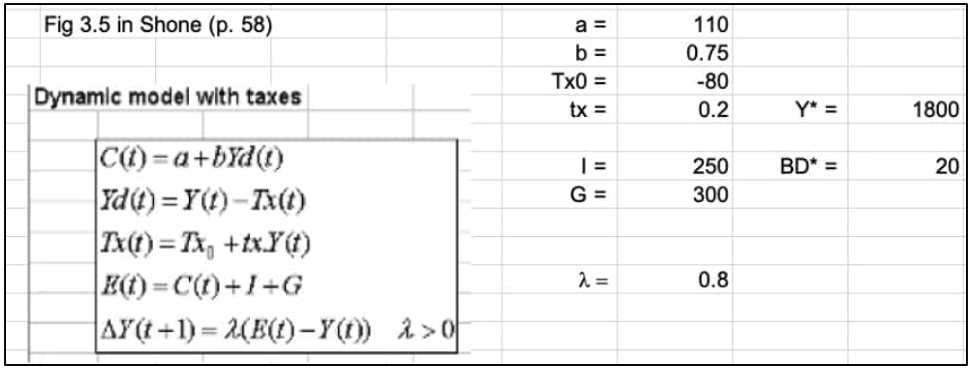
$Y_d = Y - T$ where $T = Y^*tx$

$Y_d = Y - tx^*Y$

$C = a + b(Y - txY)$

$Y = E$

$Y = a + b(Y - txY) + I + G$



$Y^* = (1/(1-b(1-tx))) * (a + I + G)$ → 'multiplier' = $k = (1/(1-b(1-tx))$

example: b = .75 and tx = .20 ➔ $k = (1/(1-.75*(1-.20)) = 2.5$

Keynesian Model: closed & open

Closed (Model 3.5 in Shone textbook)

$E = C + I + G$

$C = a + bY_d$

$Y_d = Y - T$ where $T = Y*tx$

$Y_d = Y - tx*Y$

$C = a + b(Y - txY)$

$Y = E$

$Y = a + b(Y - txY) + I + G$

$Y^* = (1/(1-b(1-tx))) * (a + I + G)$ → 'multiplier' = $k = (1/(1-b(1-tx))$

example: b = .75 and tx = .20 ➔ $k = (1/(1-.75*(1-.20)) = 2.5$

Fig 3.5 in Shone (p. 58)

Dynamic model with taxes

$$C(t) = a + bYd(t)$$
$$Yd(t) = Y(t) - Tx(t)$$
$$Tx(t) = Tx_0 + tx.Y(t)$$
$$E(t) = C(t) + I + G$$
$$\Delta Y(t+1) = \lambda(E(t) - Y(t)) \quad \lambda > 0$$

a =	110		
b =	0.75		
Tx0 =	-80		
tx =	0.2	Y* =	1800
I =	250	BD* =	20
G =	300		
λ =	0.8		

Open (Model 3.8 in Shone textbook)

same spending equations as Model 3.5 except...

$E = C + I + G + NX$

$NX = X - (M0 + mY)$

'multiplier' = $k = 1/(1-b(1-tx) + m)$

$= 1/(1-.75*(1-.20) + .2)$

$= 1/(1- .75*.80 + .2)$

$= 1/(1.2 - .60) = 1/ .60 = 1.7$

new & different parameters

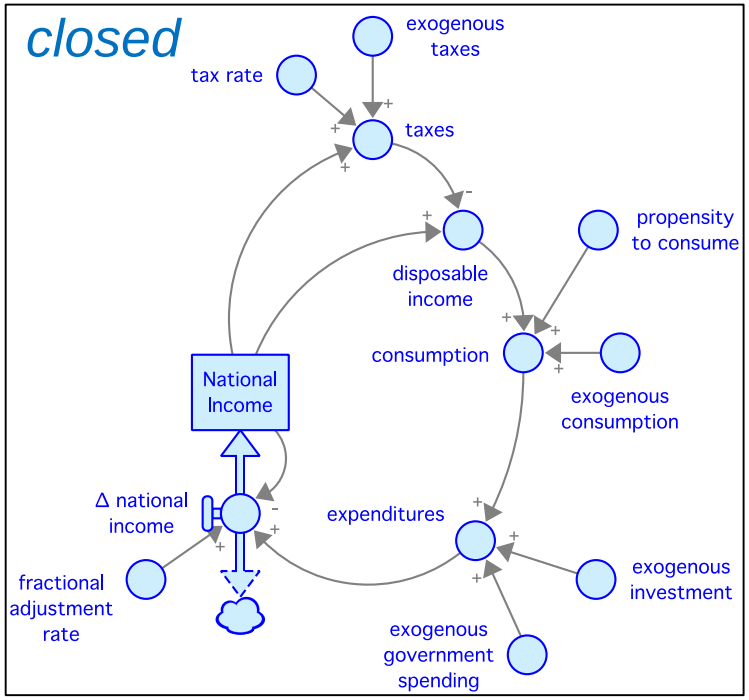
Open Economy

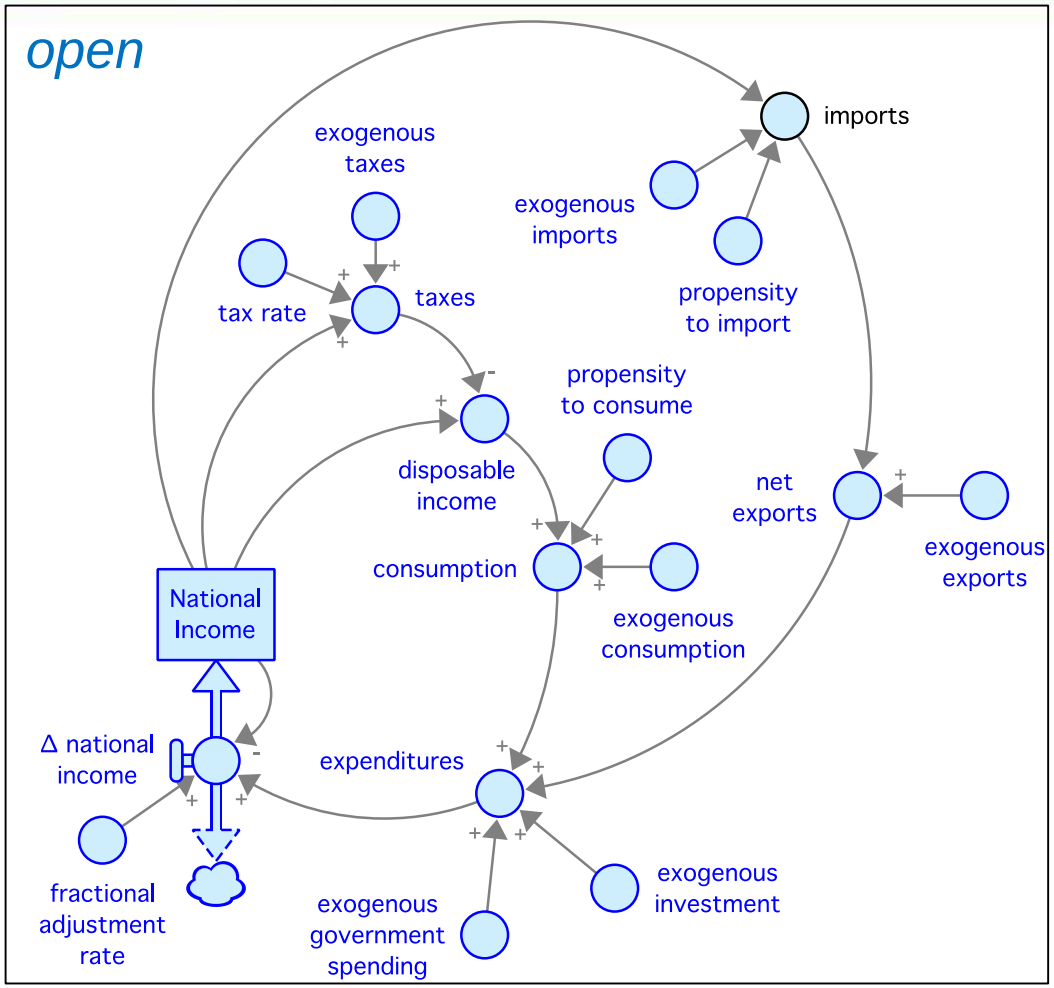
$$C(t) = a + bYd(t)$$
$$Yd(t) = Y(t) - Tx(t)$$
$$Tx(t) = Tx_0 + tx.Y(t)$$
$$NX(t) = X + mY(t)$$ X
$$E(t) = C(t) + I + G + NX(t)$$
$$\Delta Y(t+1) = \lambda(E(t) - Y(t)) \quad \lambda > 0$$

a =	110		
b =	0.75		
Tx0 =	-80		
tx =	0.2	Y* =	1766.667
m =	0.2		
I =	300	k =	1.666667
G =	200		
X =	400		
M0 =	10		
lambda =	0.8		

Fig 3.8 in Shone (p. 64)

Keynesian Model: closed and open





Stella …

I. David Wheat

Professor of System Dynamics, University of Bergen, Norway
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Professor Wheat studies economic systems. His research specialty is simulation modeling of European economies, including Ukraine, Lithuania, Latvia, and the Euro Area.

He teaches monetary policy and economic dynamics to graduate students in Lithuania and Ukraine. He also teaches macroeconomics and microeconomics to undergraduates in the United States. In Norway, after teaching the system dynamics modeling process for many years, he continues to offer courses in macroeconomic dynamics and policy design & implementation. Current projects include collaboration with Ukrainian economists to build dynamic modeling capacity at national universities in Kyiv and Lviv, plus development of monetary policy models with economists at Ukraine's central bank. He has worked with economists at Lithuania's central bank to develop a multi-industry system dynamics model of price dynamics in Europe.

For nearly twenty years, his system dynamics-based *MacroLab* model has been used by macroeconomics students in the United States. That model is available online, and students can use it without special software. He is currently writing a textbook to supplement student use of *MacroLab*. His latest economics journal article is *Teaching Endogenous Money with Systems Thinking and Simulation Tools*, and the most recent conference paper was *The Canonical New Keynesian Monetary Policy Model: A System Dynamics Translation* (with M. Oliskevych). He is co-editor of *Feedback Dynamics*, a book that will be published by Springer in 2020.

Wheat is past-president of the economics chapter of the International System Dynamics Society. He served as Associate Editor of the *System Dynamics Review* and on the Advisory Board of the *International Journal of Pluralism and Economics Education*. He has given more than thirty international guest lectures. For three decades, he was president of Wheat Resources Inc, a consulting firm serving business and government clients. His current firm, Praktika LLC, specializes in coaching others to build useful models. He received his PhD at the University of Bergen, his master's degree at Harvard University, and his bachelor's degree at Texas Tech University. During the 1970s, he served at the White House as staff assistant to the President of the United States.