Economic Dynamics

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Lecture 4: Where are the Prices?

Oct 8, 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 scheduled by Lecturer **Alina Novik** and Professor **Marianna Oliskevych**

- Connect the two models with feedback loops,
  so that one country's imports are the other country's exports.

- 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

- Can you think of any useful purpose for a trade model with one currency?

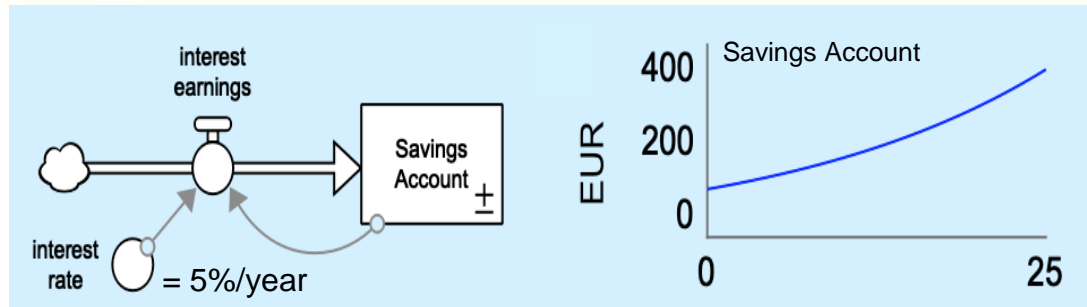<u>If the two countries had different currencies...and an exchange rate</u>:

- What would 'cause' an exchange rate to change?   XR = f(?,?, ?)

- What variables would be affected directly by an exchange rate? ? = f(XR)
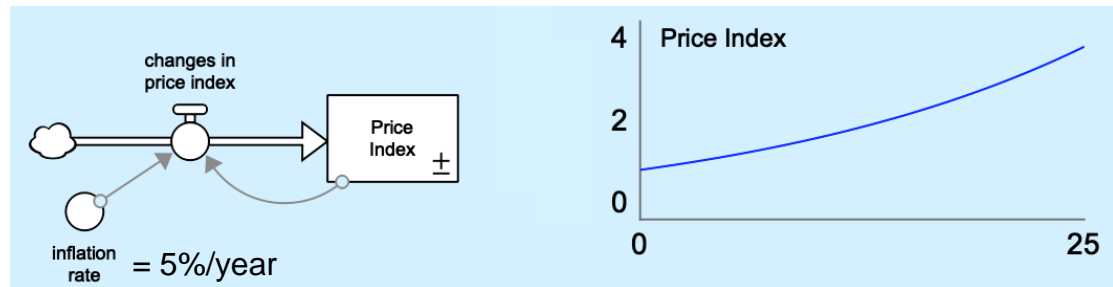

Original

Copy
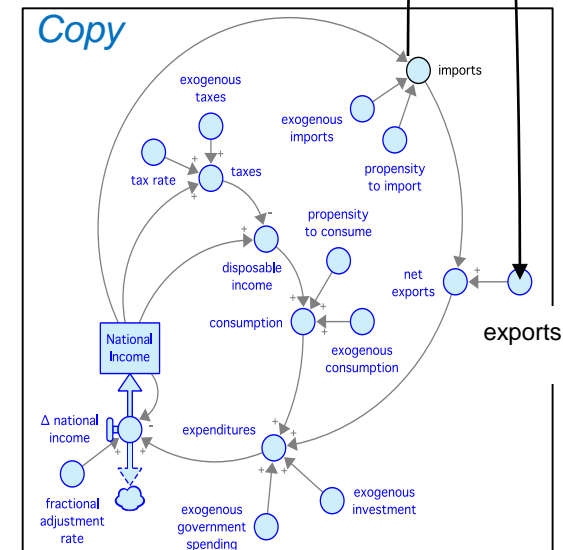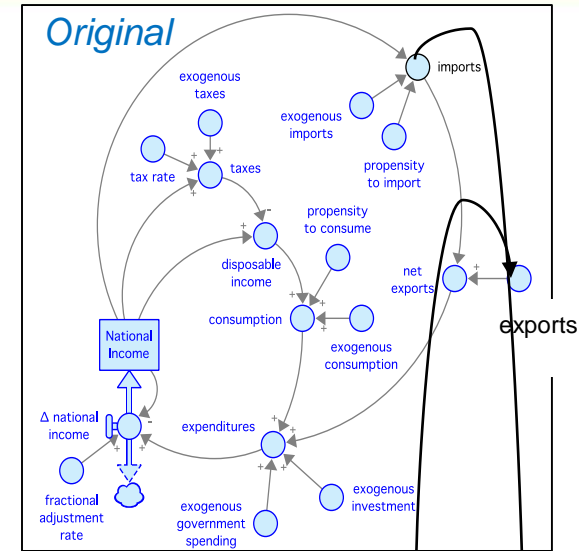
Inflation

What 'story' would you write
to explain this model?

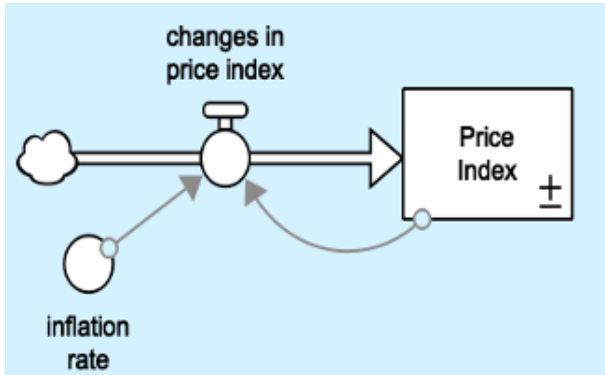What 'story' would you write
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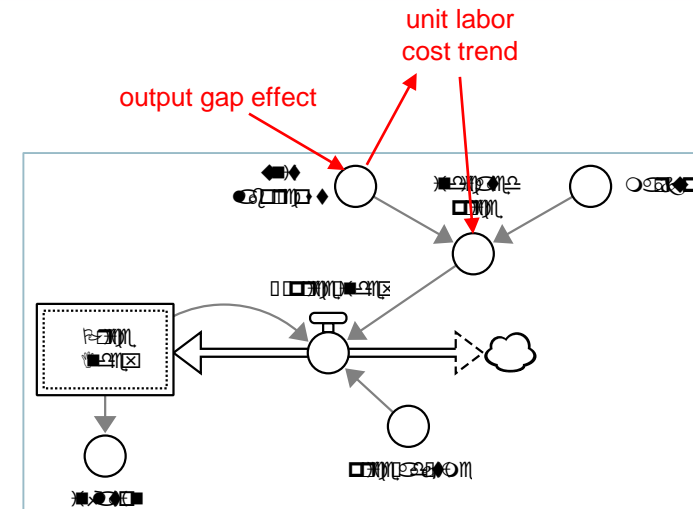
$$\pi = f(u) + \pi^e$$

Shone equation 6.1

where π = inflation, π^e = expected inflation and u = unemployment

4

Inflation

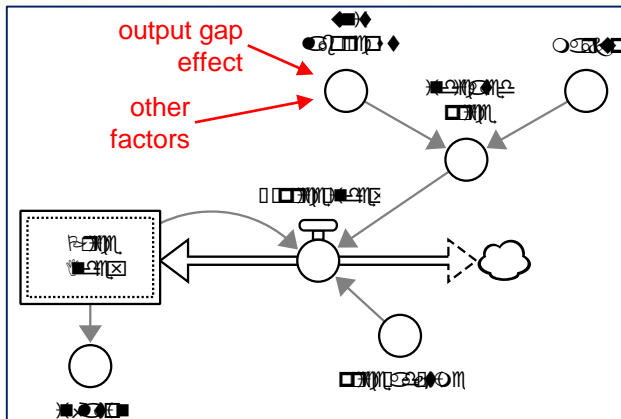inflation causes prices to change

What is the
fundamental difference
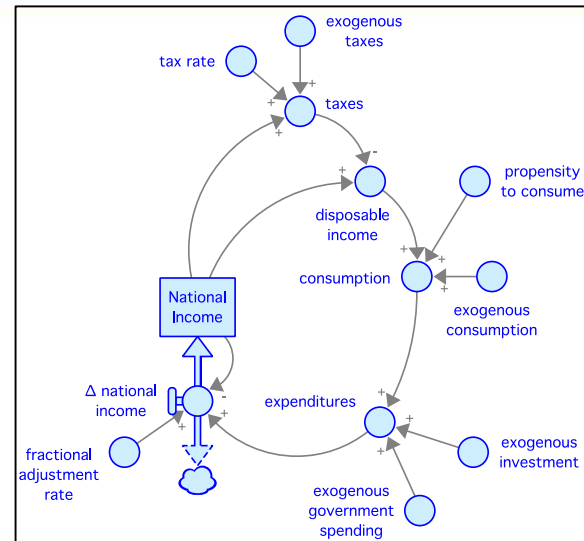between these models?

changing prices cause inflation

1. Where would you add an 'output gap' effect?

2. Where would you add 'expected inflation'?

Adding 'Prices' to model 3.5

output gap effect

other factors

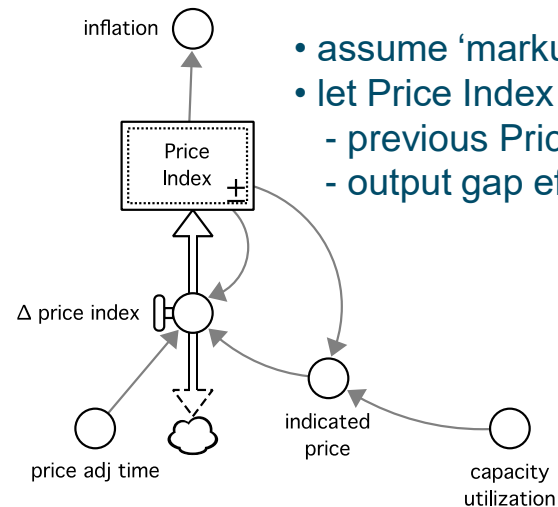How can we simplify the Price model and add it to model 3.5?

model 3.5

• assume 'markup' and 'other factors' are constant.
• let Price Index be a function of:
  - previous Price Index
  - output gap effect ('capacity utilization')

inflation

Price Index

Δ price index

price adj time

indicated price

capacity utilization

Stella

Output & Capacity concepts → need some production variables
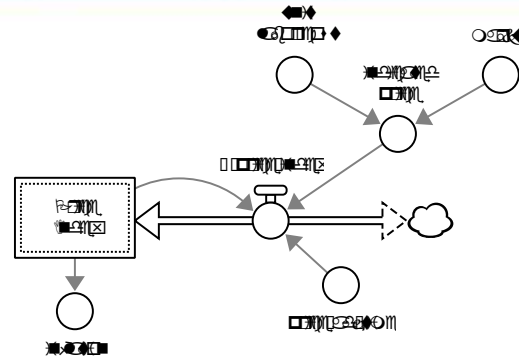
Assignments before Lecture 5

1. (a) What determines 'unit labor cost'?
   add some variables to this model

   (b) Could there be a feedback loop'?
   add some variables to this model

just add variables to the diagram;
not required to write equations yet

2. Modify Model 3.5 by adding:
   • production capacity structure
   • price structure
   • Write a 'story' that explains the
     new model (3.5b)
   • In your story, give special attention
     to the effect of capacity utilization
     on the indicated price.
   • When you simulate, compare
     nominal national income and
     real national income.

   equations on next two slides

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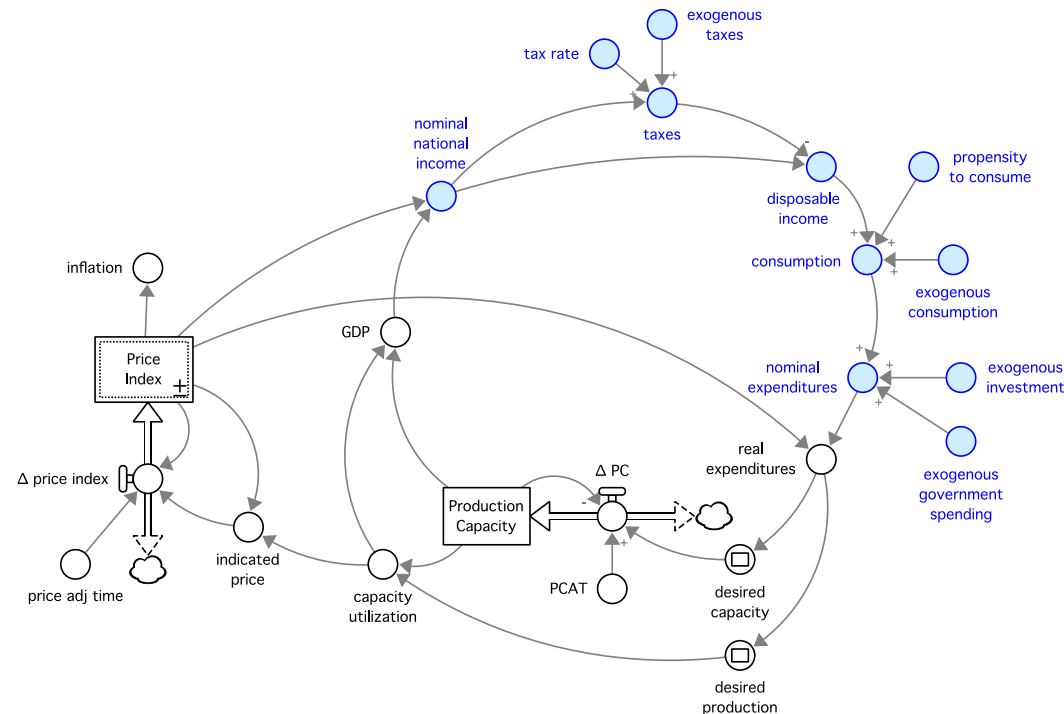
Production Capacity

Delete parts of Model 3.5
and then add the new structure
that includes Production Capacity.

*Production Capacity(t) = Production Capacity(t - dt) + (ΔPC) * dt   {Euros/year}
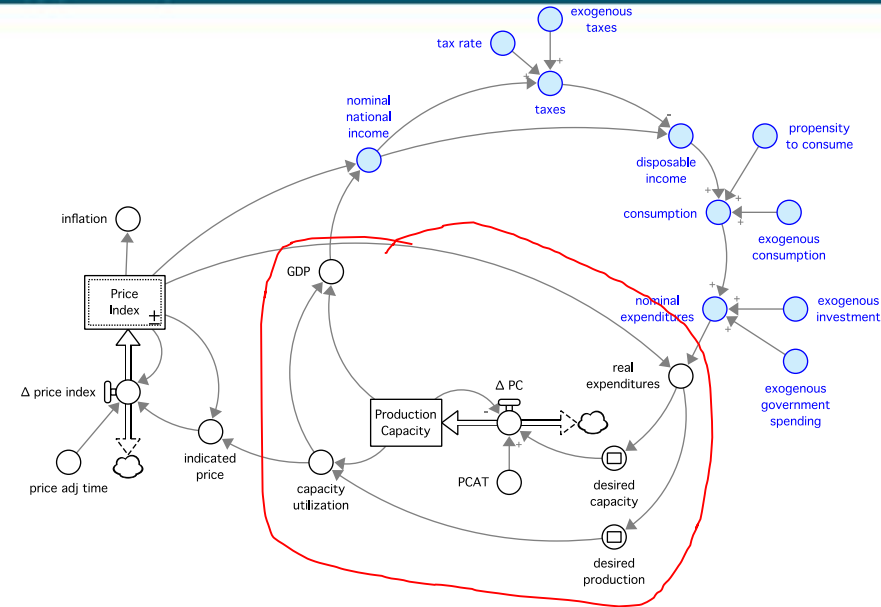INIT Production Capacity = 1800   {Euros/year}
ΔPC = (desired capacity – Production Capacity) / PCAT   {Euros/year/Years}
capacity utilization = desired production / Production Capacity   {unitless}
**desired capacity = SMTH1(real expenditures, 1, 1800)   {Euros/year}
**desired production = SMTH1(real expenditures, .25, 1800)   {Euros/year}
GDP = capacity utilization *Production Capacity   {Euros/year}
PCAT = 3   {years}
real expenditures = nominal expenditures / Price Index   {Euros/year}
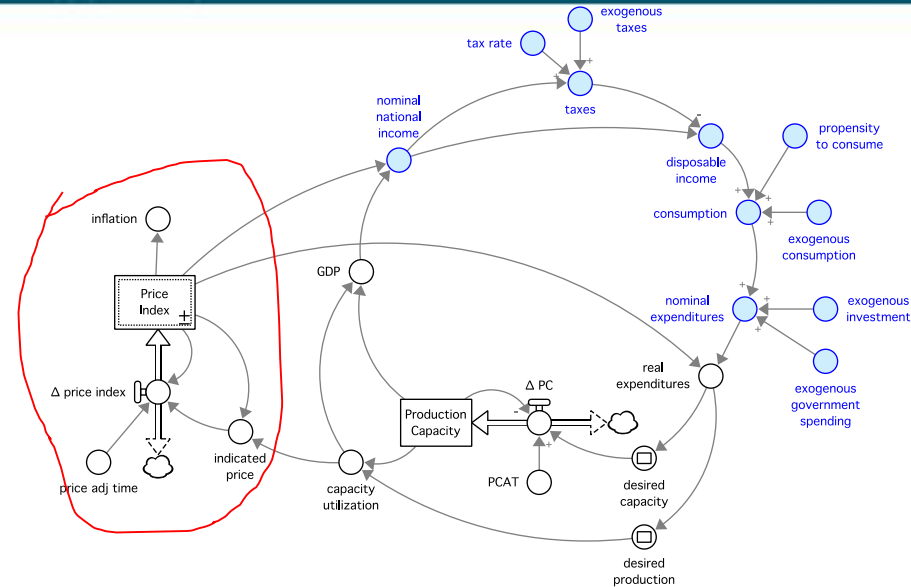
* Modeler does not write this equation; software does it.
** These are delay converters.

Price Index

Add the new structure
that includes Price Index.

*Price Index(t) = Price Index(t - dt) + (Δprice index) * dt   {unitless}
INIT Price Index = 1   {unitless}
Δprice index = (indicated price – Price Index) / price adj time   {per year}
indicated price = Price Index *capacity utilization   {unitless}
inflation = 100*TREND(Price Index, 1)   {Per Year}
price adj time = 1   {year}

* Modeler does not write this equation; software does it.

I. David Wheat

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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.