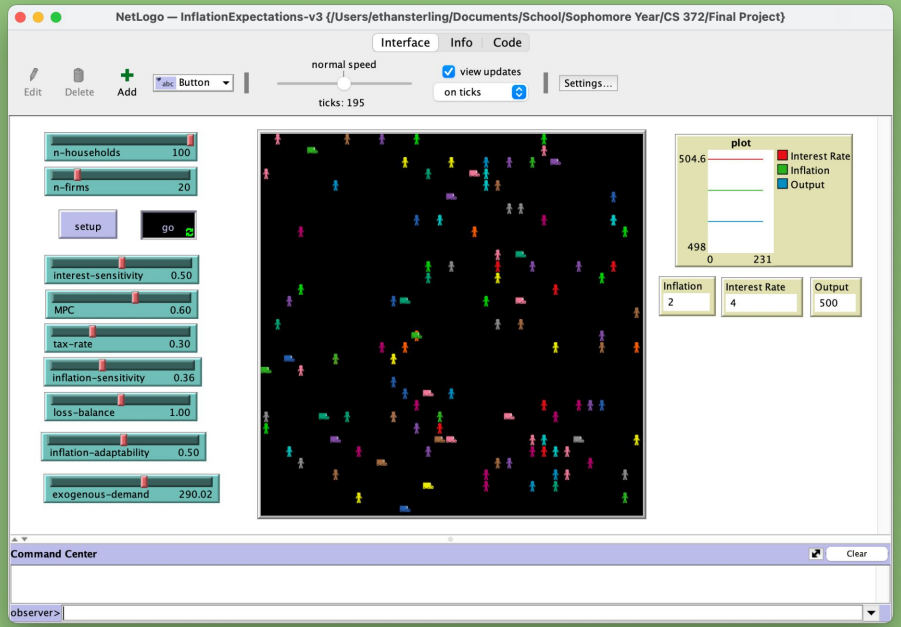



# Inflation Model

# Motivation

- **Understanding Economic Dynamics:** The model aims to provide insights into the complex interactions between households, firms, and macroeconomic variables like inflation and output. By simulating these dynamics, researchers and policymakers can better understand how different policy interventions and economic shocks impact the overall economy.
- **Macro-Micro Linkages:** By incorporating microeconomic foundations into a macroeconomic framework, the model seeks to bridge the gap between individual decision-making behaviors and aggregate economic outcomes. This integration allows for a more holistic analysis of economic phenomena, capturing both bottom-up and top-down effects.
- **Policy Analysis and Planning:** The model serves as a tool for evaluating various policy scenarios and strategies. Researchers can use it to explore the effects of fiscal and monetary policies, as well as structural reforms, on key economic indicators such as inflation, output, and interest rates. This information can inform decision-makers and help guide policy formulation and implementation.

# The 3-Equation Model

- The 3-equation model is a simplified version of the New Keynesian Dynamic Stochastic General Equilibrium (DSGE) model, which is widely used in macroeconomic analysis and monetary policy decision-making.
- It consists of three equations: an IS (Investment-Saving) curve, a Phillips curve, and a monetary policy rule.
- The IS curve relates the output gap (the difference between actual and potential output) to the real interest rate and other factors affecting aggregate demand.
- The Phillips curve describes the relationship between inflation and the output gap, capturing the short-run tradeoff between inflation and economic activity.
- The monetary policy rule specifies how the central bank adjusts the nominal interest rate in response to deviations of inflation from its target and the output gap.
- The model provides a simplified framework for analyzing the effects of monetary policy shocks, demand shocks, and supply shocks on key macroeconomic variables like output, inflation, and interest rates.

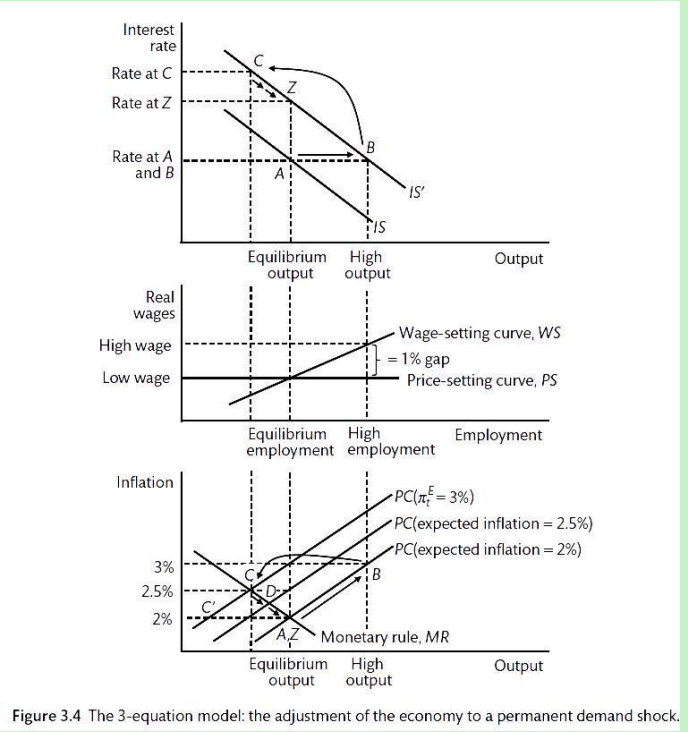
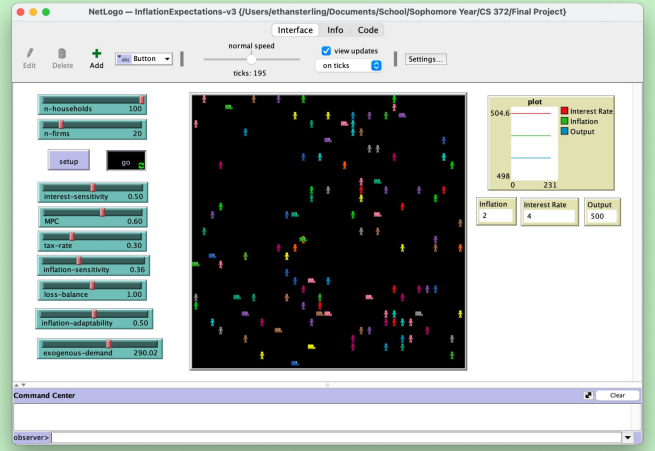



Figure 3.4 The 3-equation model: the adjustment of the economy to a permanent demand shock.

# What is the model?

- **Model:** A model of inflation in a circular economy.
- **Species:** Two types of agents, households and firms.
- **Agent behavior:**
  - Households purchase goods/services from firms based on their consumption preferences
  - Firms determine investment levels based on interest and pay households for labor with that investment
- **Macroeconomic Variables:**
  - Inflation is updated based on expected inflation
  - The output gap is measured and appropriate interest rates are set to stabilize the economy



# Rules

*Initialize*

- Set initial macroeconomic variables to be in equilibrium
- Calculate and set the stabilizing interest rate
- Create n-households (with income normally distributed around 500) and n-firms with initial revenue of 500 and a price normally distributed around 10

*At each clock tick:*

Each household does:

- decide-consumption - based on MPC
- find-and-buy - from random firm if consumption is higher than price
- update-inflation-expectations - based on inflation-adaptability

Each firm does:

- decide-investment - based on investment-sensitivity and interest rate
- find-and-pay - random household if revenue is greater than investment

The model does:

- update-macro-variables based on the 3-equation model
- set-interest-rate based on the calculated target-output-gap from the policy rule
- Plots are updated

# Demo

**Simulation Setup:**

- n-households: number of household agents
- n-firms: number of firm agents

**Running the Simulation:**

- Run: Click "Go" to start the simulation. The model will run continuously until paused or stopped.

**Parameters:**

- interest-sensitivity: how sensitive investment is to interest changes
- inflation-sensitivity: how sensitive inflation is to the output gap
- MPC: marginal propensity to consume
- tax-rate: amount of income that gets taxed
- loss-balance: how inflation and unemployment is balanced by the policy rule (1 is perfectly balanced)
- inflation-adaptability: how adaptable households' inflation expectations are (0 is adaptive, 1 is grounded)
- exogenous-demand: the part of aggregate demand not included in the model

**Monitoring Macroeconomy:**

- Graph: A graph will track the inflation, interest, and output over time

# Interesting Behavior

- The economy successfully remains in equilibrium!
- However, there is runaway inflation and deflation when consumer preferences are slightly changed.
- This is not the intended behavior and there is likely an error in the code.