Macroeconomic Models

... an introduction

Read Chapter 1 – "Economic Models":
https://www.palmislandtraders.com/econ53/chap1.pdf
before watching this video ... this is just a
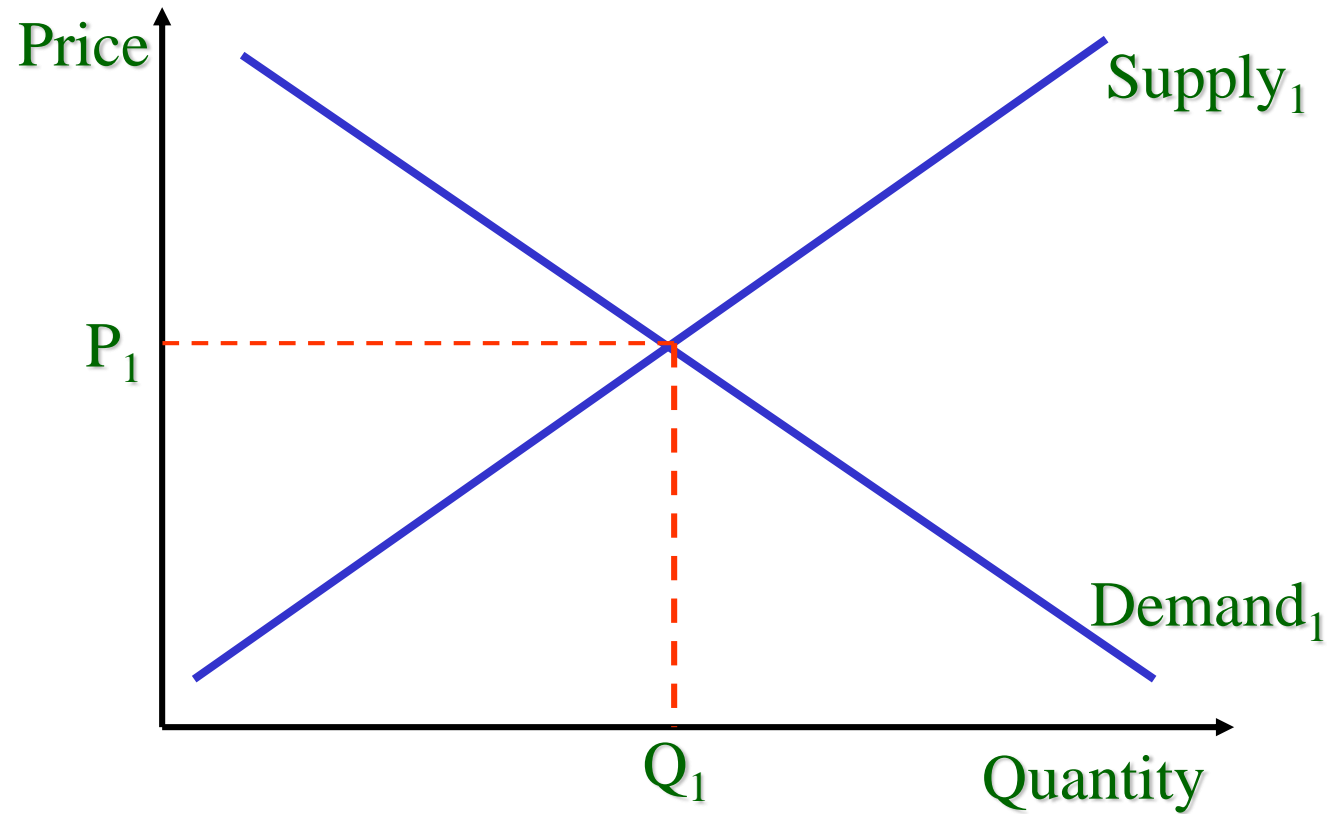supplemental reminder of that content.

Classes of economic models

- **Visual Models**

- **Mathematical Models**

- **Empirical Models**

- **Simulation Models**

Example of a visual model:

The Elementary Supply and Demand Model with Inflationary Expectations

Example of a math model:

The Elementary Supply and Demand Model with Inflationary Expectations

$$(1) \quad S = a + bP$$

$$(2) \quad D = c - dP + eIE$$

$$(3) \quad S = D = Q^0$$

$$(4) \quad P^0 = \frac{(c + eIE - a)}{(b + d)}$$

$$(5) \quad Q^0 = a + bP^0$$

Example of an empirical model:

$$(1) \quad S = \overset{\rule{20px}{2px}}{a} + \overset{\rule{20px}{2px}}{b}P$$

$$(2) \quad D = \overset{\rule{20px}{2px}}{c} - \overset{\rule{20px}{2px}}{d}P + \overset{\rule{20px}{2px}}{e}IE$$

$$(3) \quad S = D = Q^0$$

Example of a simulation model:

TABLE 1: MATHEMATICAL DESCRIPTION OF MACROSIM1

(1)	$Y = C + I^o + G^o$	Gross Domestic Product (Y) equals Consumption (C), Investment (I), plus Government Spending (G), where I and G are autonomous, determined by the user.
(2)	$C = a + b(YD)$	Consumption is determined by Disposable Income (YD) where "a" is autonomous consumption and "b" is the consumption rate from disposable income.
(3)	$YD = (1 - t)Y$	Disposable Income is after-tax income and "t" is the income tax rate.
(4)	$D = G^o - tY$	The Budget Deficit (D) is equal to Government Spending less tax collections.
(5a)	$S = YD - C$	National Savings (S) equals Disposable Income minus Consumption.
(5b)	$S = I^o + D$	This is an accounting identity: Investment and the Budget Deficit are financed with borrowed money, which in turn is financed by savings and at equilibrium this identity holds.

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ASSUMPTIONS:
Autonomous consumption(a) = 100.000
Consumption coefficient(b) = 0.750
Investment intercept (h) = 600.0
Investment slope (d) = -4500.00
Savings intercept(e) = 160.0
Savings slope (f) = 6000.00
Money supply (ms) = 1200.0

POLICY VARIABLES:
Money Supply Increase (dMS) = 60.0
Government spending (G) =   660.00
Tax rate (t) = 0.180

SIMULATION RESULTS:
GDP (Y) =  2969.84
Disposable Personal Income (YD) =   2435.27
Consumption (C) =  1926.45
Interest Rate (r) = 0.0481
Investment (I) = 383.4
Taxes collected (taxes) =   534.57
Budget Deficit (D) = 125.43
Demand for Funds (DF) = 508.8
Savings (S) = 448.82
Supply of Funds (S) = 508.8
Y test =   2969.84
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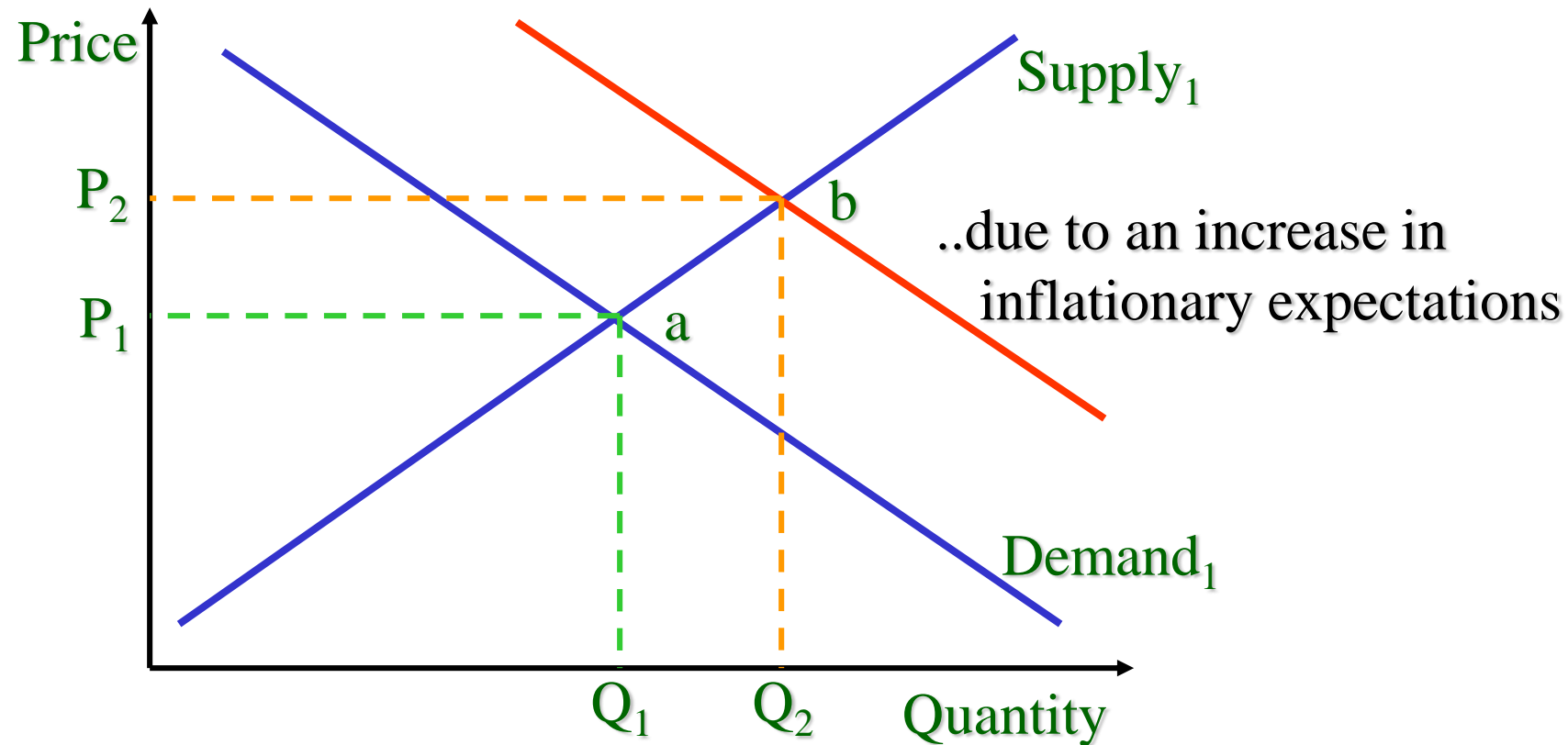
A comparative statics model ...

Price

P_2

P_1

b

a

Supply$_1$

..due to an increase in
 inflationary expectations

Demand$_1$

Q_1 Q_2 Quantity

A dynamic model ...

$$(1) \quad Y_t = C_t + I_t$$

$$(2) \quad C_t = a + bY_{t-1}$$

$$(3) \quad I_t = v(Y_{t-1} - Y_{t-2})$$

The multiplier/accelerator interaction model ...

Variables that effect supply and demand

Factors that Effect Demand   **Factors that Effect Supply**

1. *Price*	(-)	1. *Price*	(+)
2. Income	(+)	2. Labor costs	(-)
3. Wealth	(+)	3. Resource costs	(-)
4. Population	(+)	4. Advertising costs	(-)
5. Advertising	(+)		
6. Substitute prices	(+)	(+) Shift curve right	
7. Inflationary Expectations	(+)	(-) Shift curve left	

The math equivalent ...

(1) $D = f(P, I, W, N, A, S, E, \overline{X})$

(2) $S = g(P, L, R, A, \overline{Y})$

(3) $D_0 = S_0$

$where \quad \dfrac{\partial D}{\partial W} > 0 \quad and \quad \dfrac{\partial S}{\partial L} < 0$
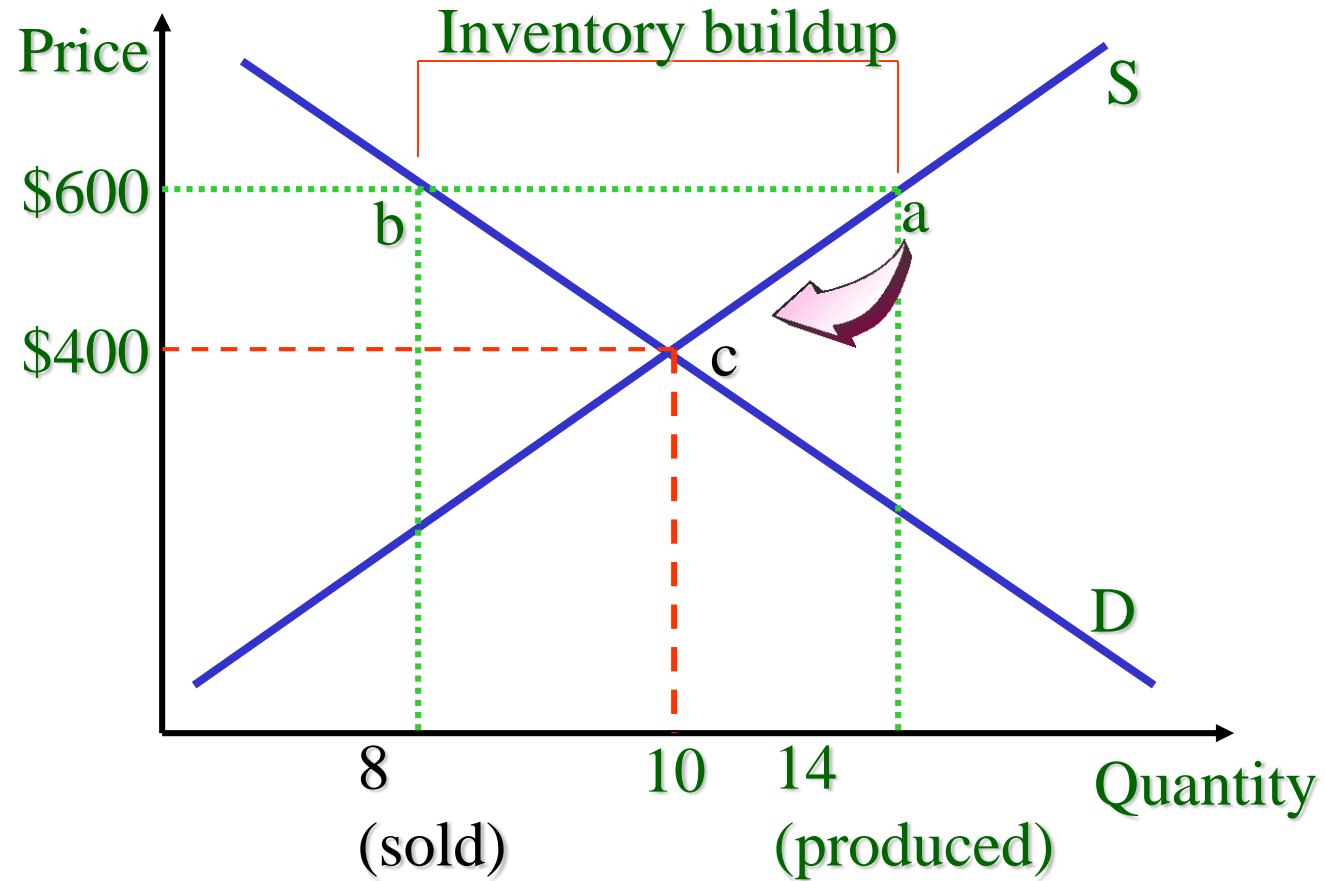
Know the following also (from the assigned reading) ...

- Expectations-enhanced models
  - Adaptive expectations
  - Rational expectations
- The primary limitations of models
- The model as an "image" of economic activity
- The examples