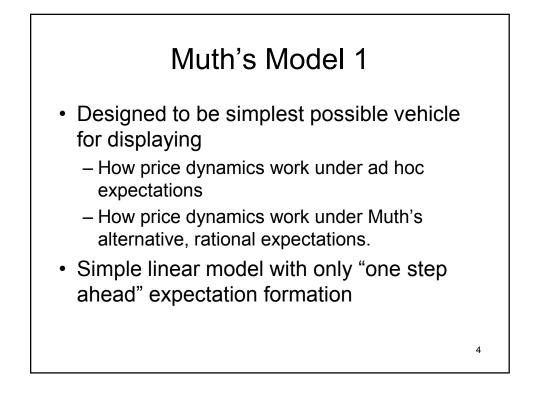
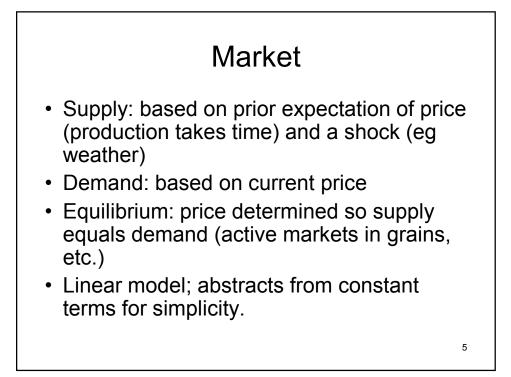


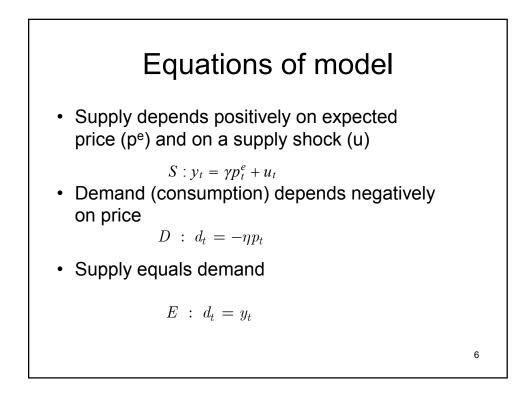
Muth's work

- Initially largely ignored, later at center of macroeconomic research
- · Provided a careful definition of Rational Expectations
- Provided two very clean examples of how expectation formation be important for price formation within a model

 production which takes time and inventory speculationand showed the consequences of RE for price dynamics in each case.
- Developed a benchmark method of solving linear rational expectations models: the method of undetermined coefficients.







Market Clearing Price

• Equating supply and demand, determine how the price depends on expectations and on shocks.

$$p_t = -\frac{\gamma}{\eta} p_t^e - \frac{1}{\eta} u_t^e$$

- The negative dependence on each variable reflects the fact that both are supply shifters – if people thought, at planting time, that that there was going to be a higher price today then they would produce more output and the price would be lower as a result.
- Muth: price and price expectations will be negatively related statistically, which seems to be a strong form of market irrationality.

7

8

The Rational Expectations alternative

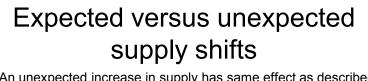
• Price expectation is the same as the prediction of the model,

$$p_t^e = Ep_t \mid I_{t-1}$$

• Using the solution for the market-clearing price above, this implies that

$$p_{t} = -\frac{1}{\eta} \{ \gamma E p_{t} \mid I_{t-1} + u_{t} \} \Rightarrow E p_{t} \mid I_{t-1} = -\frac{1}{\eta} \{ \gamma E p_{t} \mid I_{t-1} + E u_{t} \mid I_{t-1} \}$$

$$\Rightarrow E p_{t} \mid I_{t-1} = -\frac{1}{\gamma + \eta} E u_{t} \mid I_{t-1} \Rightarrow p_{t} = -\frac{1}{\eta} \{ -\frac{\gamma}{\gamma + \eta} E u_{t} \mid I_{t-1} + u_{t} \}$$



• An unexpected increase in supply has same effect as described before: it depresses price.

 An expected increase in supply has a smaller magnitude (less negative) effect on price because producers cut back on their production, knowing that price will be low.

$$p_{t} = -\frac{1}{\eta} \{ -\frac{\gamma}{\gamma + \eta} E u_{t} \mid I_{t-1} + u_{t} \}$$

= $-\frac{1}{\eta} \{ (u_{t} - E u_{t} \mid I_{t-1}) + \frac{\eta}{\gamma + \eta} E u_{t} \mid I_{t-1} \}$

 Get the "stabilizing effect on price" of having an upward sloping (as opposed to vertical) supply schedule, but only to extent expected (verify this by looking at market in which expected price is replaced by actual price)

9

Solving the model: the method of undetermined coefficients

 Muth pioneered an approach to solving RE models, by (i) assuming a particular driving process for u; (ii) hypothesizing an "undetermined coefficients" form of the solution; and then (iii) determining the values of coefficients which are consistent with rational expectations

A variant of Muth's method

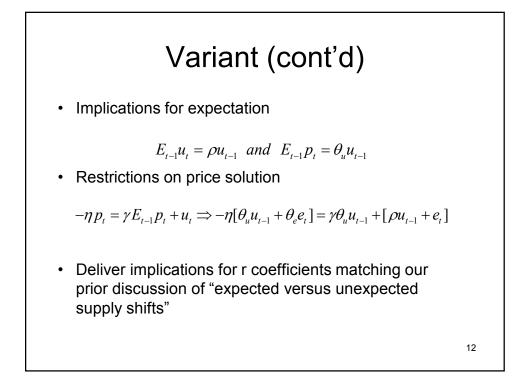
Assumed process for u

 $u_t = \rho u_{t-1} + e_t$

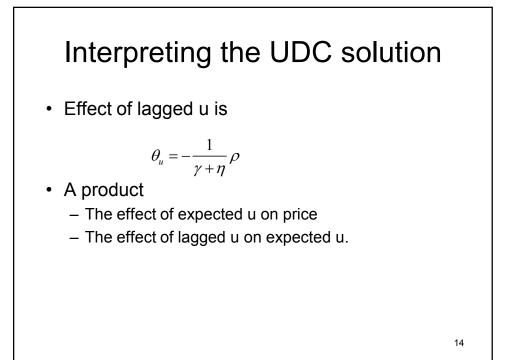
· Conjectured form of price solution

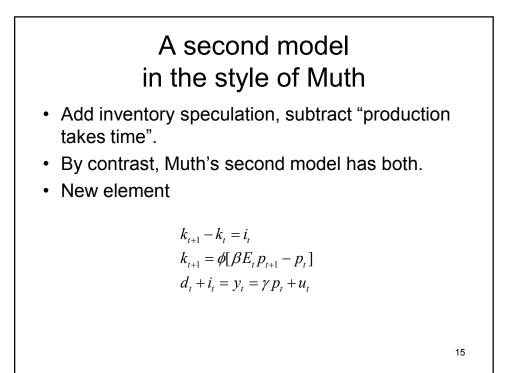
$$p_t = \theta_u u_{t-1} + \theta_e e_t$$

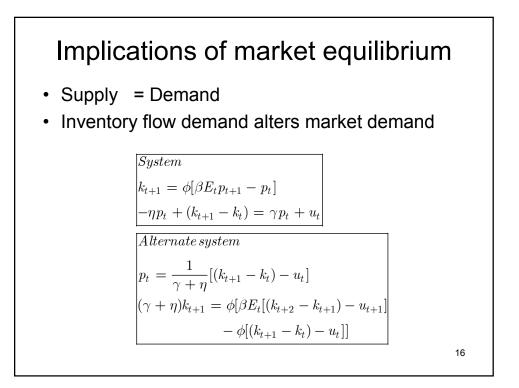
• Variant in sense that "guess" that lagged u rather than the history of e's is relevant—if wrong reach contradiction (as in state vector in HW problem)

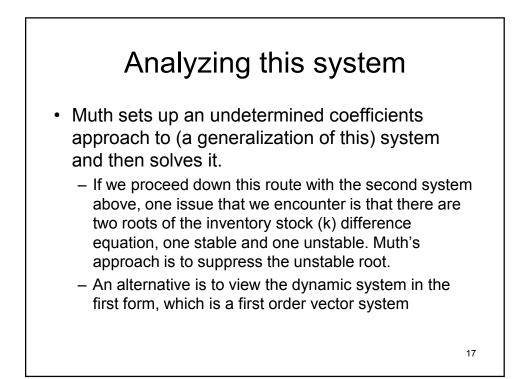


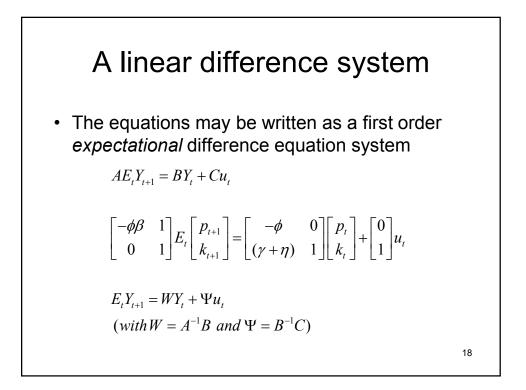
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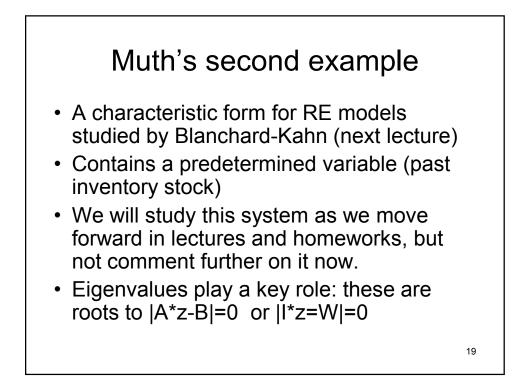


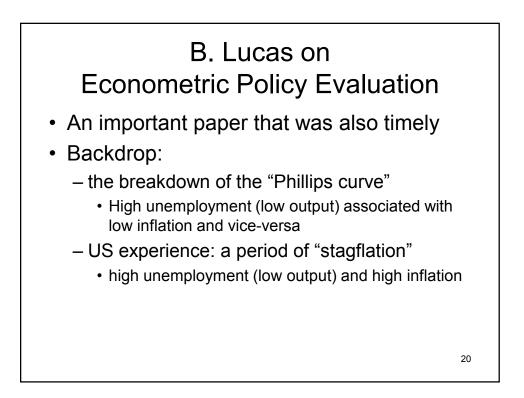


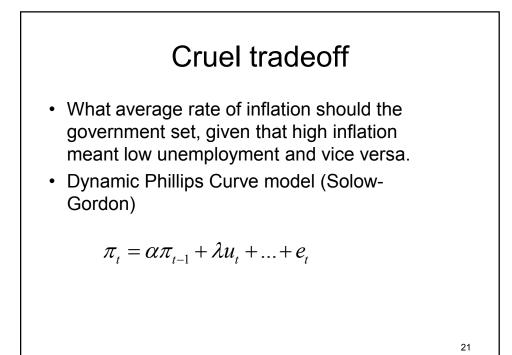


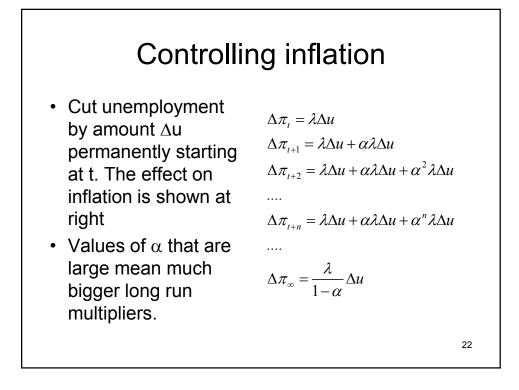


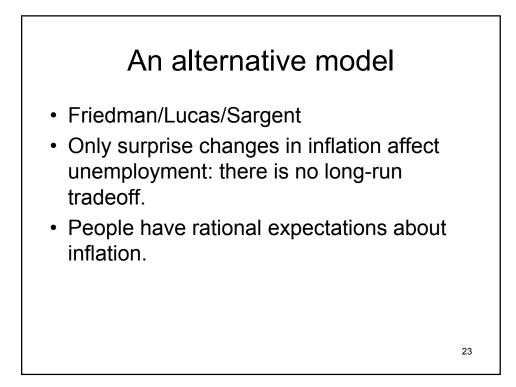




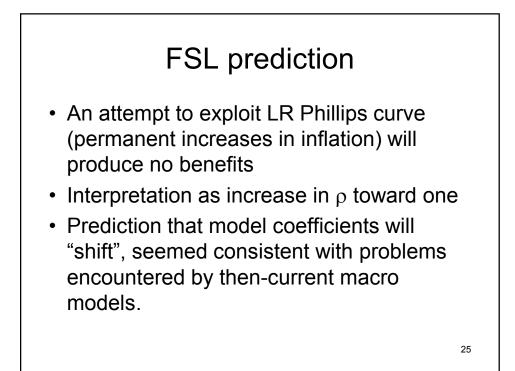








A Model Producing an apparent
but not real, LR tradeoff $\mu_{\ell} = \theta(\pi_{\ell} - E_{\ell-1}\pi_{\ell})$
 $\pi_{\ell} = \rho\pi_{\ell-1} + \nu_{\ell} \Rightarrow E_{\ell-1}\pi_{\ell} = \rho\pi_{\ell-1}$ $\pi_{\ell} = \rho\pi_{\ell-1} + \frac{1}{\theta}\mu_{\ell}$



Econometric Policy Evaluation: A Critique

- Uses a series of forceful examples to make the case that there is a general presumption that econometric model equations are not "policy invariant"
 - Phillips curve
 - Investment
 - Consumption
- Other key example added later
 - Term Structure (Poole)

Lucas Critique

- · Stimulated economists to think about
 - Rational expectations models
 - Optimizing macro models
 - New directions in policy design
 - Time (in) consistency of optimal plans
 - Dynamically optimal policy under commitment
 - Dynamically optimal policy that is credible under discretion