## Lecture 02 – Stability of Equilibrium

### 1. Static Stability

a. Walrasian Adjustment Process

If excess demand (supply) exists, the market price will go up (down).
Excess supply (demand) price above (below) equilibrium price.

$$ED(P) = D(P) - S(P)\text{: Excess Demand Function}$$

$$\frac{dED(P)}{dP} < 0$$

(Try to draw diagrams with stable and unstable conditions)

b. Marshallian Adjustment Process

Housing market has very steep supply curve. It's hard to adjust price to eliminate any existence of excess demand or supply.

$$EDP(Q) = P_D - P_S = d(Q) - s(Q)\text{: Excess Demand Price Function}$$

$$\frac{dEDP(Q)}{dQ} < 0$$

(Try to draw diagrams with stable and unstable conditions)

### 2. Dynamic Stability

a. Discrete time (Cobweb Process)

$$\begin{cases} D_t = -aP_t + b \quad \text{(demand)} \quad (1) \\ S_t = \alpha P_{t-1} - \beta \quad \text{(supply)} \quad (2) \end{cases} \qquad (a, b, \alpha, \beta \text{ are all positive numbers}).$$

Equilibrium condition implies that $D_t = S_t$.

So we get $aP_t + \alpha P_{t-1} - b - \beta = 0$ (3). And finally, rewriting *w.r.t.* $P_t$,

$$P_t = -\frac{\alpha}{a} P_{t-1} + \frac{b+\beta}{a} \quad (4) \text{ (Difference Equation)}$$

b. Continuous time (Differential Equation)

$$|\text{slope of supply}| > |\text{slope of demand}| \quad \text{(condition for dynamic stability)}$$