

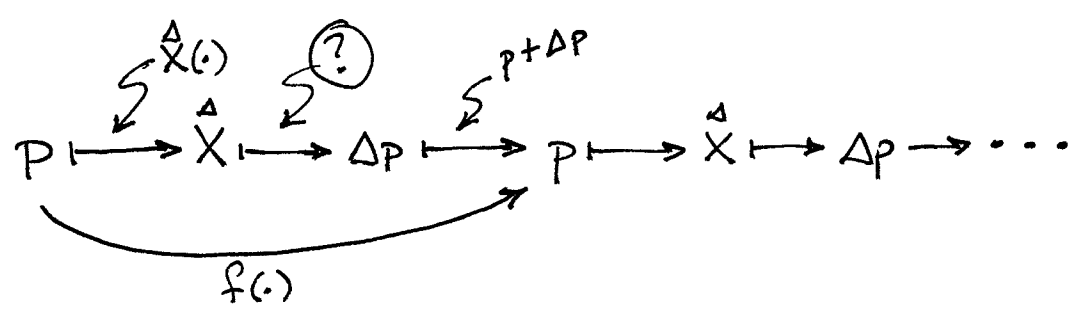
EQUAL +  
LIBRIUM

# OUR DEFINITION OF EQUILIBRIUM (THE EQUILIBRIUM CONDITIONS)

AND THE IMPLICIT ROLE OF TIME

THE MARKET DEMAND FUNCTION  $\overset{\Delta}{X}(\cdot)$  TELLS US, FOR EACH PRICE-LIST  $P \in \mathbb{R}^l_+$ , WHAT  $\overset{\Delta}{X} \in \mathbb{R}^l$  WILL BE. SUPPOSE WE ALSO KNEW WHAT  $\Delta P \in \mathbb{R}^l$  COULD BE FOR ANY EXCESS DEMAND VECTOR  $\overset{\Delta}{X} \in \mathbb{R}^l$ . (DISCRETE TIME)

THEN THE "TIME LINE" WOULD LOOK LIKE THIS:



CALL  $P$  THE "STATE" OF THE SYSTEM. FROM  $P$  WE CAN DETERMINE  $\overset{\Delta}{X}$  AND  $X_i$  FOR EACH PERSON  $i$ .

IF WE KNEW THE ANSWER TO  $(?)$  WE COULD DETERMINE, FOR ANY STATE  $P \in \mathbb{R}^l$ , WHAT THE NEXT STATE, SAY  $P'$ , WOULD BE. WE COULD WRITE THAT AS A FUNCTION:

$$P' = f(P) \quad f: S \rightarrow S$$

**(\*)** WHAT WOULD BE AN EQUILIBRIUM OF THIS SYSTEM?

ANSWER: A  $P \in S$  SUCH THAT  $\Delta P = 0$  — i.e.,  $P = f(P)$ .

UNFORTUNATELY, WE DON'T KNOW THE ANSWER TO (?).

BUT WE GENERALLY KNOW A PARTIAL ANSWER:

$$\Delta p_k \begin{matrix} \geq \\ \leq \end{matrix} 0 \text{ AS } \overset{\Delta}{X}_k \begin{matrix} \geq \\ \leq \end{matrix} 0$$

$$\text{OR AT LEAST } \Delta p_k = 0 \iff \overset{\Delta}{X}_k = 0.$$

SO ... WHILE  $\Delta p = 0$  IS WHAT WE REALLY MEAN BY "EQUILIBRIUM,"

AS A SURROGATE WE USE  $\overset{\Delta}{X} = 0$

i.e., A  $p \in \mathbb{R}_+^l$  SUCH THAT  $\overset{\Delta}{X}(p) = 0$ .

"ALL MARKETS CLEAR"

"NO EXCESS DEMAND OR SUPPLY"

"DEMAND = SUPPLY"