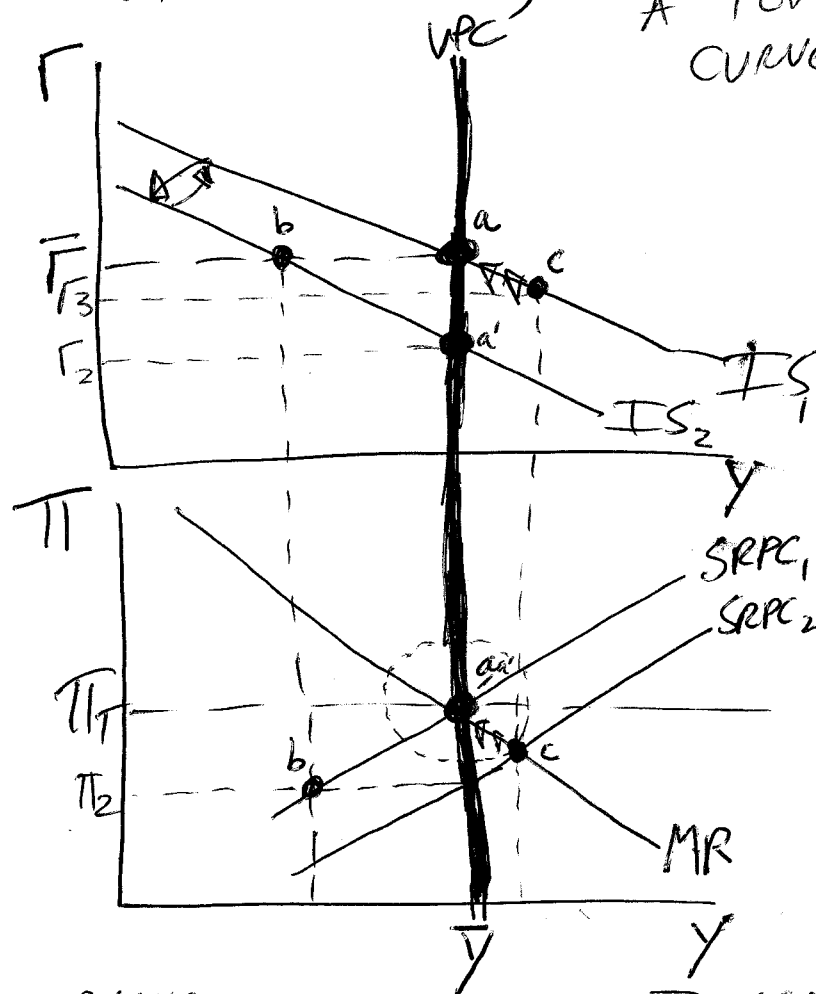


# TUTORIAL 5 - WAGE AND PRICE SETTING

## SMALL QUESTIONS

2. ~~IF THE EXPECTATIONS OF~~ WAGE SETTERS ARE STATIC, USE THE PHILLIPS CURVE TO ANALYSE THE IMPACT ~~ON OUTPUT AND INFLATION OF A~~ NEGATIVE DEMAND SHOCK.

WG WILL INITIALLY ASSUME ADAPTIVE EXPECTATIONS  
SO THAT  $\pi_t = \pi_{t-1} + \alpha(y_t - \bar{y})$  ~~WE ALSO ASSUME~~ A TEMPORARY IS CURVE SHOCK.

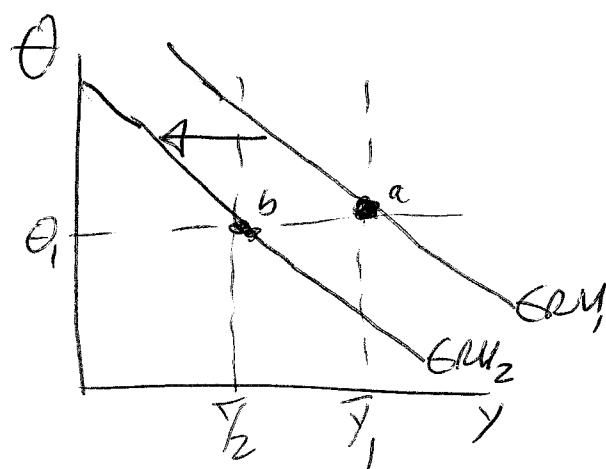
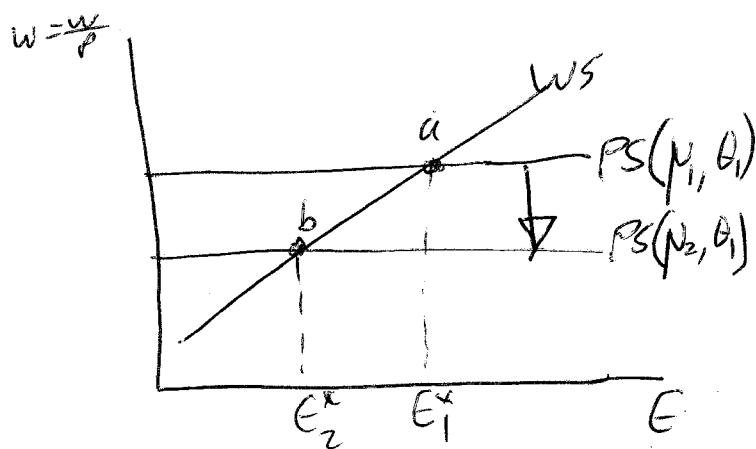


IF THE CENTRAL BANK CAN RESPOND IMMEDIATELY, THEN THE INTEREST RATE CAN BE LOWERED TO  $r_2$  SO THAT THE ECONOMY CAN STAY AT POINT  $a$  IN THE PHILLIPS CURVE DIAGRAM. IF, HOWEVER, THERE IS A ONE-PERIOD DELAY IN THE MONETARY POLICY RESPONSE THEN THE ECONOMY GOES TO POINT  $b$ , FOLLOWED BY POINT  $c$  AND THEN A RETURN UP THE MR CURVE TO  $a$ . THIS ASSUMES A CENTRAL BANK WHICH MINIMIZES  $(y - \bar{y})^2 + \beta(\pi - \pi_1)^2$ .

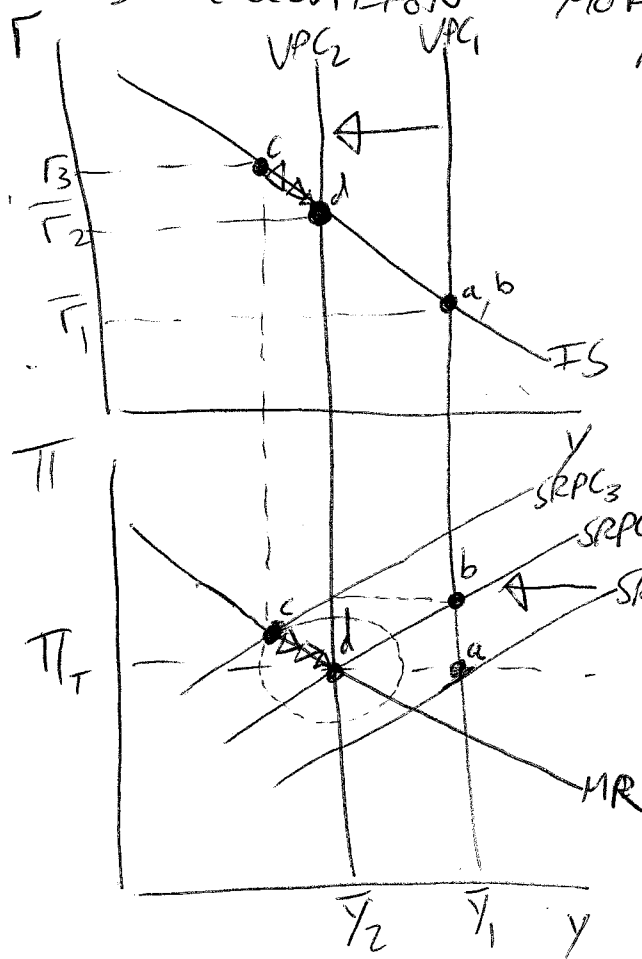
WITH RATIONAL EXPECTATIONS, ON THE OTHER  
HAND, THE ECONOMY GOES STRAIGHT FROM  
POINT b BACK TO POINT a (SEE Q3  
FOR MORE DETAILS ON WHY). ALSO SEE  
NOTES ON MONETARY POLICY TUTORIAL  
FOR MORE DETAILS ON DERIVATION OF  
MR CURVE FROM CENTRAL BANK  
PREFERENCES.

1 USING DIAGRAMS IN INFLATION AND OUTPUT SPACE, ANALYSE THE IMPACT OF A PERMANENT RISE IN OIL PRICES ON THE WORLD ECONOMY, MAKING CLEAR YOUR ASSUMPTIONS ABOUT THE OBJECTIVES OF MONETARY POLICY MAKERS.

THE OIL PRICE SHOCK WILL, IF IT PERMANENTLY RAISES <sup>REAL</sup> OIL PRICES, SHIFT THE GRU CURVE TO THE LEFT SINCE IT WILL INCREASE FIRM'S MARG-UP AND SO SHIFT PS DOWNWARDS.



NOW, WE CAN ANALYSE THE IMPACT ON DEMAND USING THE 3-EQUATION MODEL (NOW WE ASSUME A CLOSED ECONOMY FOR SIMPLICITY)



ADAPTIVE EXPECTATIONS  
 $a \rightarrow b \rightarrow c \rightarrow d$

RATIONAL EXP.  
 $a \rightarrow b \rightarrow d$

ASSUMING A ONE-PERIOD DELAY IN MONETARY POLICY RESPONSE

3. IS FALLING INFLATION LIKELY TO BE ASSOCIATED WITH A POSITIVE OR NEGATIVE OUTPUT GAP?

THE ANSWER TO THIS QUESTION DEPENDS ON WHETHER THERE ARE ADAPTIVE OR RATIONAL EXPECTATIONS, AND WHETHER OR NOT THERE ARE NOMINAL RIGIDITIES IN THE FORM OF STAGGERED WAGE / PRICE SETTING:

	NO RIGIDITIES	RIGIDITIES
ADAPTIVE	TRADITIONAL PHILLIPS CURVE	TRADITIONAL P.C.
RATIONAL	RATIONAL EXPECTATIONS PHILLIPS CURVE (RERC)	NEW (KEYNESIAN) PHILLIPS CURVE (NKPC)

TRADITIONAL PHILLIPS CURVE

$$\pi_t = \pi_{t-1} + \alpha(y_t - \bar{y}_t) + v_t$$

$$\Rightarrow \Delta \pi_t = \alpha(y_t - \bar{y}_t) + v_t$$

$$\Rightarrow E_{t-1}[\Delta \pi_t] = E_{t-1}[\alpha(y_t - \bar{y}_t) + v_t]$$

$$\Rightarrow E_{t-1}[\Delta \pi_t] = \alpha E_{t-1}[y_t - \bar{y}_t] \text{ since } E_{t-1}[v_t] = 0$$

SO, INFLATION CAN ~~ONLY~~ BE EXPECTED TO FALL NEXT PERIOD IF AND ONLY IF THE OUTPUT GAP IS EXPECTED TO BE NEGATIVE. INFLATION COULD ONLY RISE/FALL WITH A NEGATIVE / POSITIVE <sup>TERM</sup> OUTPUT GAP DUE TO THE RANDOM SHOCK  $v_t$ .

REPC

$$\pi_t = \pi_t^e + \alpha(y_t - \bar{y}_t) + v_t$$

$$\pi_t^e = E_{t-1}[\pi_t] \Rightarrow \pi_t^e = \pi_t + \varepsilon_t$$

where  $E_{t-1}[\varepsilon_t] = 0$

$$\Rightarrow E_{t-1}[\pi_t] = E_{t-1}[\pi_t^e + \alpha(y_t - \bar{y}_t) + v_t]$$

$$\Rightarrow \pi_t^e = \pi_t^e + \alpha E_{t-1}[y_t - \bar{y}_t] + E_{t-1}[v_t]$$

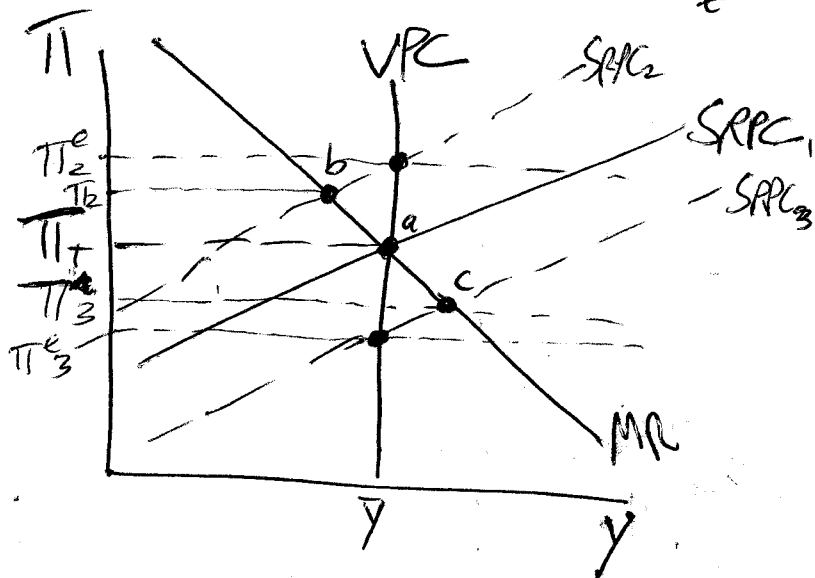
$$\Rightarrow \alpha E_{t-1}[y_t - \bar{y}_t] = 0 \quad \text{since } E_{t-1}[v_t] = 0$$

$$\Rightarrow E_{t-1}[y_t - \bar{y}_t] = 0 \Rightarrow y_t = \bar{y}_t + z_t$$

where  $E_{t-1}[z_t] = 0$

GIVEN A INFLATION TARGETTING CENTRAL BANK,  
THE ONLY WAY THAT THIS

CAN HAPPEN IS IF  $\pi_t^e = \pi_T$  :



RATIONAL EXPECTATIONS  
EQUILIBRIUM MUST  
BE AT POINT  
a WITH SRPC<sub>1</sub>  
NOT b or c  
WITH SRPC<sub>2</sub> AND  
SRPC<sub>3</sub>

So, IF  $\pi_{t-1} > \pi_T$  THEN  $E_{t-1}[\Delta\pi_t] < 0$   
AND IF  $\pi_{t-1} < \pi_T$  THEN  $E_{t-1}[\Delta\pi_t] > 0$ .  
THERE IS NO SYSTEMATIC CONNECTION WITH  
THE OUTPUT GAP!

NKPC THE NKPC IS DERIVED FROM A MODEL WHERE ONLY A PROPORTION  $\delta$  (WHERE  $0 < \delta < 1$ ) OF FIRMS ARE ABLE TO REOPTIMIZE IN EACH PERIOD. SO, WHEN SETTING PRICES TODAY, FIRMS MUST TAKE INTO ACCOUNT EXPECTED FUTURE INFLATION:

$$\Pi_t = \delta (\Pi_t^e + \alpha(Y_t - \bar{Y}_t)) + \sum_{j=1}^{\infty} \left[ \underbrace{\psi^j}_{\substack{\text{DISCOUNT FACTOR FOR } j \\ \text{PERIODS IN FUTURE}}} (1-\delta)^j E_t \left[ \underbrace{\alpha(Y_{t+j} - \bar{Y}_{t+j}) + \Pi_{t+j}^e}_{\substack{\text{EXPECTED PROFIT CURVE IN } j \\ \text{PERIODS' TIME}}} \right] \right] \quad \text{RESIDUAL SHARE}$$

II

PROPORTION OF FIRMS SETTING PRICES

TODAY'S PROFIT CURVE

SO, NEXT PERIOD ( $t+1$ ) GIVES US:

$$\Pi_{t+1} = \delta (\Pi_{t+1}^e + \alpha(Y_{t+1} - \bar{Y}_{t+1})) + \sum_{j=2}^{\infty} \left[ \psi^j (1-\delta)^j E_{t+1} [\alpha(Y_{t+j} - \bar{Y}_{t+j}) + \Pi_{t+j}^e] \left( \frac{1}{\psi(1-\delta)} \right) \right] + \xi_{t+1} \quad \text{[2]}$$

SO REARRANGING, WE GET:

$$E_{t+1}[\Pi_{t+1}] = \delta \left( \left( \frac{1}{\psi(1-\delta)} \right) \left( \sum_{j=1}^{\infty} \left[ \psi^j (1-\delta)^j E_{t+1} [\alpha(Y_{t+j} - \bar{Y}_{t+j}) + \Pi_{t+j}^e] \right] \right) \right) \quad (\text{from [2]})$$

$$E_{t+1}[\Pi_t] = \delta (E_{t+1}[\Pi_t^e + \alpha(Y_t - \bar{Y}_t)]) + \sum_{j=1}^{\infty} \left[ \psi^j (1-\delta)^j E_{t+1} [\alpha(Y_{t+j} - \bar{Y}_{t+j}) + \Pi_{t+j}^e] \right] \quad (\text{from [1]})$$

COMBINING, WE GET

$$E_{t+1}[\Pi_t] = \delta (E_{t+1}[\Pi_t^e] + \alpha E_{t+1}[Y_t - \bar{Y}_t]) + \frac{\psi(1-\delta)}{\delta} E_{t+1}[\Pi_{t+1}]$$

$$\Rightarrow \Pi_t^e = \delta \Pi_t^e + \alpha \delta E_{t+1}[Y_t - \bar{Y}_t] + \psi(1-\delta) E_{t+1}[\Pi_{t+1}]$$

$$\Rightarrow \Pi_t^e = \left( \frac{\alpha \delta}{1-\delta} \right) E_{t+1}[Y_t - \bar{Y}_t] + \psi E_{t+1}[\Pi_{t+1}]$$

$$\Rightarrow \Pi_t = \left( \frac{\alpha \delta}{1-\delta} \right) (Y_t - \bar{Y}_t) + \psi \Pi_{t+1}^e + v_t \quad \text{WHERE } E_{t+1}[v_t] = 0$$

IF WE ASSUME NO DISCOUNTING FOR SIMPLICITY, SO THAT  $\psi=1$ , THEN WE CAN REARRANGE TO GET:

$$E_{t-1}[\Delta\pi_{t+1}^e] = E_{t-1}[\pi_{t+1}^e - \pi_t] = E_{t-1}\left[-\left(\frac{\alpha\delta}{1-\delta}\right)(y_t - \bar{y}) - v_t\right]$$

$$\Rightarrow E_{t-1}[\Delta\pi_{t+1}^e] = -\left(\frac{\alpha\delta}{1-\delta}\right)E_{t-1}[y_t - \bar{y}]$$

SO, NOW IF THE OUTPUT GAP IS EXPECTED TO BE POSITIVE NEXT PERIOD THEN INFLATION MUST BE EXPECTED TO FALL IN THE PERIOD AFTER THAT. THE INTUITION IS THAT RATIONAL EXPECTATIONS AND STAGGERED PRICE SETTING MEAN THAT IF FIRMS EXPECT INFLATION TO FALL <sup>IN FUTURE</sup>, THEY <sup>WILL</sup> CUT THEIR PRICES TODAY, CREATING A POSITIVE OUTPUT GAP.

THE CENTRAL BANK NOW HAS AN IMPORTANT ROLE TO PLAY IN ENSURING CREDIBLY STABLE INFLATION ( $E_{t+1}[\Delta\pi_{t+1}^e] = 0$ ) IN ORDER TO ENSURE STABLE OUTPUT ( $E_{t+1}[y_t - \bar{y}] = 0$ ).

ALSO, THE NKPC CREATES THE POTENTIAL FOR THE INCONSISTENCY SINCE IF THERE IS A INFLATION SHOCK ( $v_t$ ) THEN THE CENTRAL BANK WOULD LIKE TO CREDIBLY PROMISE LOWER FUTURE INFLATION ( $\pi_{t+1}^e \downarrow$ ) IN ORDER TO OFFSET THE EFFECT.