

Business Cycles

University of Würzburg

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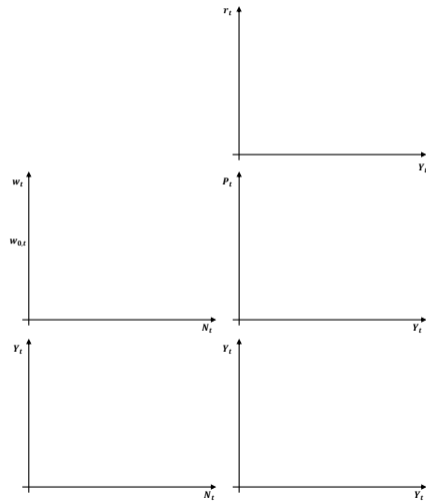
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Task 1

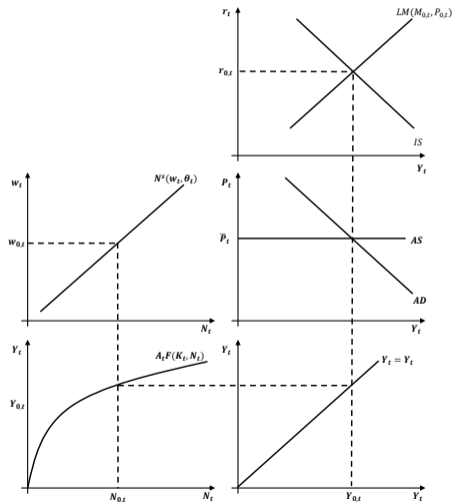
Suppose that you have a sticky price New Keynesian model. Suppose further that the central bank wants to target a constant level of output, Y_t . How must it adjust the money supply in response to the following kinds of shocks:

- 1 A decrease in A_{t+1}
- 2 An increase in θ_t
- 3 An increase in π_{t+1}^e

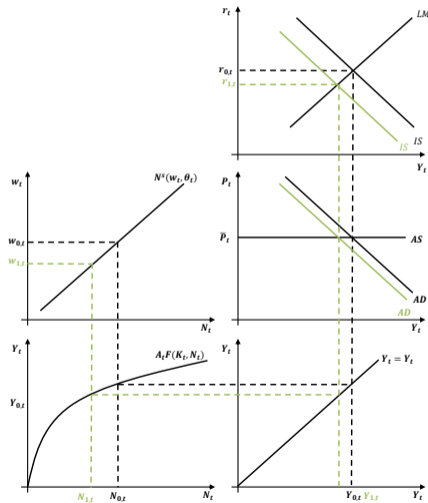
A decrease in A_{t+1}



A decrease in A_{t+1}



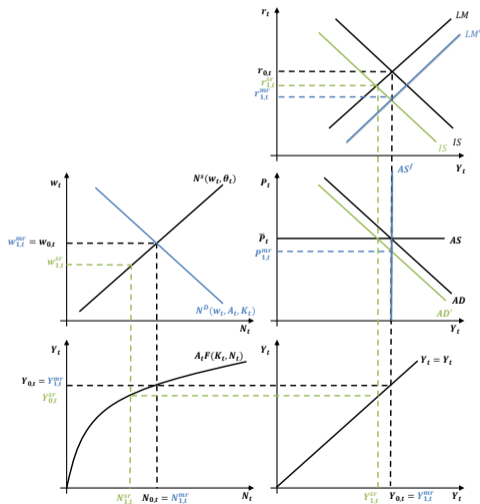
A decrease in A_{t+1}



Transmission (NKM):

- ▶ expected productivity $\downarrow \rightarrow I^d \downarrow$ for a given r_t (refer back to the firm problem) \rightarrow IS shifts to the left
- ▶ AD shifts to the left
- ▶ NKM: due to sticky prices ($P_t = \bar{P}_t$), $Y_t \downarrow$ and r_t and $w_t \downarrow$

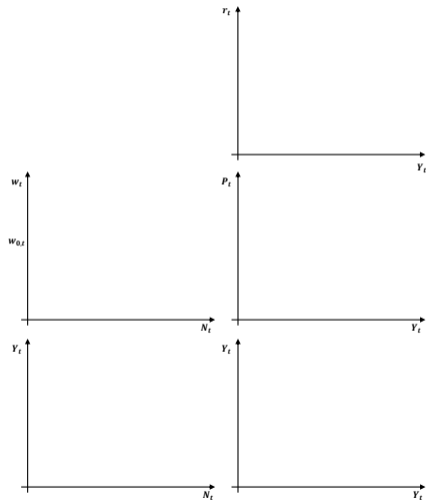
A decrease in A_{t+1}



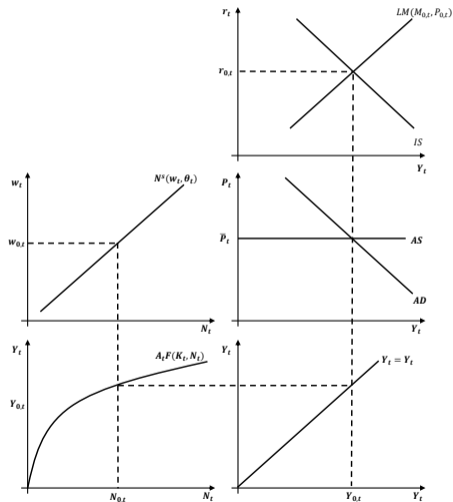
Policy Reaction:

- ▶ Aim: get back to flex price allocation (neoclassical Y -level)
- ▶ How to: adjust M^s , so that AD curve shifts back to original position
- ▶ $M^s \uparrow$ yields $r_t \downarrow$ yields $\frac{M}{P} \uparrow$
- ▶ expansionary MP to keep Y_t constant and counteract negative IS shock to close negative output gap

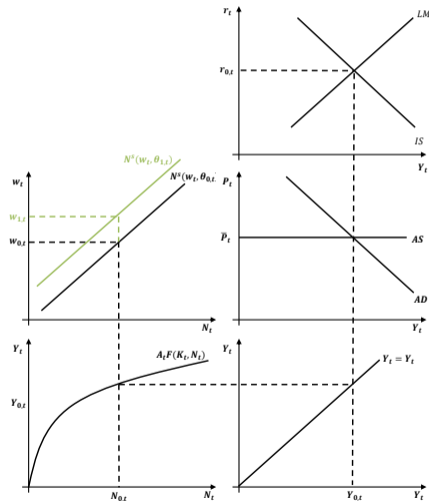
An increase in θ_t



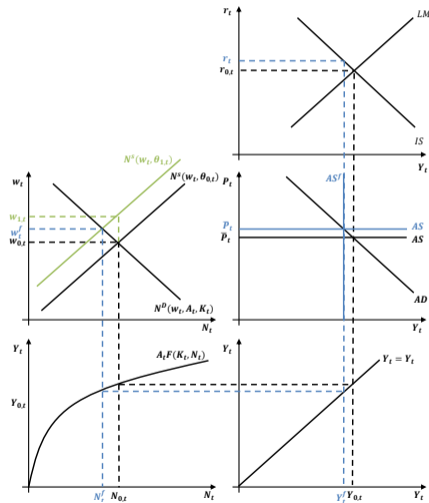
An increase in θ_t



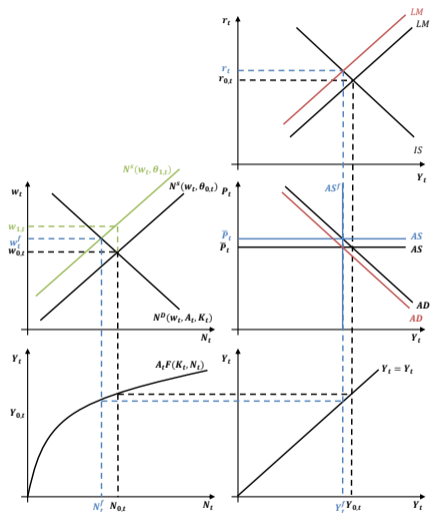
An increase in θ_t



An increase in θ_t : short to medium run



Optimal policy: in the medium run central bank targets efficient flex price allocation (Y_t): \rightarrow
 $Y_t \downarrow$



An increase in π_{t+1}^e :

- ▶ Recall where $\pi_{t+1}^e \uparrow$ shifts LM curve (Hint: argue via Fisher-equation); LM-curve shifts to the right due to DECREASE in money demand as $\pi_{t+1}^e \uparrow$ increases opportunity costs of holding money for a given level of r_t ; hence $i_t \uparrow$ and $M^d \downarrow \rightarrow r_t$ decreases
- ▶ Figure out the short-run transmission in the NKM
- ▶ Optimal Policy: rationalize why contractive monetary policy is able close output gap and offset π_{t+1}^e
- ▶ What happens with the price level in the medium run, if π_{t+1}^e and how does that affect the LM curve?
- ▶ Think about how the supply side (non)actions are different between the short and the medium run

Task 2

Summarizing what you have learned in the last question, explain how monetary policy ought to react to a positive shock to the IS curve. How should monetary policy react to a negative productivity shock (e.g. a decrease in A_t)?

- ▶ position of AD curve partly determined by $\frac{M}{P}$ (due to LM curve)
 - ▶ RBC: flexible prices - exogenous shocks yield to price adjustments; P adjusts in a way so that equilibrium level of Y is efficient
 - ▶ NKM: prices fixed in the short run \rightarrow central bank has to adjust M^s in a way to engineer efficient allocation (e.g. get $\frac{M}{P}$ so that Y equals neoclassical solution)
- ▶ Positive IS shock: right shift IS curve \rightarrow right shift AD curve: $Y > Y^f \rightarrow$ policy reaction: $M^s \downarrow$ to bring AD curve back
- ▶ Negative supply shock: Y as before, but $Y^f \downarrow \rightarrow$ policy reaction: $M_s \downarrow$ to engineer Y^f with constant prices
- ▶ Monetary policy counteracts demand shocks and accommodates (adjusts to) supply shocks

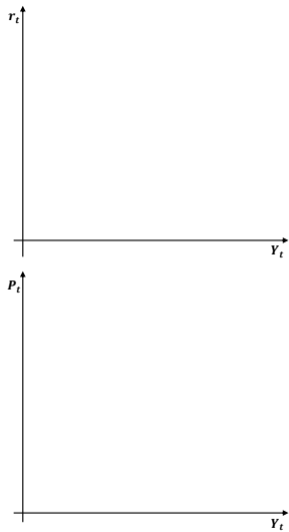
Fiscal policy as an alternative?

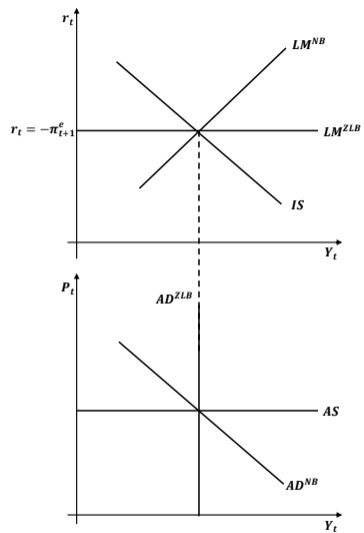
- ▶ Fiscal policy does not change Y_t^f but the allocation between $C_t \wedge I_t$
- ▶ r_t is impacted so that $r_t \neq r_t^f$ (central bank on the other hand is concerned with stabilizing r_t - policy friction)
- ▶ legislative delays

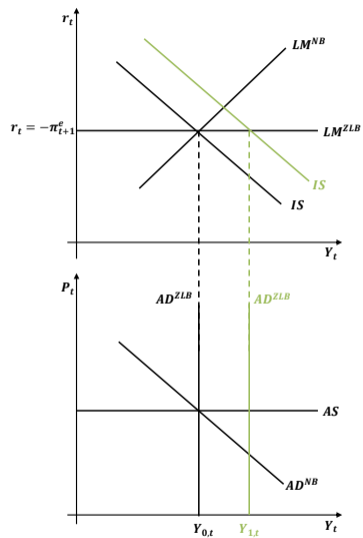
Task 3

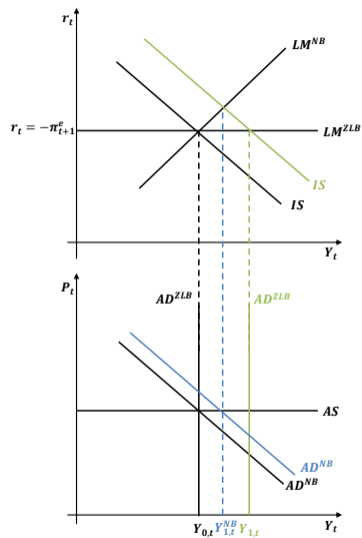
Explain why changes in government spending have a bigger effect on output at the ZLB than away from i_t . What is the economic intuition for it? Use an appropriate graph to underpin your argumentation.

- ▶ ZLB: $i_t = 0$ lower bound as otherwise money would be hold
- ▶ r_t can get negative if $\pi_{t+1}^e > 0$ (Fisher-equation: $r_t = i_t - \pi_{t+1}^e = -\pi_{t+1}^e$)
- ▶ At ZLB: AD curve vertical; normal area: $P_t \uparrow$ LM curve shifts inwards, whereas flat area remains unaffected (recall AD curve derivation)
- ▶ Vertical AD-curve area unaffected by P_t changes as long as normal area out of side









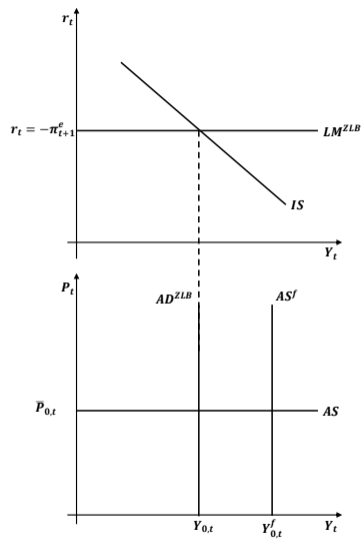
Fiscal Policy

- ▶ Normal conditions: $G_t \uparrow \rightarrow Y_t \uparrow$, but also $r_t \uparrow$ so that $I_t \wedge C_t \downarrow \rightarrow$ crowding-out
- ▶ ZLB: no crowding-out since r_t constant with $-\pi_{t+1}^e$; no r_t -adjustment; no negative effect on $I_t \wedge C_t$
- ▶ Fundamental mechanism why fiscal policy is more effective at the ZLB (and (positive and negative) IS shocks in general have larger effects)

Task 4

Explain what is meant by a deflationary spiral and why the normal mechanism which restores the efficient neoclassical equilibrium may not work at the ZLB.

- ▶ Deflationary spiral: self-reinforcing deterioration of economic conditions
- ▶ At ZLB: automatic stabilization mechanism via r_t -adjustment impaired so that efficient equilibrium cannot be restored (neoclassical allocation)
- ▶ Illustration, assuming ZLB is binding and $Y_{0,t} < Y_t^f$



- ▶ normal mechanism for $Y_{0,t} < Y_{0,t}^f$: downward price adjustment, AS shifts down with $P_t \downarrow \wedge Y_t \uparrow$ - until $Y_{1,t} = Y_t^f$
- ▶ ZLB: only $P_t \downarrow$ while Y_t remains unchanged ($Y_{1,t} = Y_{0,t} \neq Y_{p,t}^f$)
- ▶ At ZLB no conventional monetary policy available ($M^s \uparrow, i_t \downarrow$) to close negative output gap
- ▶ automatic stabilizer via price adjustment on supply side impaired
- ▶ Development of re-enforcing spiral since negative output gap induces deflationary pressure ($P \downarrow$)
- ▶ downward adjusting inflation expectations $\pi_{t+1}^e \downarrow$ yield $\pi_{2,t+1}^e < \pi_{0,t+1}^e$ so that $r_t \uparrow$ and upward shift of flat LM curve (desired expenditures decline, AD curve shifts to the left and Y_t declines)
- ▶ mechanism is self-reinforcing and can turn into deflationary spiral

