

Intermediate Macroeconomics Sample Teaching Slides II

PROBLEM 1

The Covid-19 Pandemic and Economic Policy

PROBLEM 1 (Covid-19 and Economic Policy)

We can use the business cycle model with flexible prices in chapter 12 & 13 to analyse the effects of the Covid-19 pandemic.

Let's assume that the resultant shock affects the rate of capital utilization, θ .

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Let's assume that the resultant shock affects the rate of capital utilization, θ . More specifically, we have the following production function:

$$Y = z_1 F(\theta K, N) = z_1 (\theta K)^\alpha N^{1-\alpha}$$

where $0 < \theta \leq 1$.

- Before the pandemic shock: $\theta = 1$
- After the pandemic shock: $\theta < 1$

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We can re-write the production function as:

$$Y = z_1 \theta^\alpha K^\alpha N^{1-\alpha} = \overbrace{(\theta^\alpha z_1)}^{\equiv z_2} K^\alpha N^{1-\alpha} = z_2 K^\alpha N^{1-\alpha}$$

Clearly, $z_2 < z_1$ since $\theta < 1$ after the pandemic.

Thus, the pandemic shock is equivalent to a negative *TFP* shock in our model.

PROBLEM 1 (Covid-19 and Economic Policy)

Note that we can also assume the rates of **capital** and **labour** utilization are affected.

$$Y = z_1 F(\theta K, \theta N) = z_1 (\theta K)^\alpha (\theta N)^{1-\alpha}$$

where $0 < \theta \leq 1$.

- Before the pandemic shock: $\theta = 1$
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Then, we can re-write the production function as:

$$\begin{aligned} Y &= z_1 \theta^\alpha K^\alpha \theta^{1-\alpha} N^{1-\alpha} = \theta^\alpha \theta^{1-\alpha} z_1 K^\alpha N^{1-\alpha} \\ &\stackrel{\equiv z_2 < z_1}{=} \overbrace{(\theta z_1)} K^\alpha N^{1-\alpha} \\ &= z_2 K^\alpha N^{1-\alpha} \end{aligned}$$

As in the previous case, since $z_2 < z_1$, the pandemic shock is equivalent to a negative *TFP* shock in our model.

THE SHOCK

PROBLEM 1 (Covid-19 and Economic Policy)

Q1.a).

The pandemic shock is equivalent to a negative *TFP shock* in our model. Determine its effects on output (Y), employment (N), and price level (P) in the current period.

PROBLEM 1 (Covid-19 and Economic Policy)

Q1.a). Determine the effects of the pandemic shock on Y , N , and P in the current period.

The pandemic as a negative TFP shock: $z \downarrow$

$$a) \quad z \downarrow \xrightarrow{\text{"AS shock"}} \begin{cases} Y^S \downarrow \rightarrow Y^S \text{ shifts to the left from } Y_1^S \text{ to } Y_2'^S \\ N^D \downarrow \rightarrow N^D \text{ shifts to the left from } N_1^D \text{ to } N_2^D \end{cases}$$

$$b) \quad z \downarrow \longrightarrow \pi \downarrow \xrightarrow{\text{"wealth shock"}} we \downarrow (\text{lifetime wealth} \downarrow)$$

$$\xrightarrow[\text{(small)}]{\text{negative wealth effect}} \begin{cases} c \downarrow \rightarrow Y^D \text{ shifts to the left} \\ l \downarrow \rightarrow N^S \uparrow: N^S \text{ shifts to the right from } N_1^S(r_1) \text{ to } N_2^S(r_1) \\ \rightarrow Y^S \text{ shifts to the right from } Y_2'^S \text{ to } Y_2^S \end{cases}$$

$$c) \quad r \uparrow \xrightarrow{\text{intertemporal } SE \gg IE} s \uparrow \xrightarrow[\text{(current period)}]{\text{"negative income effect"}} \begin{cases} c \downarrow, I \downarrow \rightarrow \text{move along } Y_2^D \text{ to } Q_2 \\ l \downarrow \rightarrow N_2^S \uparrow: N_2^S(r_1) \text{ shifts to the right to } N_2^S(r_2) \\ \rightarrow \text{move along } Y_2^S \text{ from } O \text{ to } Q_2 \end{cases}$$

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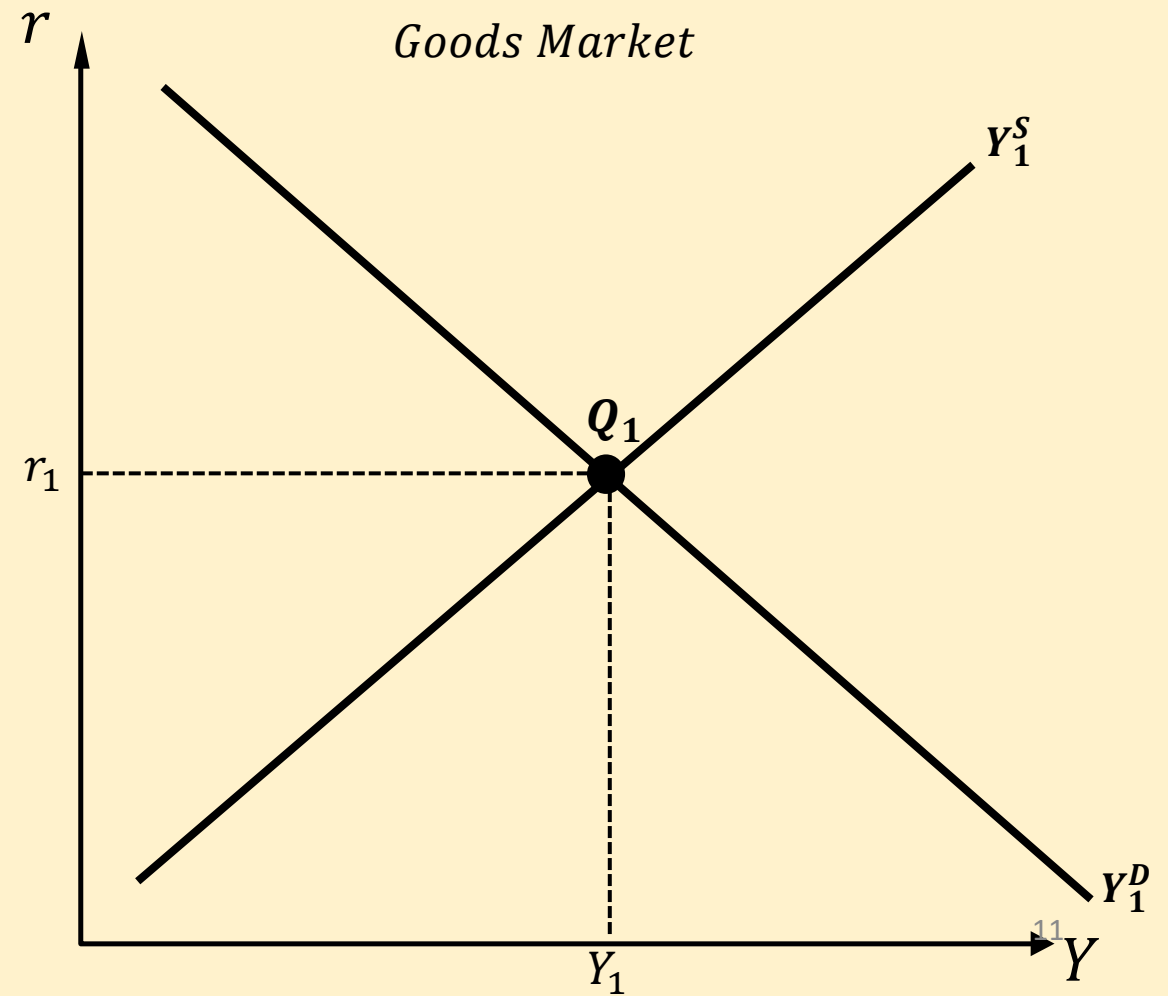
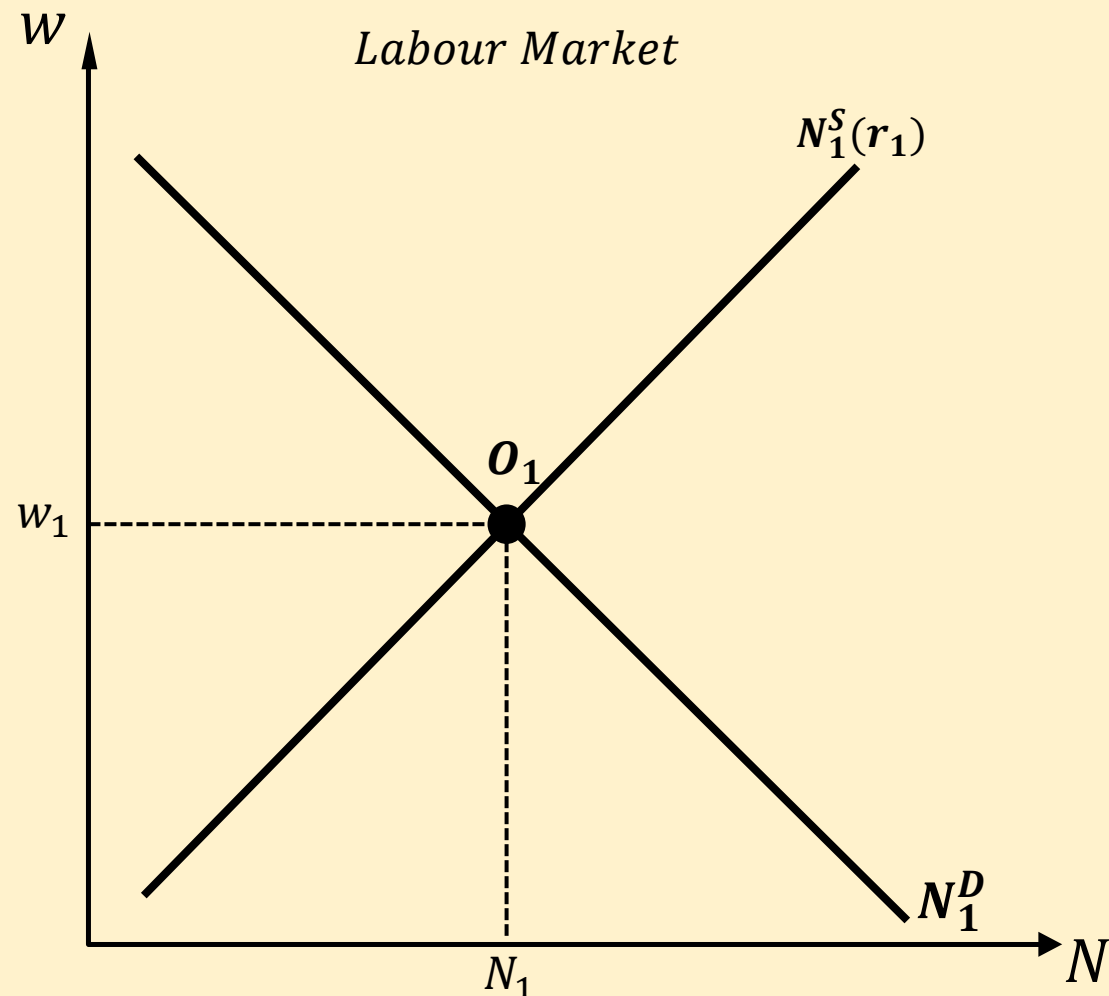
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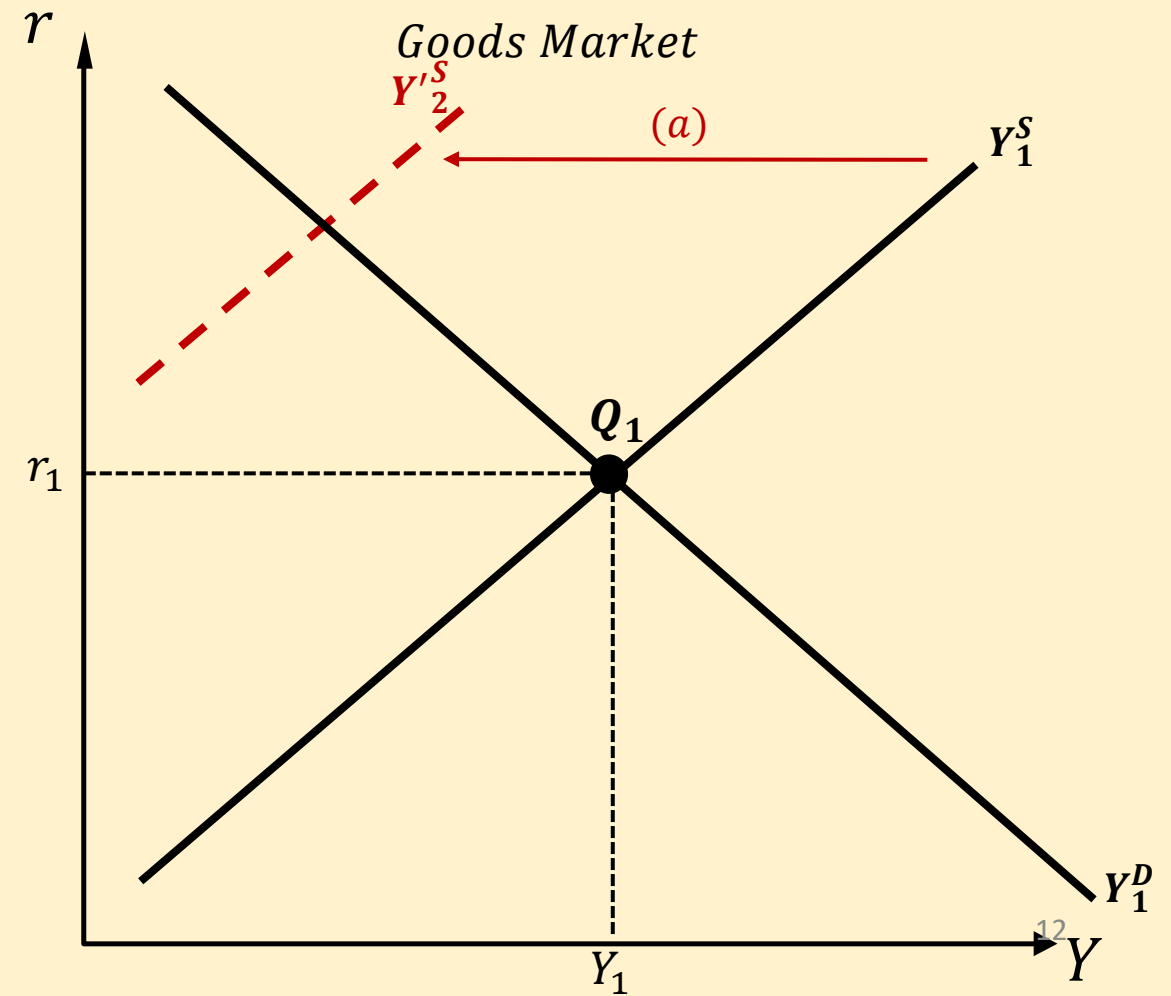
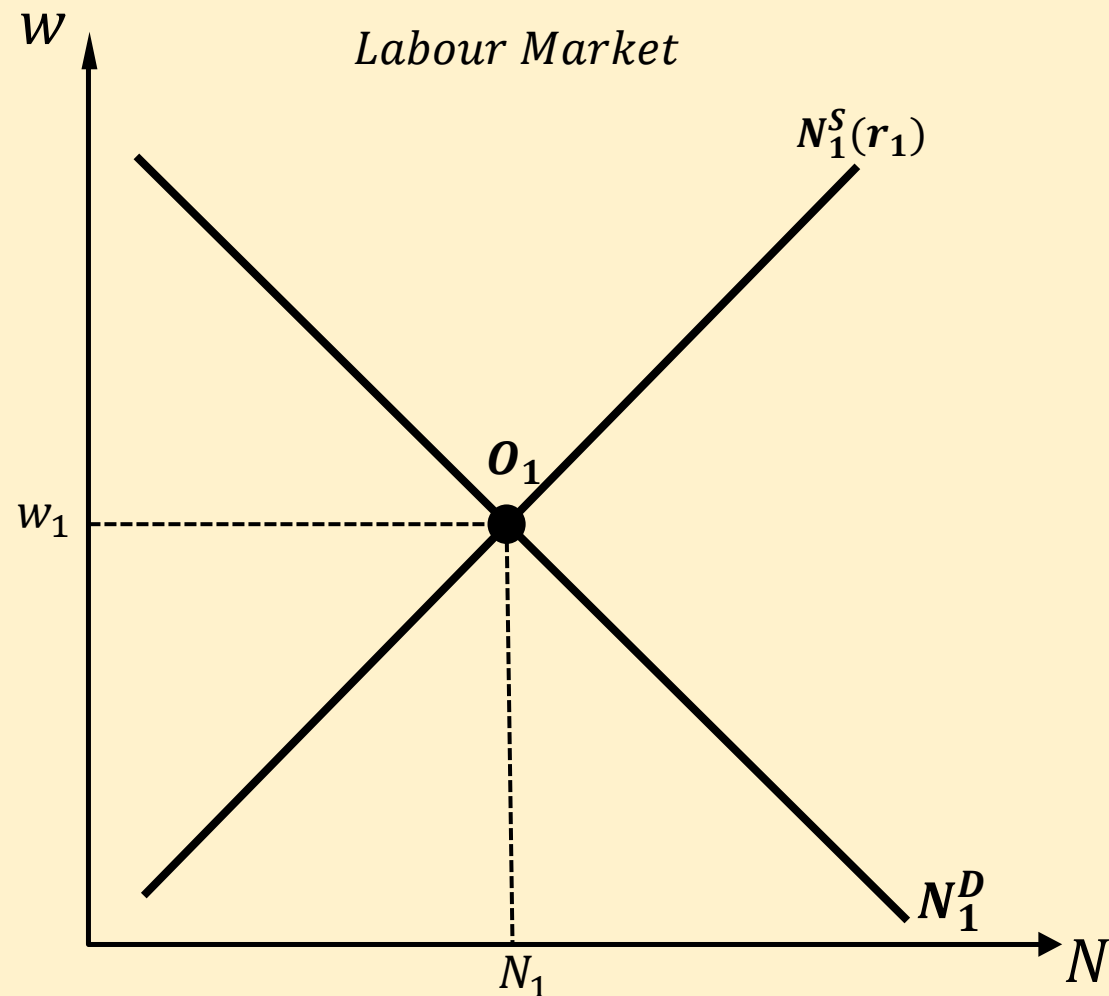
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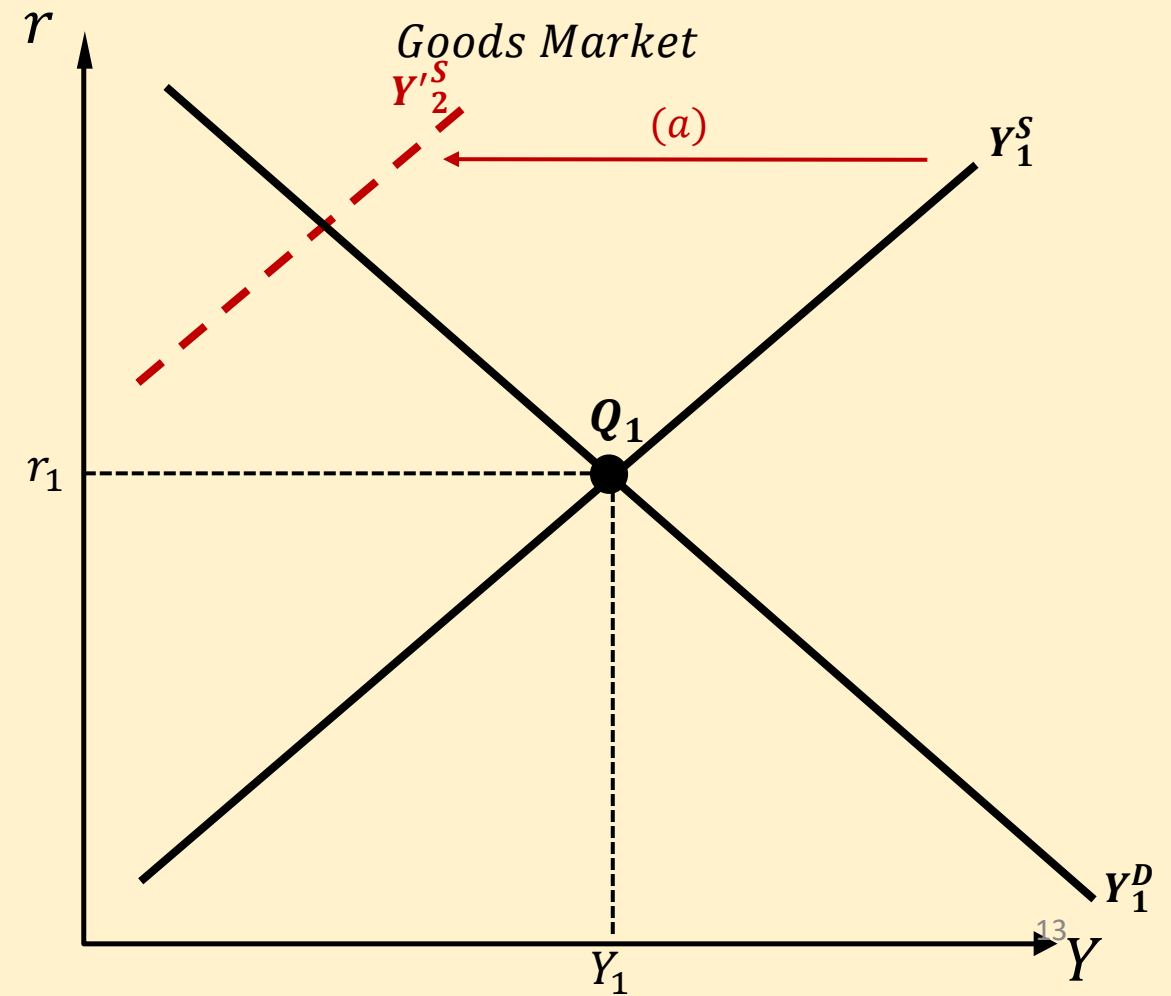
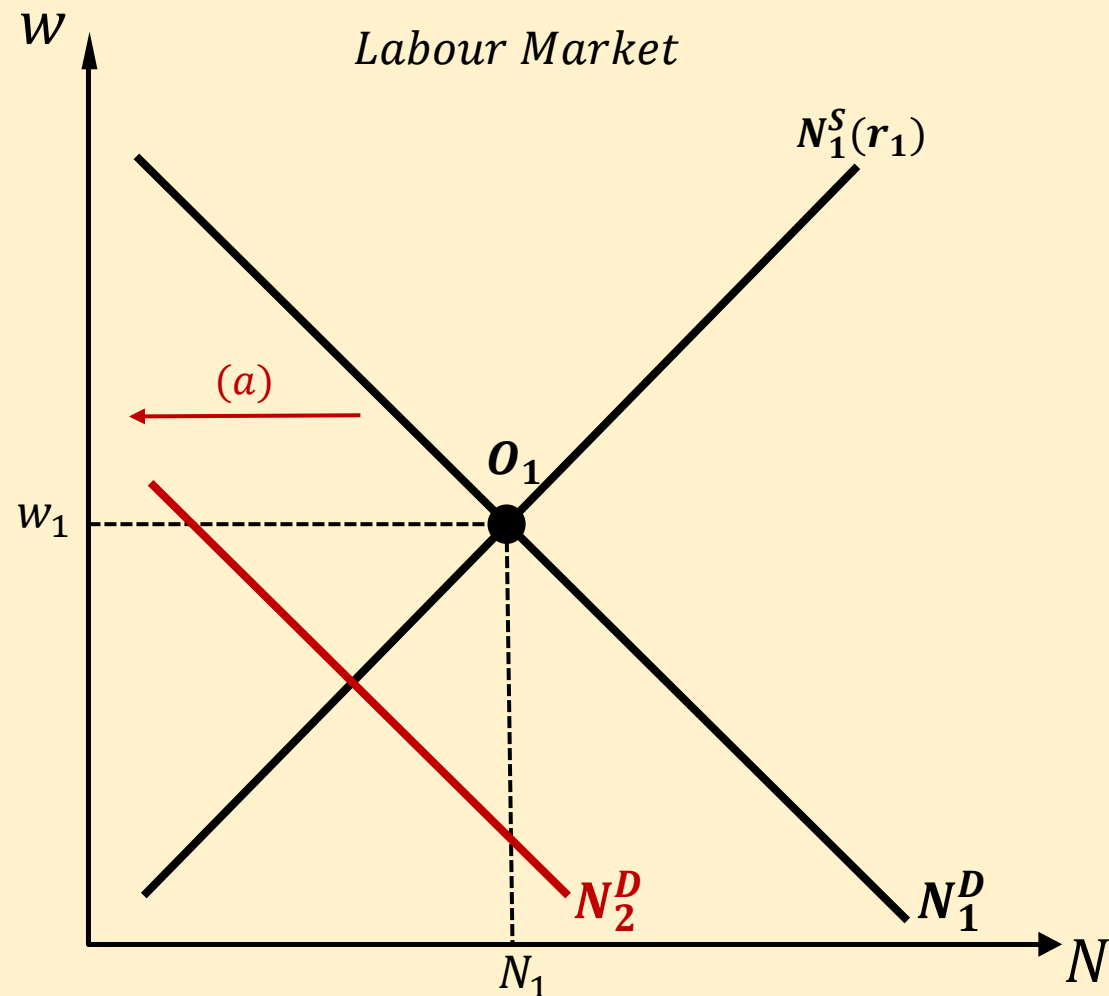
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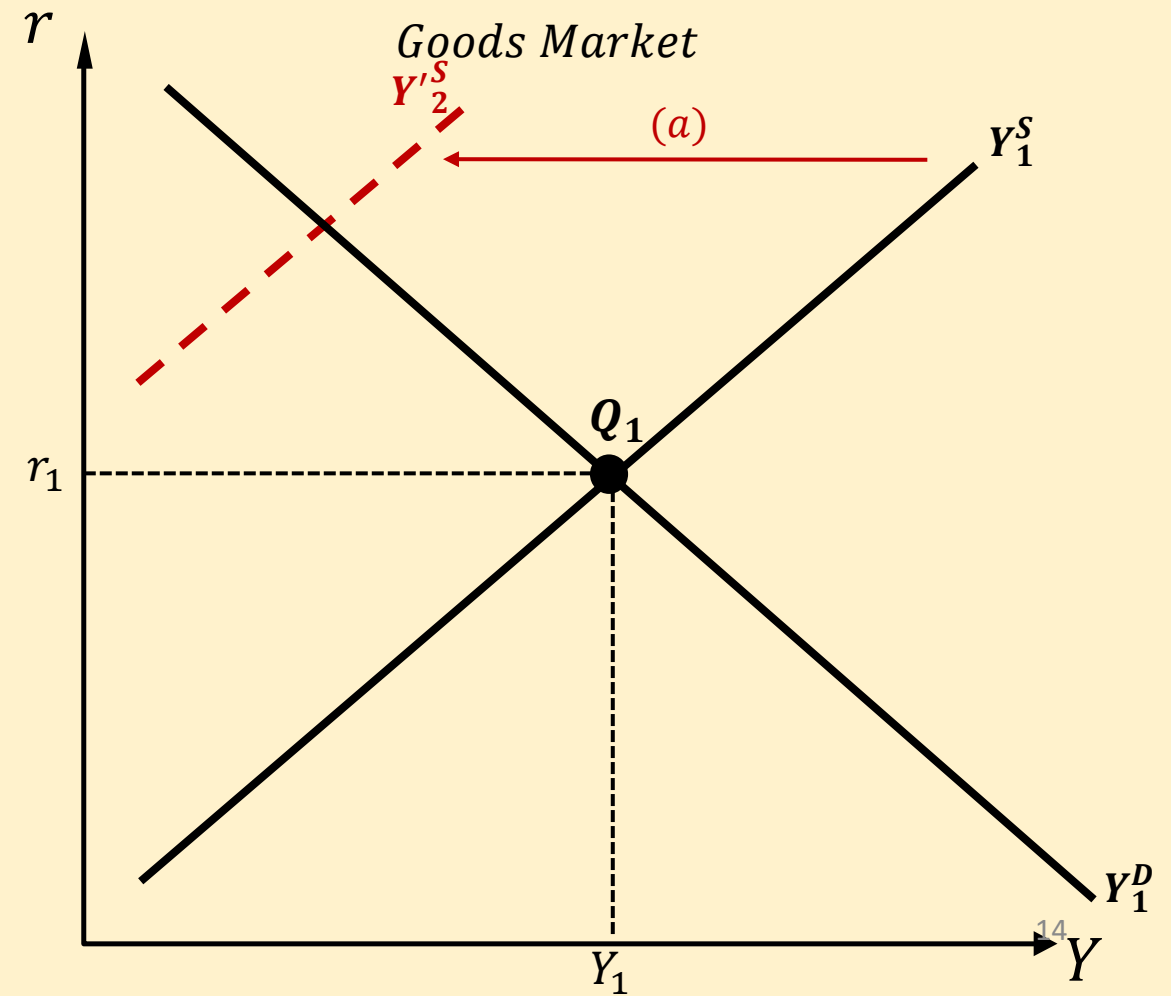
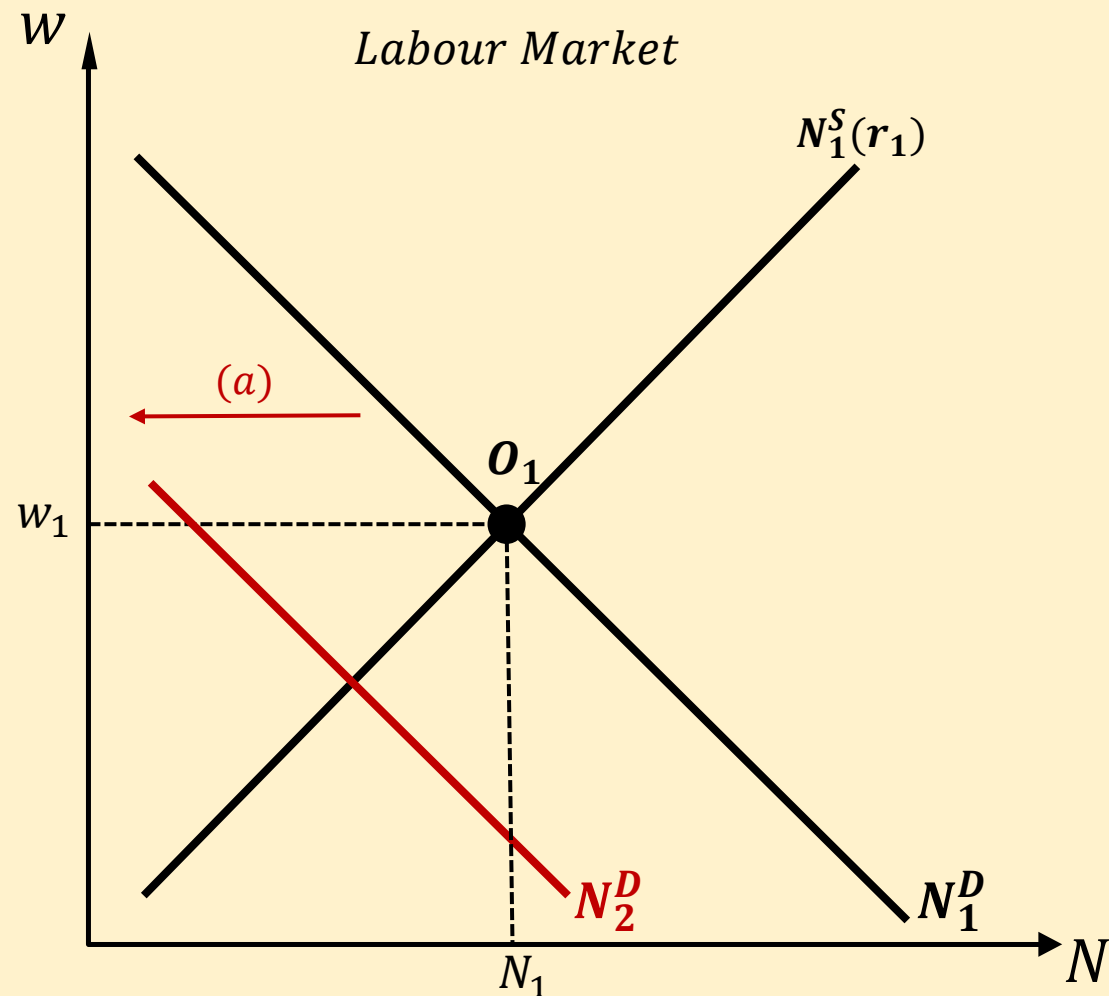
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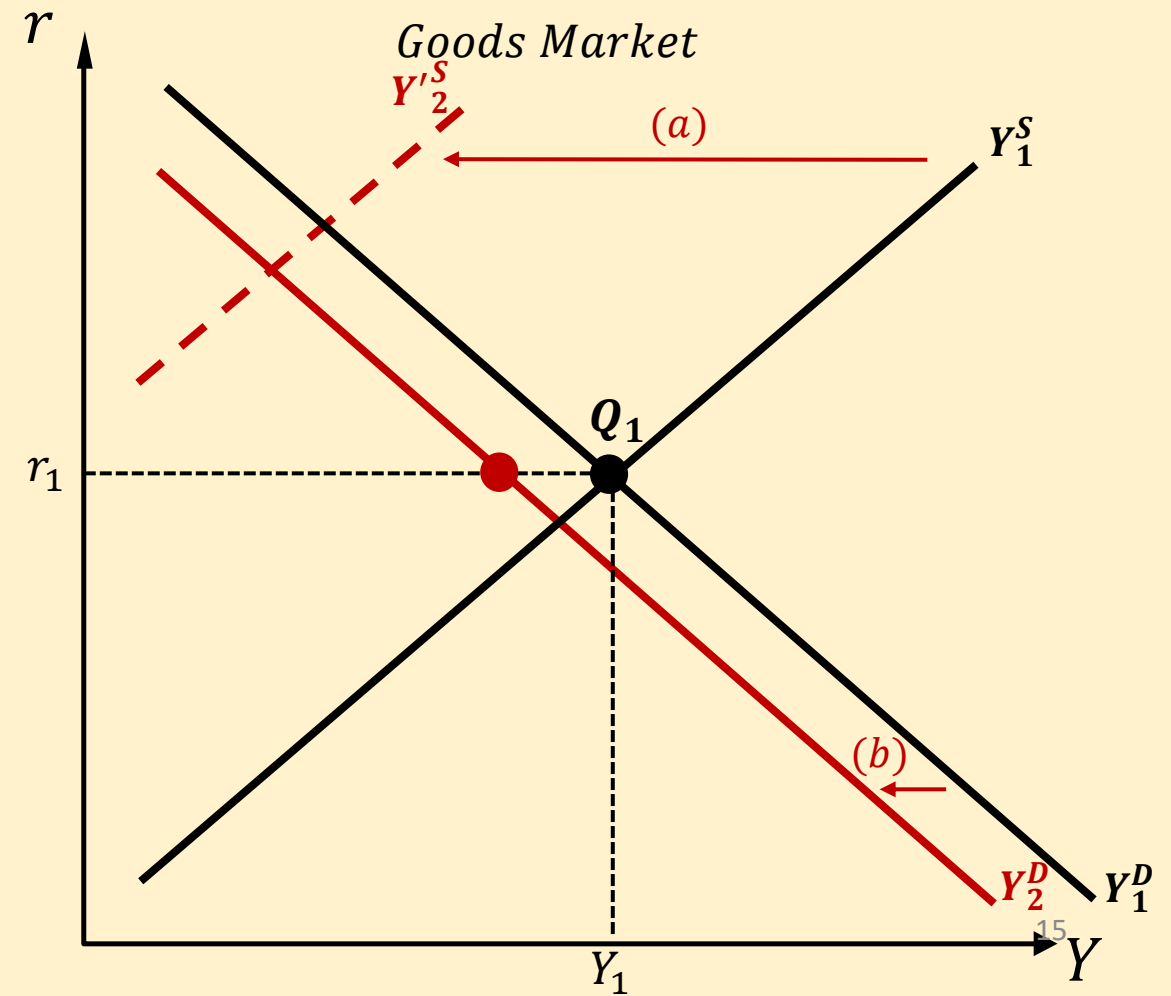
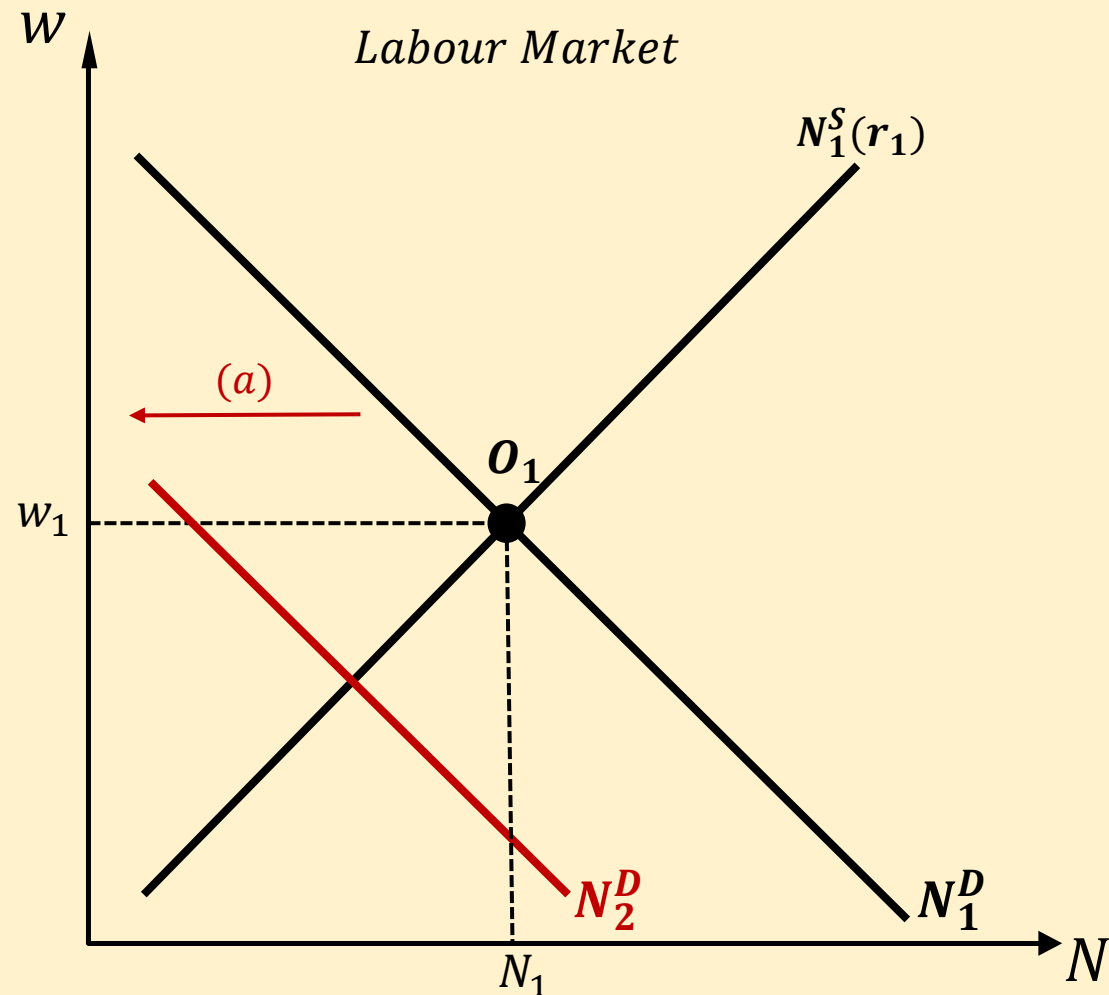
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$b). z \downarrow \longrightarrow \pi \downarrow \xrightarrow{\text{"wealth shock"}} we \downarrow \xrightarrow{\text{neg. wealth effect (small)}} \begin{cases} c \downarrow \rightarrow Y^D \text{ shifts leftward} \\ l \downarrow \rightarrow N^S \text{ shifts rightward from } N_1^S(r_1) \text{ to } N_2^S(r_1) \\ \rightarrow Y^S \text{ shifts to the right from } Y_1^S \text{ to } Y_2^S \end{cases}$



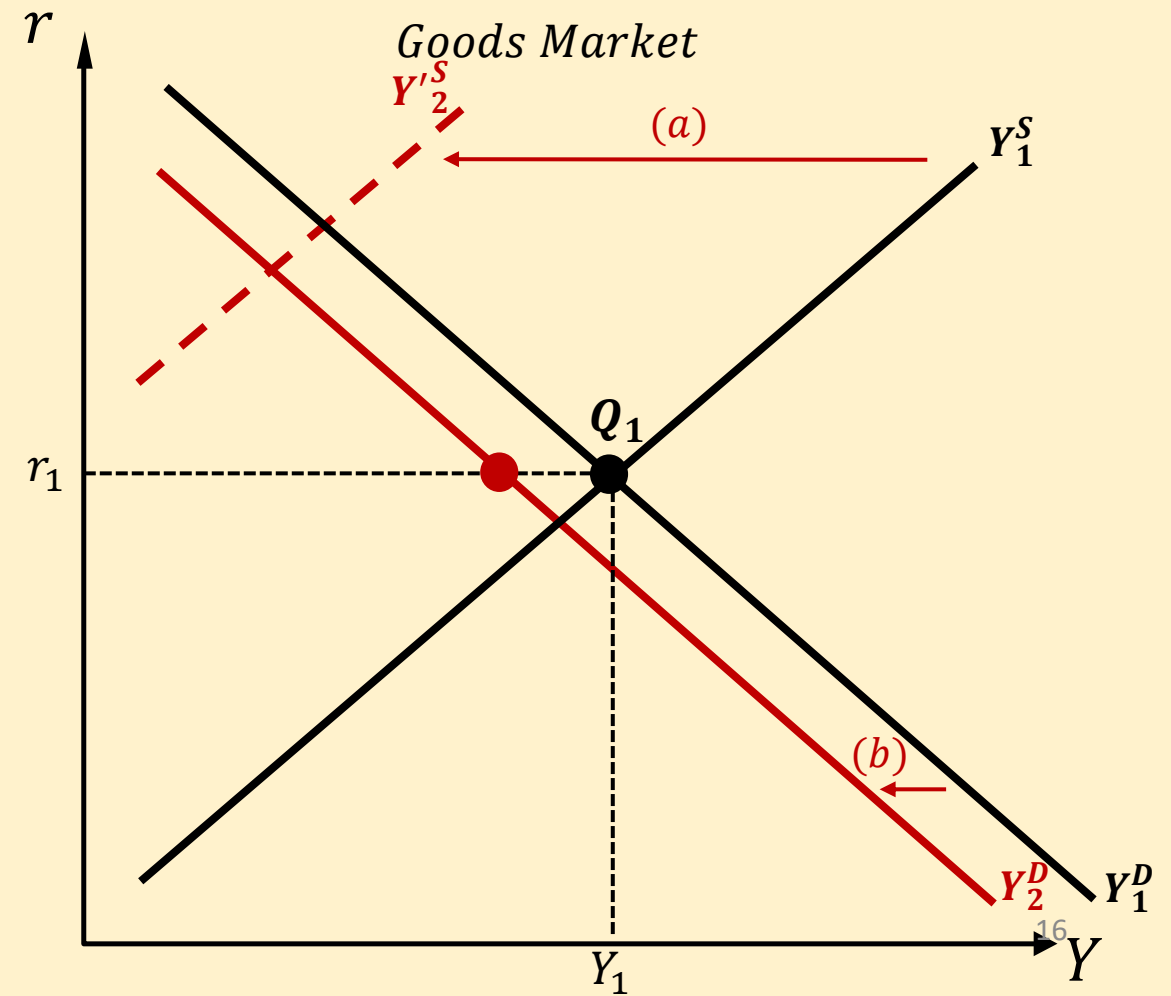
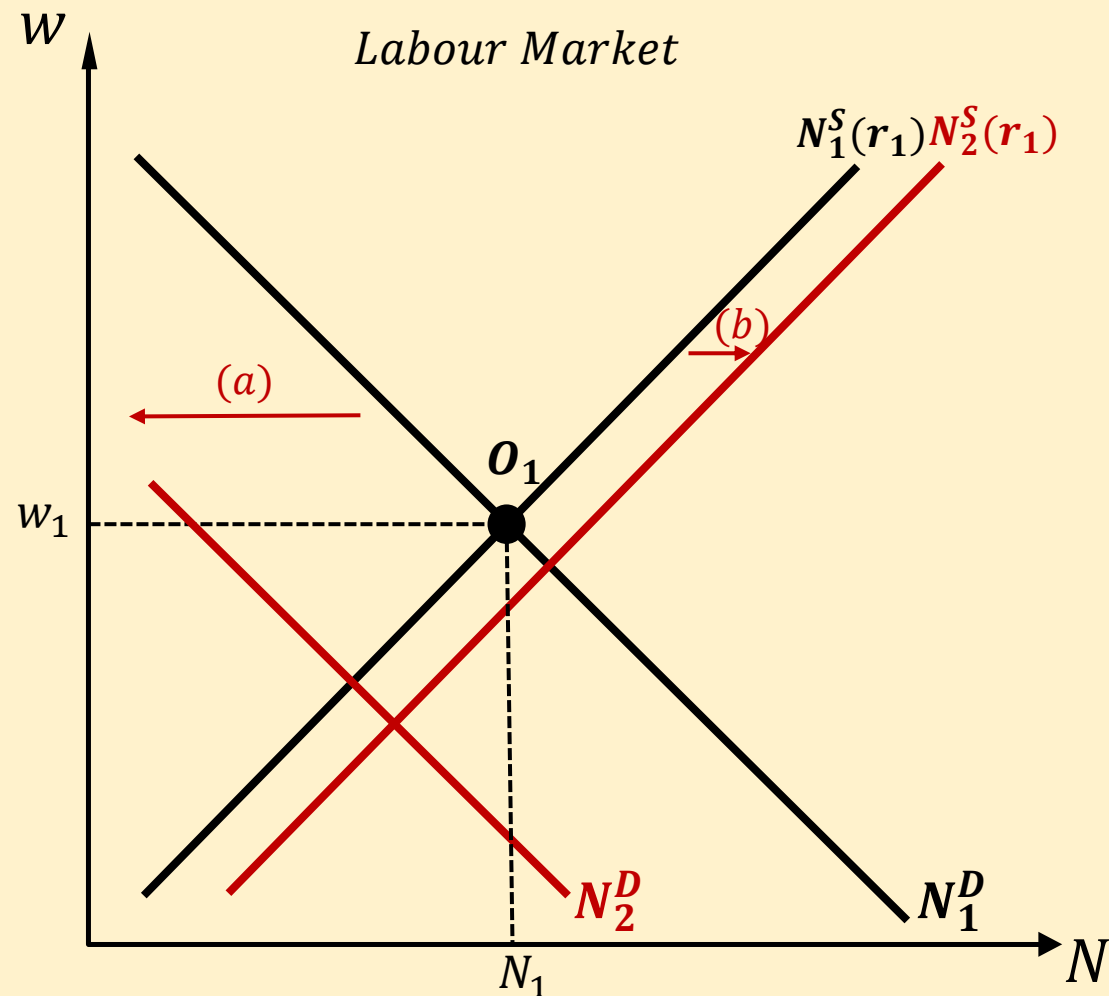
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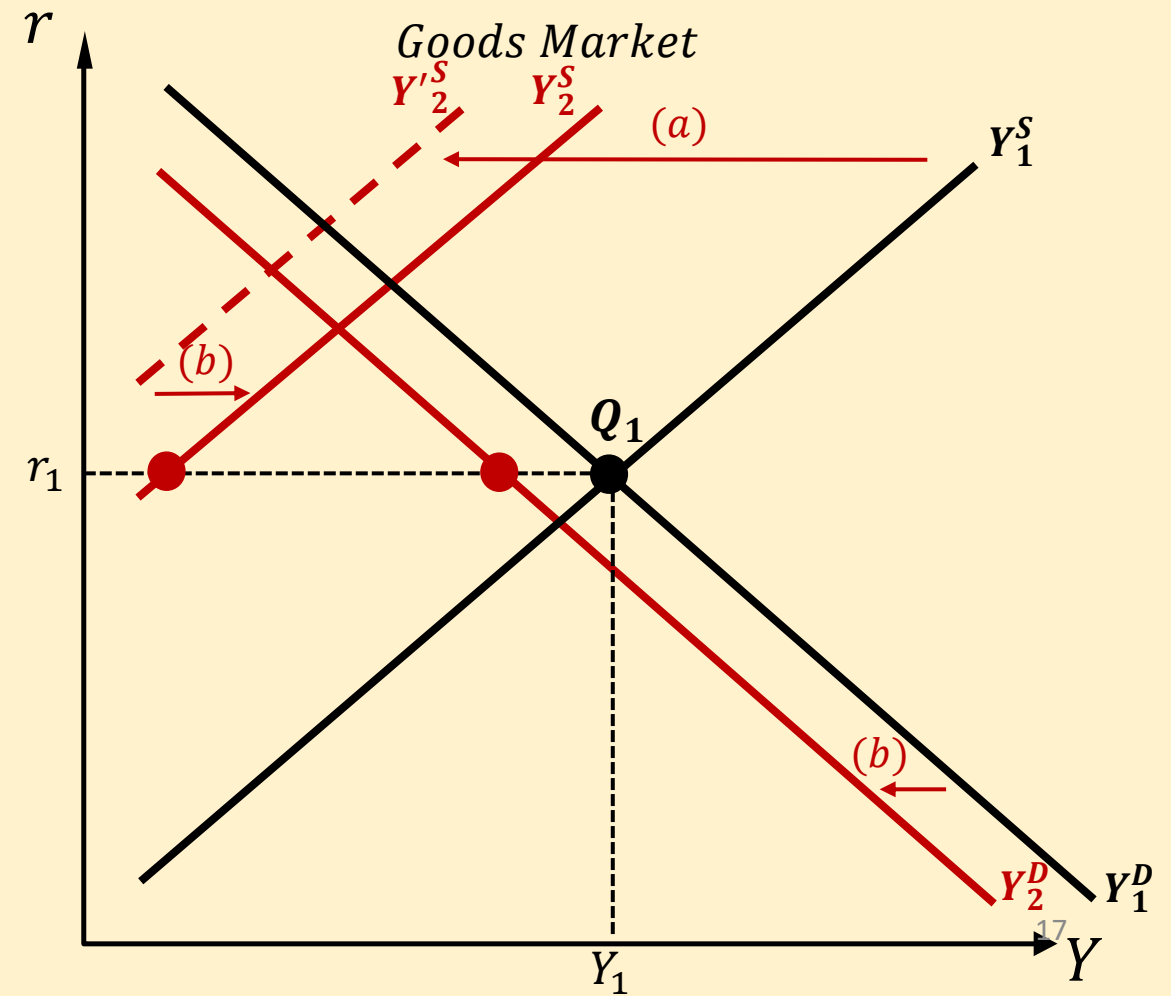
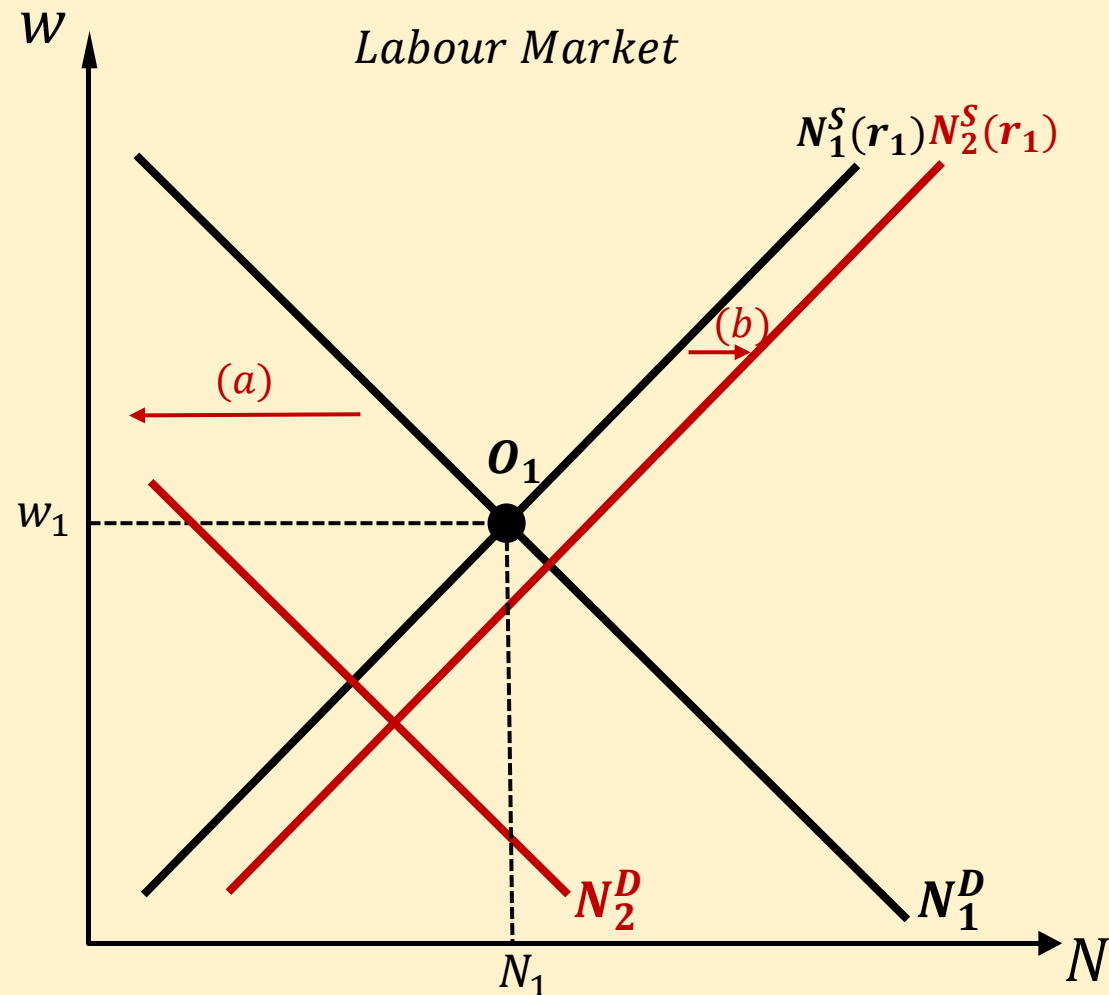
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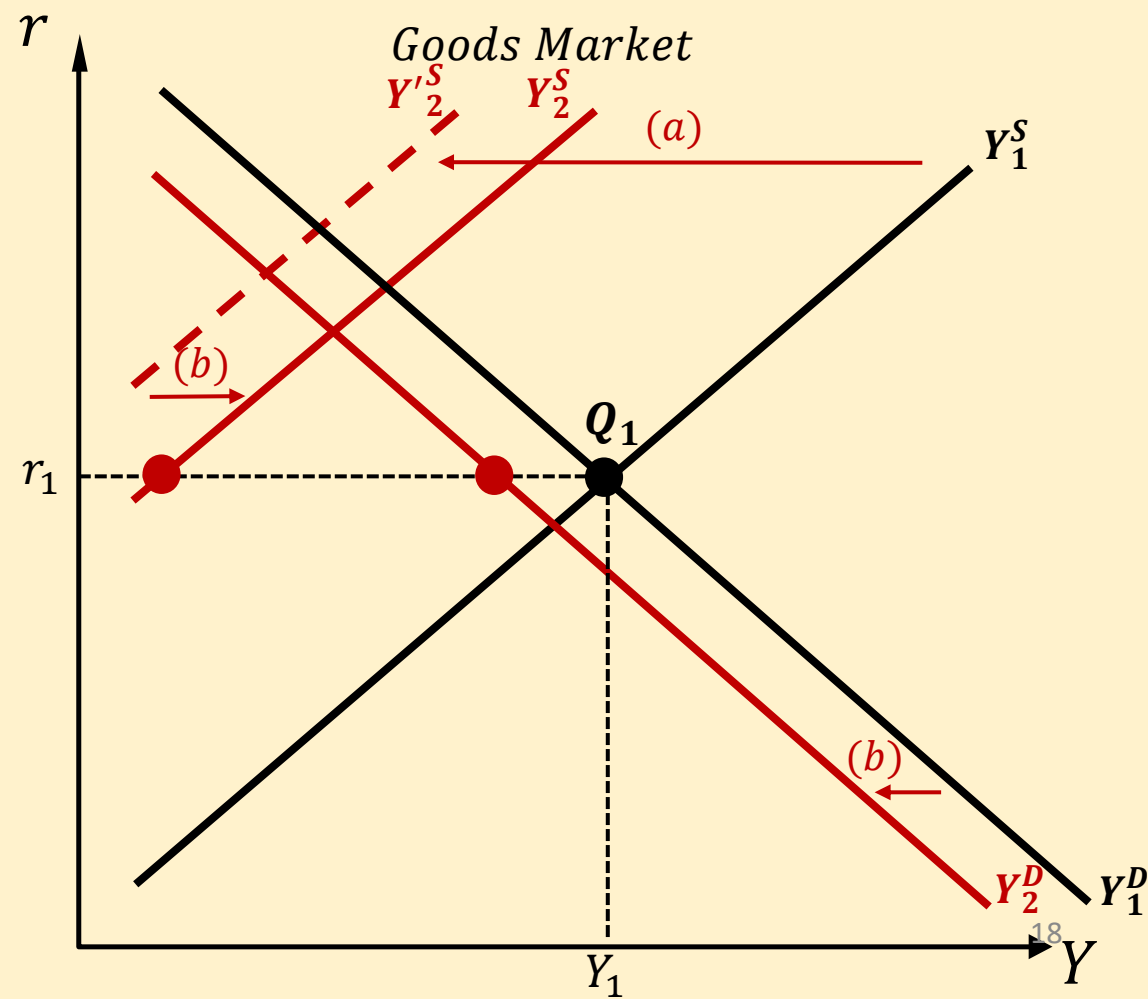
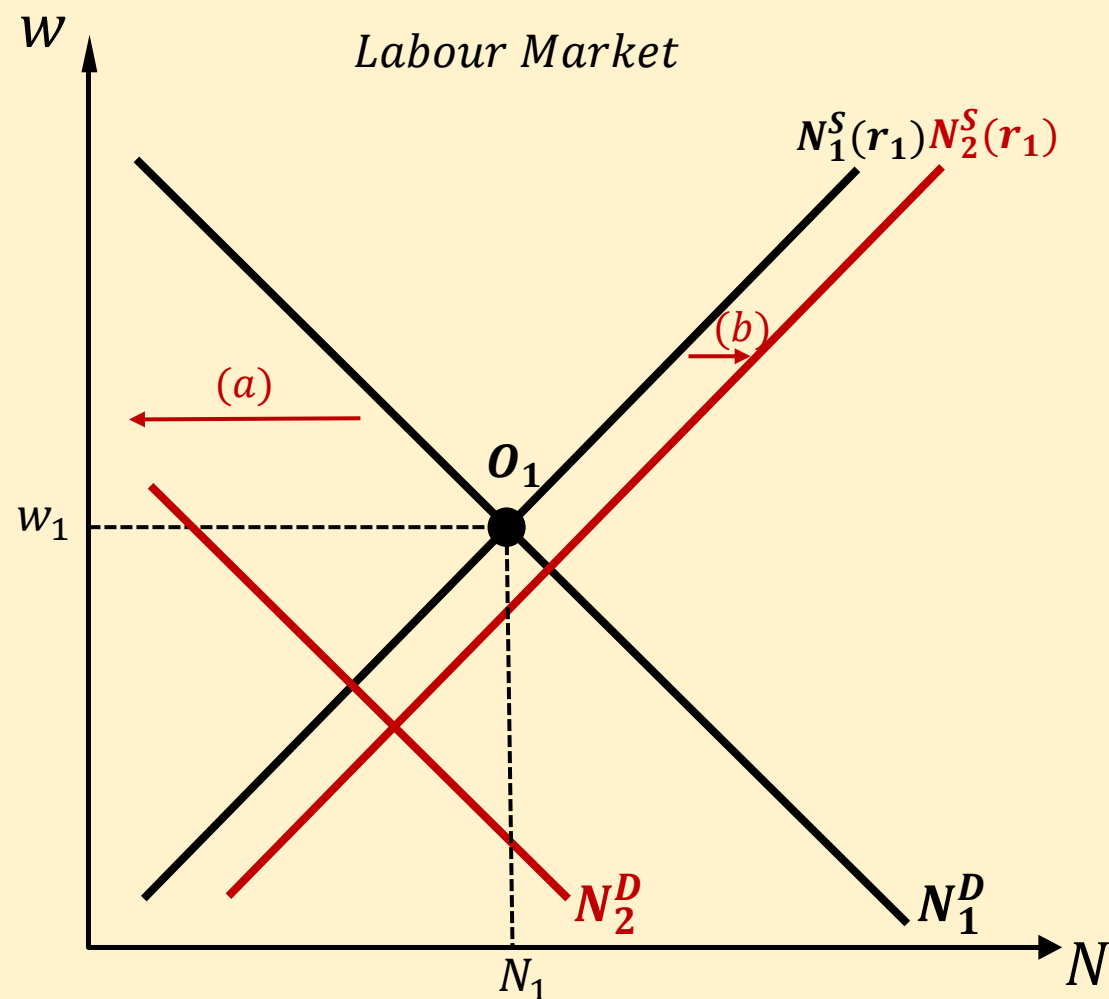
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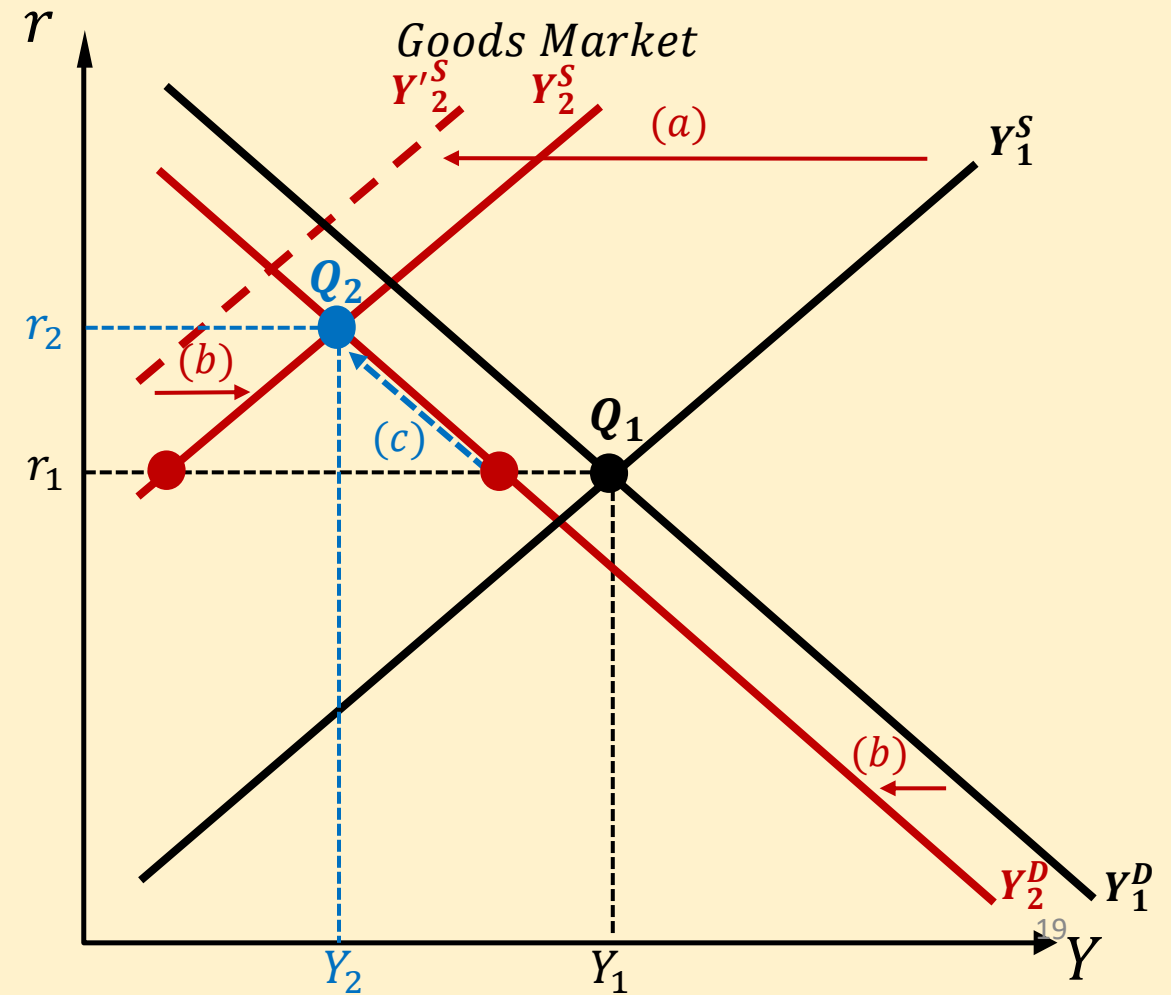
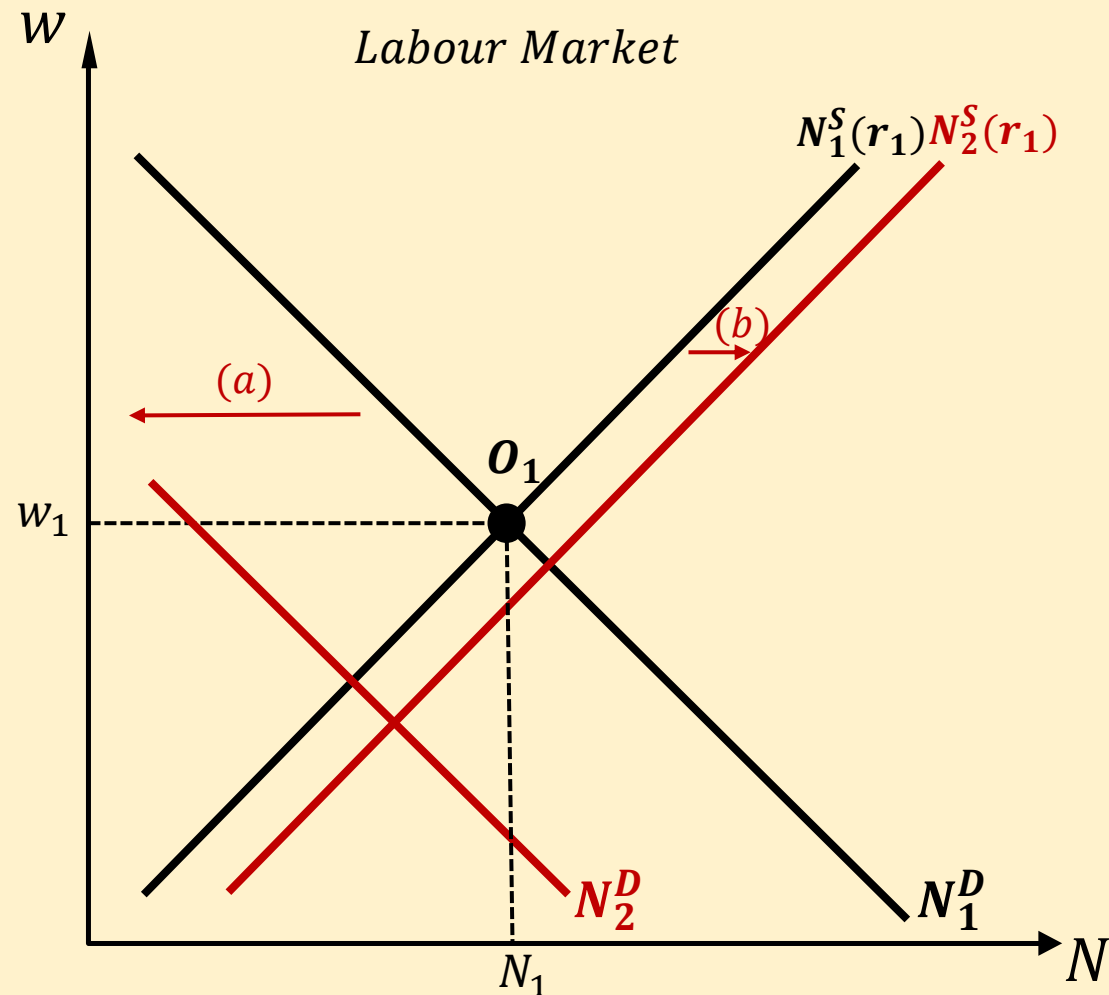
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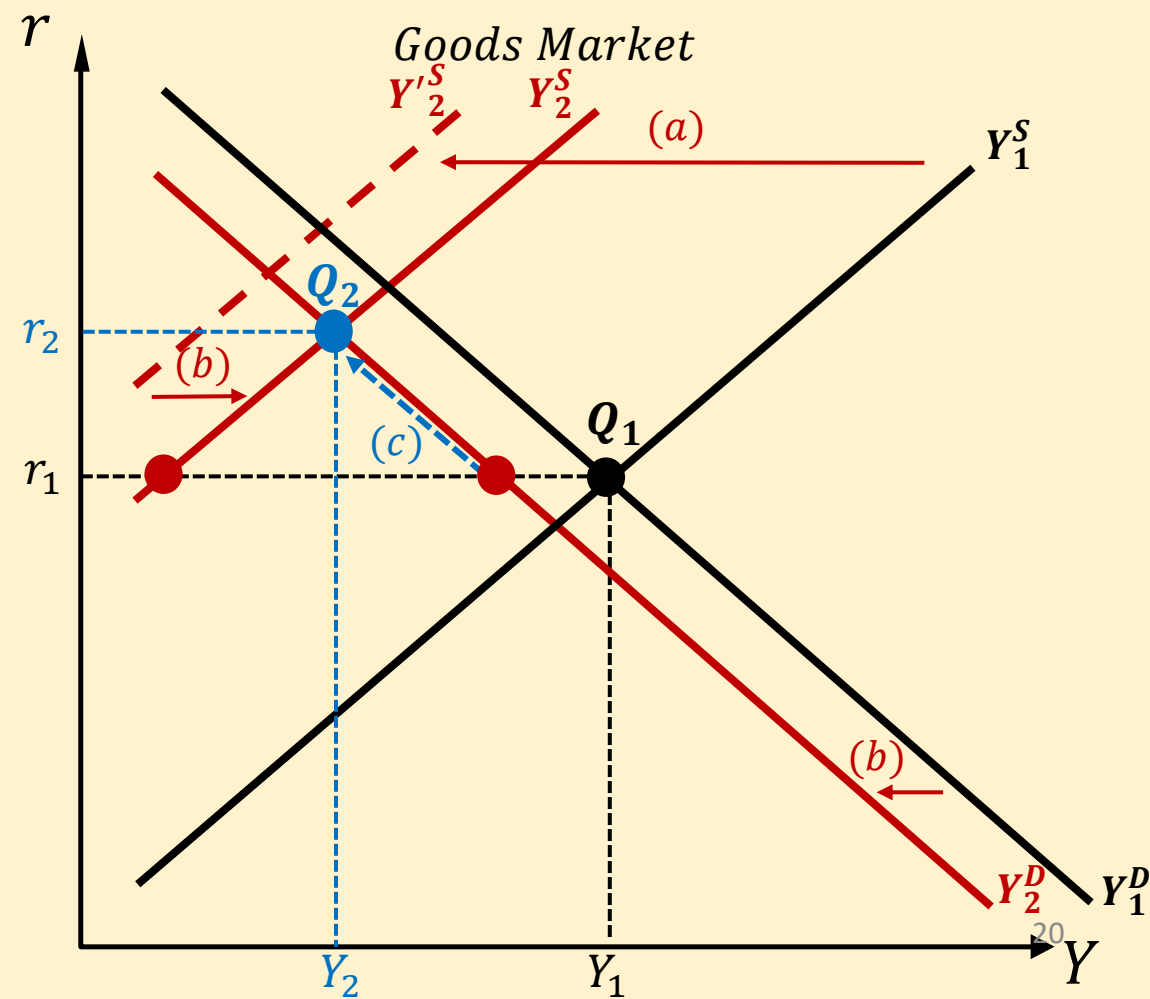
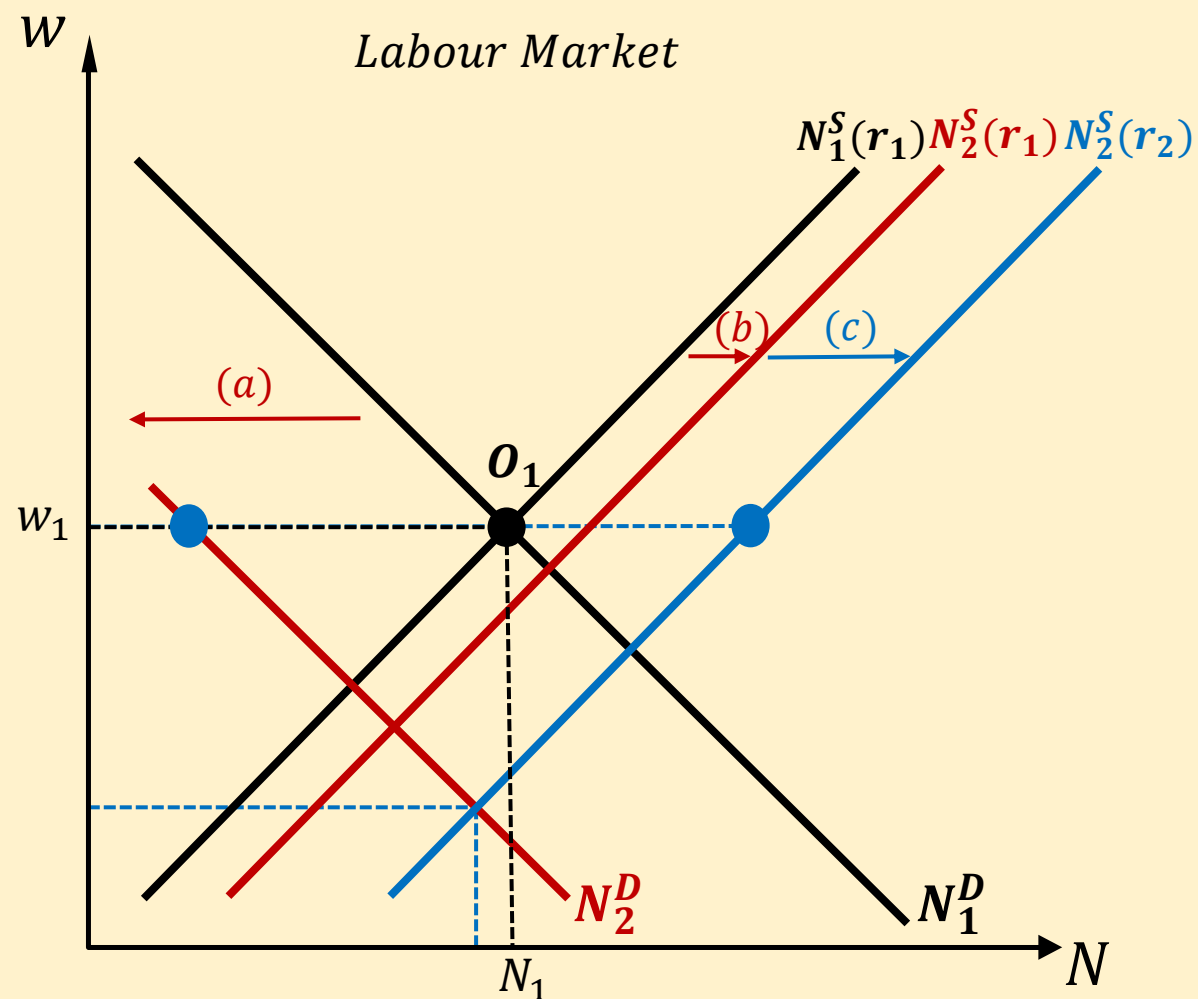
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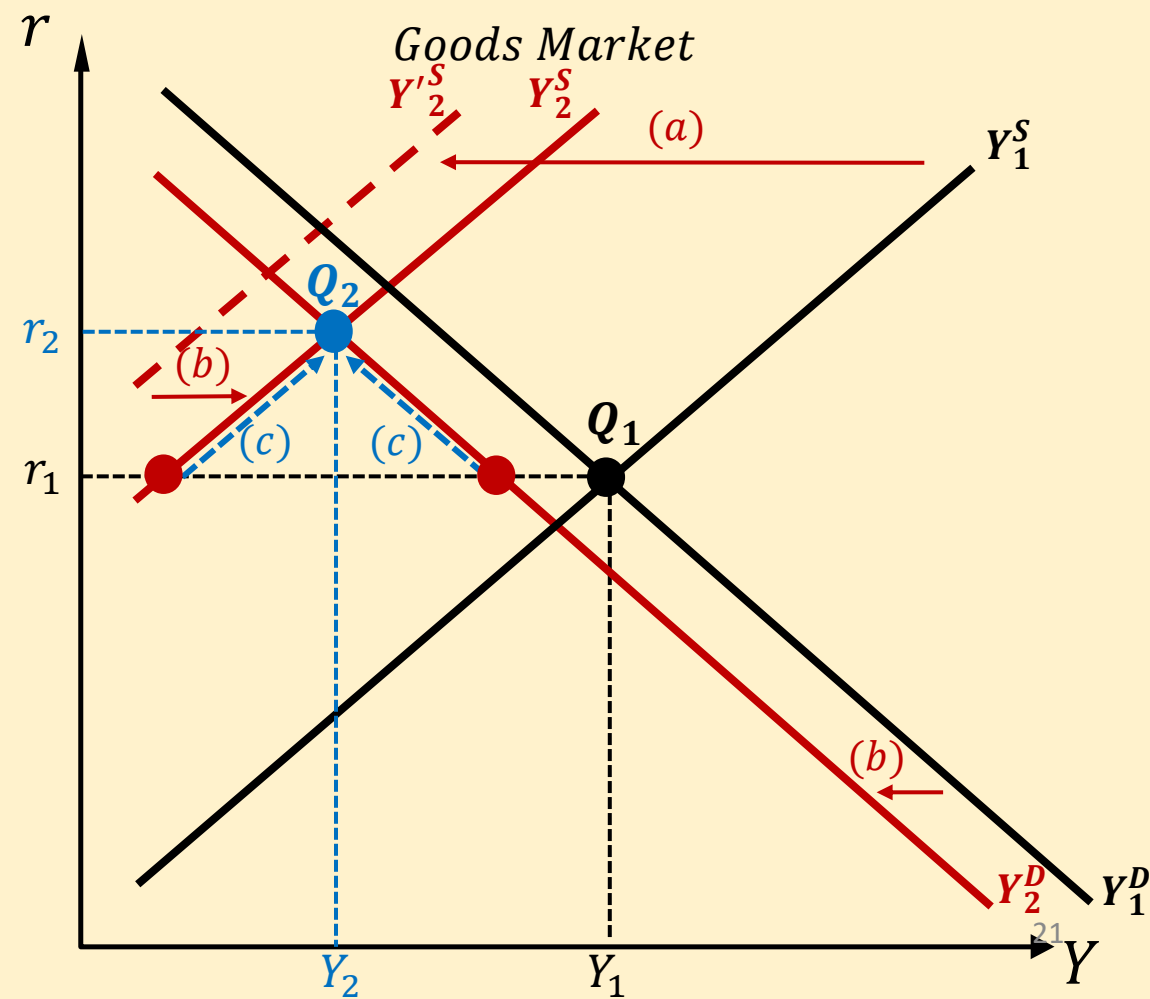
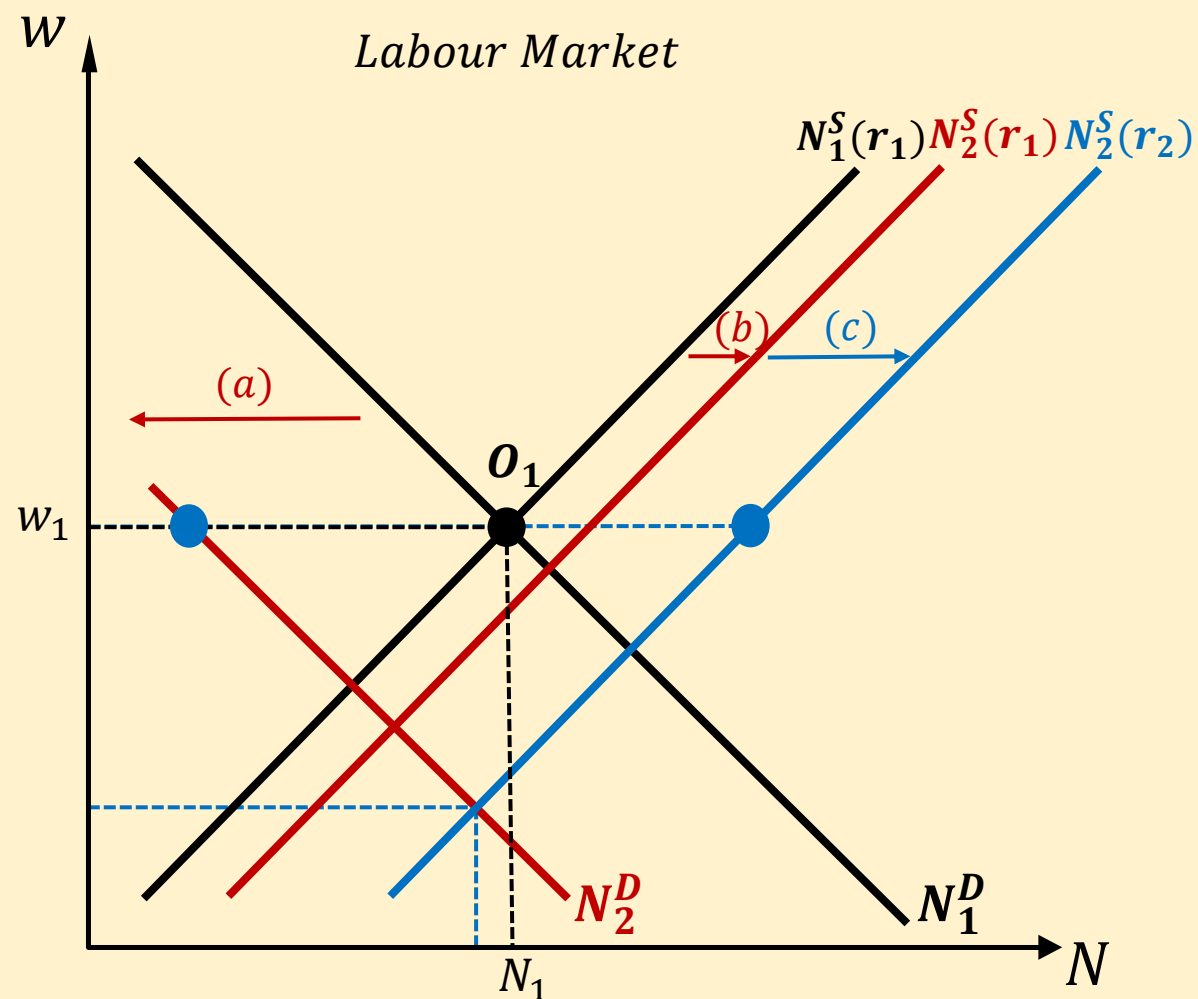
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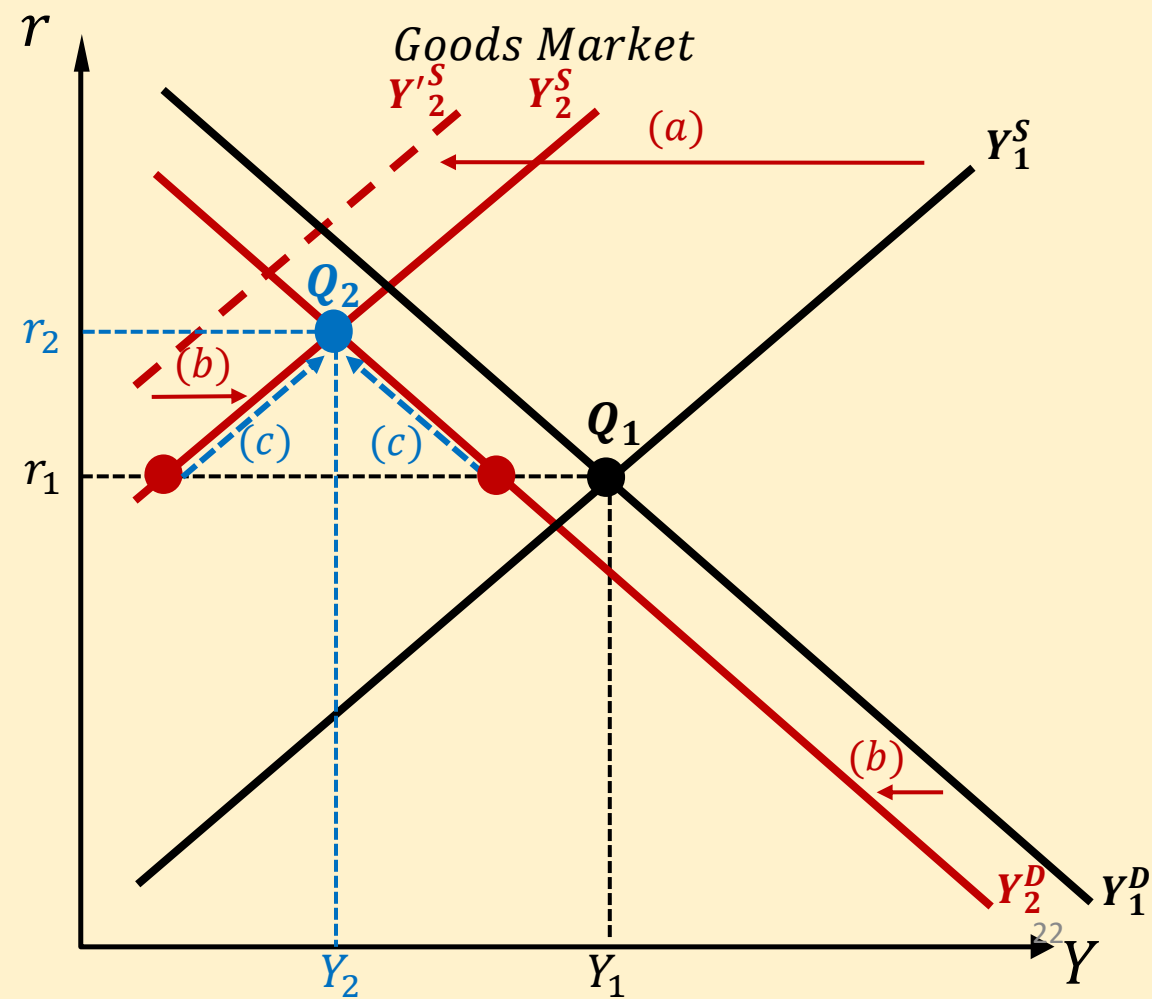
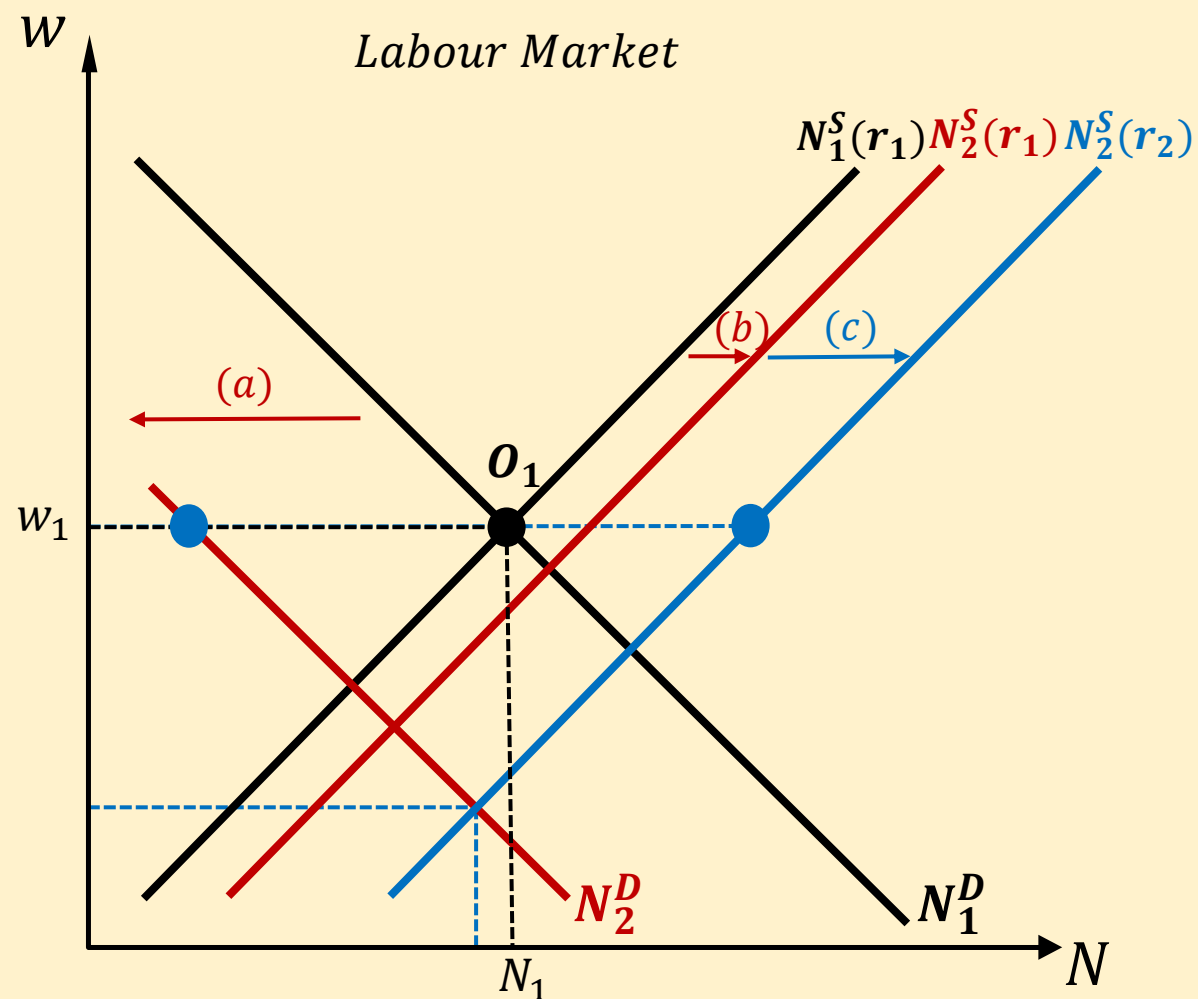
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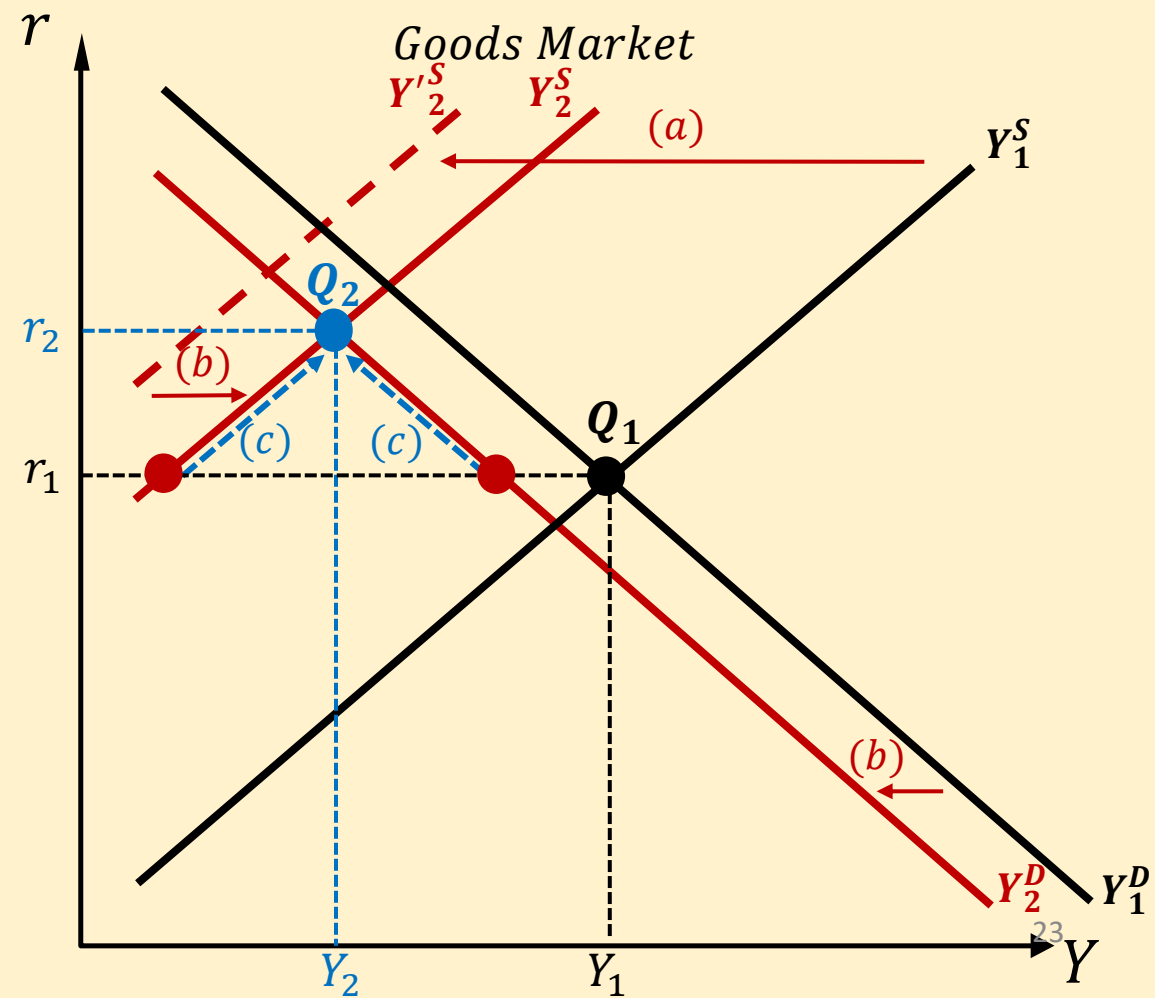
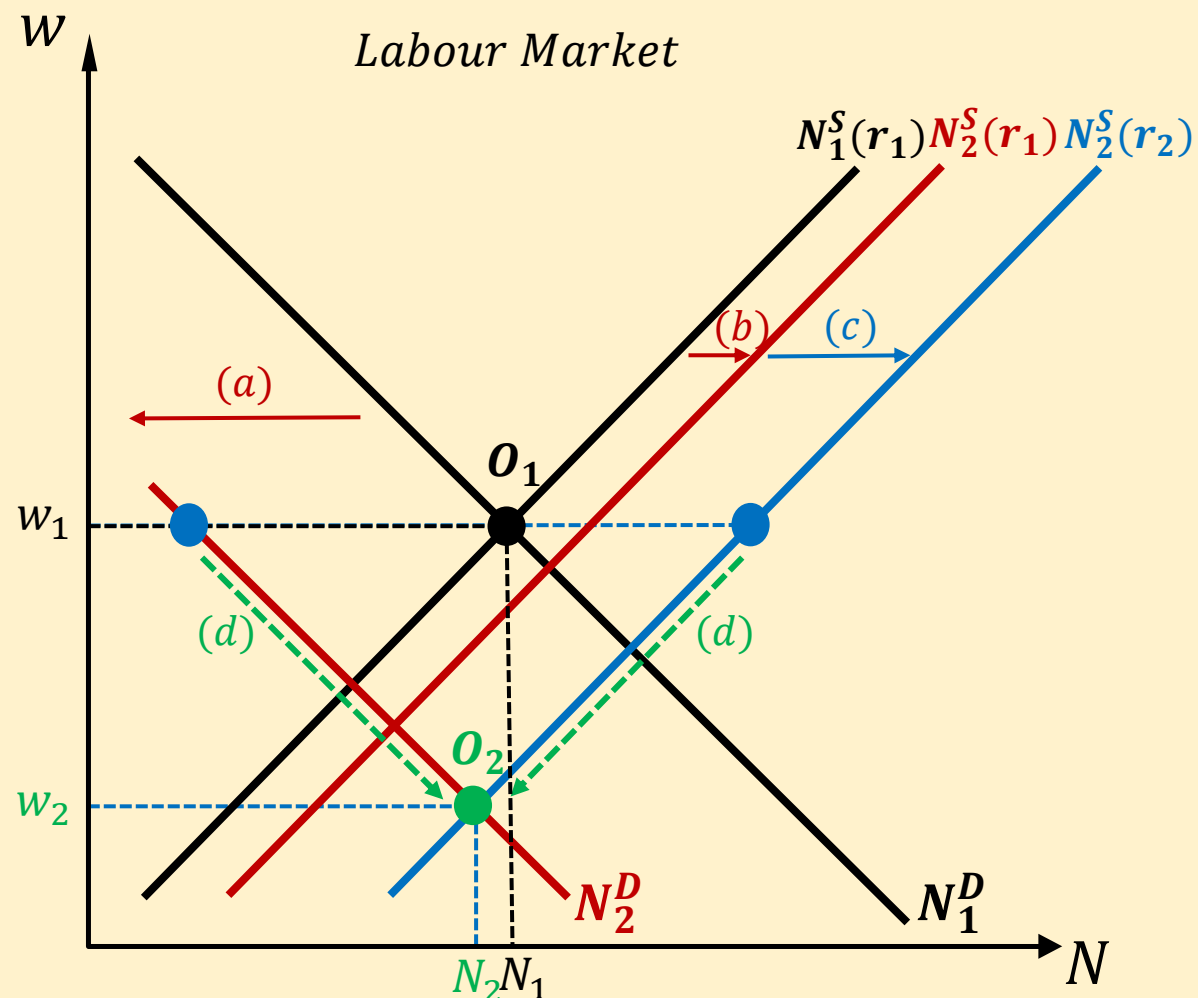
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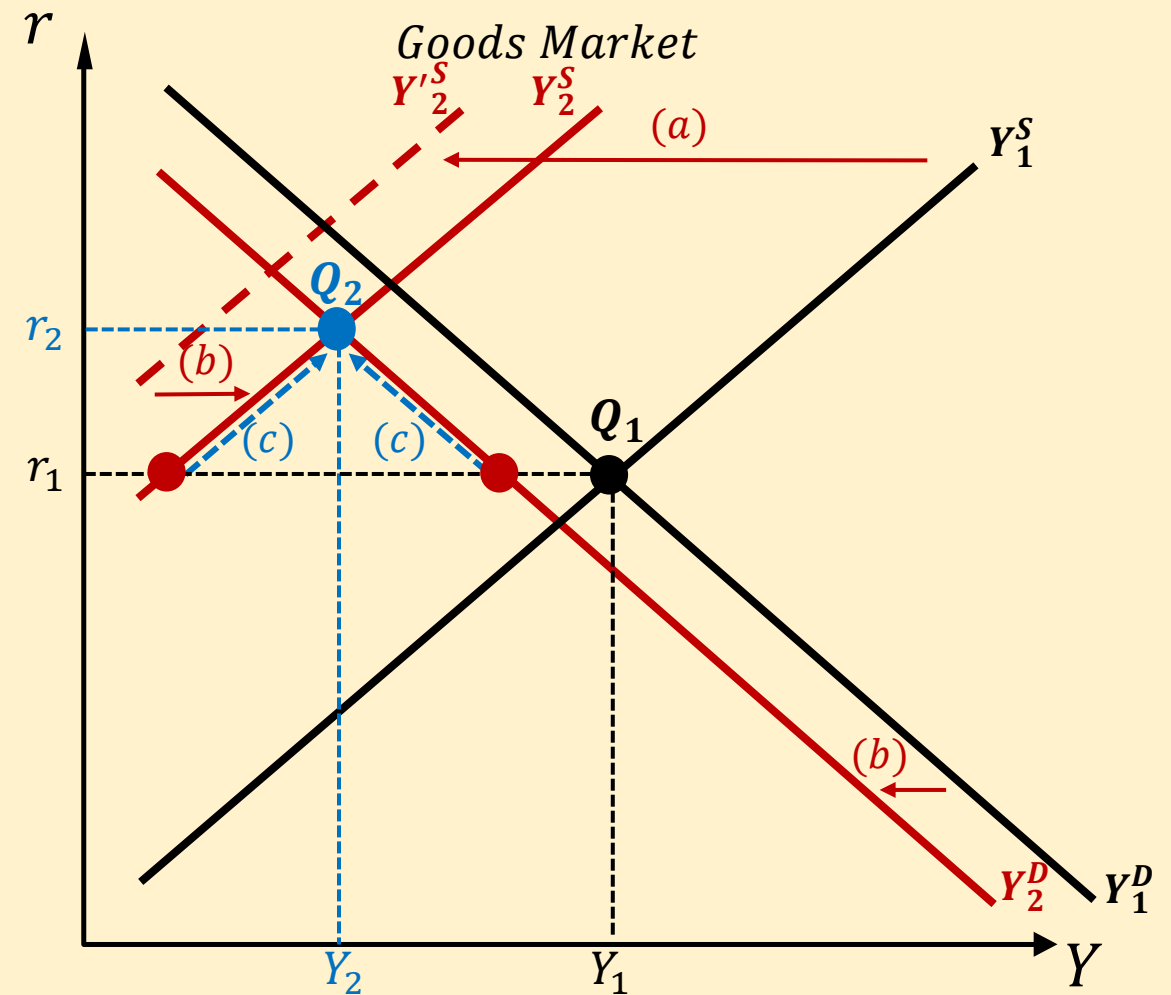
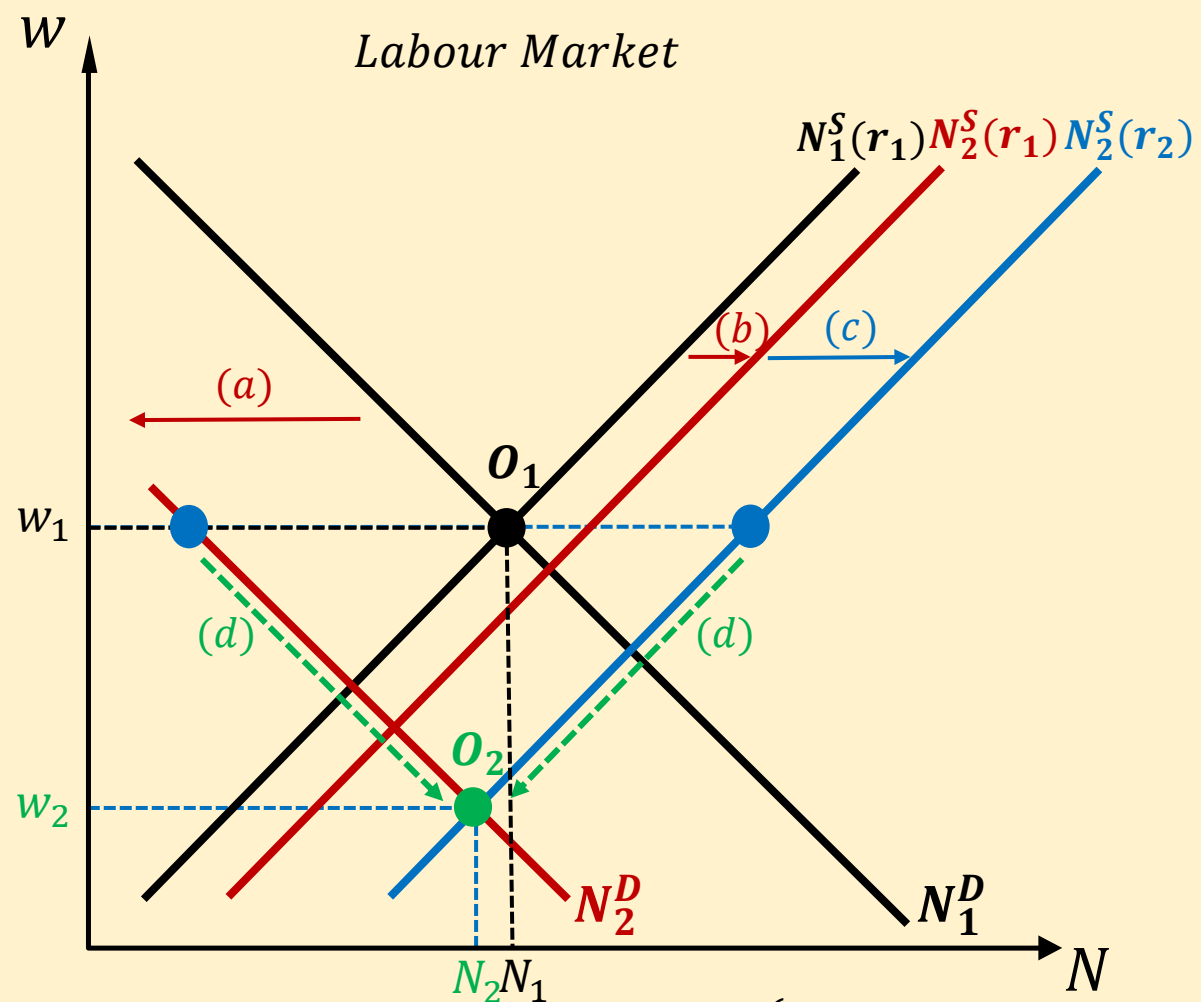
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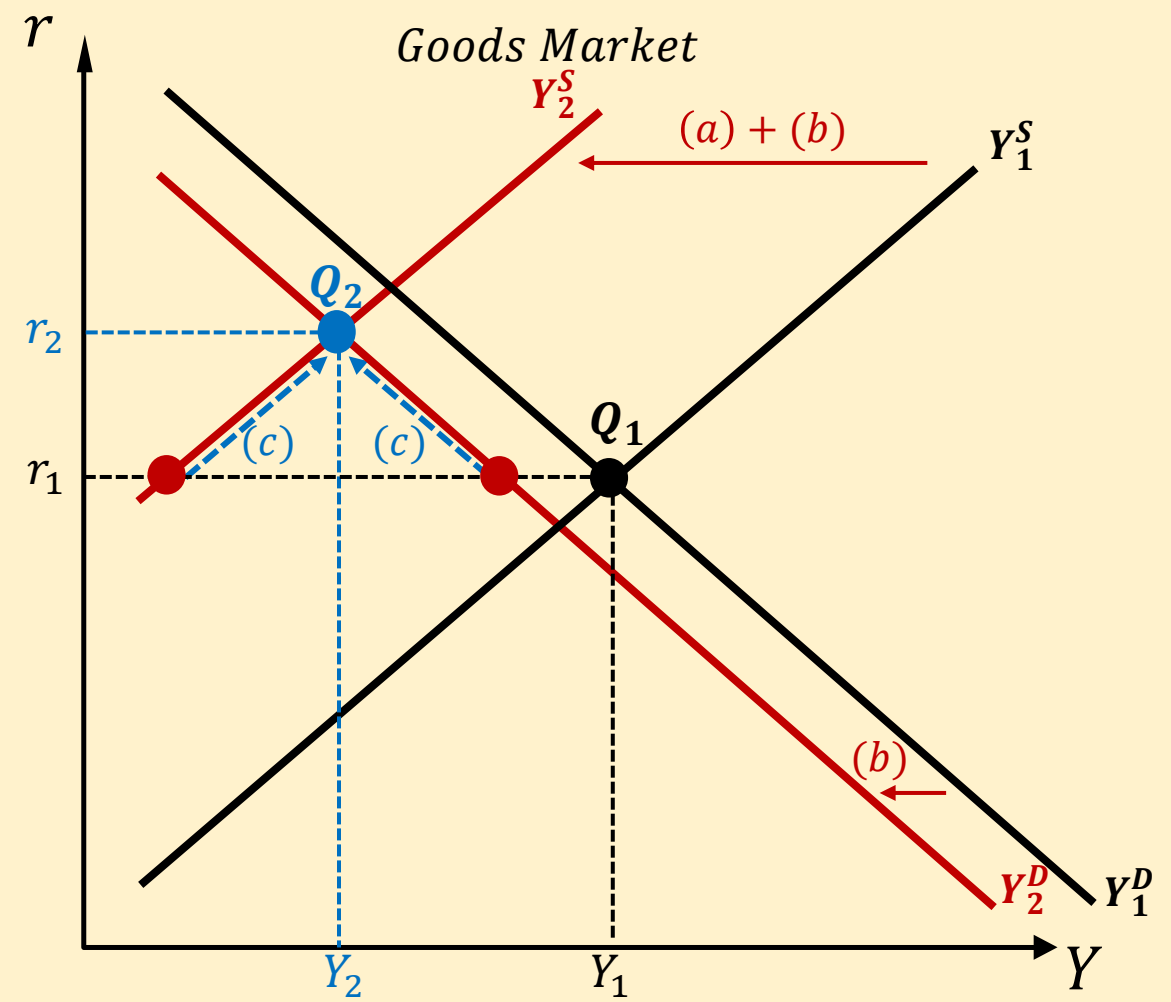
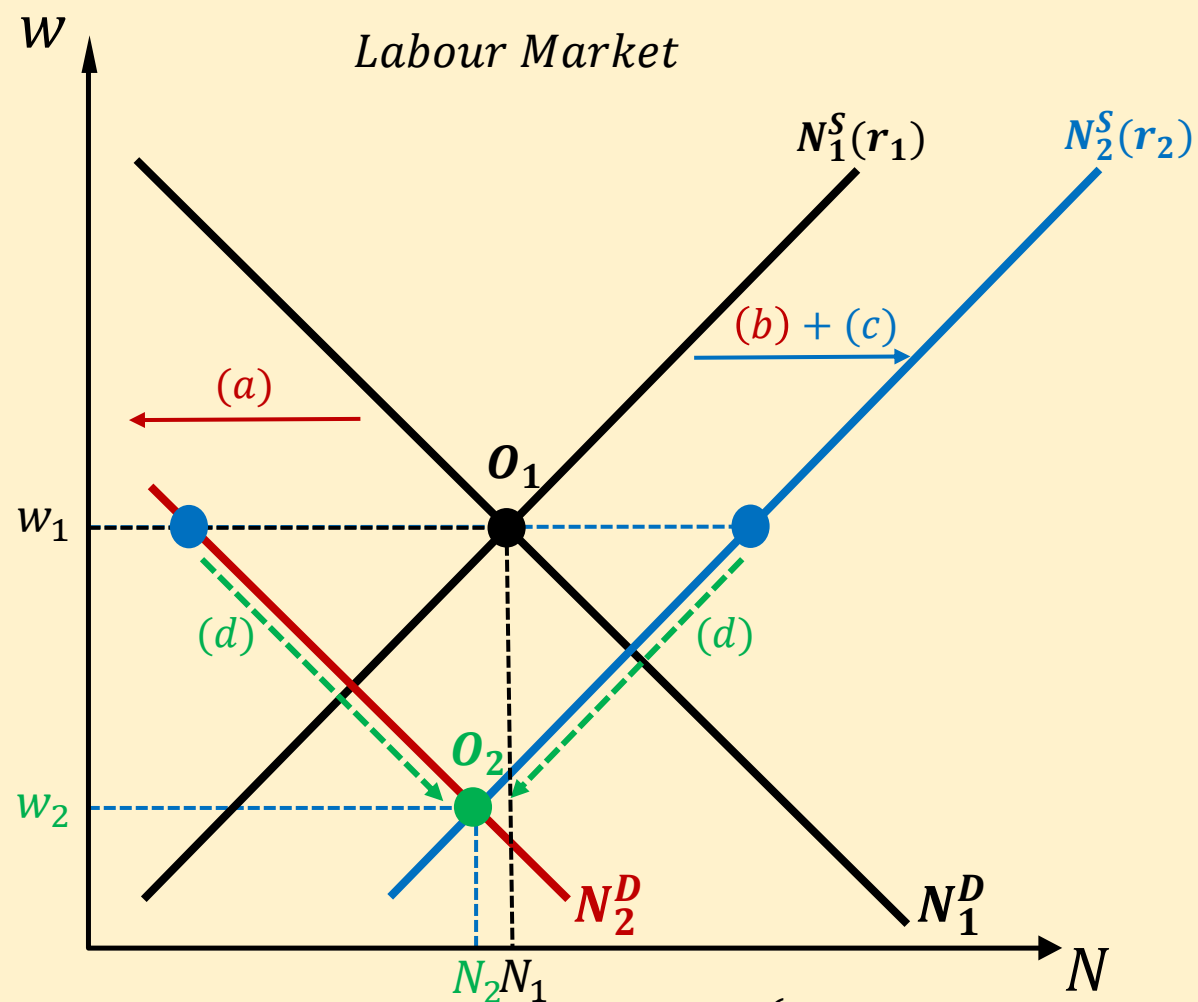
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>>>>> Thus, in the new equilibrium: $\begin{cases} Q_2: Y \downarrow & r \uparrow \\ O_2: N \downarrow & w \downarrow \end{cases}$

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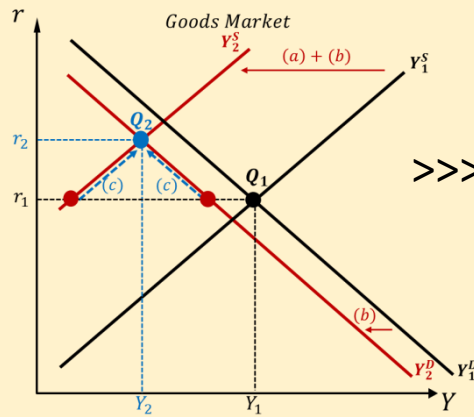
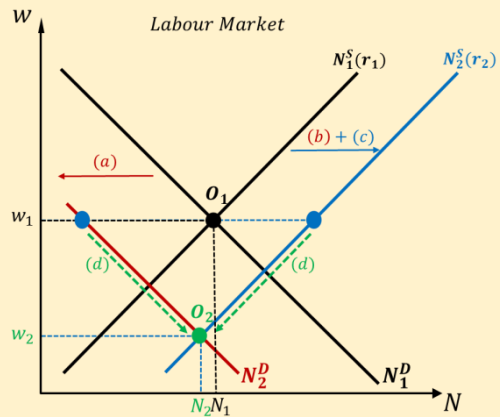
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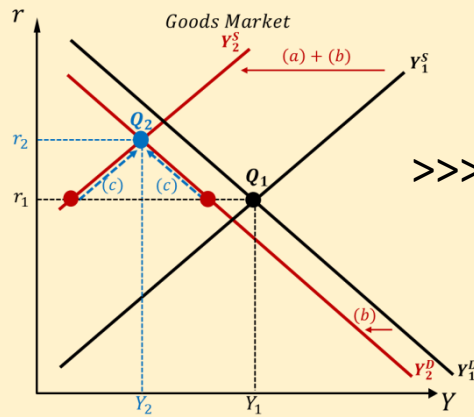
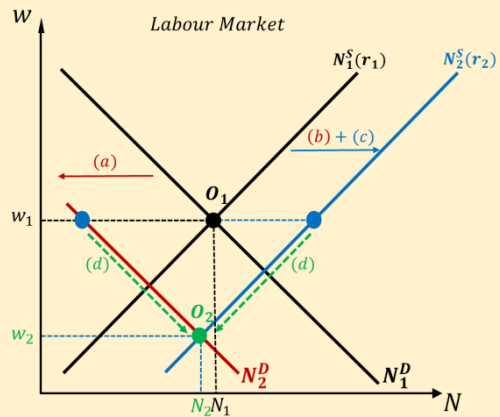
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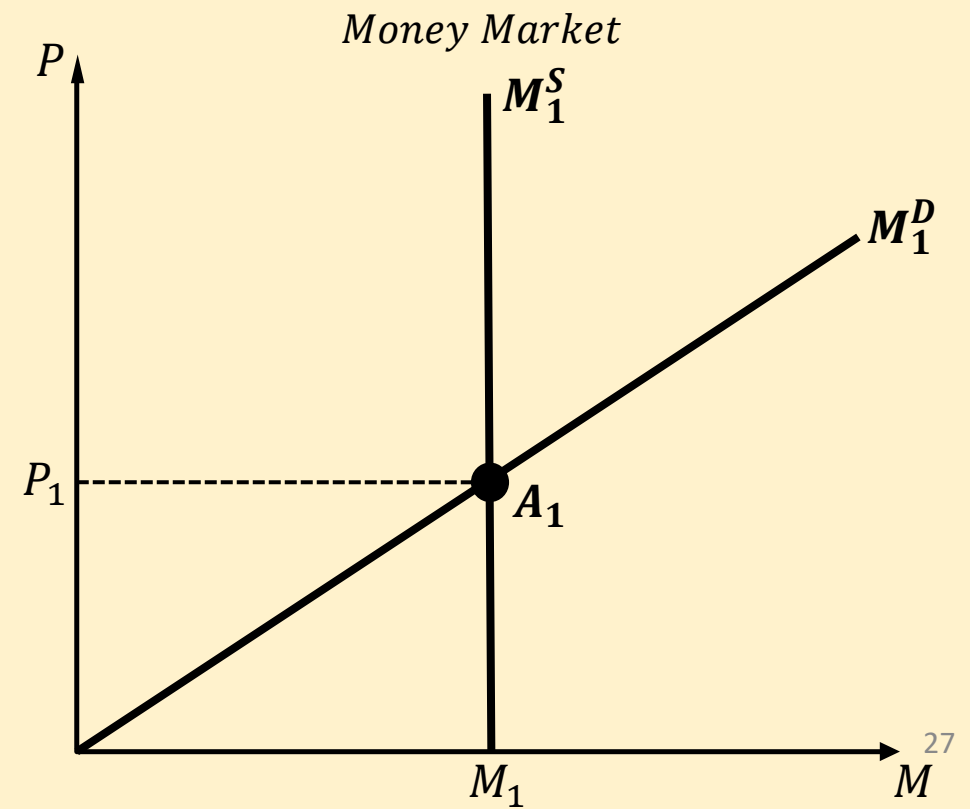
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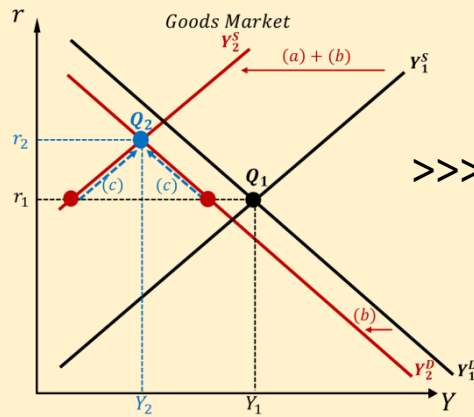
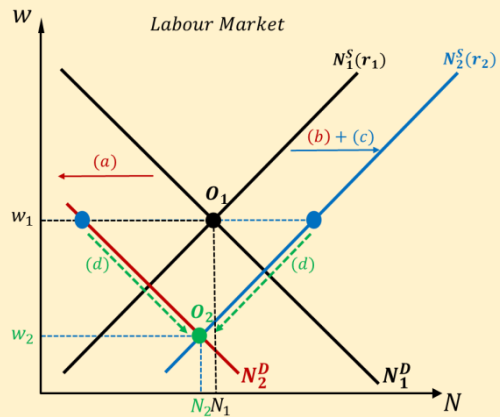


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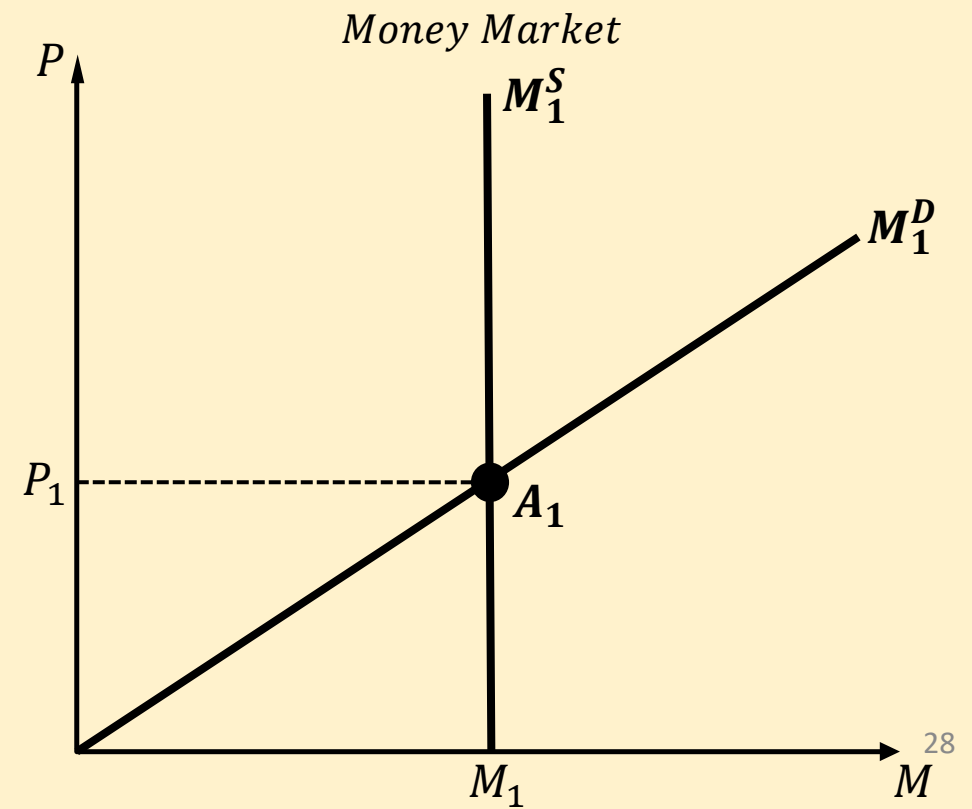
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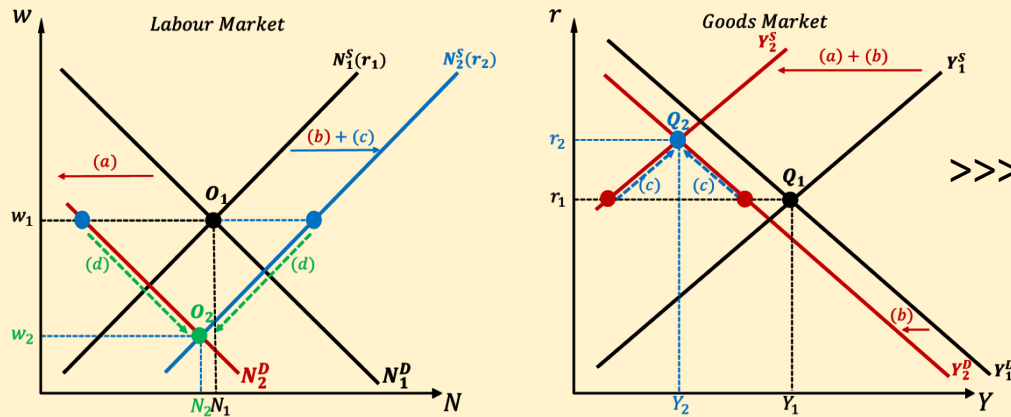
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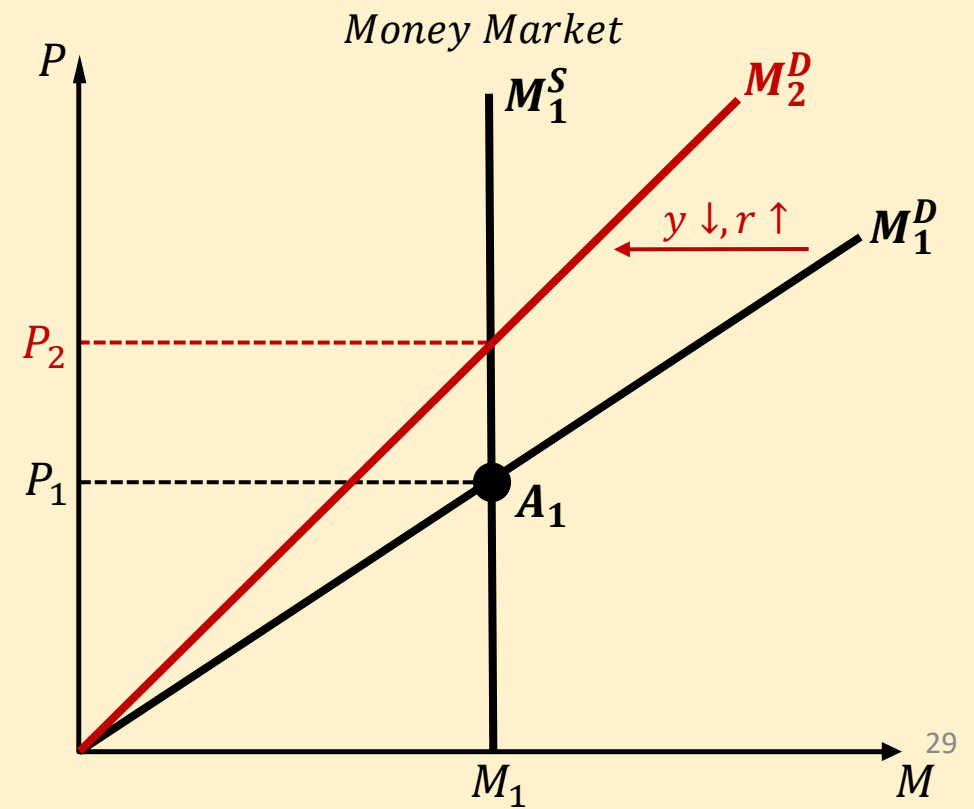
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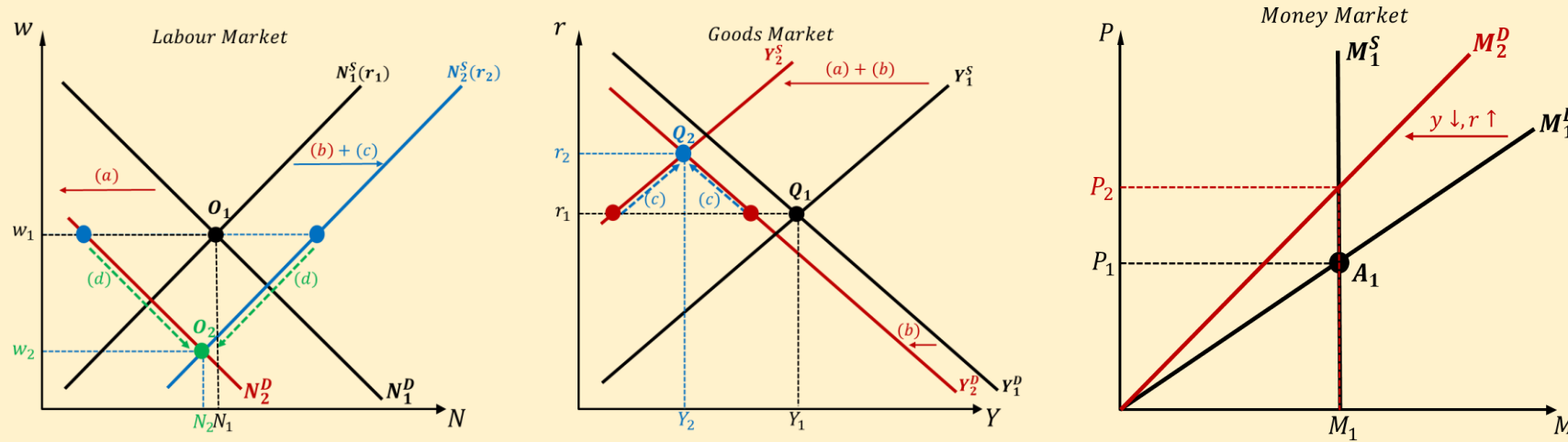
If M^S is constant, then $P \uparrow$: $P_2 > P_1$ (Inflation).



THE INTERVENTION: EXPANSIONARY FISCAL POLICY

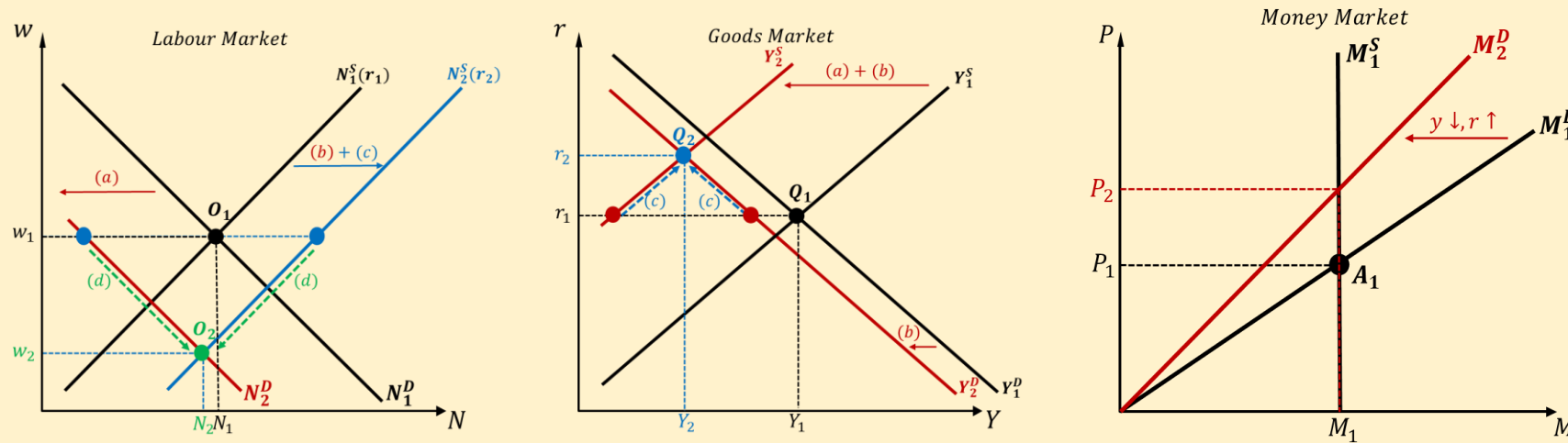
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To mitigate the negative effects on the economy, governments around the world have adopted economic measures (fiscal and monetary) - with varying scale and scope across countries – targeting primarily households, firms, health systems and banks.

Let's assess the effects of such measures under different scenarios.

PROBLEM 1 (Covid-19 and Economic Policy)

Q1.b).

- Assume the fiscal authority (Treasury) increases G in response to the pandemic shock. Let's also assume that the fiscal authority uses the current lump-sum tax T to finance the increase in G .
- Assume that the monetary authority (Central Bank) keeps the money supply M^S constant.

Determine the effects on output (Y), employment (N), and price level (P) in the current period.

PROBLEM 1 (Covid-19 and Economic Policy)

Q1.b). $G \uparrow$ in response to shock. $T \uparrow$ to finance ΔG . M is constant. Effects on Y , N , and P in the current period?

The government increases spending $G \uparrow$

e) $G \uparrow \longrightarrow Y^D \uparrow = C + I + G \uparrow$: Y^D shifts to the right from Y_2^D to Y_3^D

f) $T \uparrow \xrightarrow{\text{"wealth shock"}} we \downarrow \xrightarrow[\text{(small)}]{\text{negative wealth effect}} \begin{cases} c \downarrow \rightarrow Y^D \text{ shifts to the left from } Y_3^D \text{ to } Y_2^D \\ l \downarrow \rightarrow N^S \uparrow: N^S \text{ shifts to the right from } N_2^S(r_2) \text{ to } N_3^S(r_2) \\ \rightarrow Y^S \text{ shifts to the right from } Y_2^S \text{ to } Y_3^S \end{cases}$

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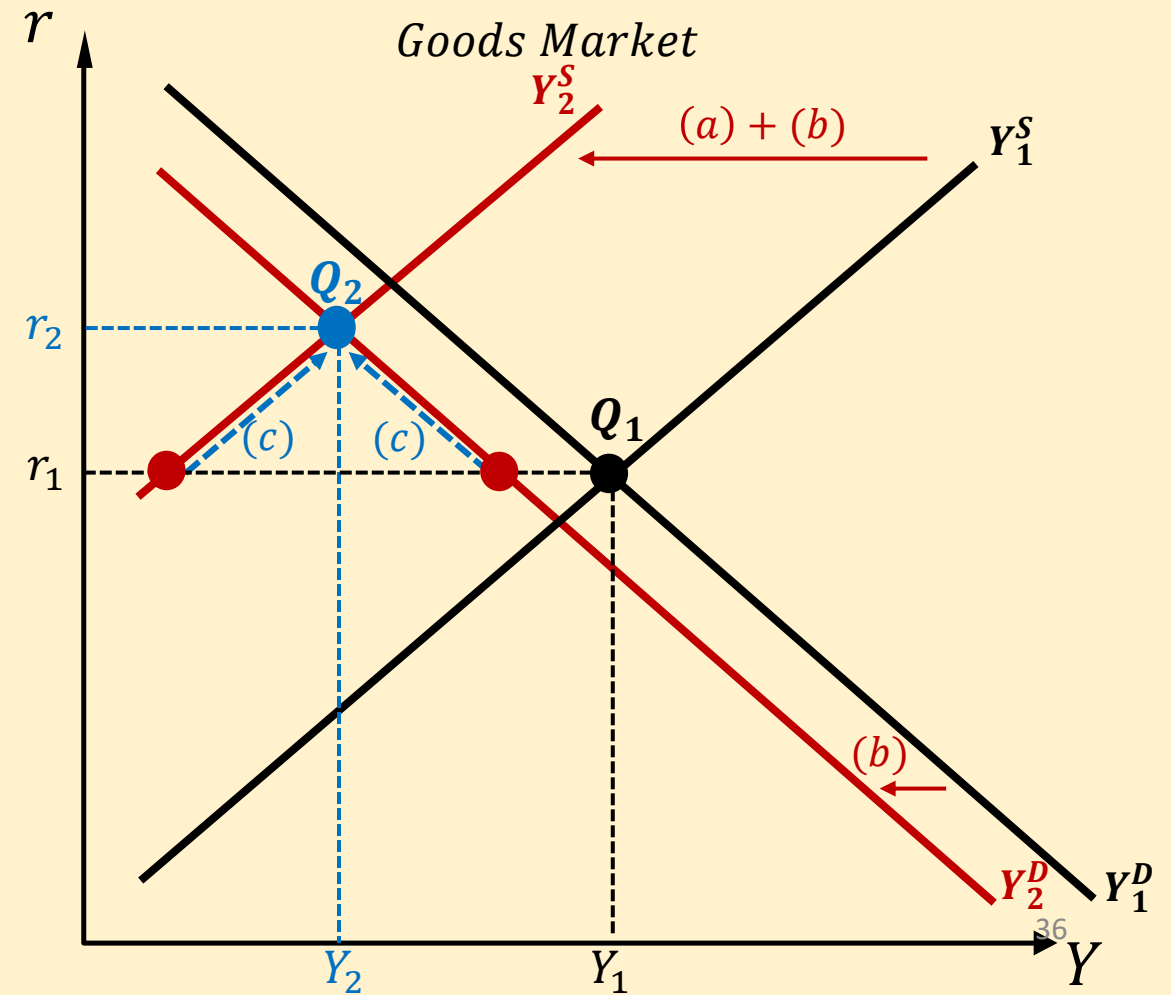
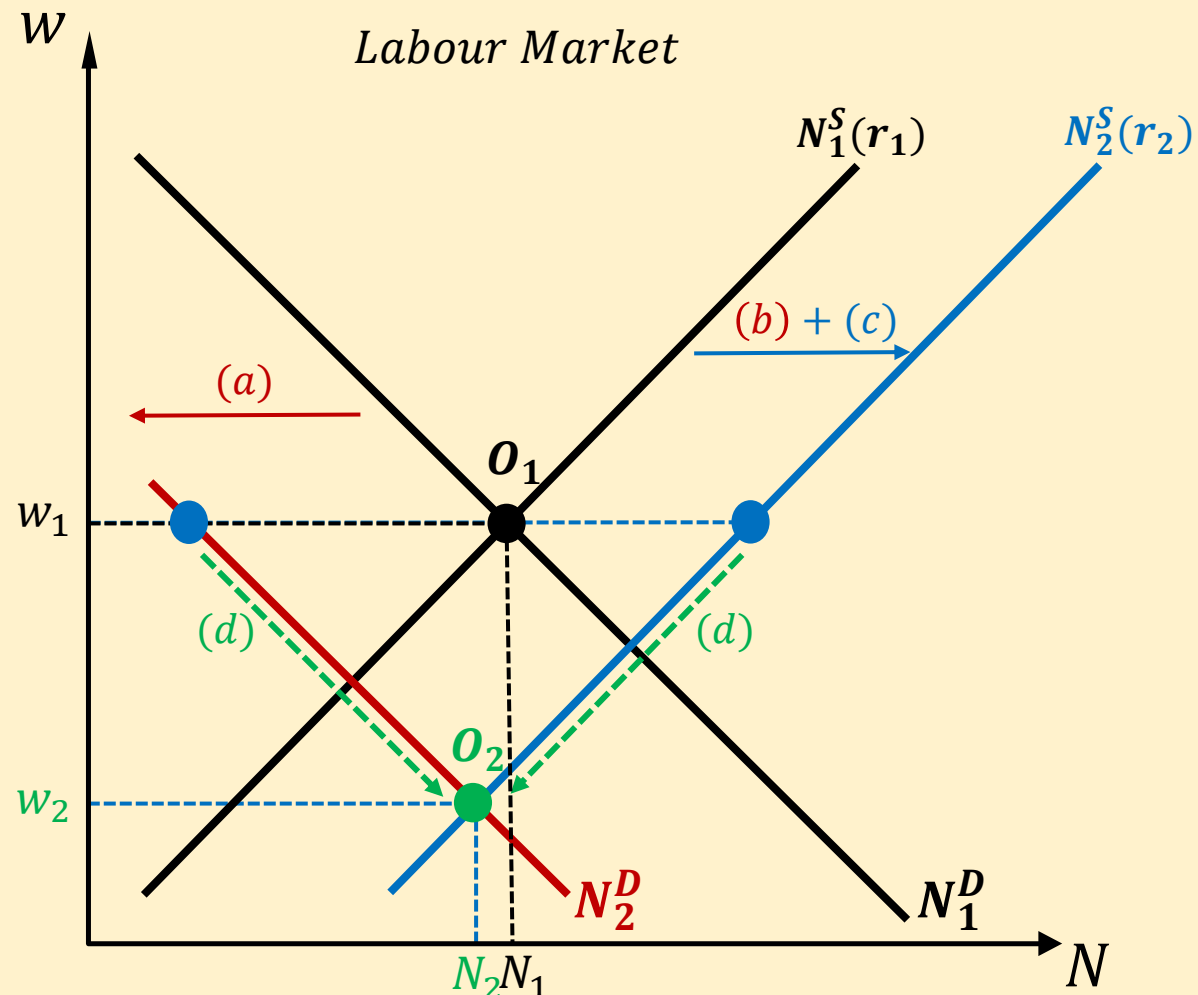
Q1.b). $G \uparrow$ in response to shock. $T \uparrow$ to finance ΔG . M is constant. Effects on Y , N , and P in the current period?

The government increases spending $G \uparrow$

h) $w \downarrow \longrightarrow \begin{cases} N^S \downarrow: \text{move along } N_3^S(r_3) \\ N^D \uparrow: \text{move along } N_2^D \end{cases} \text{ towards } O_3 \implies \text{New equilibrium in the labour market.}$

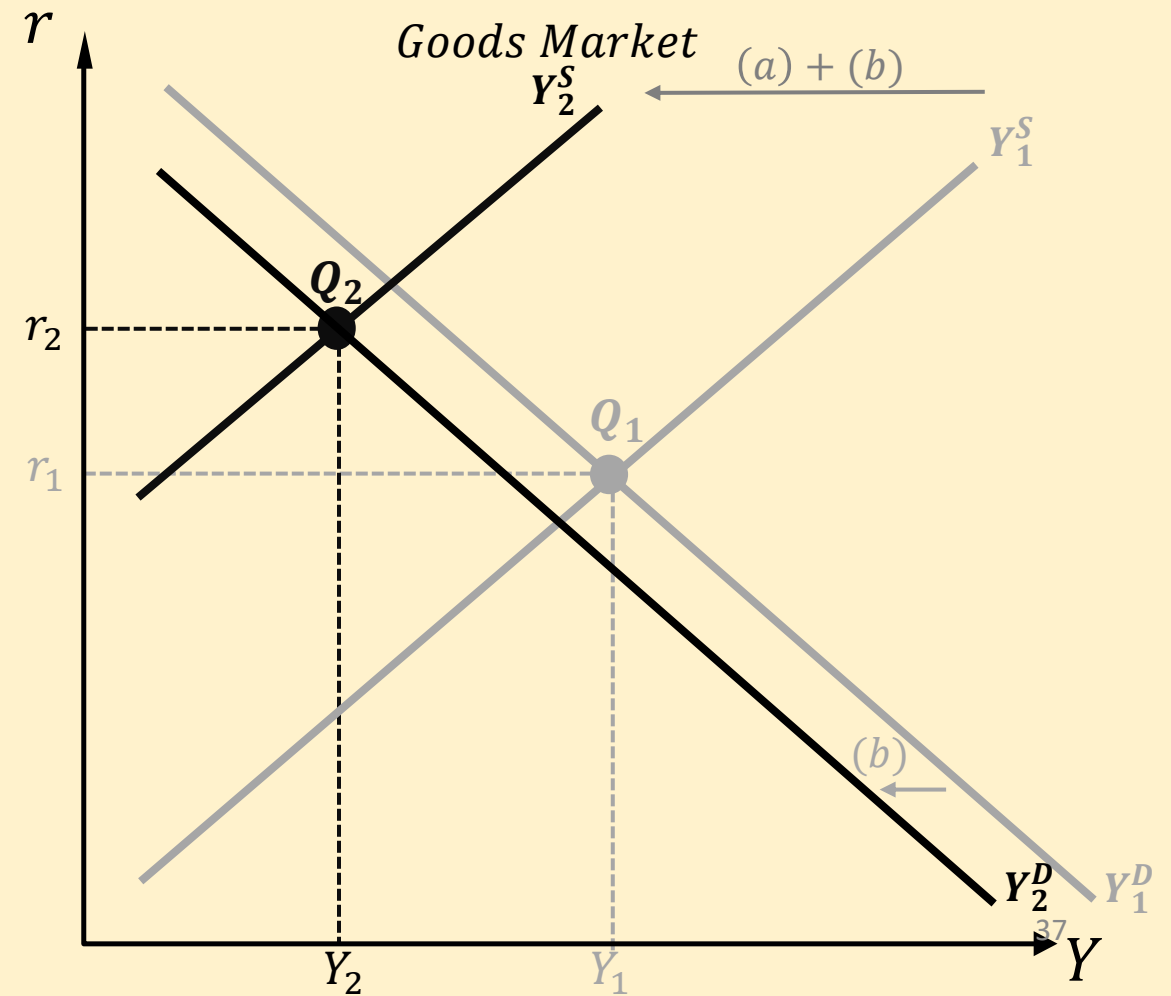
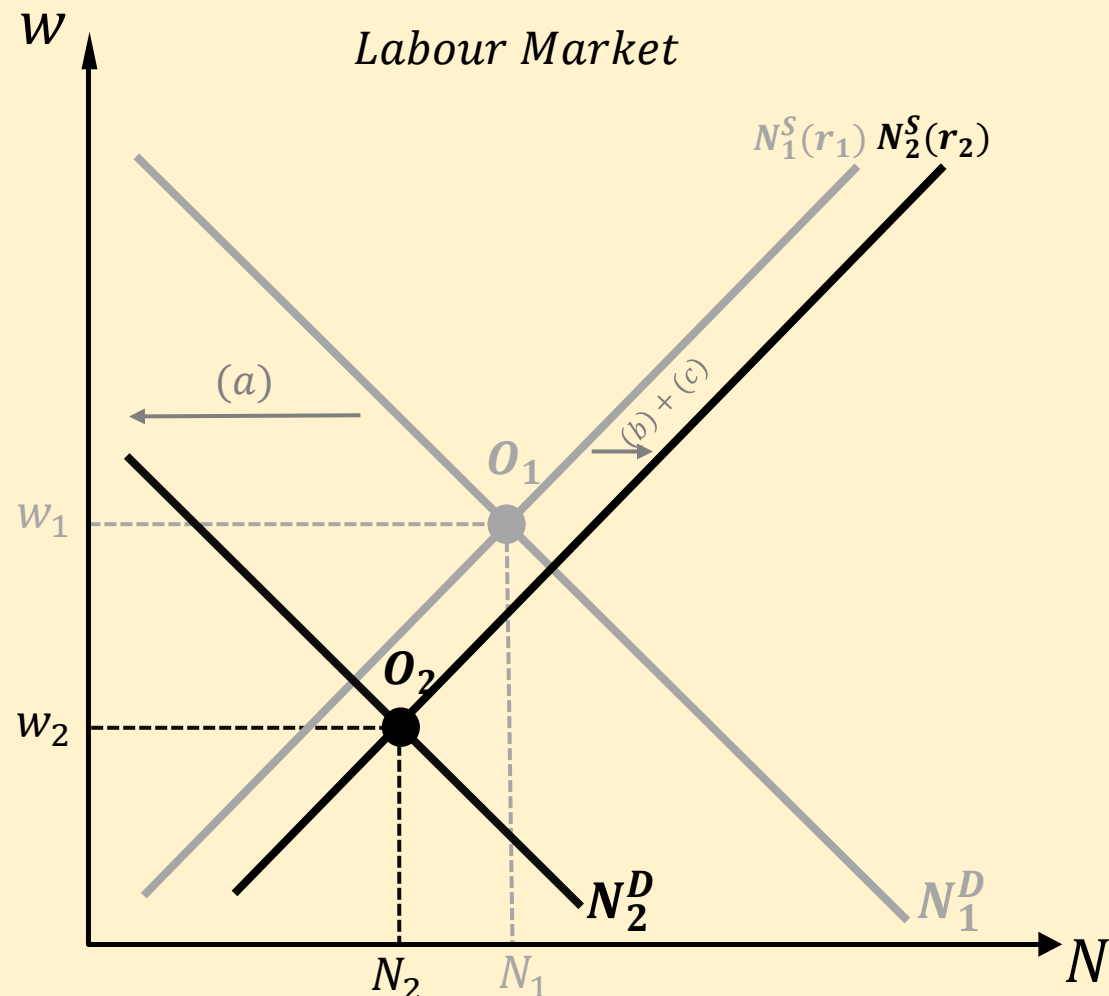
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Recall the after-shock (ex-post) economy in Q1.a. This will be the starting point for our policy analysis. Let's first simplify the two figures below.



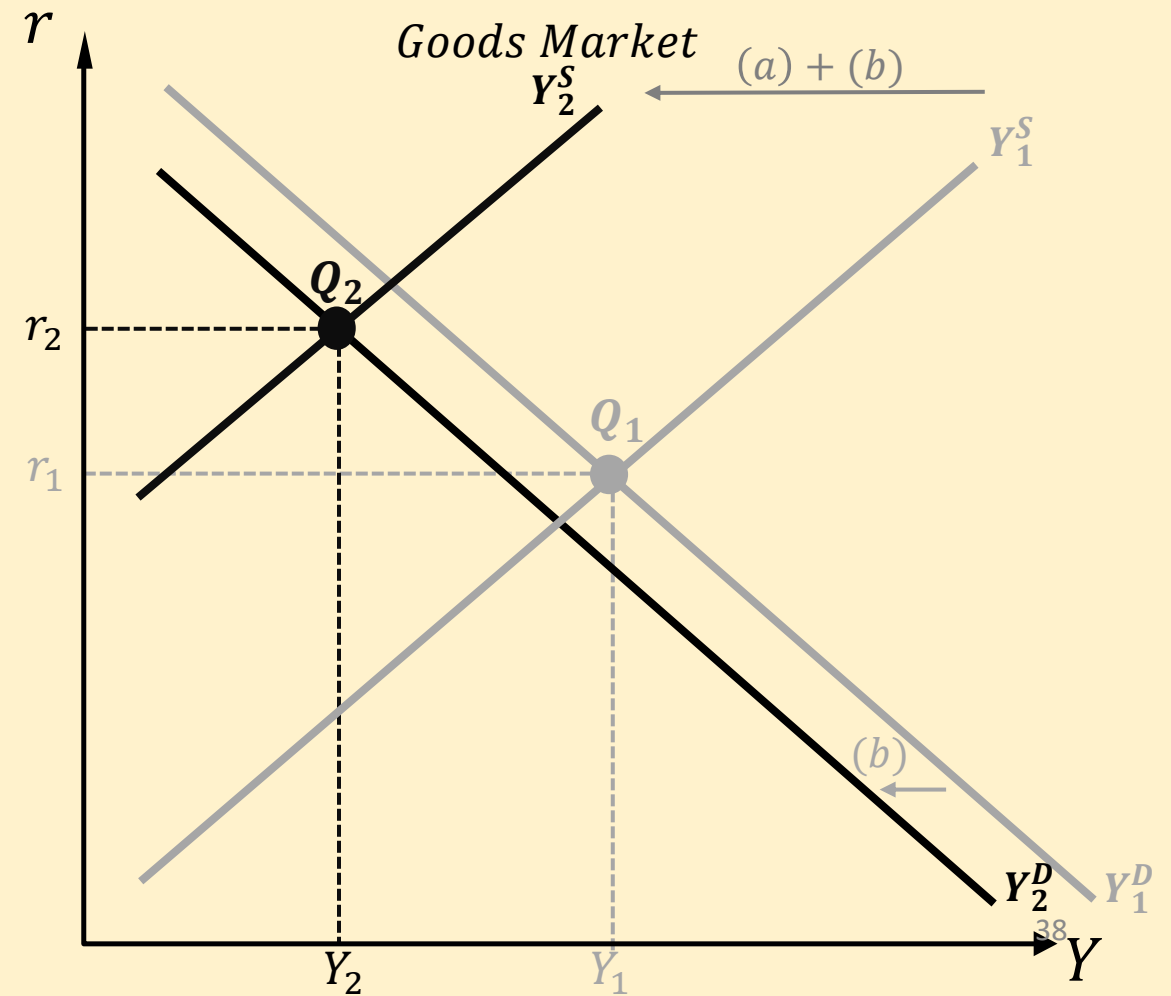
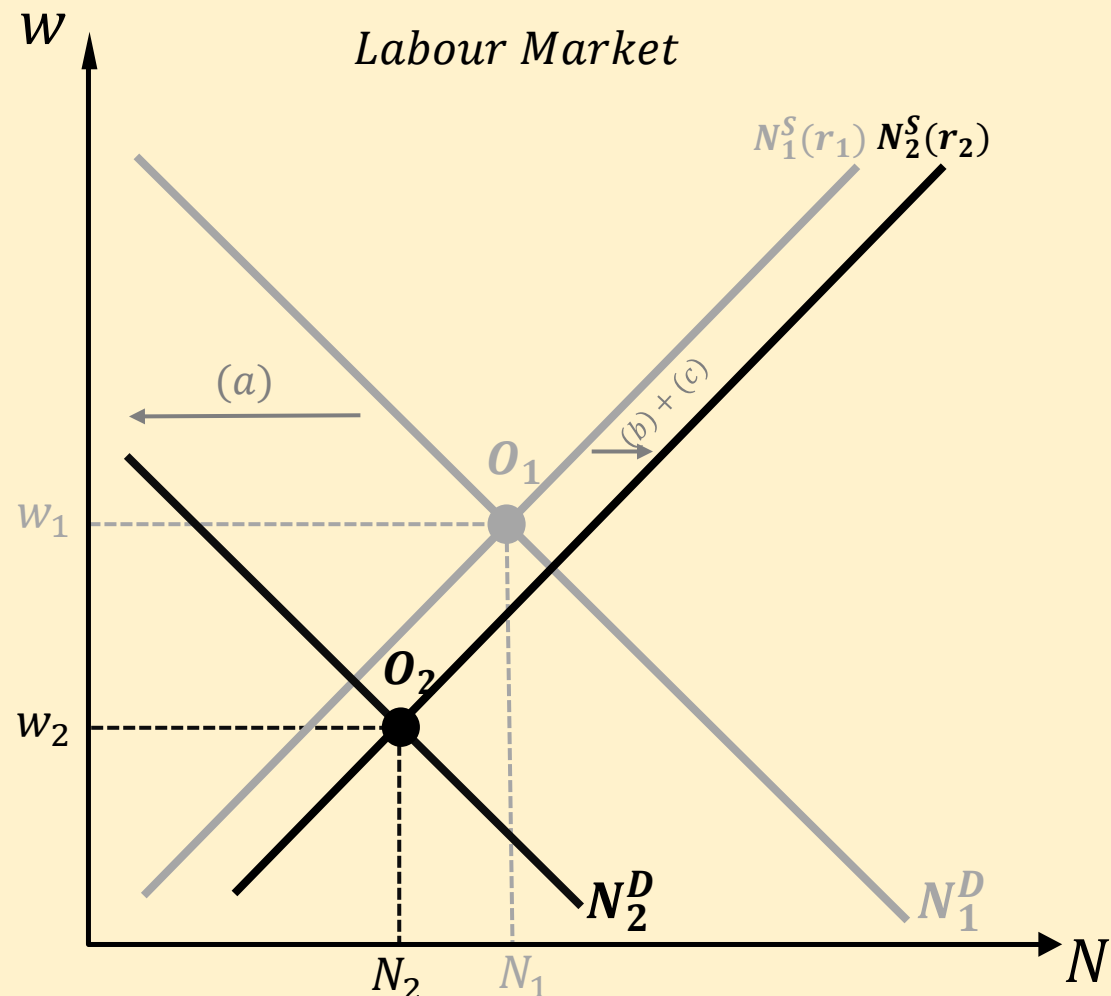
PROBLEM 1 (Covid-19 and Economic Policy)

Recall the after-shock (ex-post) economy in Q1.a. **This will be the starting point for our policy analysis.** Let's first simplify the two figures below. We only modify the graph visually (*the previous result and intuition remain intact*) to allow space for additional movements of the labour and output curves due to the $\uparrow G$.



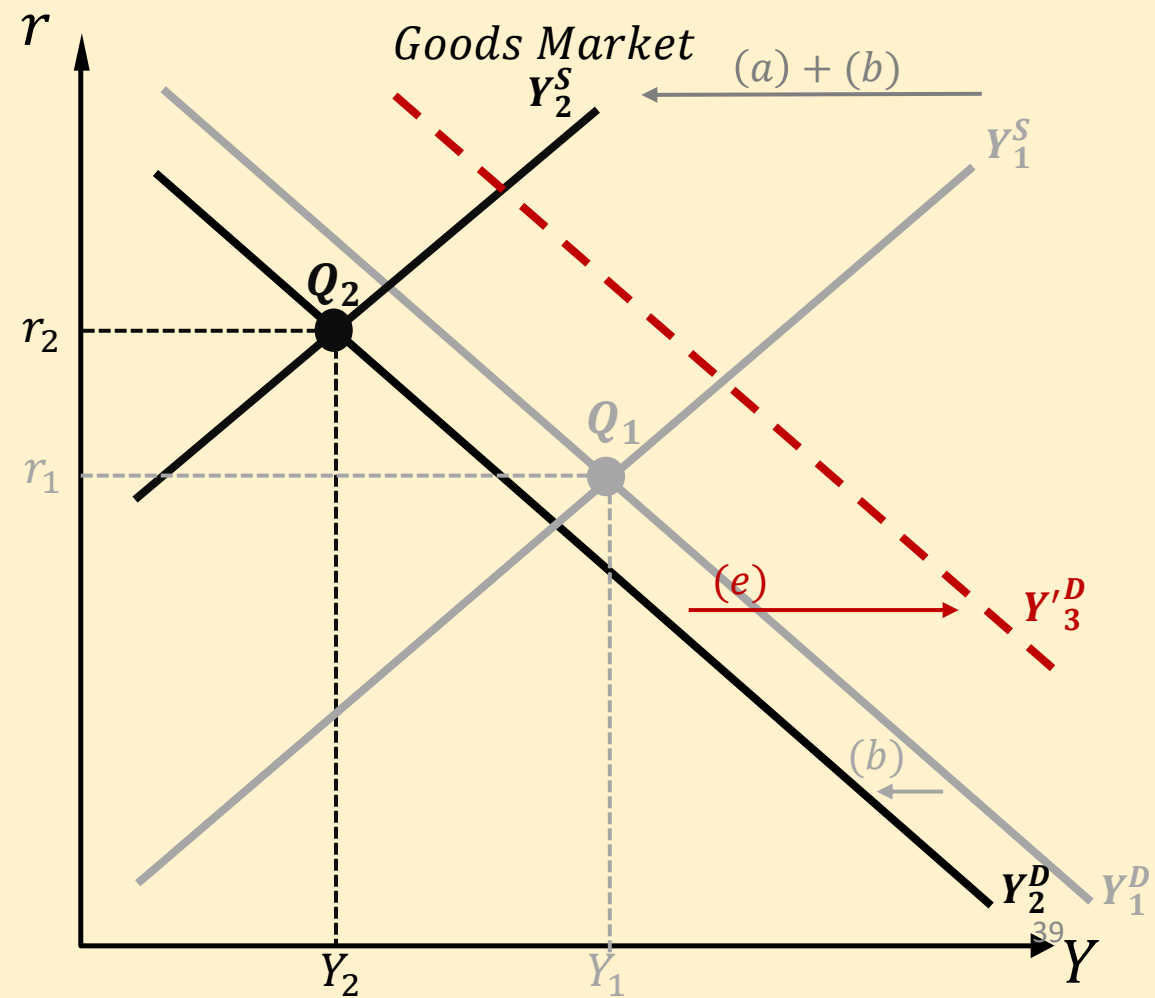
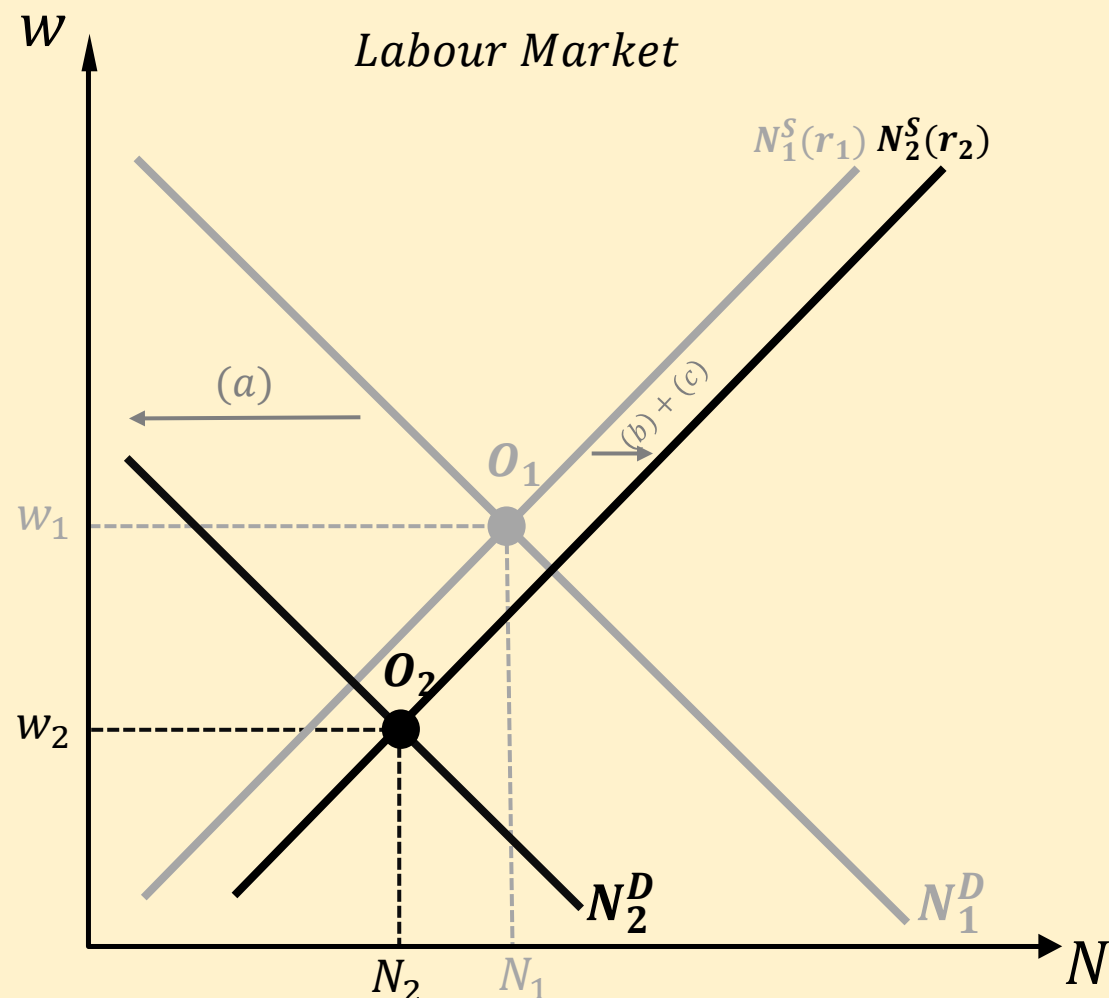
PROBLEM 1 (Covid-19 and Economic Policy)

e) $G \uparrow \longrightarrow Y^D \uparrow = C + I + G \uparrow$: Y^D shifts to the right from Y_2^D to Y_1^D



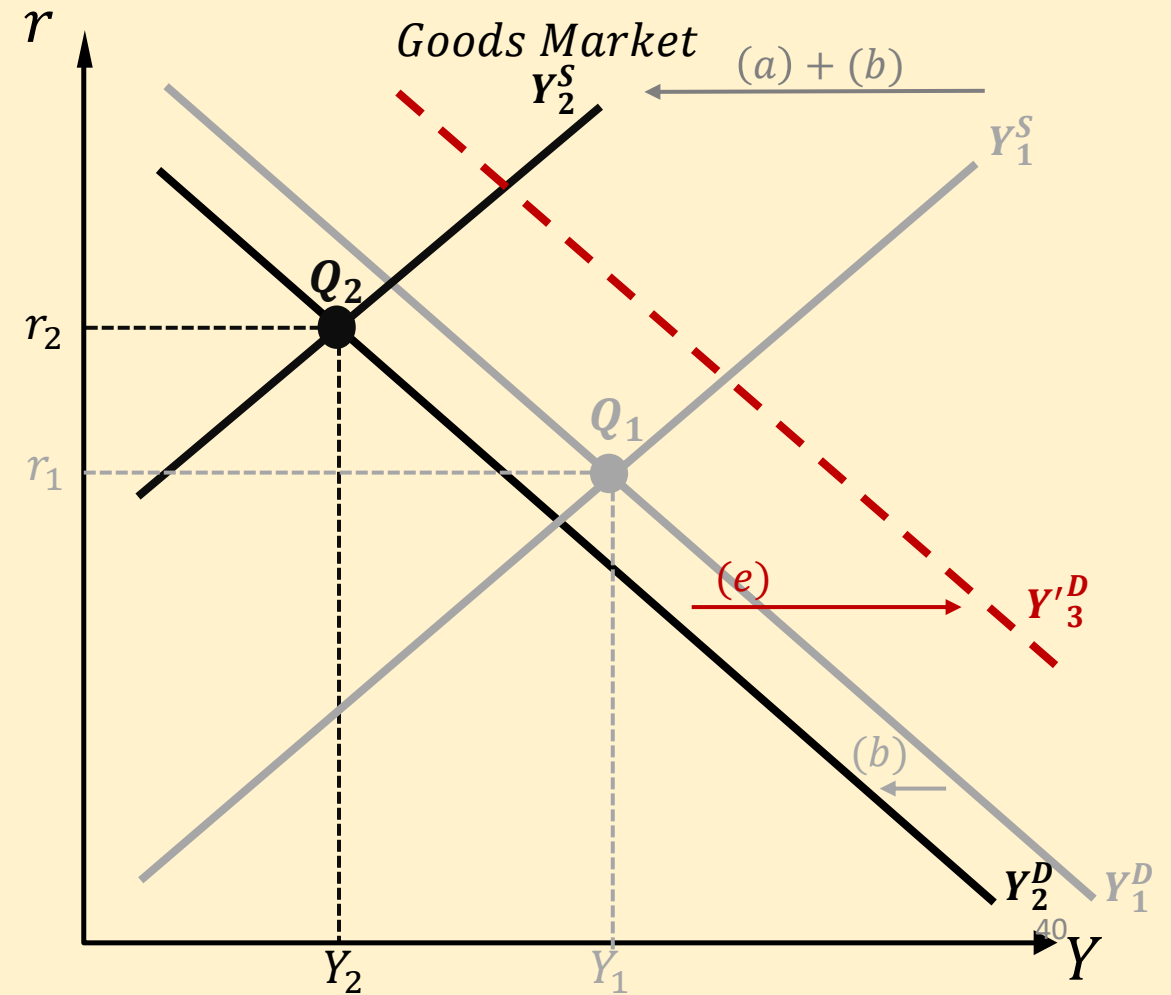
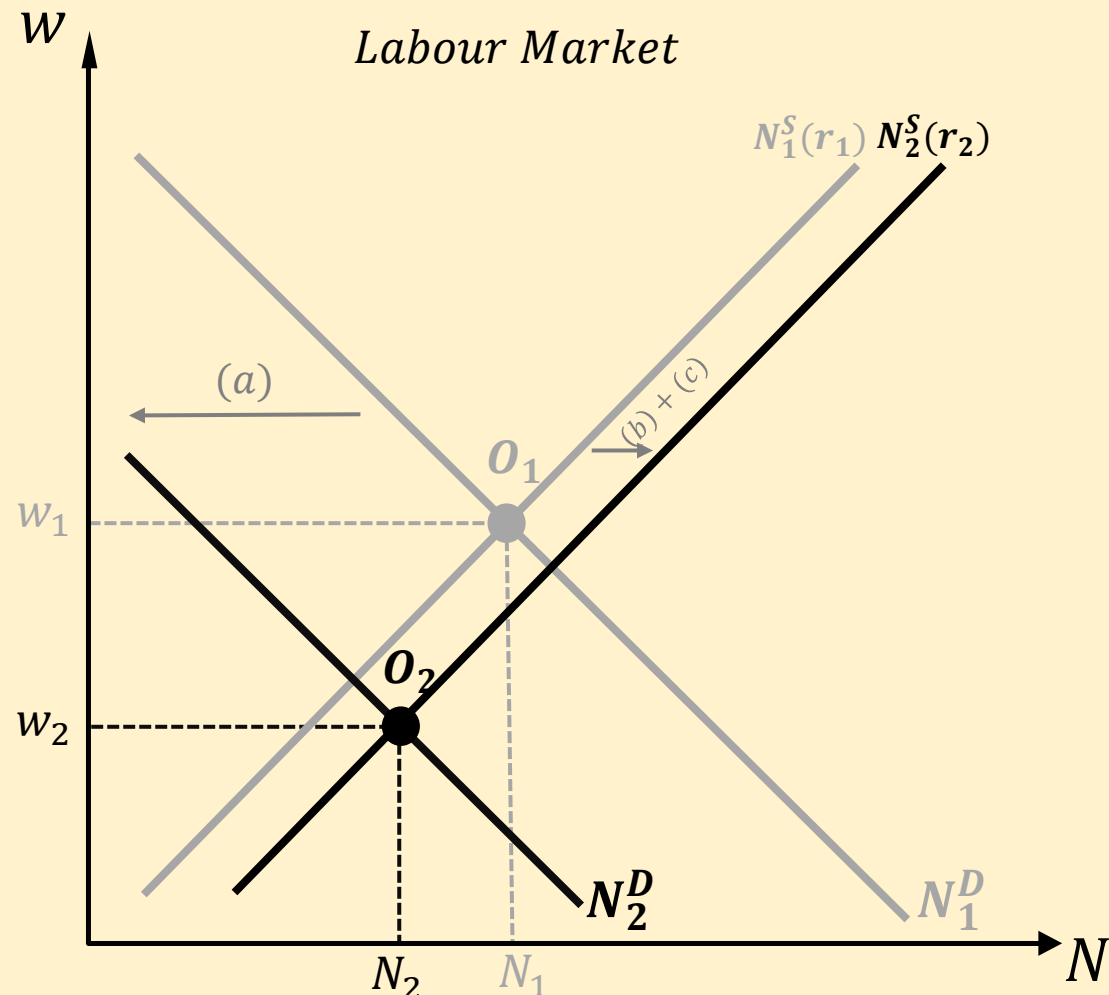
PROBLEM 1 (Covid-19 and Economic Policy)

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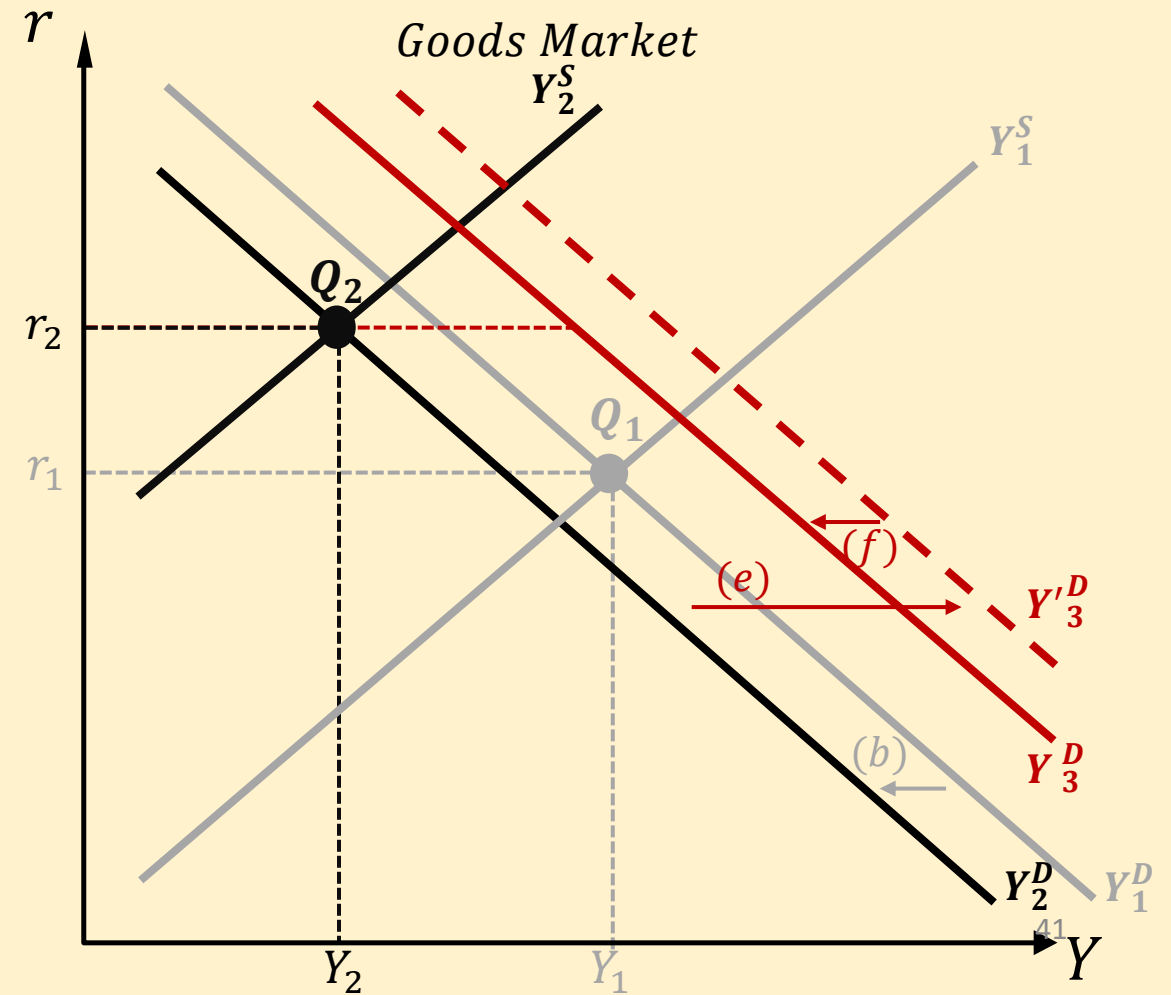
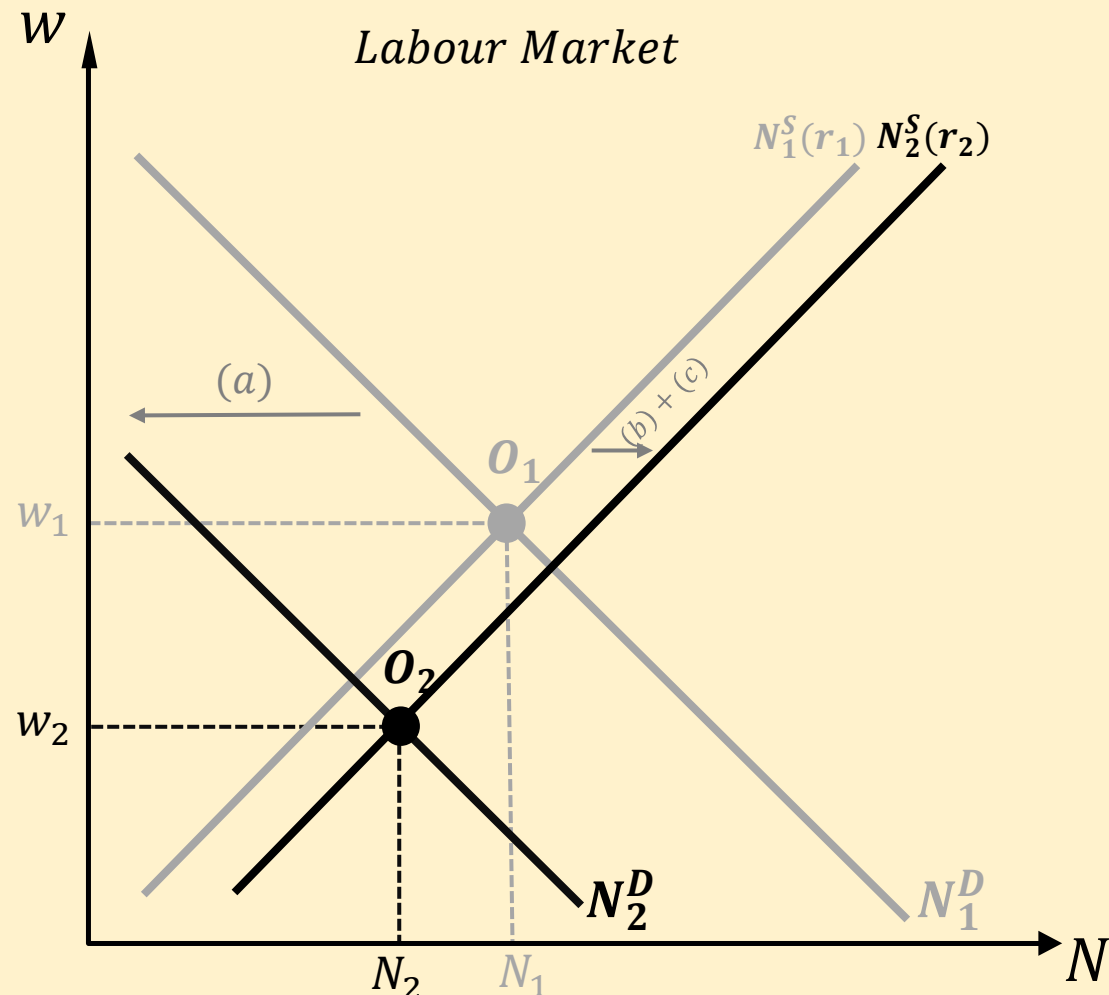
$f) \quad T \uparrow \xrightarrow{\text{"wealth shock"}} we \downarrow \xrightarrow{\text{negative wealth effect (small)}} \left\{ \begin{array}{l} c \downarrow \rightarrow Y^D \text{ shifts to the left} \\ l \downarrow \rightarrow N^S \uparrow: N^S \text{ shifts to the right} \\ \rightarrow Y^S \text{ shifts to the right from } Y_2^S \text{ to } Y_3^S \end{array} \right.$



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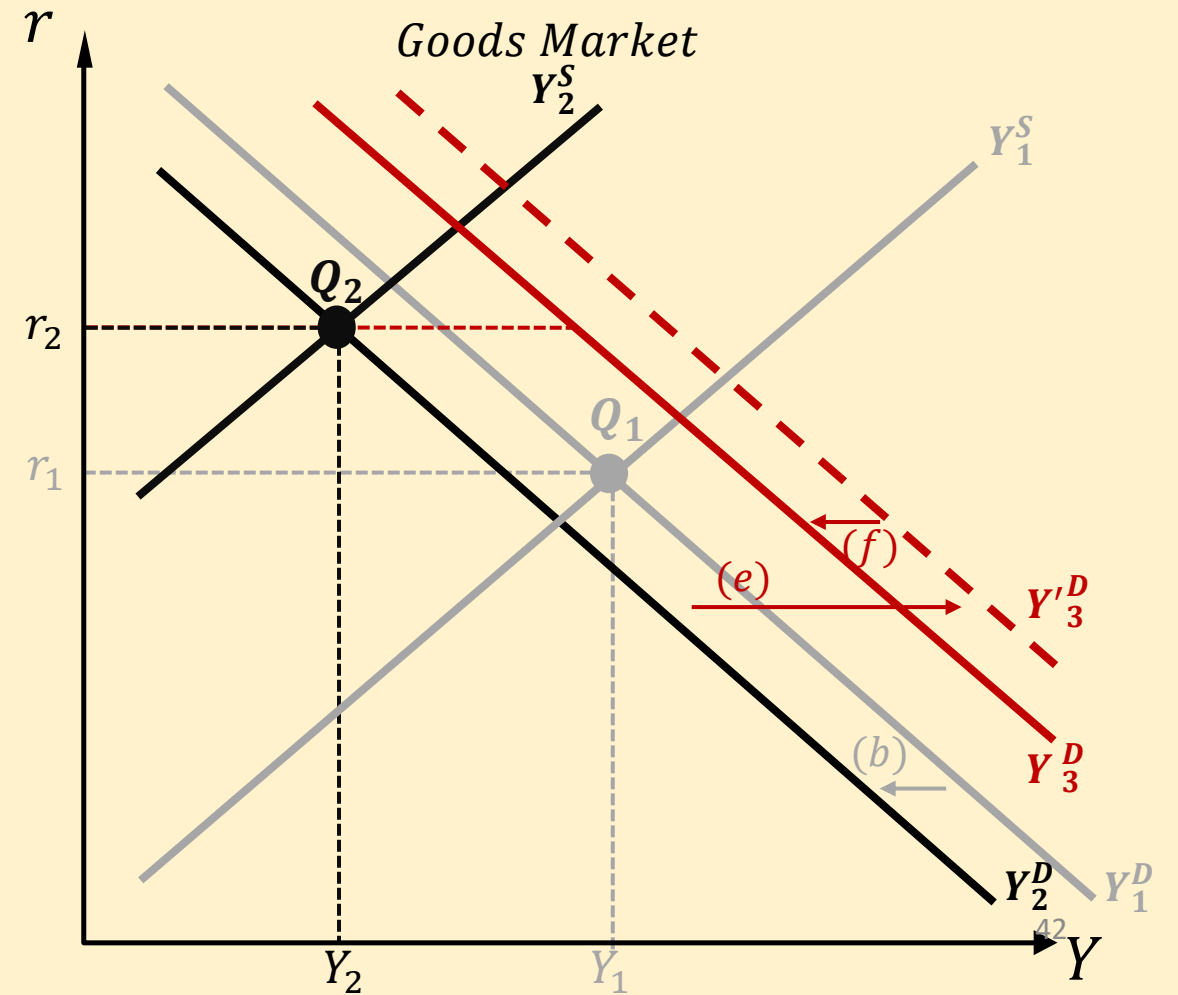
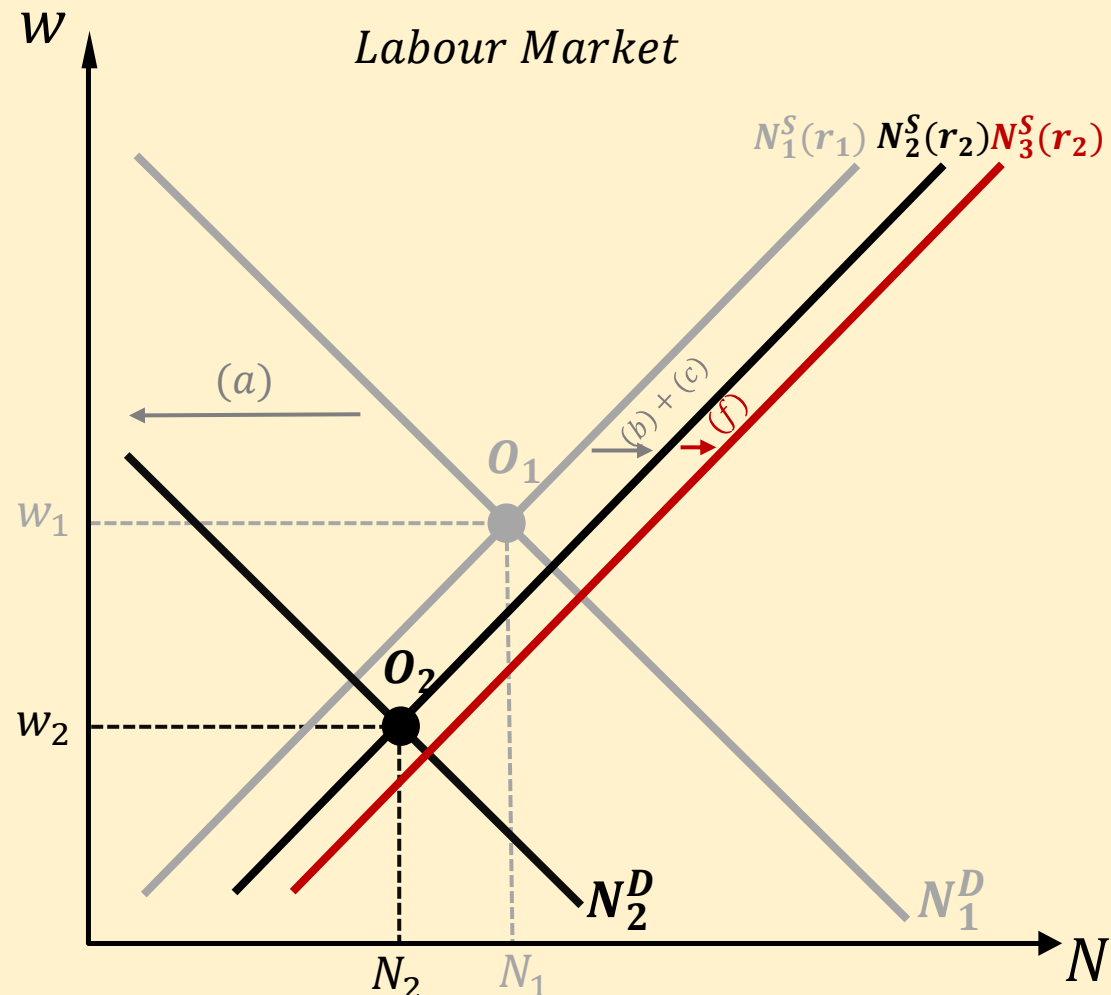
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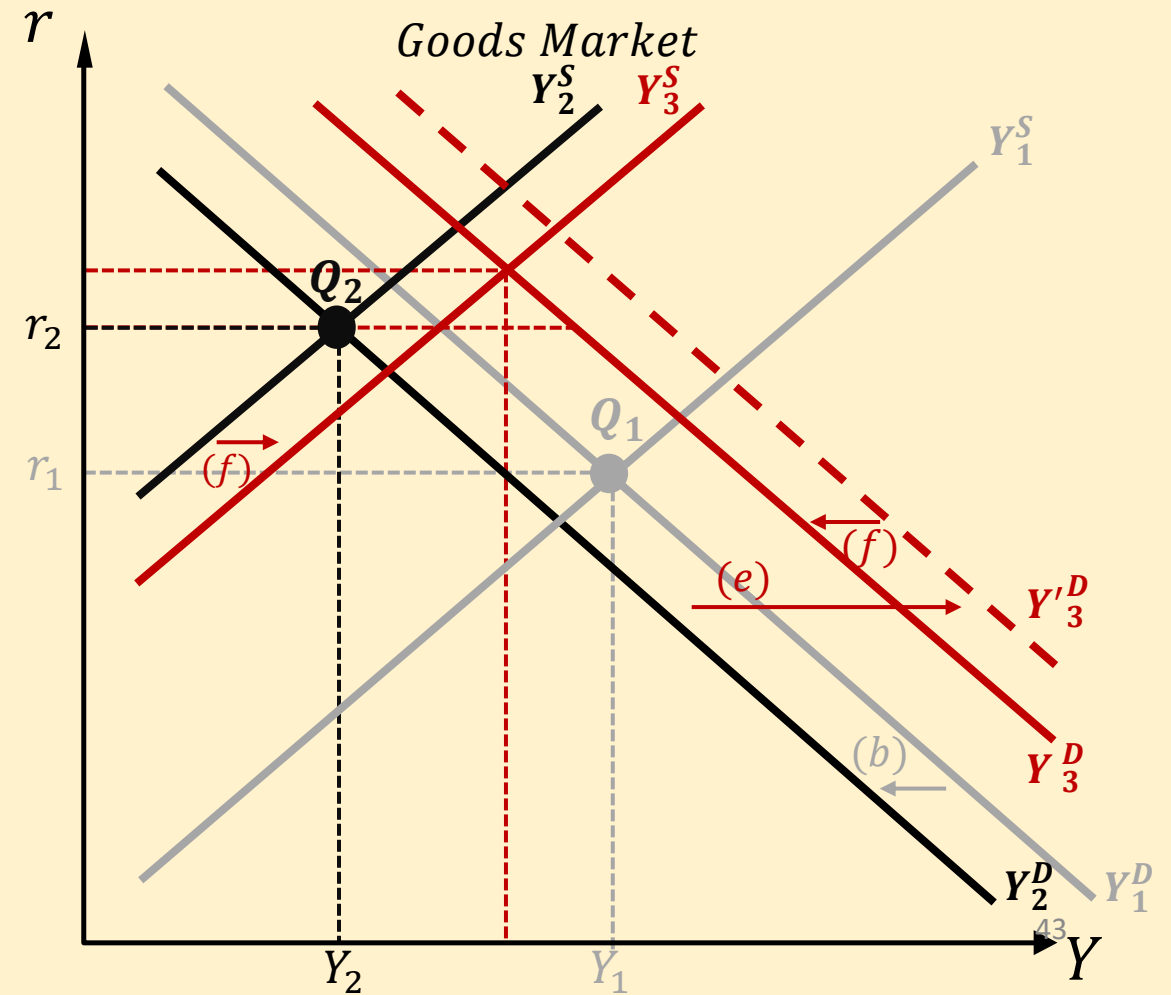
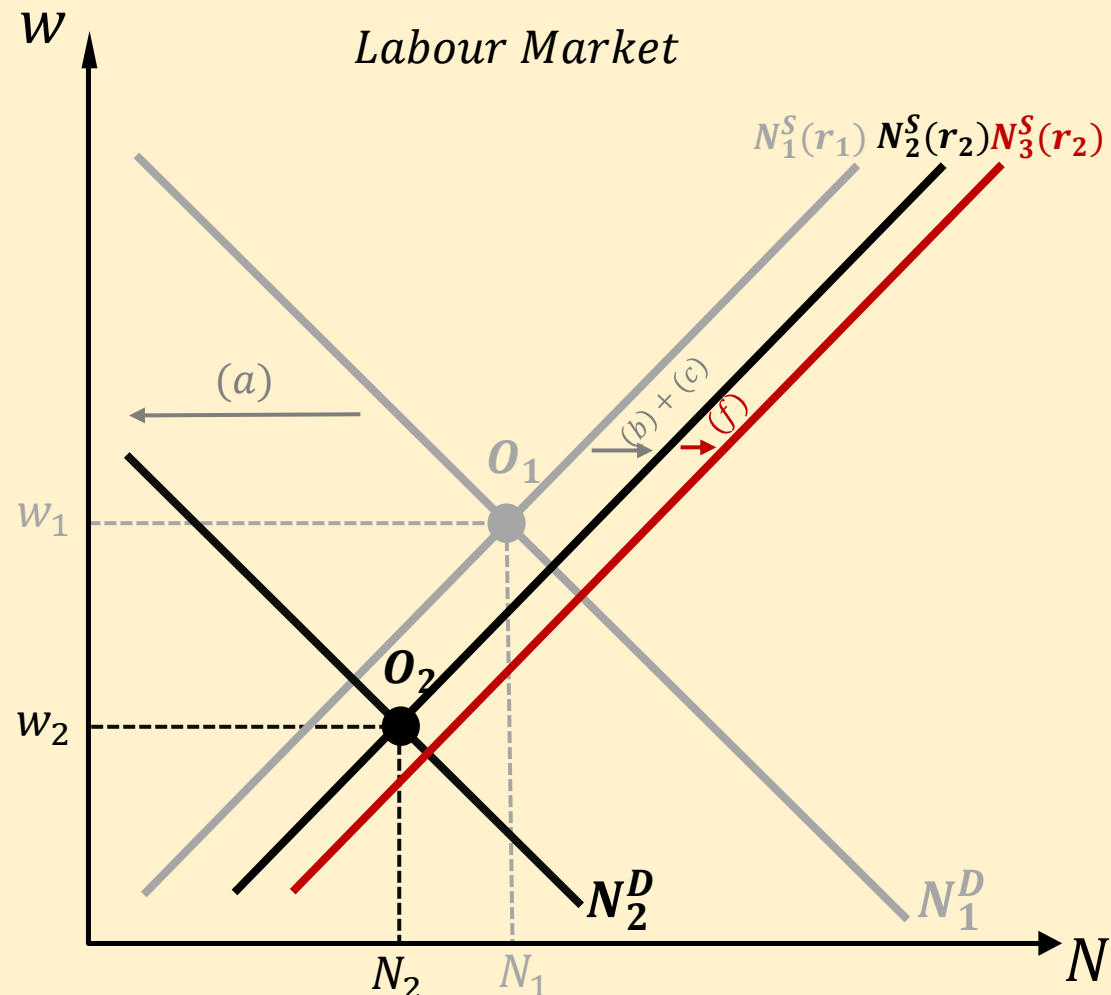
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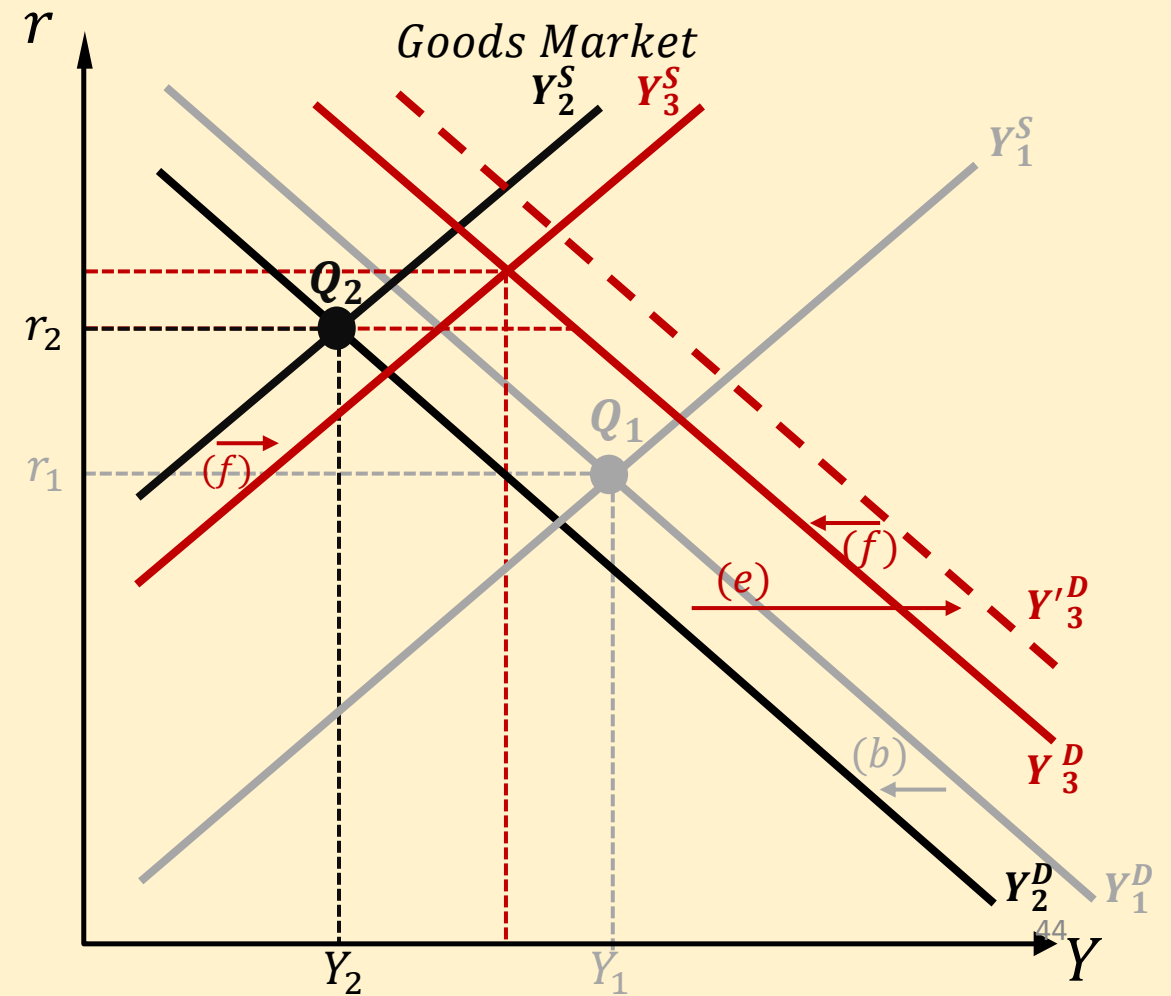
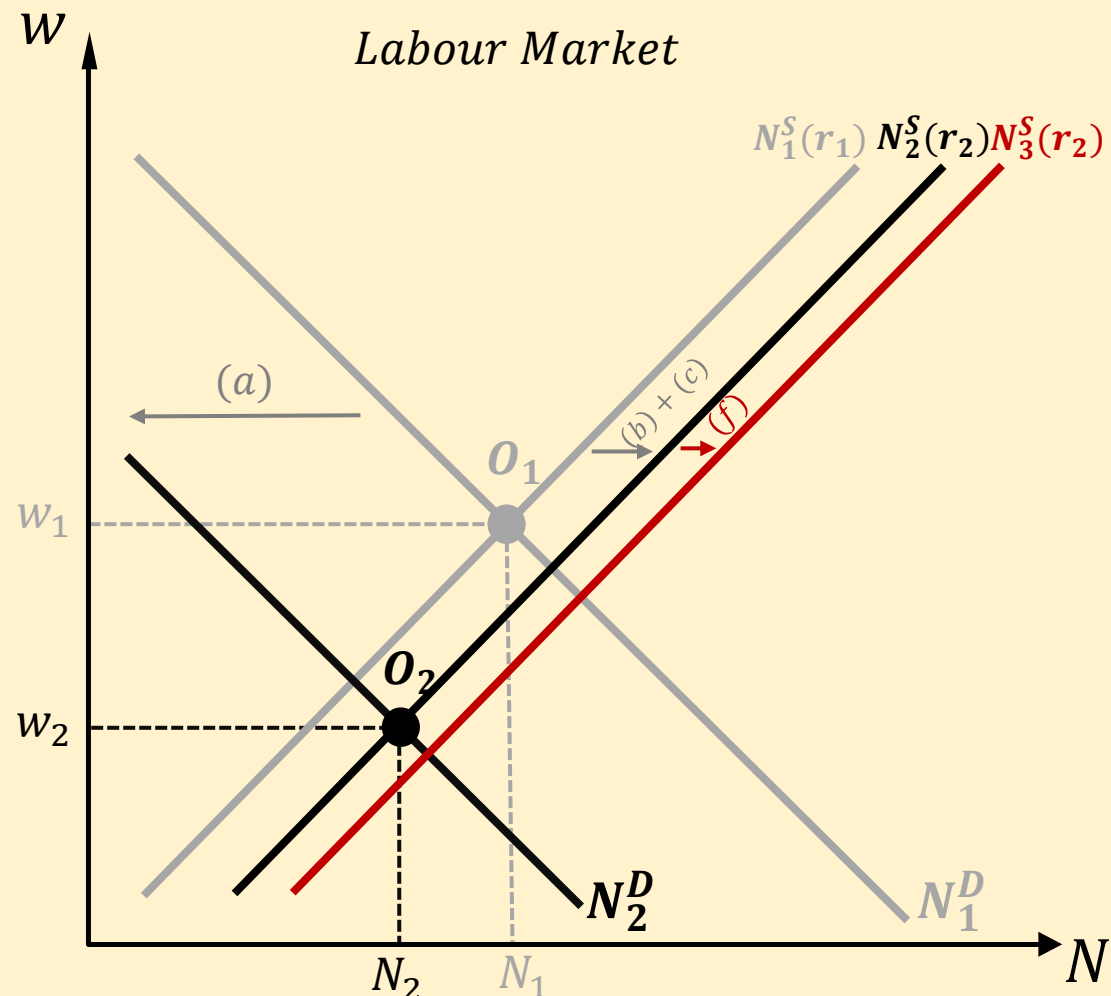
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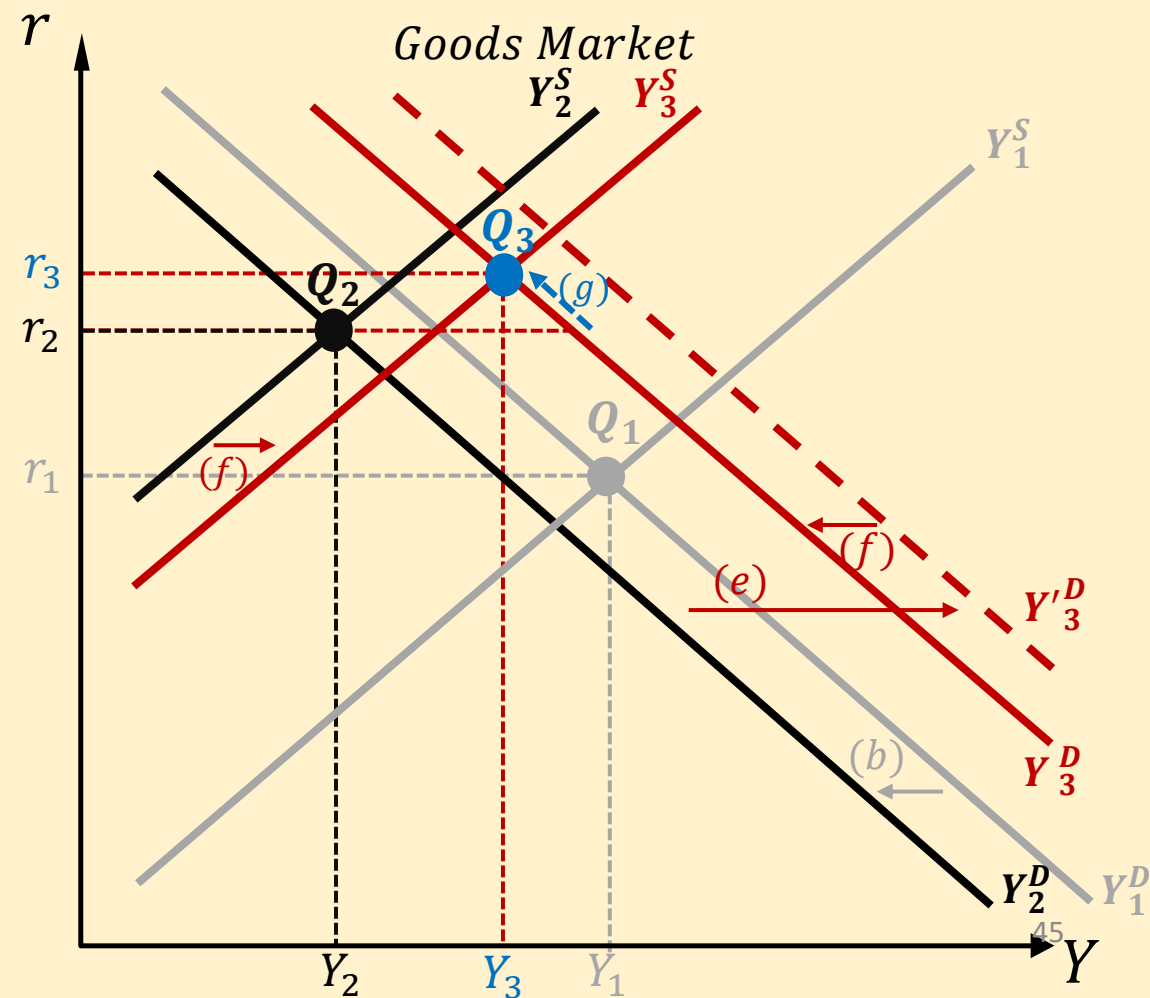
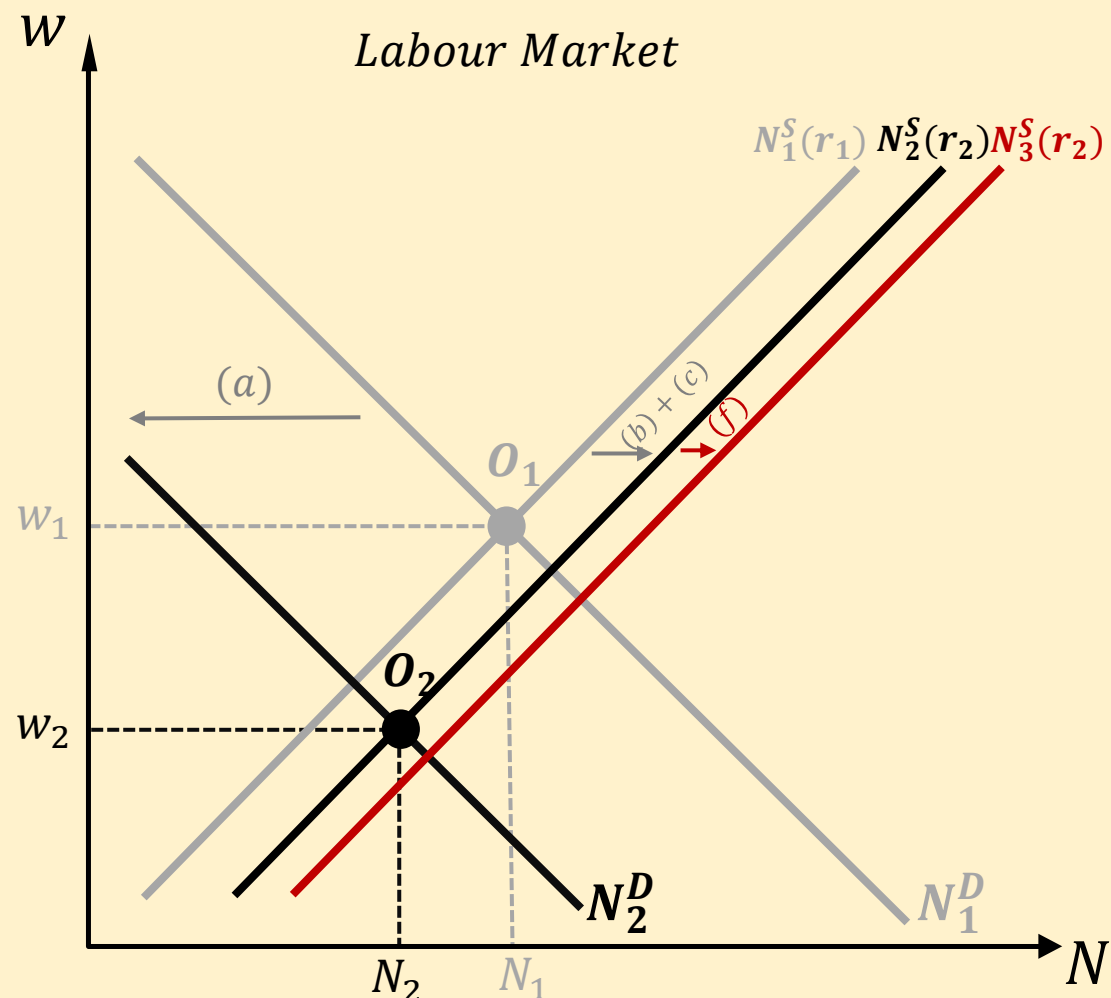
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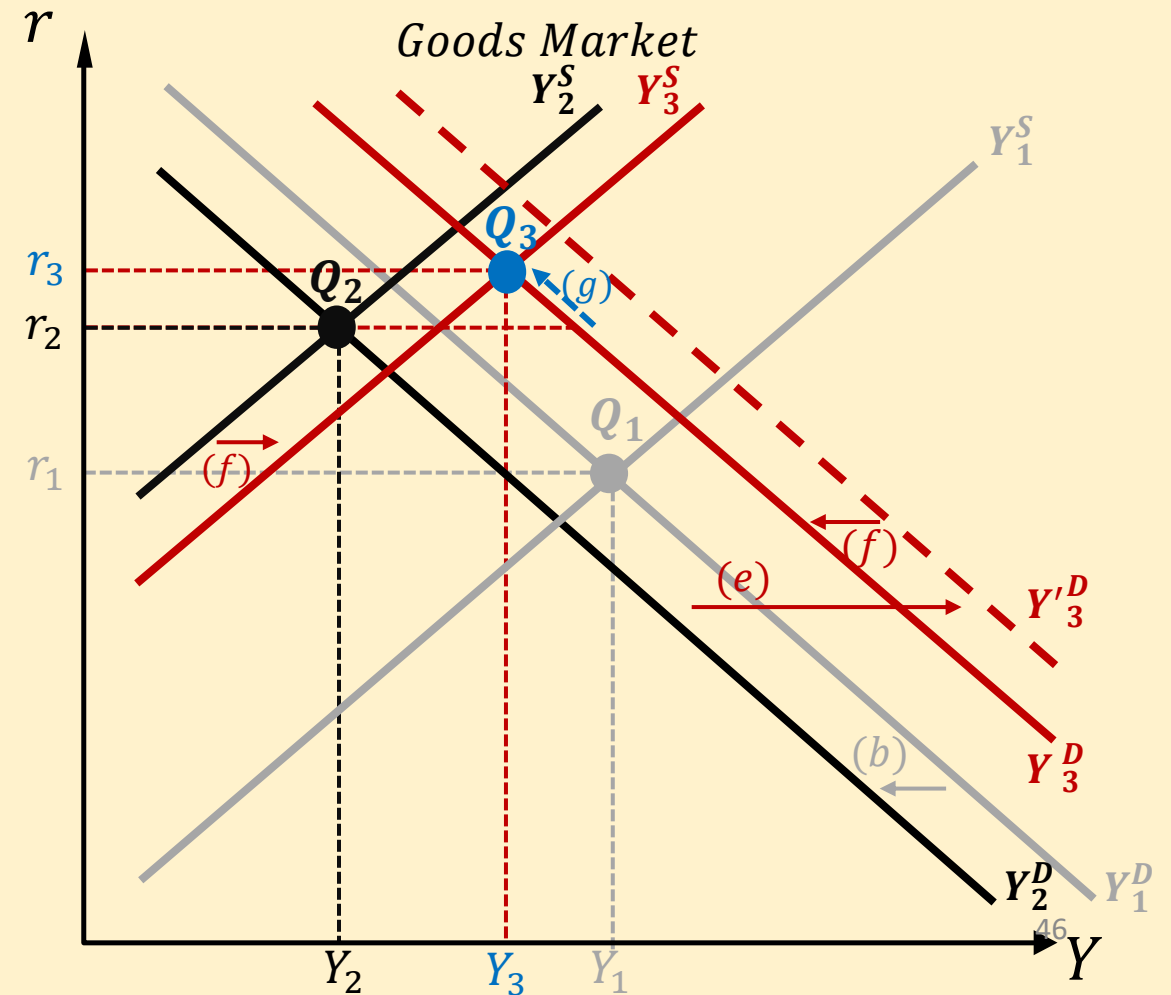
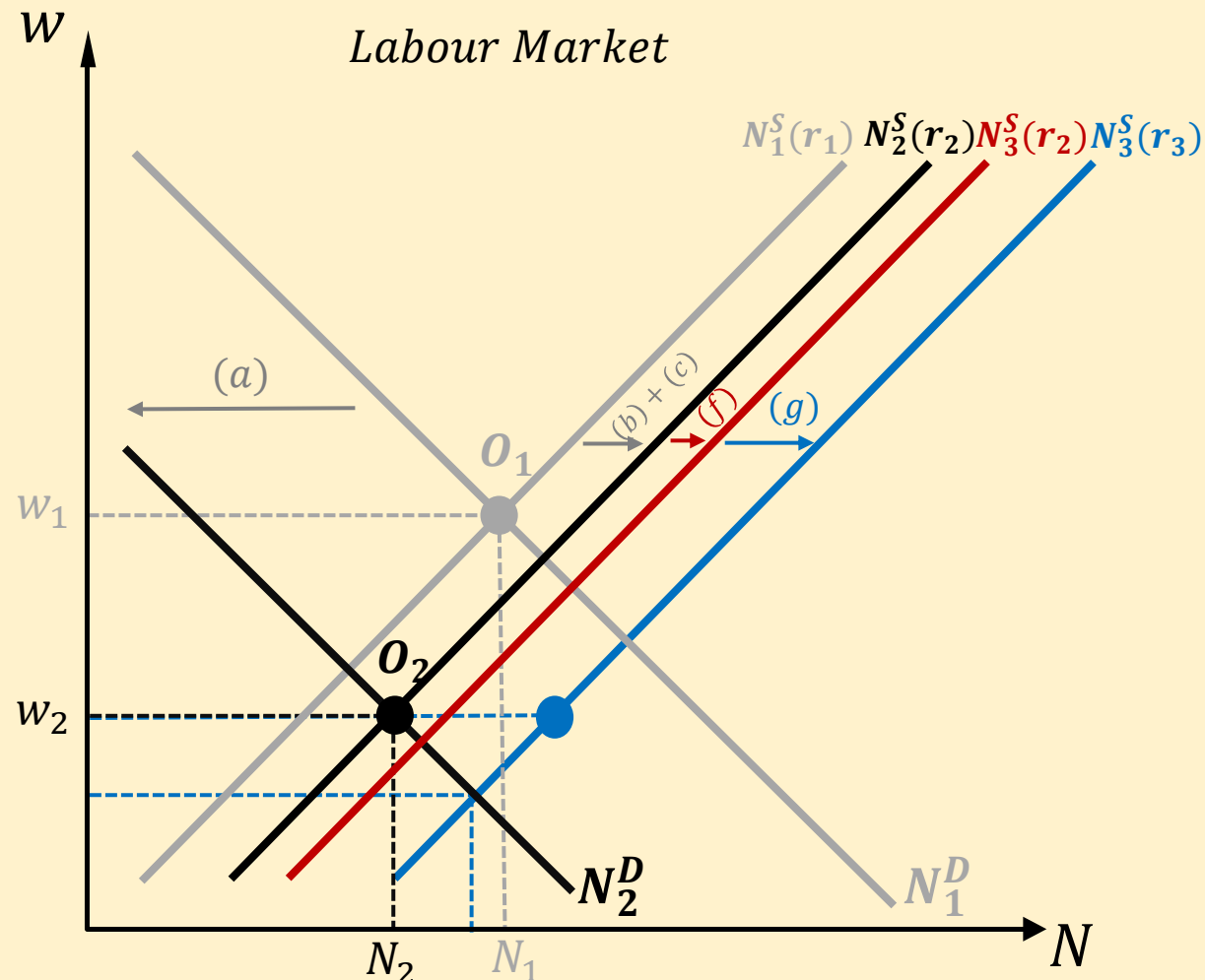
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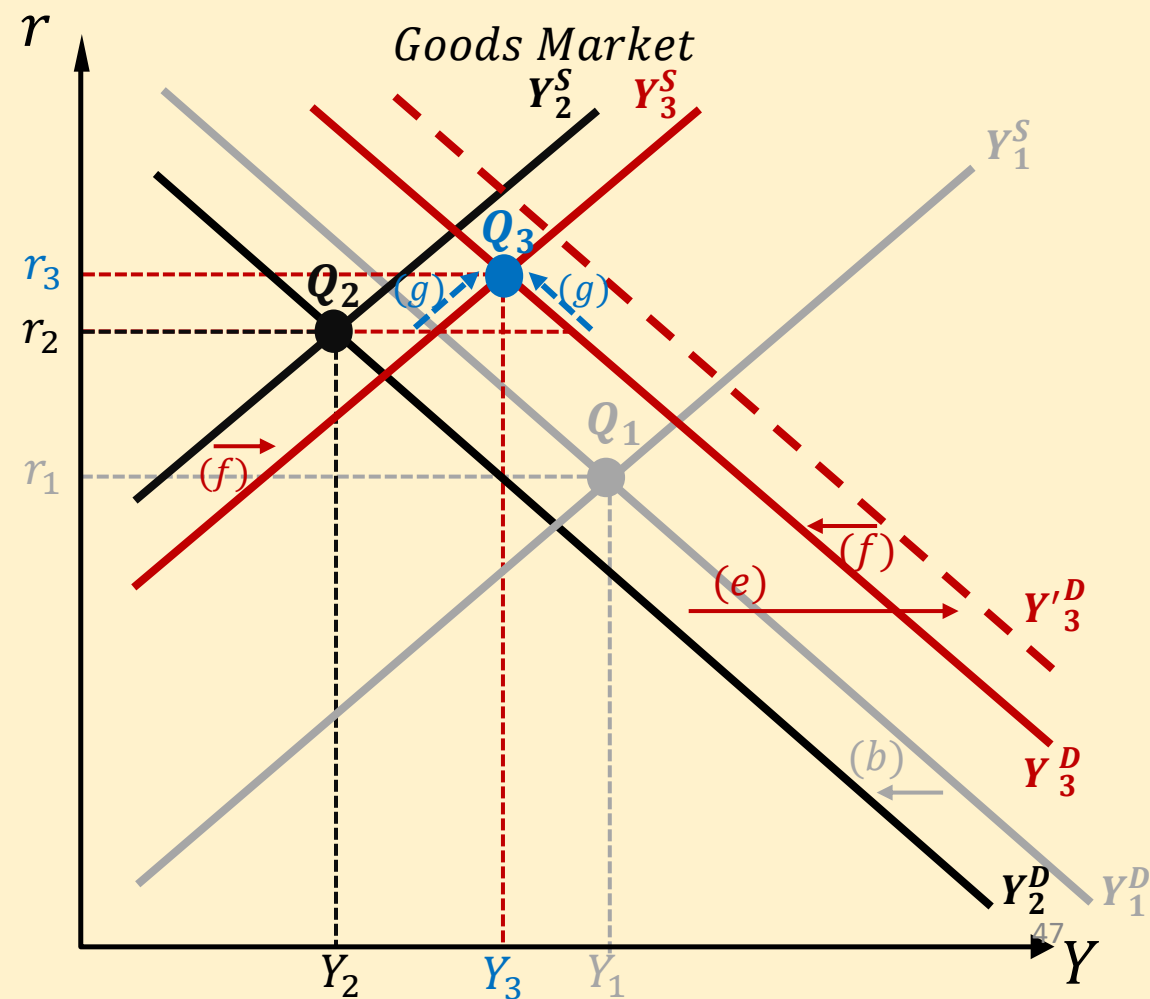
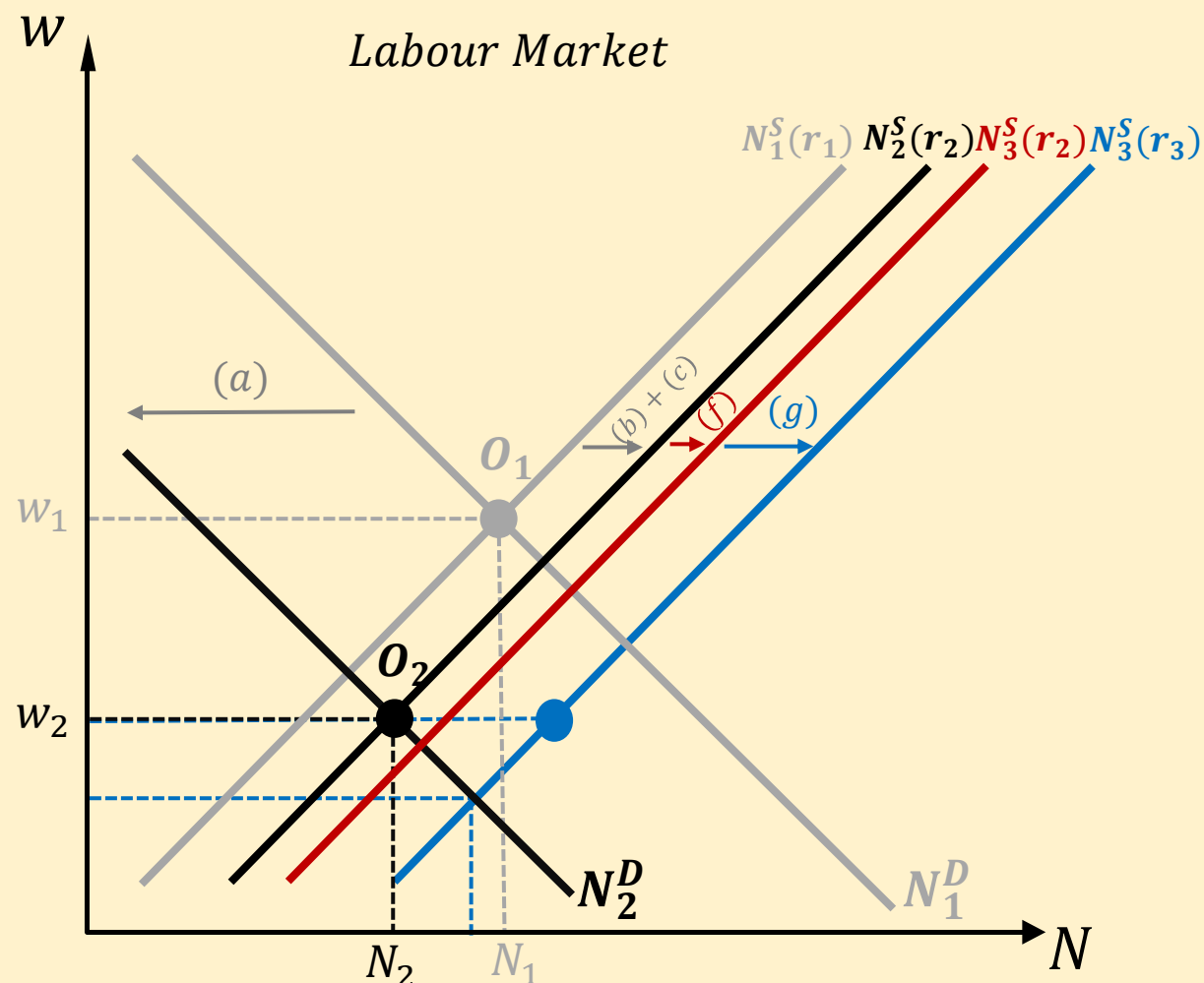
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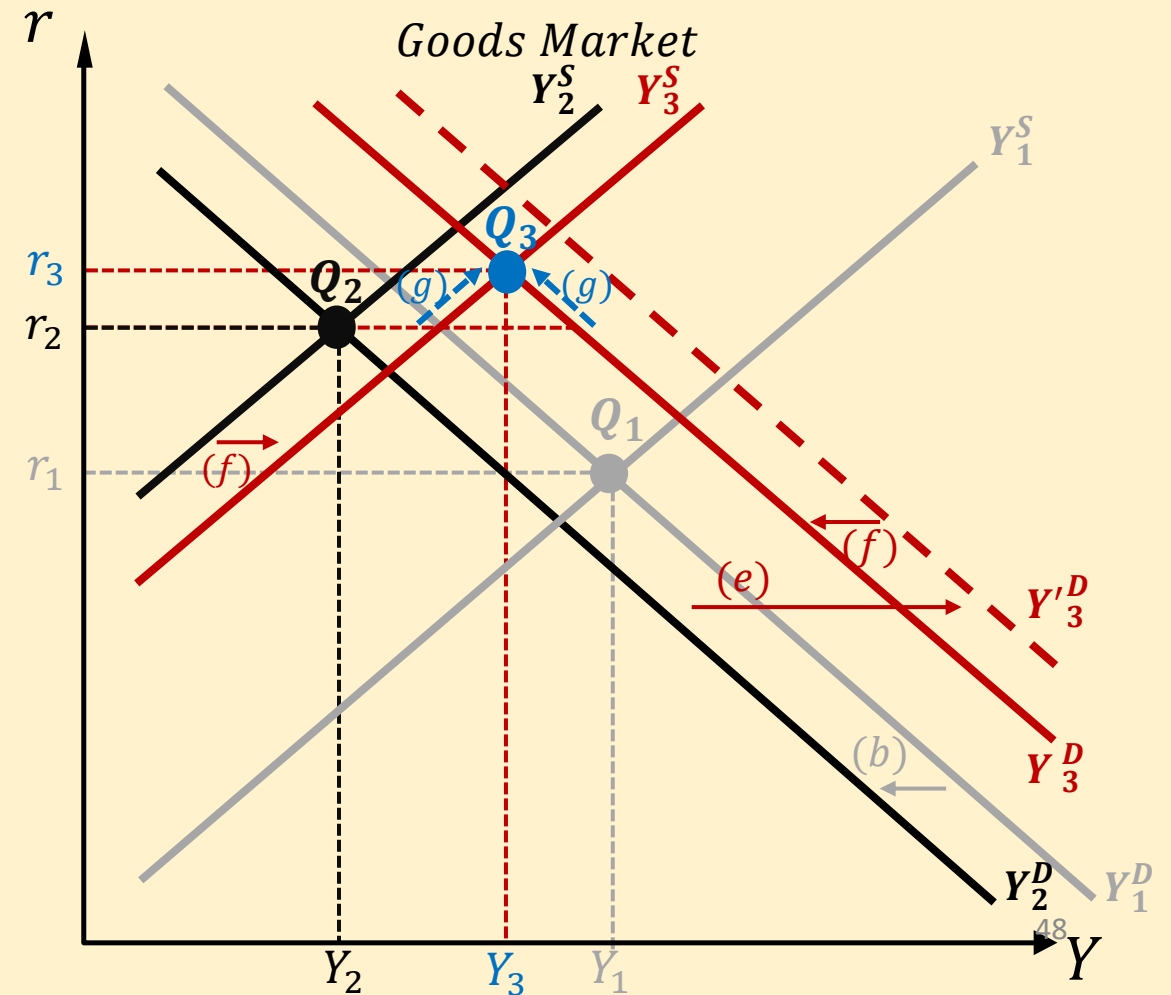
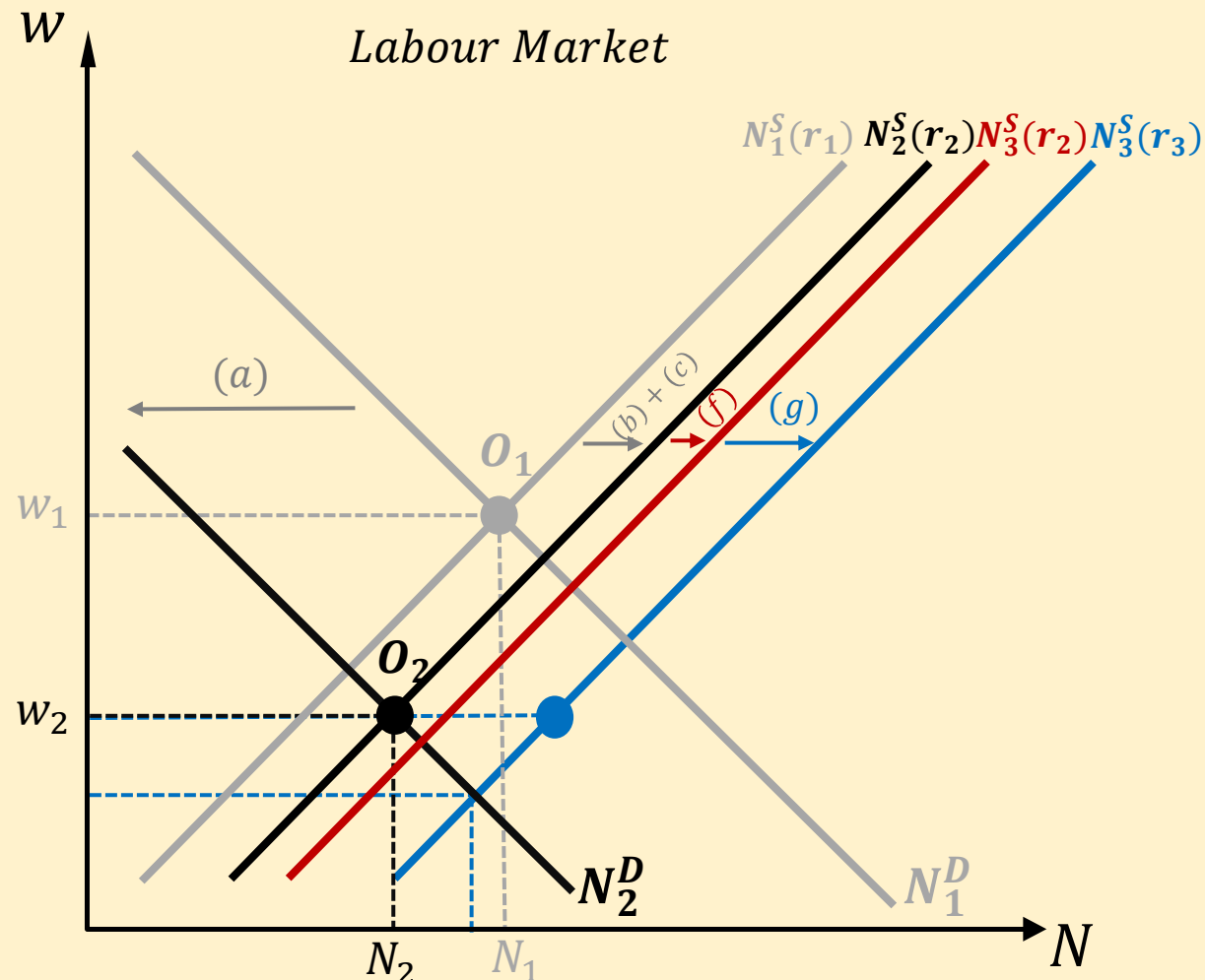
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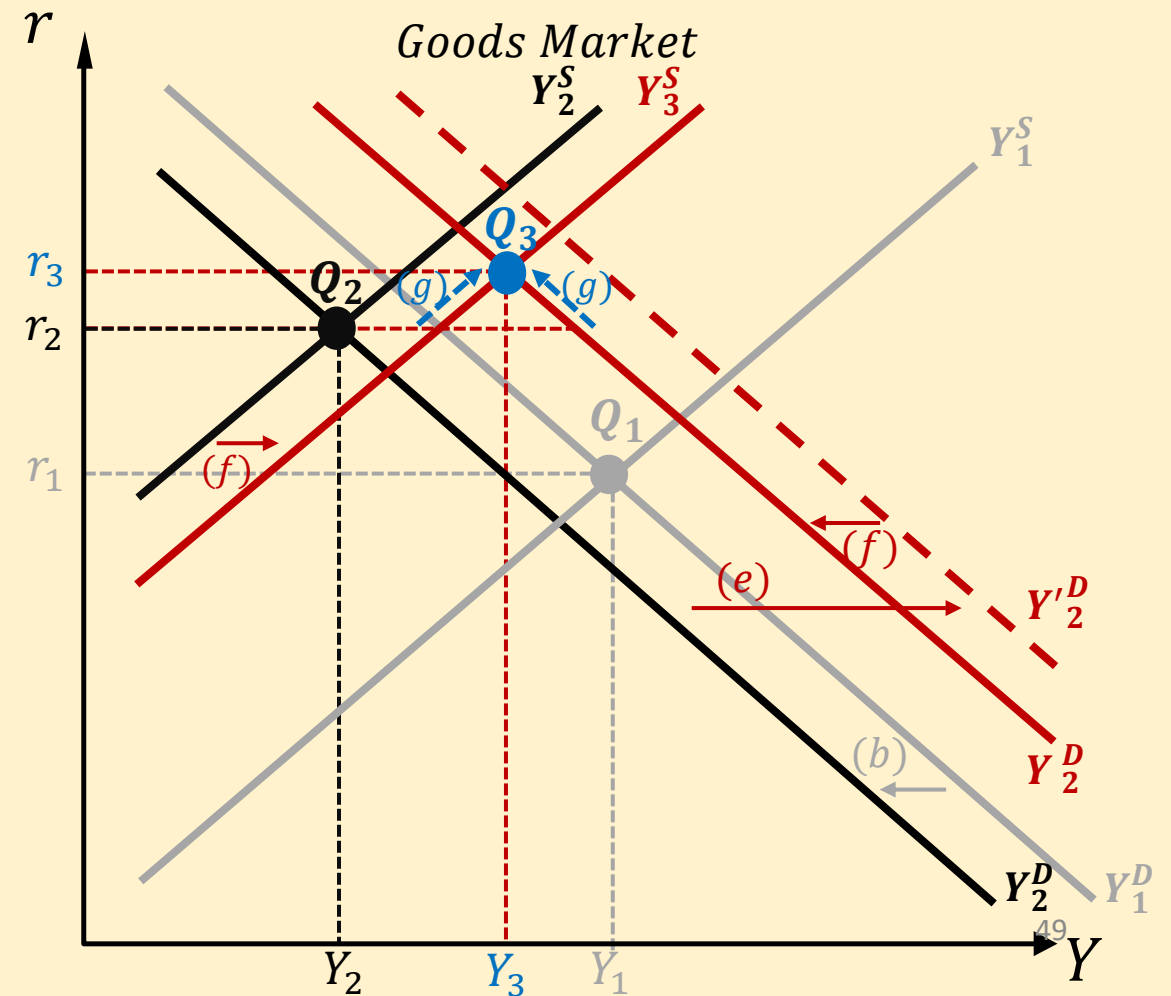
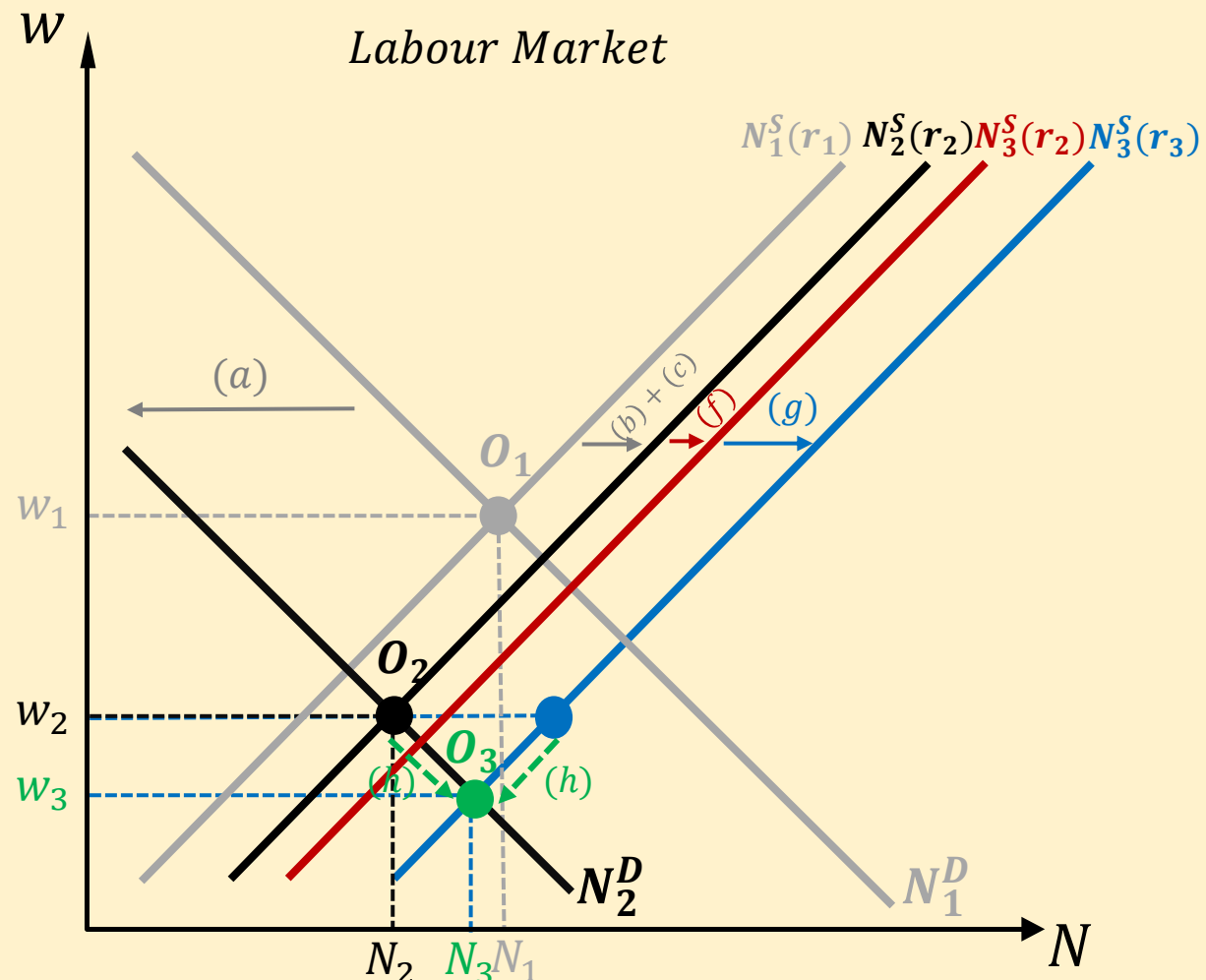
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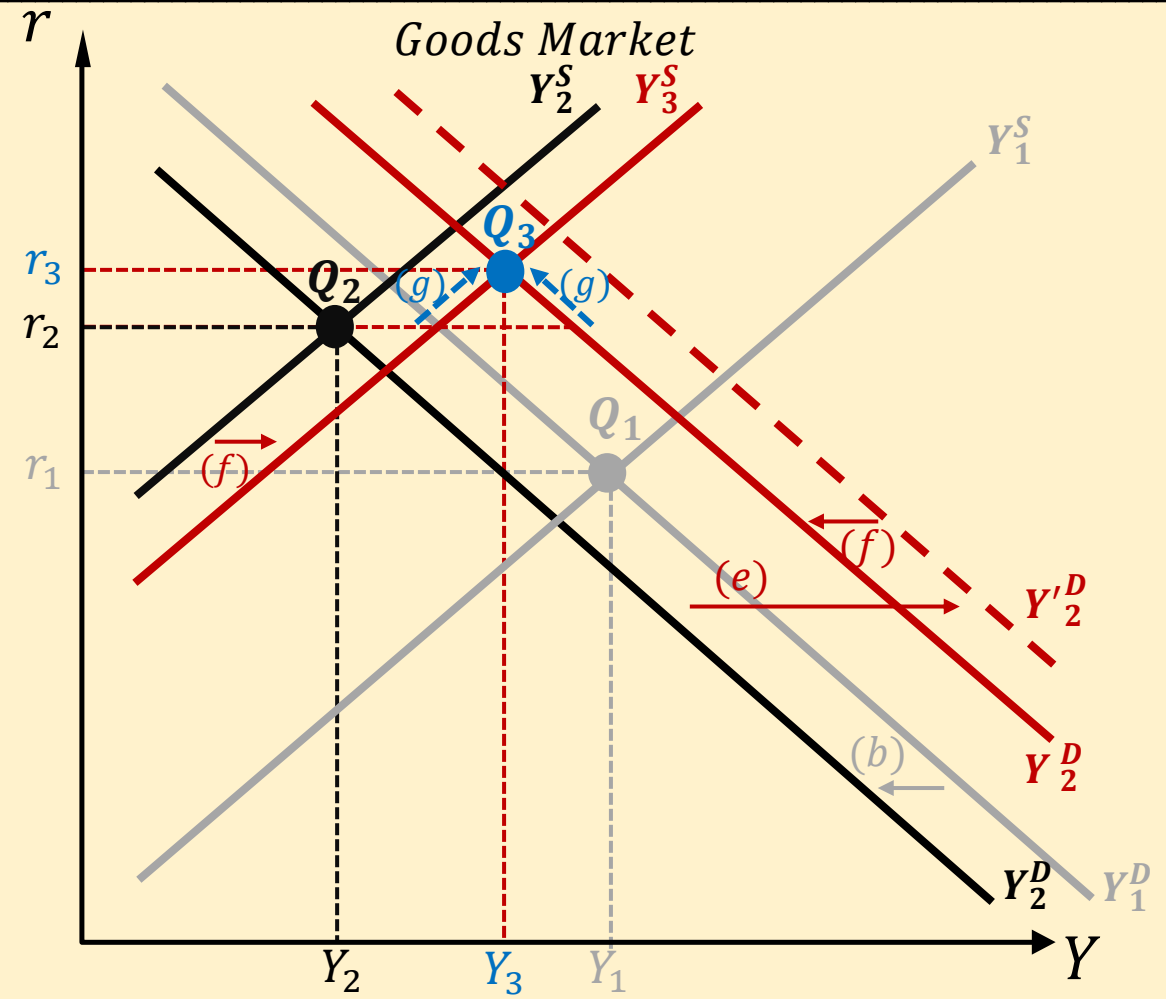
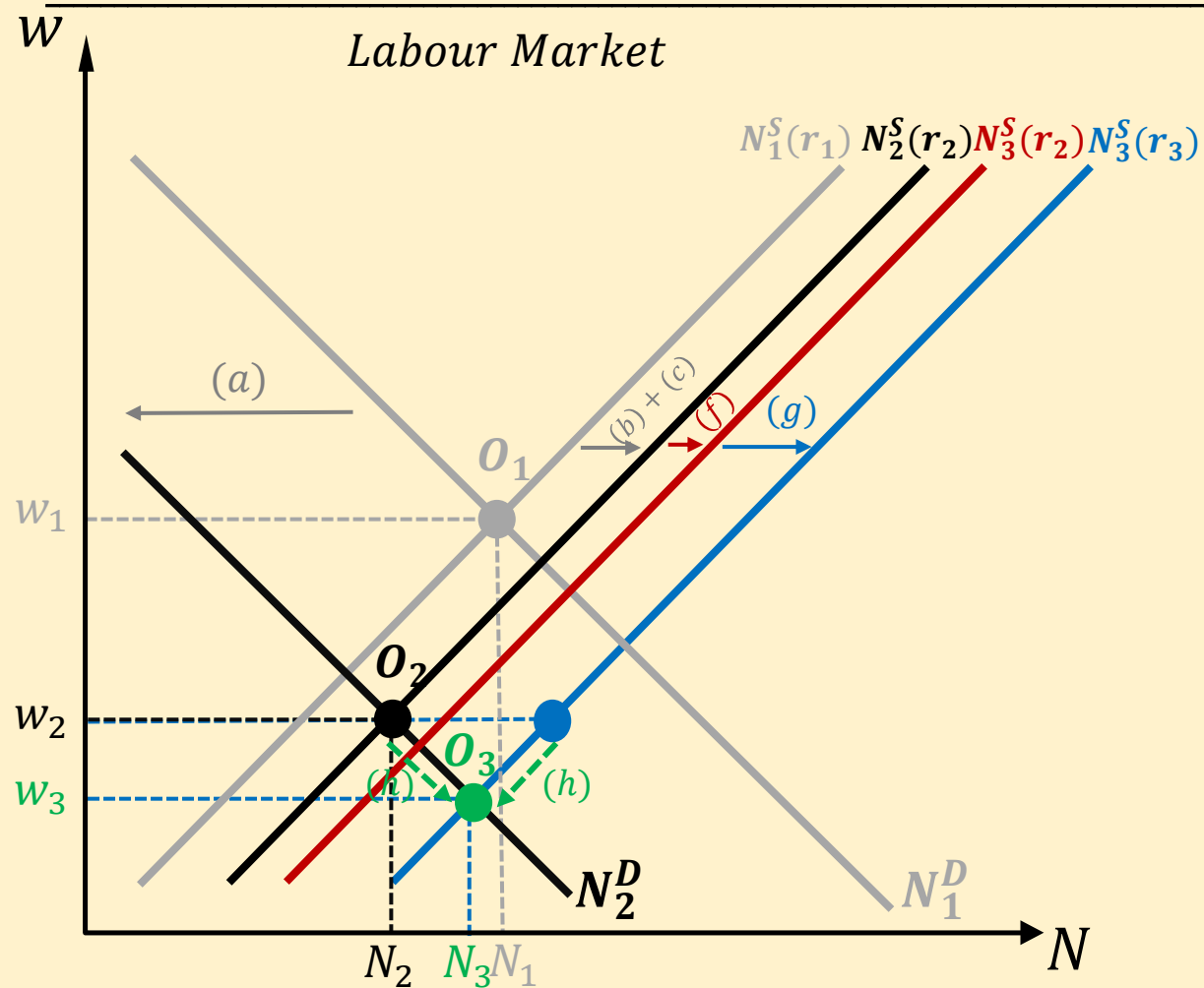
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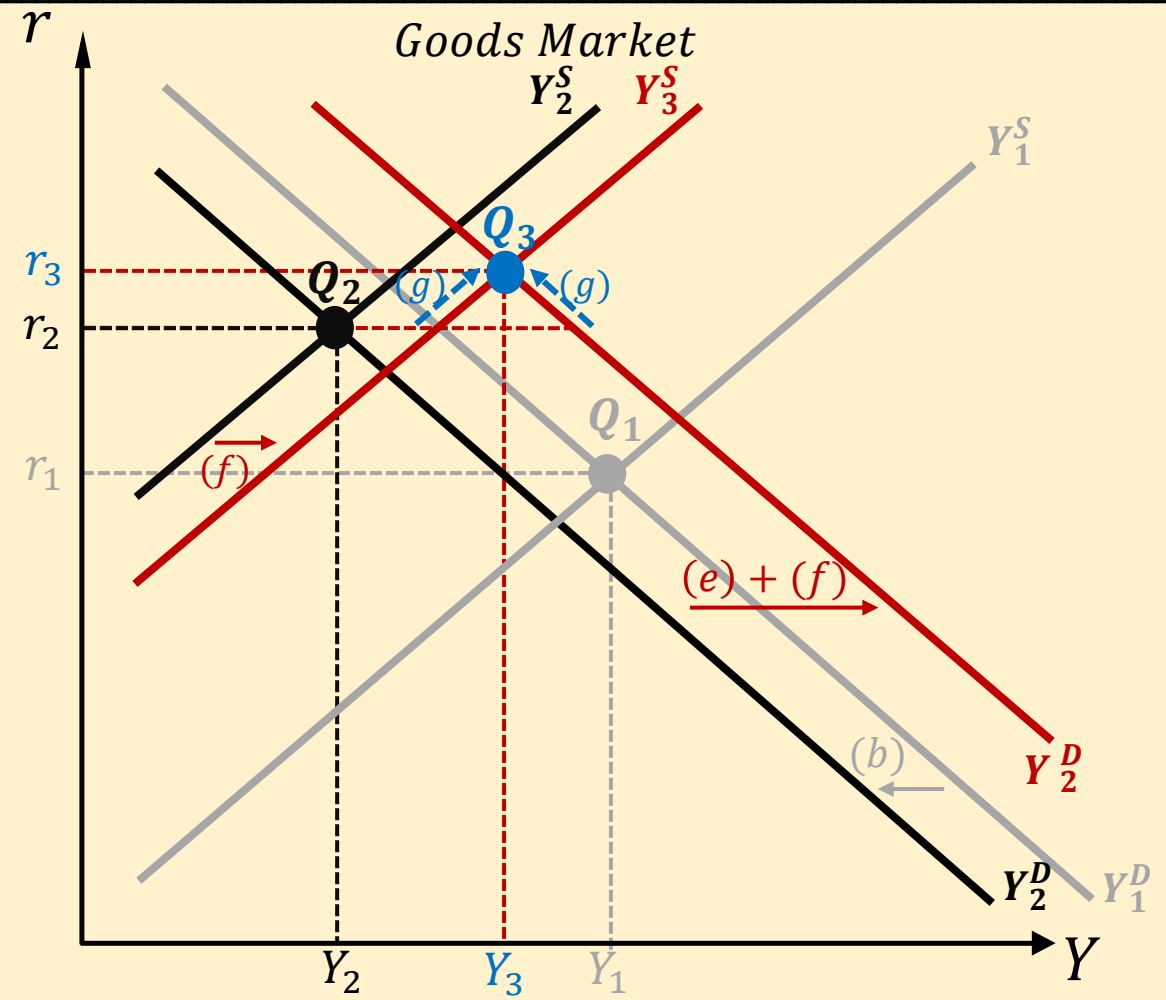
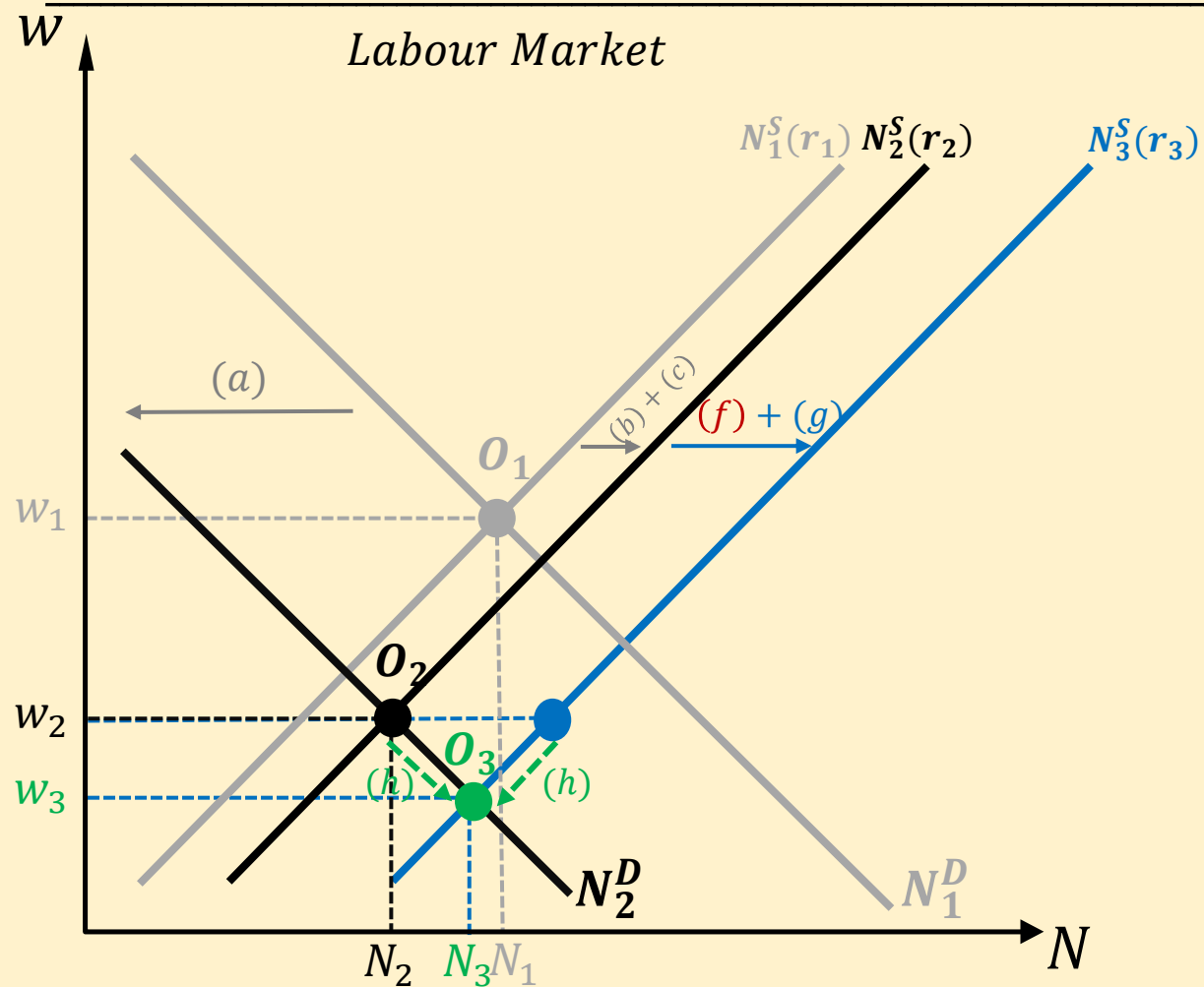
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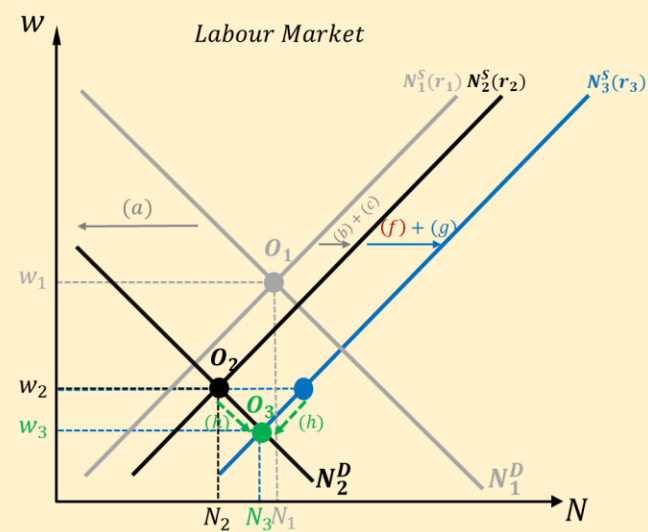
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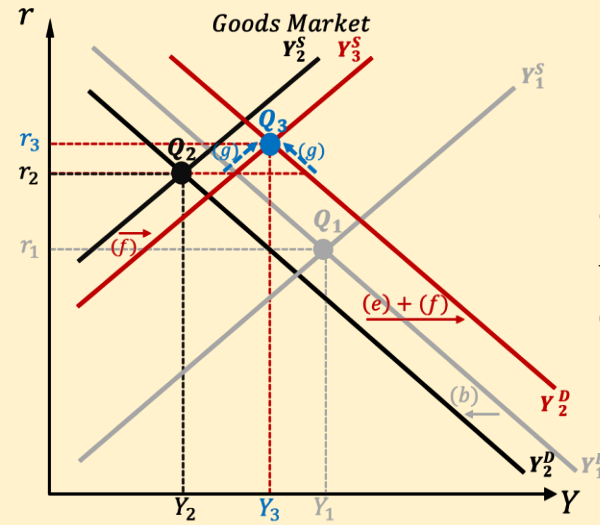
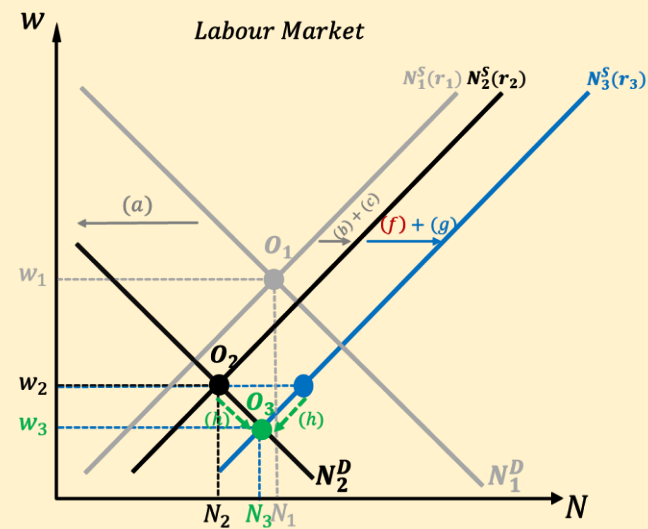


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“STIMULUS PACKAGE”: The expansion of the government spending mitigates the negative effects of the pandemic shock (TFP shock) on output and employment.

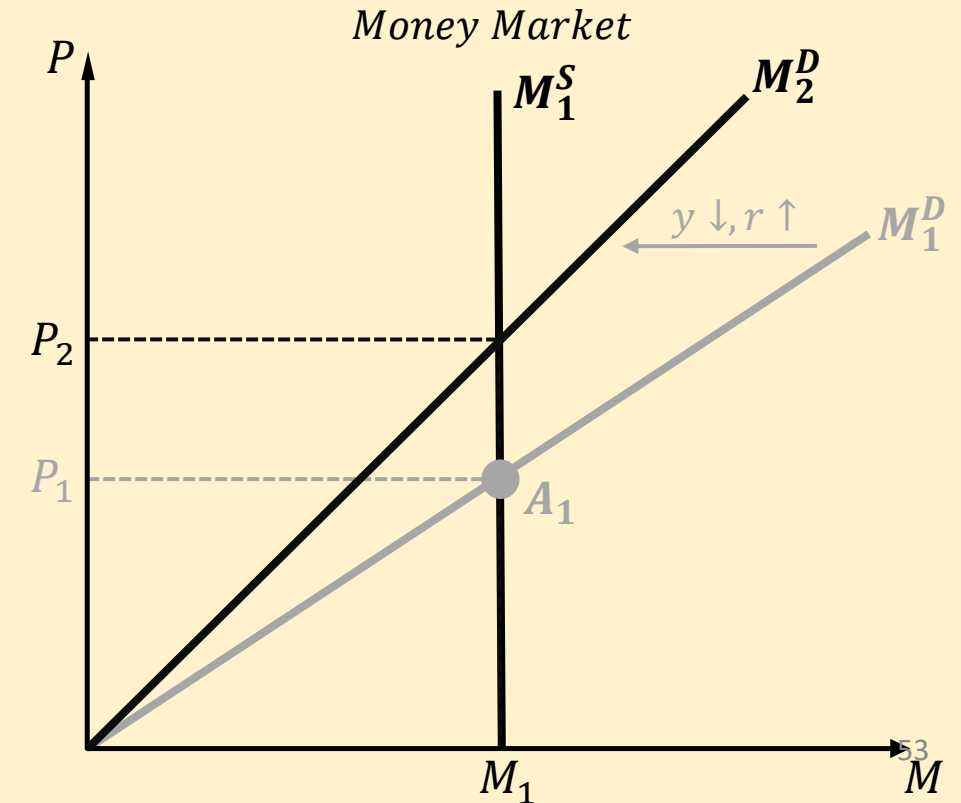
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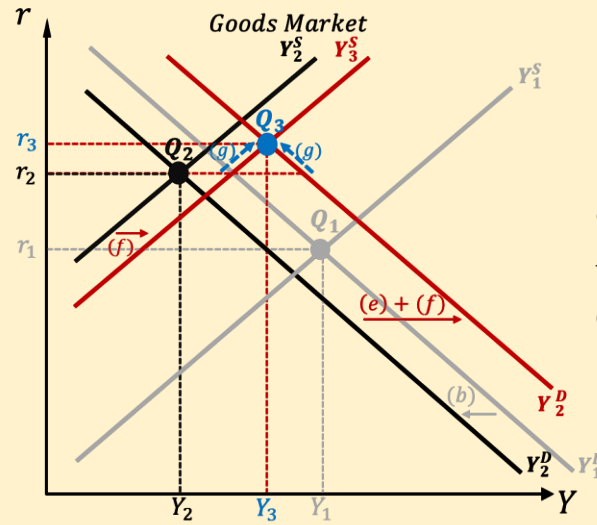
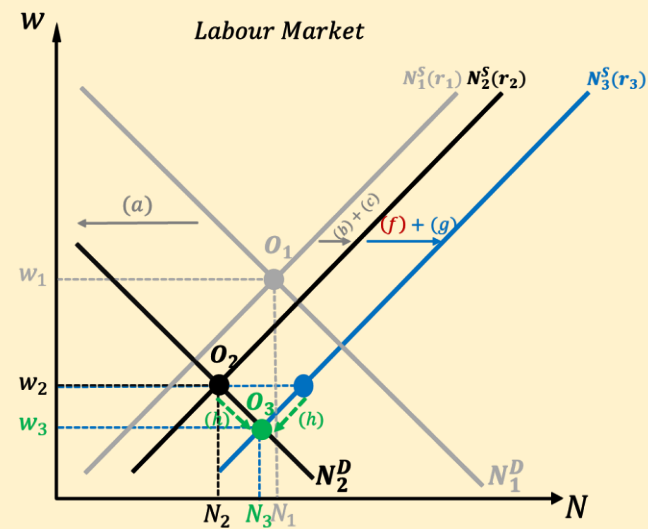
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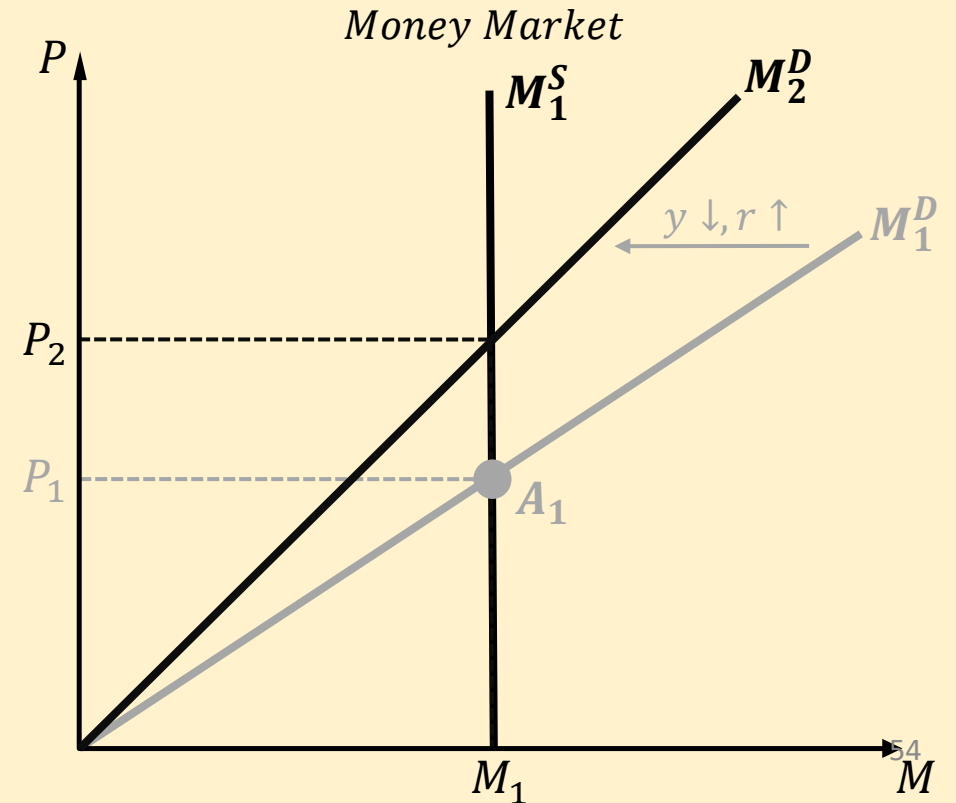
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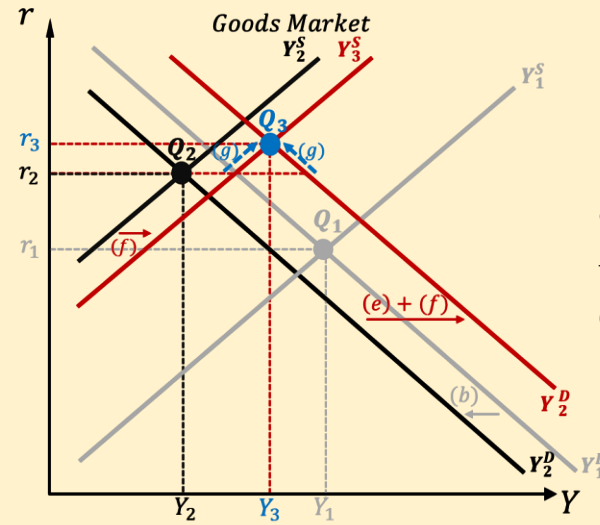
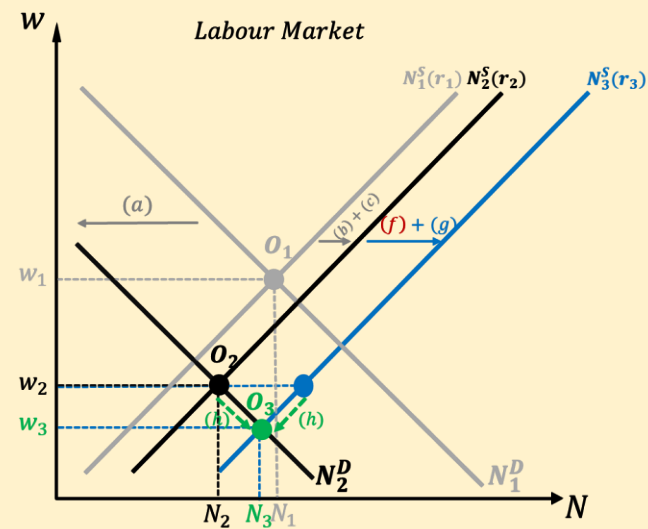
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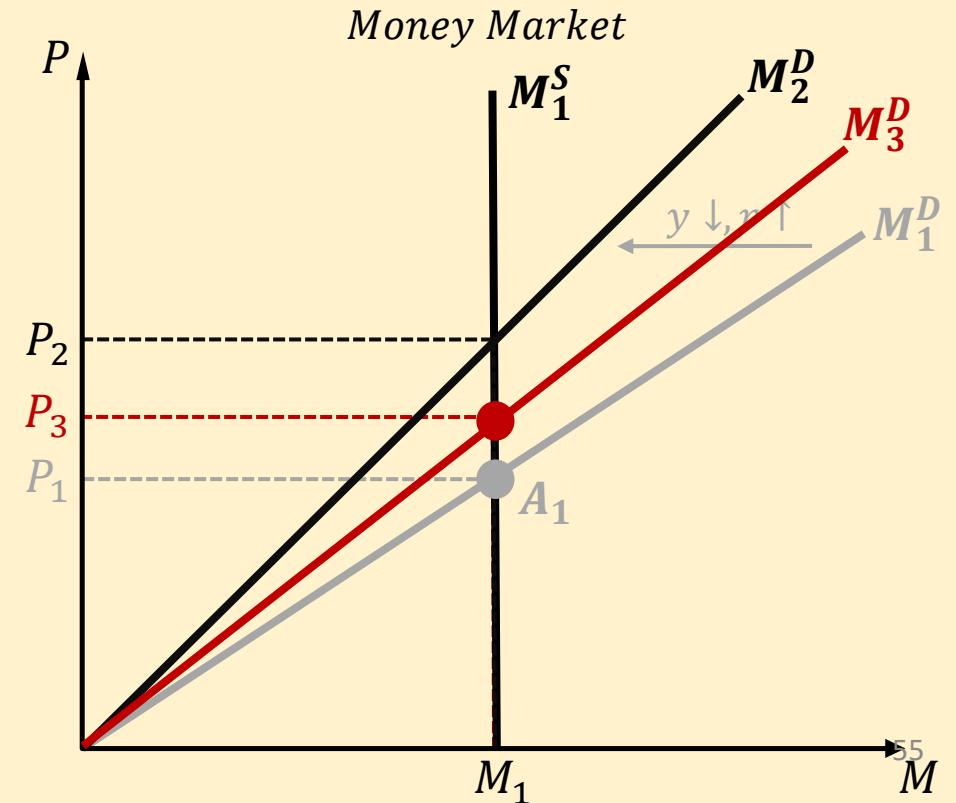
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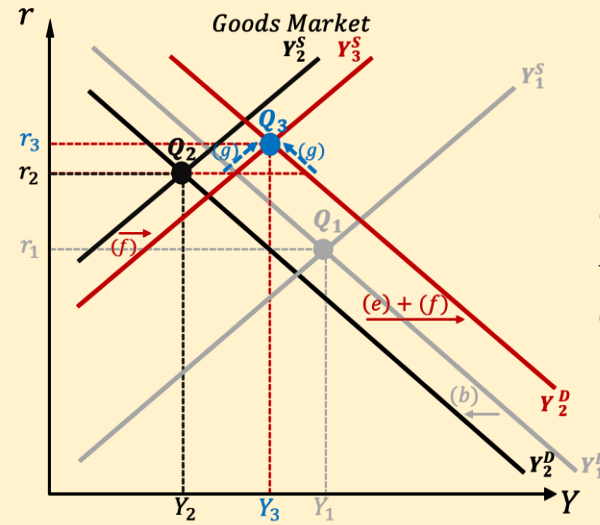
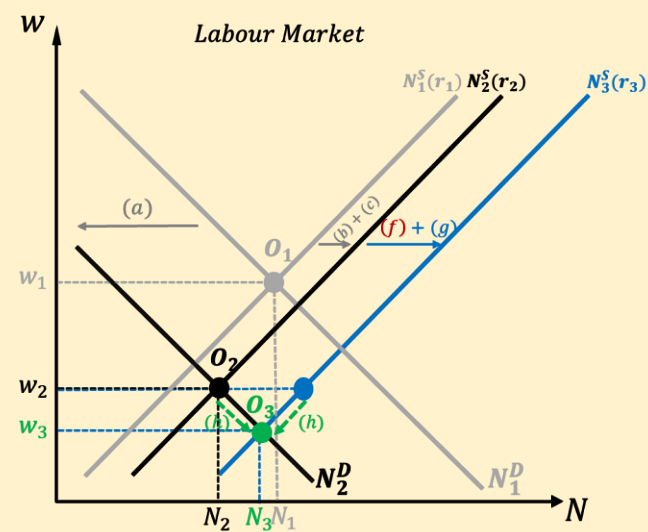
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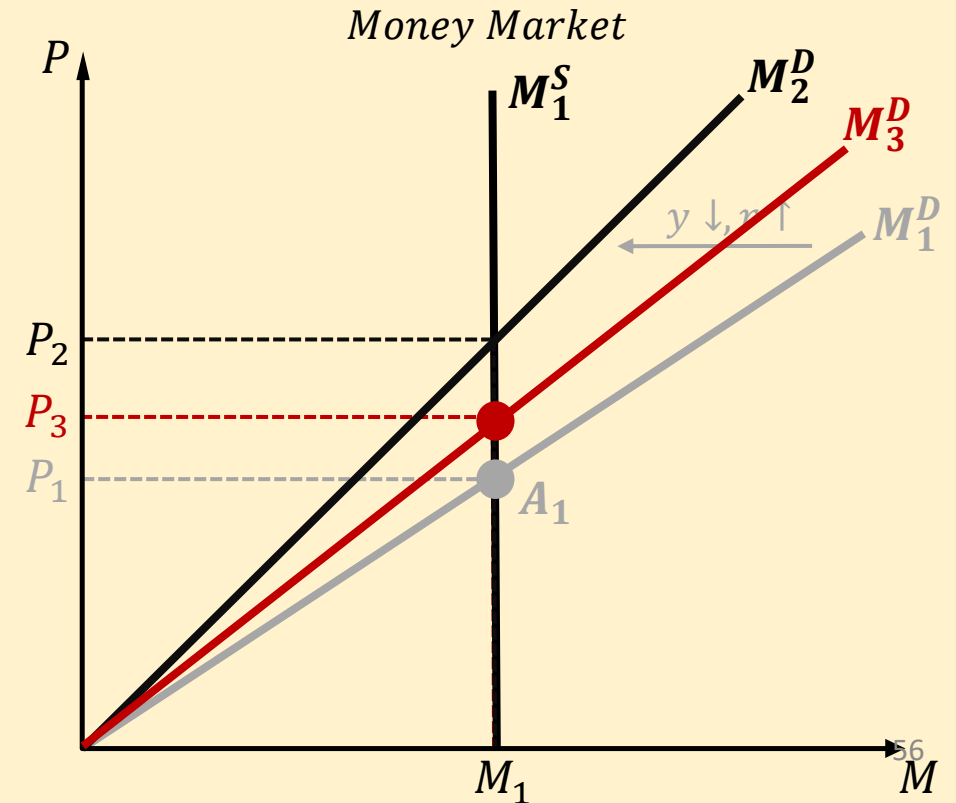
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Since M^S is fixed by the monetary authority, then $P \downarrow: P_2 \rightarrow P_3$

THE INTERVENTION: MONETARY POLICY (PRICE STABILIZATION)

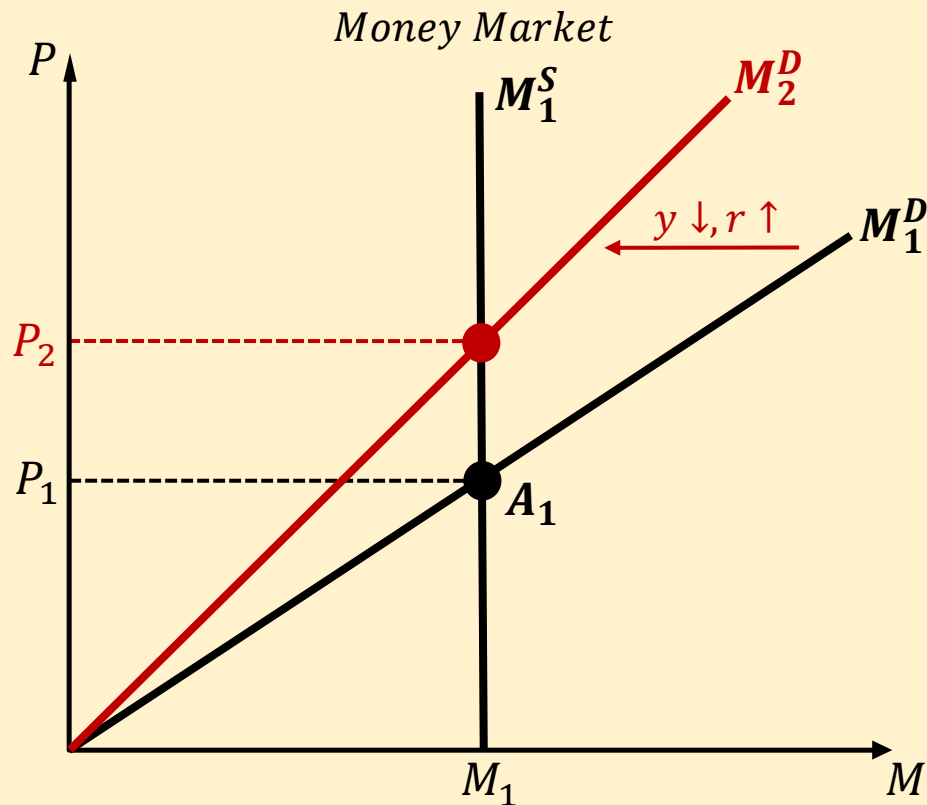
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Q1.c). Assume that the monetary authority **conducts monetary policy to stabilize the price level**. Determine the effects on money supply M and price level P .

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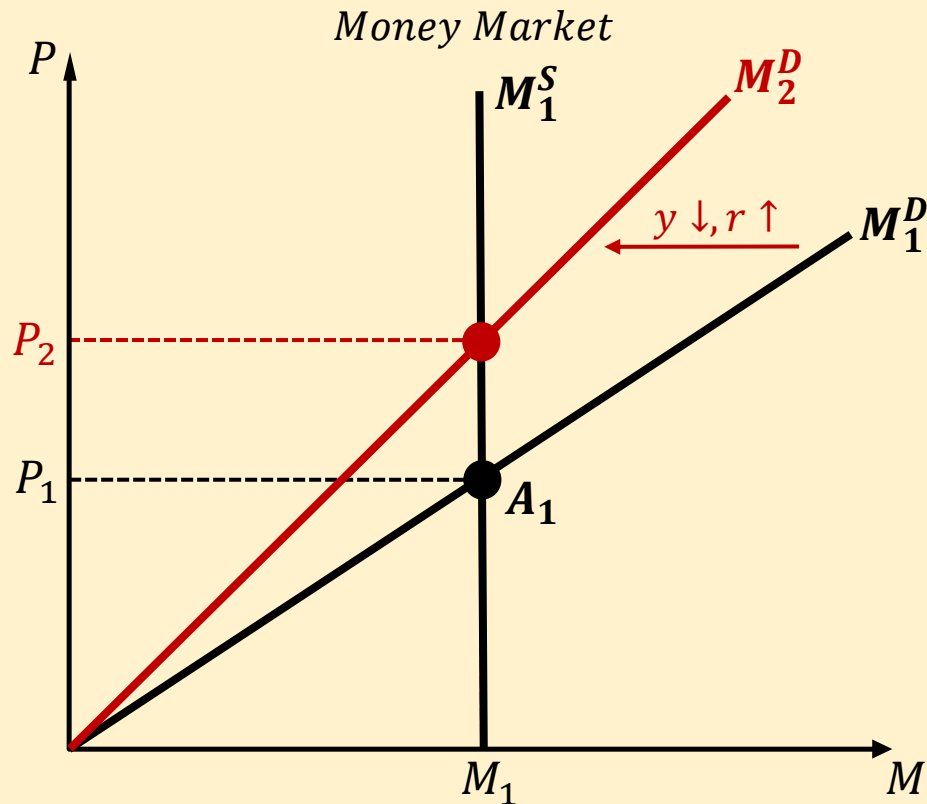
Due to the pandemic:

$$z \downarrow \longrightarrow \begin{cases} Y \downarrow \\ r \uparrow \end{cases} \longrightarrow M^D \downarrow \longrightarrow P \uparrow (\text{inflation})$$

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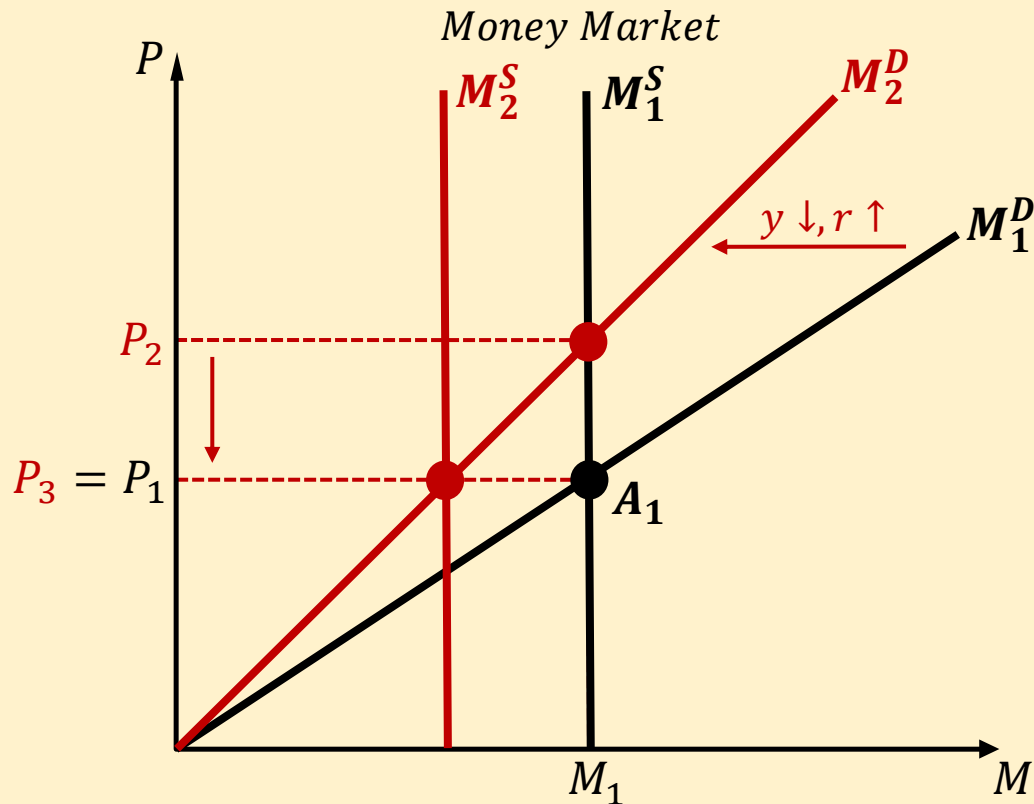
To stabilize the price level, the central bank implements contractionary monetary policy:

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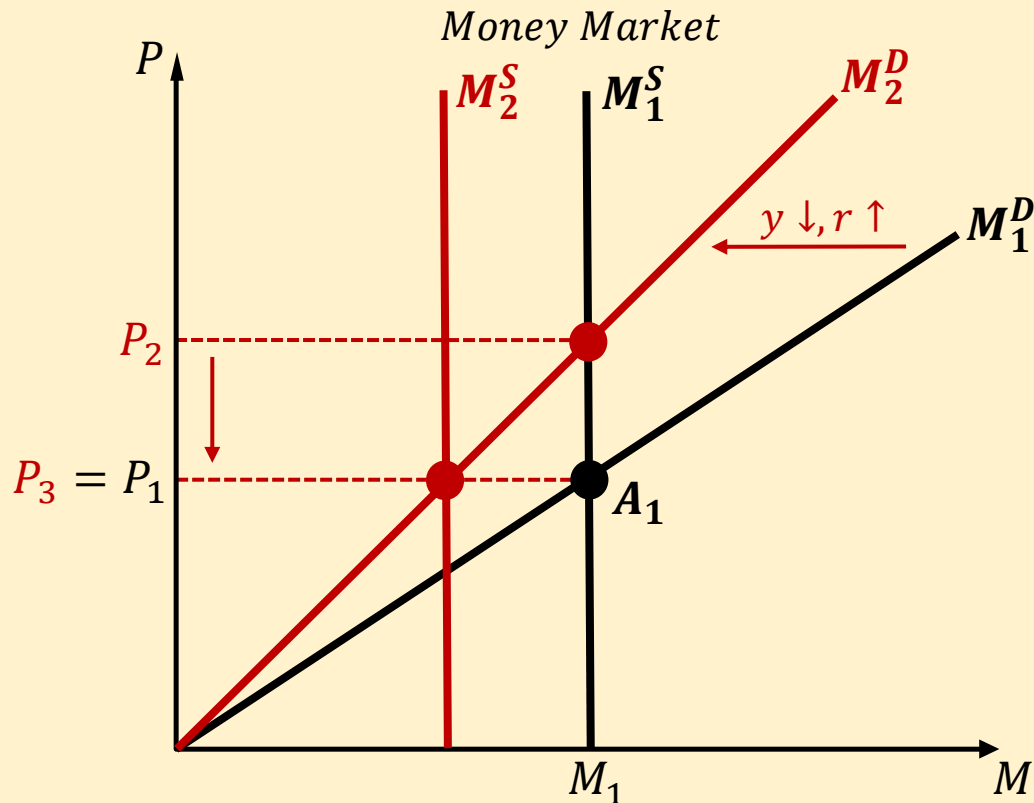
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To sum up, active monetary policy:

- **Goal:** Stabilize price level
- **Action:** In this scenario, $M^S \downarrow \longrightarrow$ Price level unchanged (returns to its original position)

THE INTERVENTION: PASSIVE MONETARY POLICY

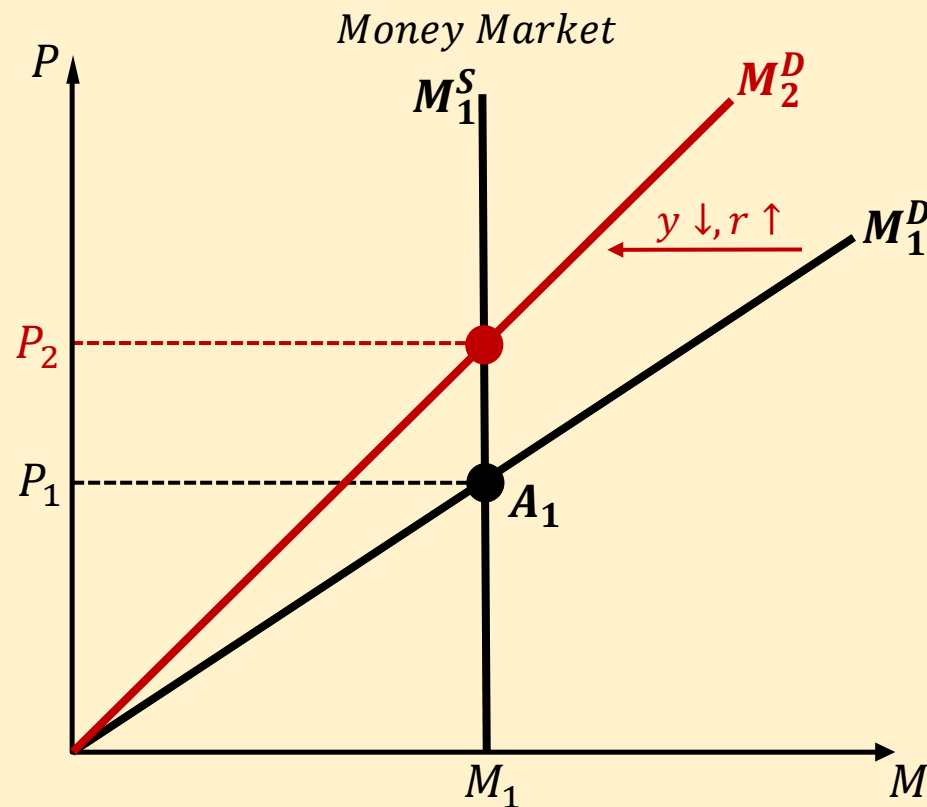
PROBLEM 1 (Covid-19 and Economic Policy)

Q1.d). Now we consider an alternative financing mechanism. We assume that **the fiscal authority issues new government bonds (B)** to finance the increase in government spending and **the monetary authority is forced to buy the government bonds**. Determine the effects on output Y , employment N and price level P in the current period.

PROBLEM 1 (Covid-19 and Economic Policy)

Q1.d). Assume **active fiscal authority** and **passive monetary authority (Fiscal Dominance)**. Determine the effects on output Y , employment N and price level P in the current period.

From Q1.a).



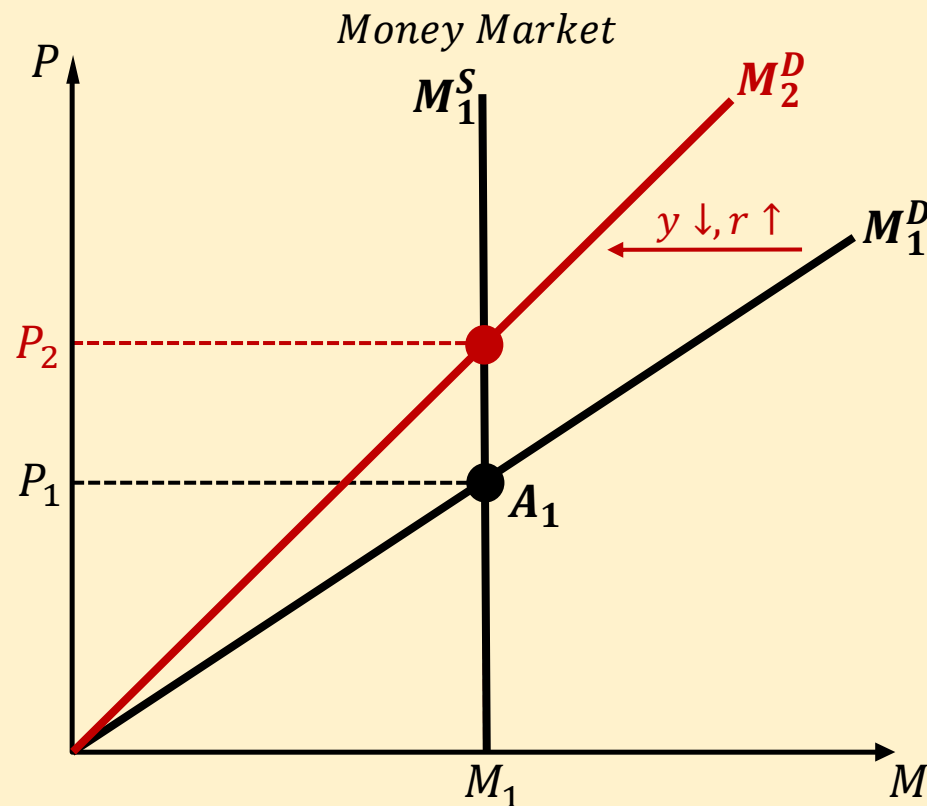
- Due to the pandemic:

$$z \downarrow \longrightarrow \begin{cases} Y \downarrow \\ r \uparrow \end{cases} \longrightarrow M^D \downarrow \longrightarrow P \uparrow (\text{inflation})$$

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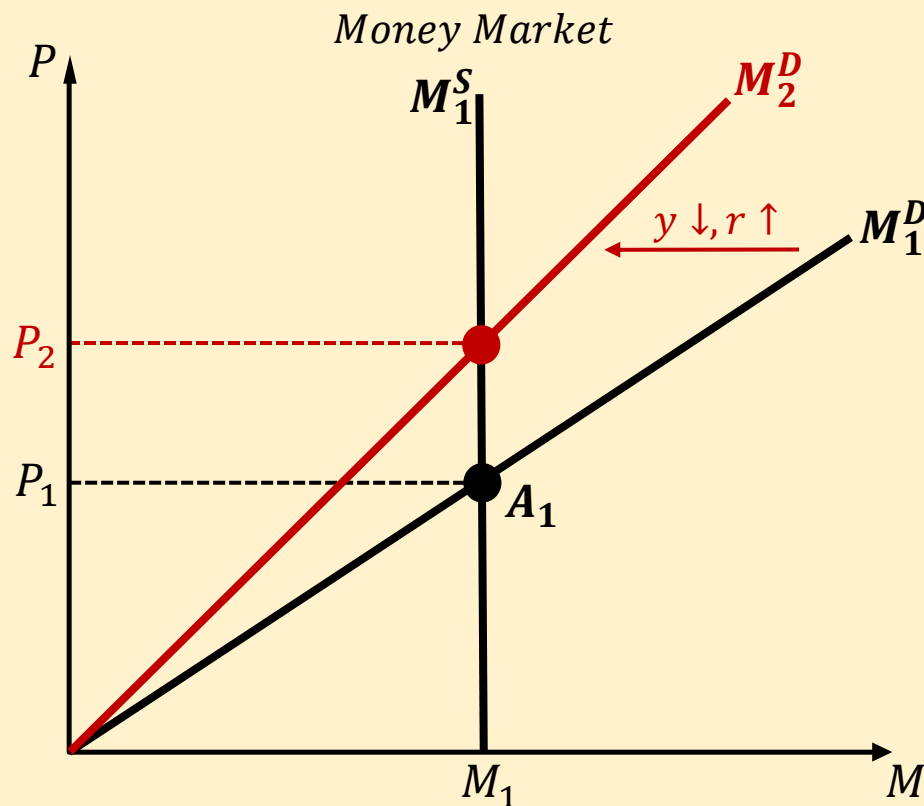
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- **Active fiscal policy:** $\uparrow G$ to stabilize $Y \longrightarrow$ mitigate the adverse effects. As in Q.2.b, $Y \uparrow, N \uparrow$ due to the fiscal expansion.

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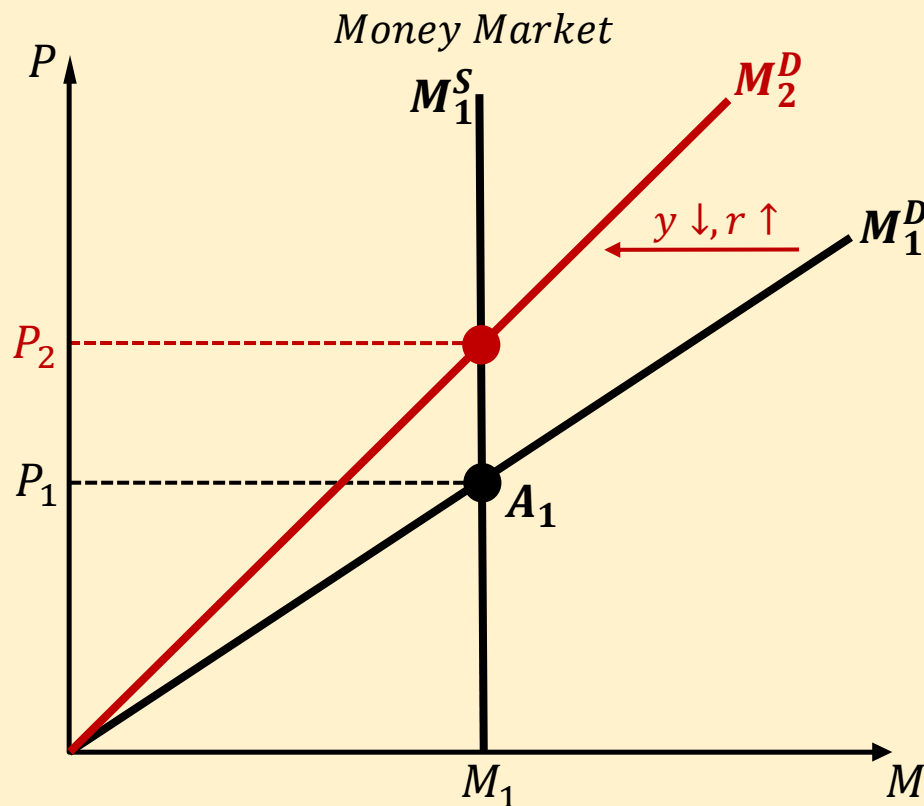
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- The expansionary fiscal policy (in particular, the deficit spending) is financed by the issuance of bonds (instead of tax), all of which are purchased by the (passive) monetary authority.

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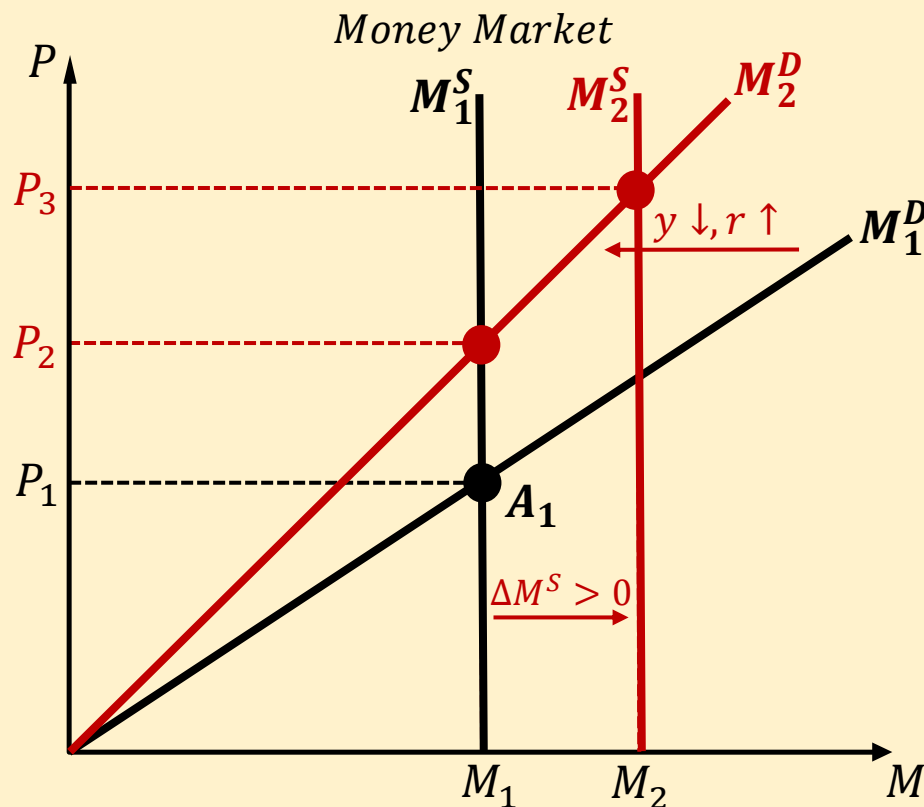
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$$G \uparrow \xrightarrow{\text{financed by}} M^S \uparrow \xrightarrow{\text{inflationary pressure}} P \uparrow (\text{more inflation})$$

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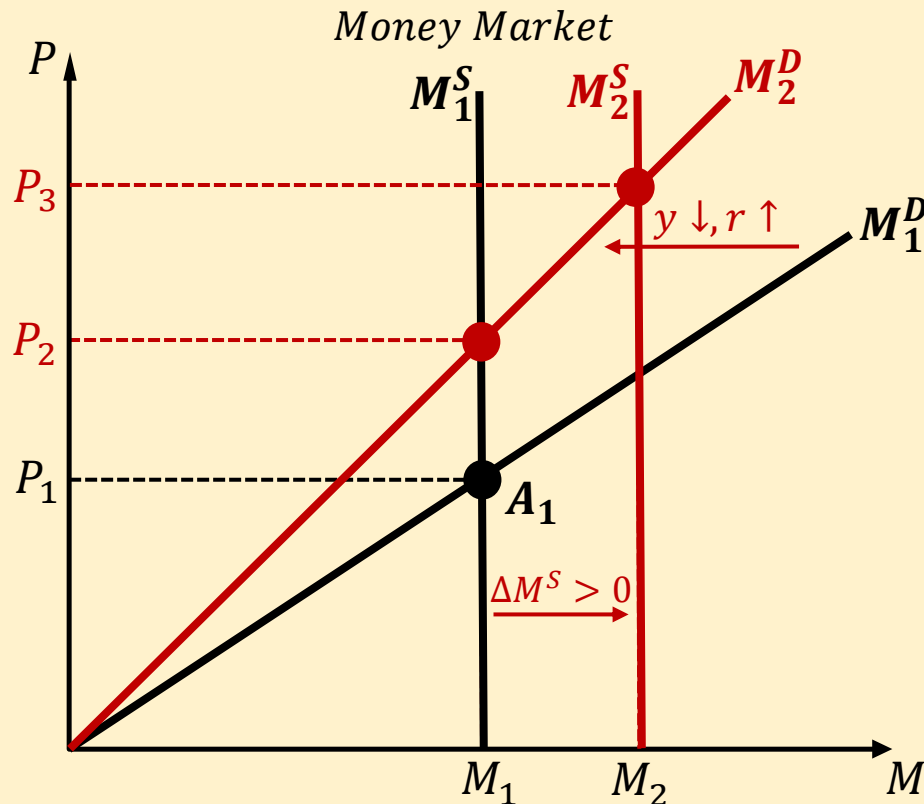
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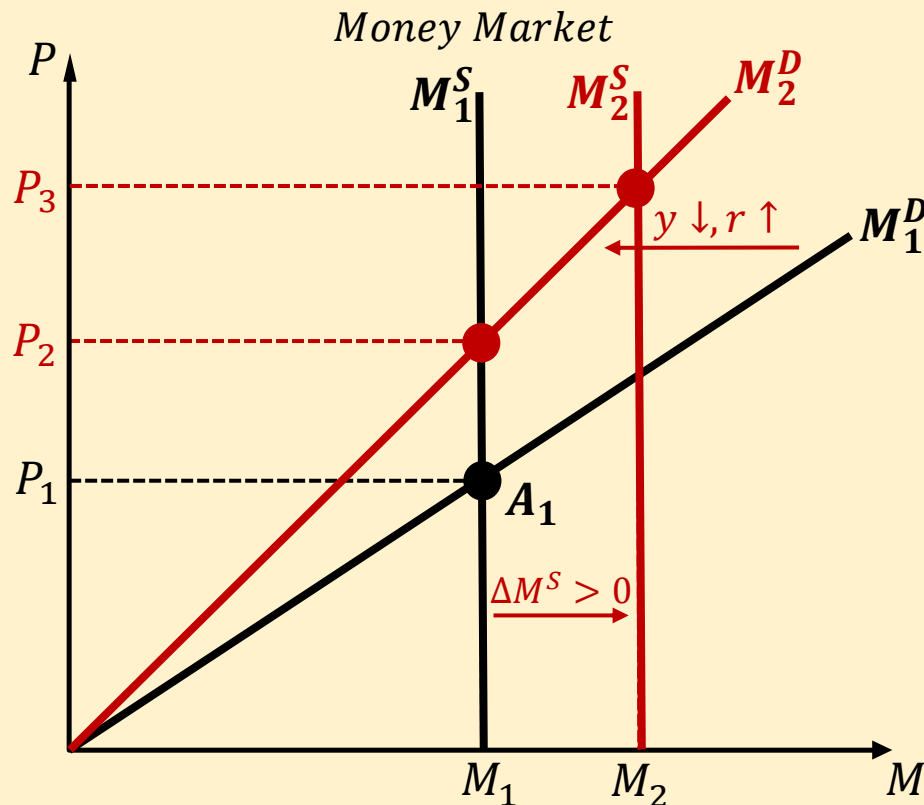
New money: $\Delta M = M_2 - M_1 \rightarrow$ use ΔM to buy ΔB to pay ΔG .

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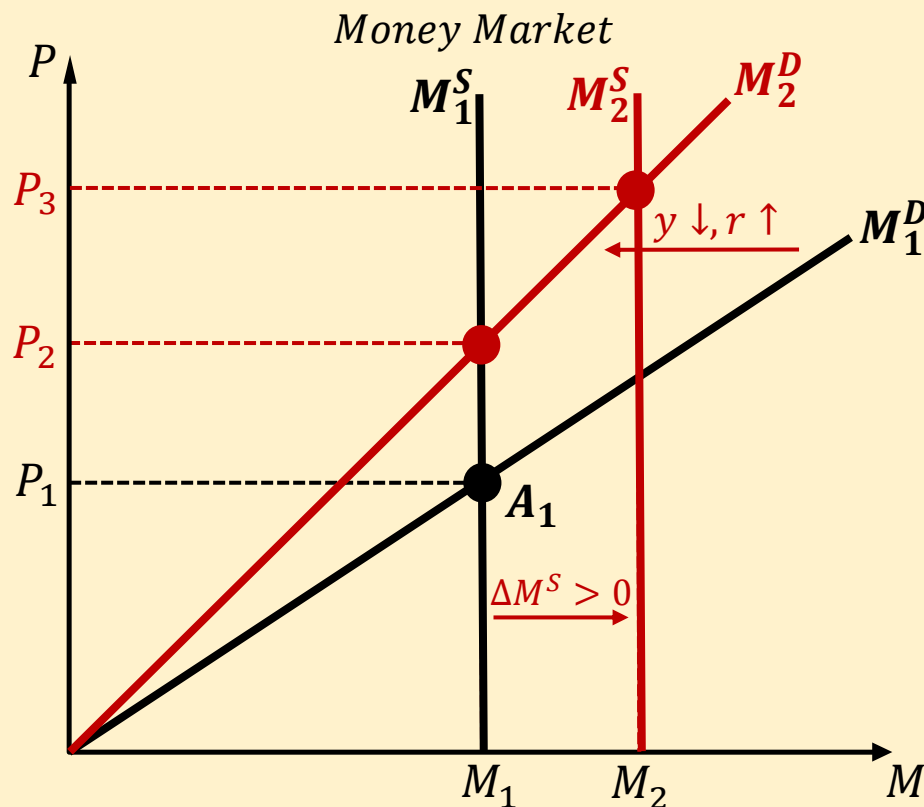
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- There is a **trade-off**: **Price level vs. Output**.

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- There is a **trade-off: Price level vs. Output**.
- The monetary authority (Central bank) **indirectly contributes to the stabilization of output** at the cost of further **de-stabilizing price level** in the process.