

# Monetary Policy

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# Outline

- 화폐수요곡선
- 이자율결정모형
- 중앙은행의 이자율결정
- 통화정책의 단기/장기영향
- 저축 투자지출 항등식에 대한 재검토

# Money Demand

# Opportunity Cost of Holding Money

- 화폐의 명목수익률 = 0%
  - 실질수익률은 인플레이션에 따라 달라짐
- 비화폐 자산에는 각기 나름의 수익률( $>0$ )이 있음
- 인플레이션의 존재: 화폐가치를 부식시킴
- 그런데도 왜 사람들은 화폐를 보유하려 하는가?

# Various Interest Rates

**TABLE 14-1**

## **Selected Interest Rates**

	May 2004	March 2005
Federal funds rate	1.00%	2.63%
One-month Treasury bill	0.91	2.36
Interest-bearing checkable bank deposits*	0.54	1.05
Currency	0.00	0.00
Treasury bill rate minus rate on deposits	0.37	1.31
Treasury bill rate minus rate on currency	0.91	2.36

\*Average on all zero-maturity deposits (deposits that can be withdrawn at any time)

Source: Federal Reserve Bank of St. Louis.

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Source: Federal Reserve Bank of St. Louis.

# Benefits of Holding Money

- 지불수단으로써 화폐는 가장 높은 유동성을 제공:  
가장 확실한 지불수단
- 신용카드, 체크카드, 여타 다른 지불 수단들과 비교할 때, 화폐는 지불할 수 있는 범위가 가장 넓음
- 화폐를 가지고 있으면 거래비용이 감소하기 때문에  
누구나 얼마 정도의 화폐는 가지고 있음

# Money Demand

- 화폐수요에 영향을 주는 요인들
  - 이자율: 기회비용
  - 화폐의 상대적 편리성: 거래비용
- 우리는 분석의 편의상 거래비용적 측면은 무시하고 기회비용적 측면에 집중함.



# Money Demand Curve

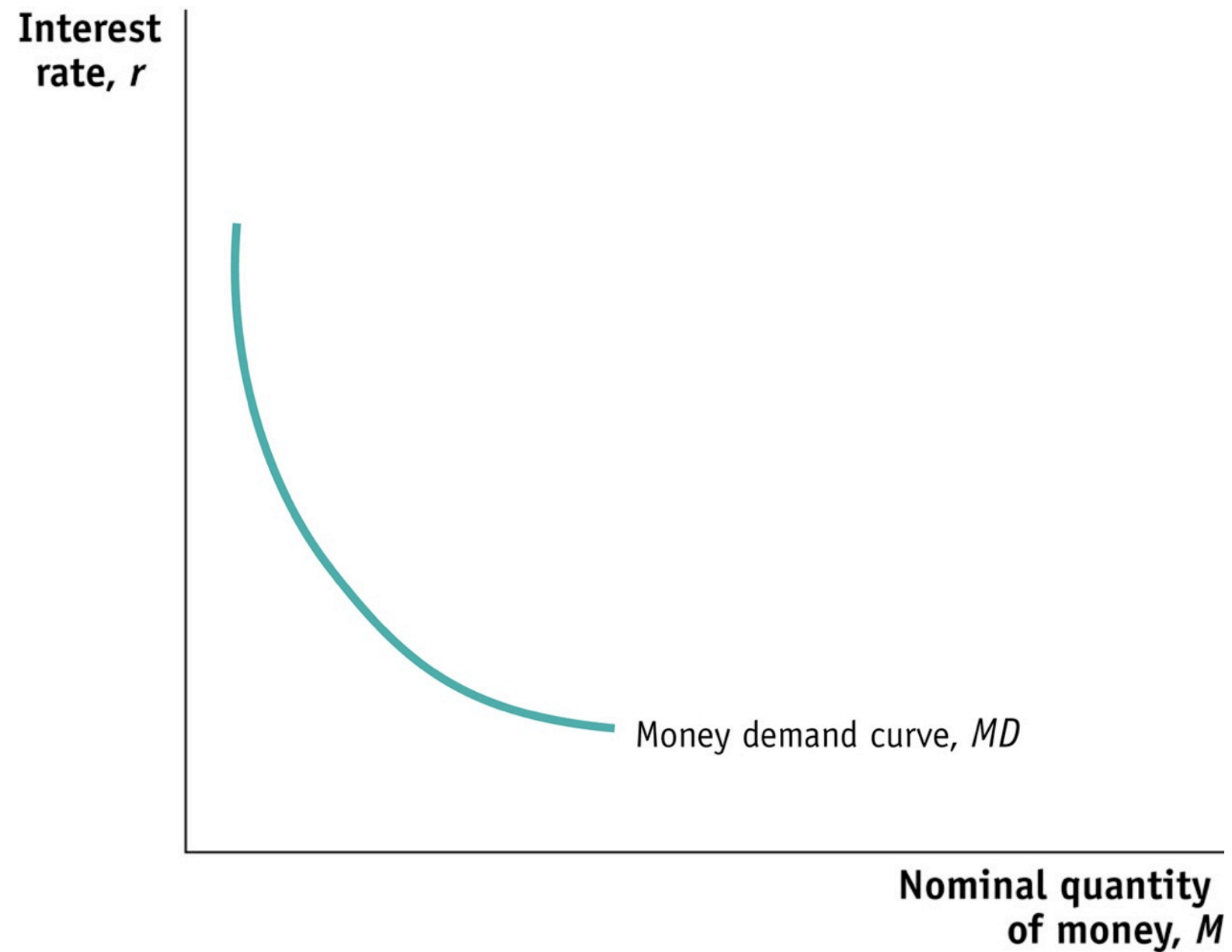
- 이자율(세로축)과 화폐수요량(가로축)의 관계를 그래프로 표현한 것.
- 이자율이 높다면: 더 많은 화폐를 소비하는 대신 투자하려 할 것이므로 화폐수요량은 감소함: 음(-)의 관계

# MD curve

Interest  
rate,  $r$

Nominal quantity  
of money,  $M$

# MD curve



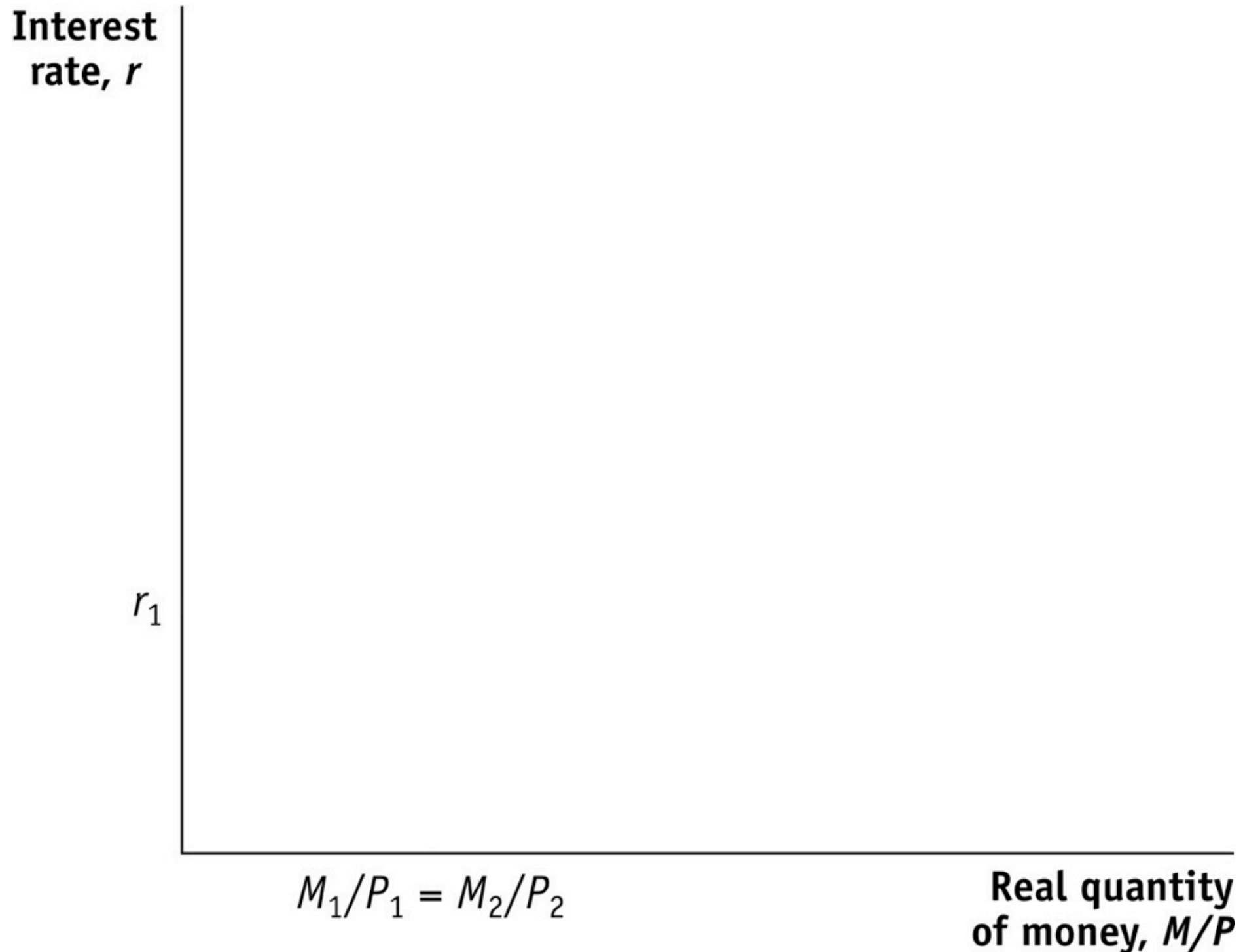
# 실질통화량

## Real Quantity of Money

- 실질통화량=[M:명목통화량]/[P:물가수준]
- M/P는 인플레이션으로 인한 구매력침식요인을 제거함
- 물가변화는 이론적으로는 화폐수요에 비례적 영향만을 미침: 물가변화만으로는 실질통화수요는 변하지 않음
- 따라서 화폐수요는 실질화폐수요를 봐야함

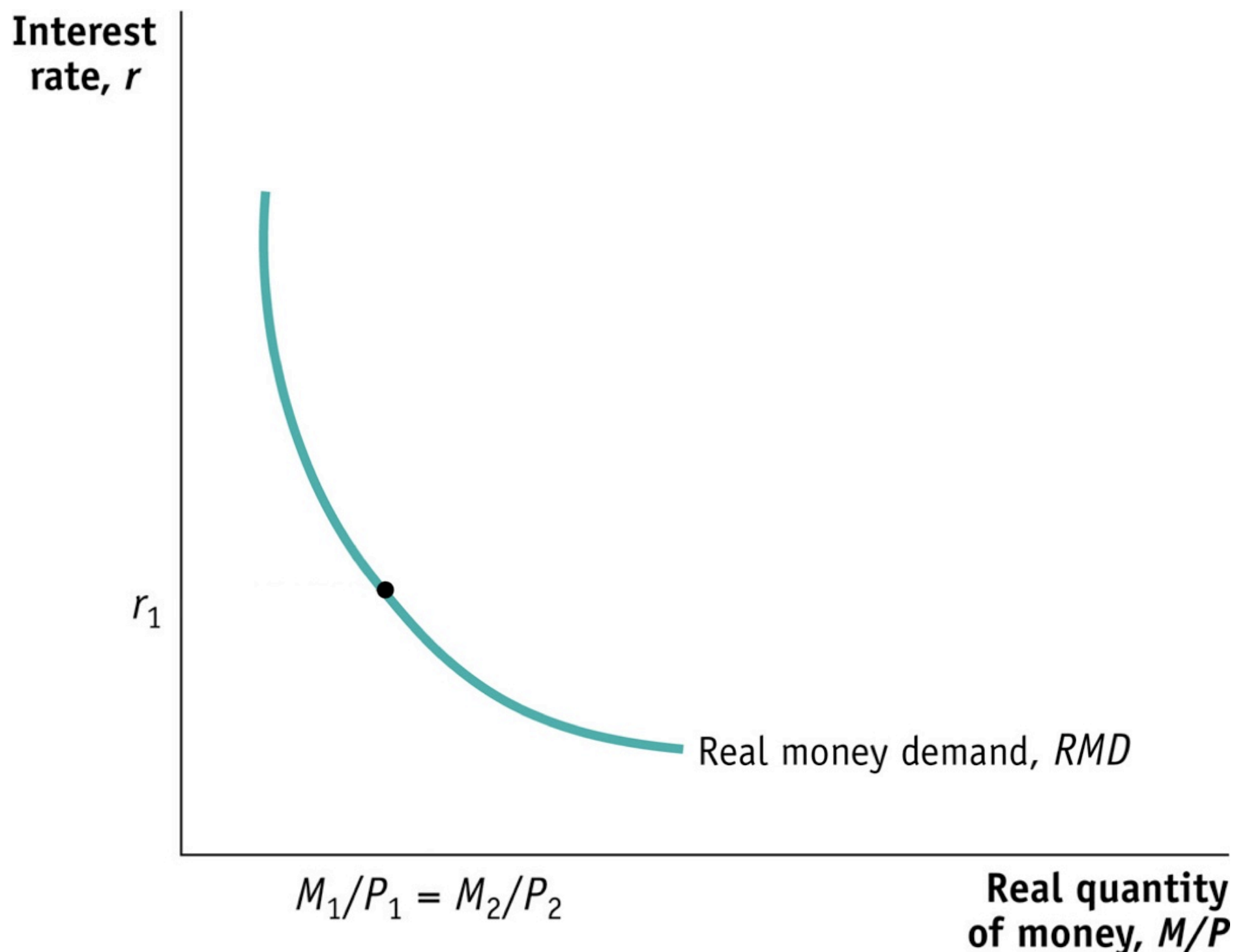
# 실질 화폐수요곡선

RMD: Real Money Demand Curve



# 실질 화폐수요곡선

RMD: Real Money Demand Curve



# Sources of Change in RMDC

- 총지출의 변화
- 기술의 변화
- 제도변화

# Changes in Total Expenditure (=rGDP)

- 실질 총지출이 증가하면: 거래를 위한 화폐 수요가 증가함
- 화폐수요곡선은 오른쪽으로 이동



# Changes in Credit Markets and Banking Technology

- 지불/결제 시스템이 편리해지면, 가지고 있어야 할 화폐량이 줄어들게 됨:
- RMDC는 왼쪽으로 이동

# Others: Changes in Institutions, etc.

- 자유저축예금에 대한 이자지급 등도 화폐보유에 영향을 끼침
- 치안 등도 간접적으로 영향을 미칠 수 있음
  - 치안상태가 좋지 않을 경우: 위험(도난, 강도) 회피를 위해 화폐보유 최소화

# 화폐의 유통속도

## Velocity of Money

# Velocity of Money

- $V = PY/M$ 
  - V: Velocity of Money
  - P: Price Level
  - Y: rGDP
  - M: Quantity of Nominal Money
- $MV = PY$  : Quantity Equation of Money

# Meaning of V

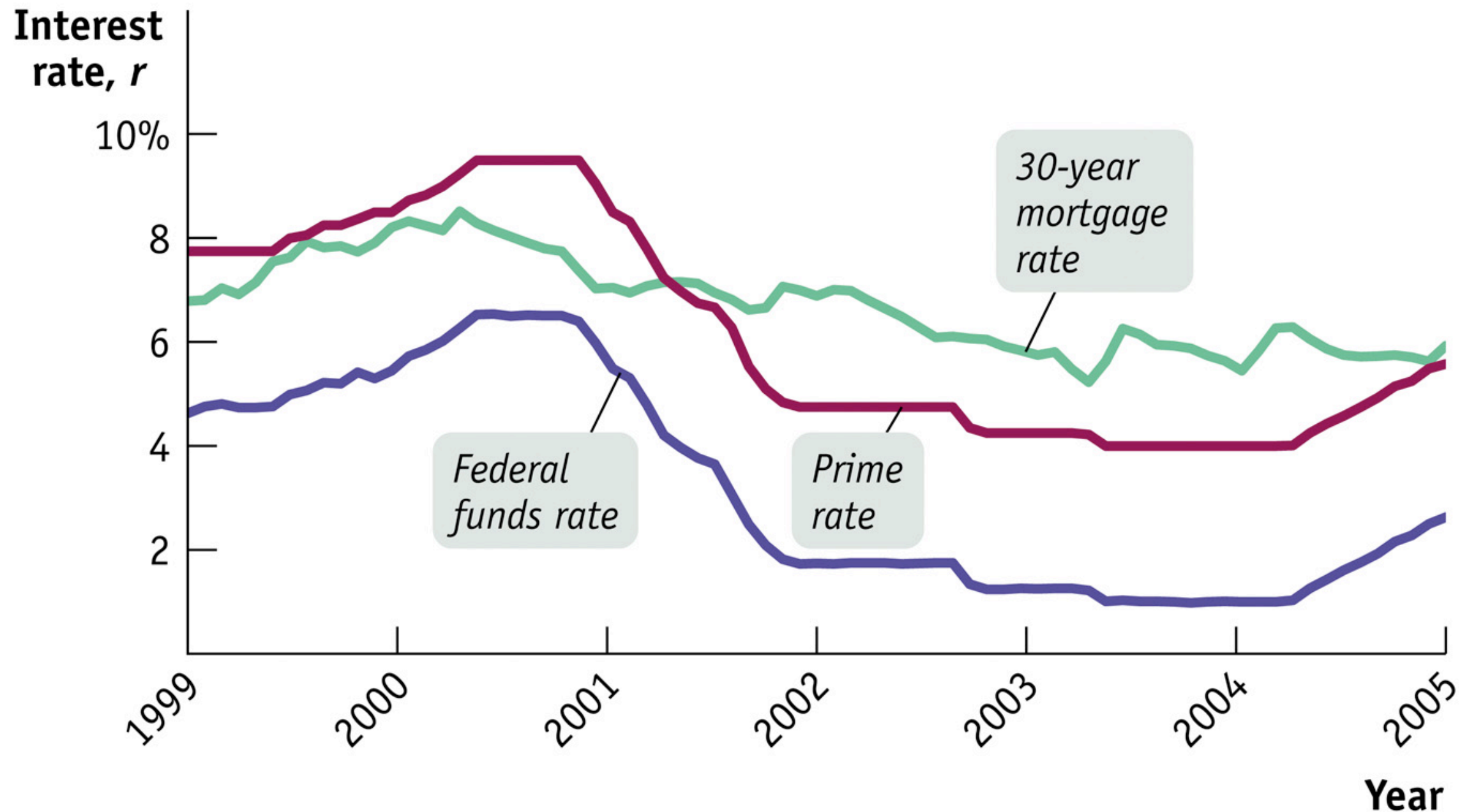
- 화폐가 단위기간(예: 년)에 지불되는 빈도수
- V가 높다: 그 경제는 화폐가 지불되는 빈도수가 높다는 것을 의미
- V가 높은 경제는 적은 화폐로 많은 통화를 대변할 수 있음
- $M/P = 1/V * Y$ : 이자율은 RMD에 V의 변화로 반영됨 -- 나중에 다룸

# Money and Interest Rates

# Call rate and Short Run Interest rate

- 직접규제  $\Rightarrow$  콜금리설정  $\Rightarrow$  RP금리 설정
- 콜금리: 금융기관 사이의 초단기 금융거래(보통 하루)인 콜시장에서 거래되는 이자율
- 2008년 3월부터 정책목표금리를 콜금리에서 기준금리(7일짜리 환매조건부채권의 금리)로 바꿈
- 파급: 기준금리  $\Rightarrow$  단기금리  $\Rightarrow$  장기금리

# Base rate and Interest rates





# 이자율에 대한 유동성선호 모형 Liquidity Preference model of the Interest rate

- 단순화를 위해 이자율이 장단기 통틀어 한 가지만 존재한다고 가정
- 이자율은 화폐시장에서 화폐에 대한 수요/공급으로 결정된다는 모형
- MD: Money Demand: 민간부문에서 결정
- MS: Money Supply: 당국이 독점: 수직 공급곡선

# 화폐시장 균형

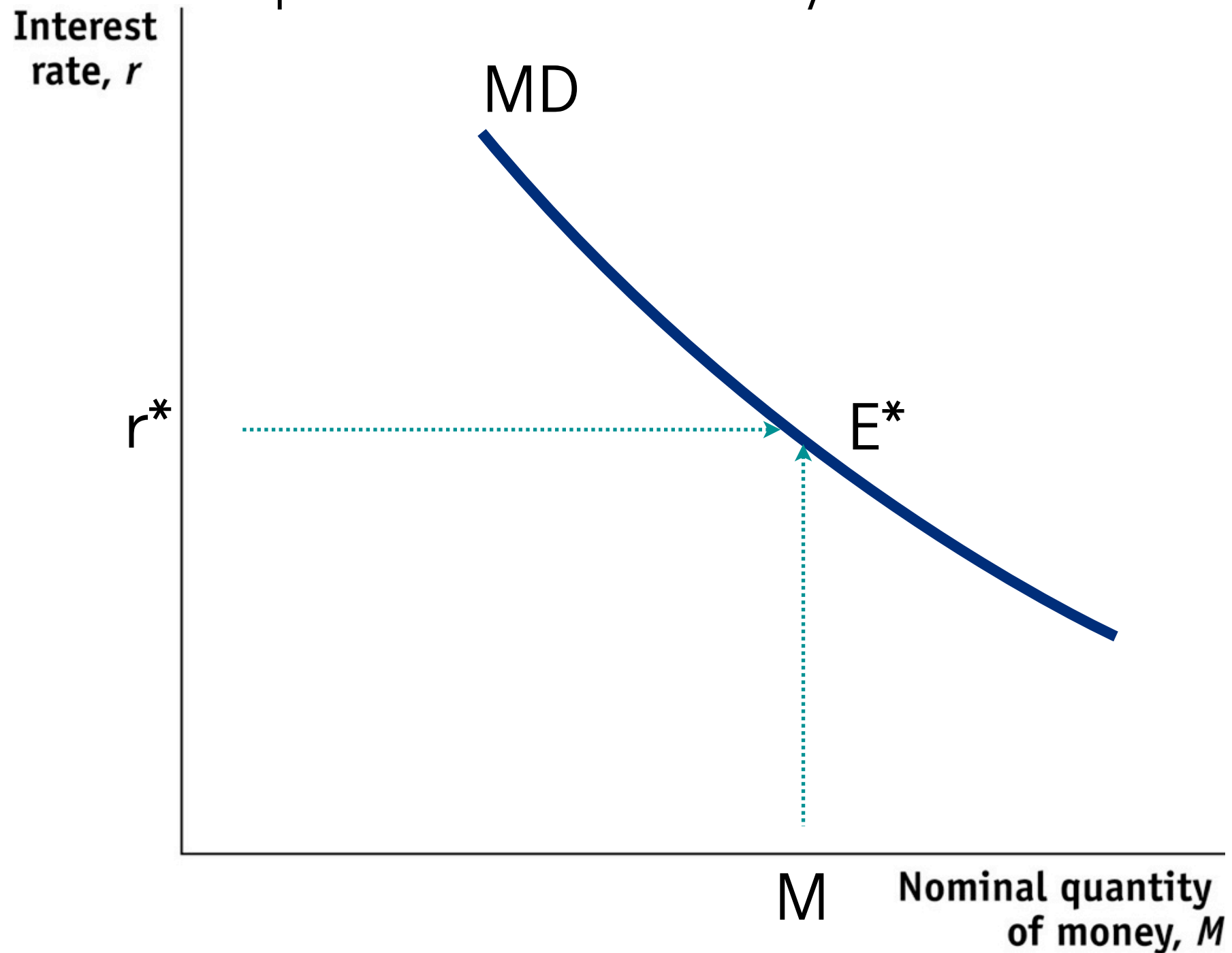
Equilibrium in the Money Market

Interest  
rate,  $r$

Nominal quantity  
of money,  $M$

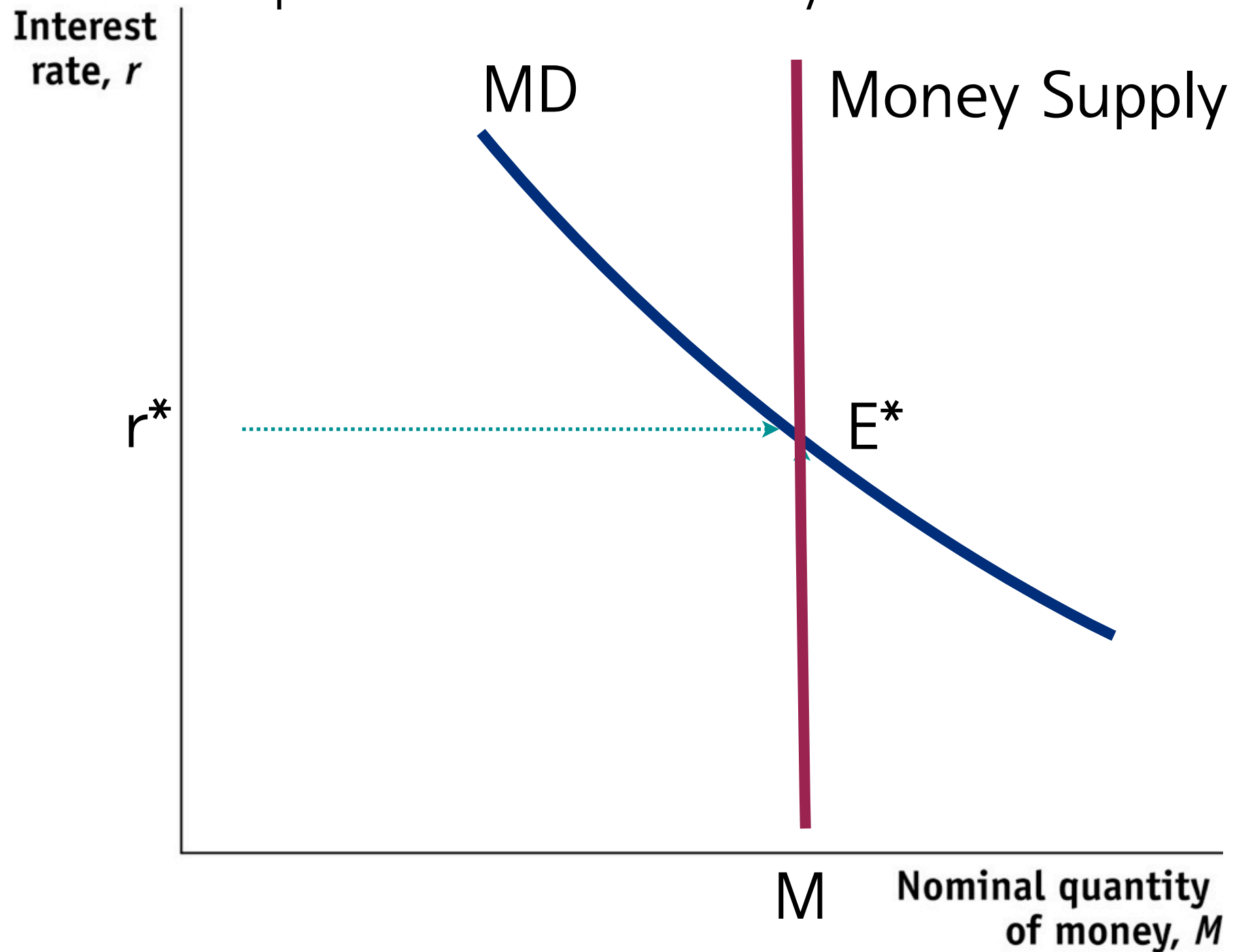
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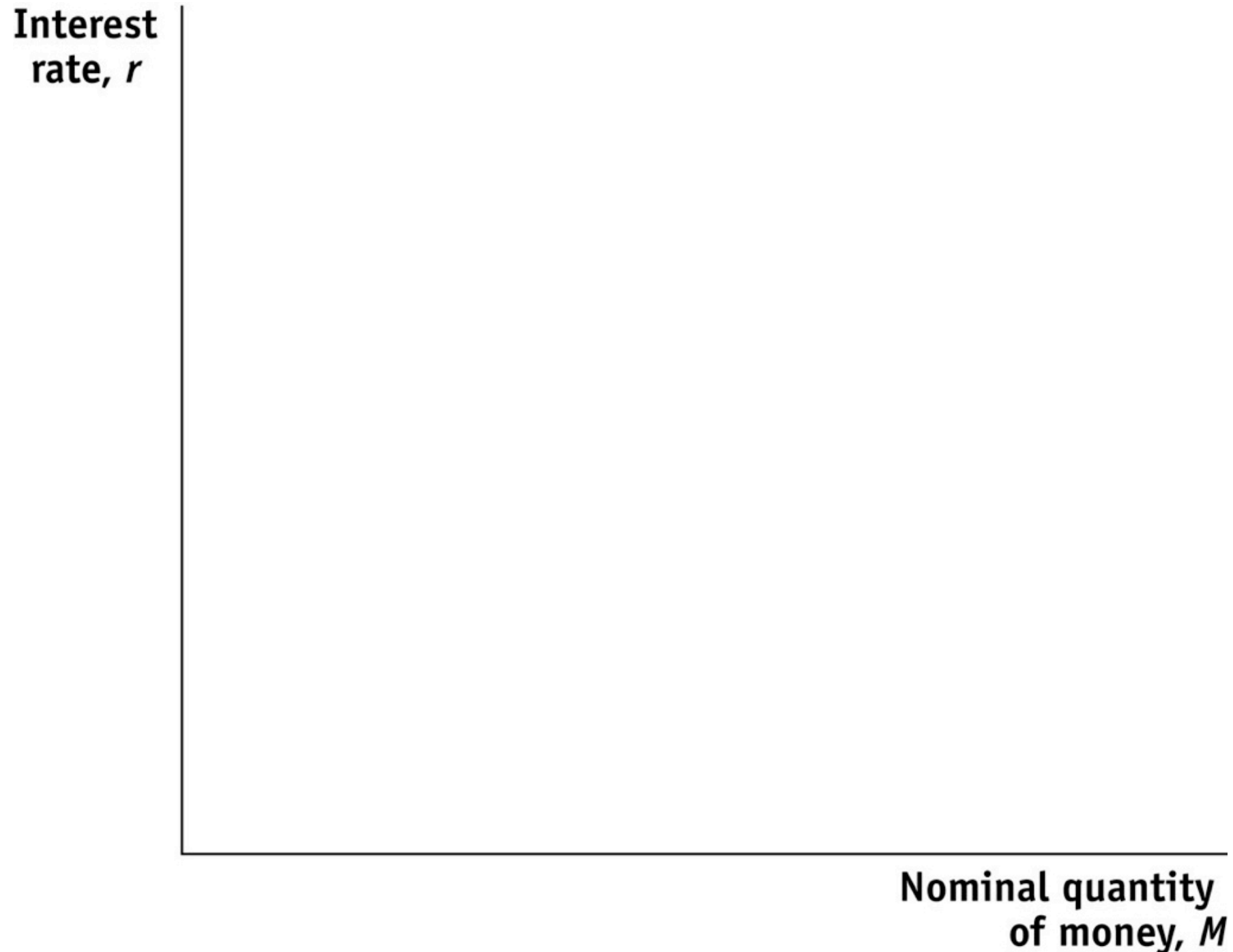


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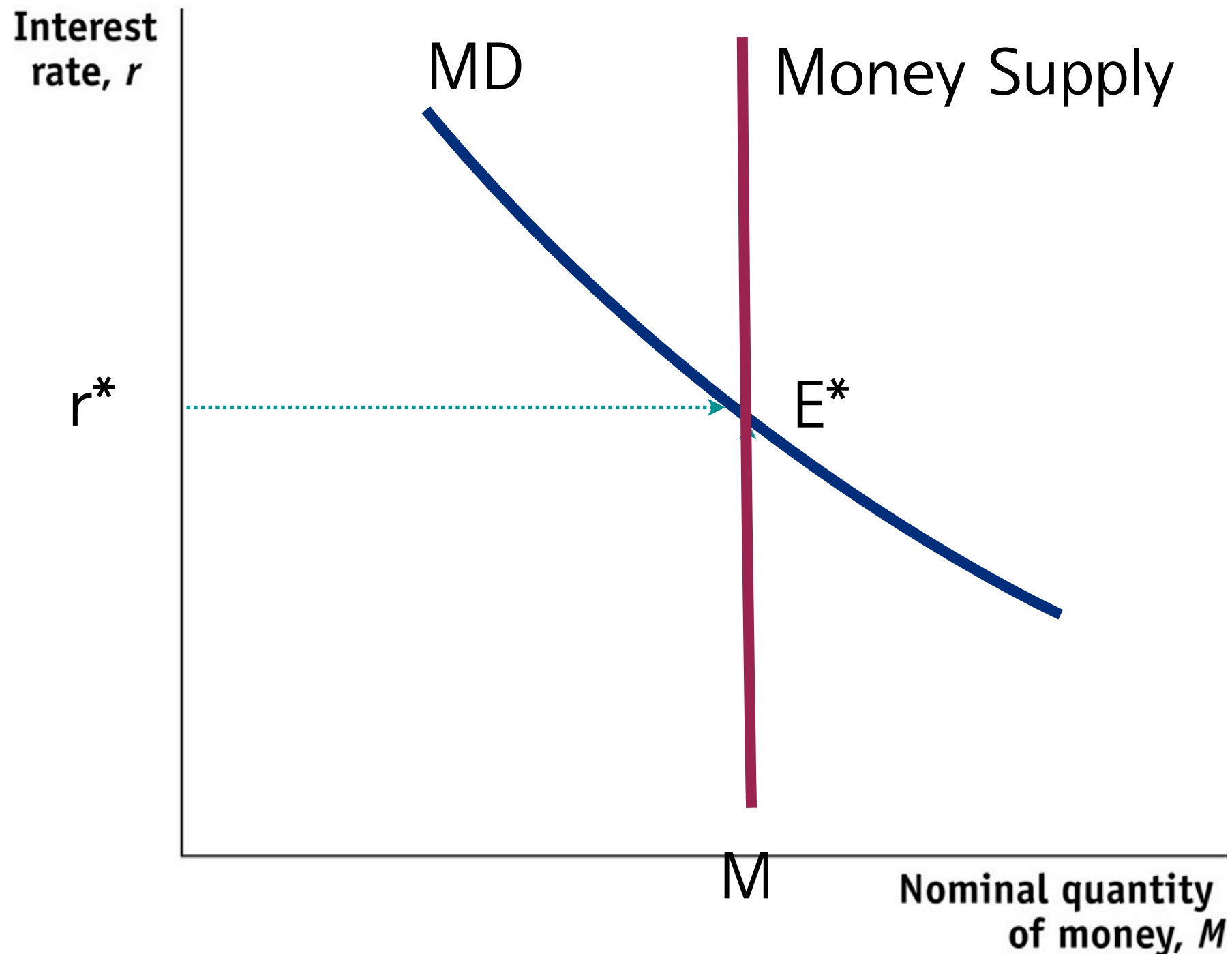
Equilibrium in the Money Market



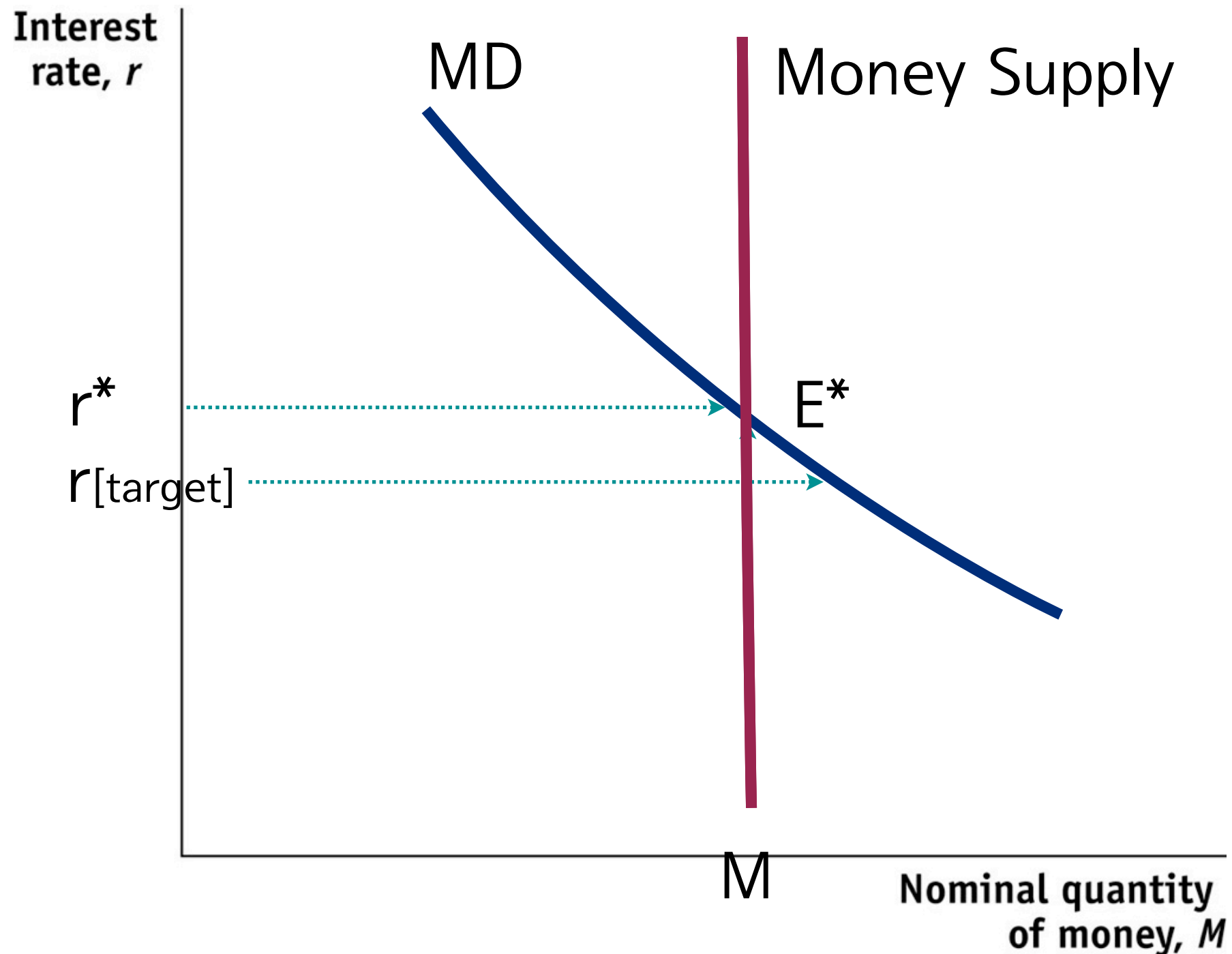
# Monetary Policy and Interest Rate



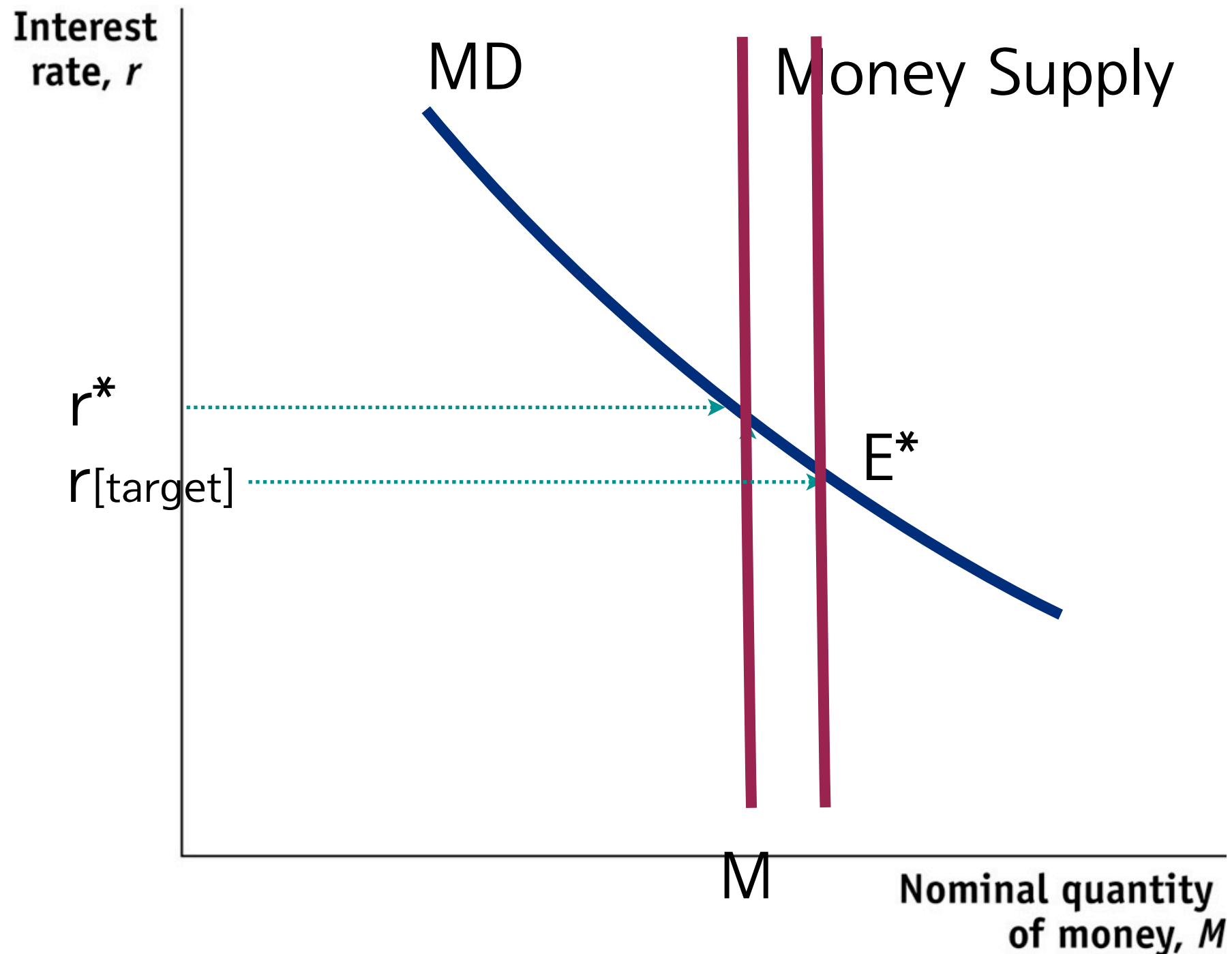
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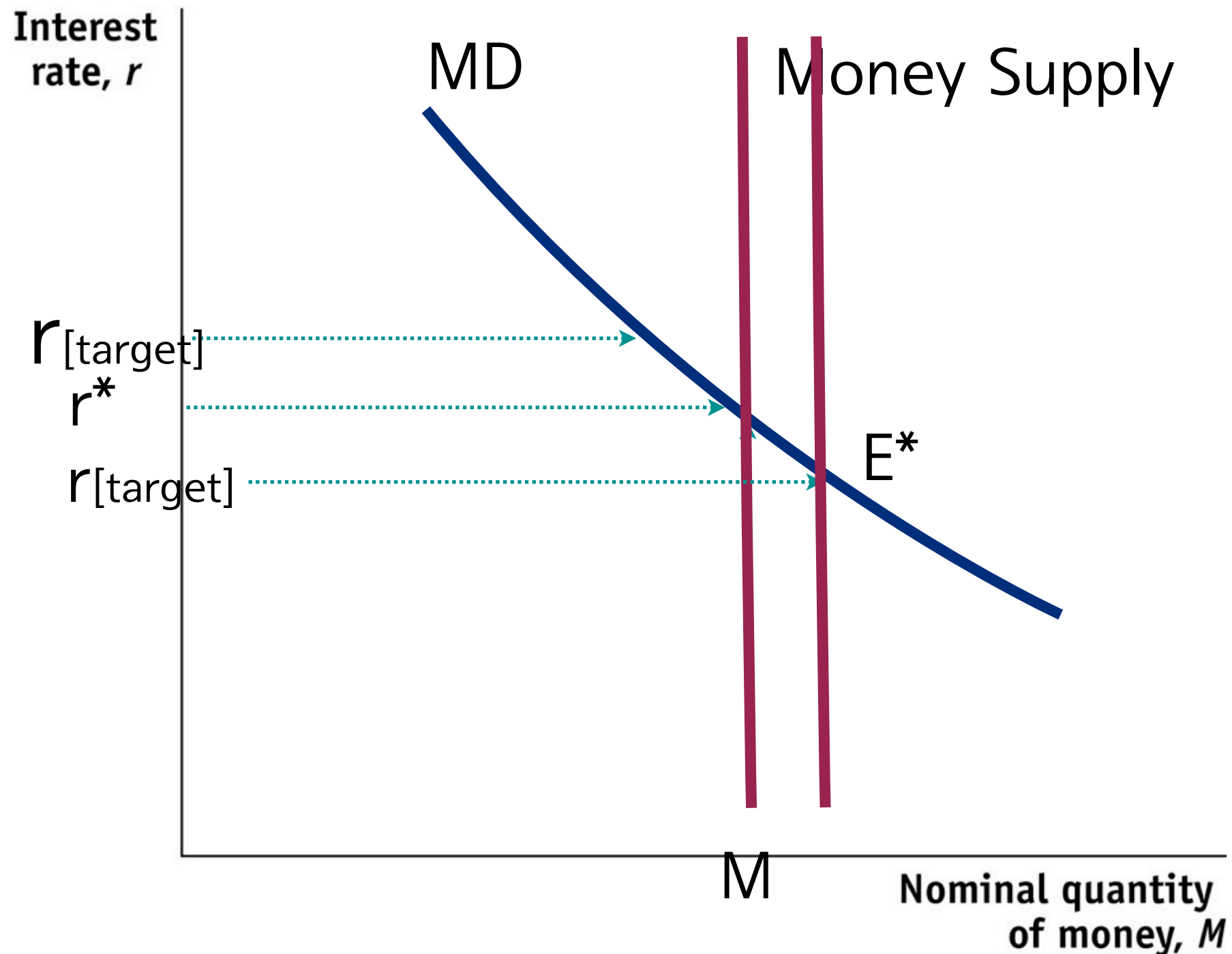


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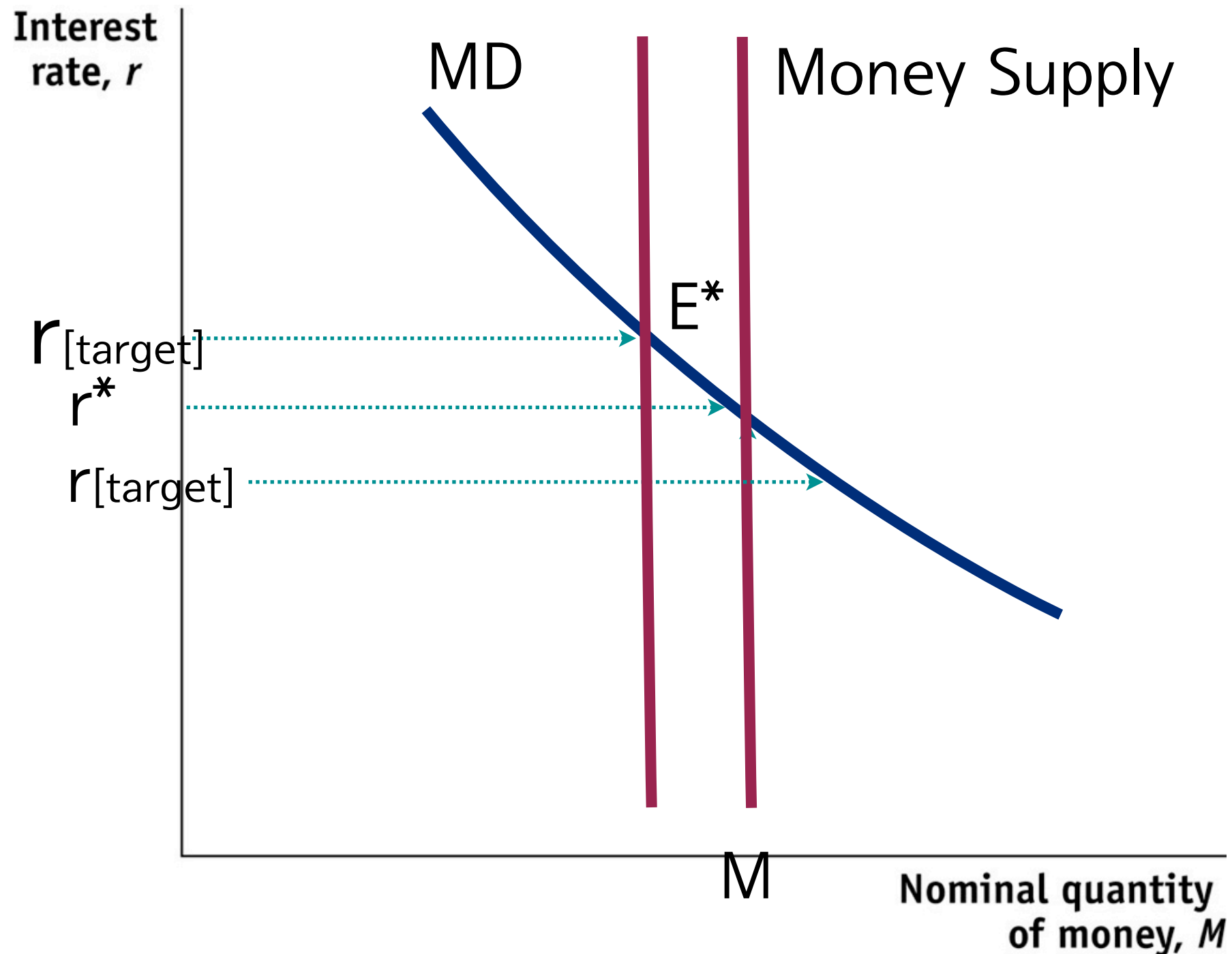




# Monetary Policy and Interest Rate



# Monetary Policy and Interest Rate



# How can CB control Money Supply?

- By Open Market Operation
  - 중앙은행의 국공채 매입: MS right shift
  - 중앙은행의 국공채 매각: MS left shift

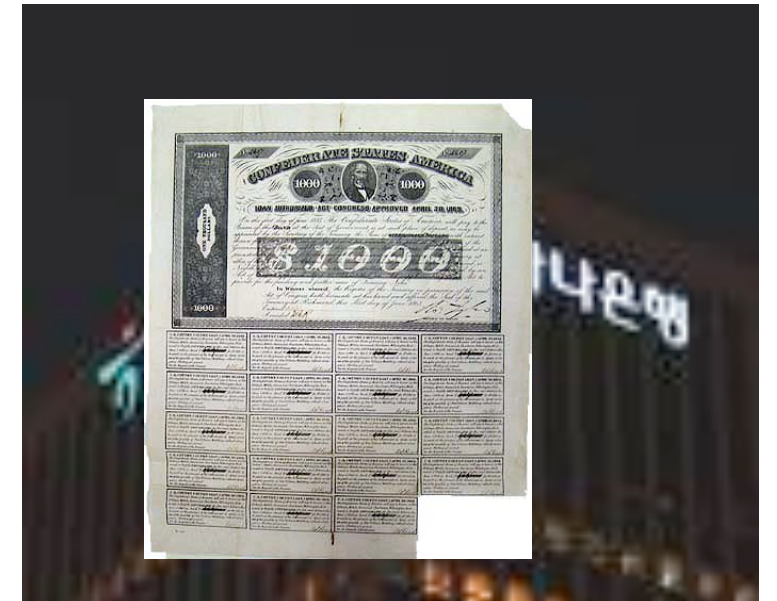
# Open Market Operation

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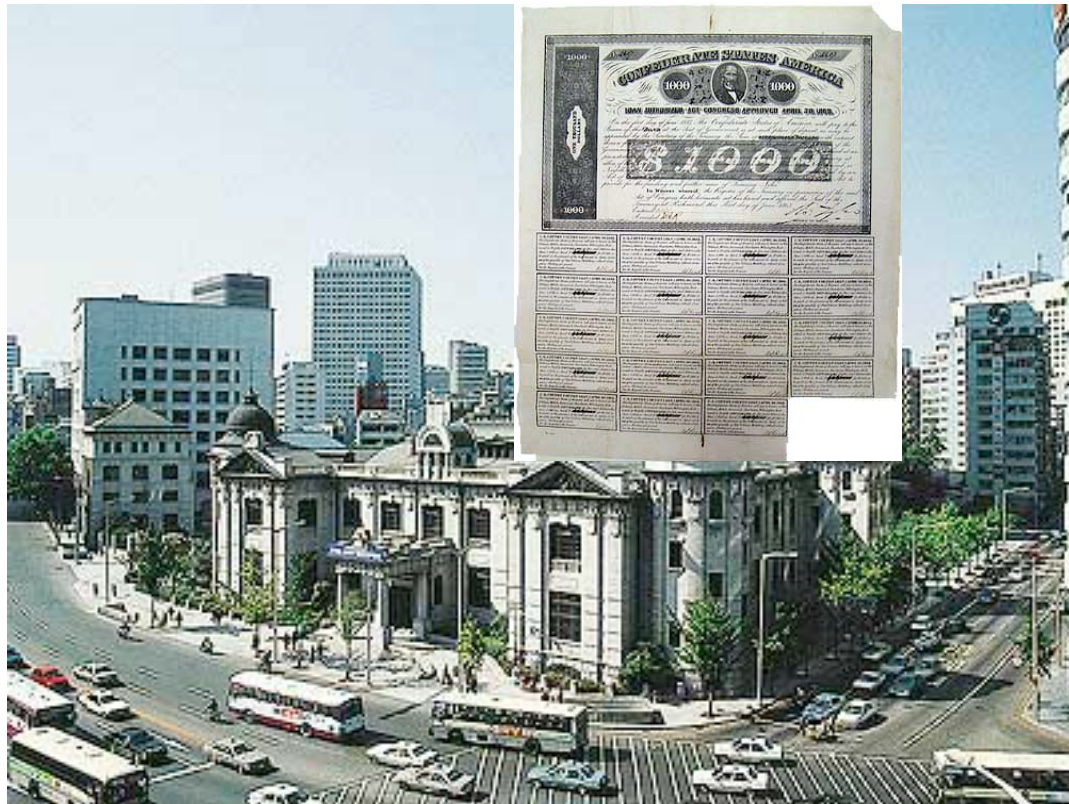


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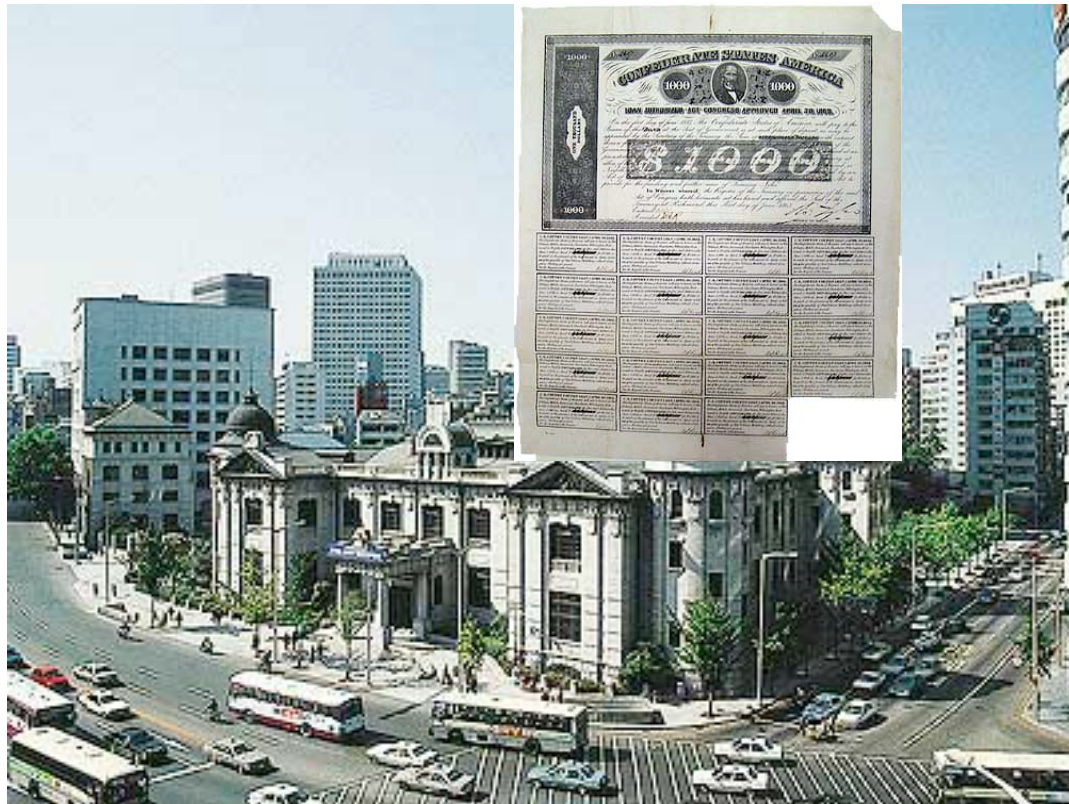


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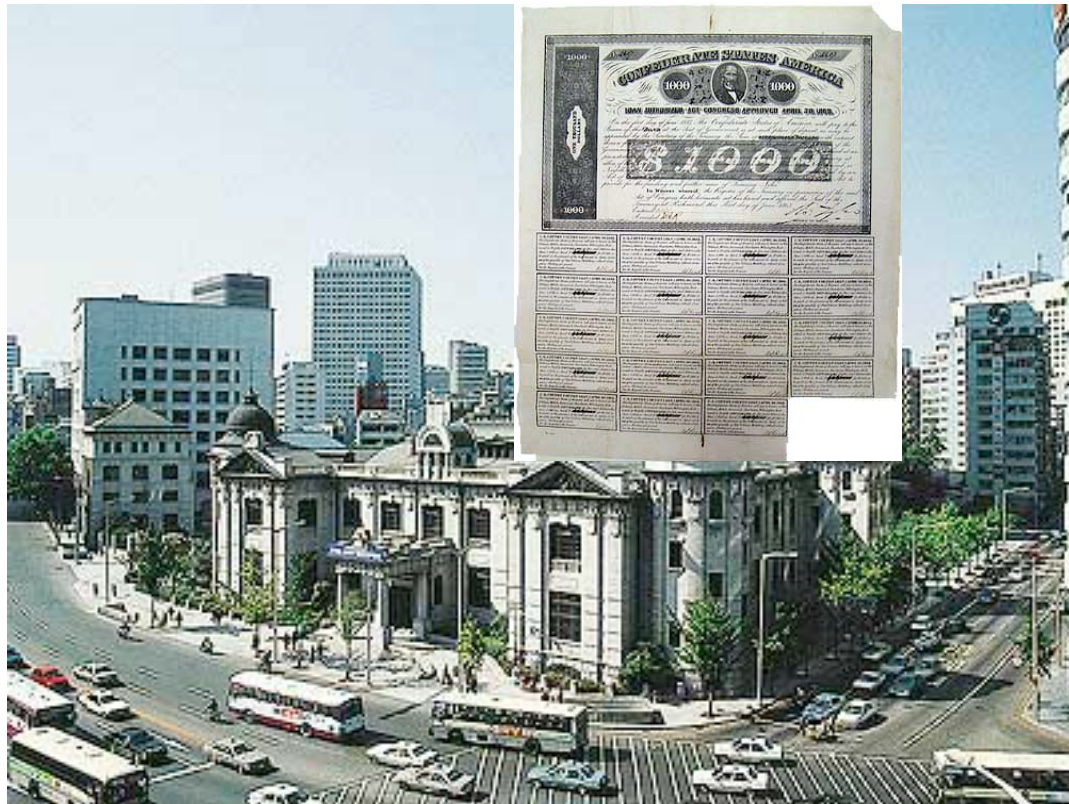


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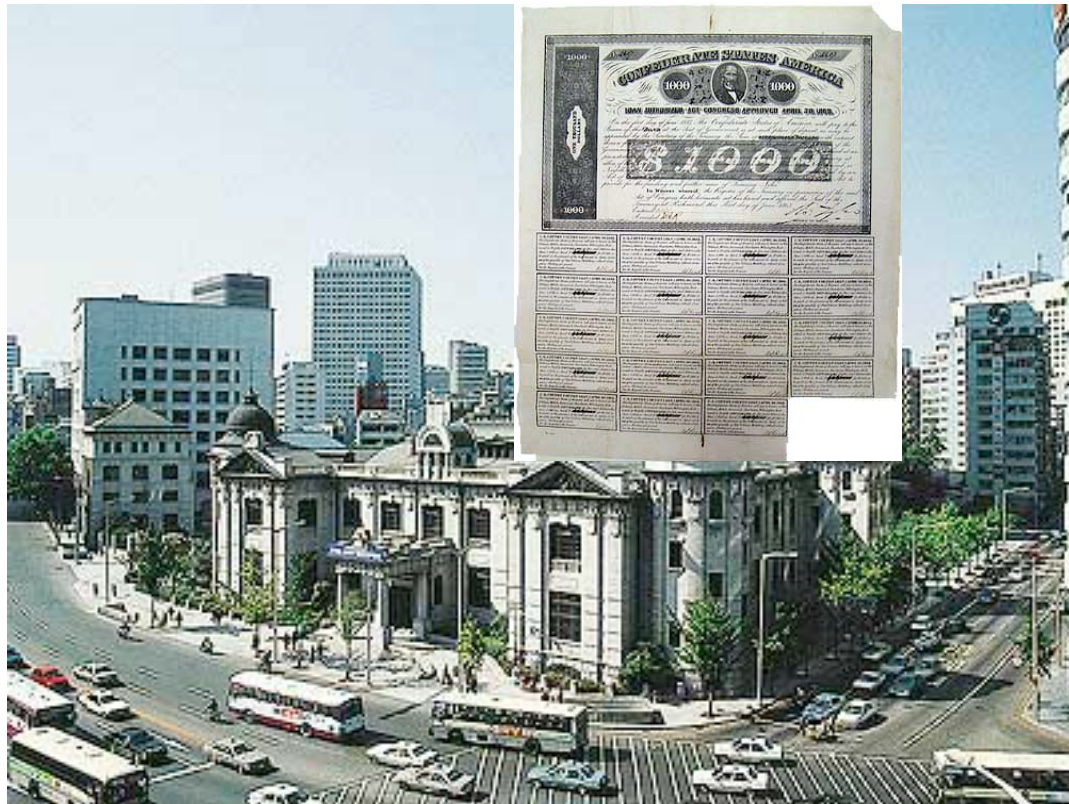


국공채 매입: 통화증가





# Open Market Operation

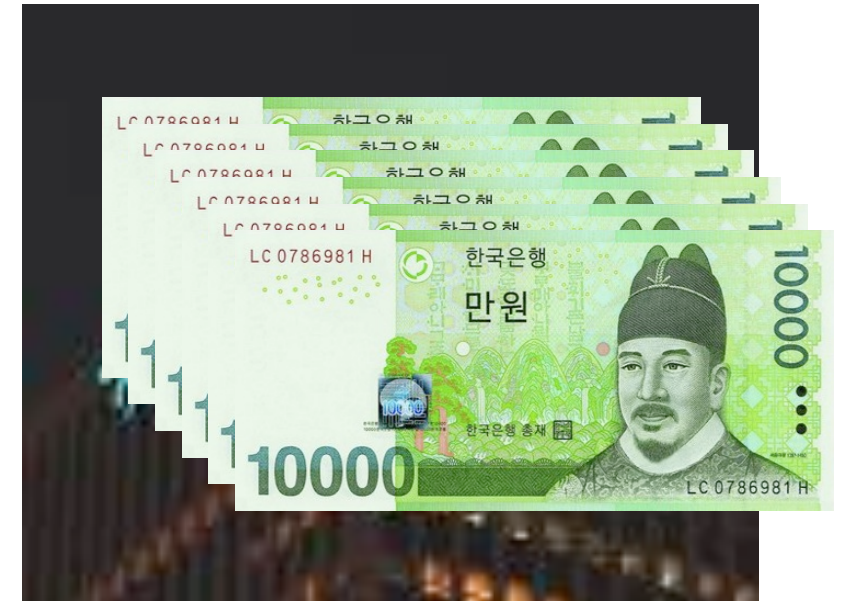
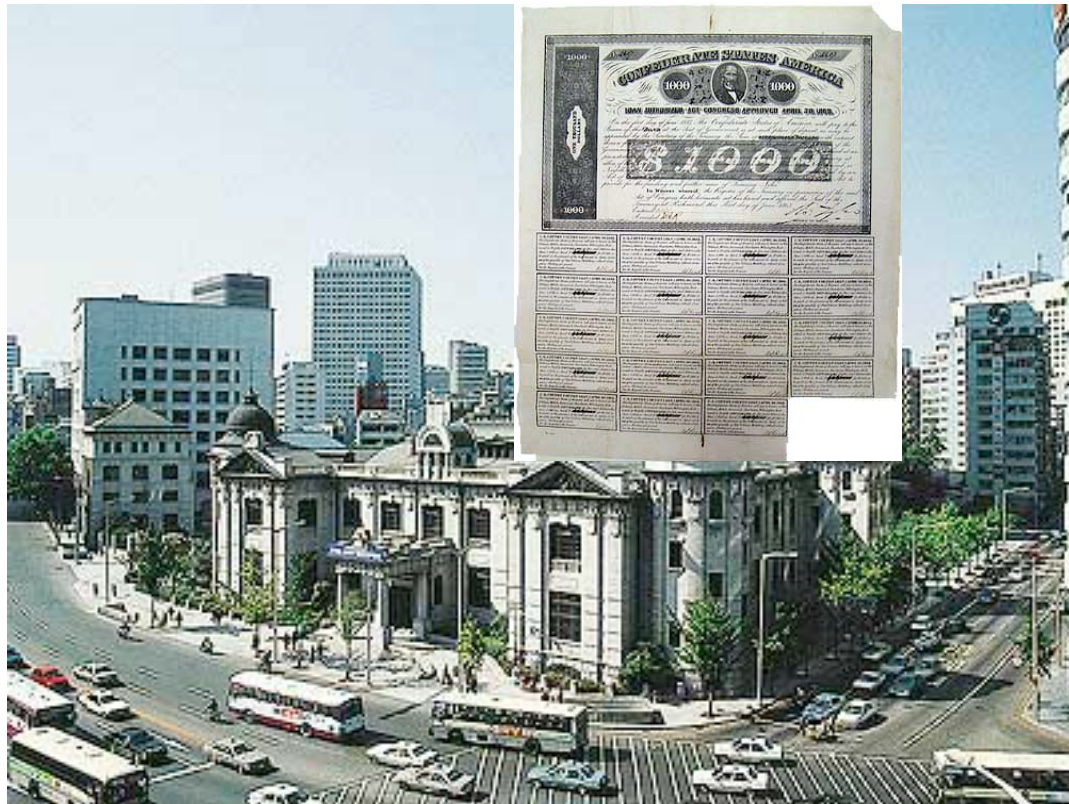


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# Open Market Operation

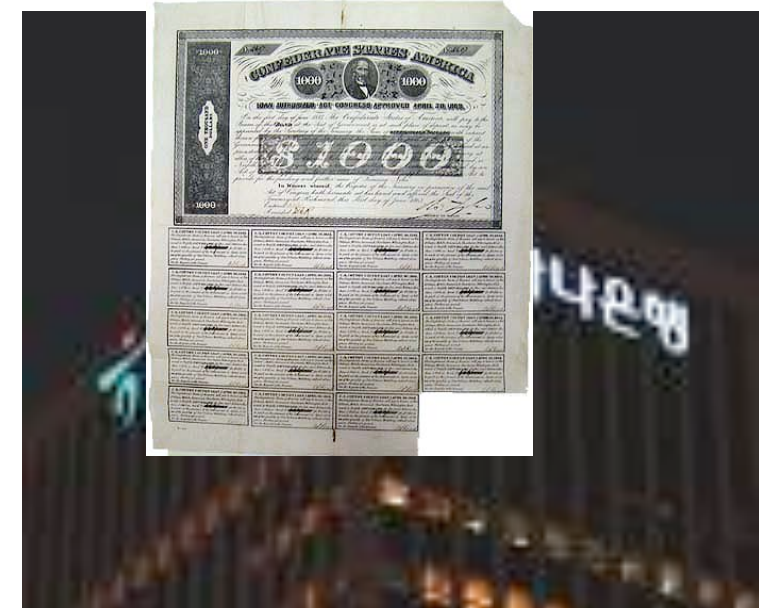


국공채 매입: 통화증가





# Open Market Operation



국공채 매입: 통화증가





# Open Market Operation



국공채 매각: 통화감소



# Next Topics

- 통화정책과 총수요
- 통화정책의 장기 효과



# 수고하셨습니다!



# 수고하셨습니다!





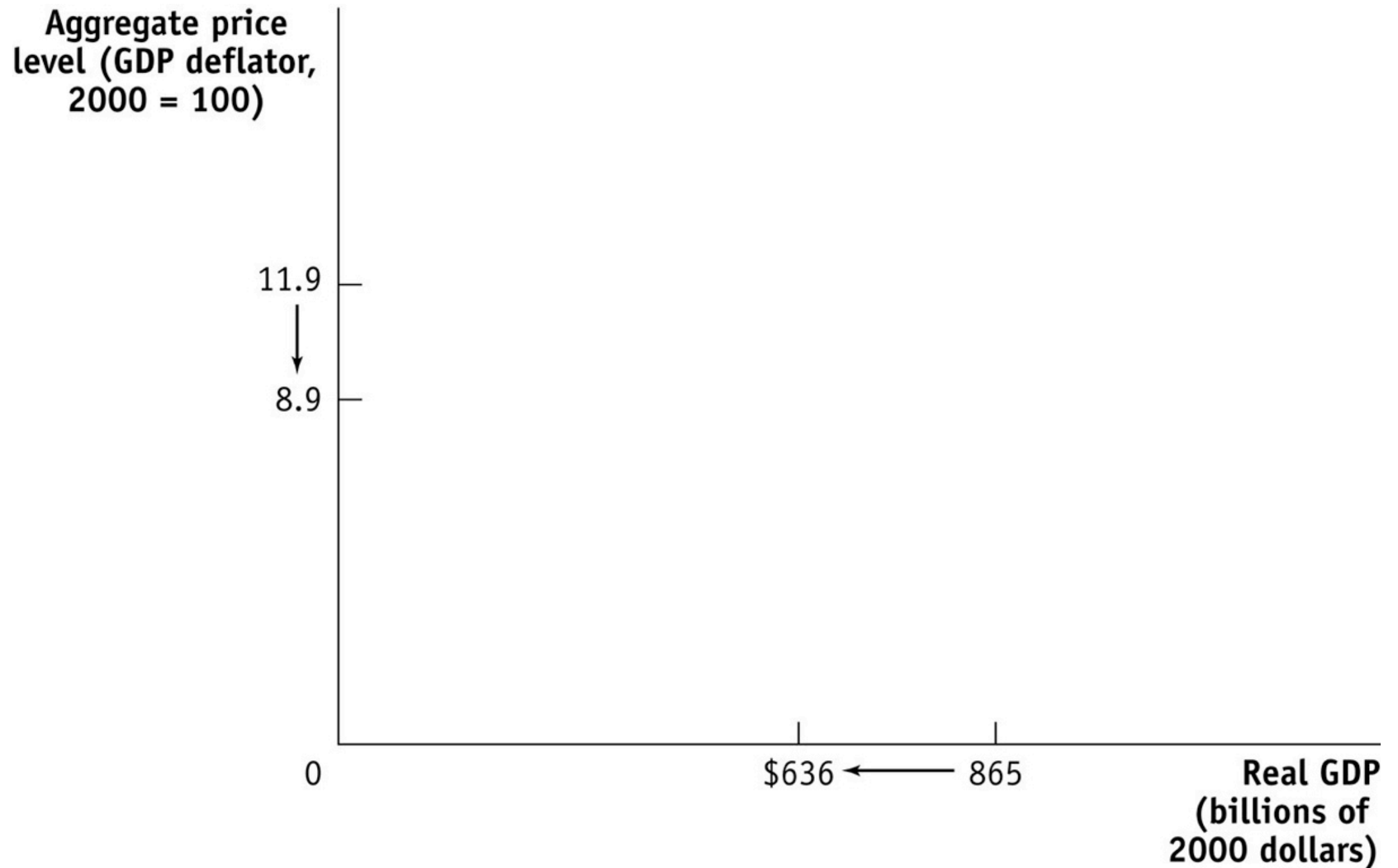
# 통화정책과 총수요

## Monetary Policy and Aggregate Demand

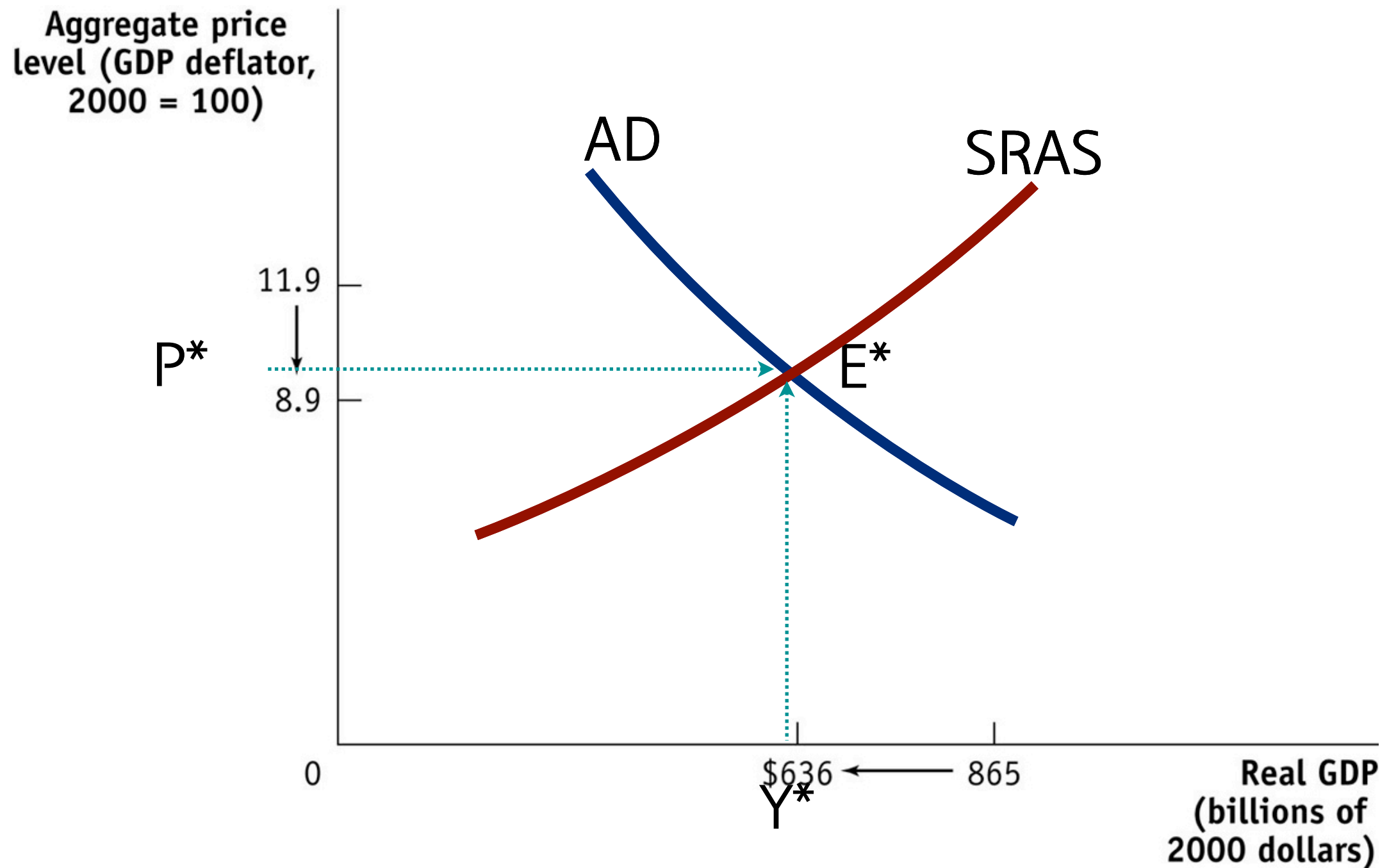
# Monetary Policy

- 확장적 통화정책과 긴축적 통화정책
- 확장정책: 이자율 하락/화폐공급 증가 ➡ 총수요 증가: loose monetary policy
- 긴축정책: 이자율 상승/화폐공급 감소 ➡ 총수요 감소: tight monetary policy

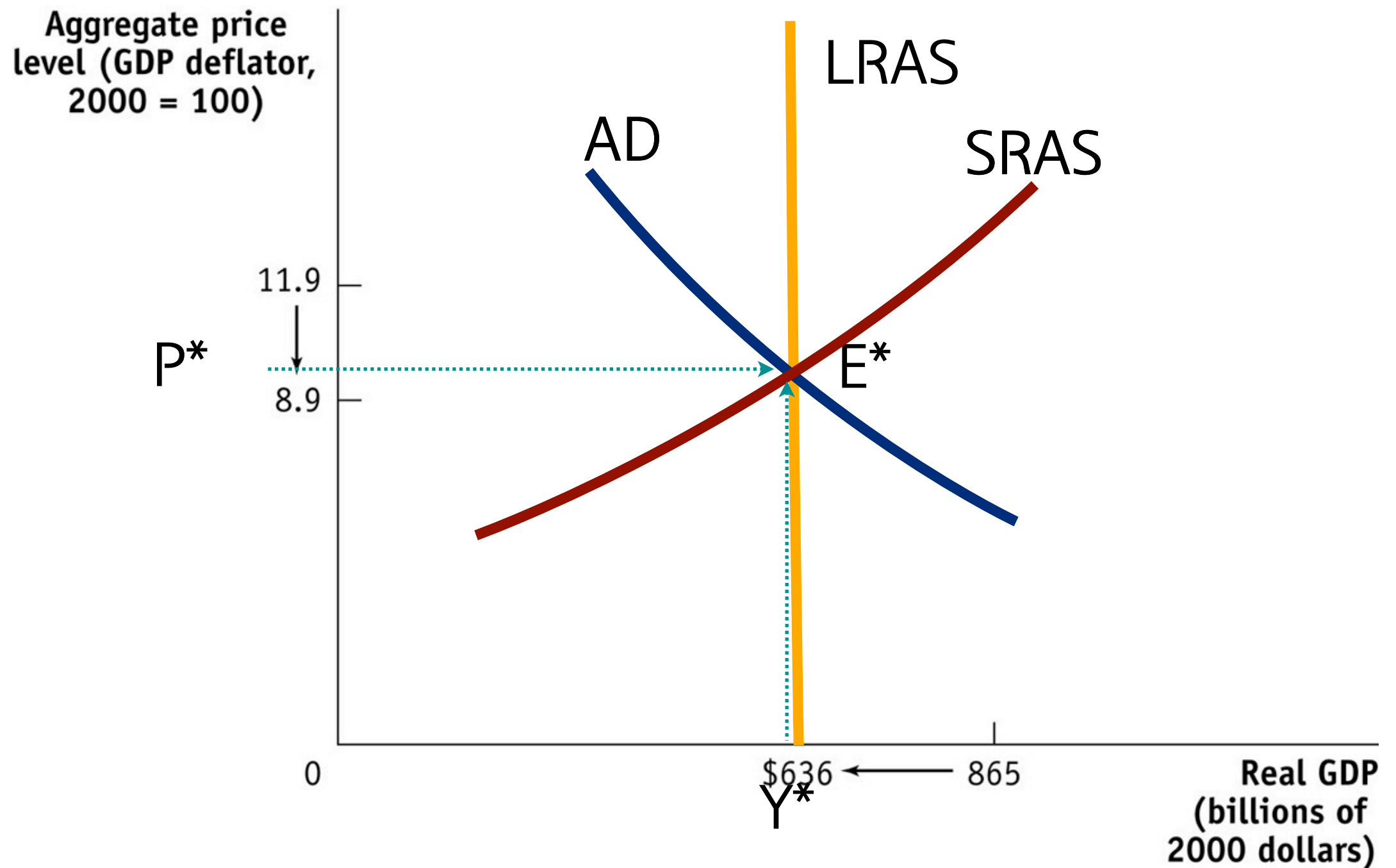
# Expansionary Monetary Policy: Graphical Expression



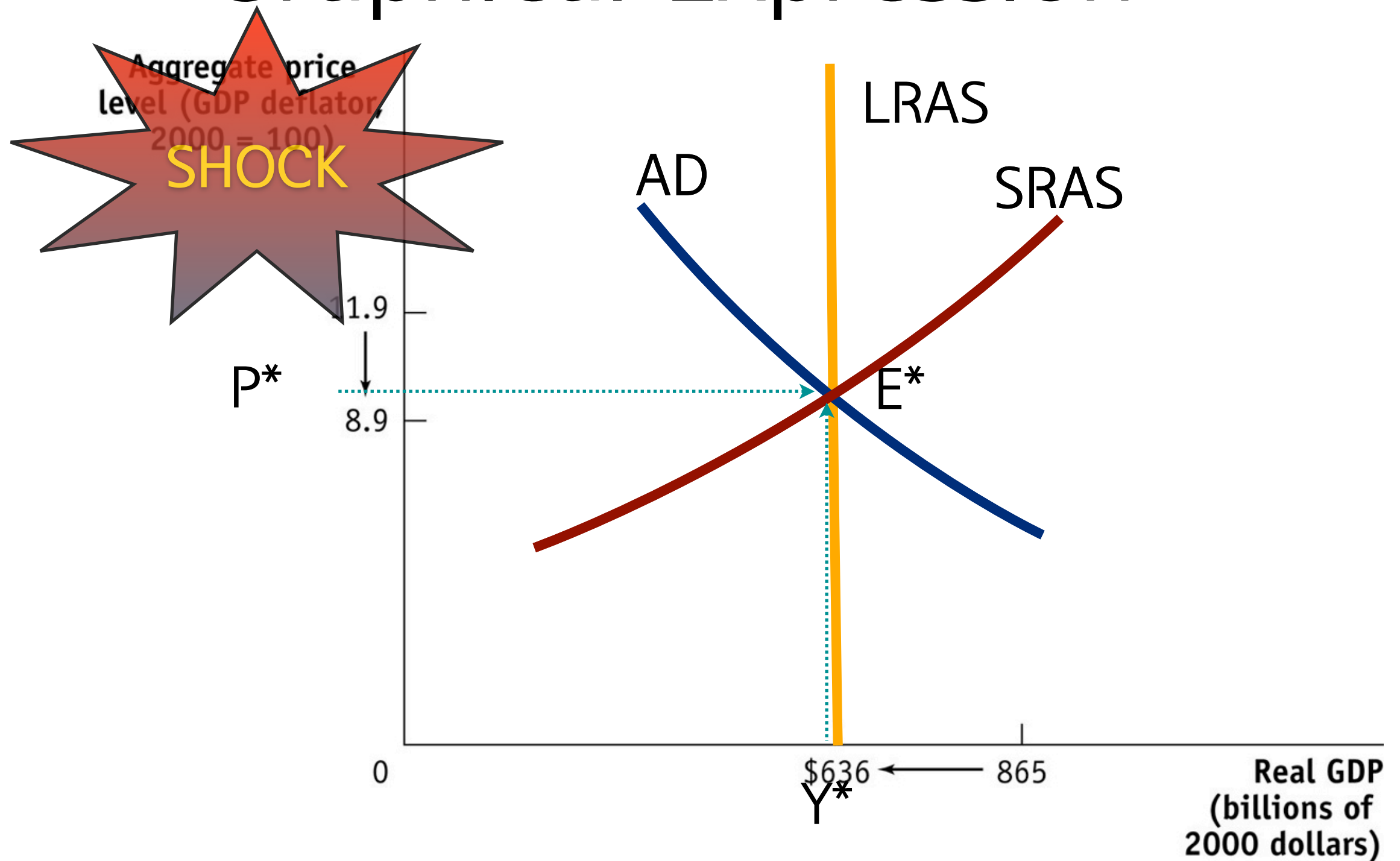
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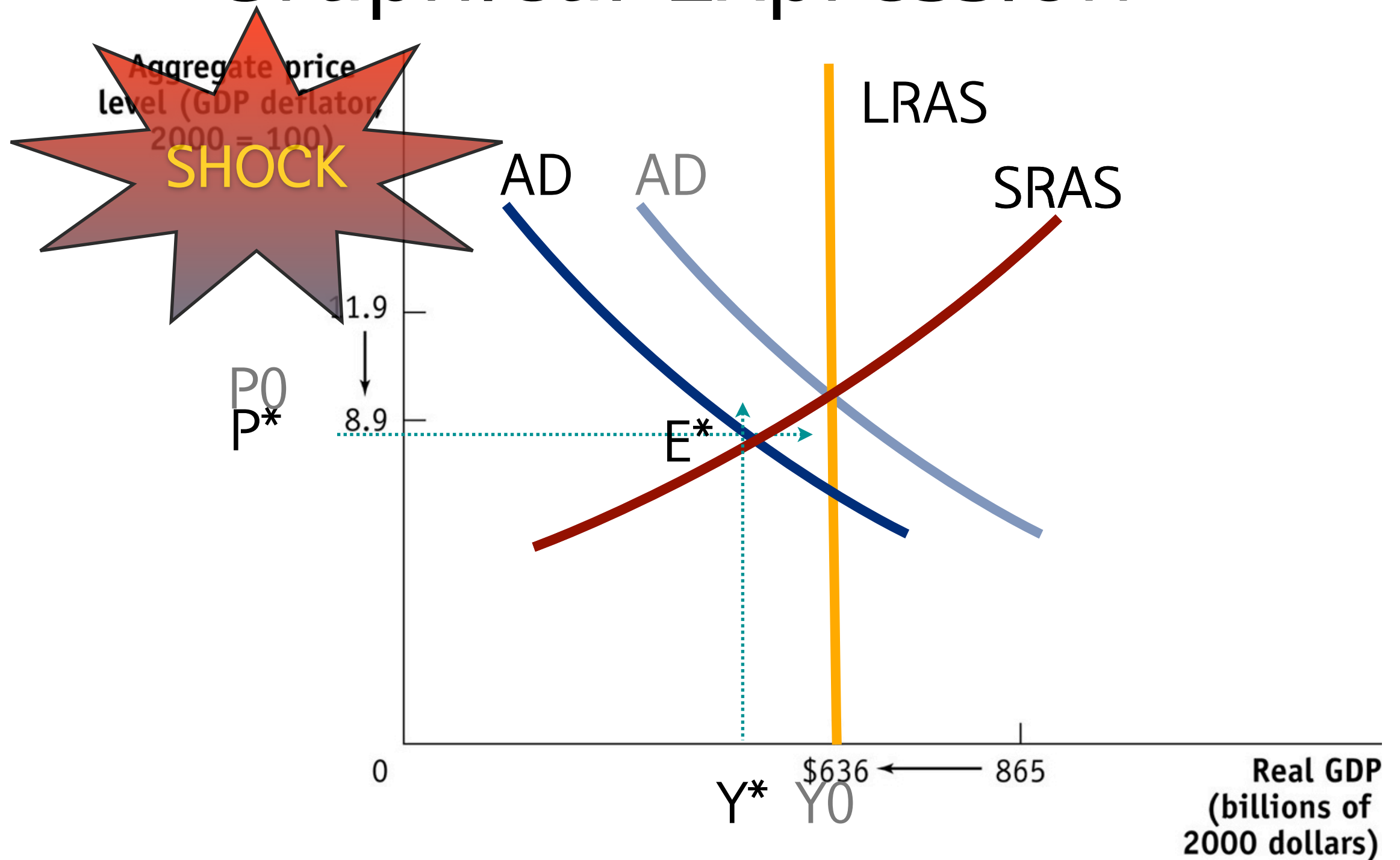
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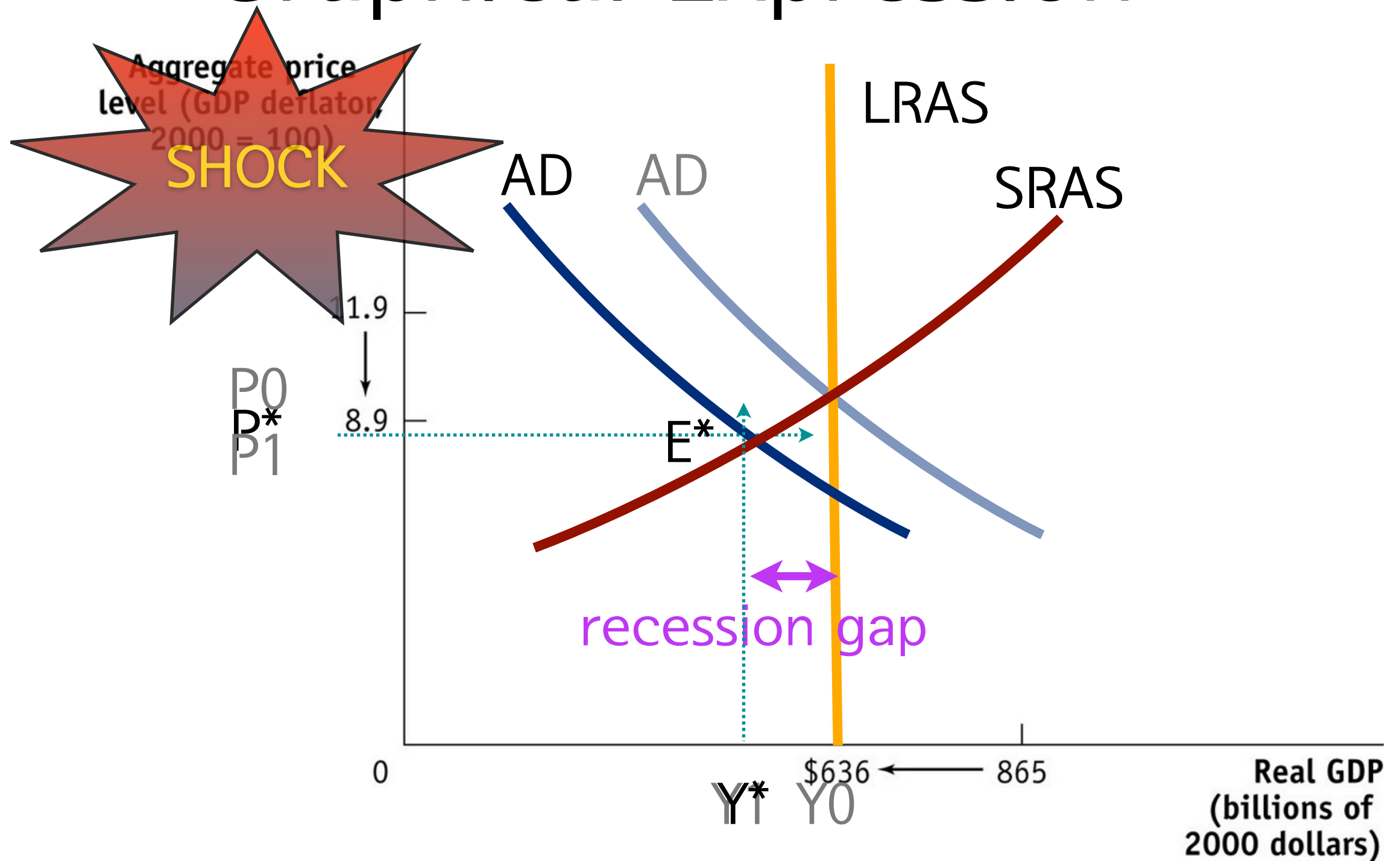
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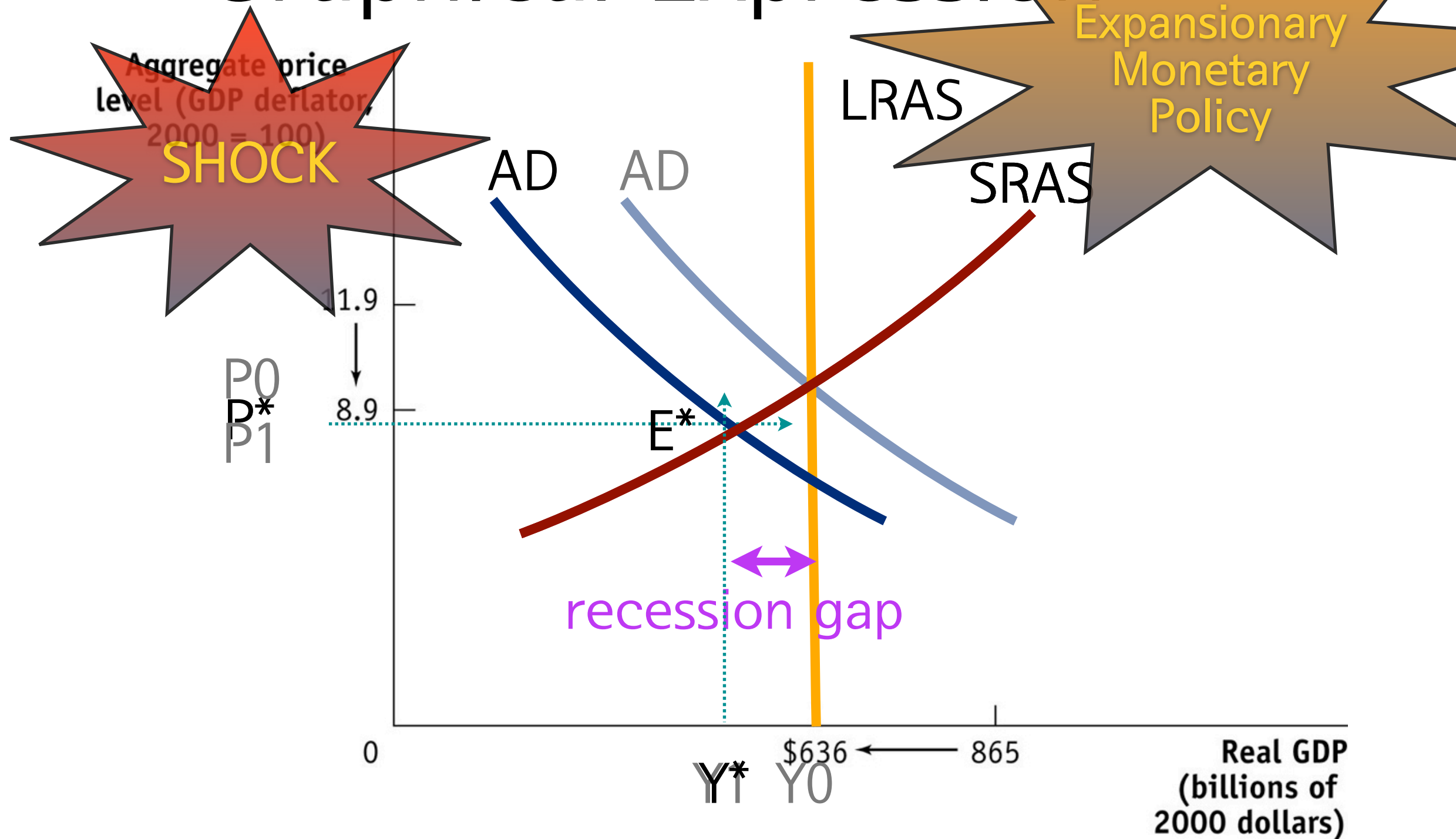


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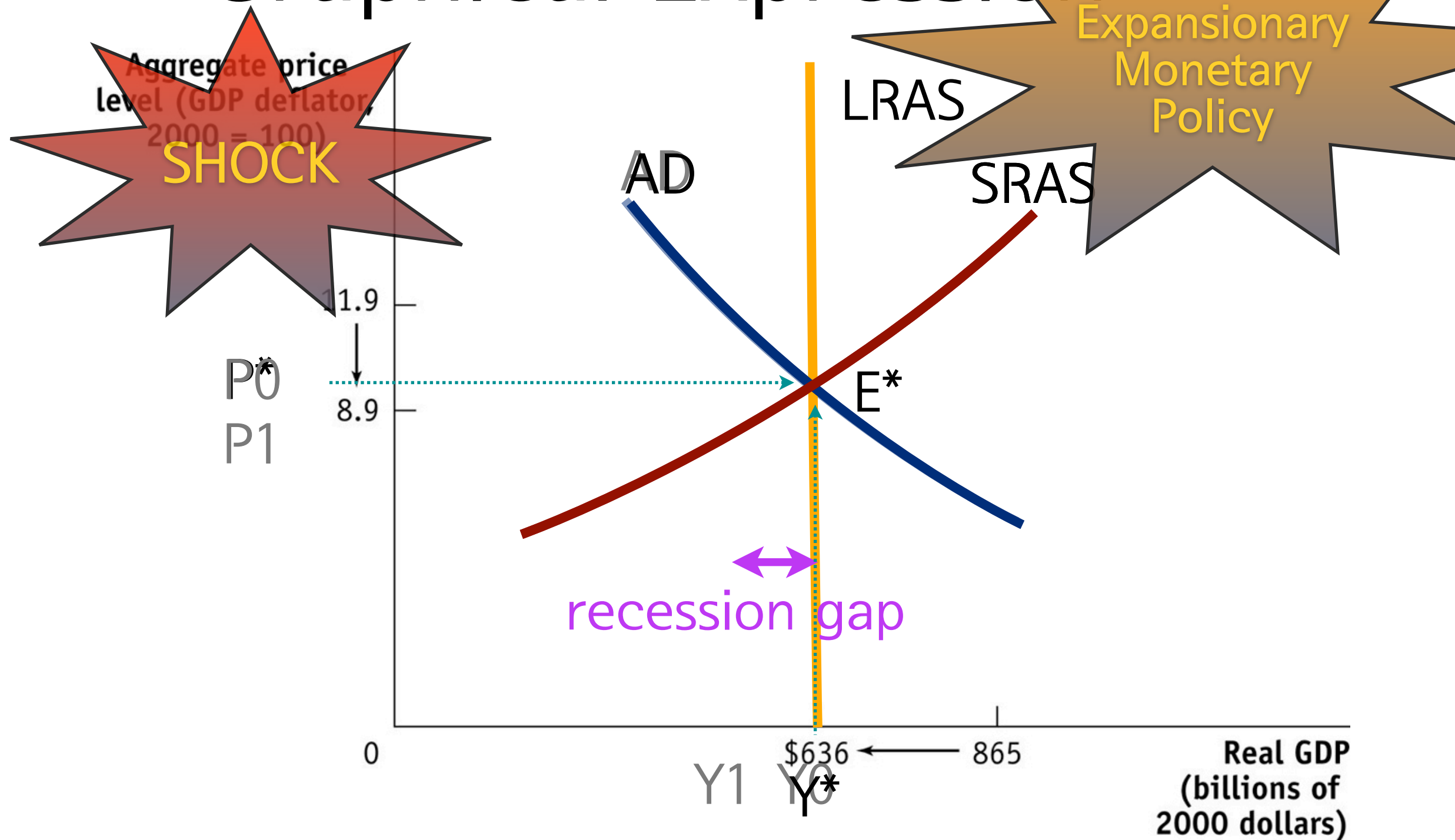




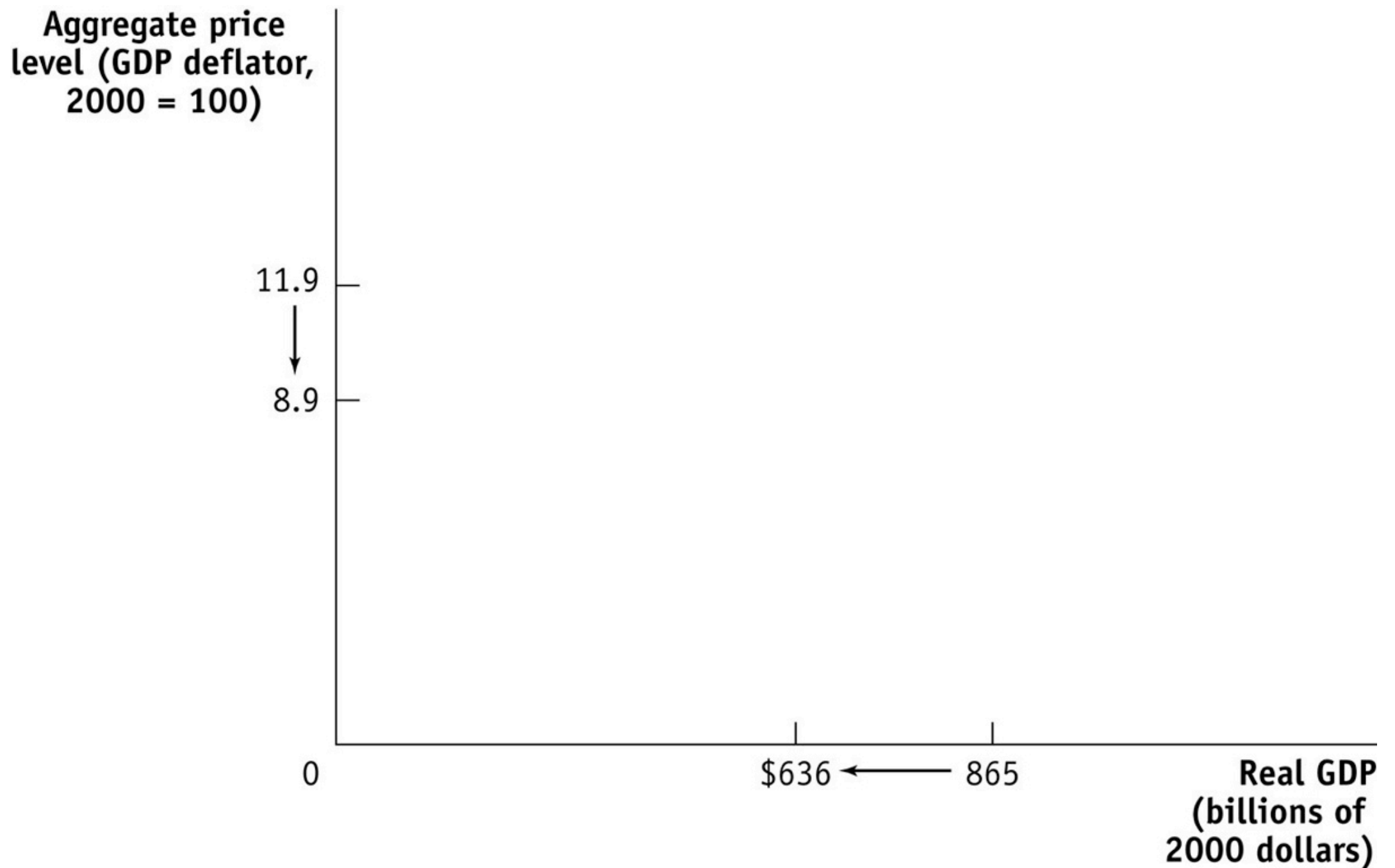
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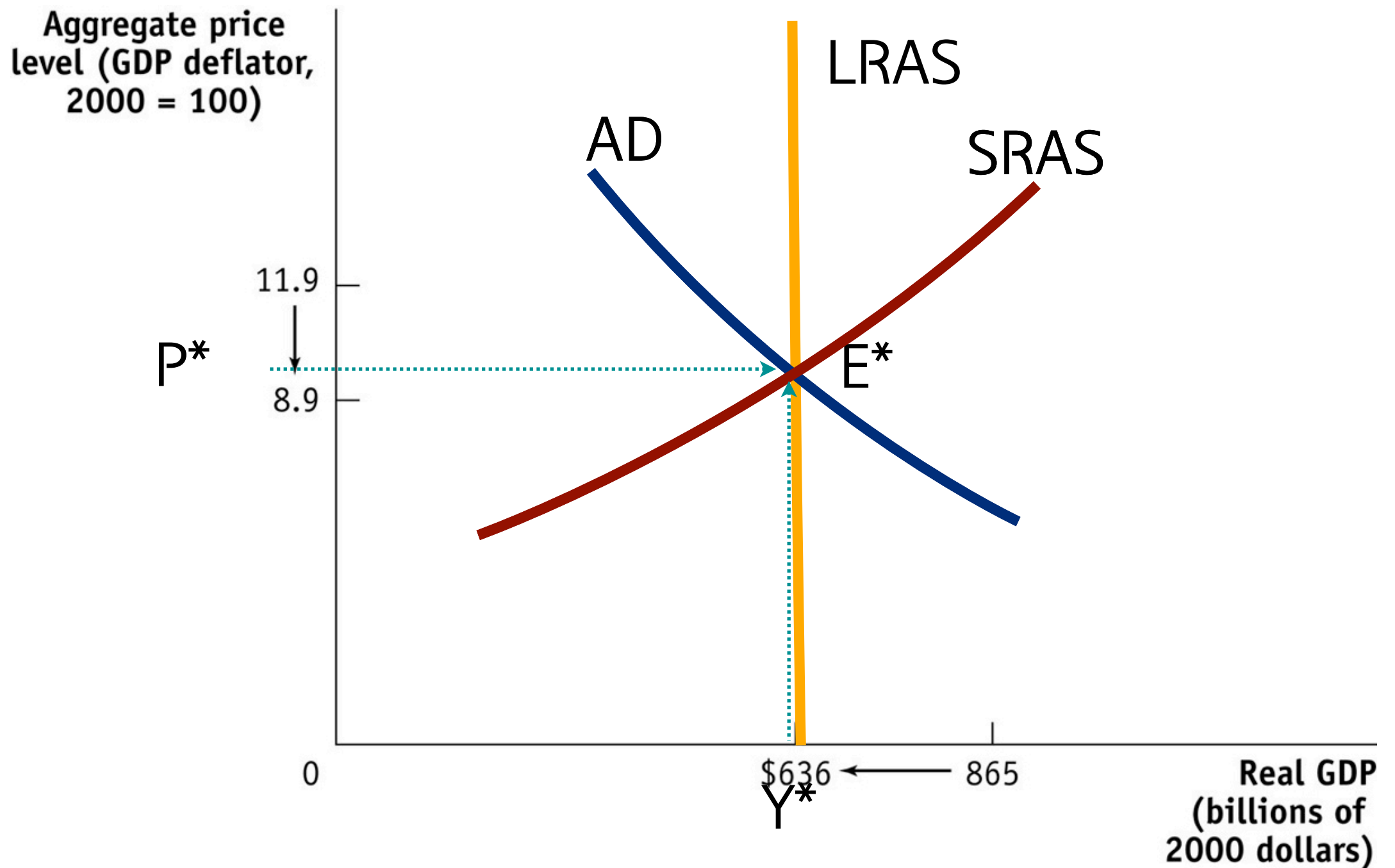
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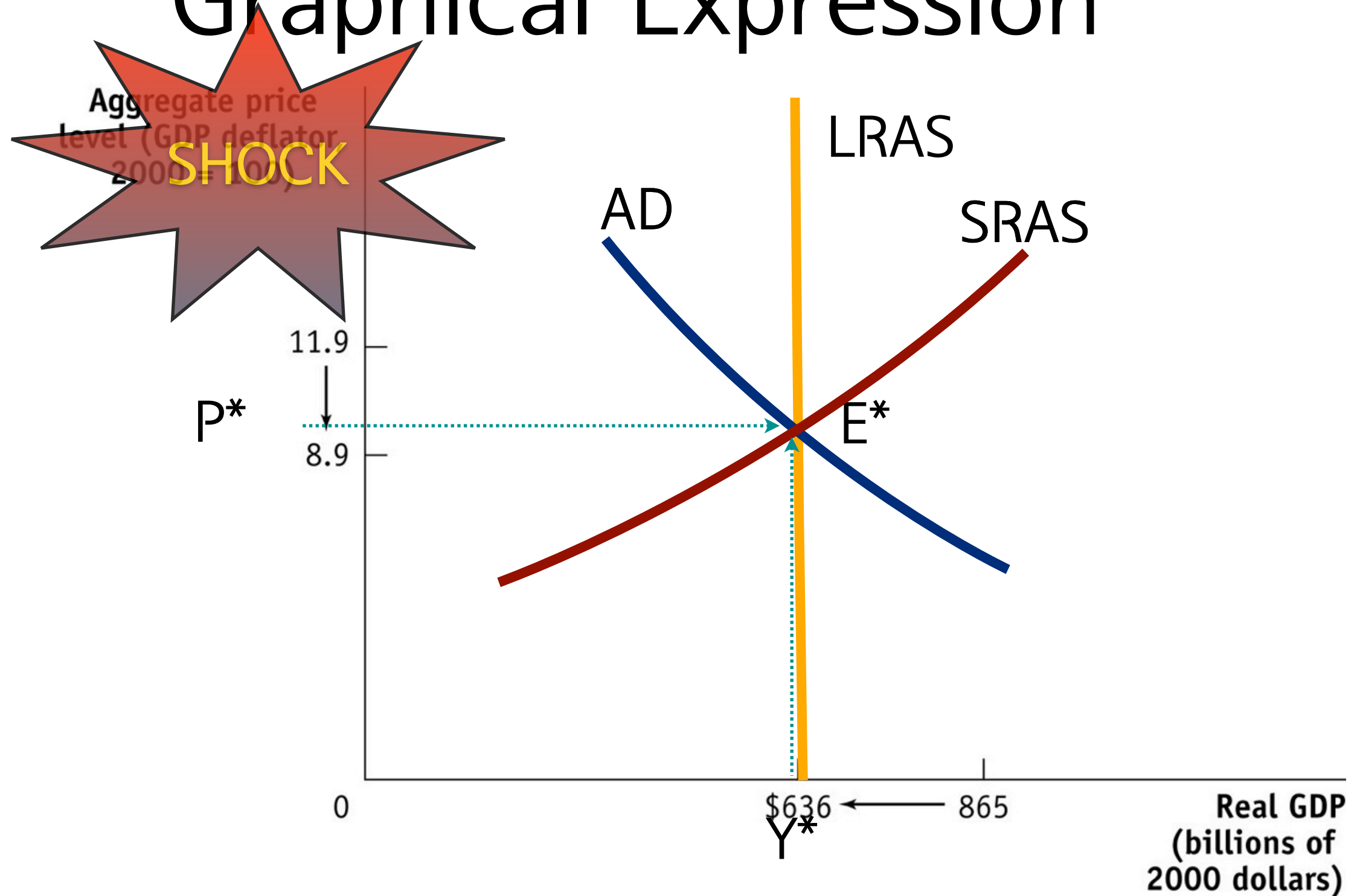
# Contractionary Monetary Policy: Graphical Expression



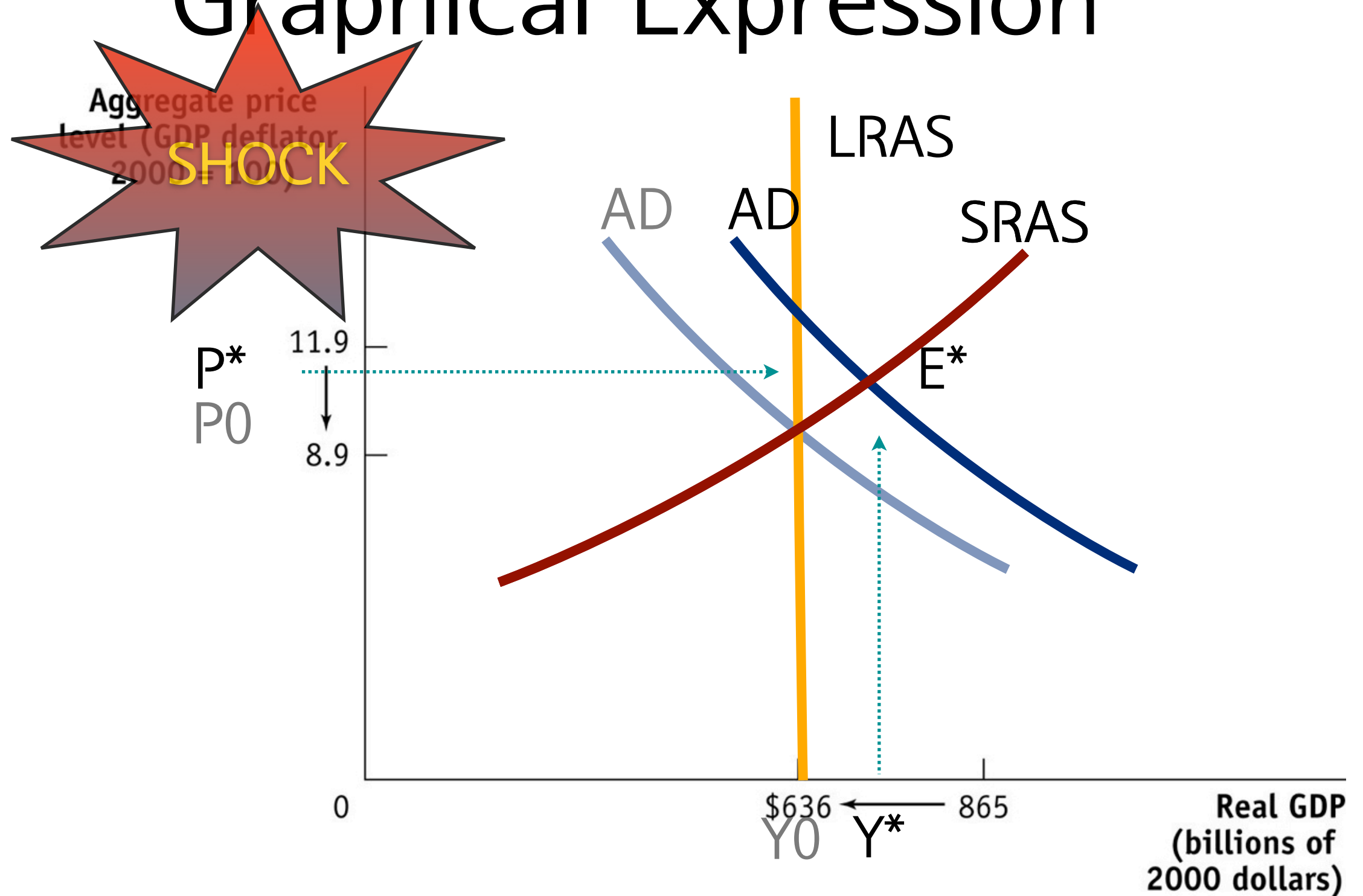
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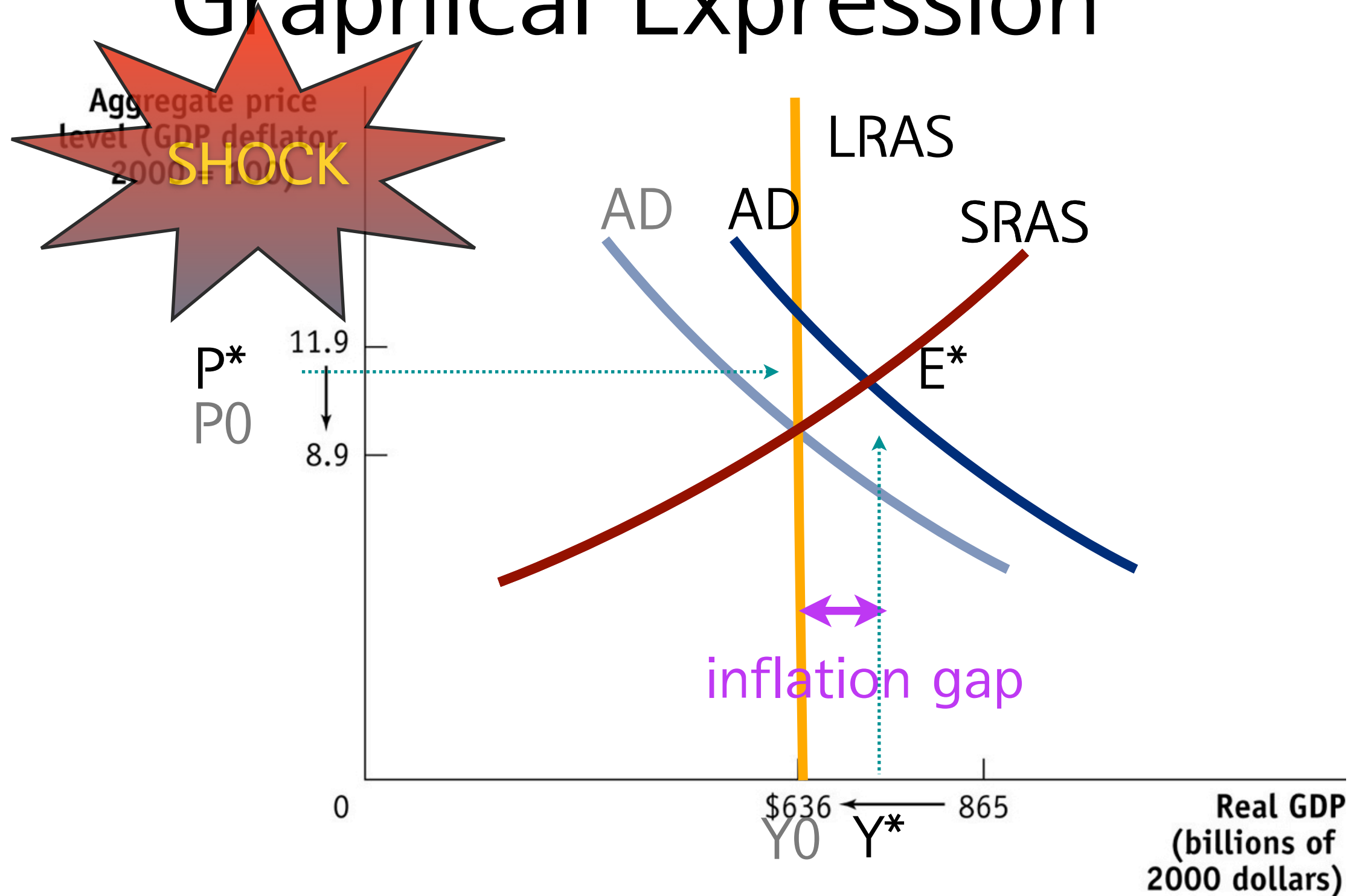
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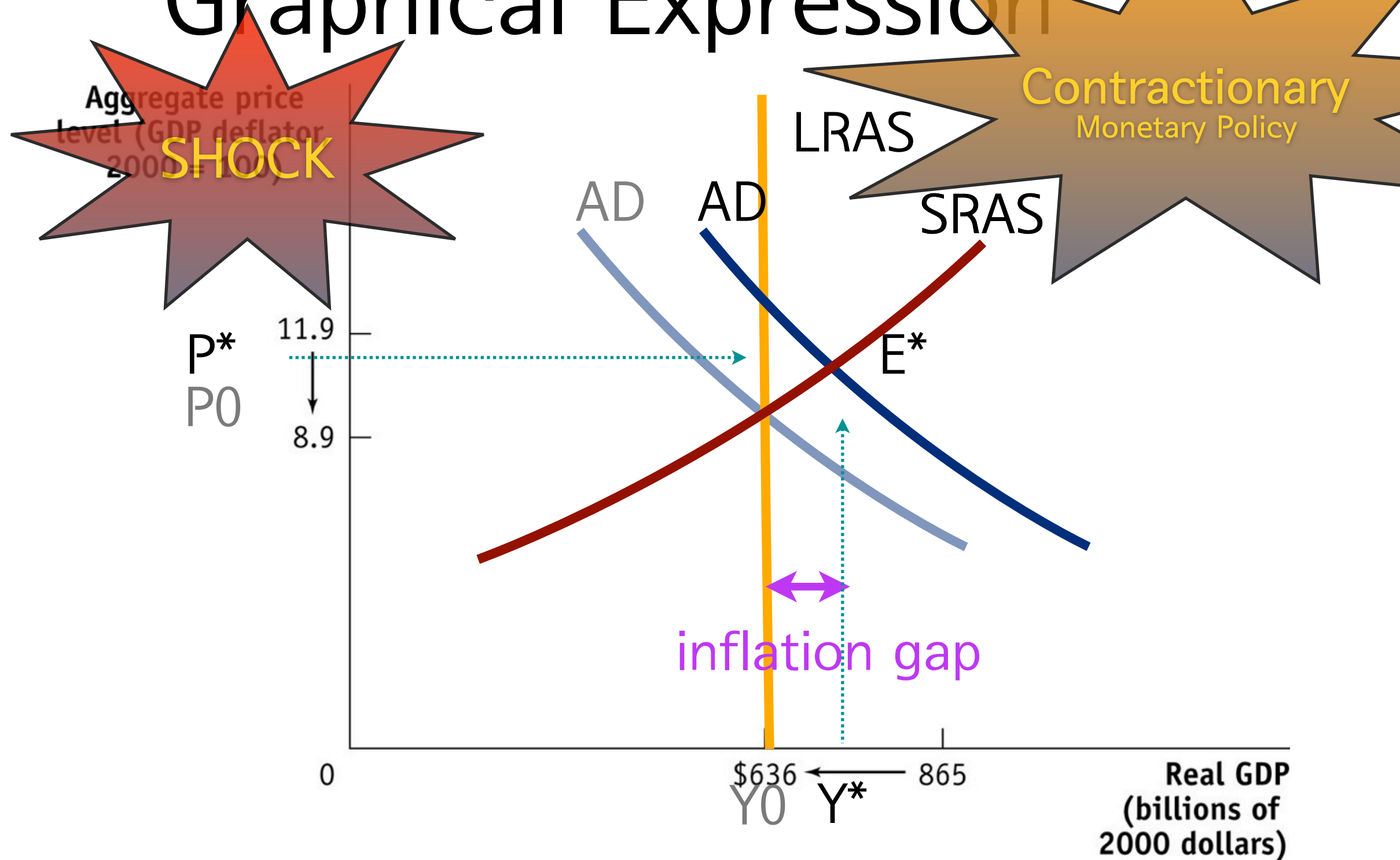
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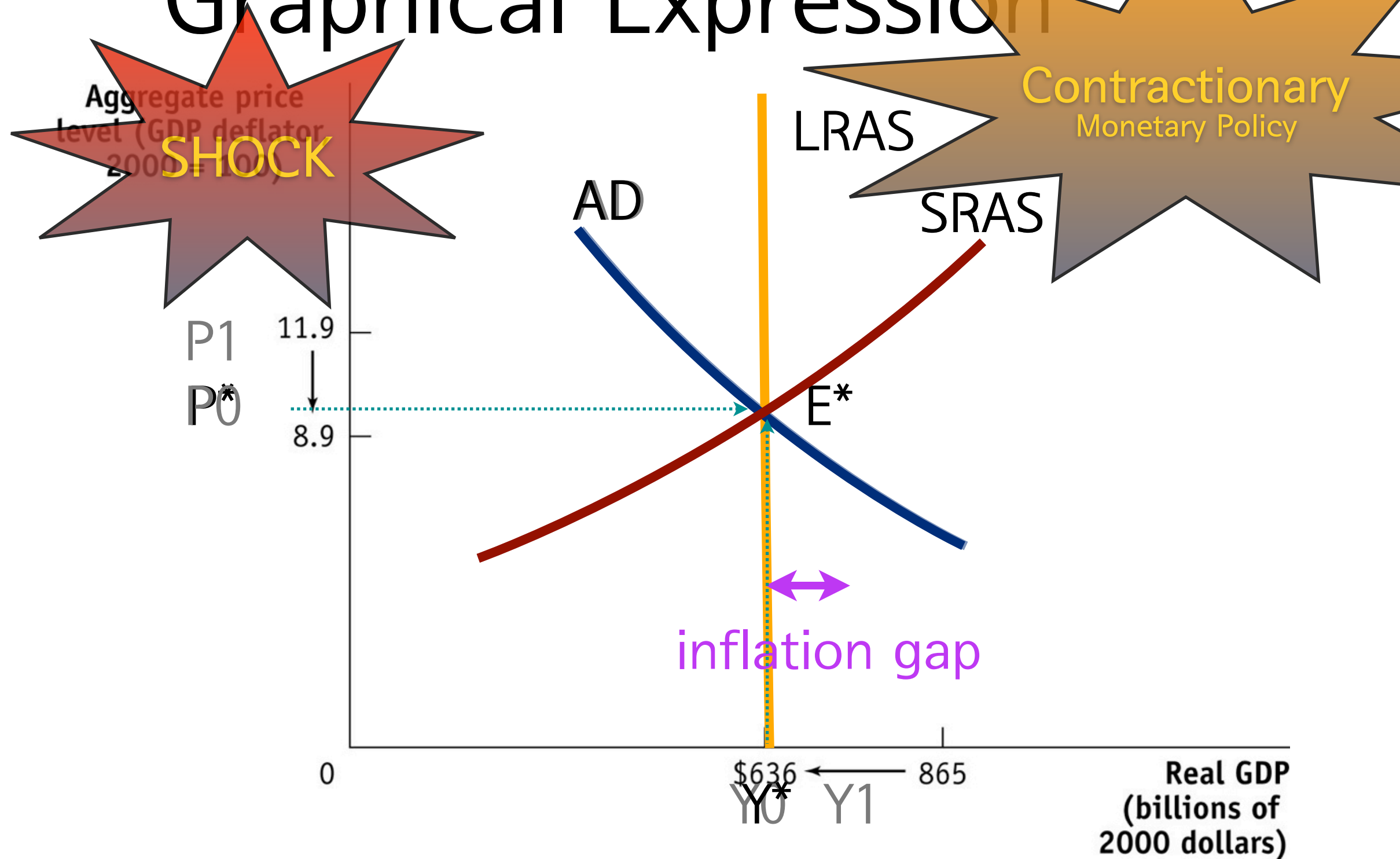


# Contractionary Monetary Policy: Graphical Expression





# Contractionary Monetary Policy: Graphical Expression



# How Much push AD?

## Multiplier approach

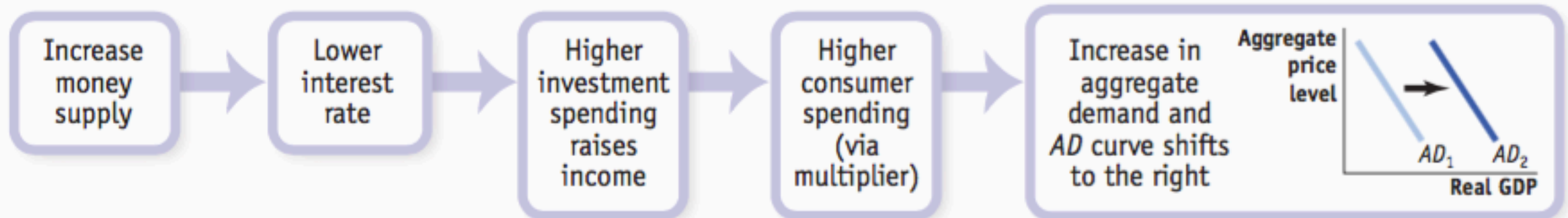
# Assumptions

- ignore Tax
  - $T=G=TR=0$
- ignore Trade with other countries
  - $X=IM=0$
- ignore  $\triangle$  Consumption with varying interest rate

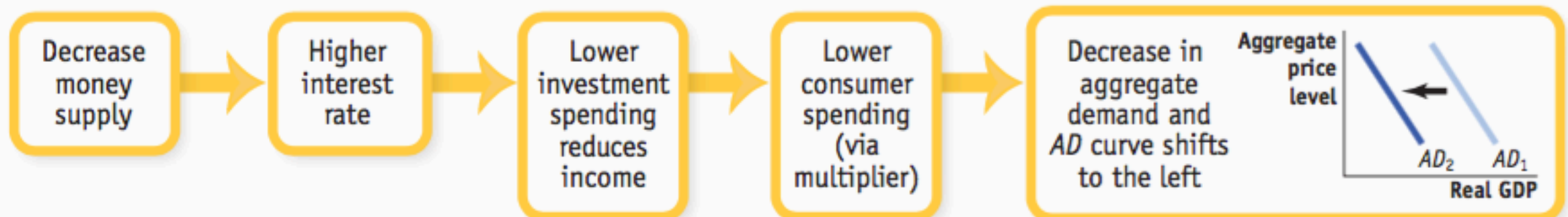
# Multiplier process

- 이자율 하락[상승]
- ➡ 투자지출 증가[하락] :  $\Delta I$
- ➡ 증폭과정(Multiplier effect)
- ➡ AD curve right[left] shift

## EXPANSIONARY

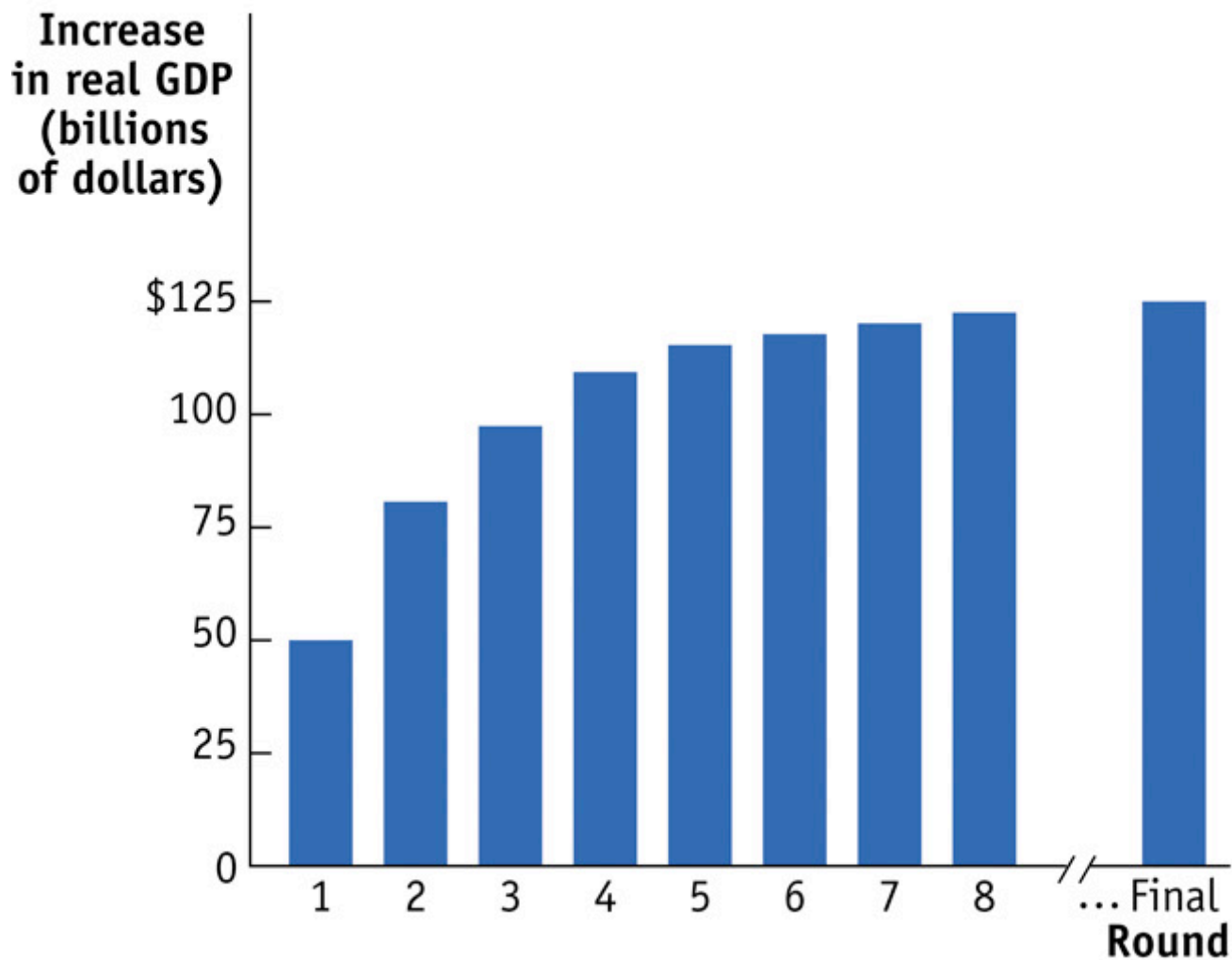


## CONTRACTIONARY



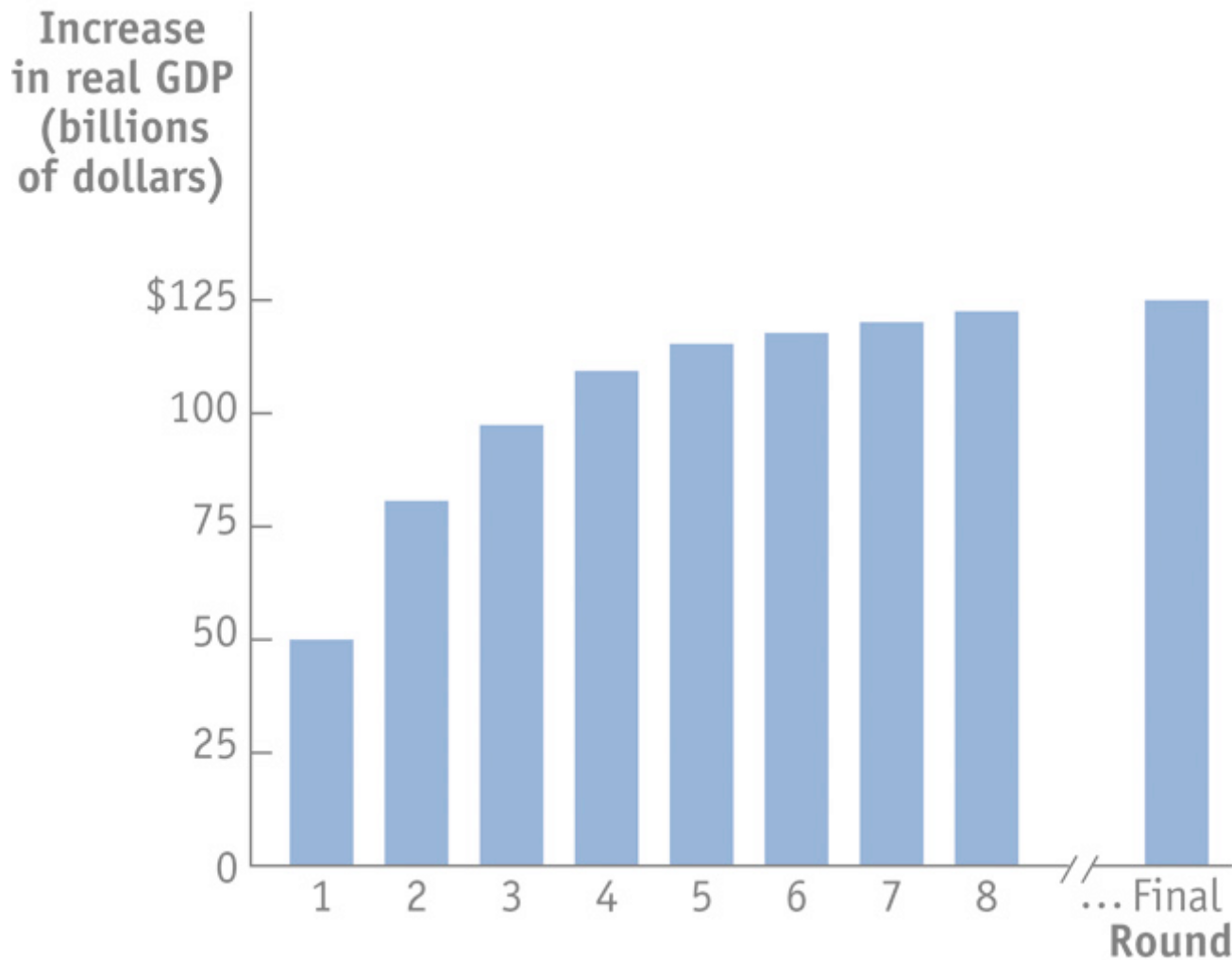
# (Review) Multiplier effect: Graphical Explanation

(a) Rounds of Cumulative Increases in Real GDP

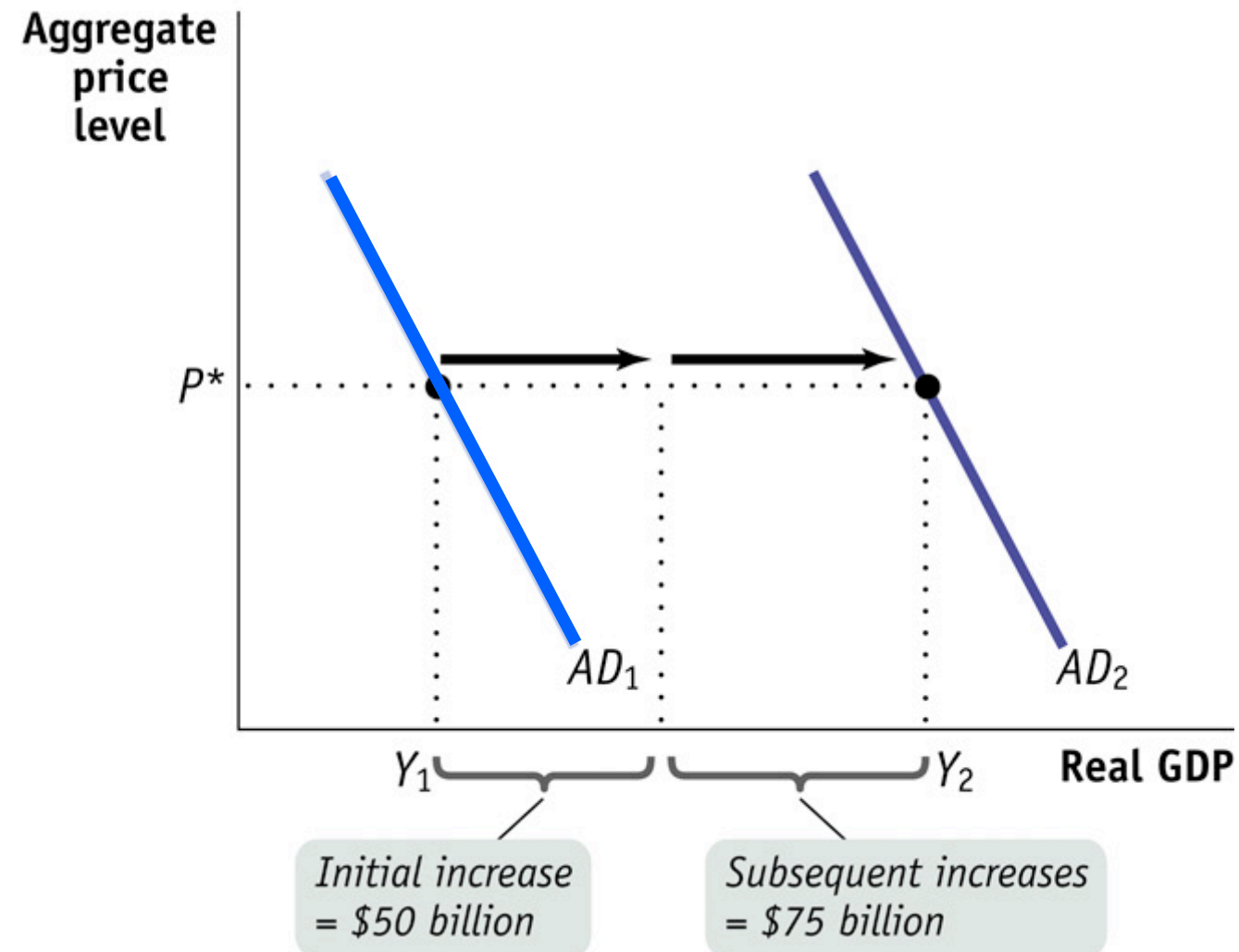


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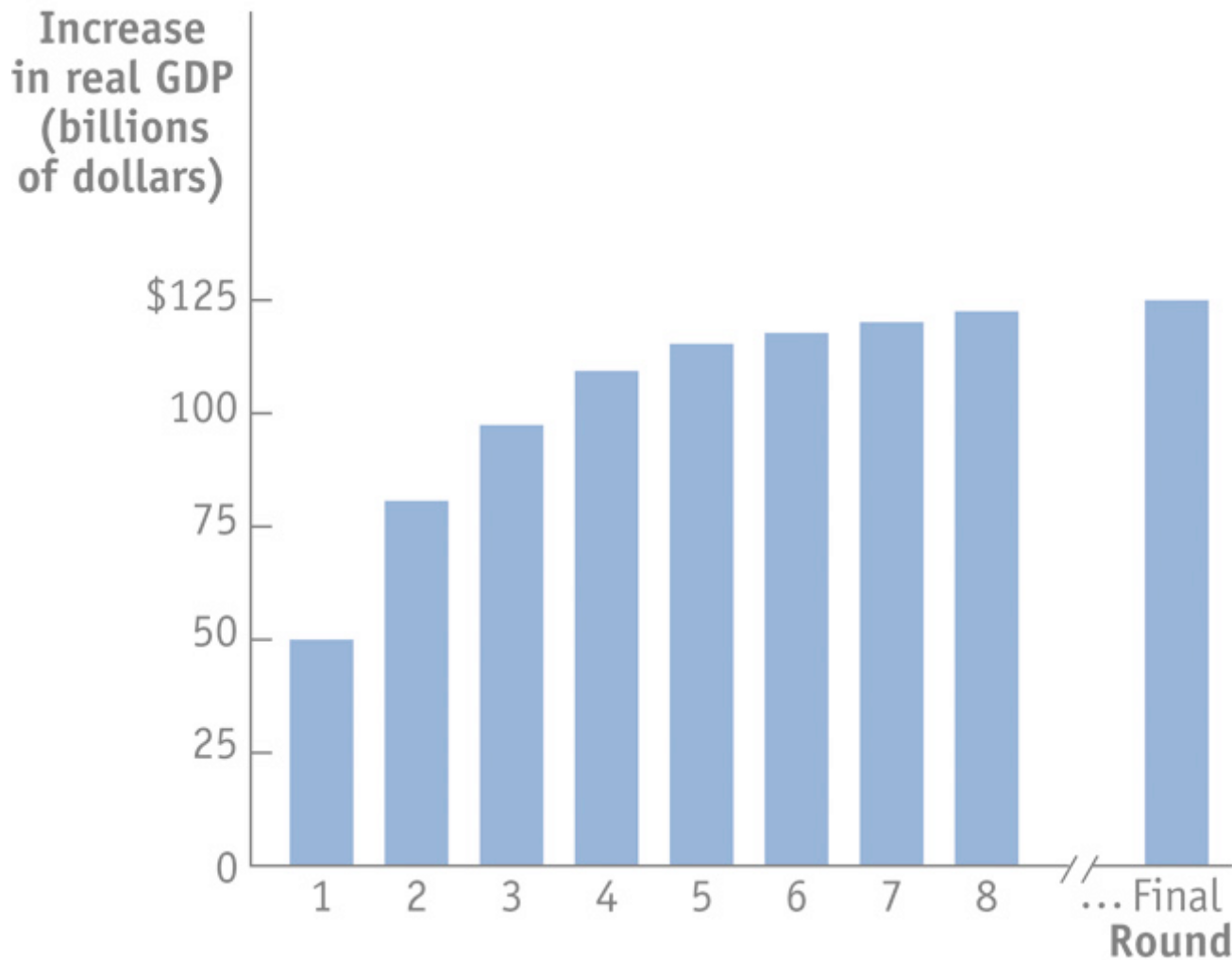


(b) The Corresponding Effect on Aggregate Demand

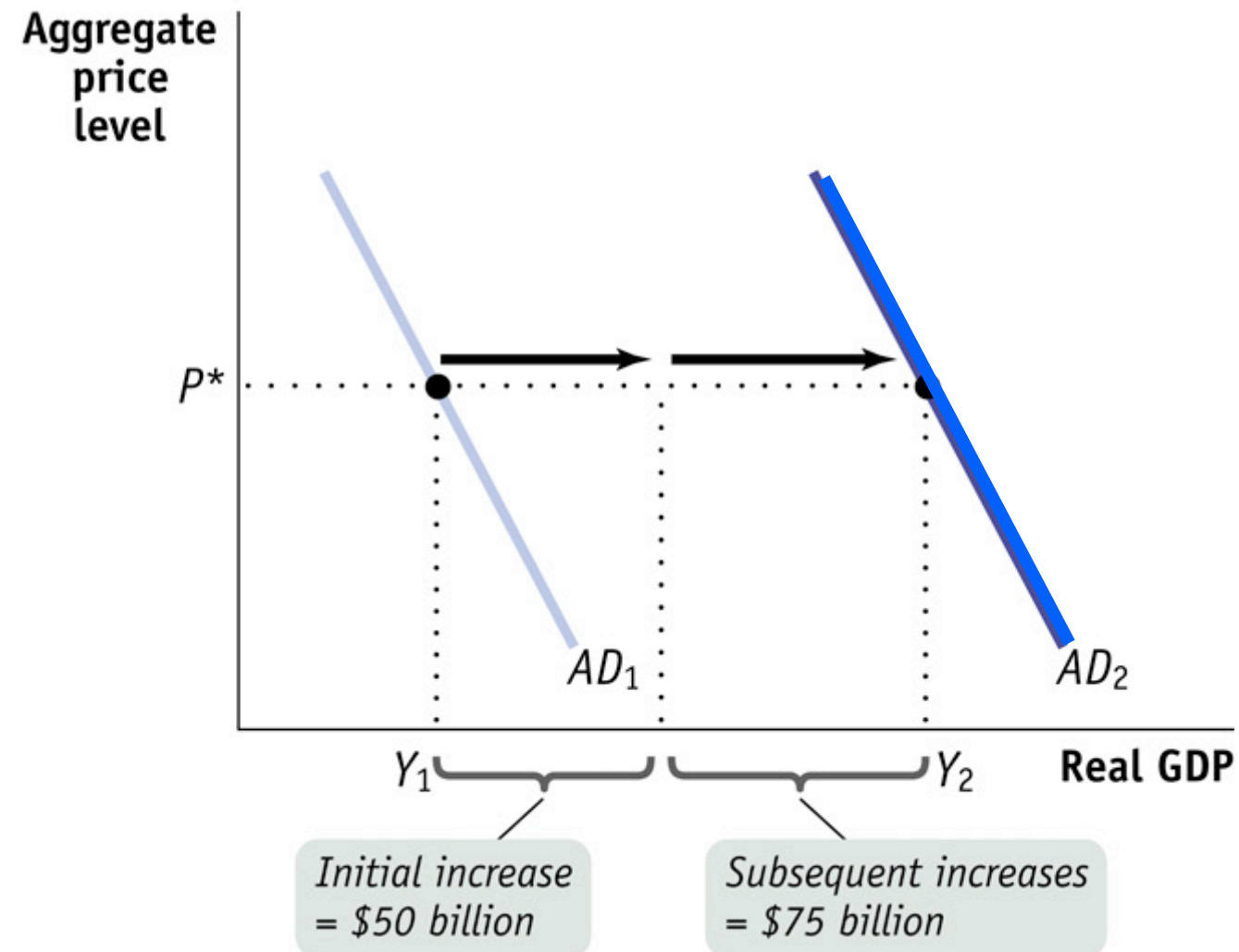


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(a) Rounds of Cumulative Increases in Real GDP



(b) The Corresponding Effect on Aggregate Demand





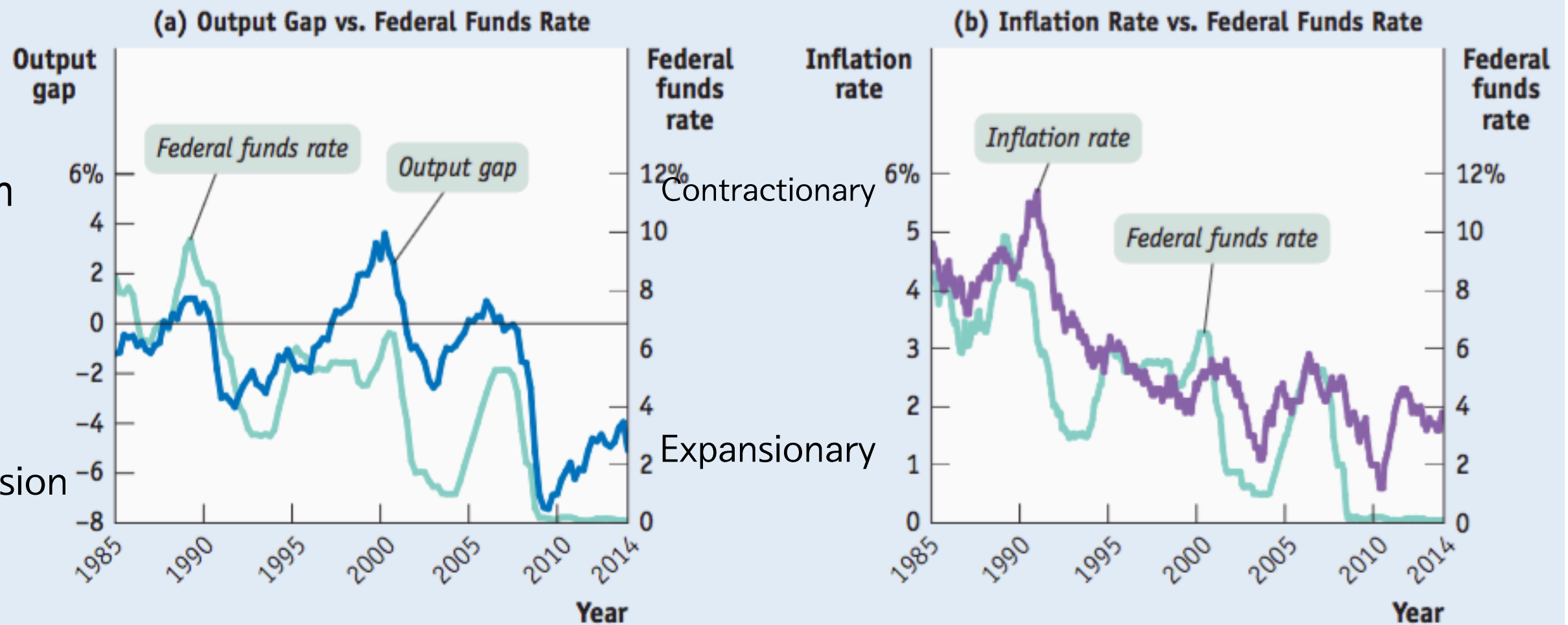
# Review: Multiplier Effect

$$\Delta Y = \Delta I \times \frac{1}{1 - MPC}$$

# Monetary Policy in US: 1985-2014

Boom

recession



Panel (a) shows that the federal funds rate usually rises when the output gap is positive—that is, when actual real GDP is above potential output—and falls when the output gap is

negative. Panel (b) illustrates that the federal funds rate tends to be high when inflation is high and low when inflation is low.  
Source: Federal Reserve Bank of St. Louis.

# Taylor Rule Method of Setting Monetary Policy

$$i_t = \pi_t + r_t^* + \bar{a}_\pi(\pi_t - \pi^*) + \bar{a}_y(y_t - y^*)$$

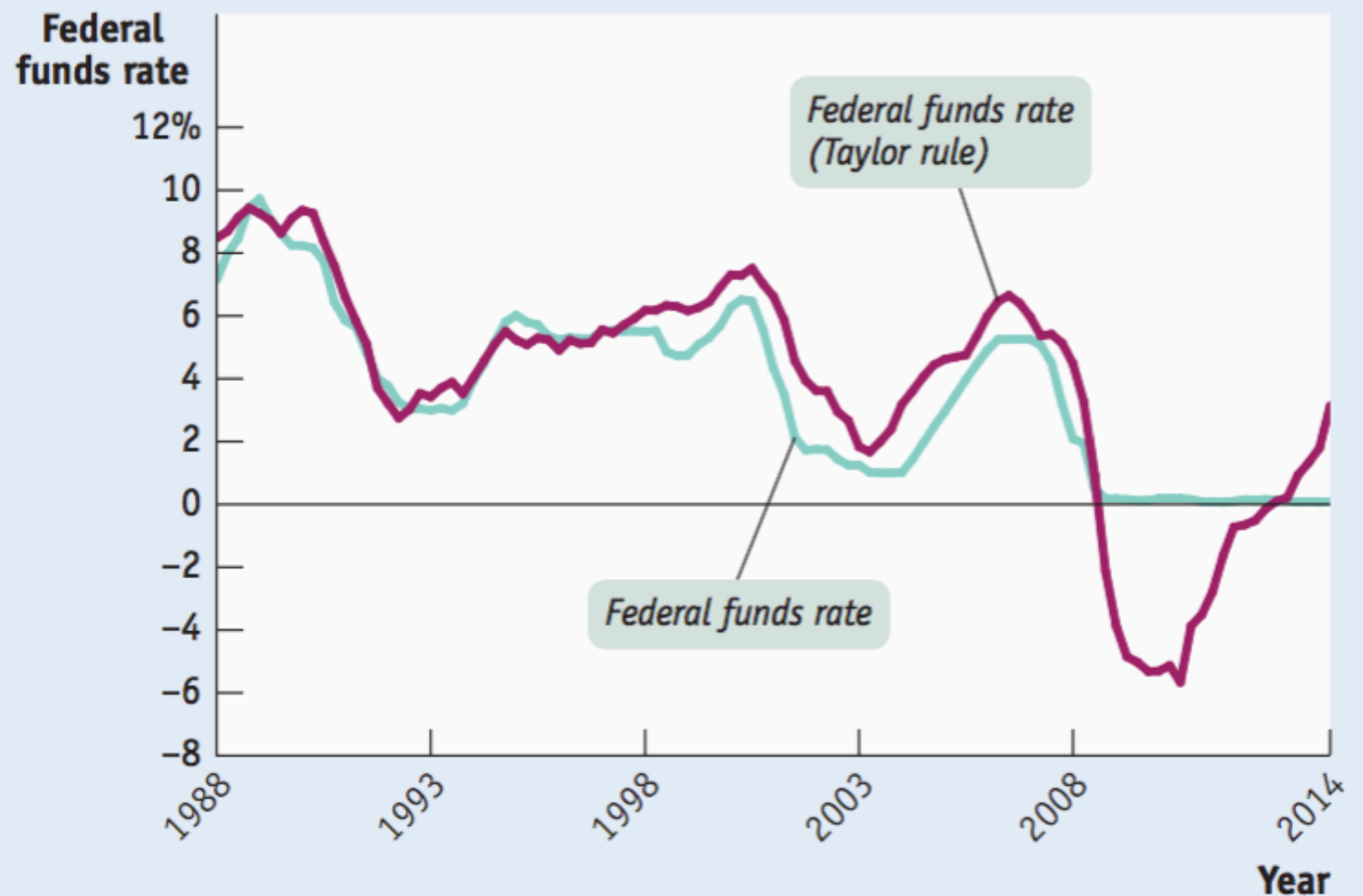
- 테일러가 제안한 통화정책 준칙
- $i$ : nominal interest rate (the only variable CB can set)
- $\pi$ : inflation rate
- $*$ : potential values
- $y$ : rGDP (or unemployment rate)
- $a > 0$ : constants



# Did FRB followed Taylor Rule? -- YES

The purple line shows the federal funds rate predicted by the San Francisco Fed's version of the Taylor rule, which relates the interest rate to the inflation rate and the unemployment rate. The green line shows the actual federal funds rate. The actual rate tracked the predicted rate quite closely through the end of 2008. After that, however, the Taylor rule called for negative interest rates, which aren't possible.

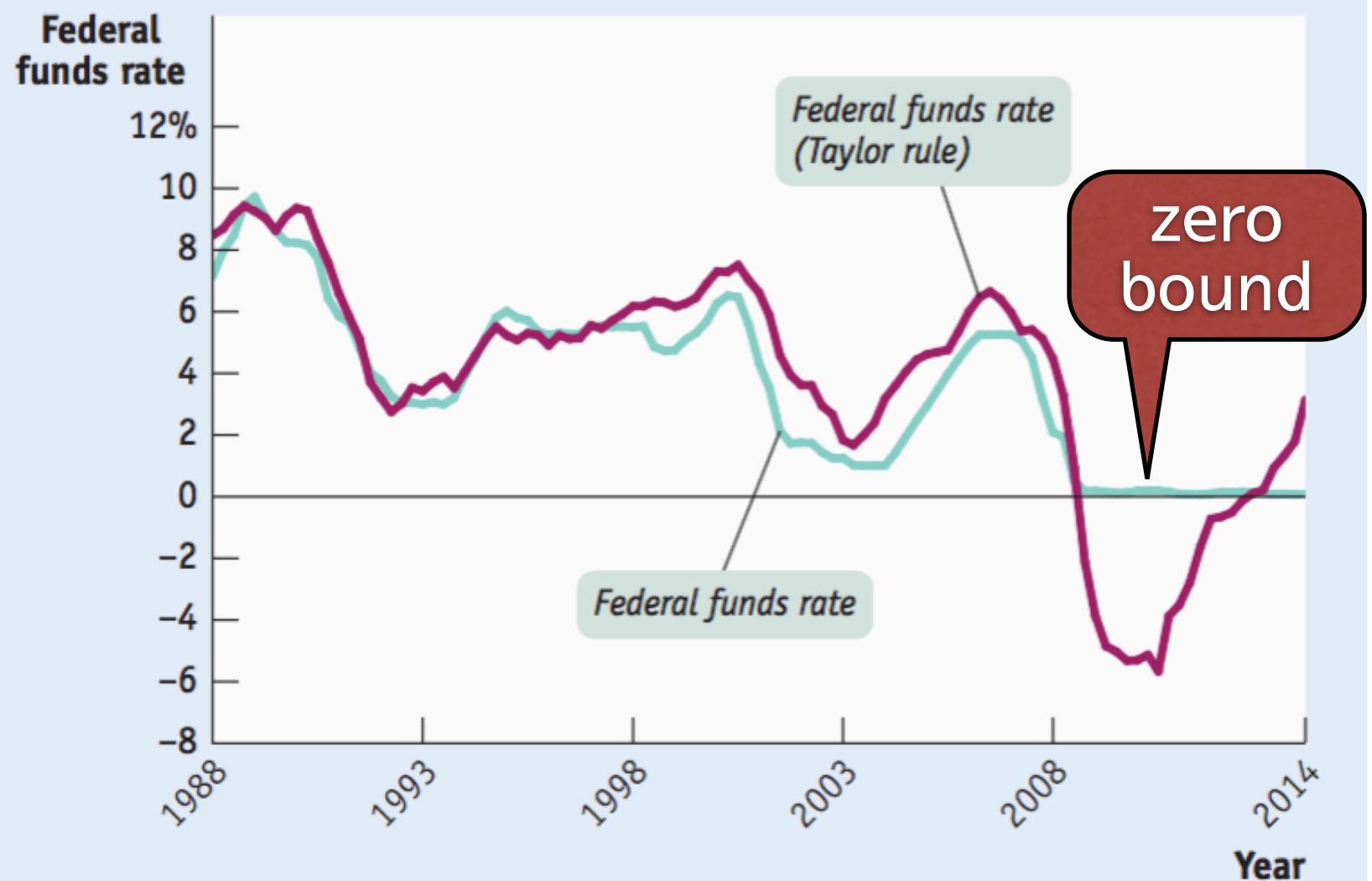
Sources: Bureau of Labor Statistics; Congressional Budget Office; Federal Reserve Bank of St. Louis; Glenn D. Rudebusch, "The Fed's Monetary Policy Response to the Current Crisis," *FRBSF Economic Letter* #2009-17 (May 22, 2009).



# Did FRB followed Taylor Rule? -- YES

The purple line shows the federal funds rate predicted by the San Francisco Fed's version of the Taylor rule, which relates the interest rate to the inflation rate and the unemployment rate. The green line shows the actual federal funds rate. The actual rate tracked the predicted rate quite closely through the end of 2008. After that, however, the Taylor rule called for negative interest rates, which aren't possible.

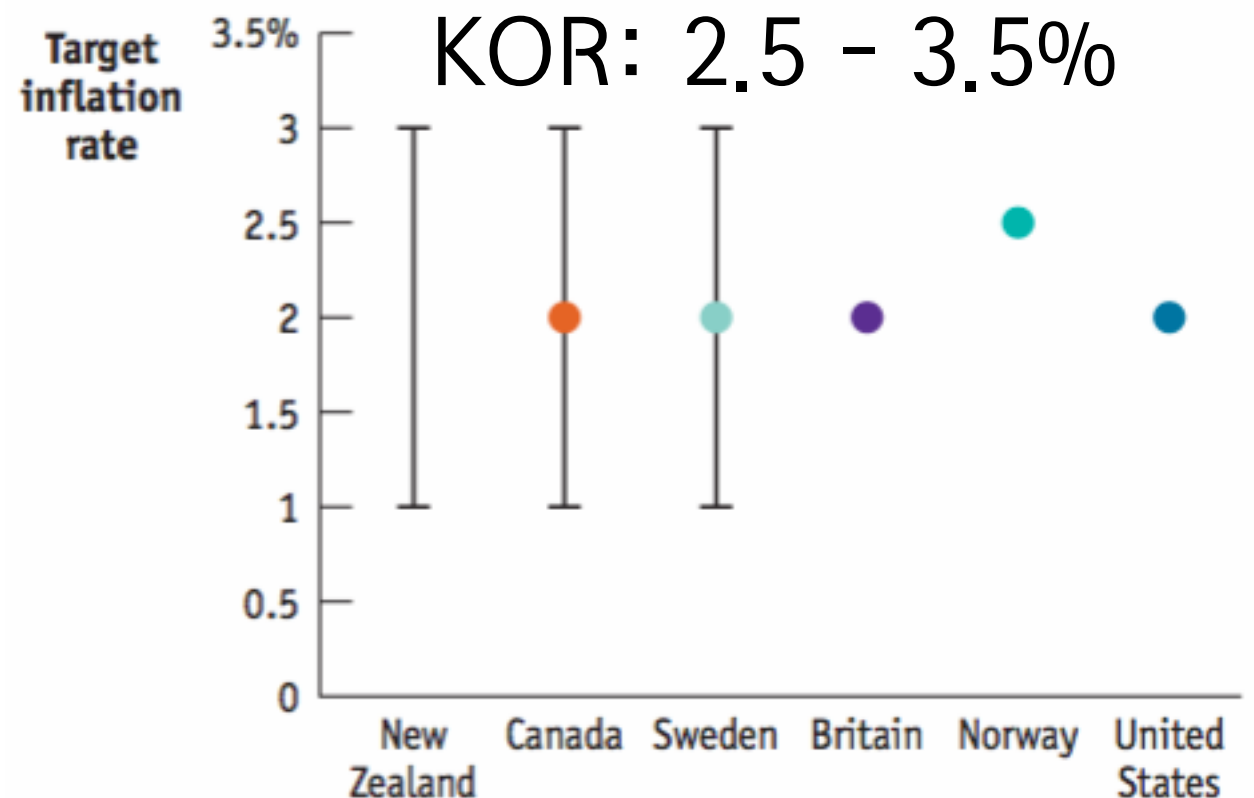
Sources: Bureau of Labor Statistics; Congressional Budget Office; Federal Reserve Bank of St. Louis; Glenn D. Rudebusch, "The Fed's Monetary Policy Response to the Current Crisis," *FRBSF Economic Letter* #2009-17 (May 22, 2009).





# Inflation Targeting

- 물가안정목표제
- 목표로 하는 인플레이션율을 달성하기 위해 통화정책 수 행
- Taylor Rule: Backward Looking
- Inflation Targeting: Forward Looking



# Inflation Targeting: Advocates

- Transparency
  - 중앙은행의 행태가 예측가능 --> 불확실성 저하
- Accountability
  - 중앙은행이 잘했는지를 평가 가능: 얼마나 목표 인플레이션율에 가깝게 만들었는가? --> 중앙은행 책임성 강화

# Inflation Targeting: Critics

- 위급할 때에는 Taylor Rule이나 Inflation Targeting보다 우선시해야 할 상황이 존재 (ex: US 2007 Financial Crisis --> FRB rate ↓ ↓)



# Reconciling Liquidity Preference Model (CH30) and Loanable Fund Model (CH25)

# Liquidity Preference Model and Loanable Fund Model: Short Run

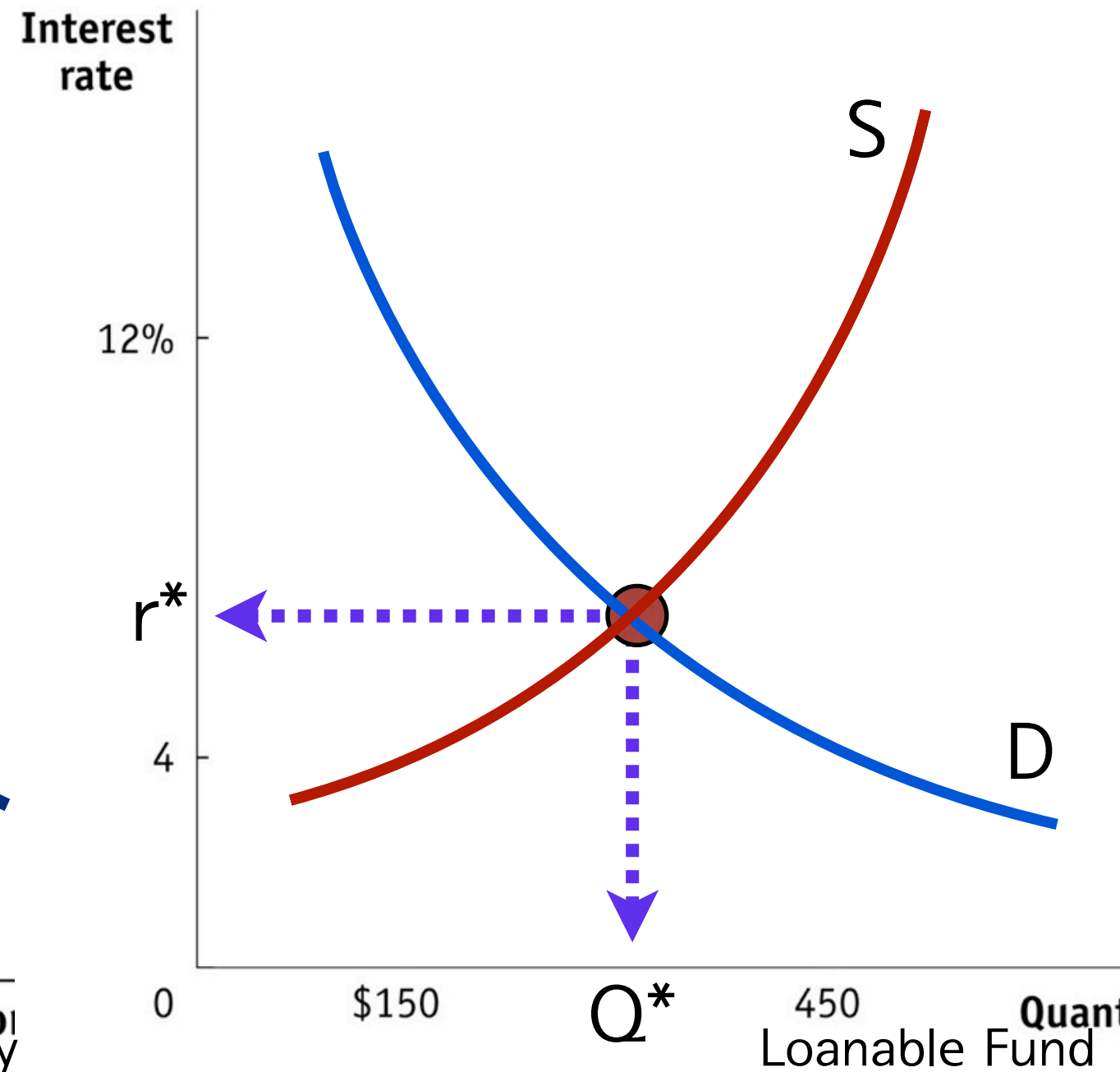
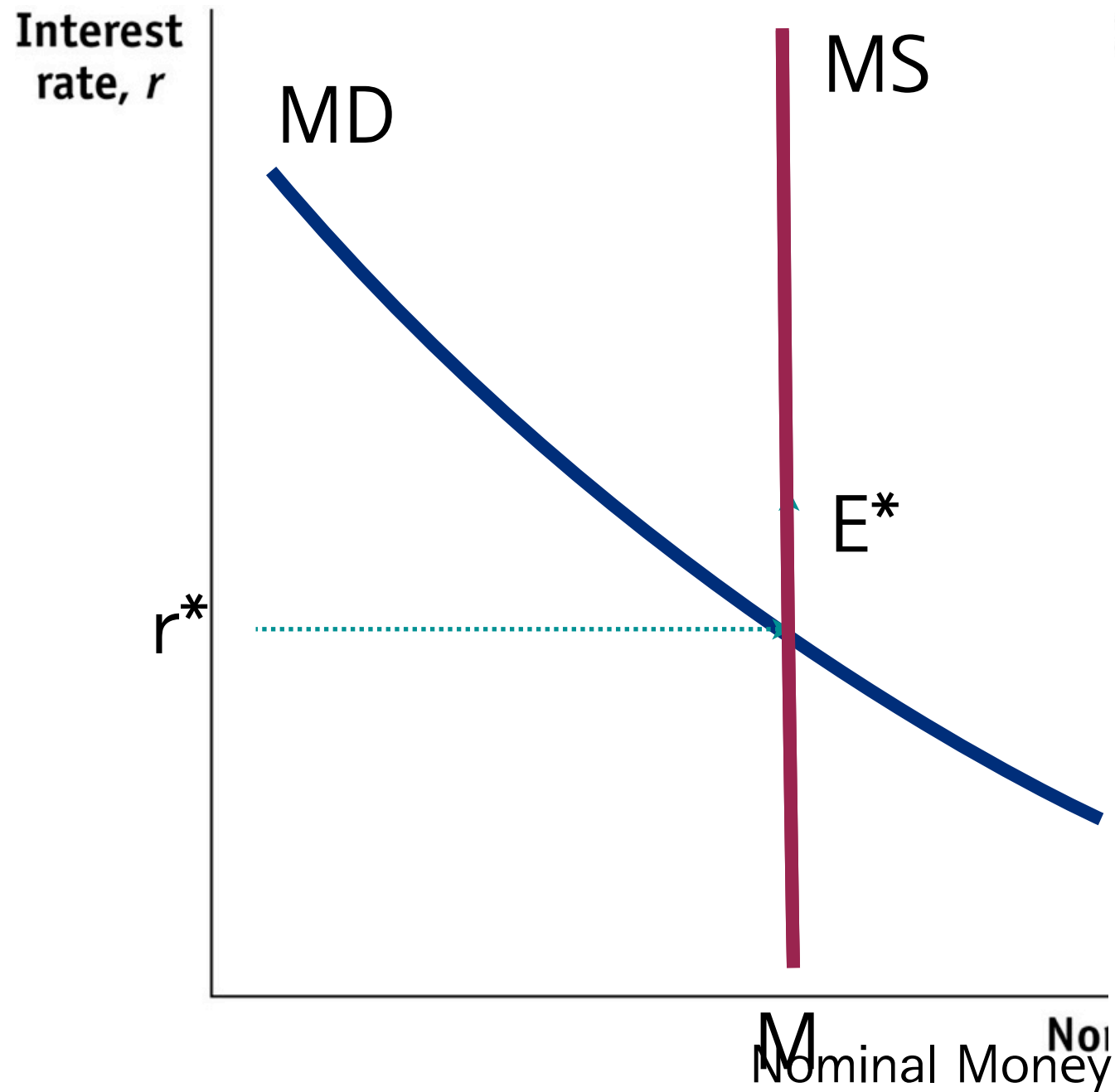
- 이자율 하락[상승]시..
  - 화폐공급 증가[감소]: 속도증가[감소]로 볼 수도 있음
  - 승수효과 발생: 이때 저축량( $\neq$  저축률)도 증가[감소]
  - 저축량 증가[감소] ➡ 대부자금공급증가[감소]  
➡ 대부자금공급곡선 오른쪽[왼쪽]이동

# Review: IS Equivalence

- $Y = C + I + G$
- $i \downarrow \Rightarrow C \uparrow$  and  $I \uparrow \Rightarrow Y \uparrow$  and  $S \uparrow (\equiv I)$
- $\Delta S \equiv \Delta I$  : 대부자금 공급  $\uparrow$

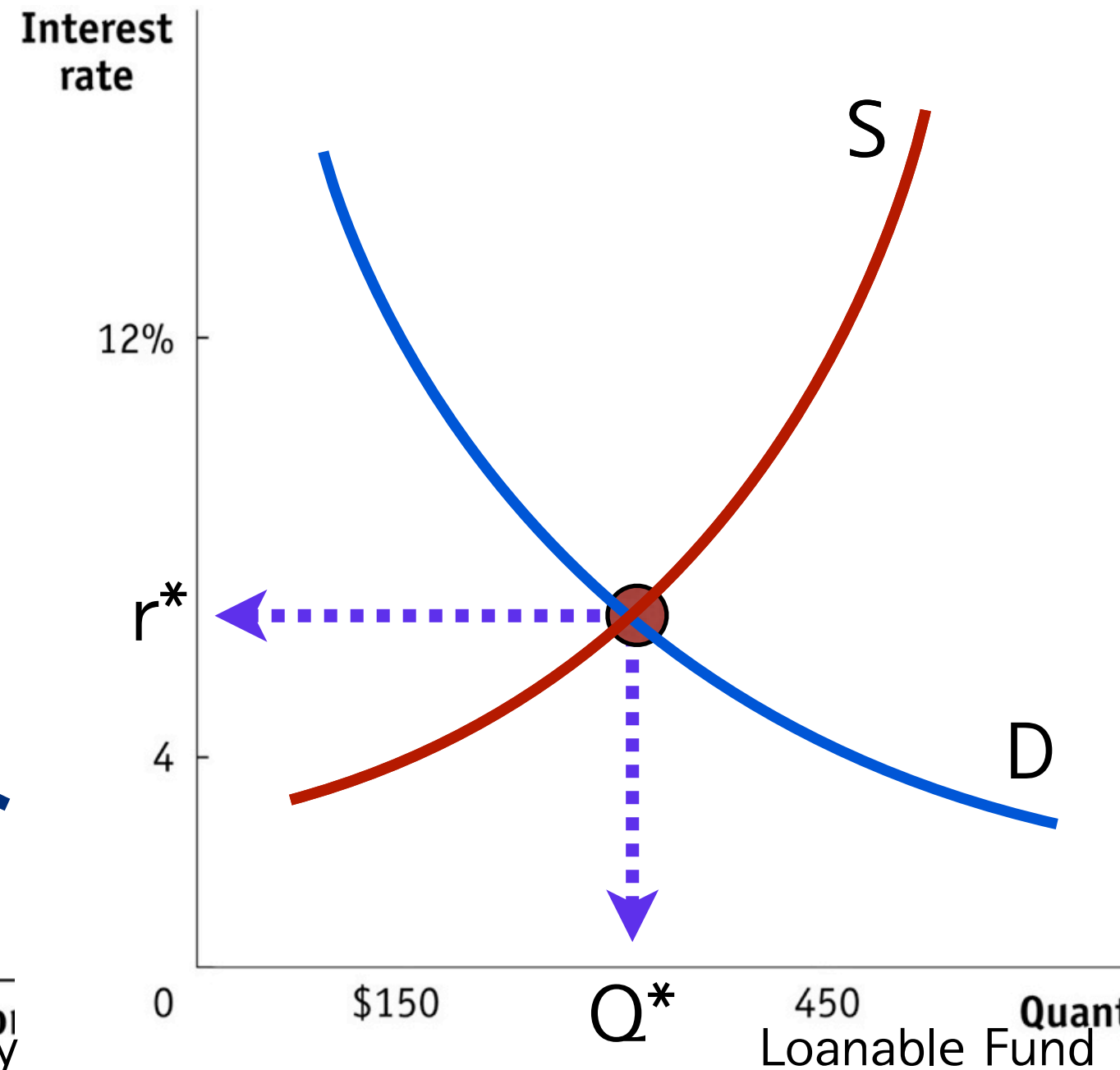
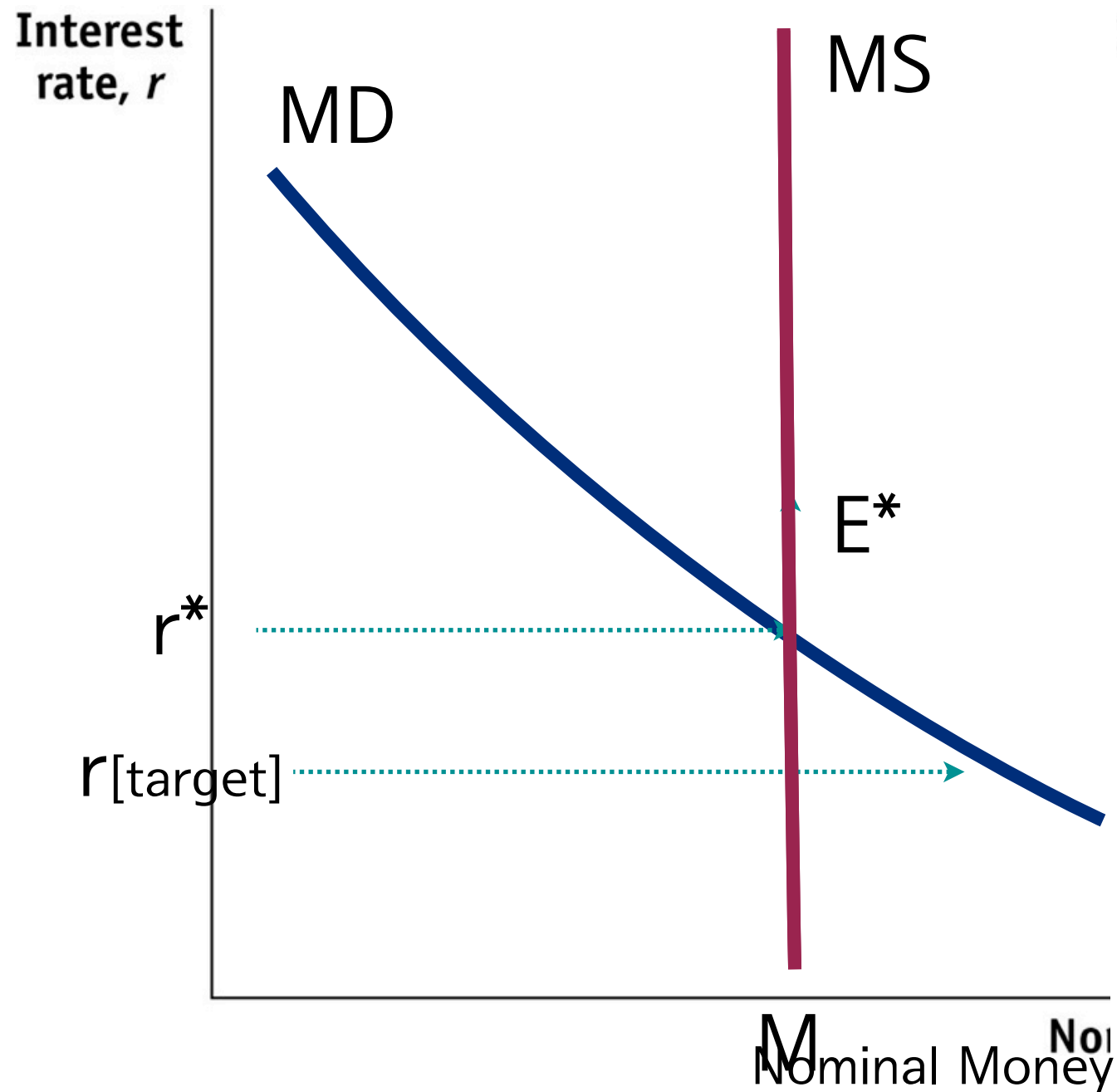
# Monetary Policy and Interest Rate (SR)

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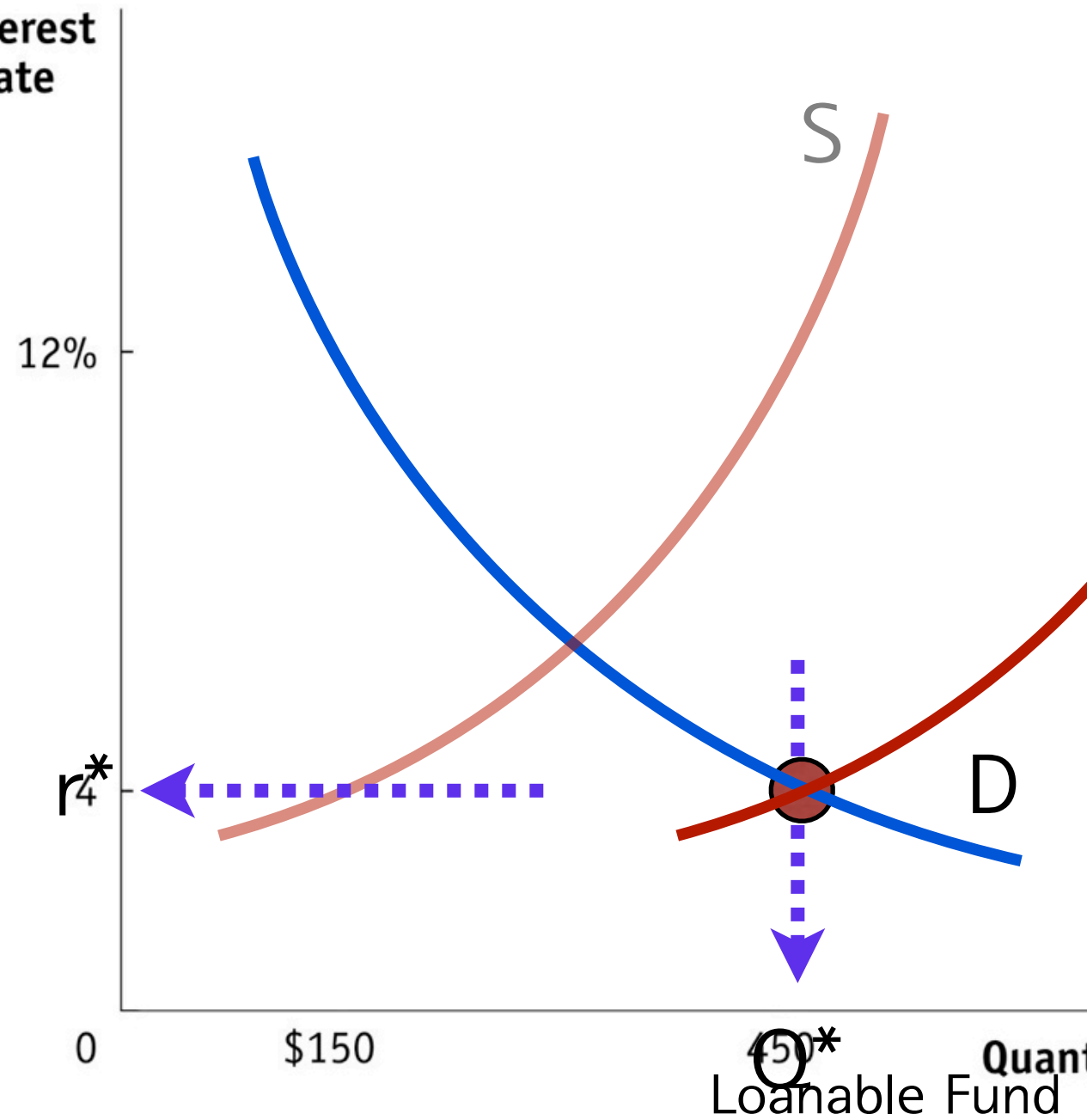
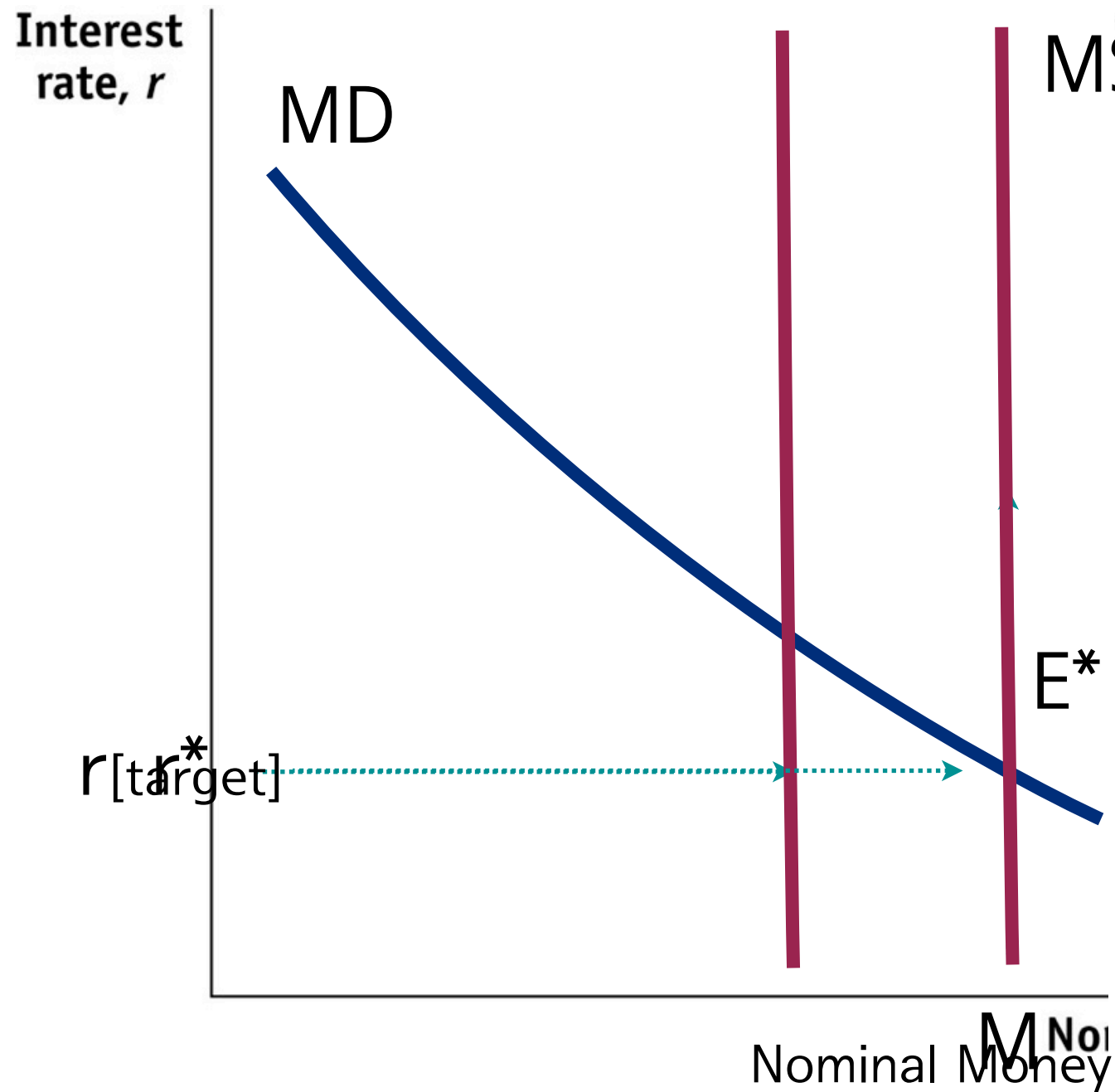




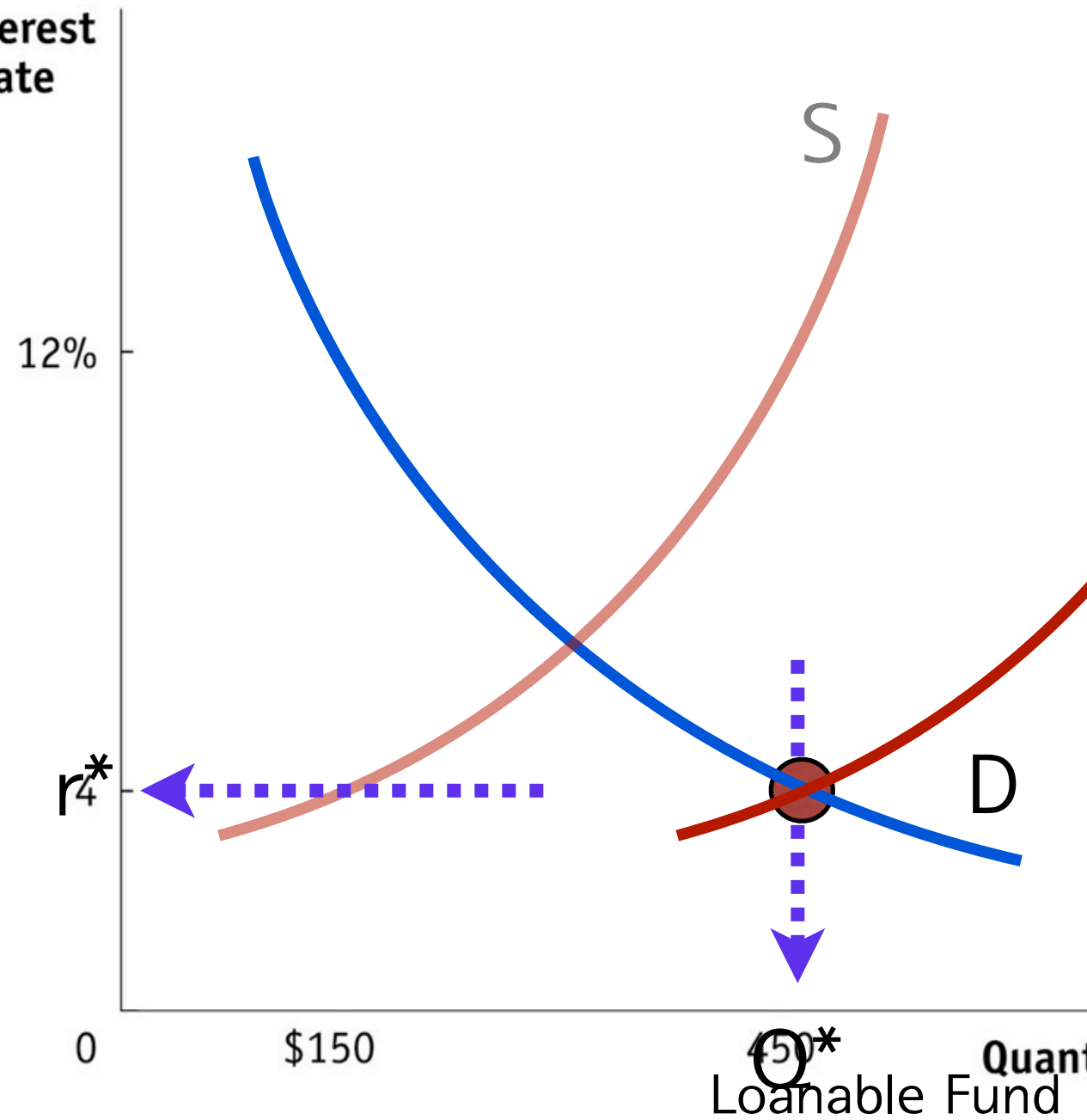
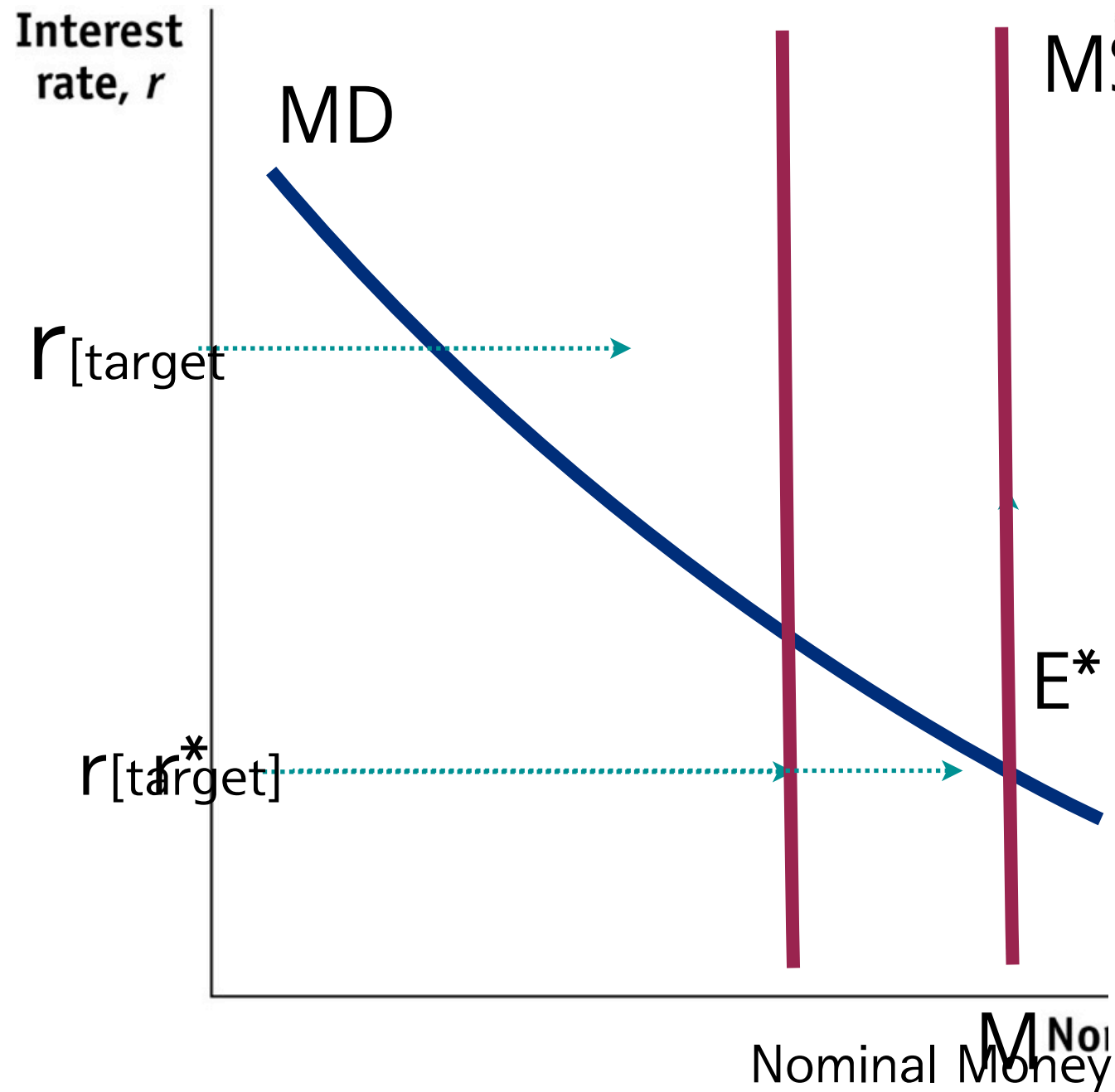
# Monetary Policy and Interest Rate (SR)



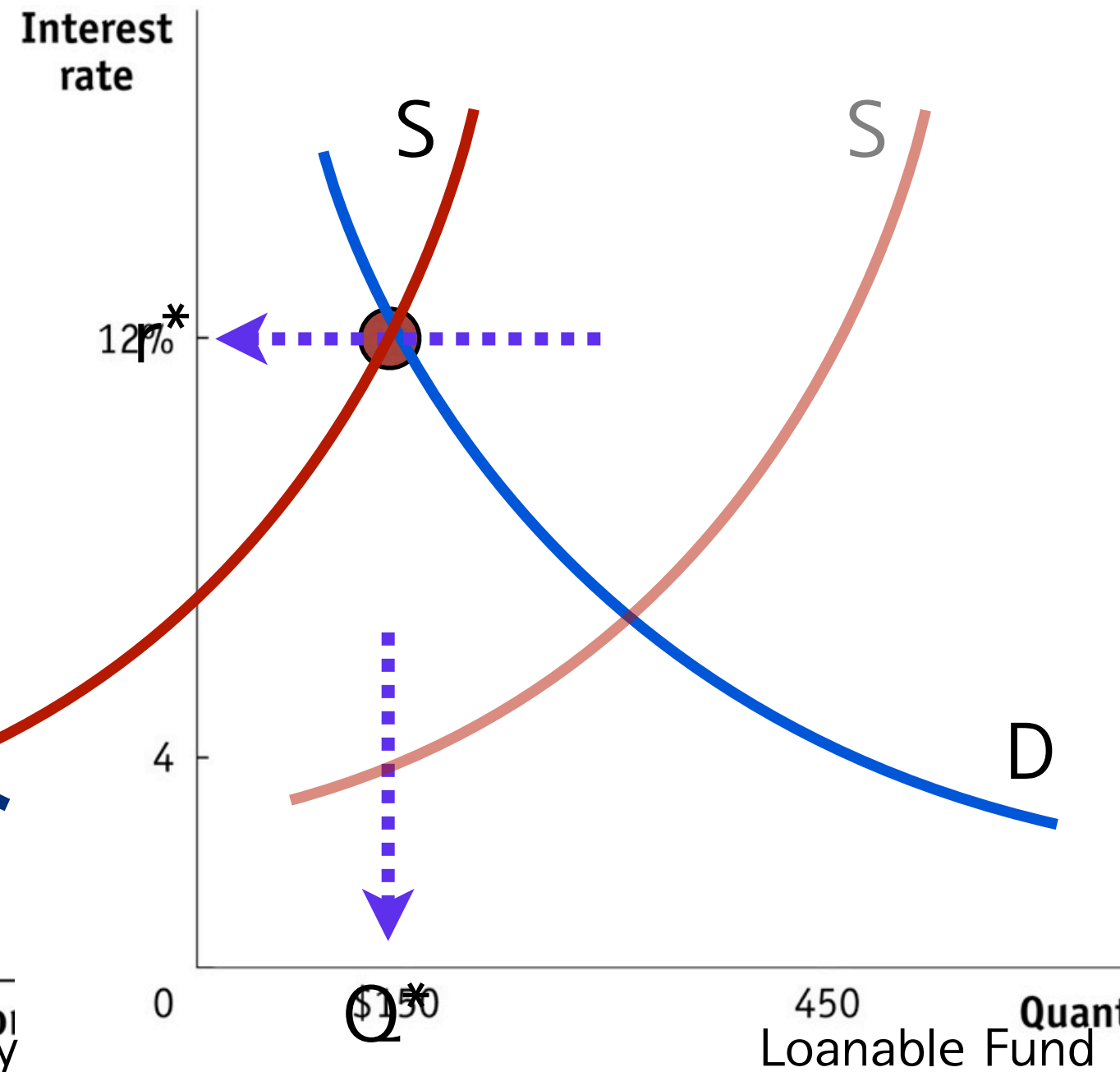
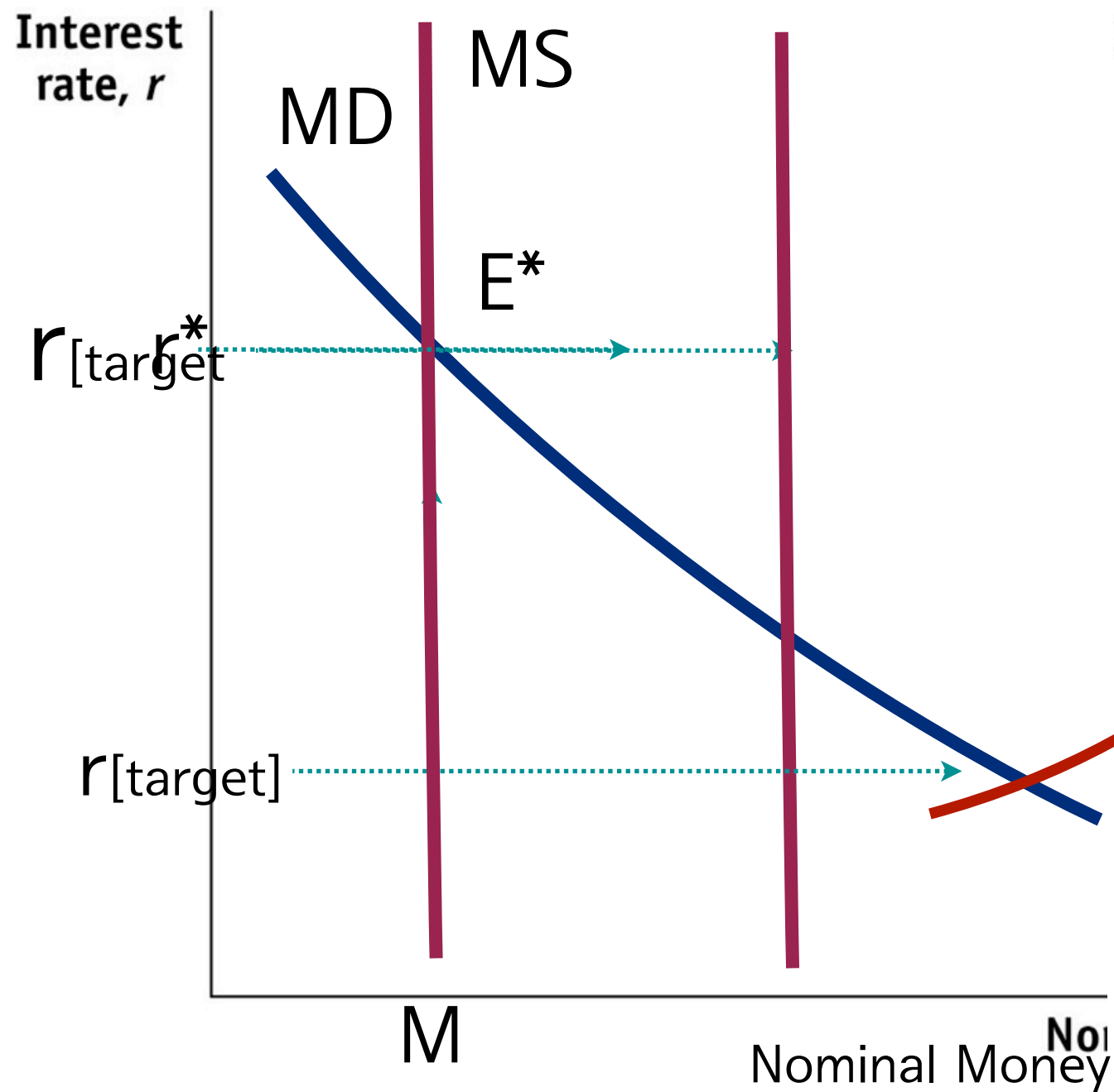
# Monetary Policy and Interest Rate (SR)



# Monetary Policy and Interest Rate (SR)



# Monetary Policy and Interest Rate (SR)



# Implications

- 단기이자율은 화폐공급과 수요로 결정됨
- 대부자금시장은 화폐시장의 변동에 뒤따라 움직임
  - 화폐시장변동 ➡ 대부자금공급 변동
- 장기에는 인과역전
  - 대부자금시장이 균형이자율 결정 ➡ 화폐시장  
조용 (물가의 변화)

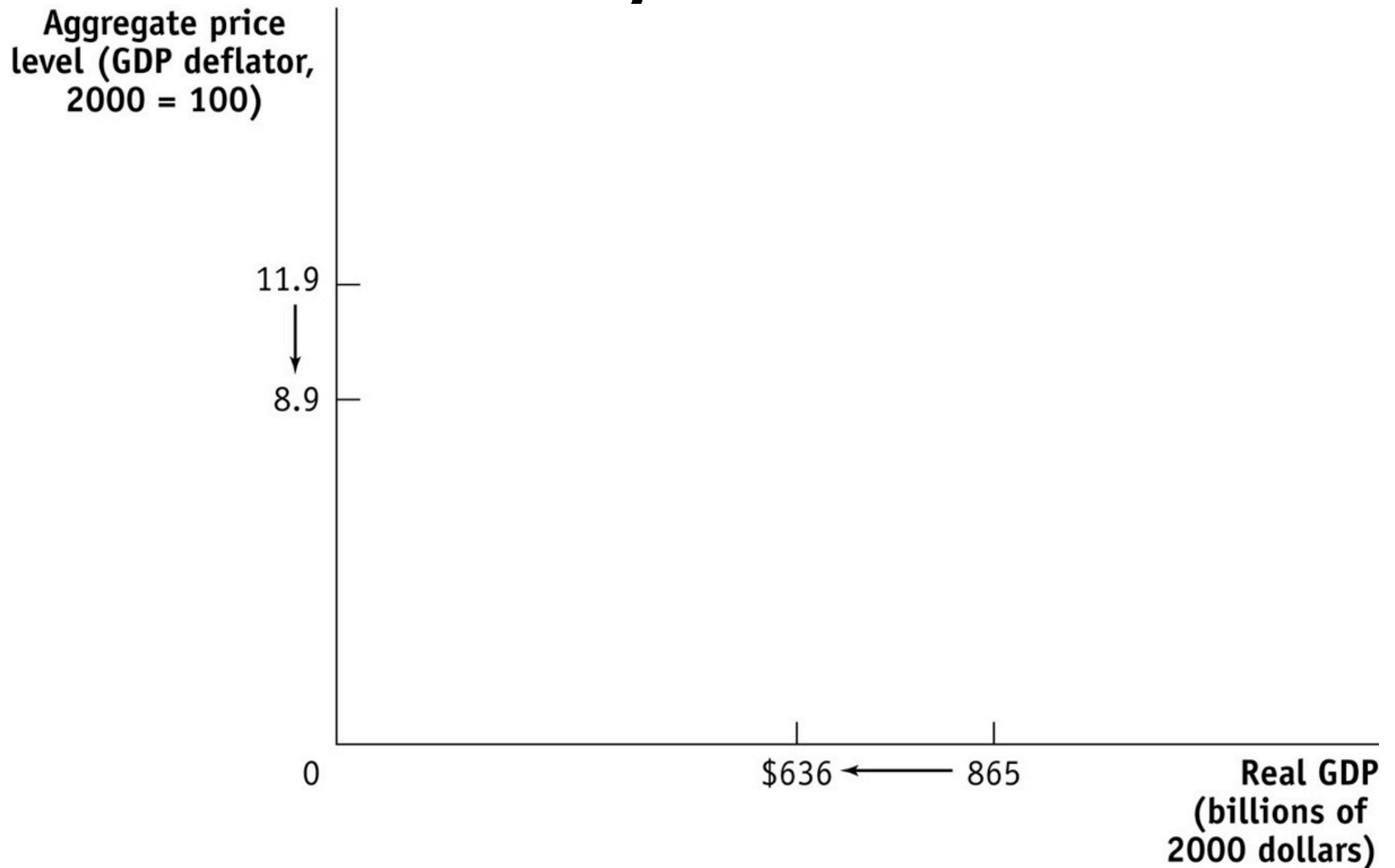
# Money, Output, Prices Long-run Analysis



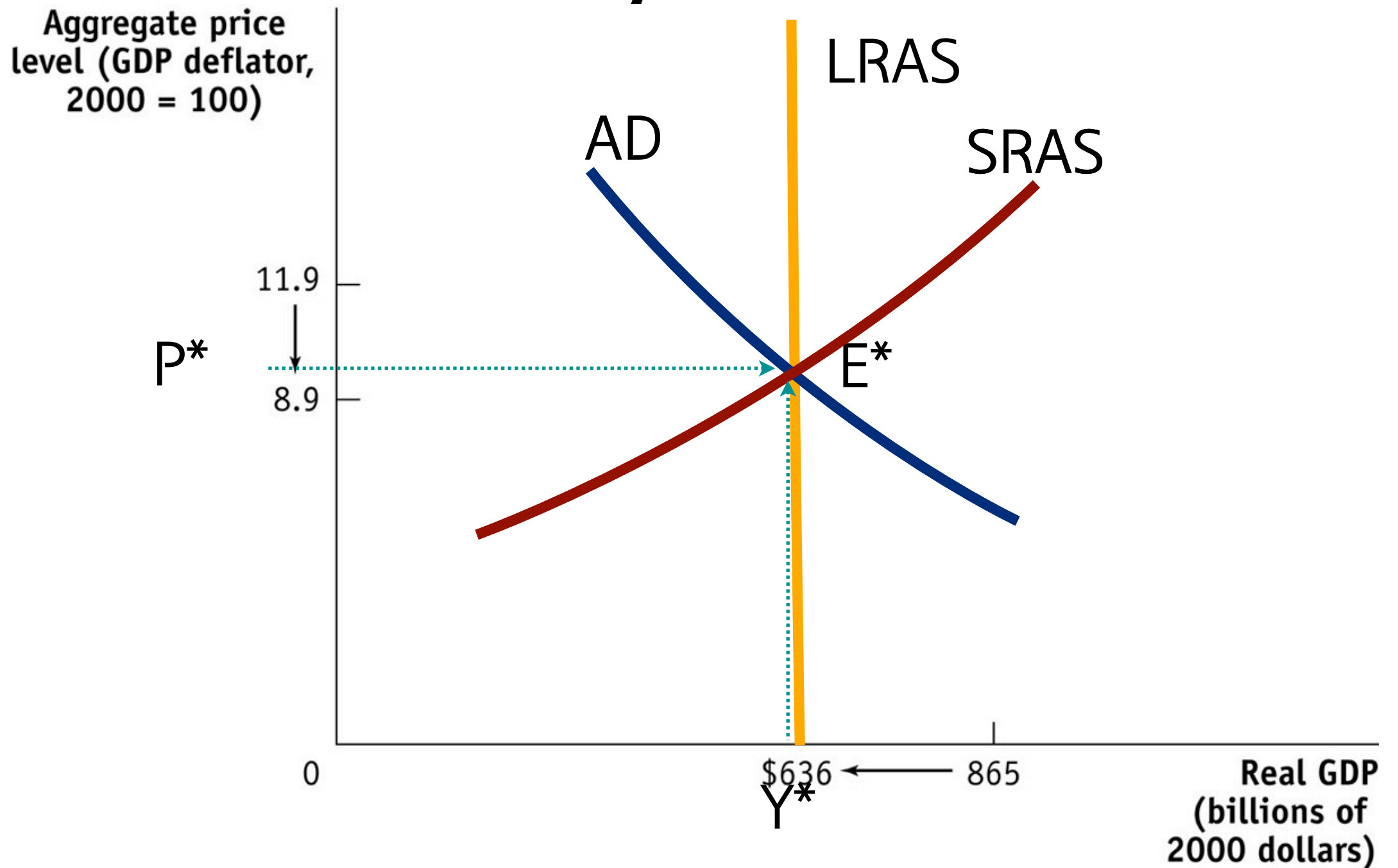
# Long Run Equilibrium and Money Supply

- 통화정책은 여러가지 이유로 장기균형점으로부터 경제상황을 더 이탈시킬 수 있음
  - 판단착오
  - 경기안정 이외의 고려사항 발생
- 하지만 장기적으로는 통화량 변화는 물가외의 실물 요소들(실질총생산, 이자율)을 변화시키지 않음: 화폐중립성

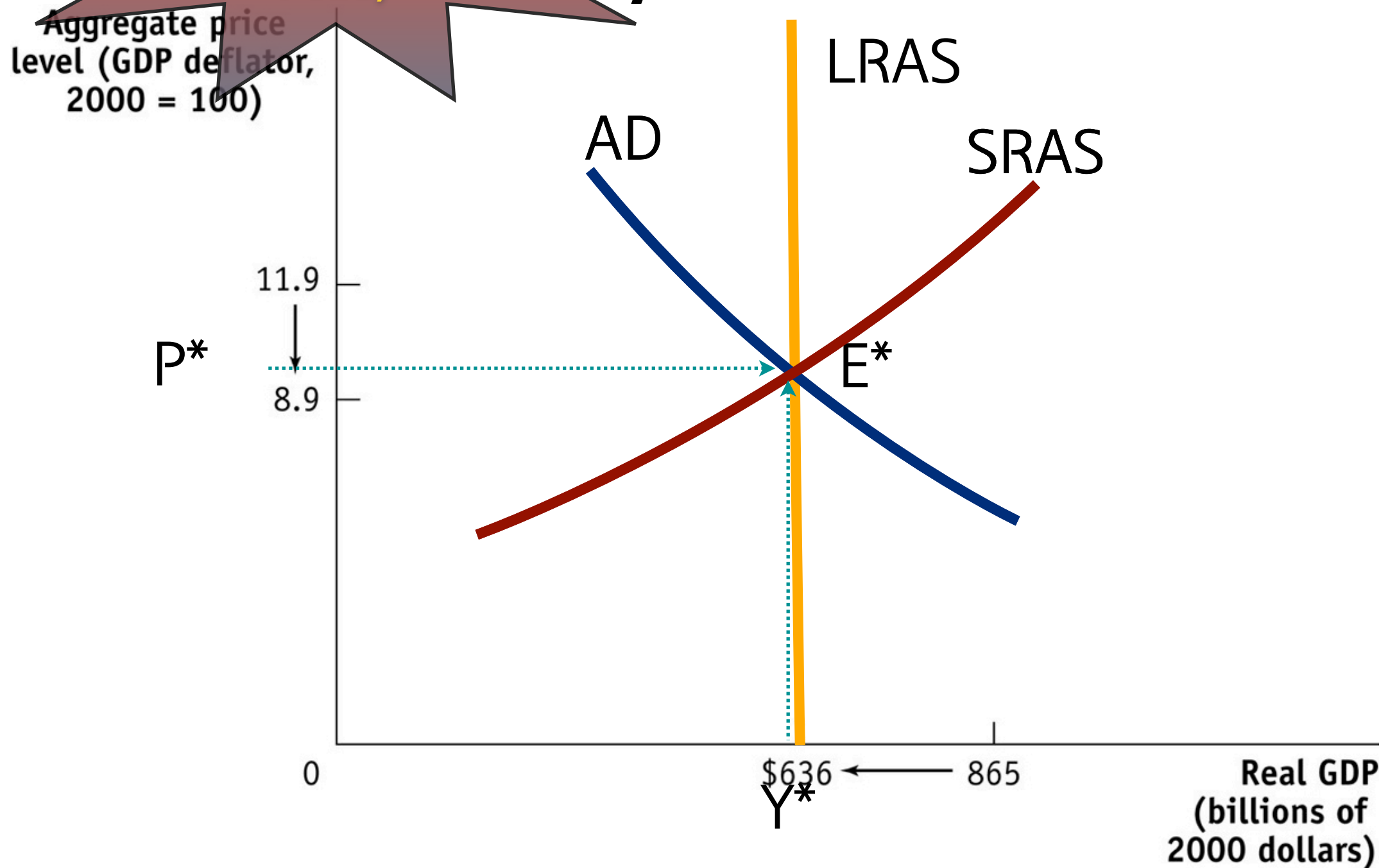
# Expansionary Monetary Policy: LR



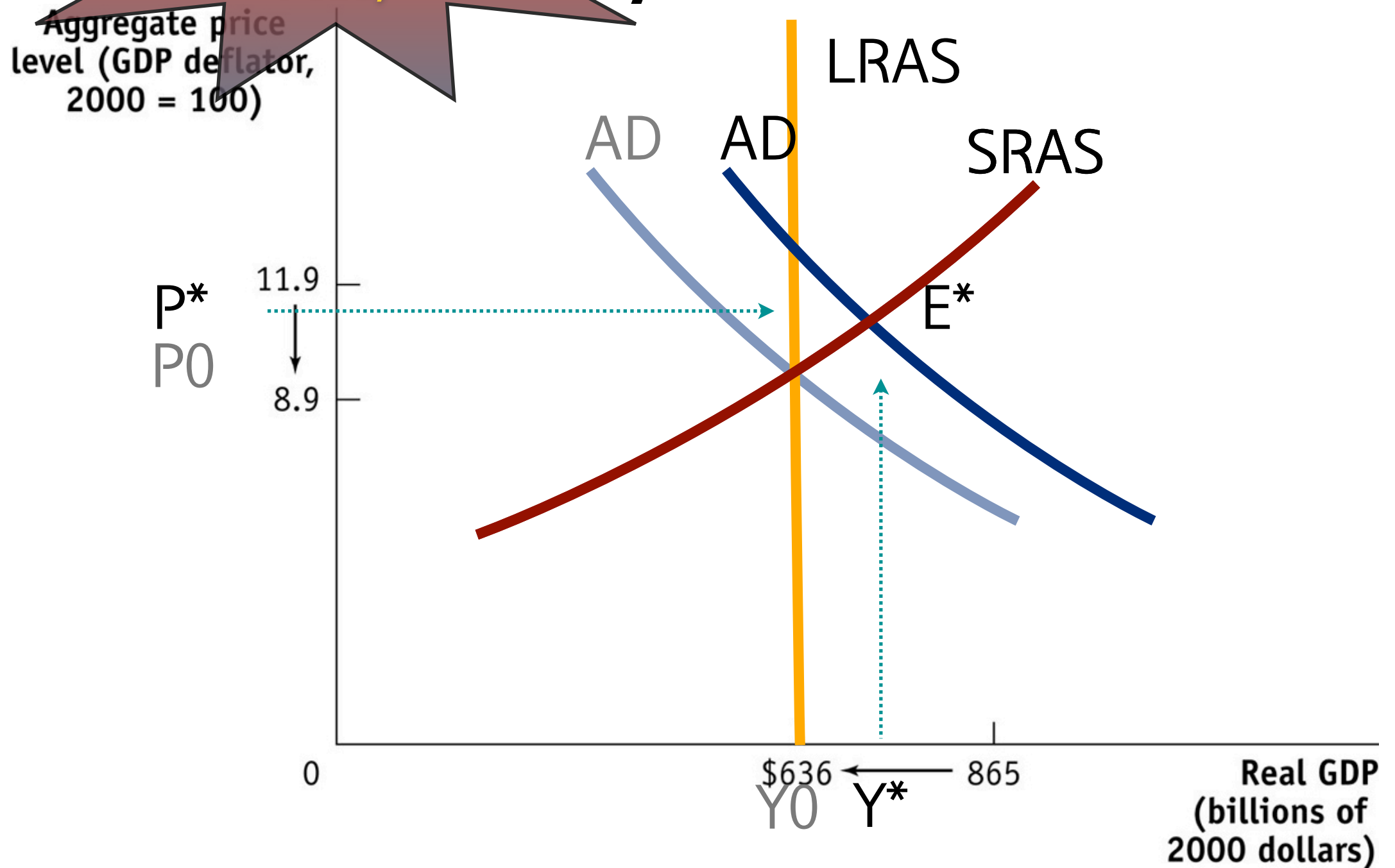
# Expansionary Monetary Policy: LR



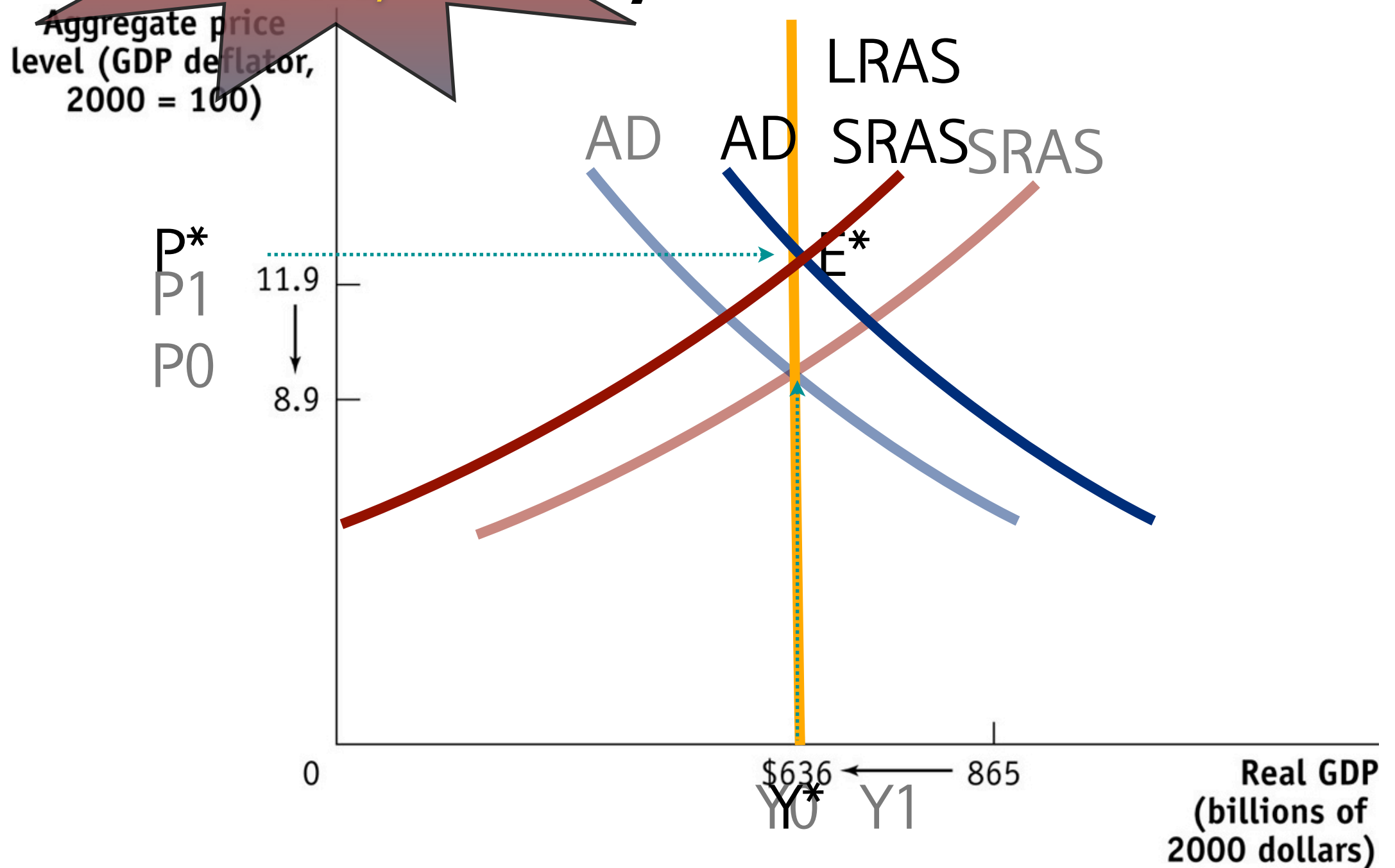
# Expansionary Monetary Policy: LR



# Expansionary Monetary Policy: LR

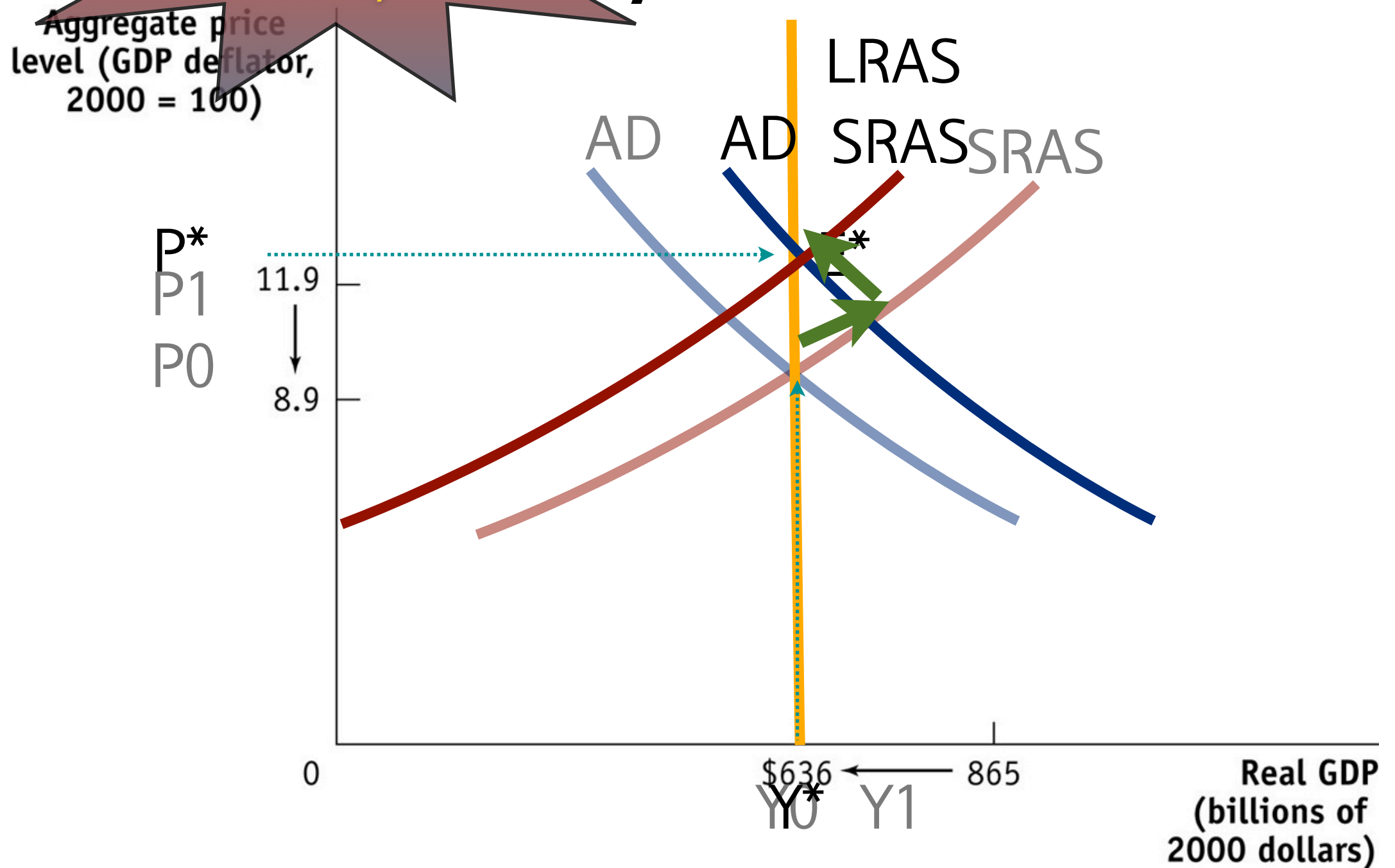


# Expansionary Monetary Policy: LR



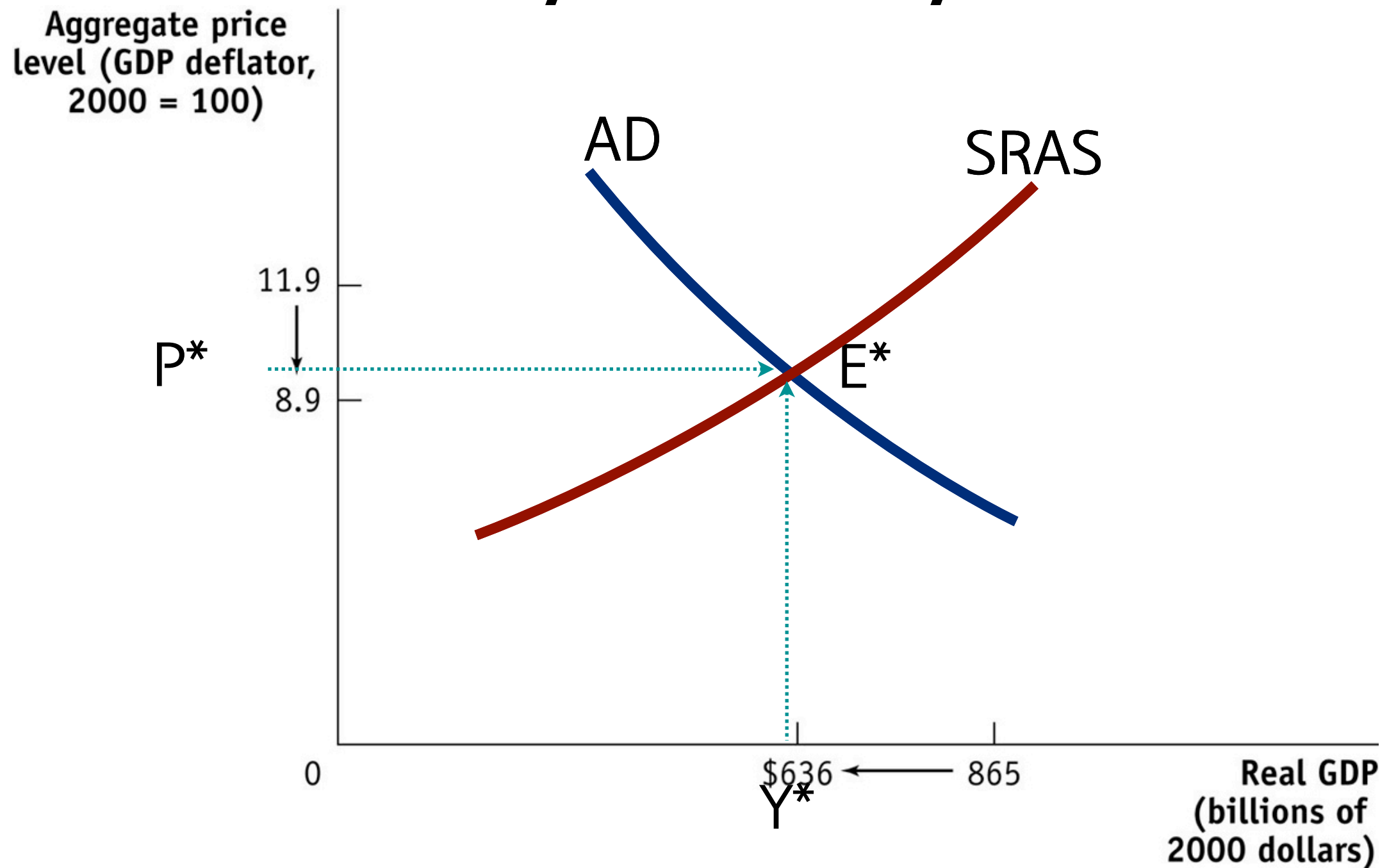


# Expansionary Monetary Policy: LR

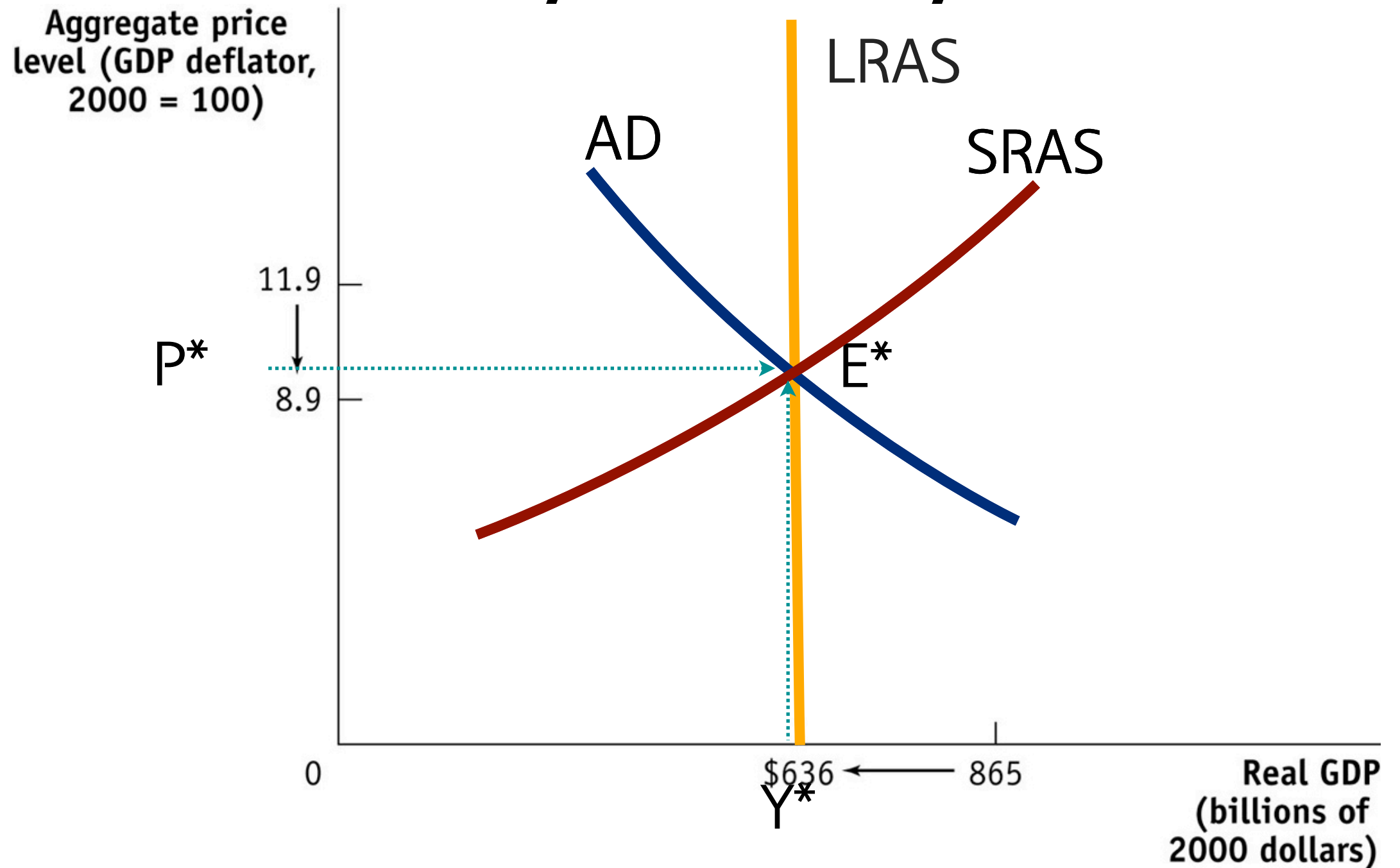


# Contractionary Monetary Policy: LR

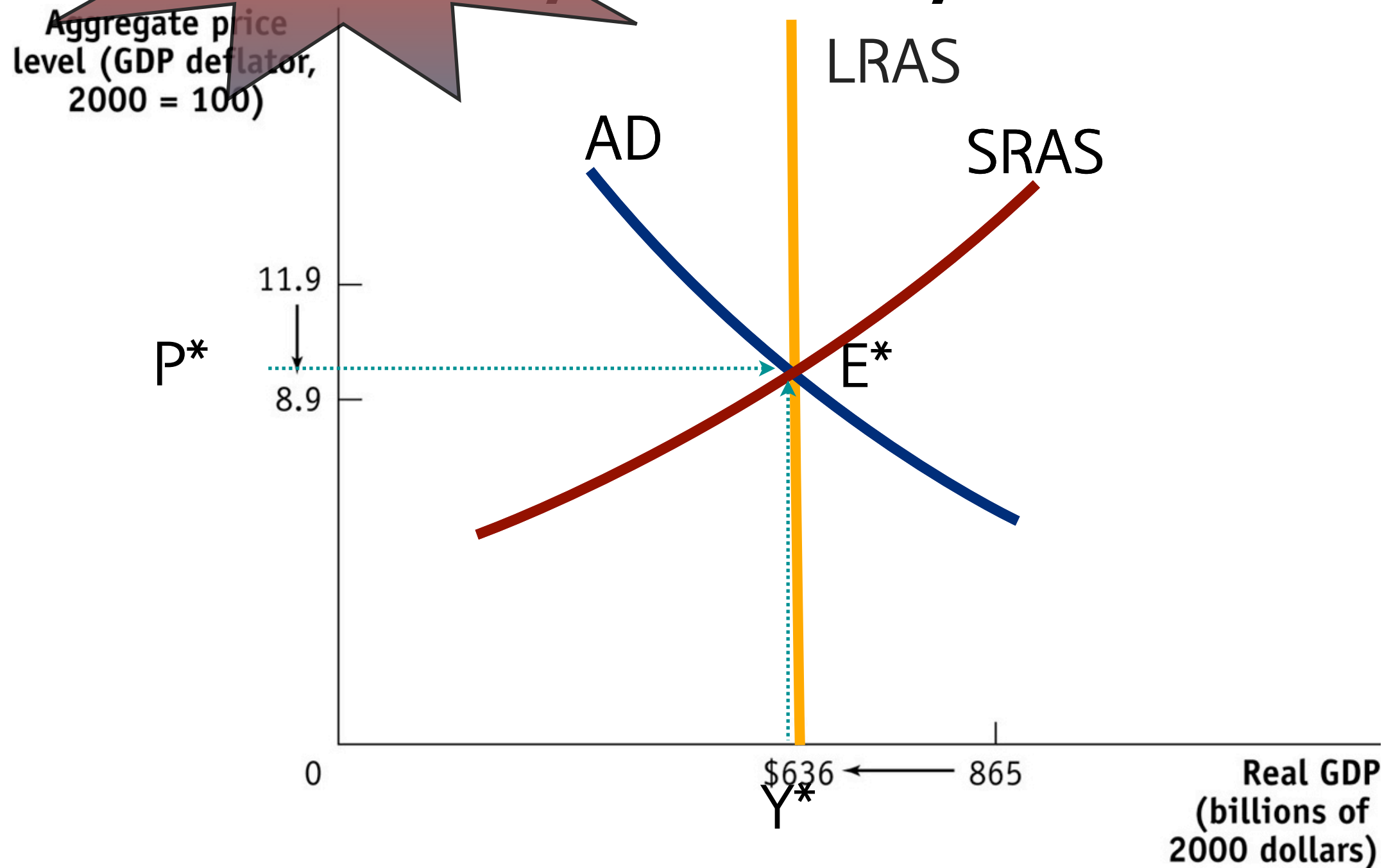
# Contractionary Monetary Policy: LR



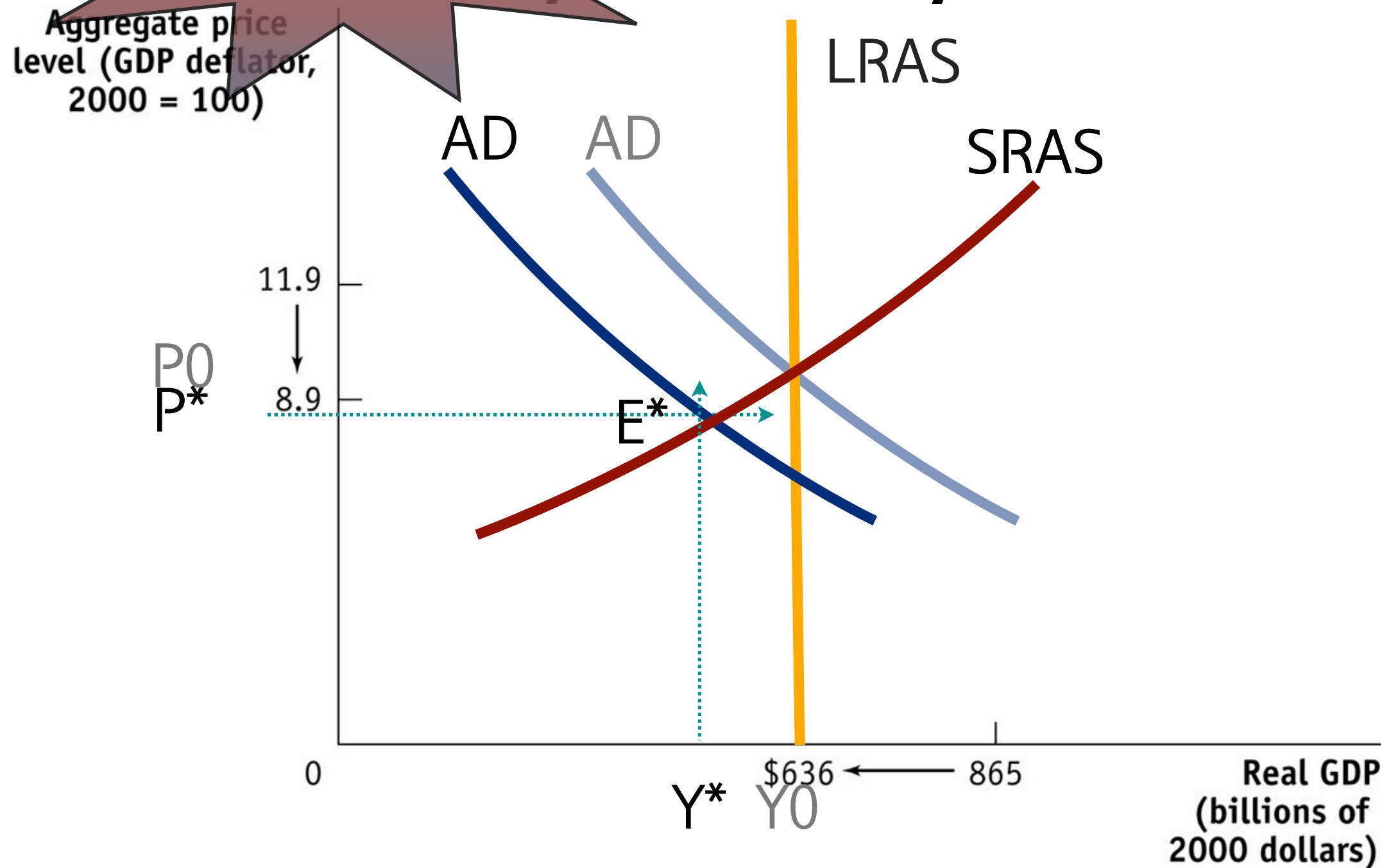
# Contractionary Monetary Policy: LR



# Contractionary Monetary Policy: LR

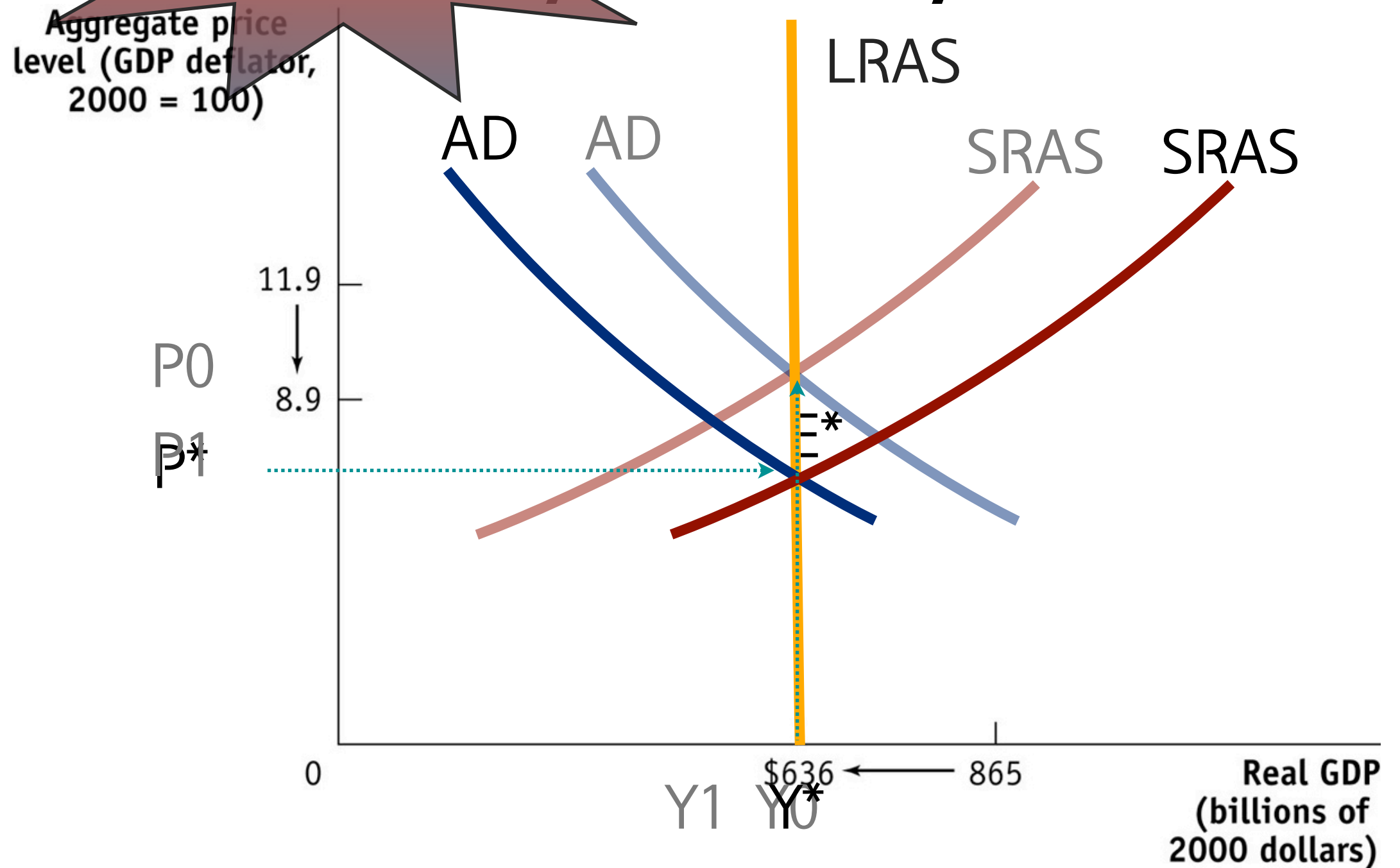


# Contractionary Monetary Policy: LR

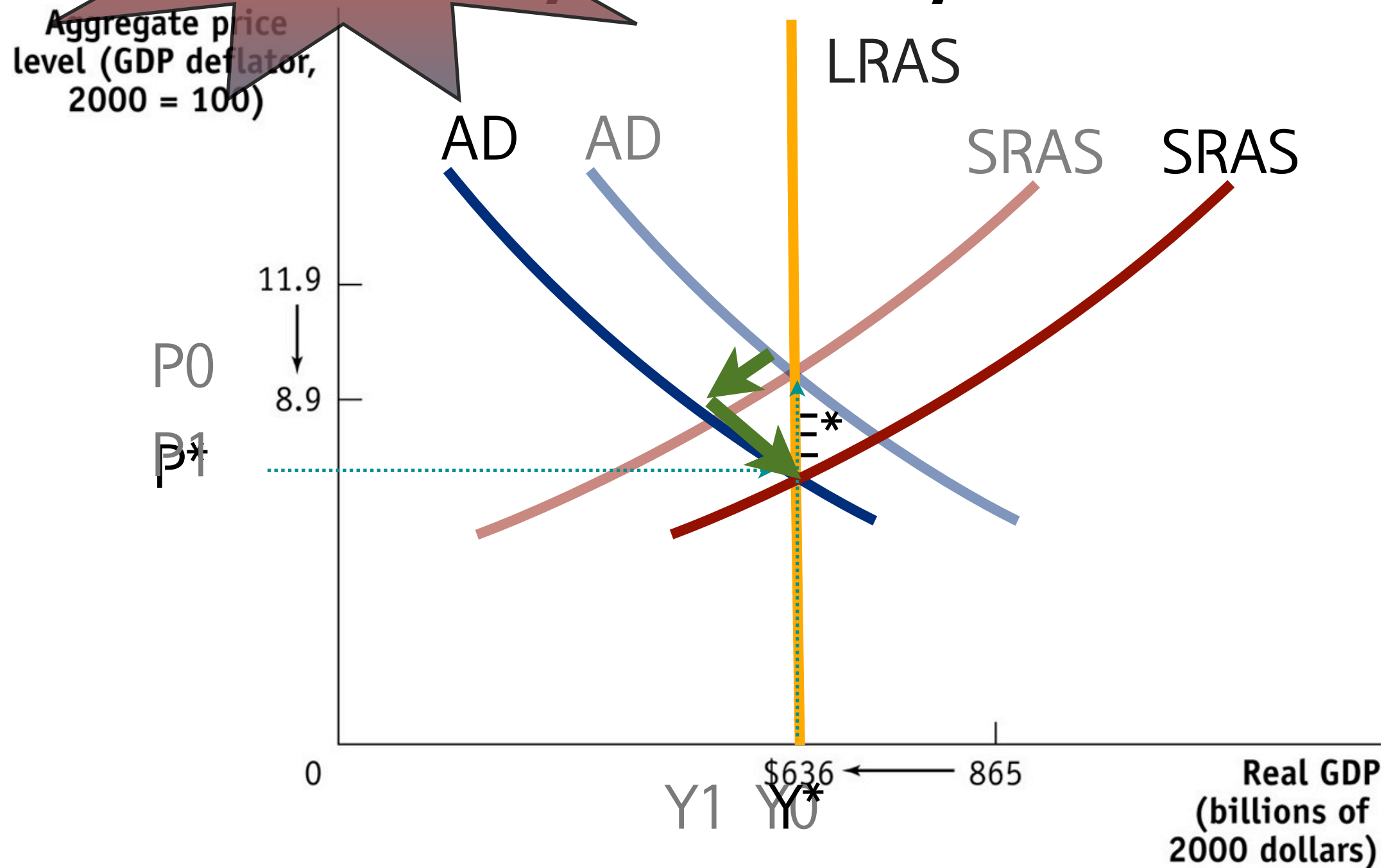




# Contractionary Monetary Policy: LR



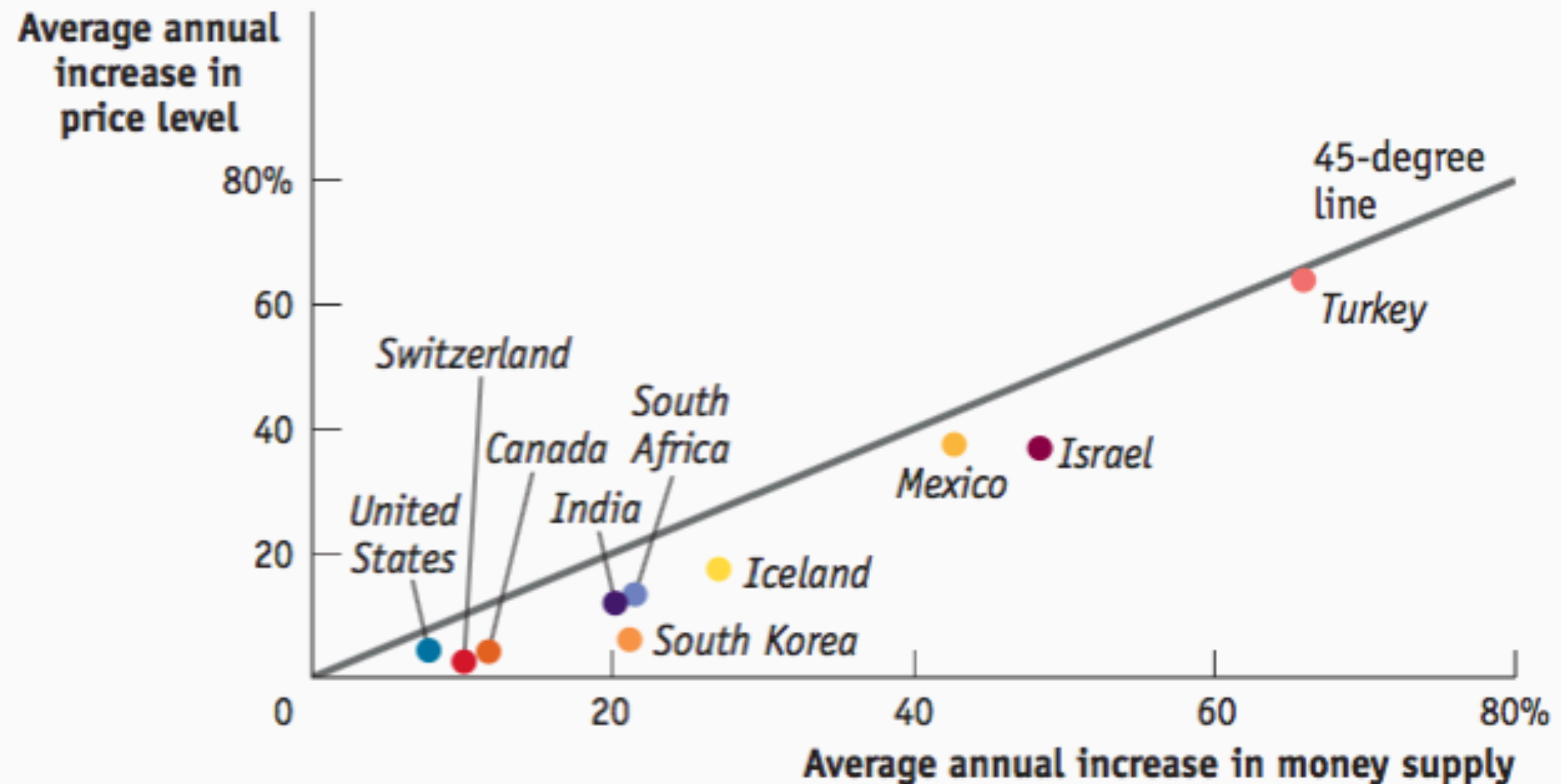
# Contractionary Monetary Policy: LR



# Money Neutrality

- 화폐공급은 장기적으로 물가에만 영향을 끼침
  - 화폐공급 증가: (장기) 물가증가
  - 화폐공급 감소: (장기) 물가감소
- 화폐공급이 장기적으로 경제에 실질적 영향을 미치지 못한다는 사실을 “**화폐중립성**”으로 표현

# The Long-run Relationship between Money and Inflation

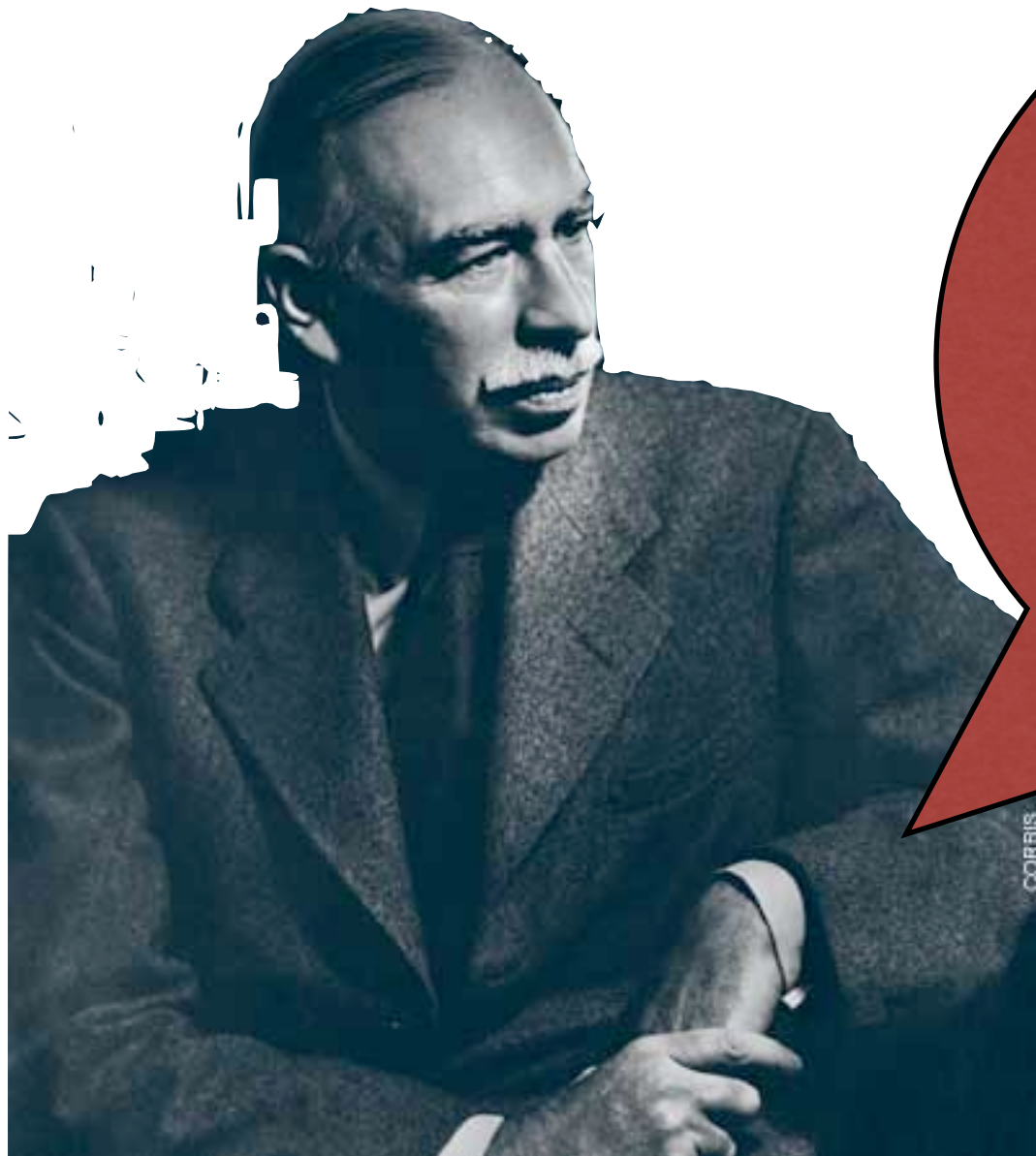


Source: Federal Reserve Bank of St. Louis.

# Then, is Monetary Policy useless?



# Then, is Monetary Policy useless?



In the long  
run we are all  
dead!



# Meaning of Short run Effect

- 장기적으로 중립적일지라도 단기적으로 발생하는 악영향은 최소화할 필요 존재
  - 단기적: 재정/통화 정책을 통한 단기적 부작용 최소화
  - 장기적: 생산성 향상(장기 성장 추세, 혹은 장기 균형 생산량 증가율 향상)을 위한 장기 투자, 기술 개발 등

# Interest rate: Long run analysis

# 장기 이자율 결정

- 화폐공급으로 인한 단기 이자율 하락은 장기 물가 상승에 의해 상쇄됨
  - $M \uparrow \Rightarrow RMD \uparrow \Rightarrow (\text{Long-Run}) \Rightarrow P \uparrow \Rightarrow M/P \downarrow \Rightarrow RMD \downarrow (\text{Equilibrium Level})$
- 장기적으로 이자율은 잠재생산량에 조응하는 수준으로 돌아가게 됨

# Monetary Policy and Interest Rate

Interest  
rate,  $r$

$r^*$

No

Interest  
rate

12%

$r^*$

4

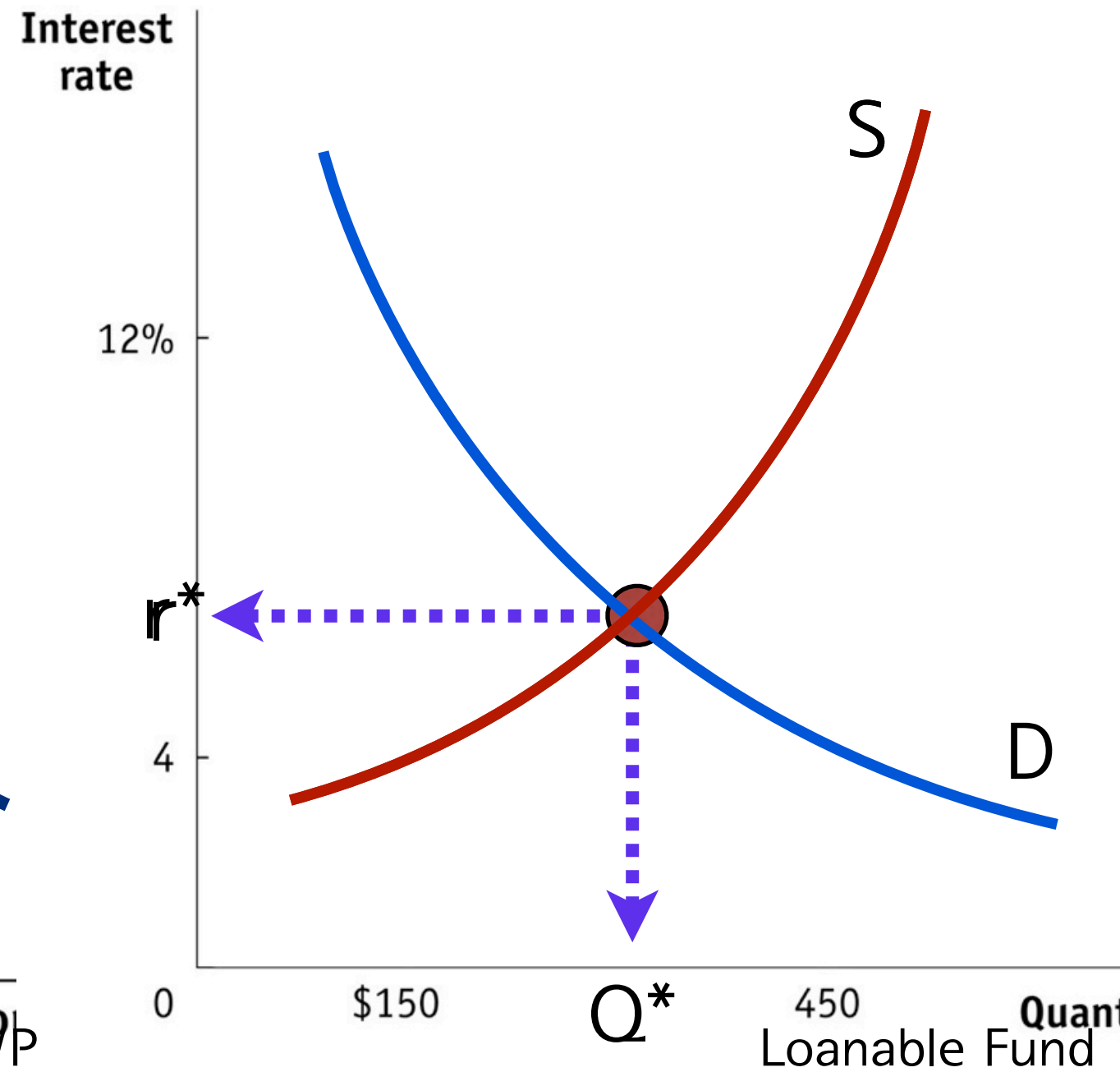
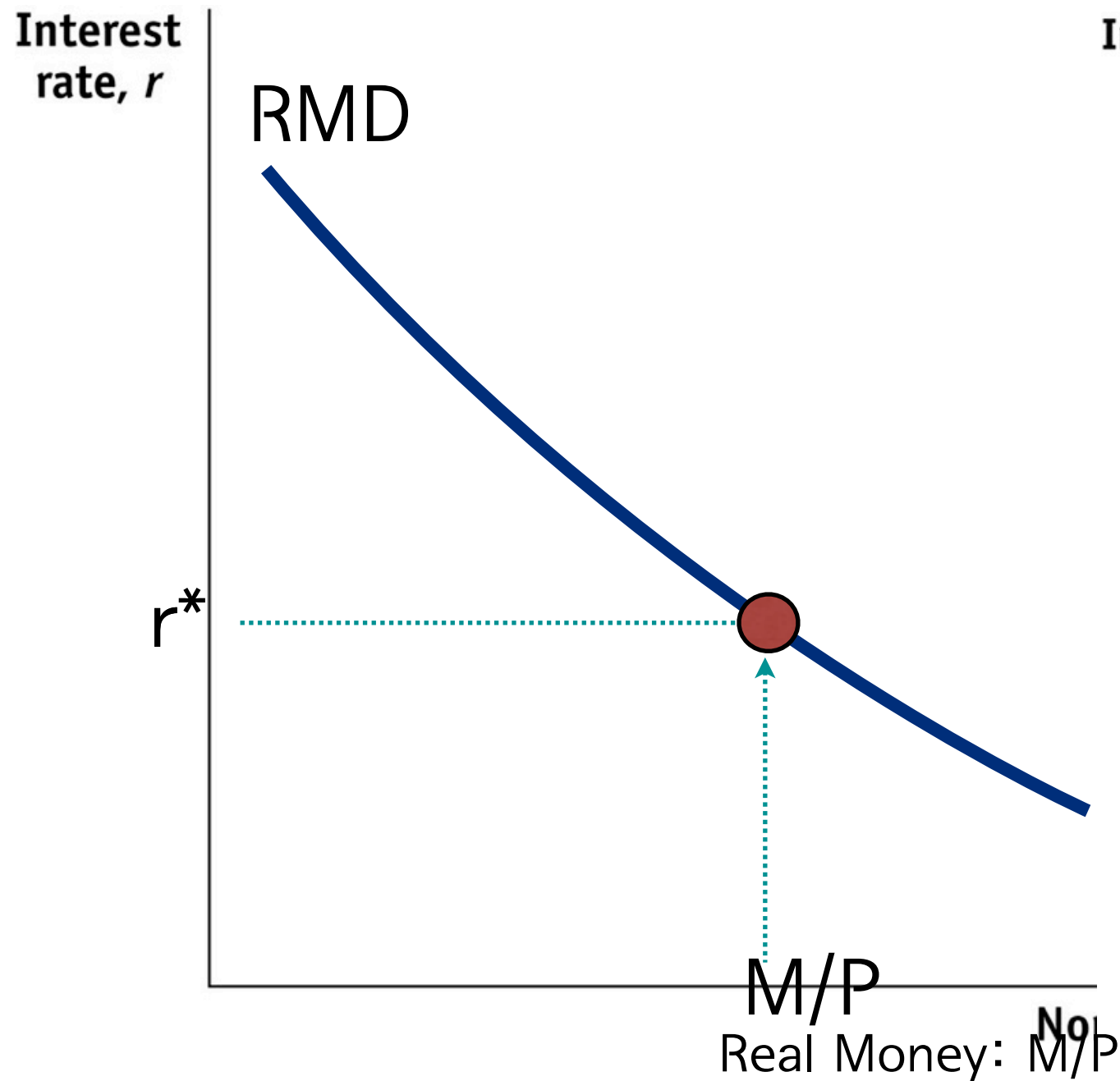
0

\$150

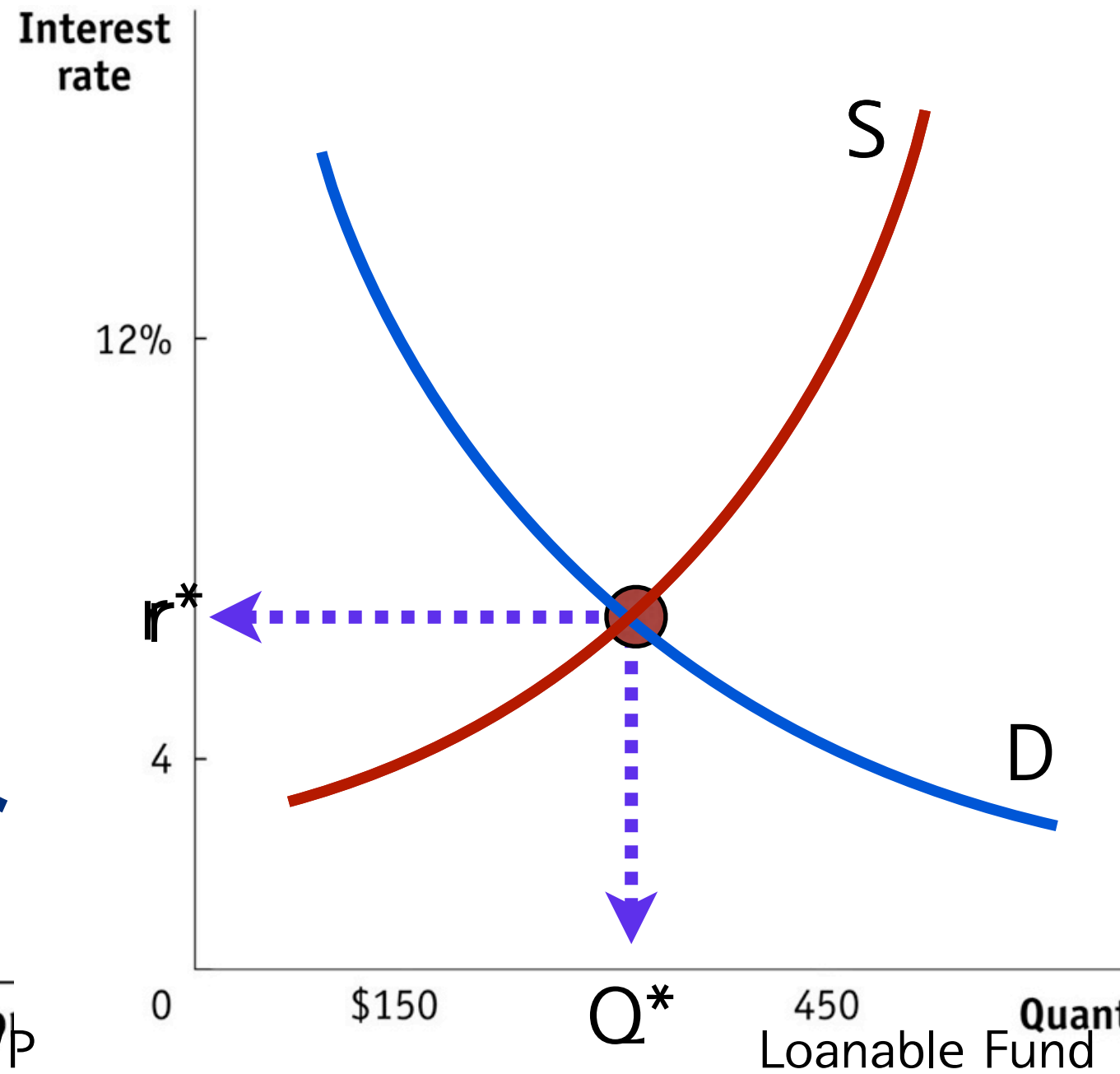
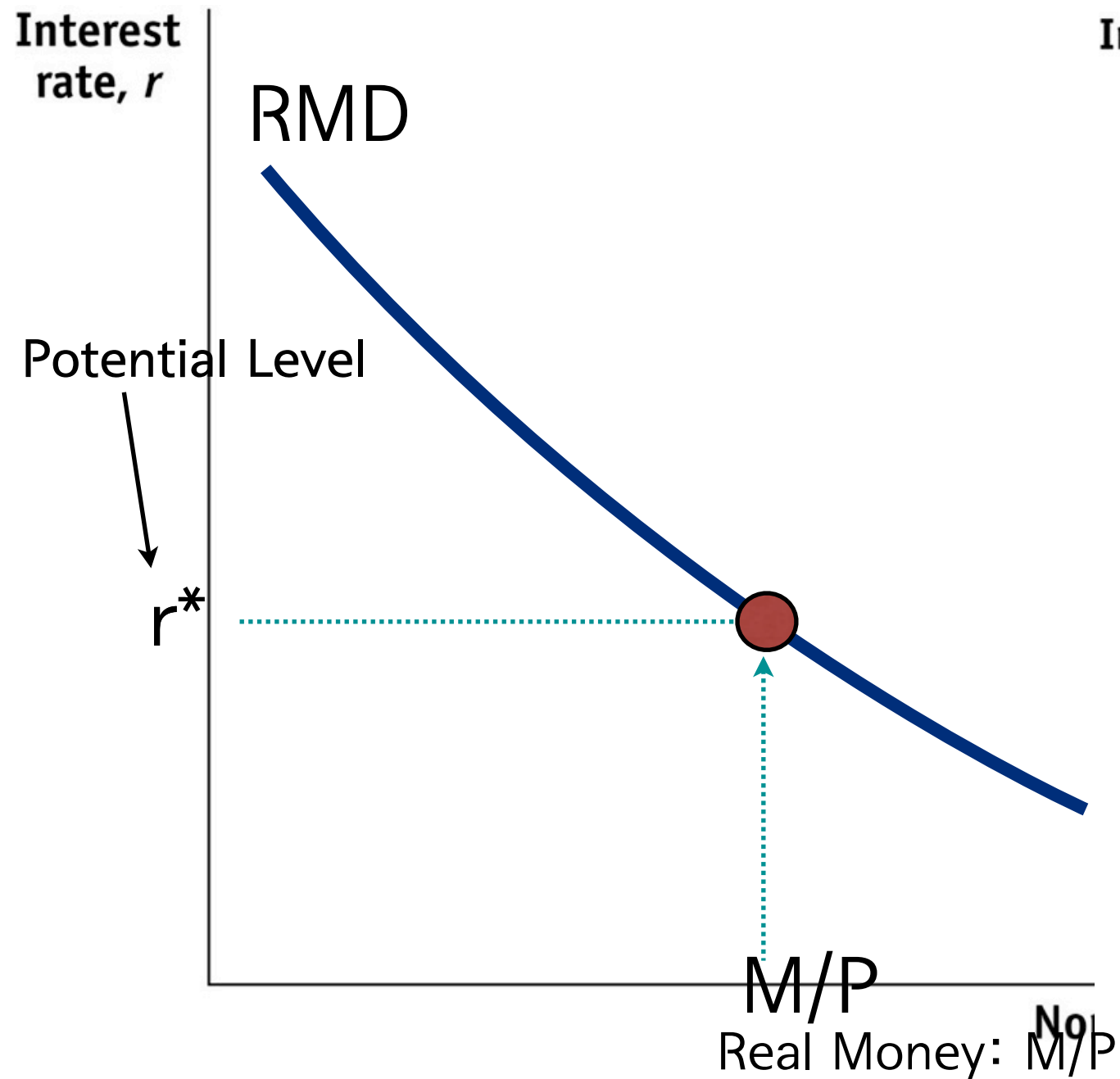
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Quant

# Monetary Policy and Interest Rate

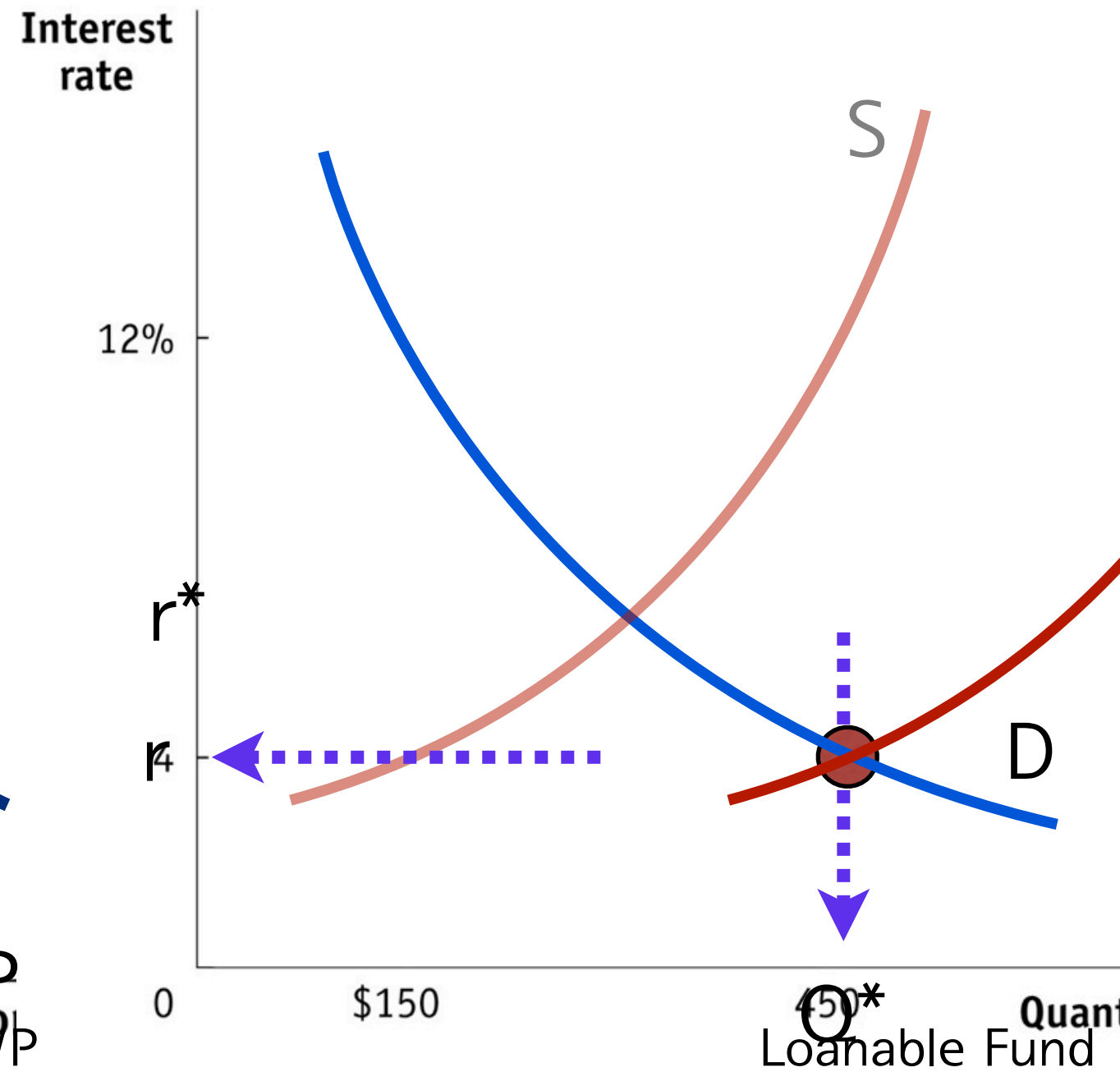
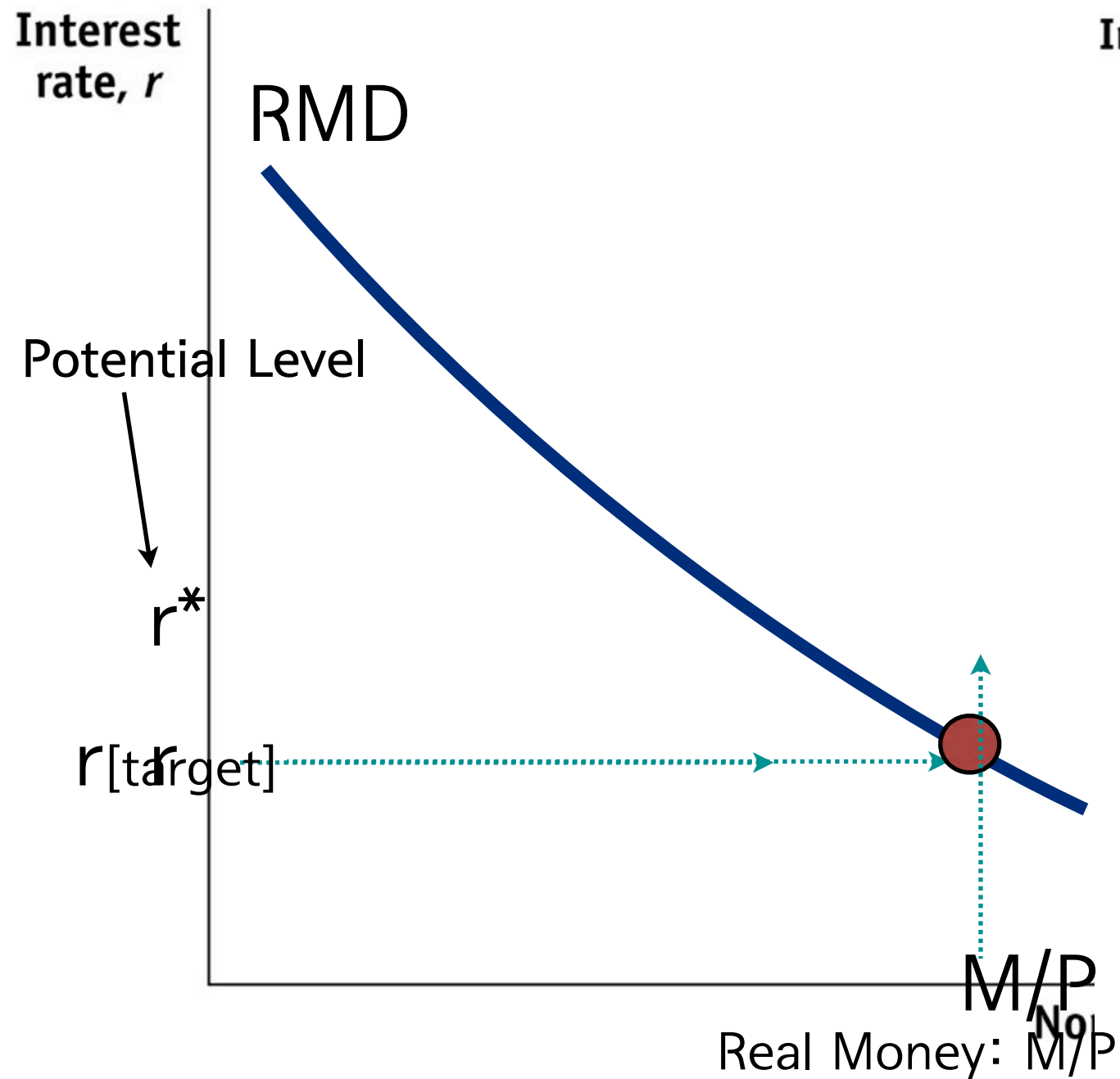


# Monetary Policy and Interest Rate

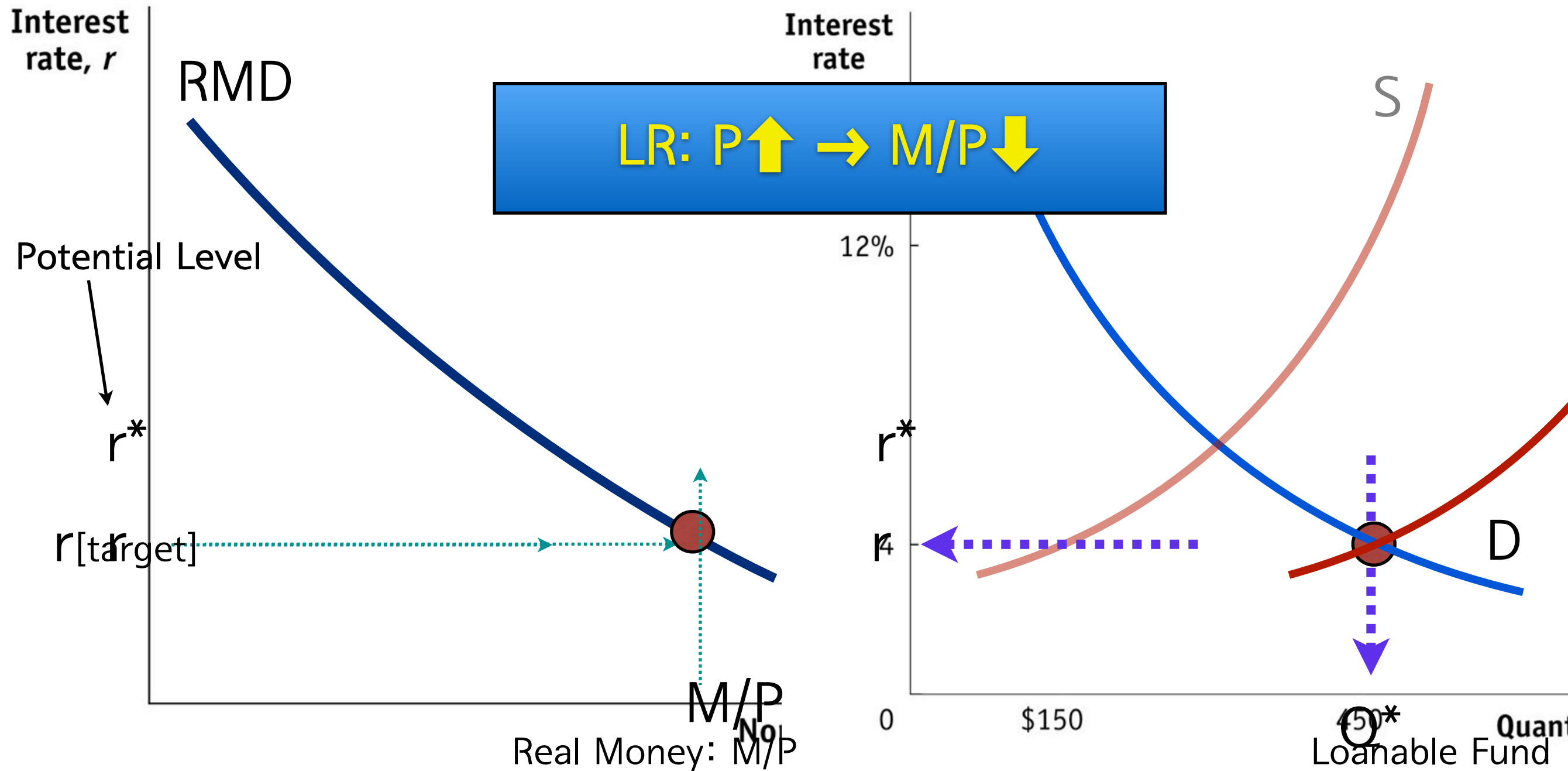




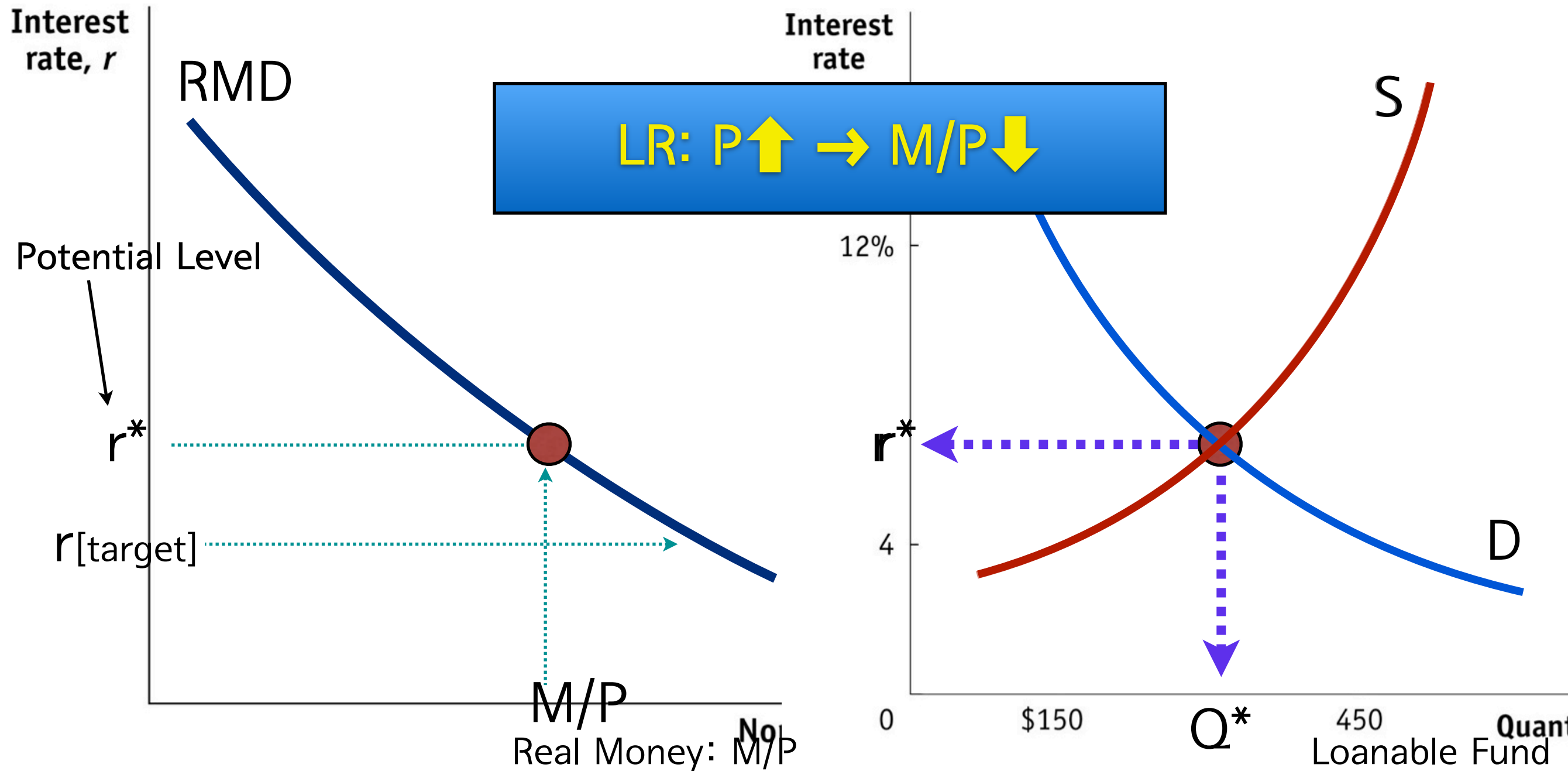
# Monetary Policy and Interest Rate



# Monetary Policy and Interest Rate



# Monetary Policy and Interest Rate



# Monetary Policy and Interest Rate

Interest  
rate,  $r$

$r^*$

No

Interest  
rate

12%

$r^*$

4

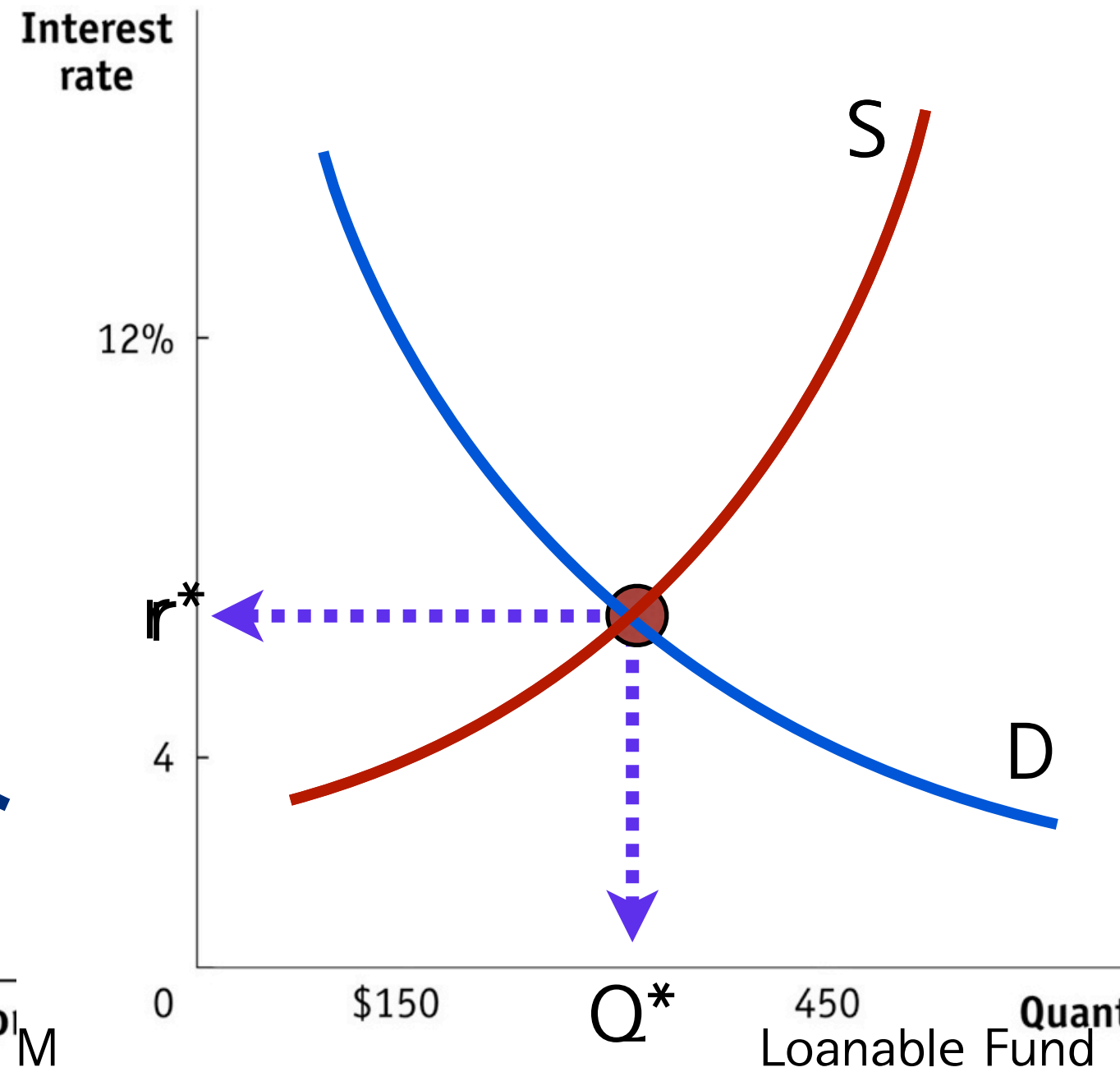
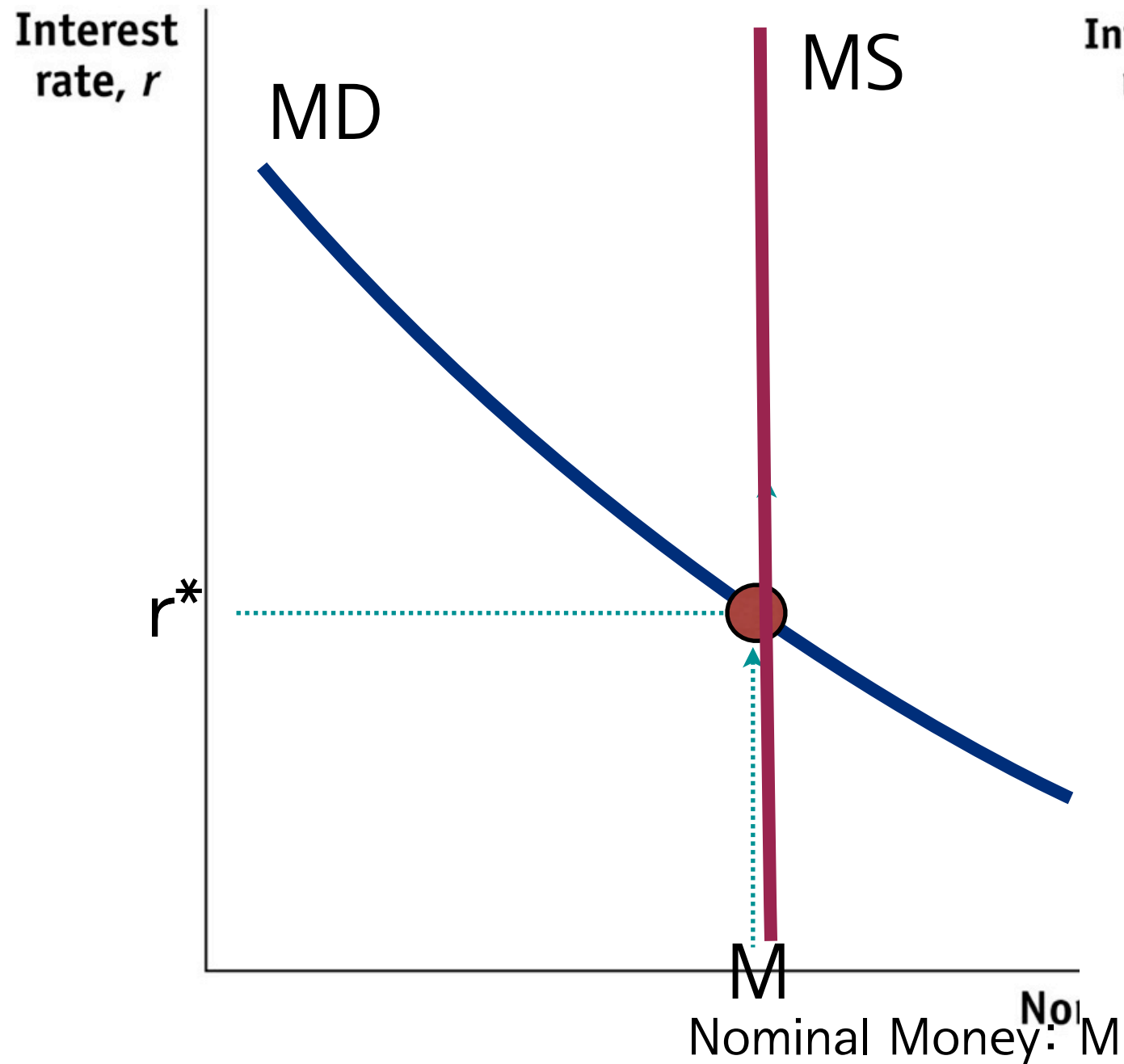
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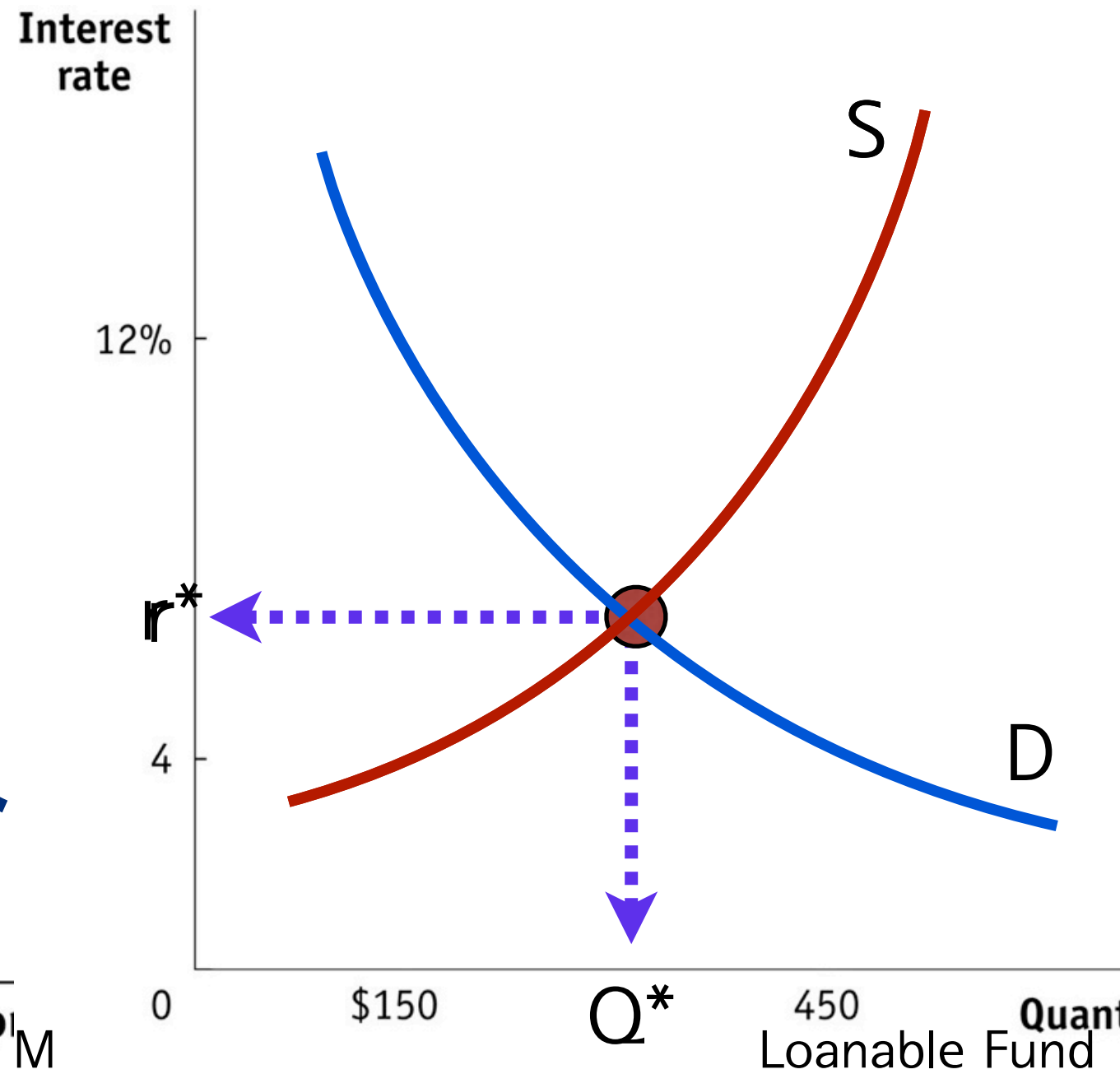
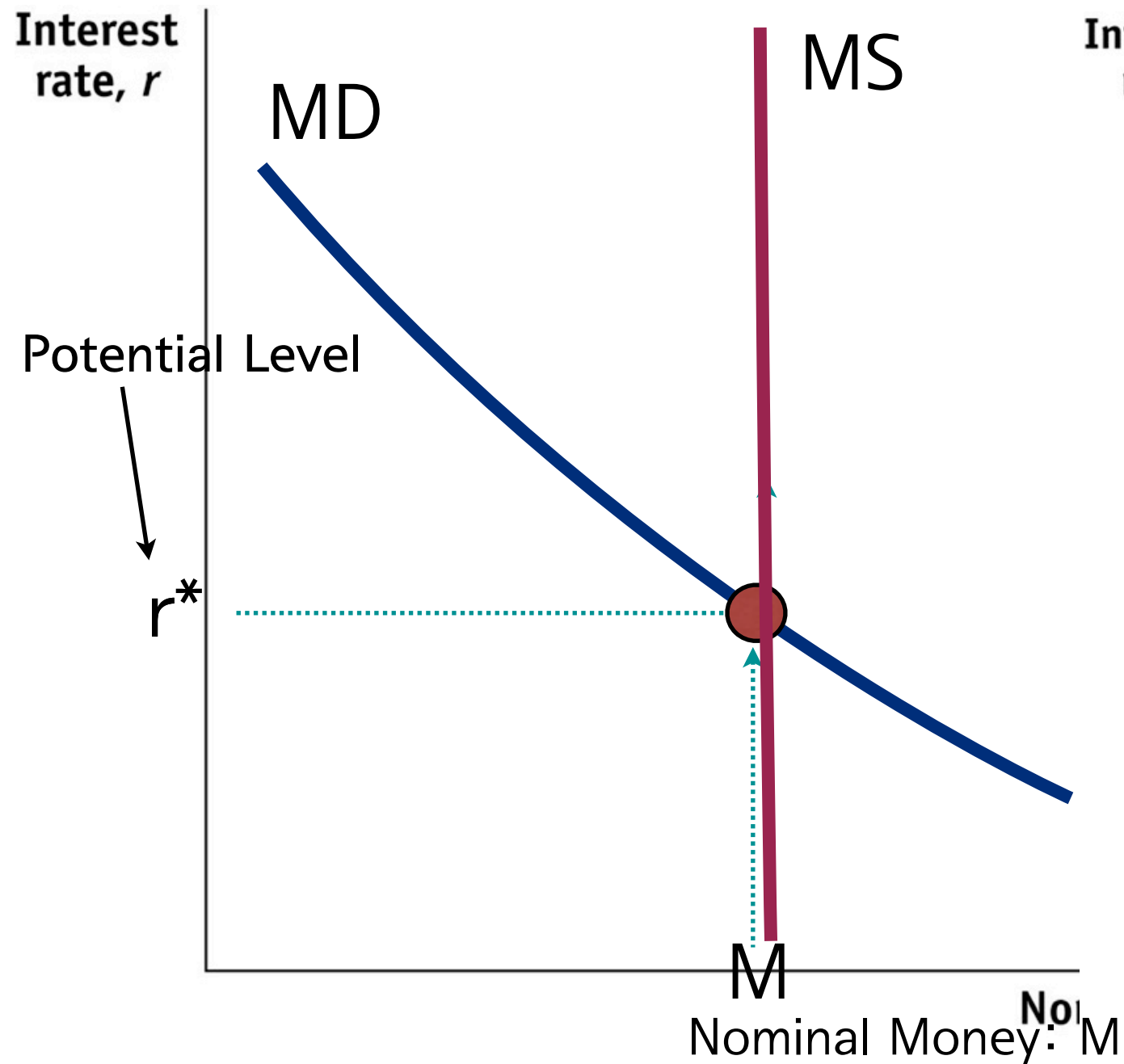
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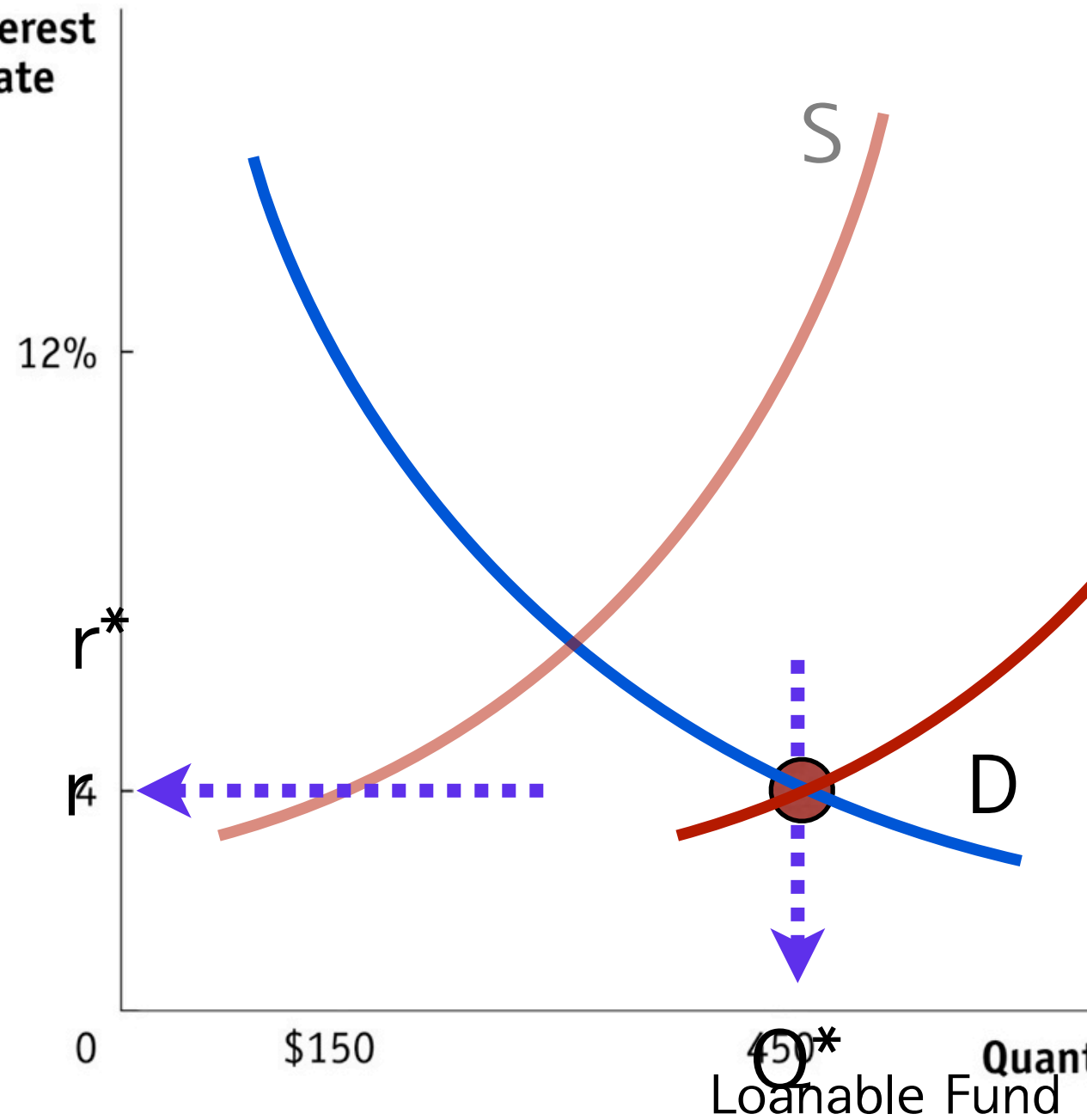
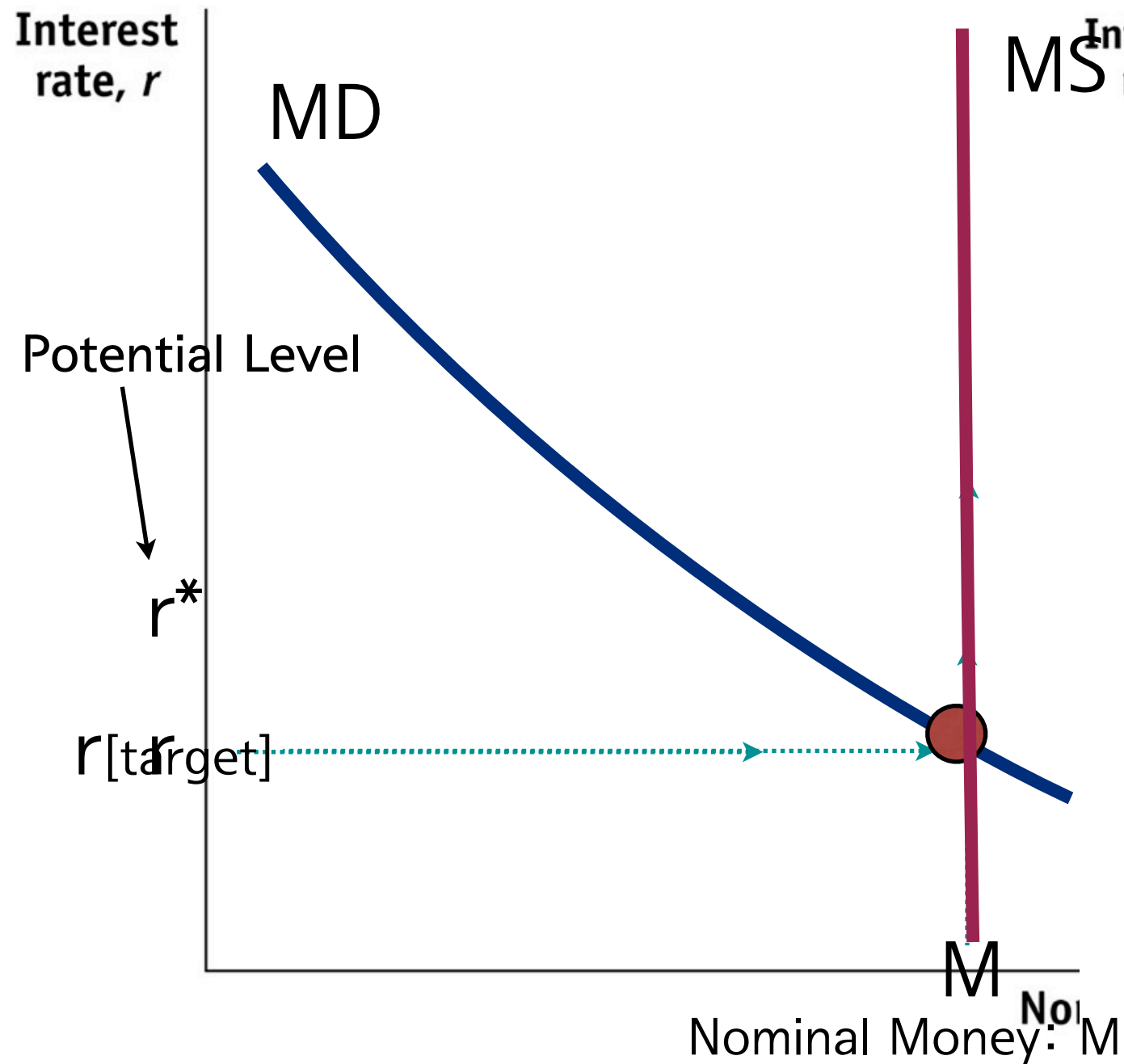
# Monetary Policy and Interest Rate



# Monetary Policy and Interest Rate

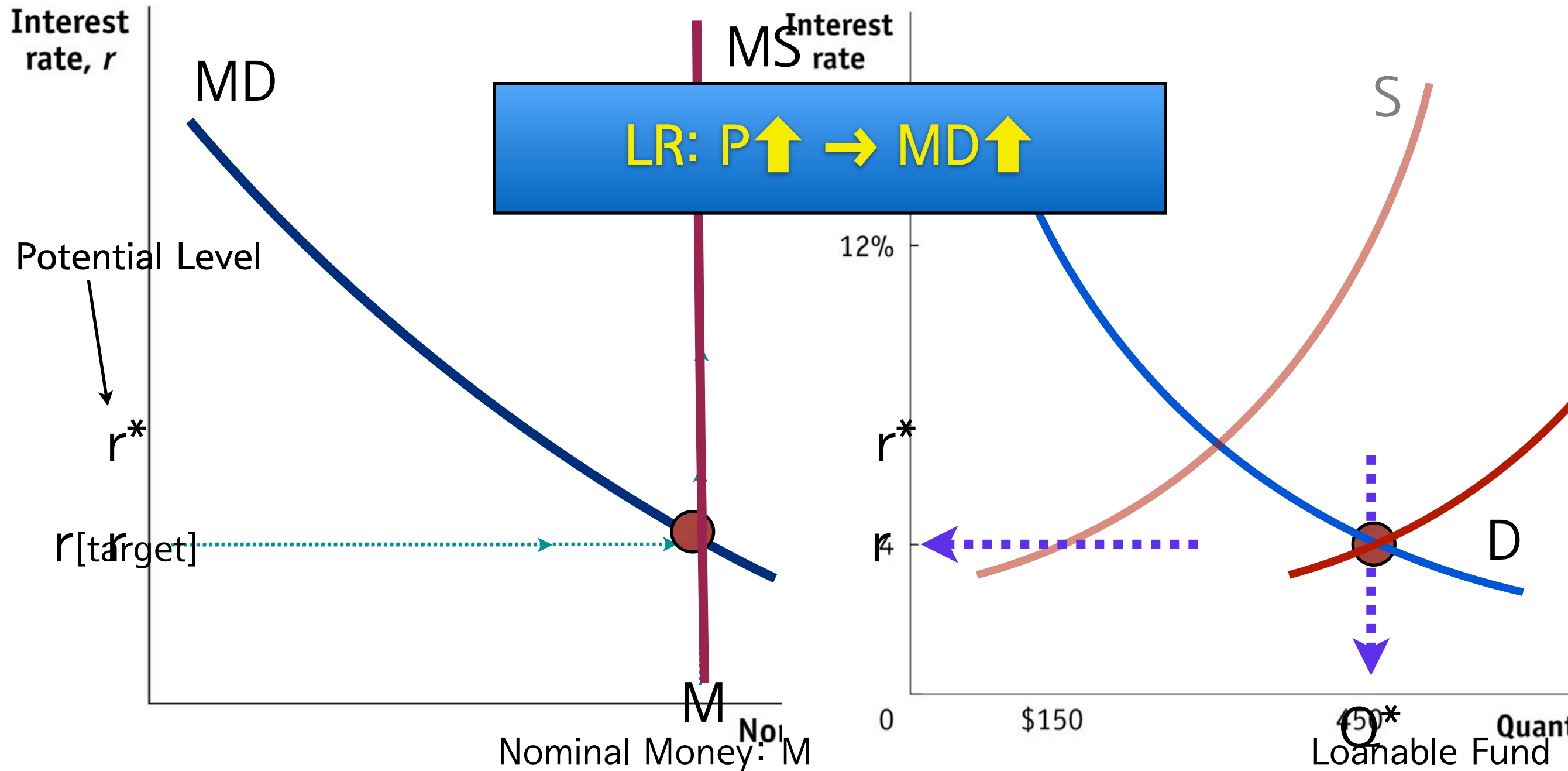


# Monetary Policy and Interest Rate

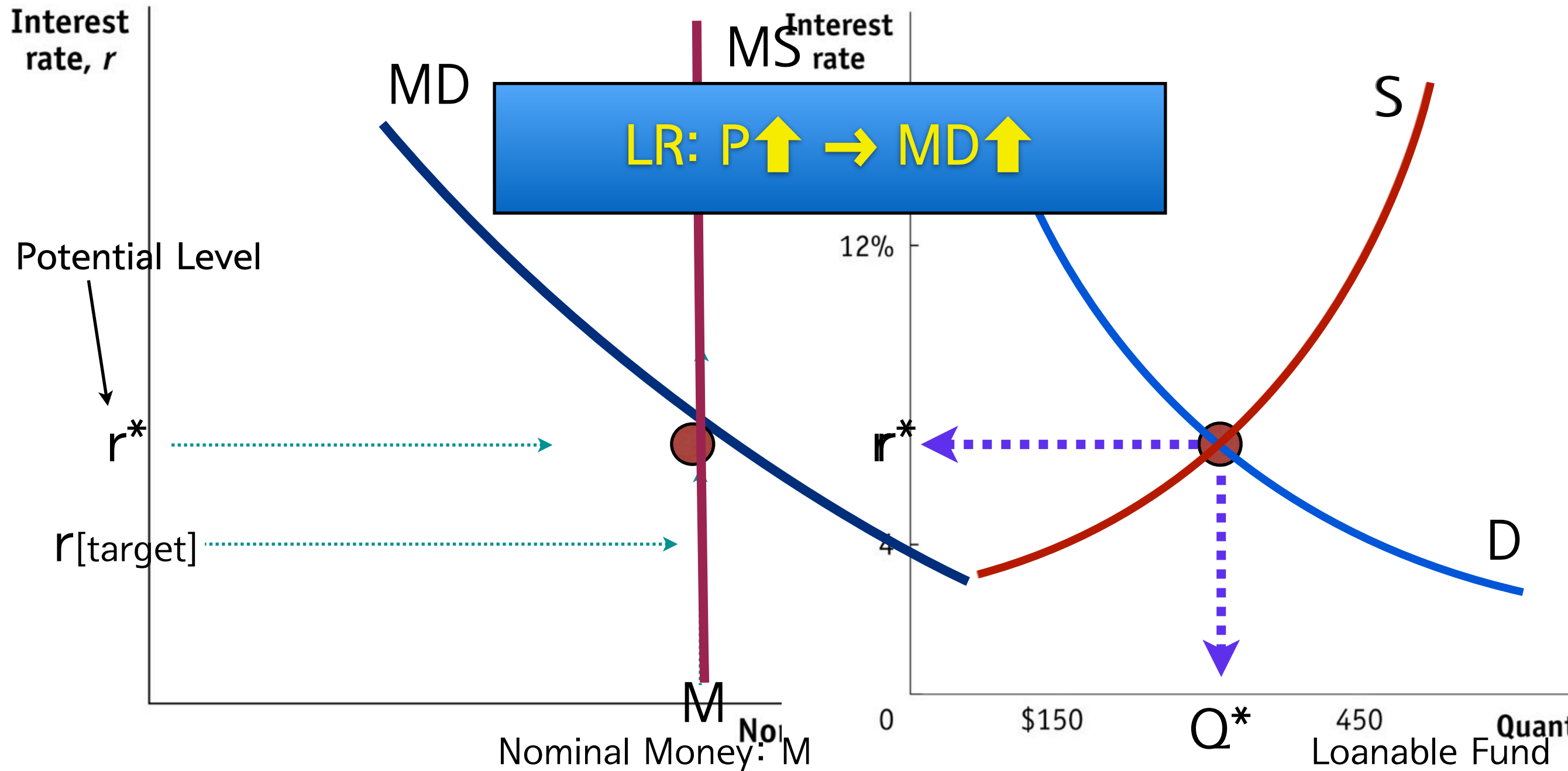




# Monetary Policy and Interest Rate



# Monetary Policy and Interest Rate



# Determinant of Long Term Interest Rate

- 장기 이자율은 잠재생산량 수준에서의 대부자금시장 수요와 공급에 의해 결정됨:  $r^*$ (자연이자율)
- 중앙은행은 단기 이자율을 조정할 수는 있지만, 결국 물가상승/하락으로 장기에는  $r^*$ 로 돌아옴: 화폐중립성

# Next Topics

- Labor Market
- Unemployment
- Inflation

수고하셨습니다!

