

Capital Flows and Monetary Policy

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PEARSON
Education

Macroeconomics

Errol D'Souza

Advance Uncorrected Proofs



Current Account Balance = CA

Capital Account Balance = KA

Overall Balance = (CA + KA)

Official Reserves, R = - (CA + KA)

(Rupees Billion)		2001-02	2005-06	Share
Exports				
Agriculture				
Gems & Jewellery				
Chemicals & Related Products				
Engineering Goods				
Textiles				
Imports				
Petrol, Oil & Lubricants				
Capital Goods				
Chemicals				
Pearls, precious & semi precious stones				
Gold & Silver				

	Year →	2001-02	2005-06
Trade Balance		-549.55	-2279.63
Invisibles (Net)		713.81	1811.07
Foreign Travel		158.89	60.85
Transport		-61.60	-49.80
Insurance		.35	2.21
Investment Income		-183.43	-224.33
Private Transfers		733.63	1068.30
Software Exports		328.36	986.78
Current Account Balance		164.26	-468.56

Year →	2001-02	2005-06
Current Account Balance	164.26	-468.56
Foreign Investment (net)	319.20	807.59
(a) FDI	226.30	254.24
(b) Portfolio Investment	92.90	553.35
Banking Capital (incl. NRI Deposits)	137.78	57.95
Commercial Borrowing & Ext. Assistance	-75.28	204.23
Total Capital Account Balance	410.80	1085.21
Overall Balance	565.93	658.96
Monetary Movements	-565.93	-658.96
(a) IMF (net)	0	0
(b) Foreign Exchange Reserves [$\uparrow(-), \downarrow(+)$]	-565.93	-658.96

Figure 2.2: Exchange Rate and Balance of Payments

Exchange Rate $E_{\text{Rs./\$}}$

Flow of
Dollars

Figure 2.2: Exchange Rate and Balance of Payments

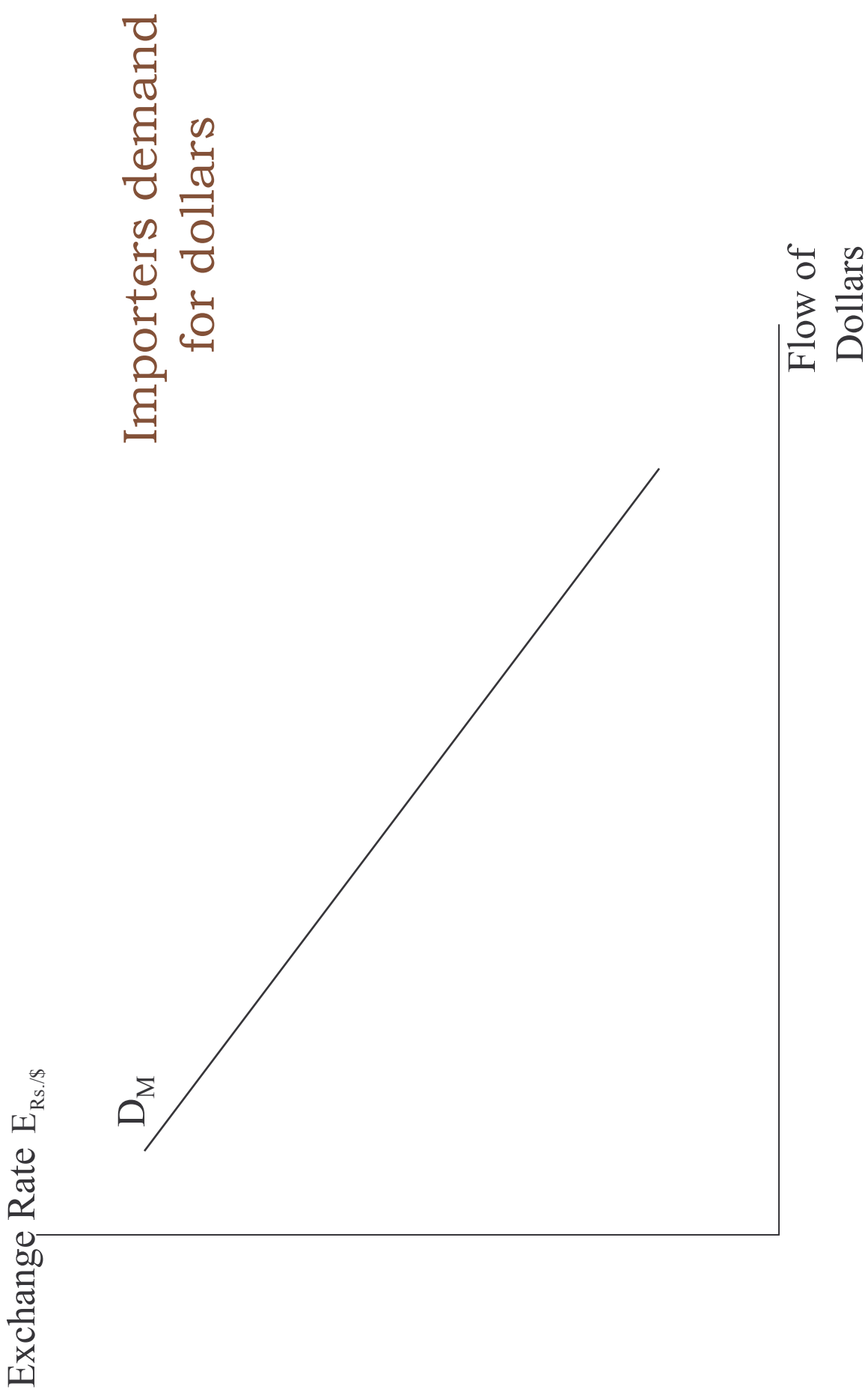


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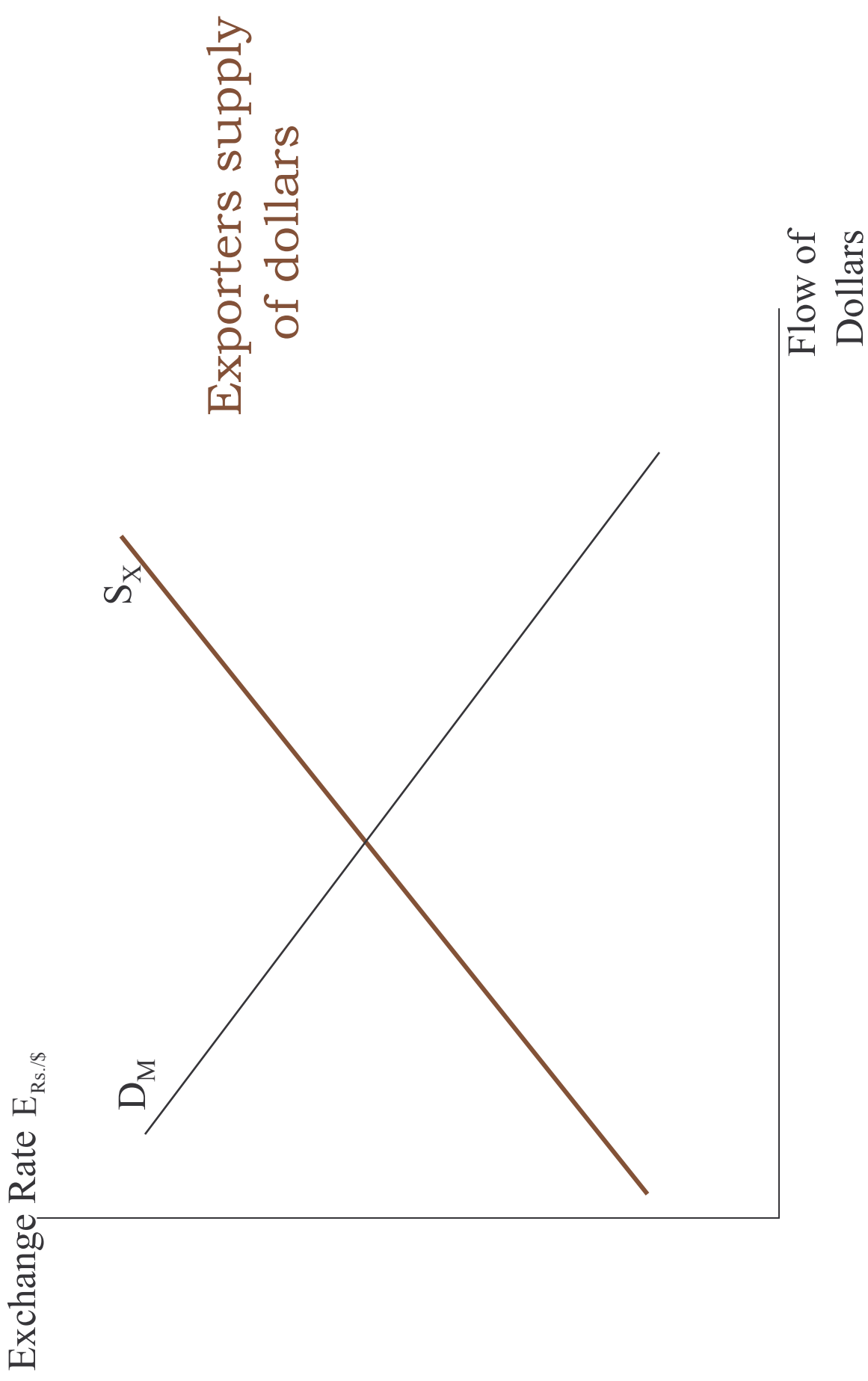


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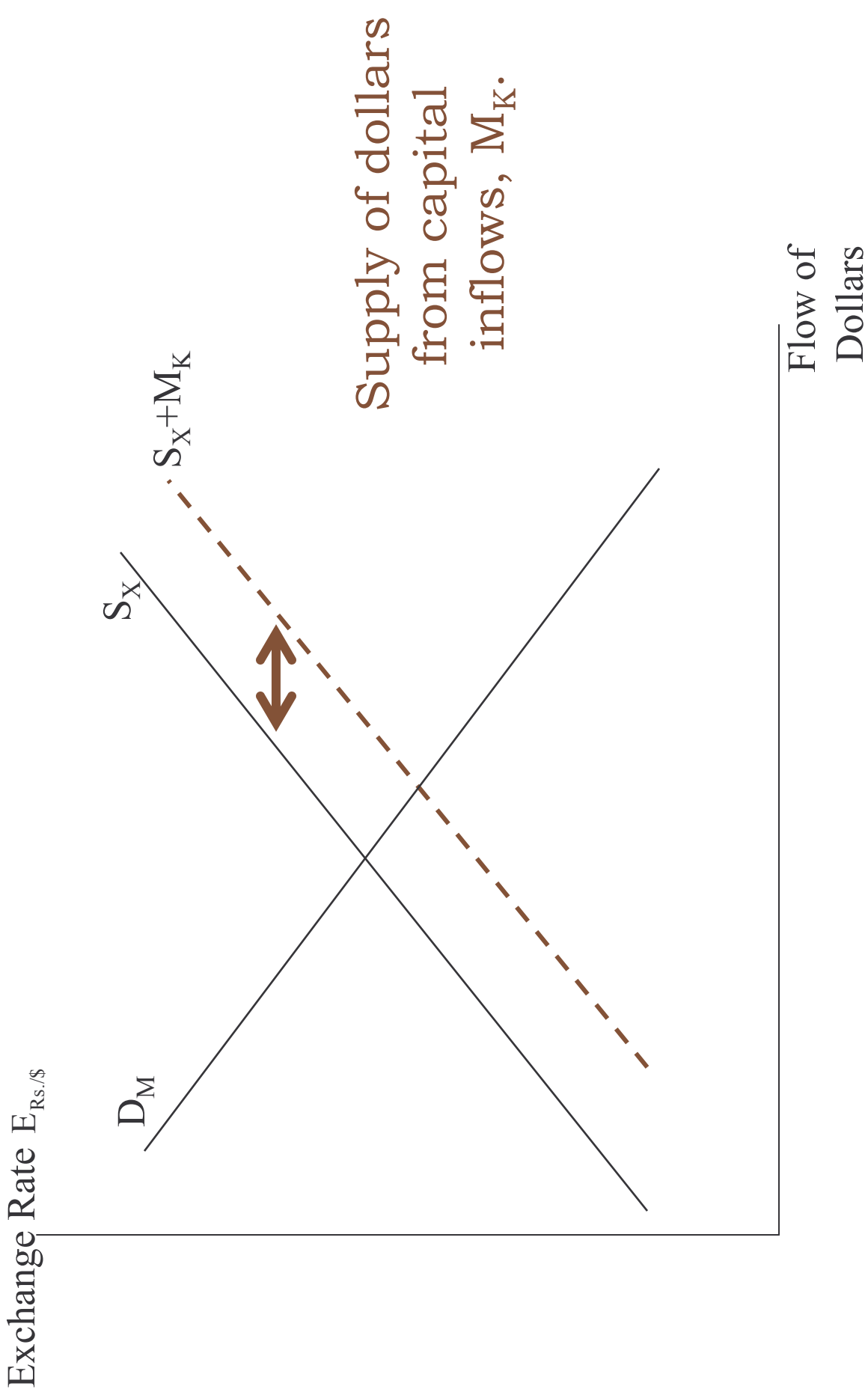


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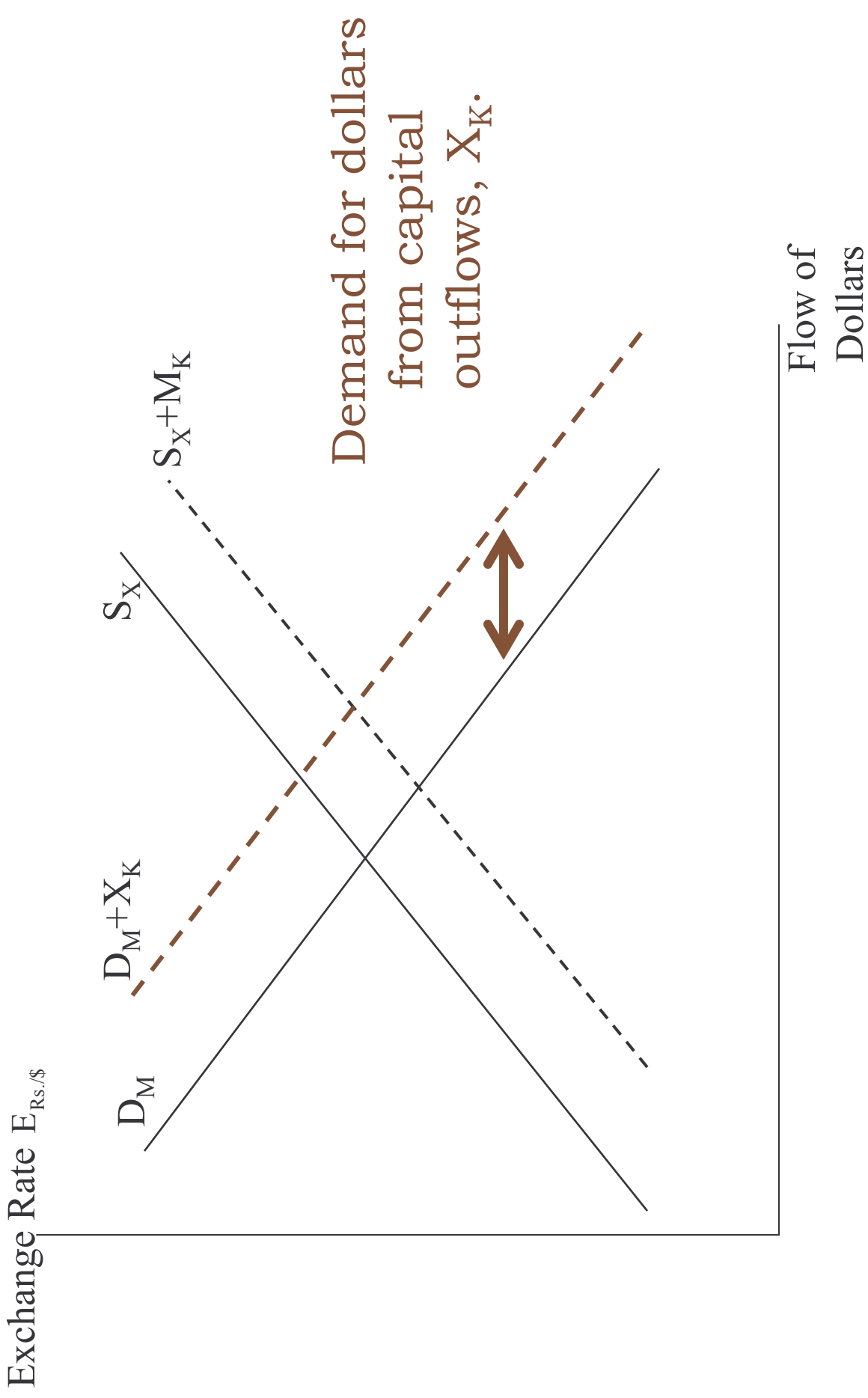


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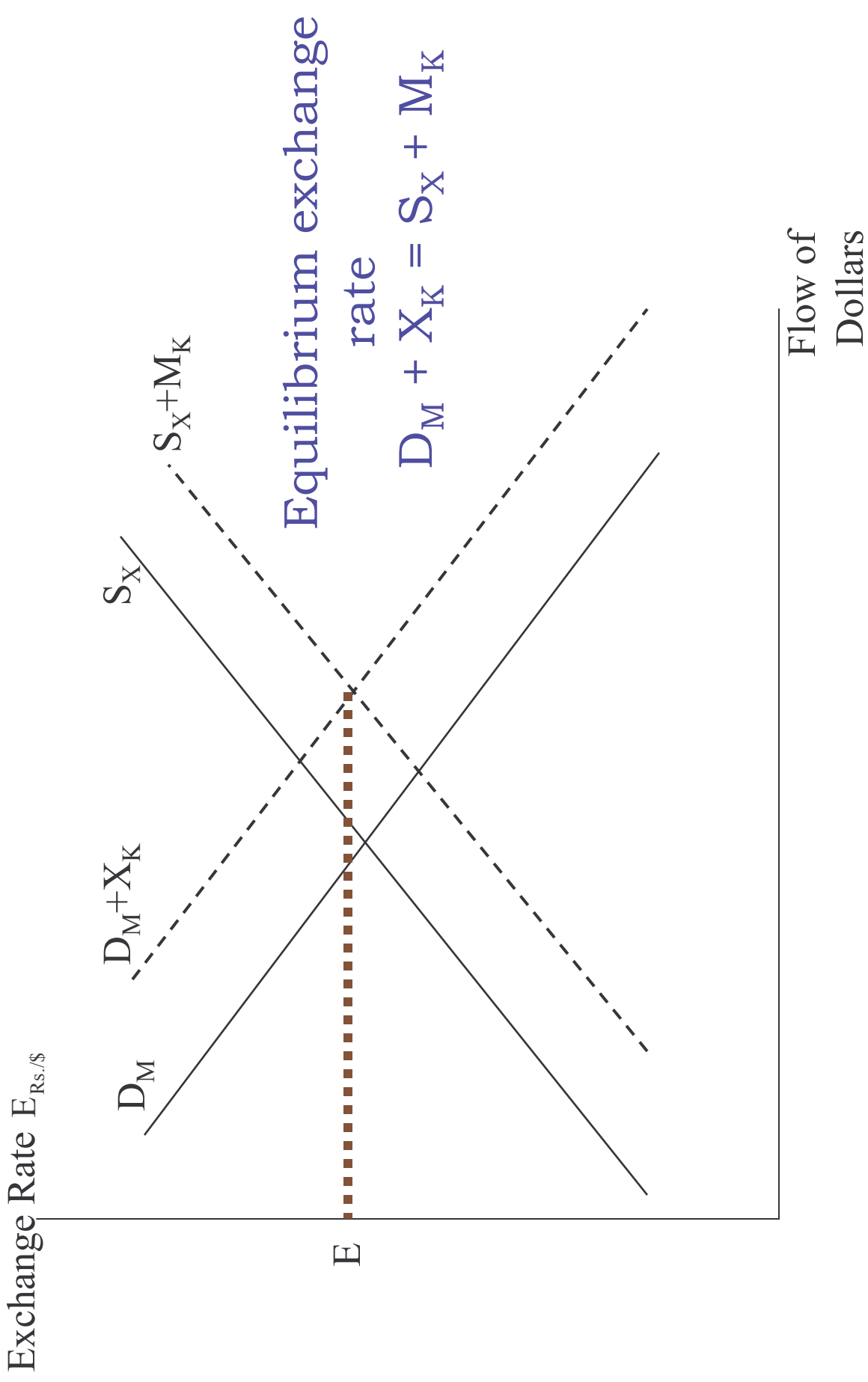


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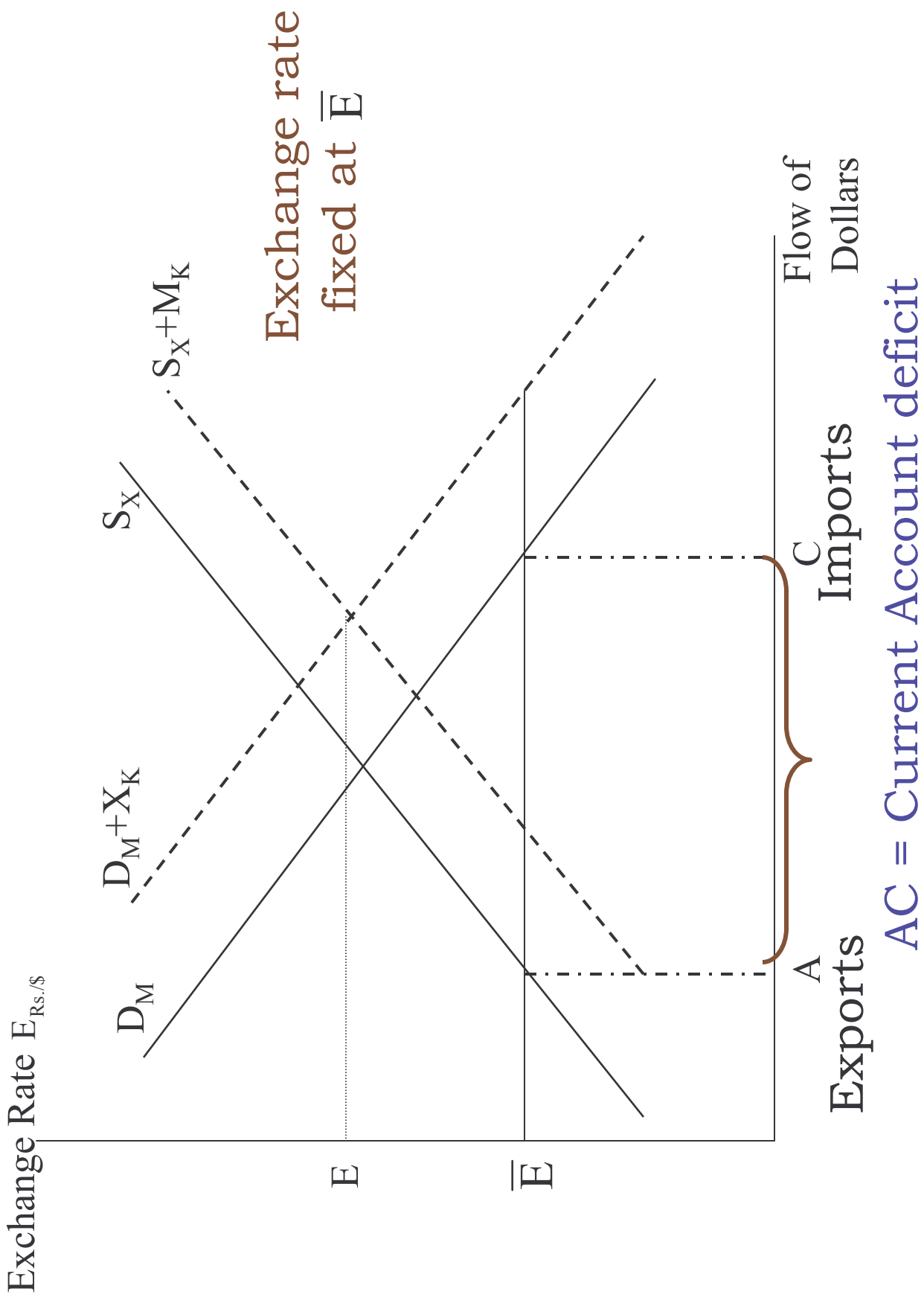


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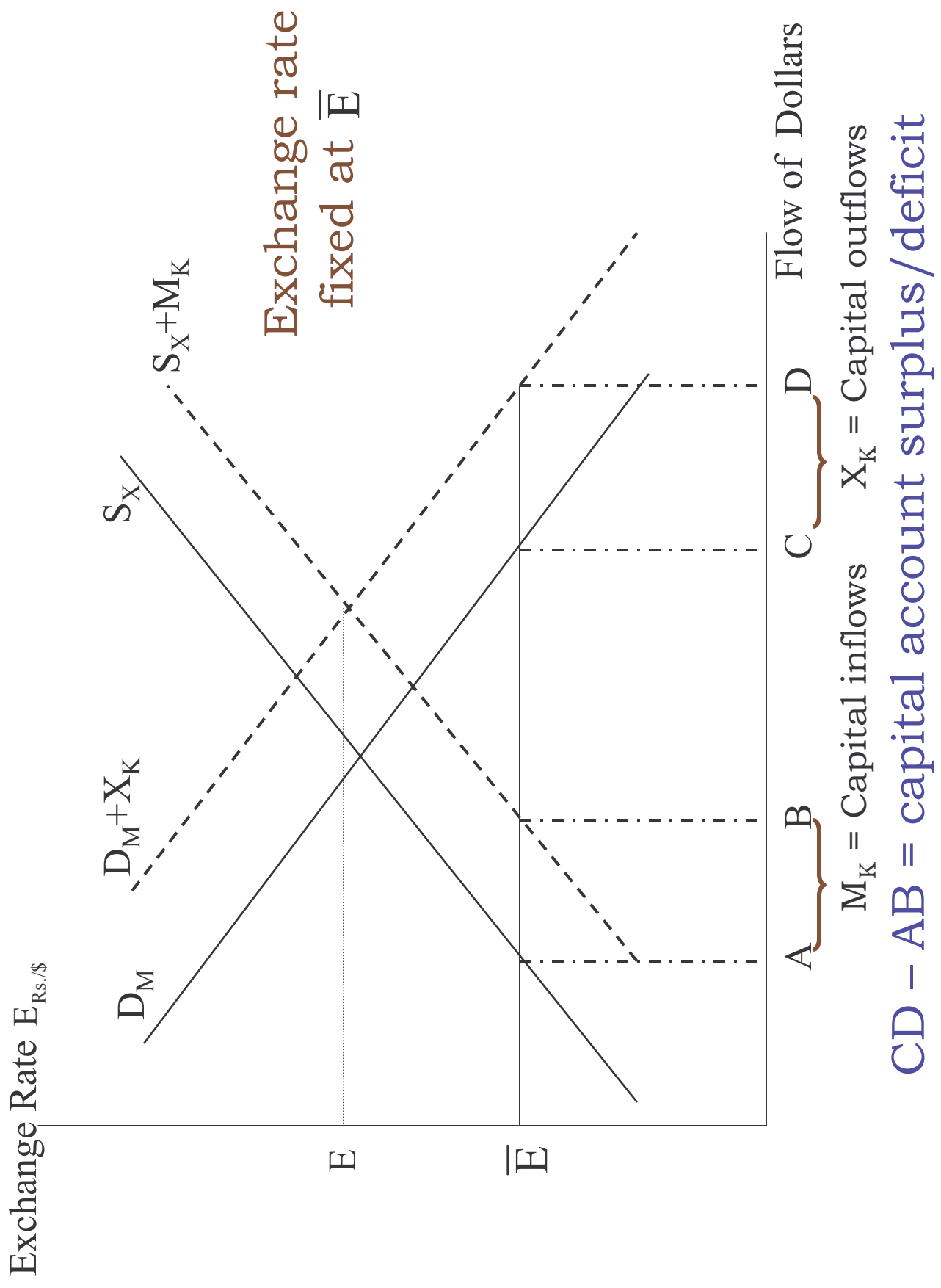


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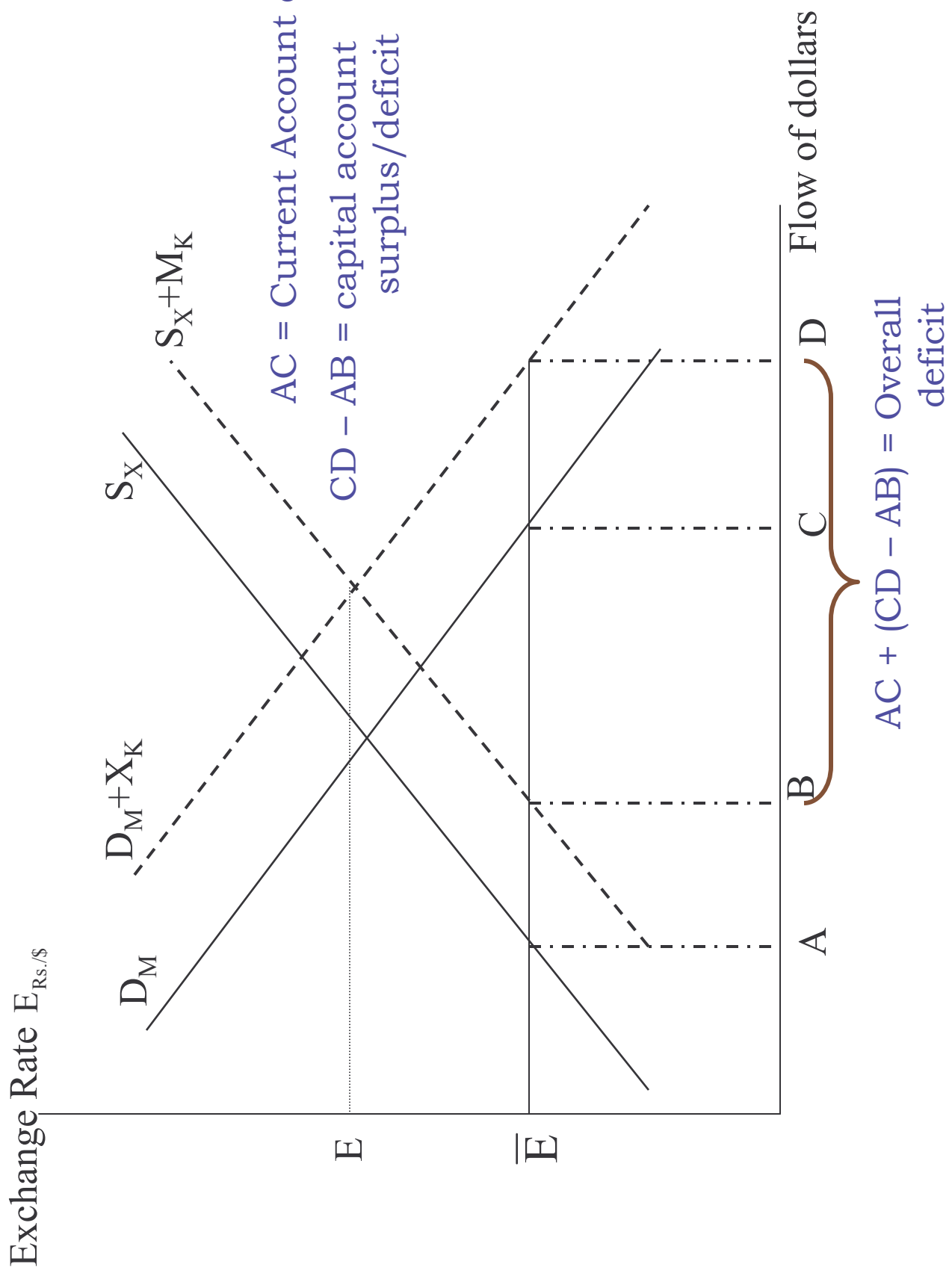
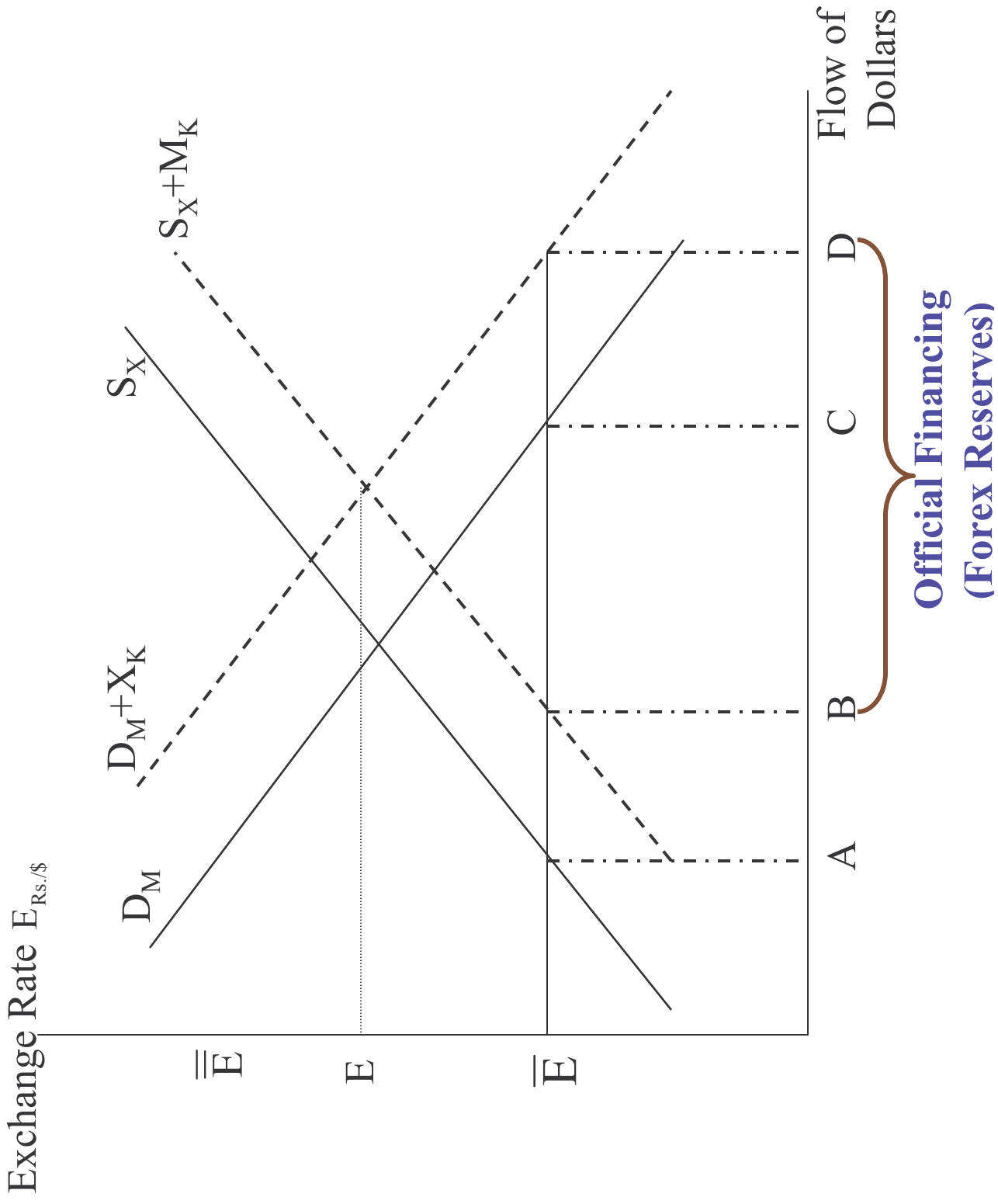


Figure 2.2: Exchange Rate and Balance of Payments



Balance of Payments

$$\text{Current Account Balance} = \text{CA}$$

$$\text{Capital Account Balance} = \text{KA}$$

$$\text{Overall Balance} = (\text{CA} + \text{KA})$$

$$\text{Official Reserves, R} = - (\text{CA} + \text{KA})$$

What happens if the exchange rate is managed at $\bar{\bar{E}}$?

Figure 2.2: Exchange Rate and Balance of Payments

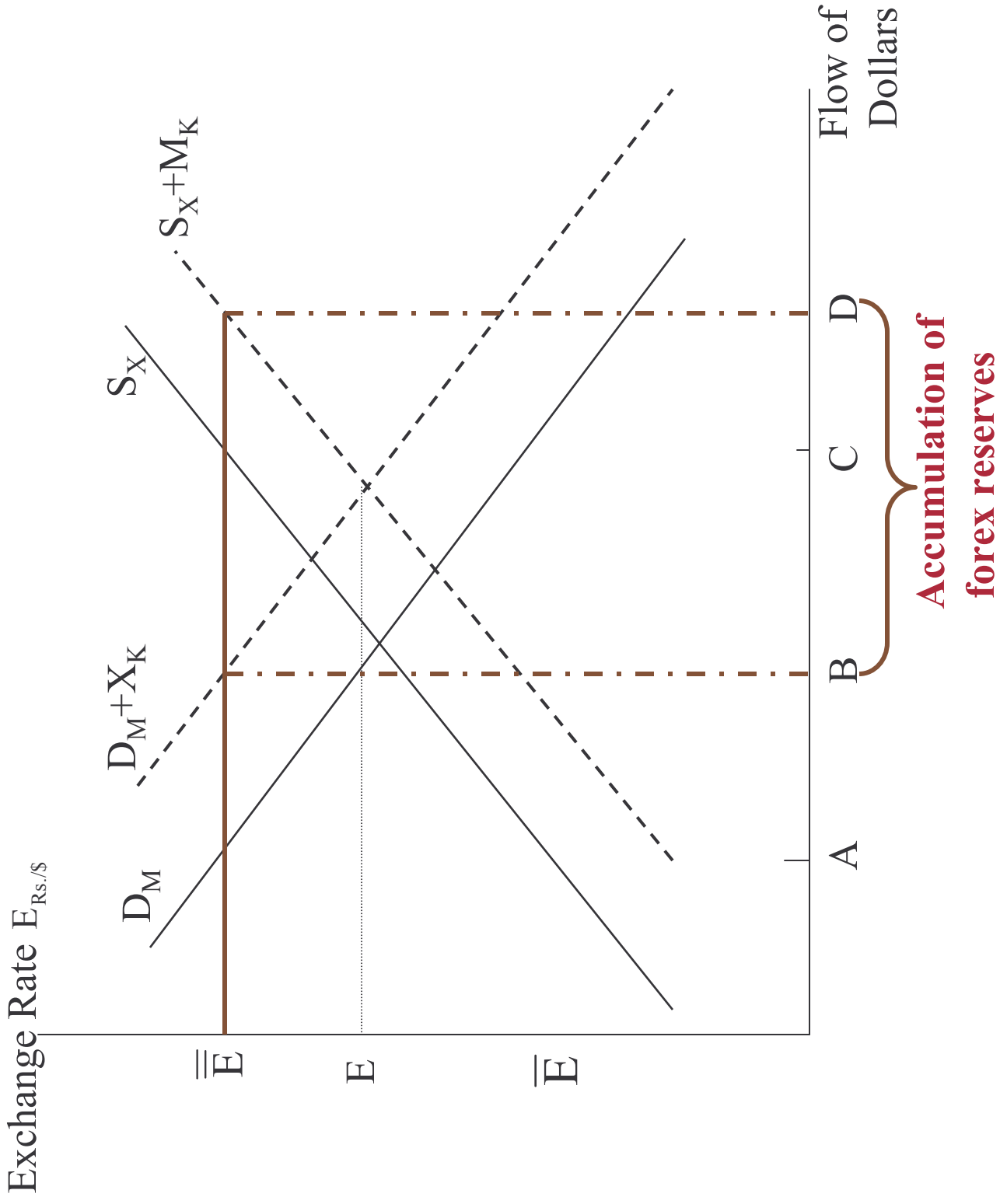
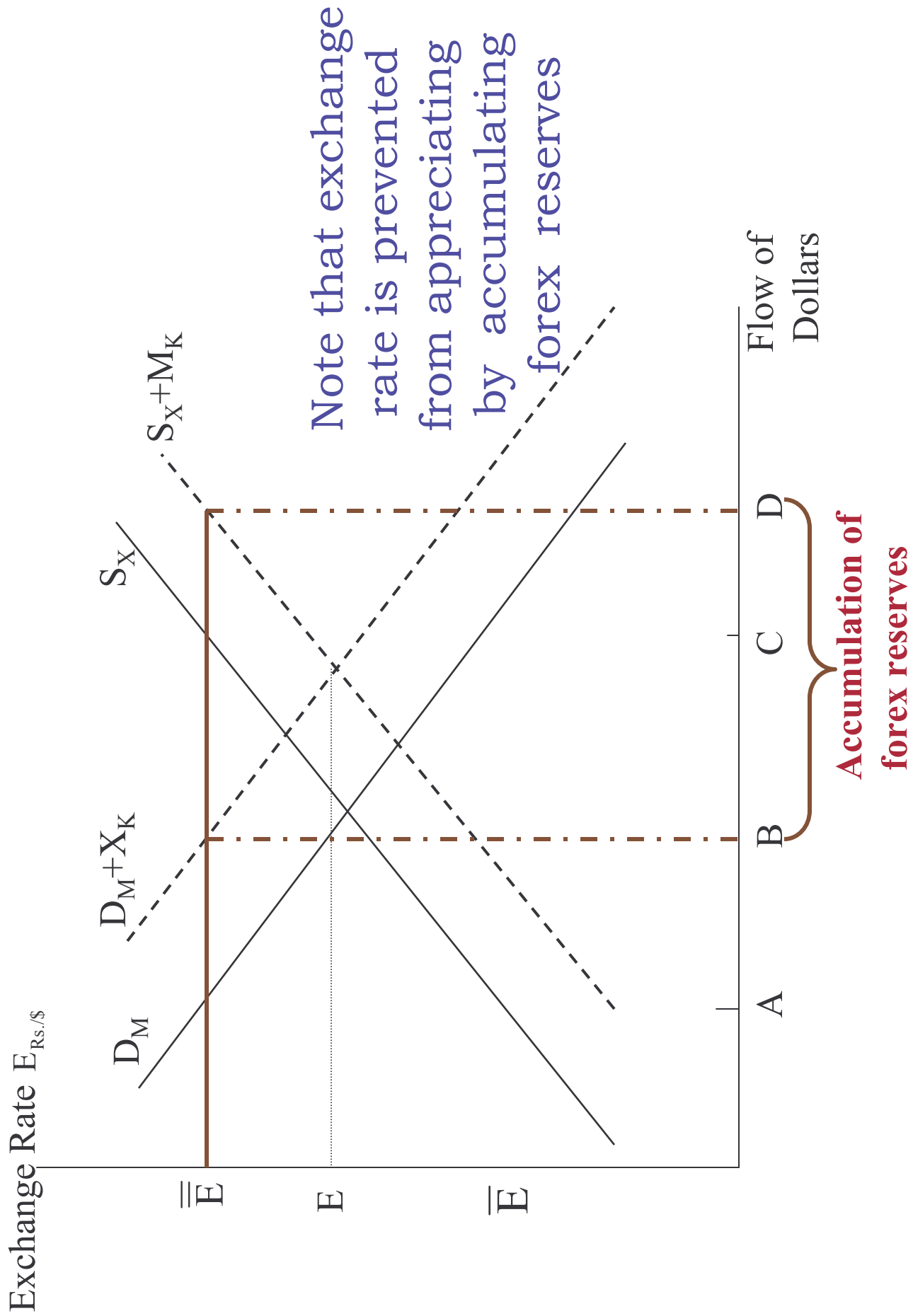


Figure 2.2: Exchange Rate and Balance of Payments



Benefit of Intervention in Exchange Rate market -

Exchange rate does not appreciate

Cost ?

Central Bank Balance Sheet

ASSETS

Credits to domestic banks

Central Bank credit to govt.
 = Holdings of govt. debt
 (incl. loans to govt.) less
 govt. deposits ($G_{b/CB}$)

Advances (Credits) to
 Commercial Private
 Sector (A_{CB})

Foreign Exchange
 Assets (FE_{CB})

LIABILITIES

Currency in Circulation (C)
 = Currency with public (C^P)
 + Currency with banks (C^B)

Reserves and Central Bank
 balances of domestic banks

Net Non Monetary Liabilities of
 Central Bank (NML_{CB})

$$M_0 = R$$

DC

Simplified Central Bank Balance Sheet

Assets	Liabilities
Central Bank credit to government	Currency in circulation
Central Bank credit to private sector	Reserves and central bank balances of domestic banks
Foreign Exchange Assets	
Liquidity	Liquidity

$$M_0 = R$$

DC

(FE_{CB})

Ignoring Net Non monetary liabilities,

$$FE_{CB} = M_0 - DC$$

Or, $\Delta FE_{CB} = \Delta M_0 - \Delta DC$

Ignoring Net Non monetary liabilities,

$$FE_{CB} = R - DC$$

Or, $\Delta FE_{CB} = \Delta R - \Delta DC$

Money Supply is $M^s = mM_0$

Ignoring Net Non monetary liabilities,

$$FE_{CB} = M_0 - DC$$

$$\text{Or, } \Delta FE_{CB} = \Delta M_0 - \Delta DC$$

Money Supply is $M^S = mM_0$

$$\Delta M^S = m\Delta M_0$$

$$\Delta M^S = m[\Delta FE_{CB} + \Delta DC]$$

Ignoring Net Non monetary liabilities,

$$FE_{CB} = M_0 - DC$$

$$\text{Or, } \Delta FE_{CB} = \Delta M_0 - \Delta DC$$

Money Supply is $M^S = mM_0$

$$\Delta M^S = m\Delta M_0$$

$$\Delta M^S = m[\Delta FE_{CB} + \Delta DC]$$

If there is no **sterilization**, then an increase in foreign exchange reserves results in an increase in reserve money and so the money supply.

Intervention in the forex market results in a rise in liquidity and a potential inflation build up.

To avoid this cost of increased liquidity what can
the monetary authority do?

To avoid this cost of increased liquidity what can the monetary authority do?

It can sterilize the liquidity impact of the capital flow.

Sterilization is the policy of altering the domestic credit extended by the central bank in an equal and opposite direction to the variation of foreign exchange reserves so that the monetary base remains unchanged.

Simplified Central Bank Balance Sheet

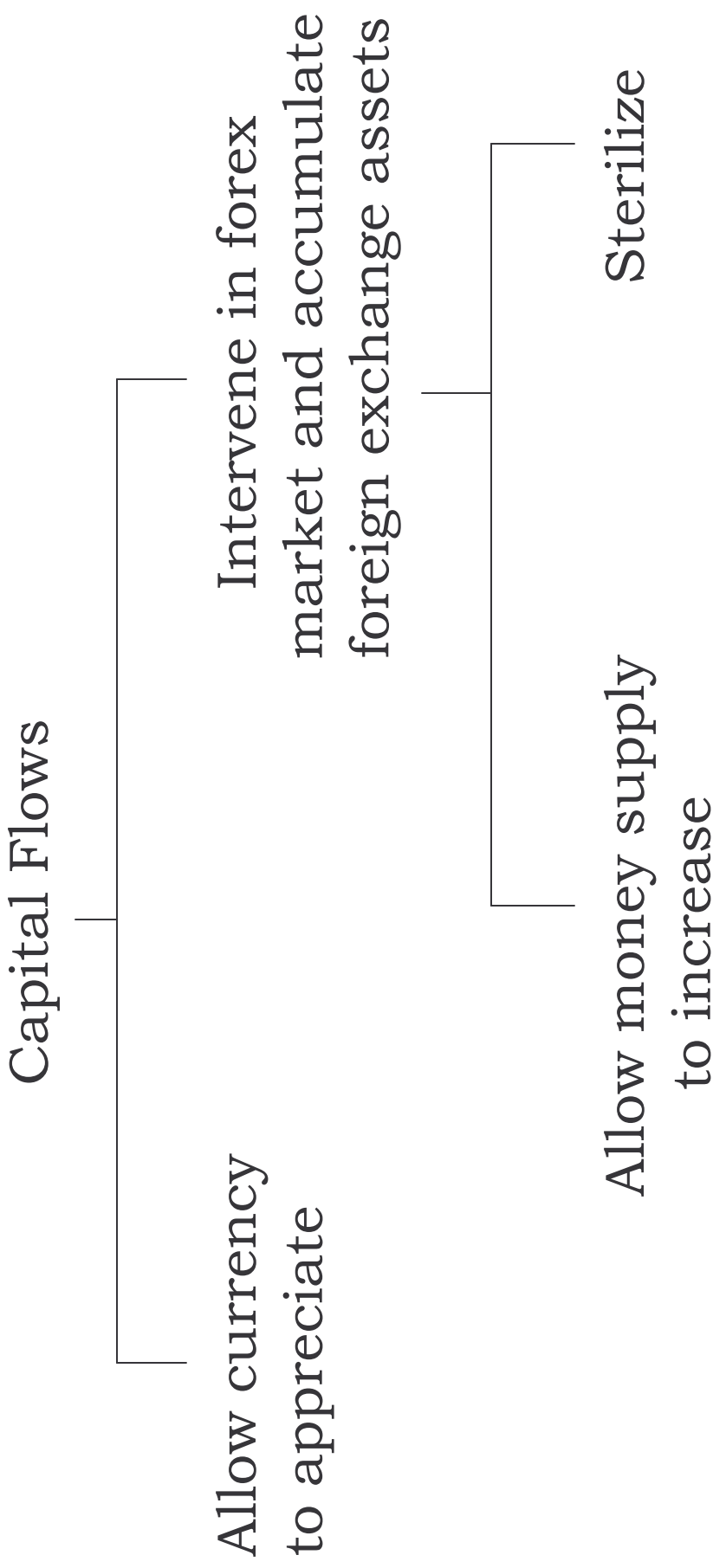
Assets	Liabilities
Central Bank credit to government	Currency in circulation
Central Bank credit to private sector	Reserves and central bank balances of domestic banks
Foreign Exchange Assets	

$$M_0 = R$$

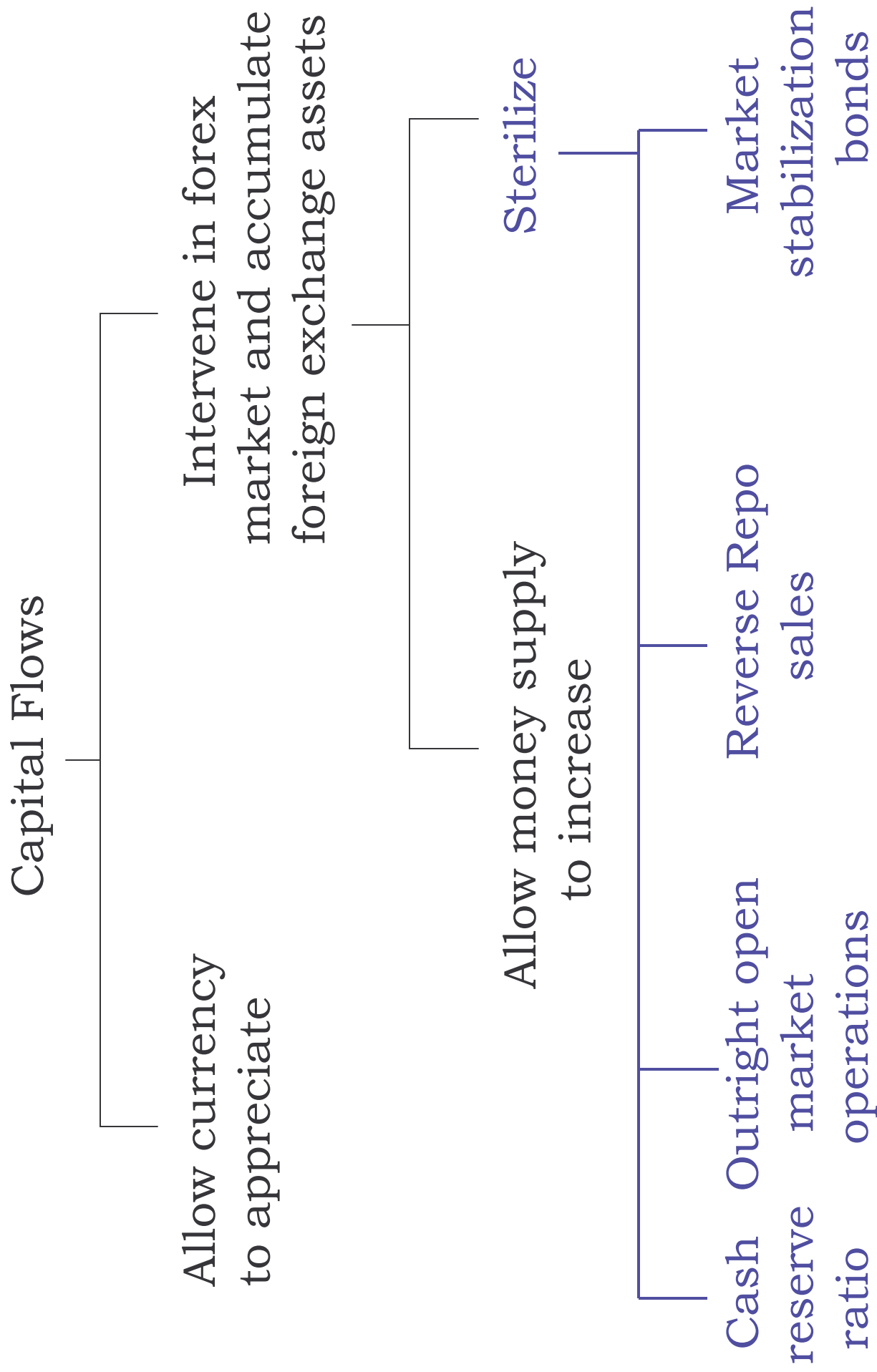
DC

(FE_{CB})

Sterilization involves $\Delta DC = -\Delta FE_{CB}$ so that $\Delta M_0 = 0$



What are the instruments of sterilization?



An **outright open market operation** involves the definitive **sale or purchase of securities** by the central bank with the objective of absorbing or injecting liquidity in the system.

From the second half of the 1990s to 2003-04 OMOs were used by the RBI to manage the impact of capital flows.

Sustained large capital flows, however, led to a decline in the RBI's holdings of government securities.

Finite stock of government securities held by RBI and also legal restrictions on RBI on issuing its own paper placed constraints on sterilization operations.

Due to shortage of government securities for liquidity management, the **Market Stabilisation Scheme** was introduced on April 1, 2004.

Under the MSS the **government issues** short-term (91-day, 182-day and 364-day) Treasury Bills and medium term (with residual maturity up to 2.5 years) dated government securities to mop up liquidity.

The proceeds from the securities is parked in a **separate identifiable cash account** maintained and **operated by the RBI**.

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The proceeds from the securities is parked in a separate identifiable cash account maintained and operated by the RBI.

The RBI **decreases** the net **Reserve Bank credit to government** in response and this nullifies the expansionary impact of increase in net foreign exchange assets with RBI due to capital inflows.

Funds parked in the cash account operated by the RBI can only be appropriated for the purpose of redemption and/or buyback of paper issued under the MSS.

Impact on government of issuing MSS securities is limited to the discount on Treasury Bills and coupons on dated securities issued. Interest payments under MSS were Rs. 29.69 billion in 2004-05.

The Liquidity Adjustment Facility (LAF) introduced in June 2000 enables the RBI to manage day to day liquidity and ensure stable conditions in the overnight money market.

The LAF operates through reverse repo and repo auctions and sets a short term interest rate consistent with policy objectives.

The LAF is essentially an instrument of day to day liquidity management as it absorbs/injects liquidity in the overnight money market.

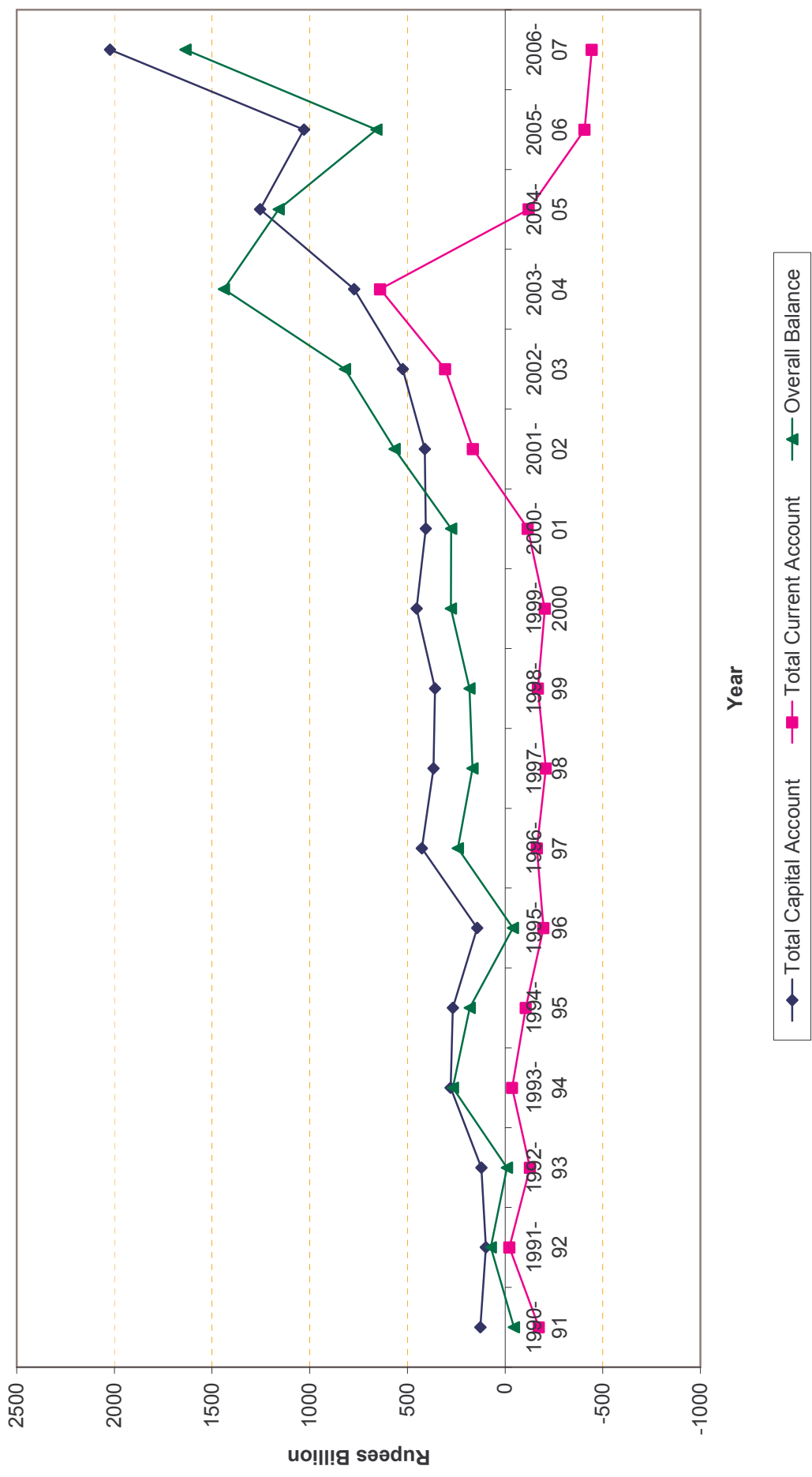
However, due to large capital flows the LAF has also been relied on for sterilization since 2004-05.

The **cash reserve ratio** is the fraction of deposits that the commercial banks are required to hold as deposits with the central bank.

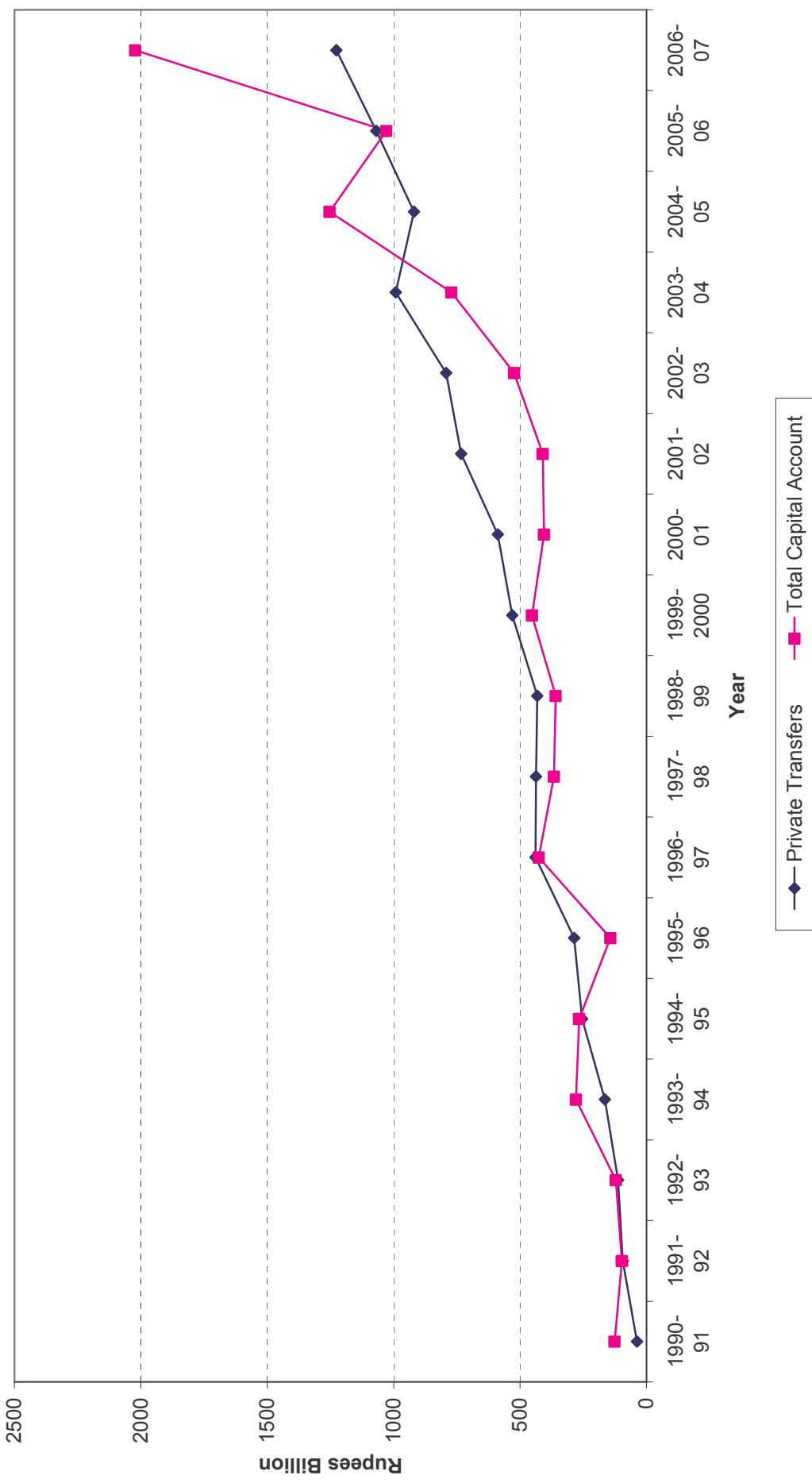
This is a direct instrument of monetary control unlike the indirect instrument of the LAF.

Though the monetary authority is moving towards indirect instruments the CRR continues to be used to augment/absorb liquidity and influence interest rates when there is huge capital flows.

Overall Balance of Payments

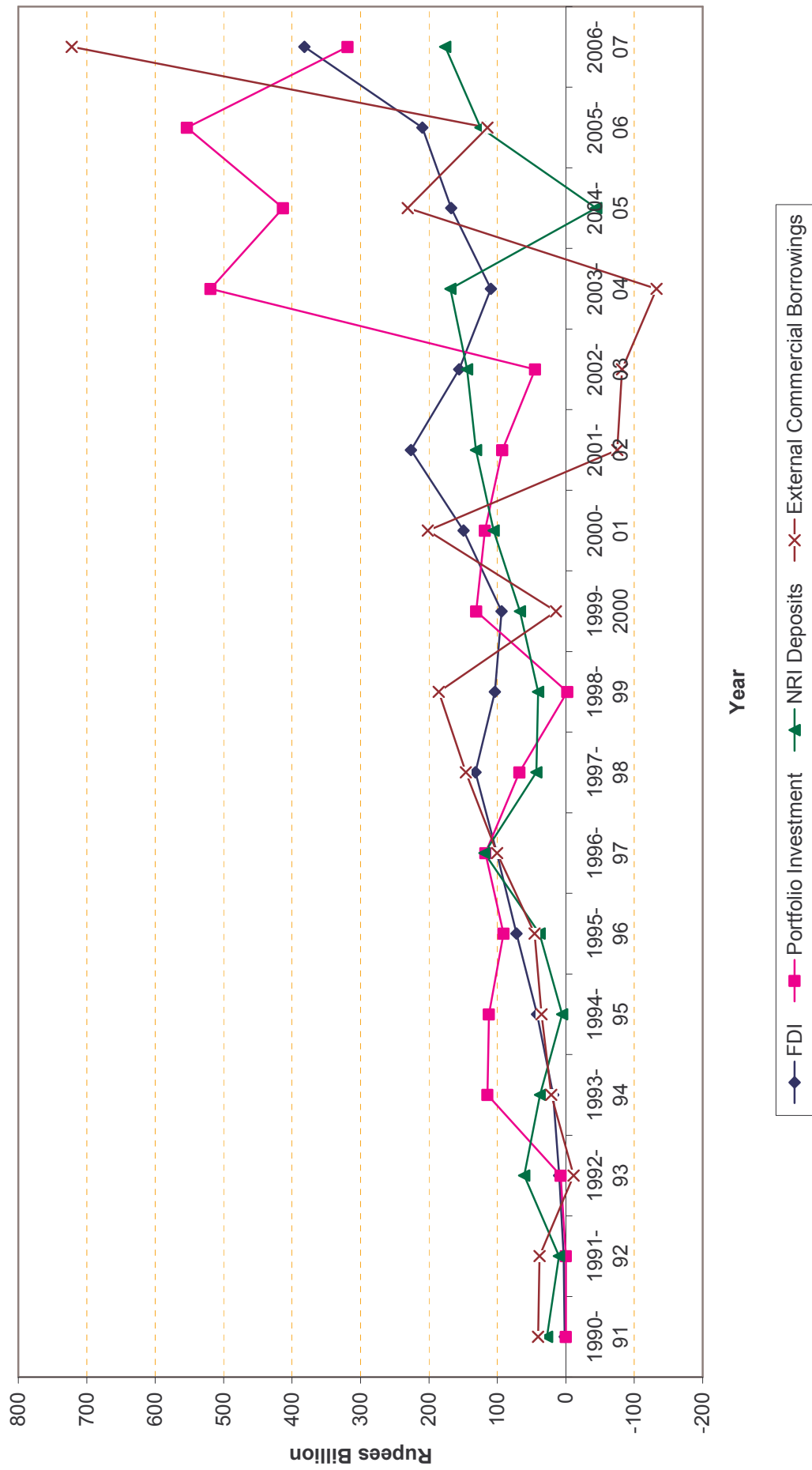


Private Transfers and Capital Account

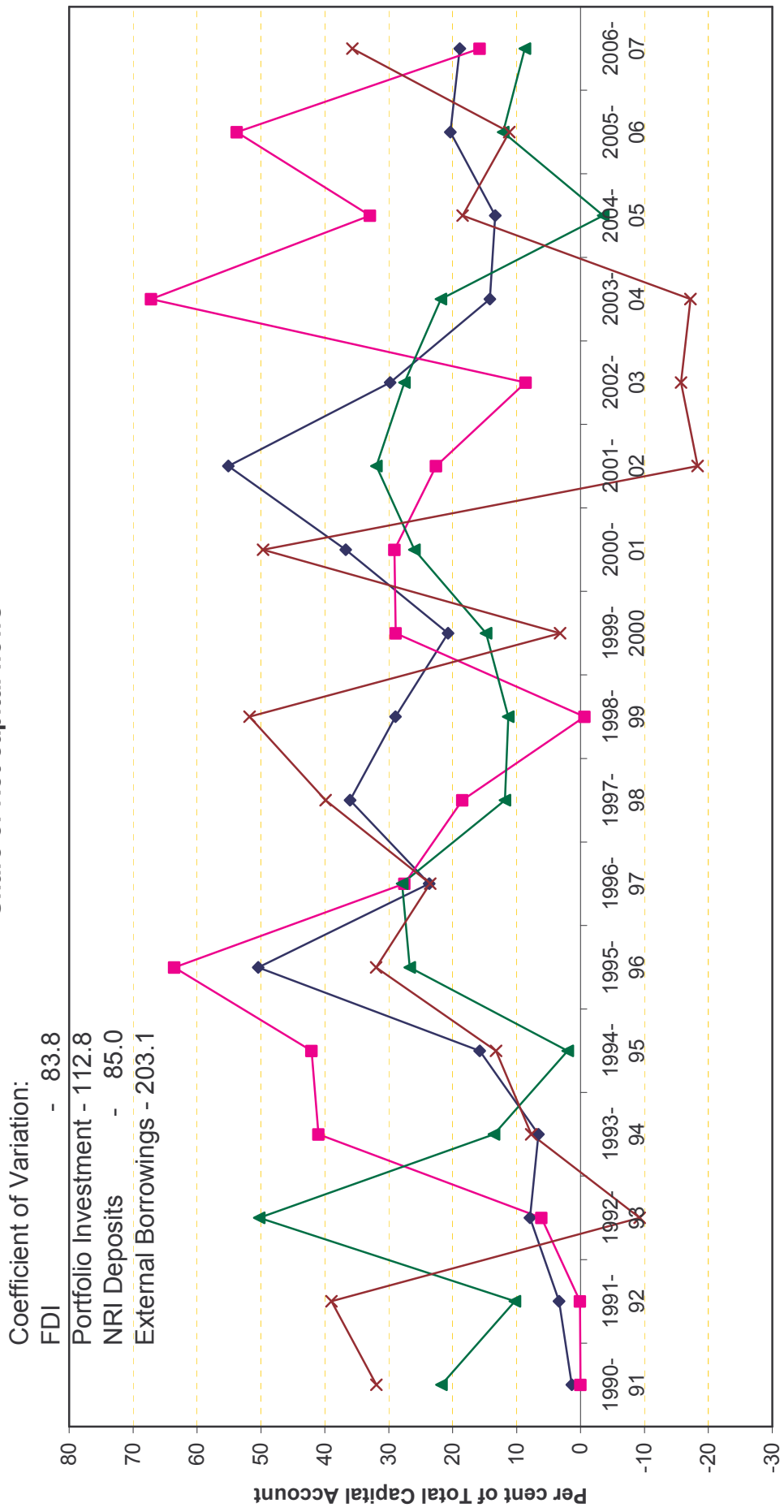


Private Transfers (mainly remittances) have been larger than capital account surplus flows till recent past (2003-04).

Net Capital Flows



Share of Net capital flows



Year



Financing of Overall Balance

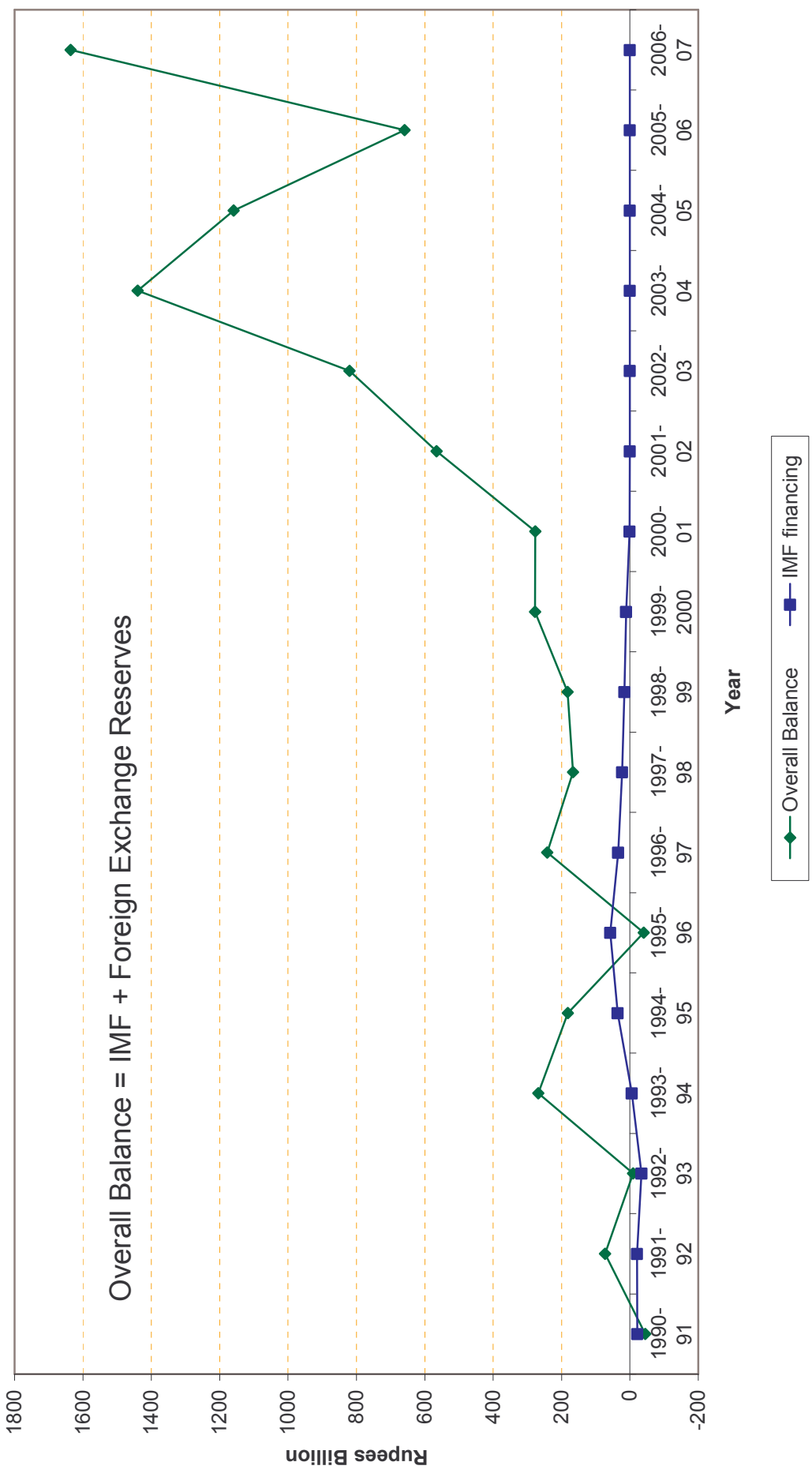
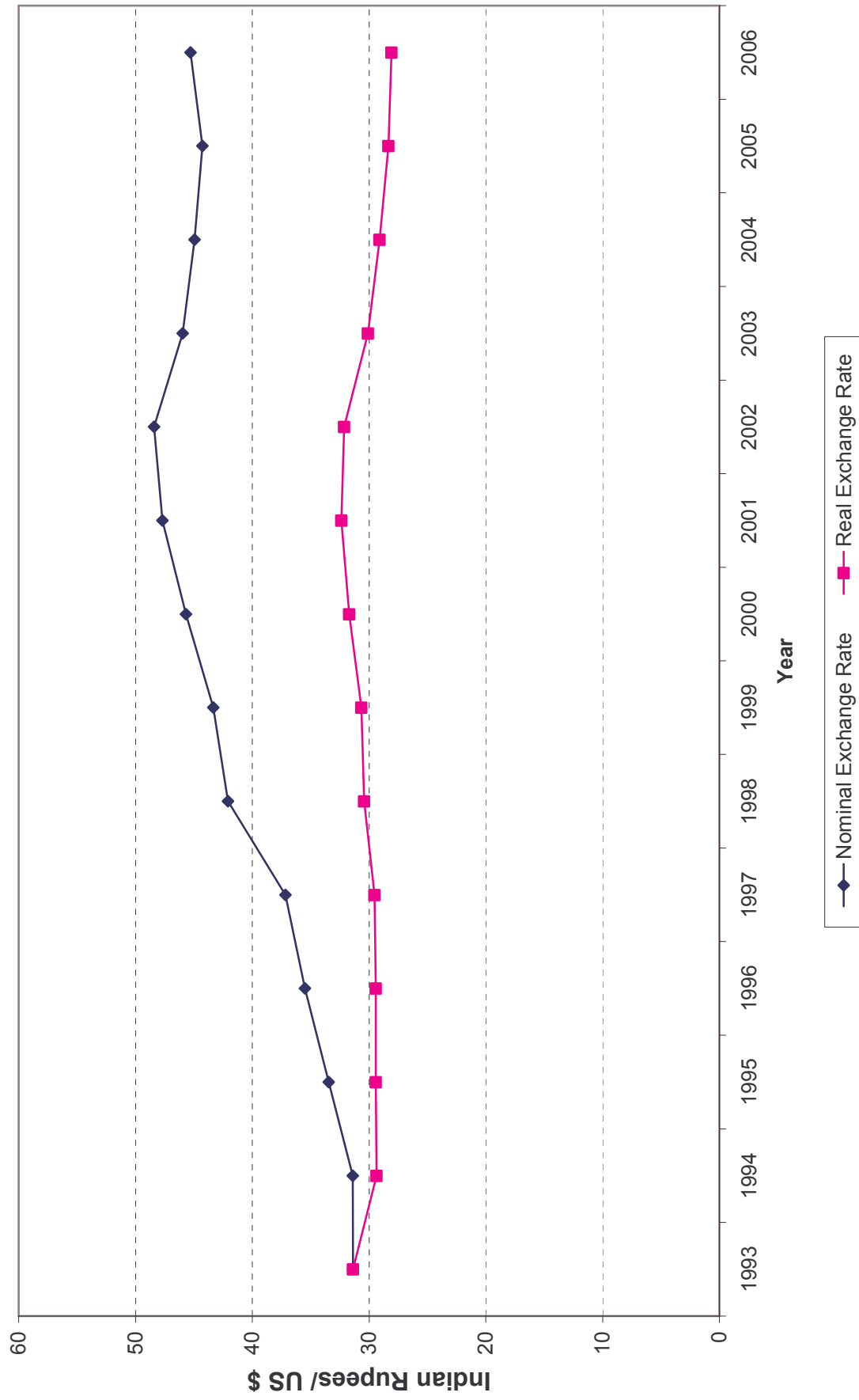
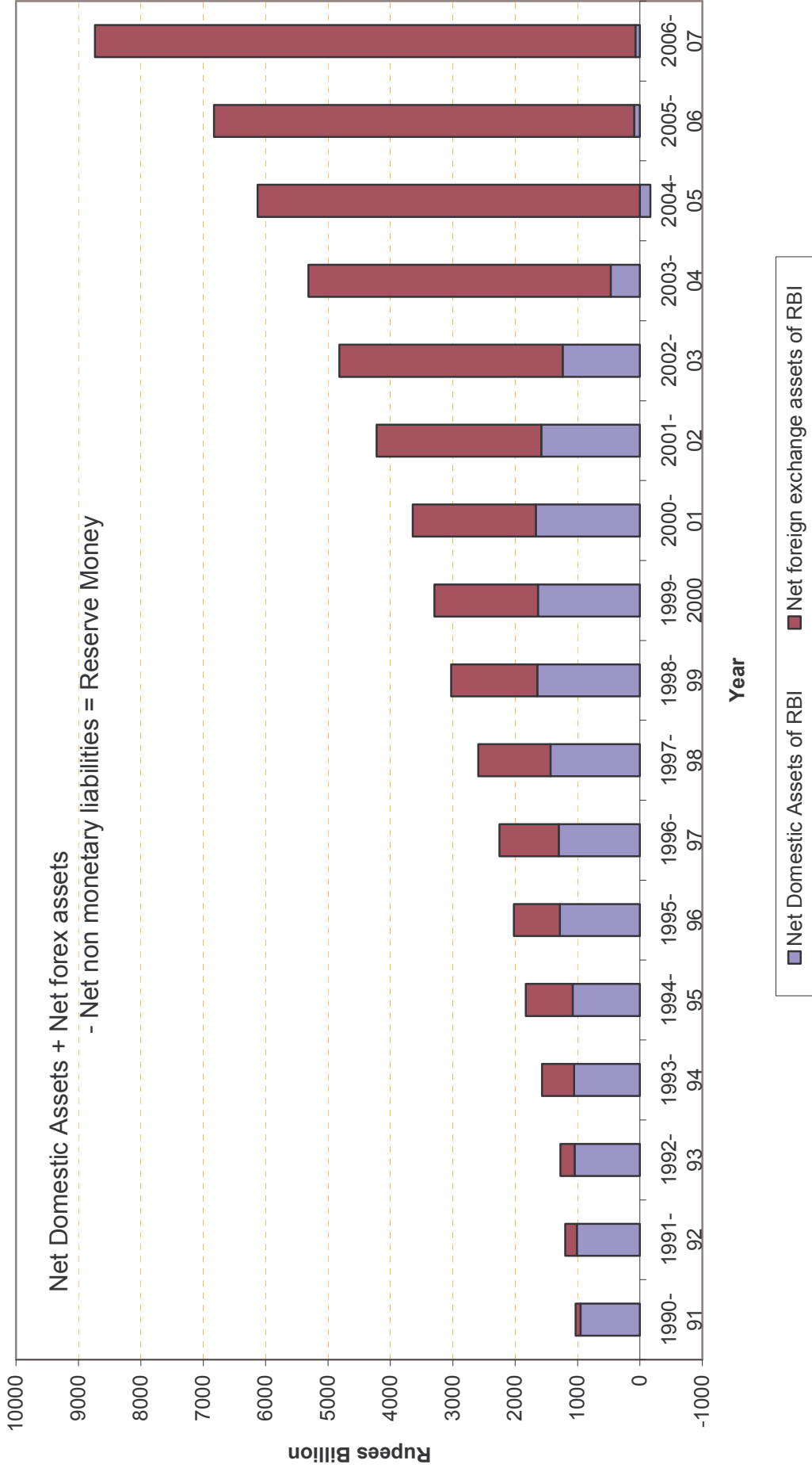


Figure 5.1: Real & Nominal Exchange Rates (INR/\$)

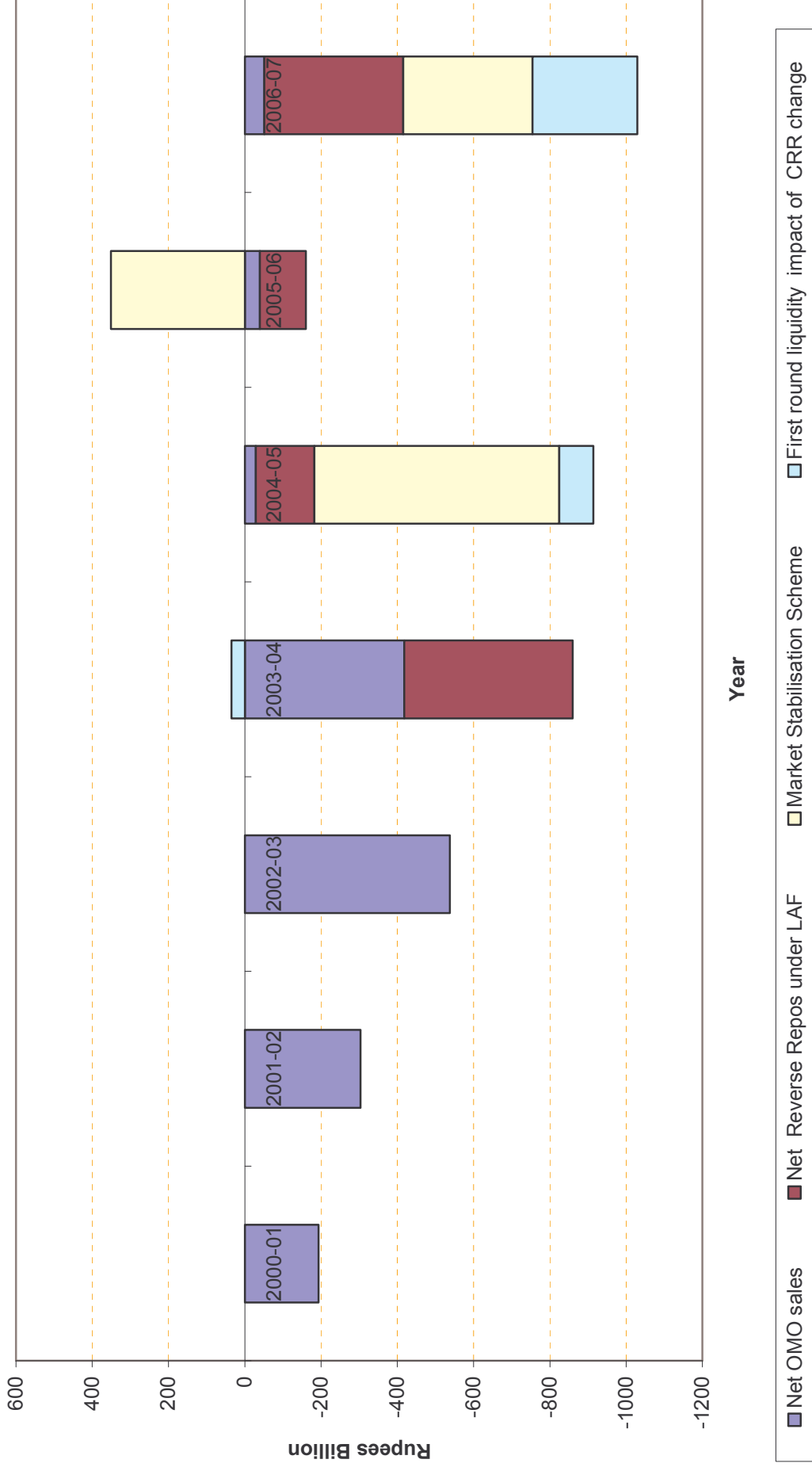


Changing composition of reserve money



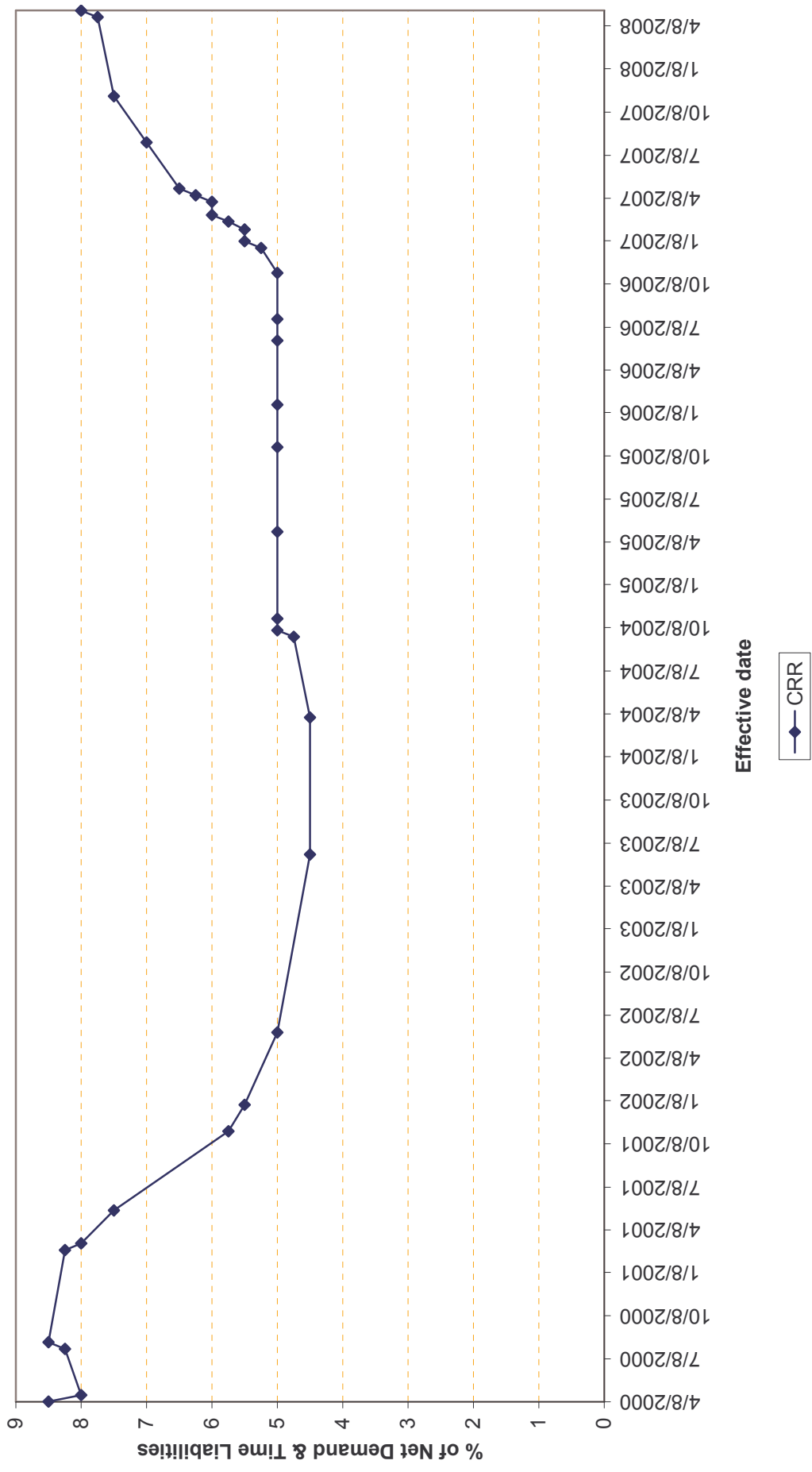
Accumulation of forex assets increases the stock of reserve/base money.

Liquidity absorption by RBI



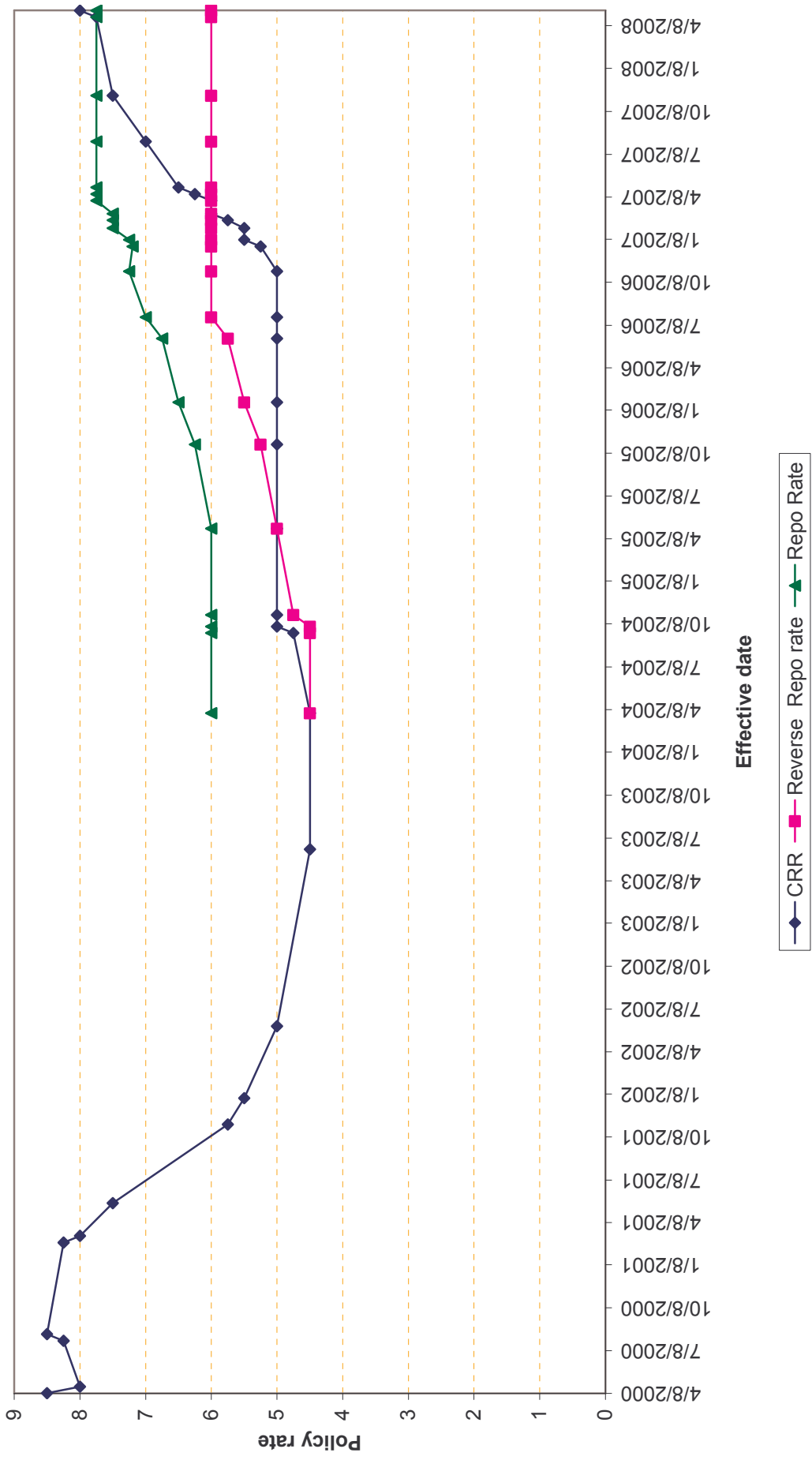
RBI used a combination of instruments – OMO sales, reverse repos, market stabilisation bonds, and CRR to mop up domestic liquidity.

Cash Reserve Ratio



As liquidity increased in the recent past direct instruments of policy such as CRR hikes were also used.

Monetary Policy Rates



Hikes in reverse repo rates were also used to absorb liquidity

It is sometimes suggested that a way of handling capital flows is to discourage inflows by putting restrictions or procedural impediments to their entry.

This has the limitation that it may be seen as a signal of going back on liberalizing the capital account.

Chronology on easing of controls on portfolio flows

1992-93

Foreign Institutional Investors permitted into the country including pension funds, mutual funds, etc. proposing to invest in India as a broad based fund with at least 50 investors and no investor with more than 5%. Permitted access to primary and secondary Market for securities, and products sold by mutual funds with a minimum 70% investment in equities.

Ceiling upon one FII of 5% ownership of any firm, and ceiling upon total of all FIIs at 24%

1996-97

New concept of 100% debt FIIs permitted, which could invest in corporate bonds but not government bonds

1997-98

Ceiling upon ownership by one FII in one firm raised from 5% to 10%. FIIs permitted to partially hedge currency exposure using the currency forward market. FIIs permitted to trade on the equity derivative market in a limited way.

1999-2000

Requirement that FII must have at least 50 investors eased to 20 investors.

1999-2000

Foreign firms and individuals permitted to access Indian market through FIIs as “sub accounts”. Local fund managers also permitted to do fund management for foreign firms and individuals through sub accounts. Requirement that no investor can have over 5% of the FII fund eased to 10%

Ceiling upon total ownership by all FIIs of local firms raised from 30% to 40% (required shareholder resolution)

2000-01

Ceiling upon total ownership by all FIIs of local firms raised from 40% to 49% (required shareholder resolution)

2001-02

Ceiling upon total ownership by all FIIs of local firms raised from 49% to “the sectoral cap for the industry” (required shareholder resolution)

2003-04

Limitations on FIIs hedging using the currency forward market removed

Twin approvals for FIIs at both SEBI and RBI replaced by single approval at SEBI

2004-05

New ceiling placed upon total ownership by all FIIs of corporate bonds of \$0.5 billion

2006-07

Range of international entities that can invest in stock market in India widened to include institution established as incorporated outside India as a pension fund, MF, investment trust, insurance company and reinsurance company as registered FIIIs.

The list would also include international or multilateral agencies, foreign government agencies, or foreign central banks.

SEBI also allowed registration by an asset management company, investment management advisor, banks or institutional portfolio manager, established or incorporated outside India and preparing to make investments in India on behalf of broad based proprietary funds.

2006-07

Foreign investment up to 49 percent allowed in infrastructure companies in securities market.
Separate cap of FDI of 26 percent and FII of 23 percent also fixed.

Macroeconomics of the Open Economy: Mundell Fleming

$$Y = C + I + G + X - M$$

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$$Y = C + I + G + X - M$$

$$Y - C - G - (X - M) = I$$

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$$\underbrace{(Y - T) - C}_{S_{\text{pvt}}} + \underbrace{(T - G)}_{S_{\text{govt}}} - (X - M) = I$$

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$$S - (X - M) = I \quad S = S_{\text{pvt}} + S_{\text{govt}}$$

Macroeconomics of the Open Economy: Mundell Fleming

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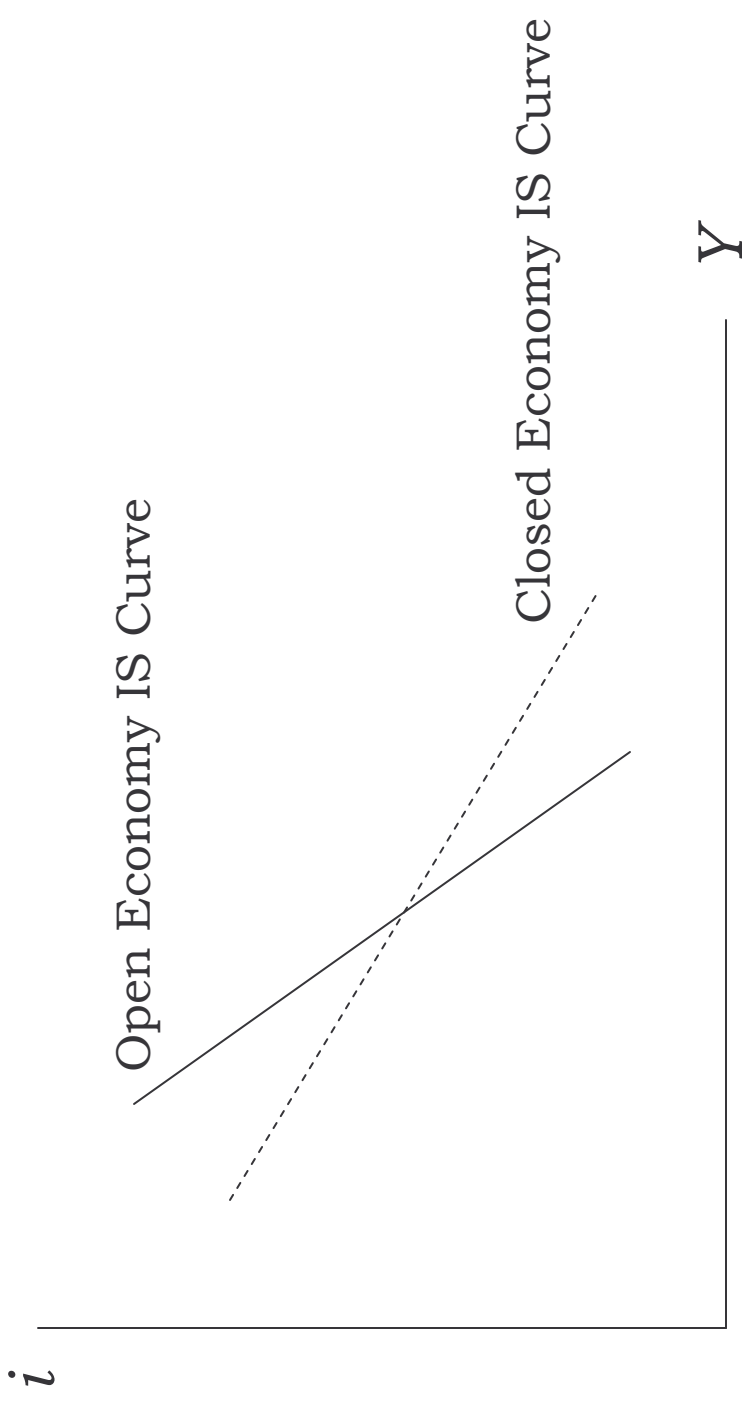
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Open Economy IS Curve

$$S\left(Y_{(+)(+)}^+, r_{(+)(+)}\right) - NX\left(E, Y_{(+)(-)}^-\right) = I\left(r_{(-)}^-\right)$$



- 1) $Y \uparrow$ results in $NX \downarrow$ and an increase in $(S - NX)$
- 2) If $E \uparrow$ then $NX \uparrow$ and IS curve shifts to right

$$Y > (C + I + G) \Rightarrow (X - M) > 0$$

If the country is spending less than its income then it must be building up claims against the rest of the world, or, adding to its net foreign exchange assets.

$$\Delta FE = X - M = (S_{\text{pvt}} - I) + (T - G)$$

T
h
u
s

Central Bank Balance Sheet

ASSETS

Credits to domestic banks

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= Holdings of govt. debt
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balances of domestic banks

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Central Bank (NML_{CB})

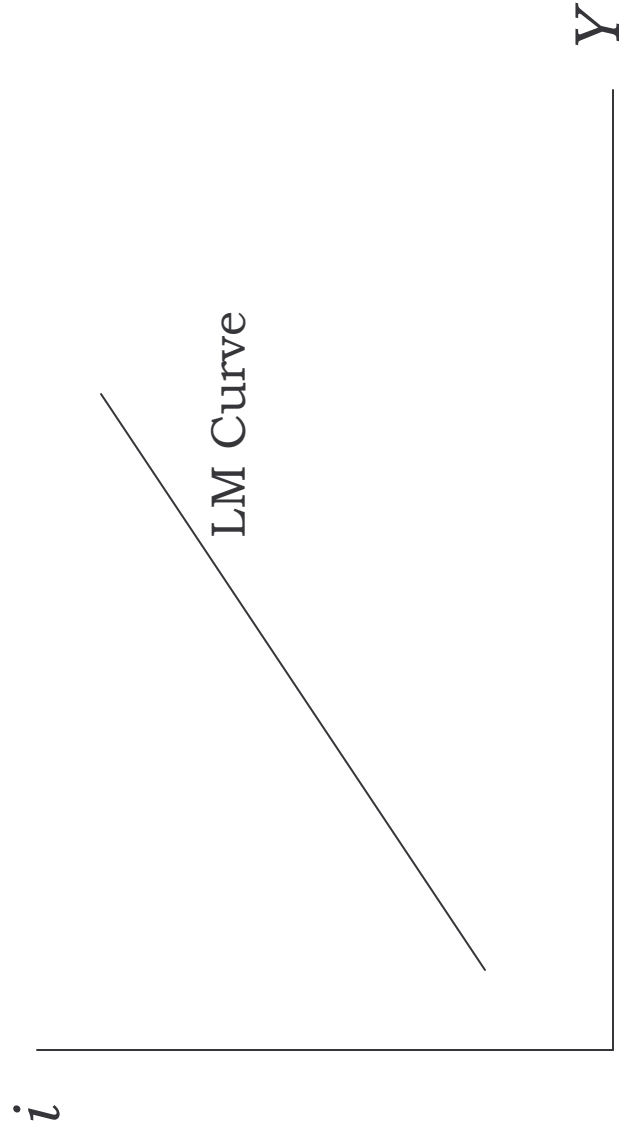
$$M_0 = R$$

Financial Market: *LM* Curve

$$\frac{M^D}{P} = L(i, Y), \quad L_i < 0, L_Y > 0.$$

$$M^S = m(FE_{CB} + DC)$$

$$M^D = M^S = M$$



Capital Mobility

Capital flows will depend on which destination offers higher rates of return. Let r^* be the foreign interest rate that includes any expected depreciation of the domestic currency.

Then, $NKI = K(r - r^*) = K(r) \quad K'(r) > 0$

Capital Mobility

Assume $P = P^* = 1$ so that $\pi^e = 0$ and $i = r$

$$\text{Then, } NX \left(\frac{EP^*}{P_{(+)}}, \frac{Y}{Y_{(-)}} \right) = NX \left(\frac{E}{E_{(+)}}, \frac{Y}{Y_{(-)}} \right)$$

Capital flows will depend on which destination offers higher rates of return. Let r^* be the foreign interest rate that includes any expected depreciation of the domestic currency.

$$\text{Then, } NKI = K(r - r^*) = K(r) \quad K'(r) > 0$$

Balance of Payments:-

$$BP = NX(Y, E) + NKI(r - r^*) = \Delta FE$$

A pure float requires that a surplus on one account is balanced by a deficit on the other.

$$NX(Y, E) + NKI(r - r^*) = 0$$

Regime I: **Capital Immobility:** $NKI(r - r^*) = 0$ as $\frac{\Delta NKI}{\Delta r} \rightarrow 0$

$$BP = NX(Y, E) = \Delta FE = 0$$

Regime II: **Perfect Capital Mobility:** $\frac{\Delta NKI}{\Delta r} \rightarrow \infty$

Large flows of capital for small deviations from $r = r^*$

Regime III: **Imperfect Capital Mobility** $0 < \frac{\Delta NKI}{\Delta r} < \infty$

- (a) Limited supply of arbitrage funds
- (b) Risk aversion that results in risk premium increasing with flow of funds
- (c) Capital Controls

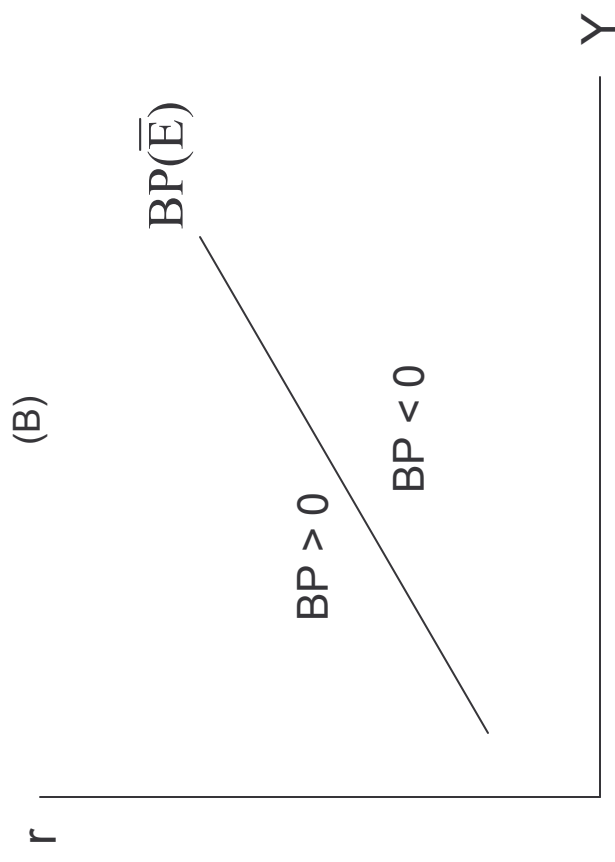
r not necessarily equal to r^*

Flexible Exchange Rates

$$NX(Y, E) + NKI(r - r^*) = 0$$

$$\text{Or, } NX(Y, E) = -NKI(r - r^*)$$

Three unknowns: r, Y, E

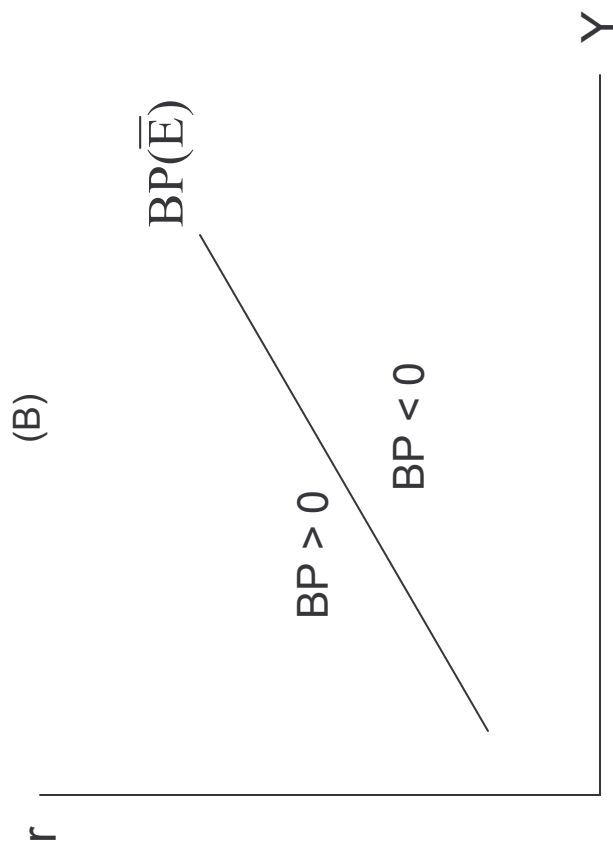


Flexible Exchange Rates

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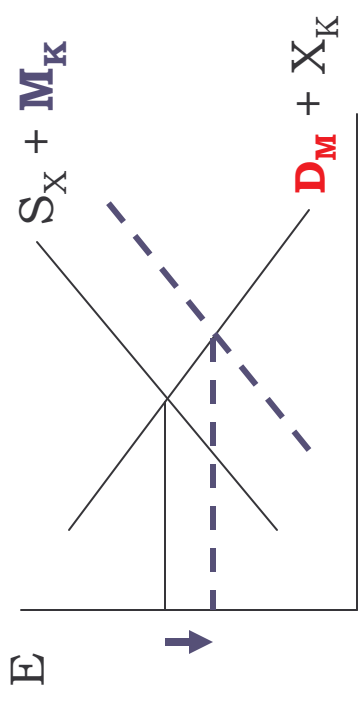
Three unknowns: r, Y, E



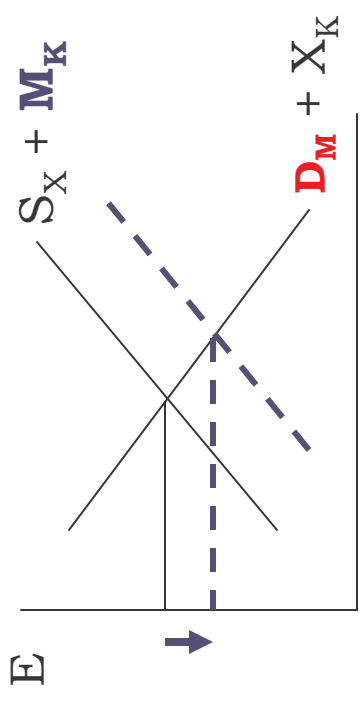
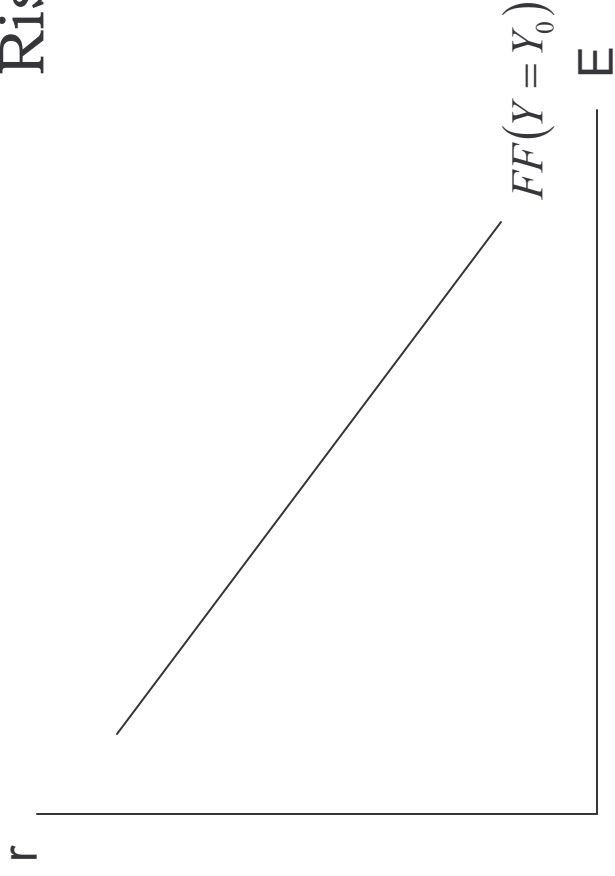
Slope of BP line depends on how elastic capital inflows are with respect to interest rates. Our diagram is for imperfect capital mobility. $\left. \frac{\partial r}{\partial Y} \right|_E = -\frac{\partial NX / \partial Y}{\partial NKI / \partial r}$

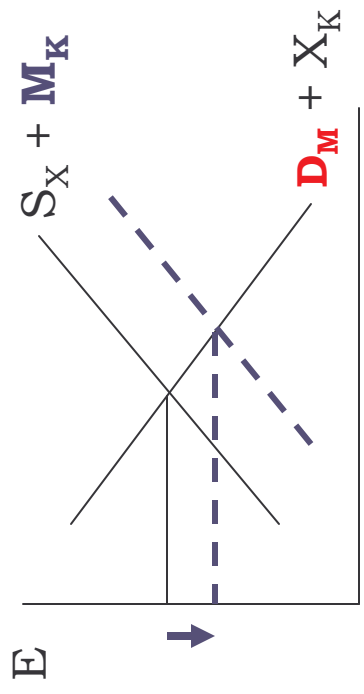
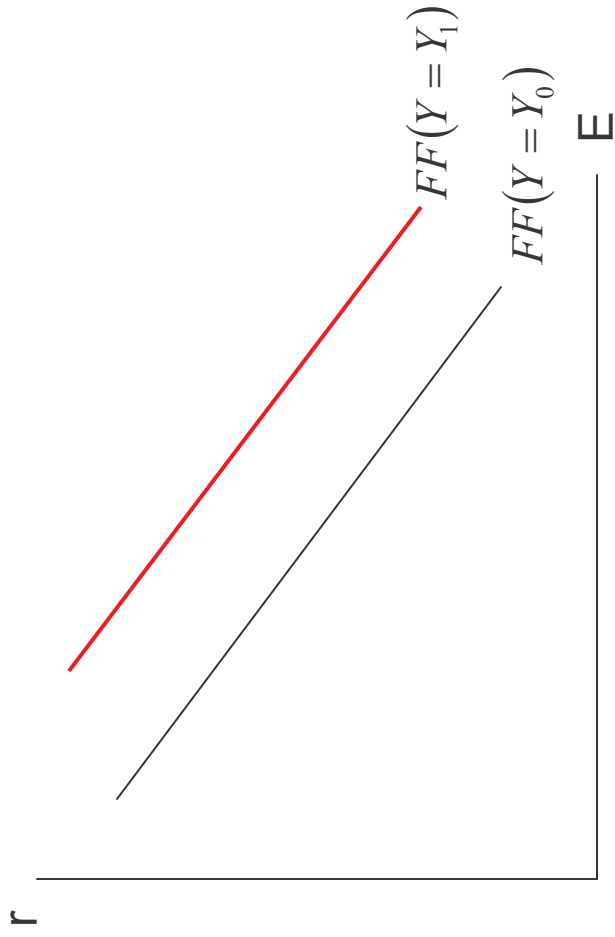
$E \uparrow$ then $NX \uparrow$ which must be offset by a decline in capital inflows as $NX = -NKI$ and requires $r \downarrow$

Rise in r results in $NKI = M_K \uparrow$



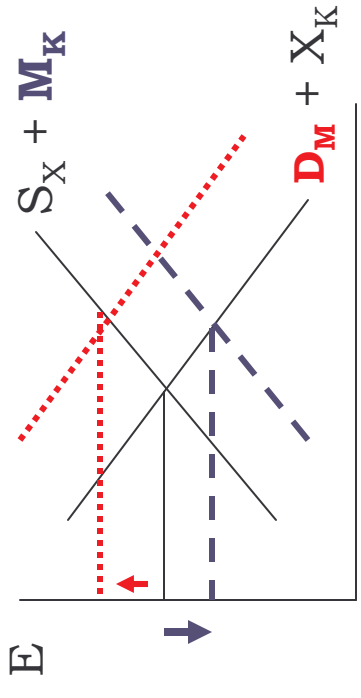
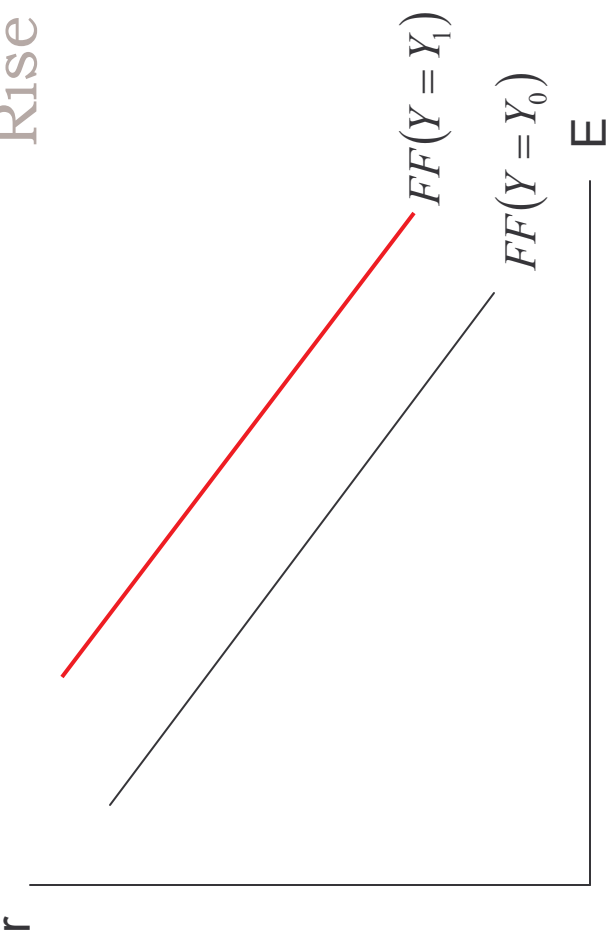
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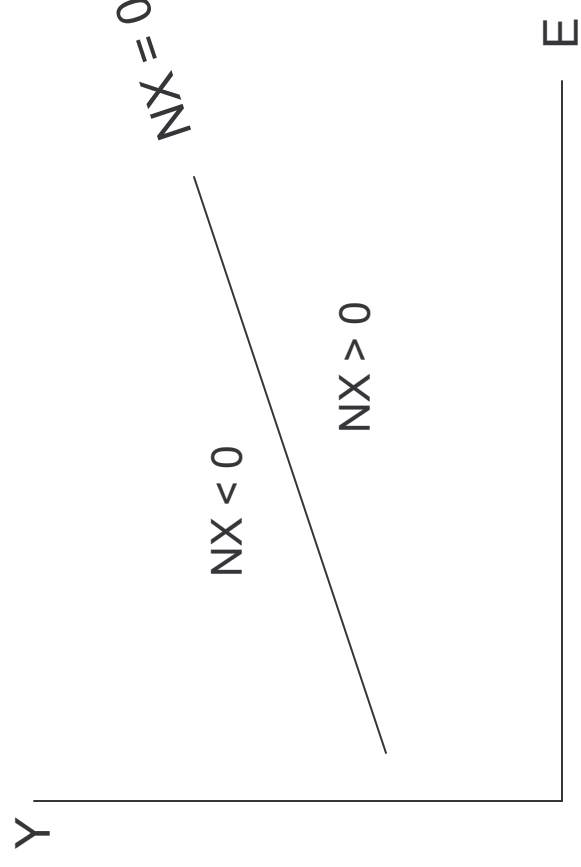


Rise in Y to $Y_1 = \vec{D}_M$

Rise in r results in $NKI = M_K \uparrow$



Rise in Y to $Y_1 = \vec{D}_M$



$$NX(Y, E) = 0$$

$Y \uparrow$ implies imports \uparrow and so exports must also \uparrow for $NX = 0$ which occurs when $E \uparrow$

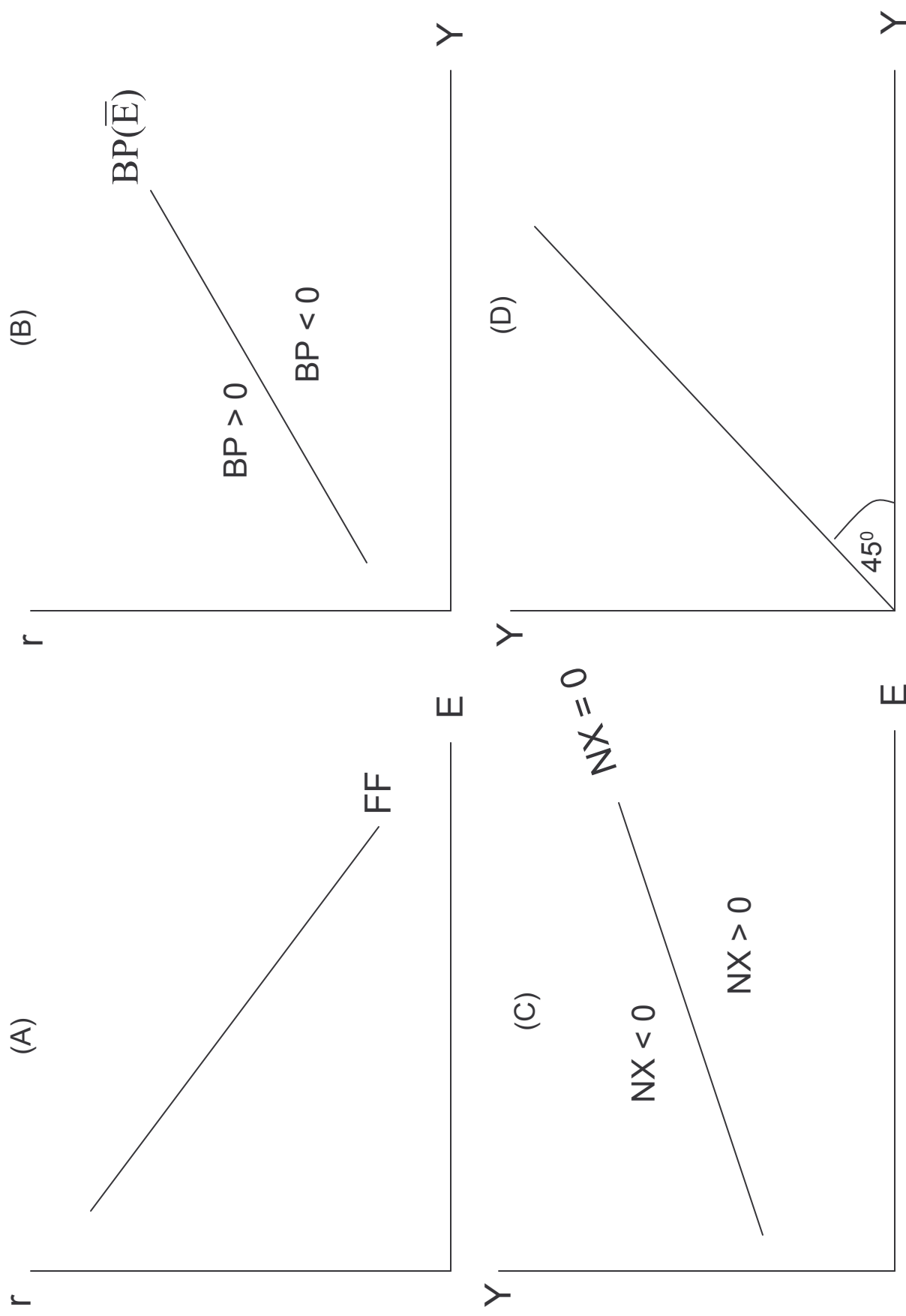


Figure II: Balance of Payments under Imperfect Mobility of Capital

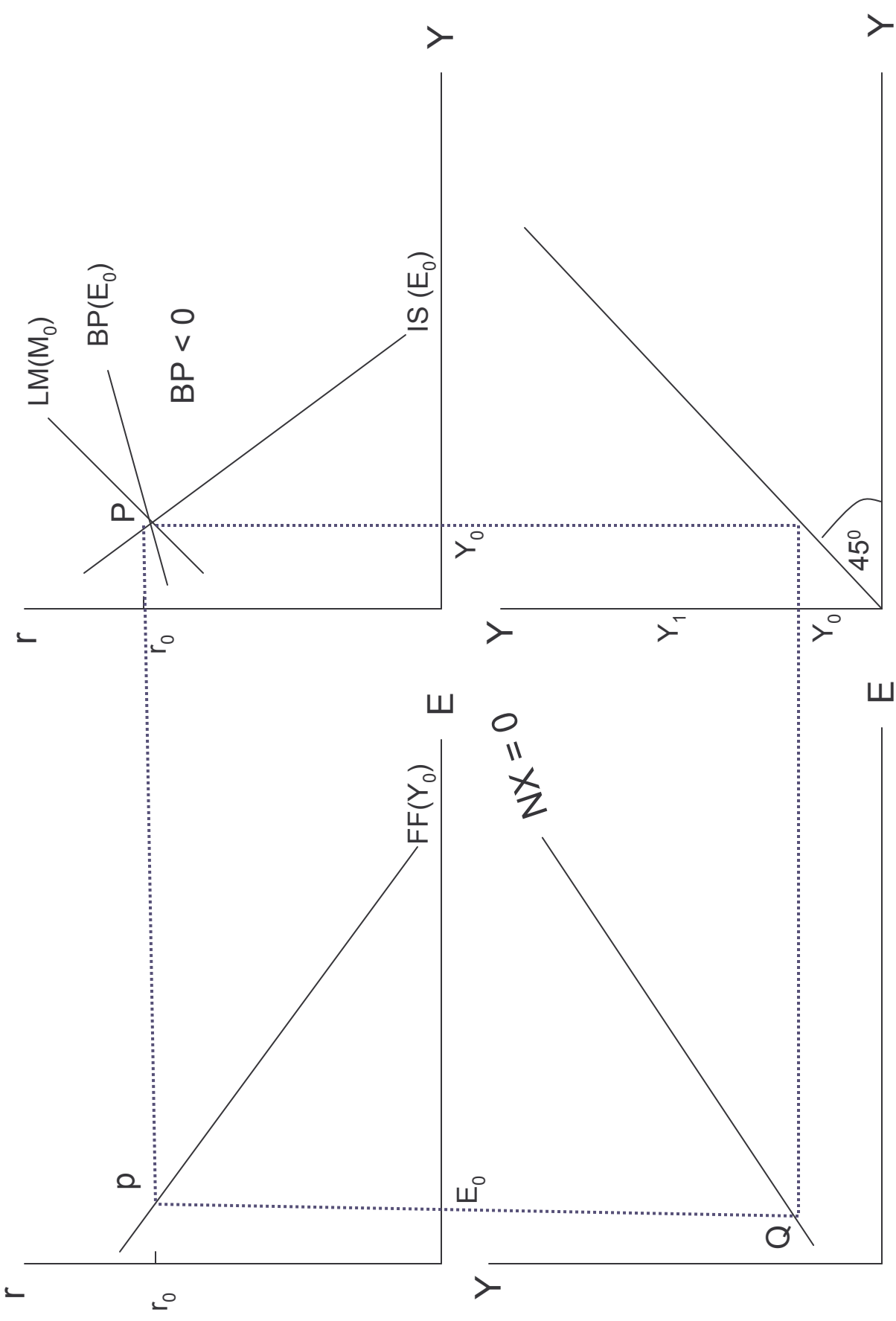


Figure IV: Monetary Policy with Flexible Exchange Rates

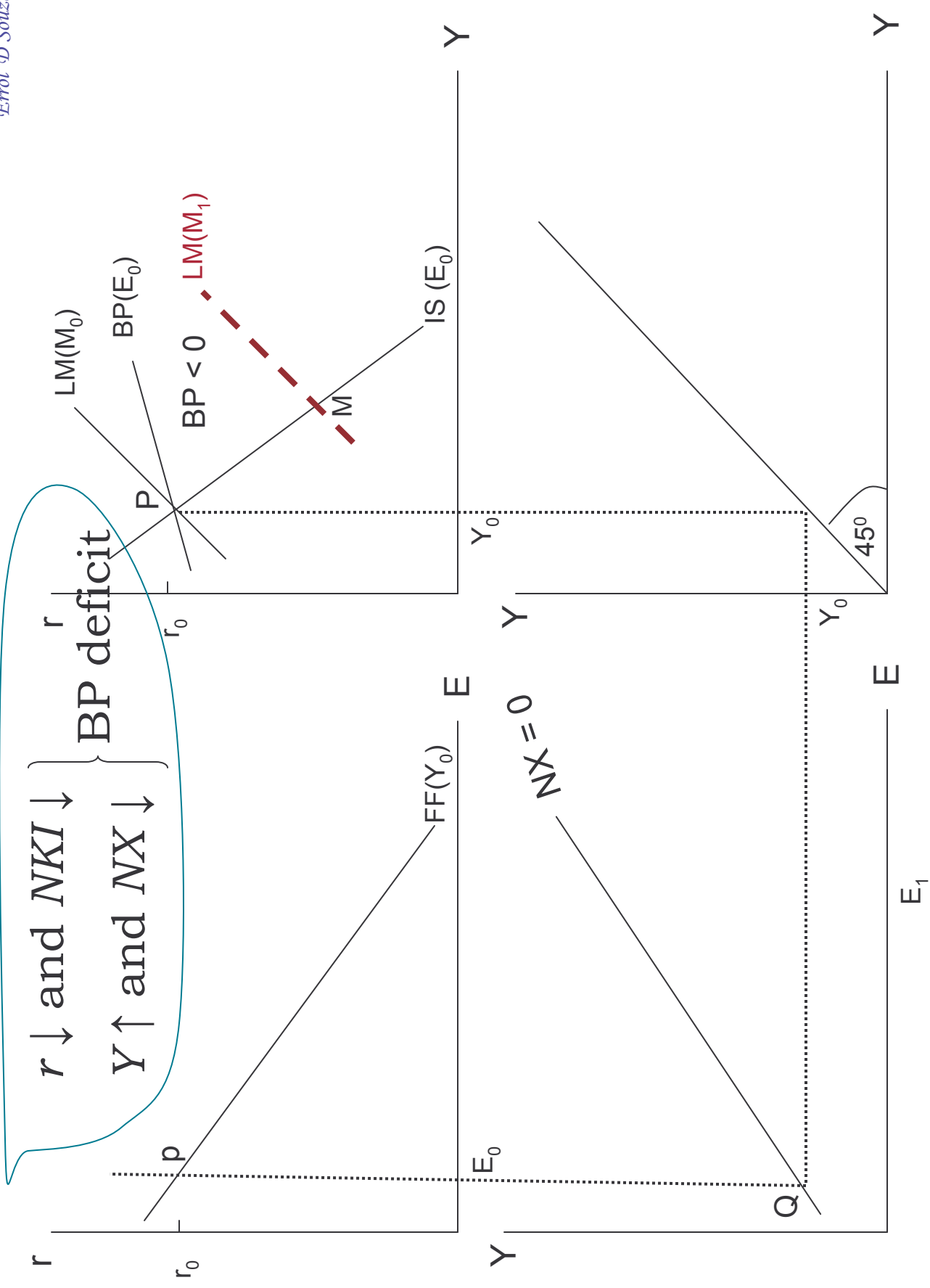
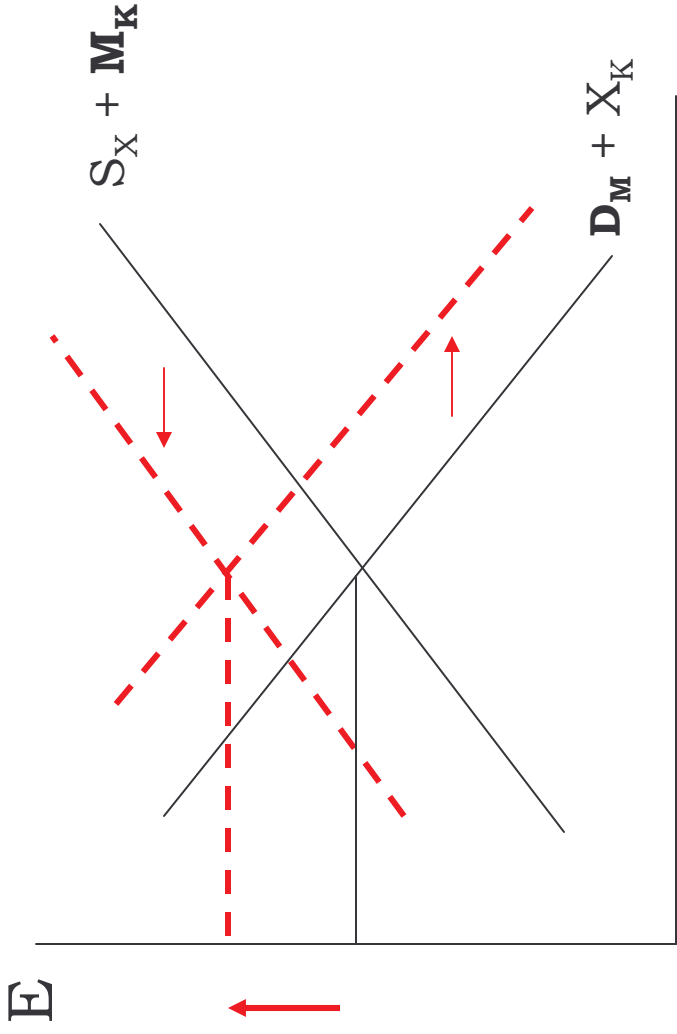


Figure IV: Monetary Policy with Flexible Exchange Rates



Increase in imports implies $D_M + X_K$ shifts right

Reduction in capital inflows implies $S_X + M_K$ shifts to left.

Exchange Rate depreciates to E_1

BP curve shifts downwards to the right

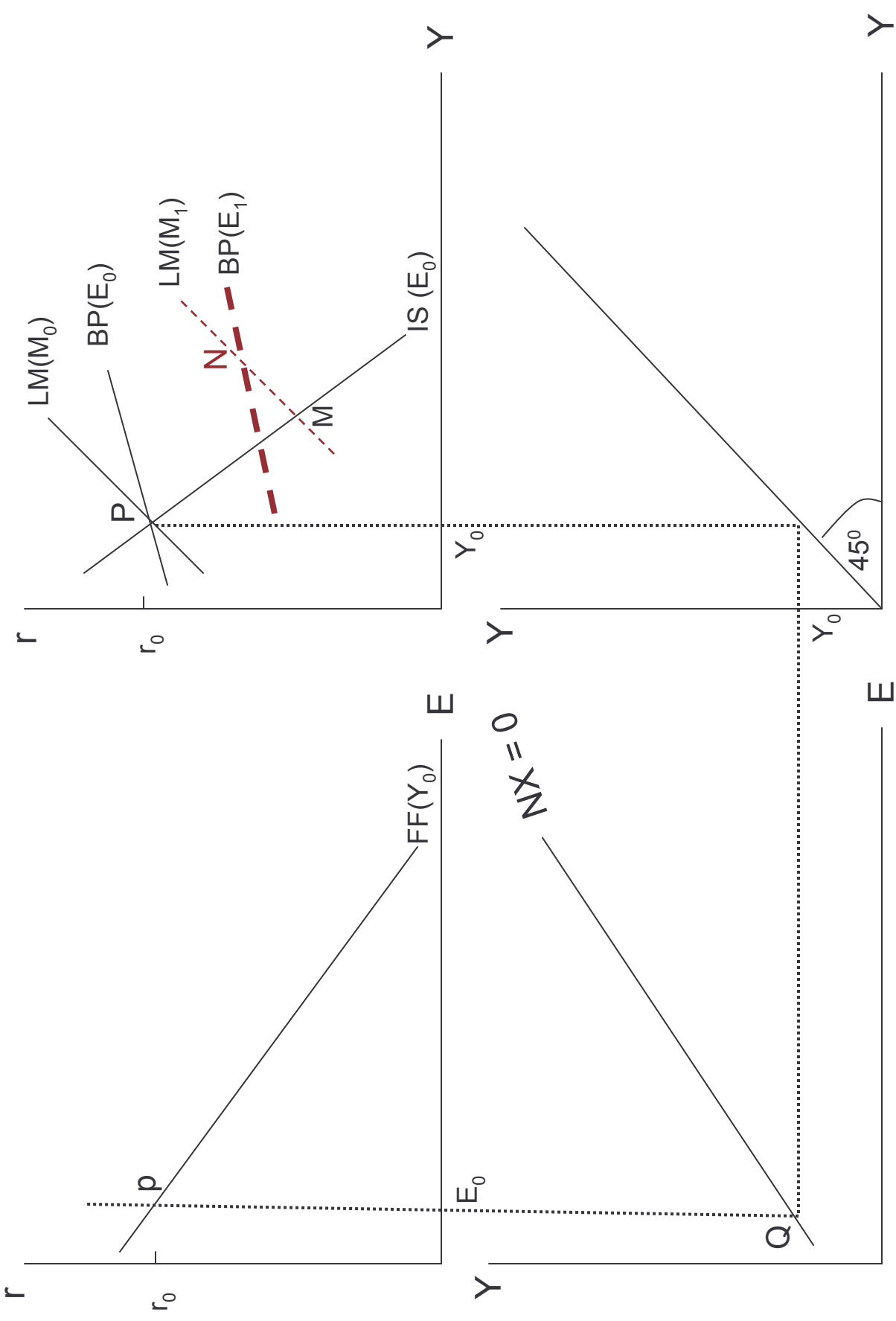


Figure IV: Monetary Policy with Flexible Exchange Rates

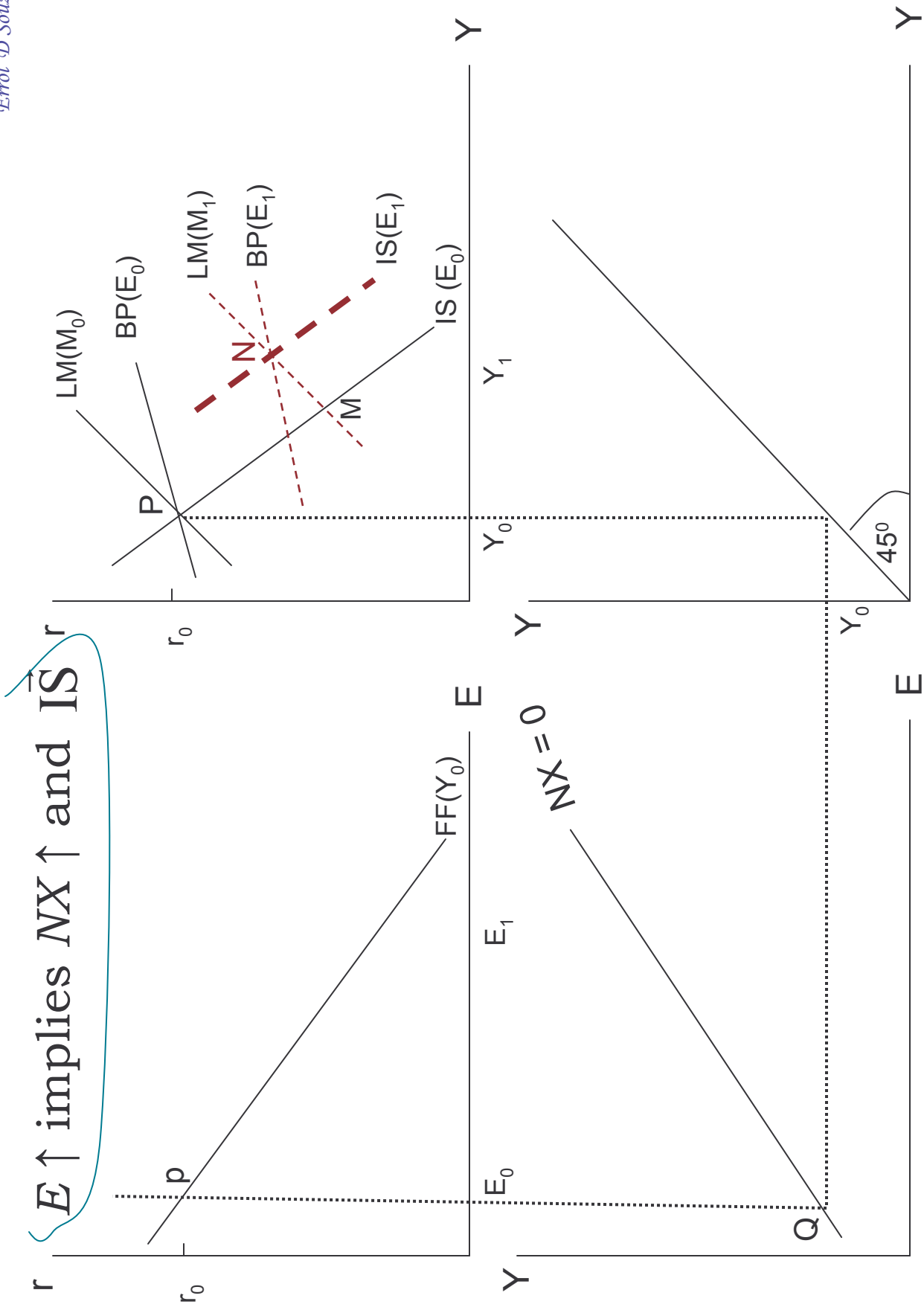


Figure IV: Monetary Policy with Flexible Exchange Rates

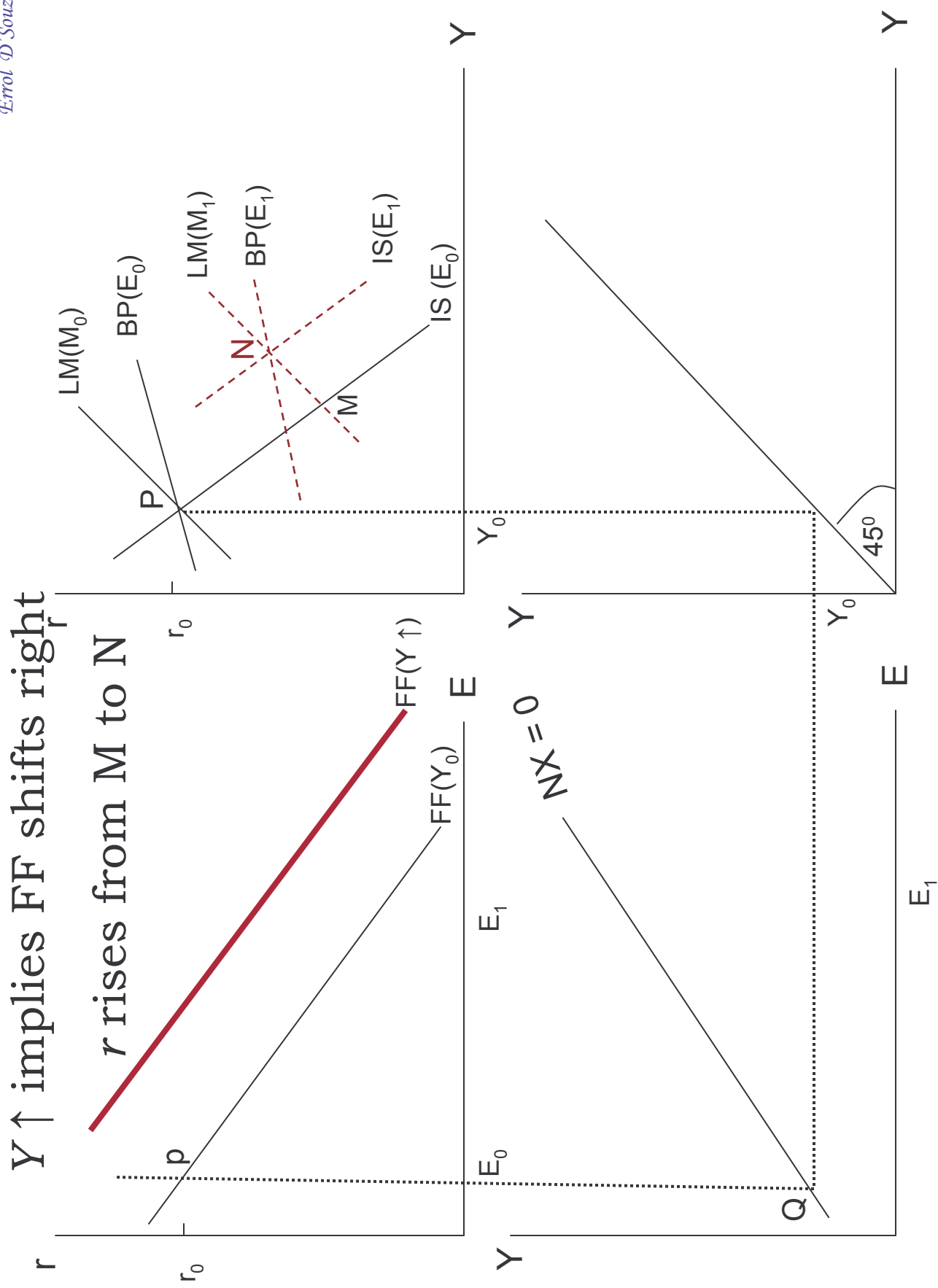


Figure IV: Monetary Policy with Flexible Exchange Rates

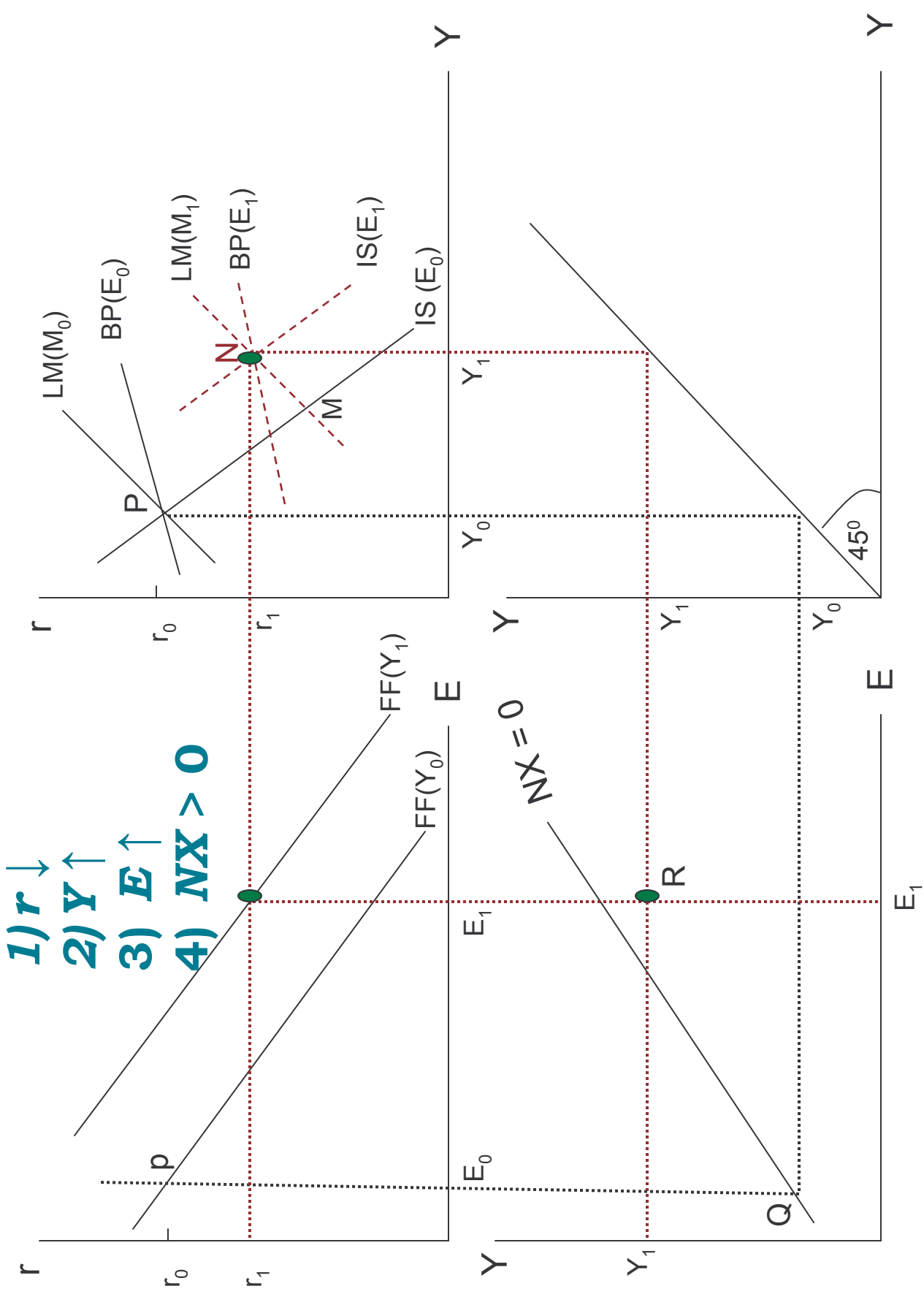


Figure IV: Monetary Policy with Flexible Exchange Rates

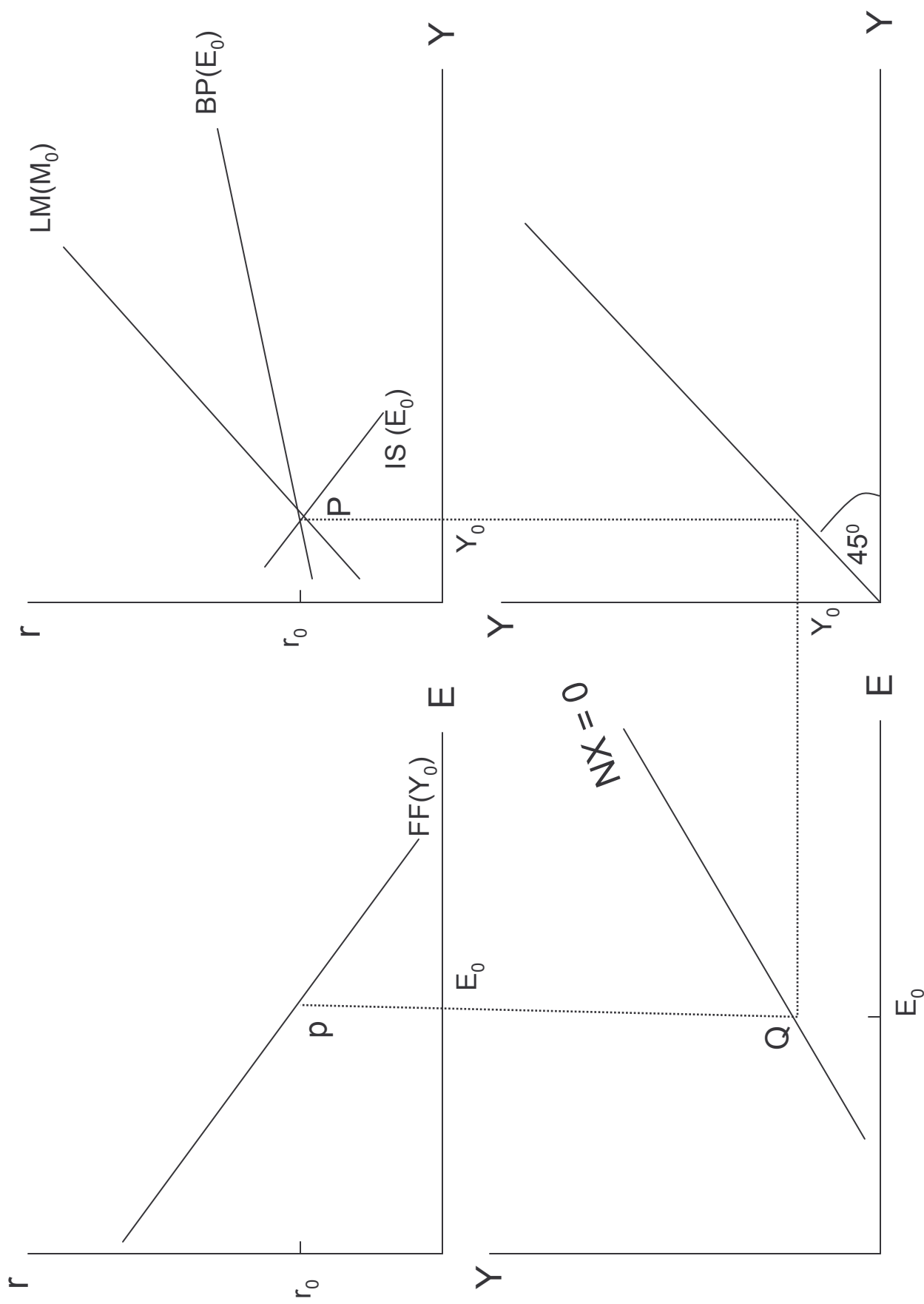


Figure V: [Fiscal Policy](#) with Flexible Exchange Rates

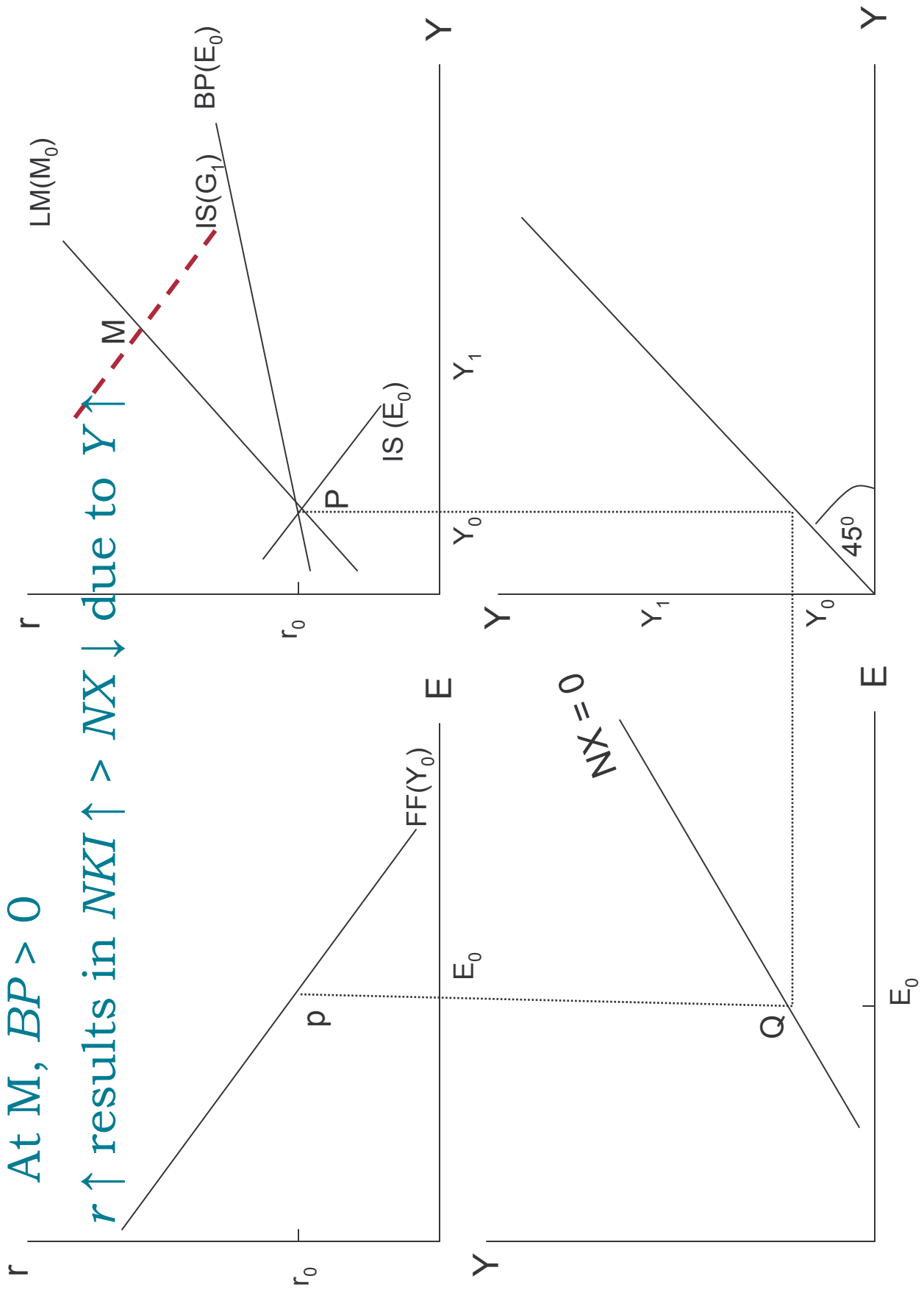
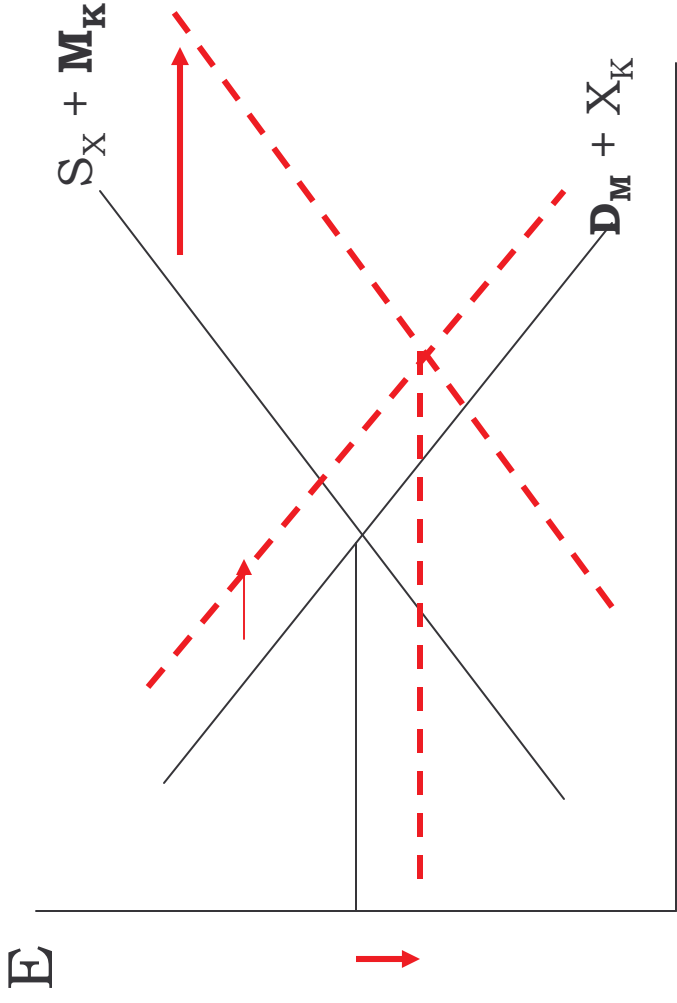


Figure V: [Fiscal Policy](#) with Flexible Exchange Rates



$r \uparrow$ results in $NKI = M_K \uparrow > D_M \uparrow = NX \downarrow$ due to $Y \uparrow$

Exchange Rate appreciates

BP curve shifts upwards to the right

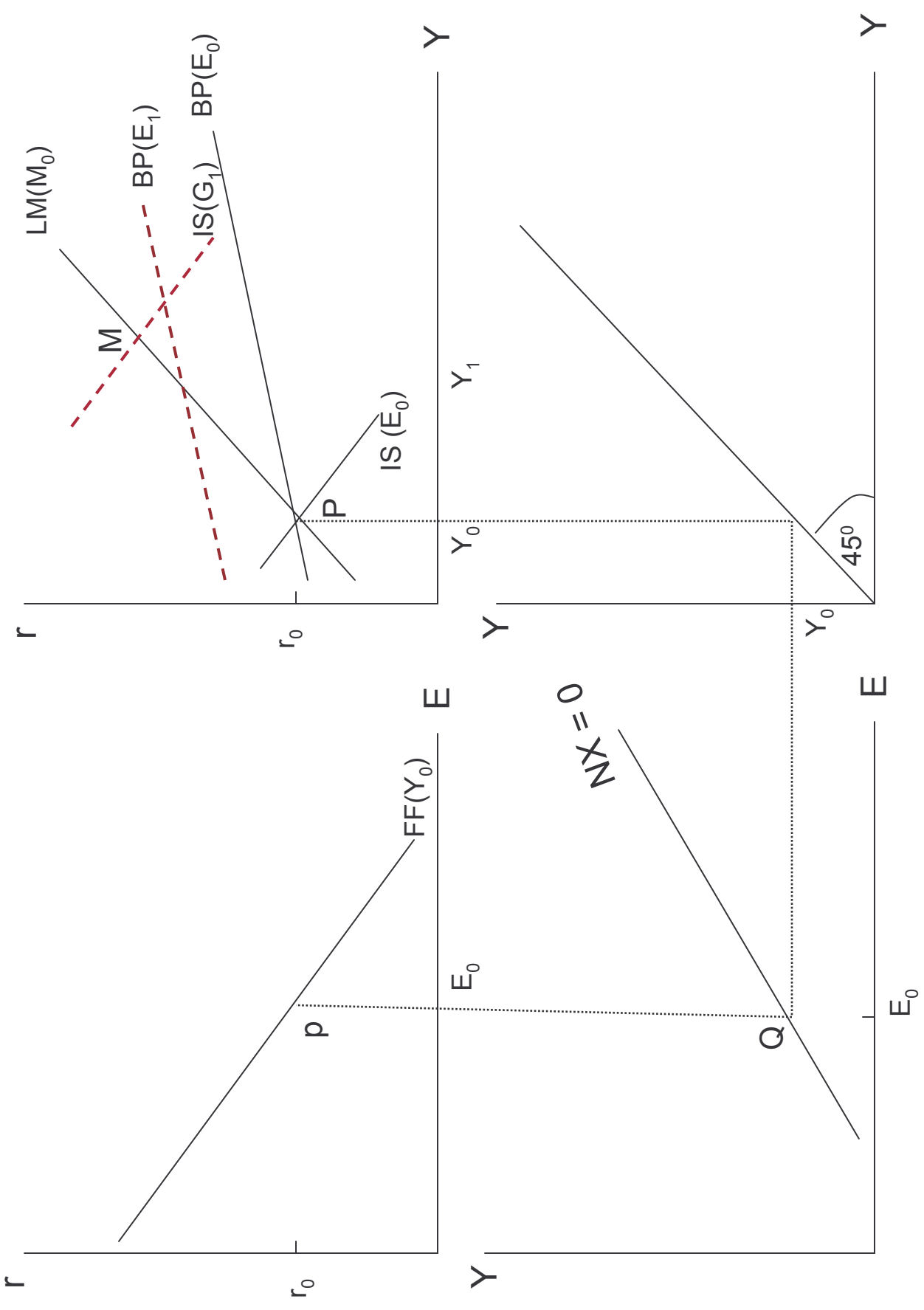


Figure V: [Fiscal Policy](#) with Flexible Exchange Rates

$E \downarrow$ shifts IS to the left as $NX \downarrow$

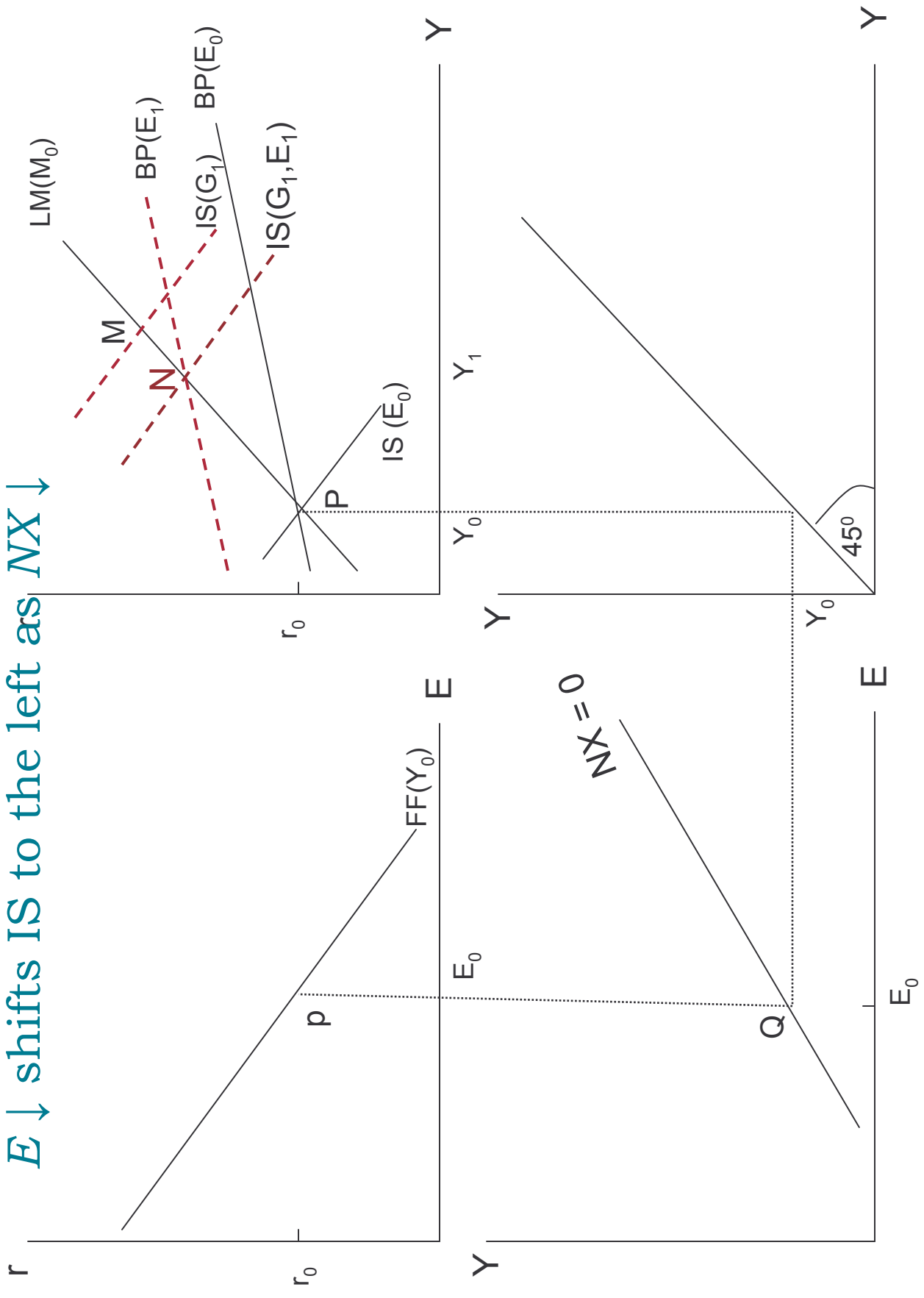


Figure V: [Fiscal Policy](#) with Flexible Exchange Rates

As $Y \uparrow$, FF curve shifts right

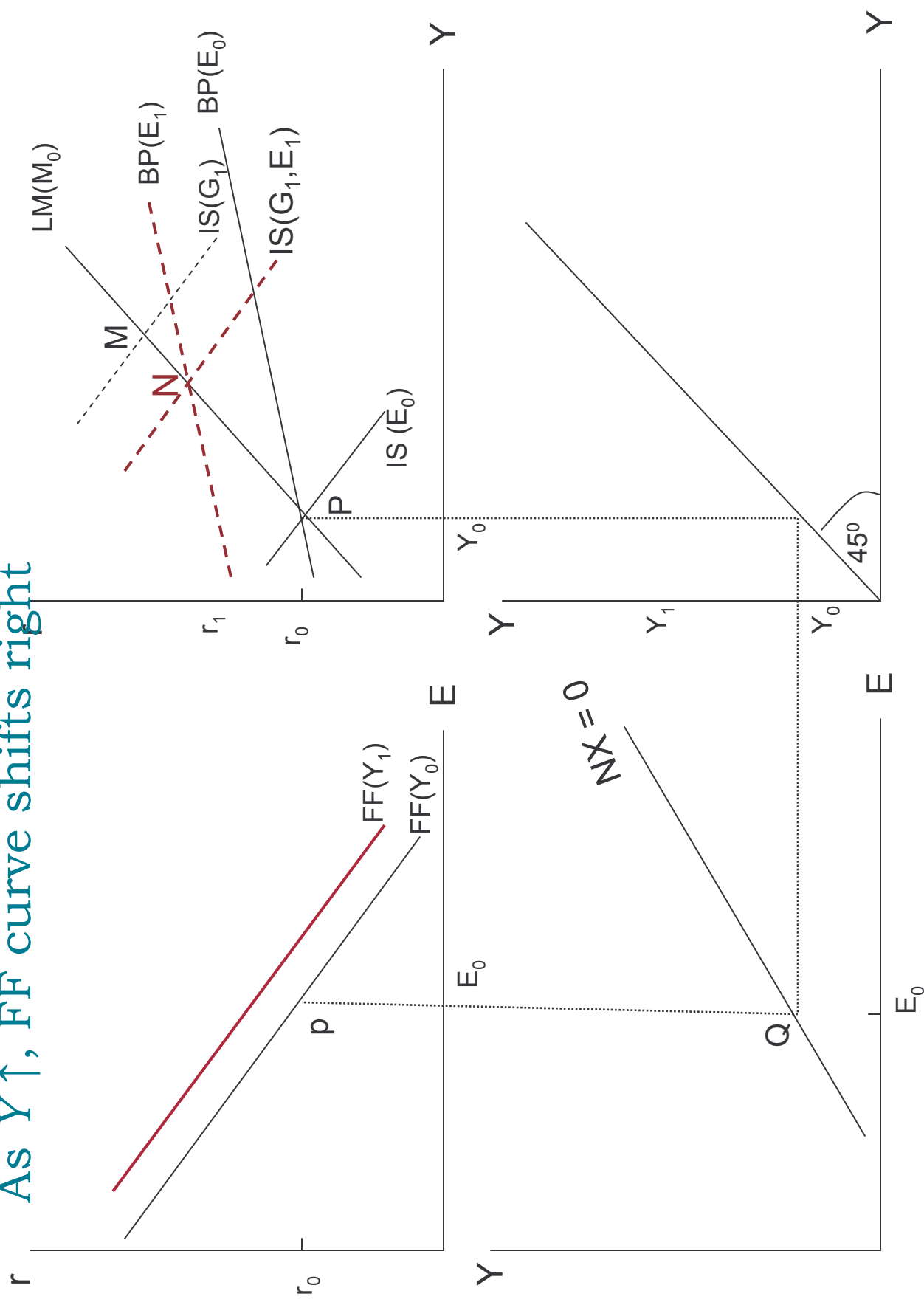


Figure V: [Fiscal Policy](#) with Flexible Exchange Rates

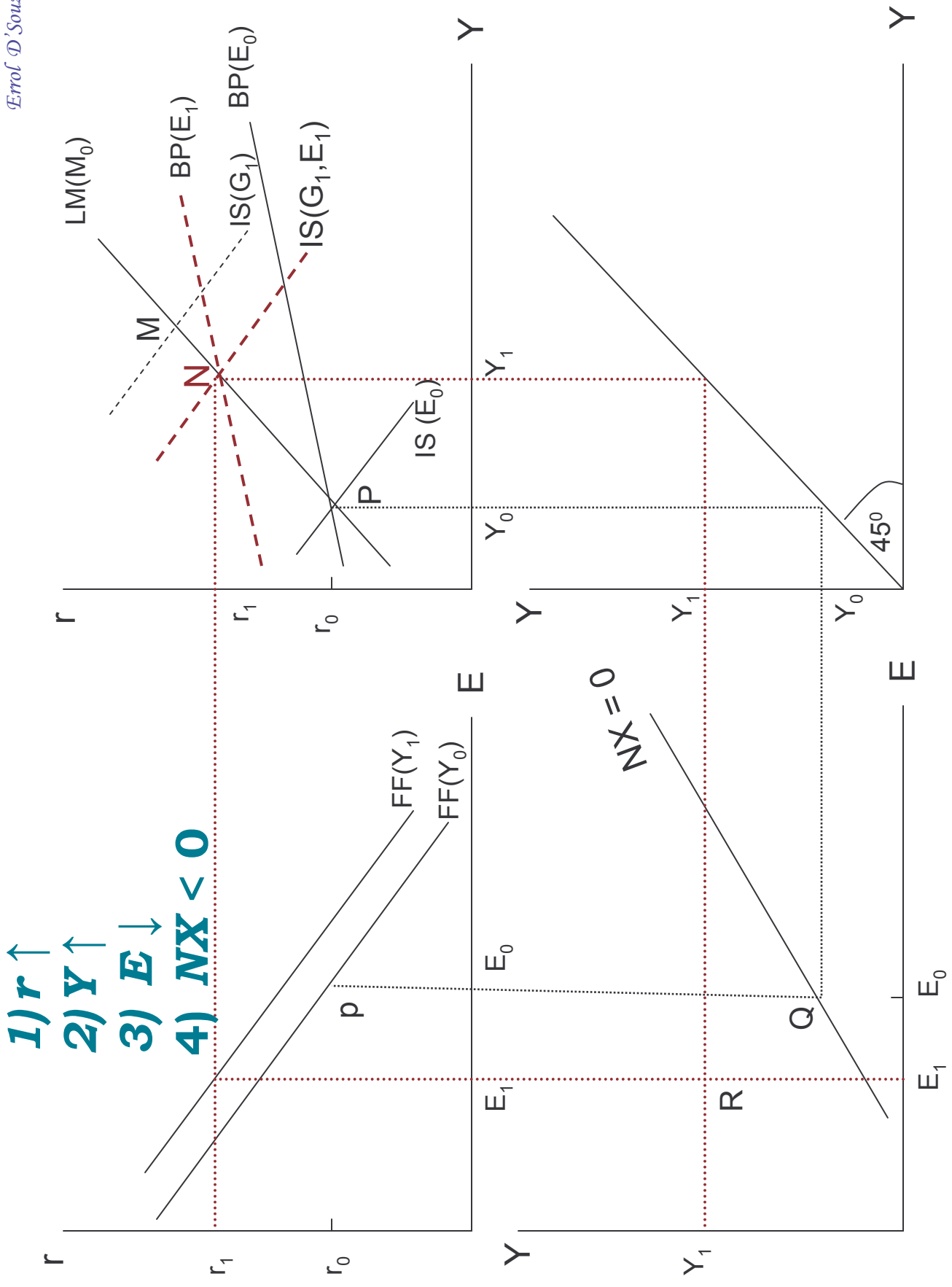


Figure V: **Fiscal Policy** with Flexible Exchange Rates

Crowding Out:

Closed Economy due to $i \uparrow$

Open Economy in addition $E \downarrow$ and $NX \downarrow$

Fiscal expansion associated with a deterioration of current account balance.

Hence, **monetary policy** is **more expansionary** in a floating exchange rate regime.

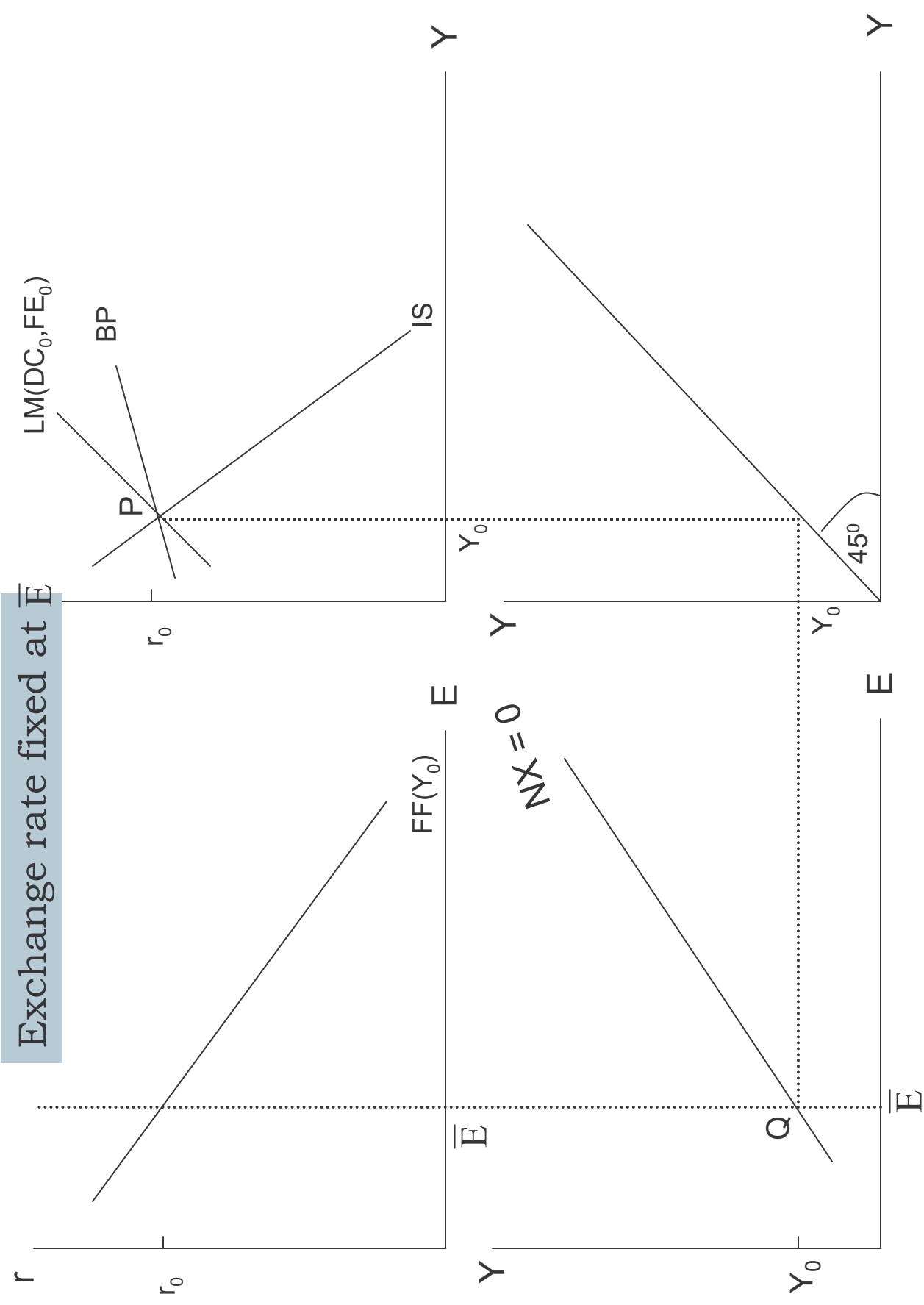


Figure VI: Monetary Policy with [Fixed Exchange Rates](#)

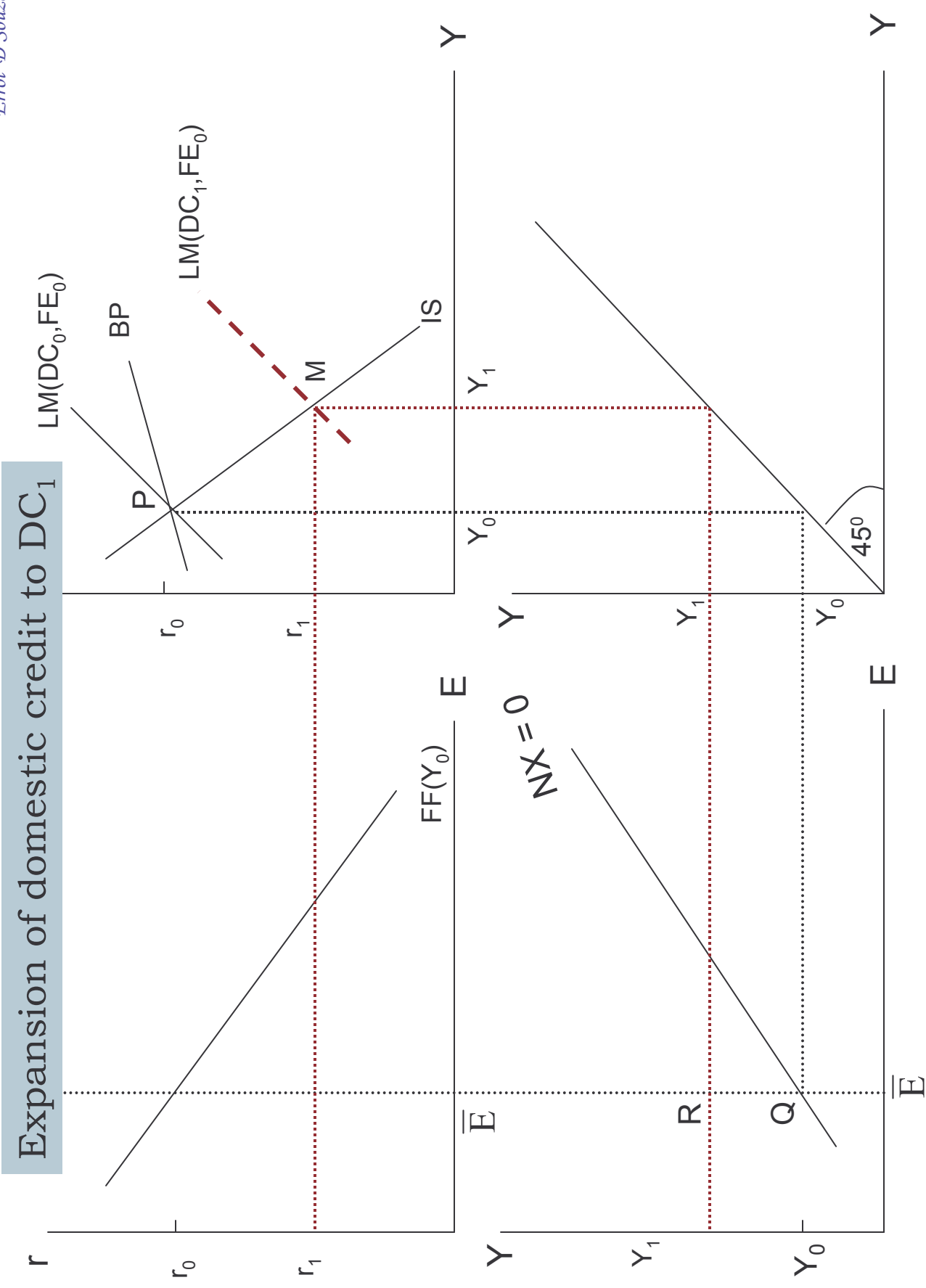


Figure VI: Monetary Policy with Fixed Exchange Rates

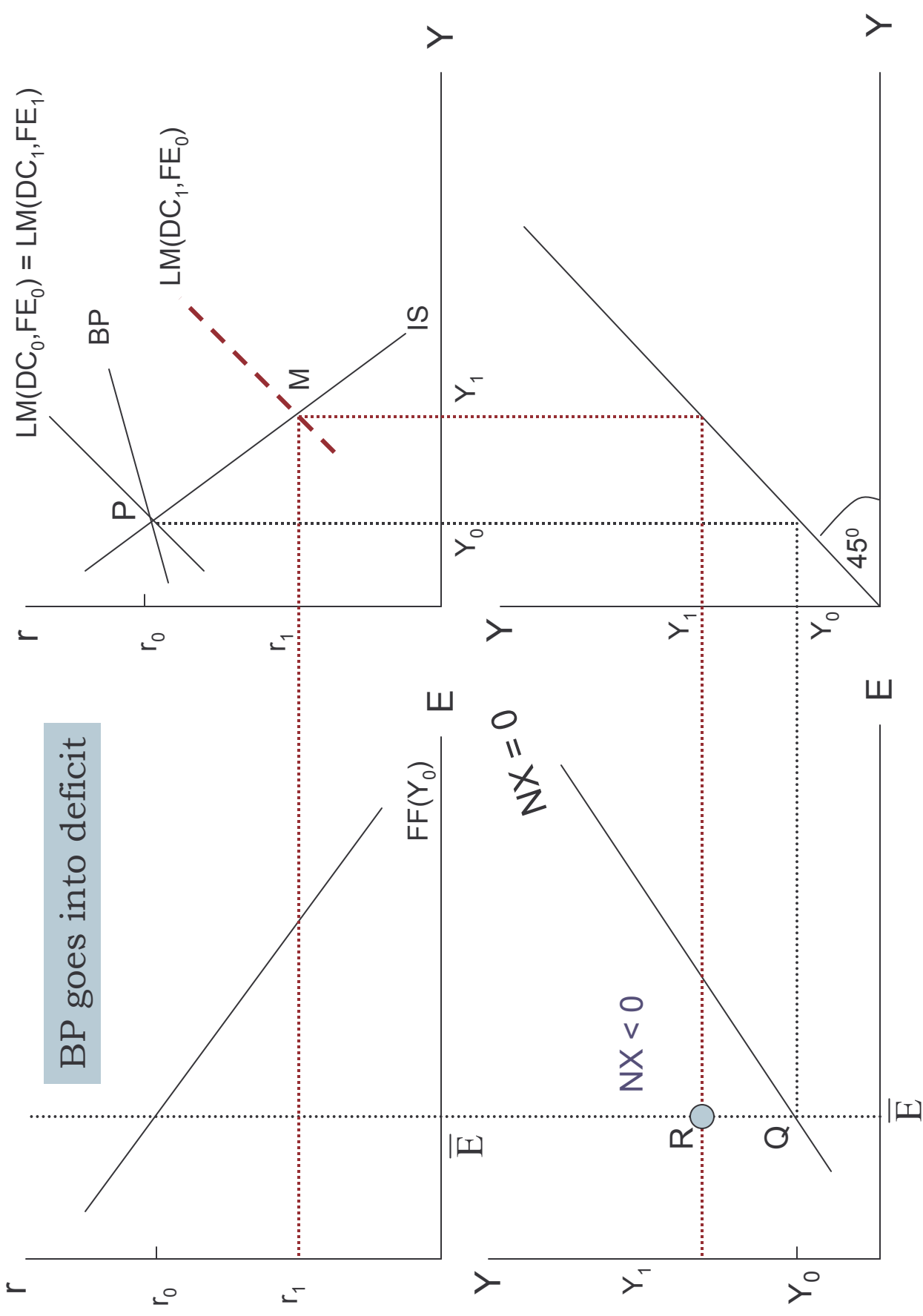


Figure VI: Monetary Policy with Fixed Exchange Rates

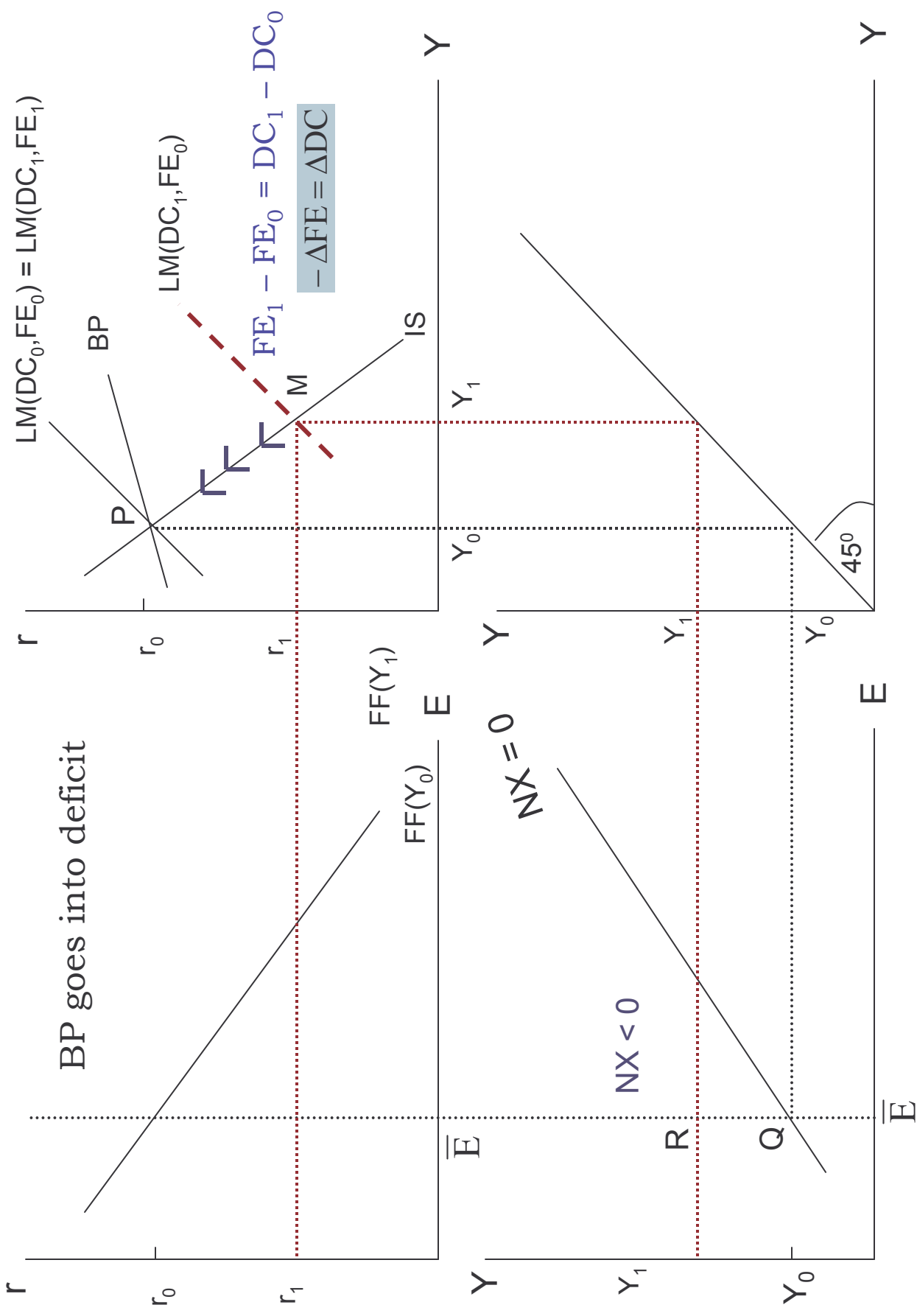


Figure VI: Monetary Policy with Fixed Exchange Rates

Monetary Policy under Fixed Exchange Rates

Short run impact:-

1. $r \downarrow$
 2. $Y \uparrow$
 3. $NX \downarrow$
 4. $NKI \downarrow$
- } $BP \downarrow$

Long run impact:-

1. Decline in FX to FX_1
2. No change in r , Y , BP

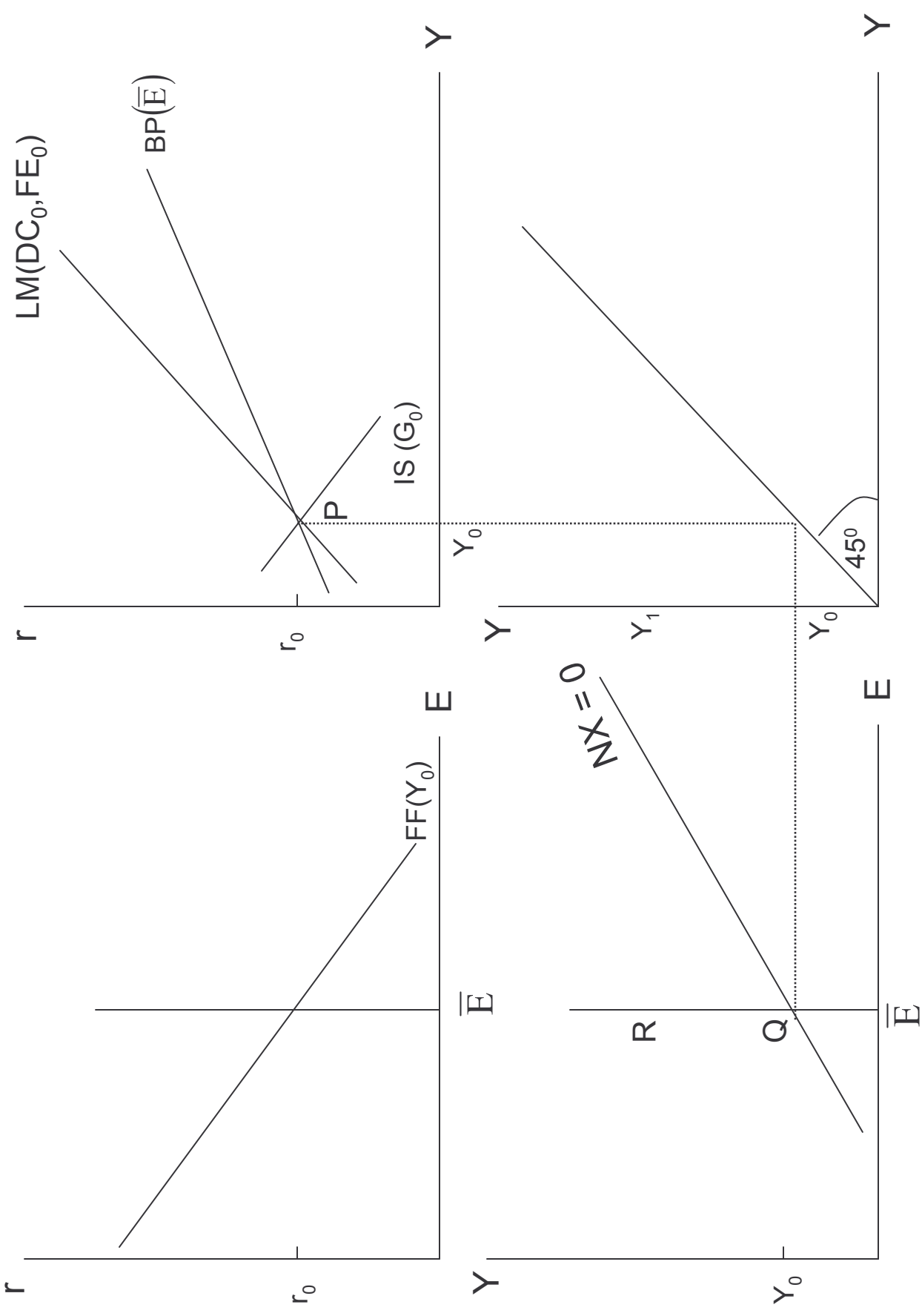


Figure VII: [Fiscal Policy with Fixed Exchange Rates](#)

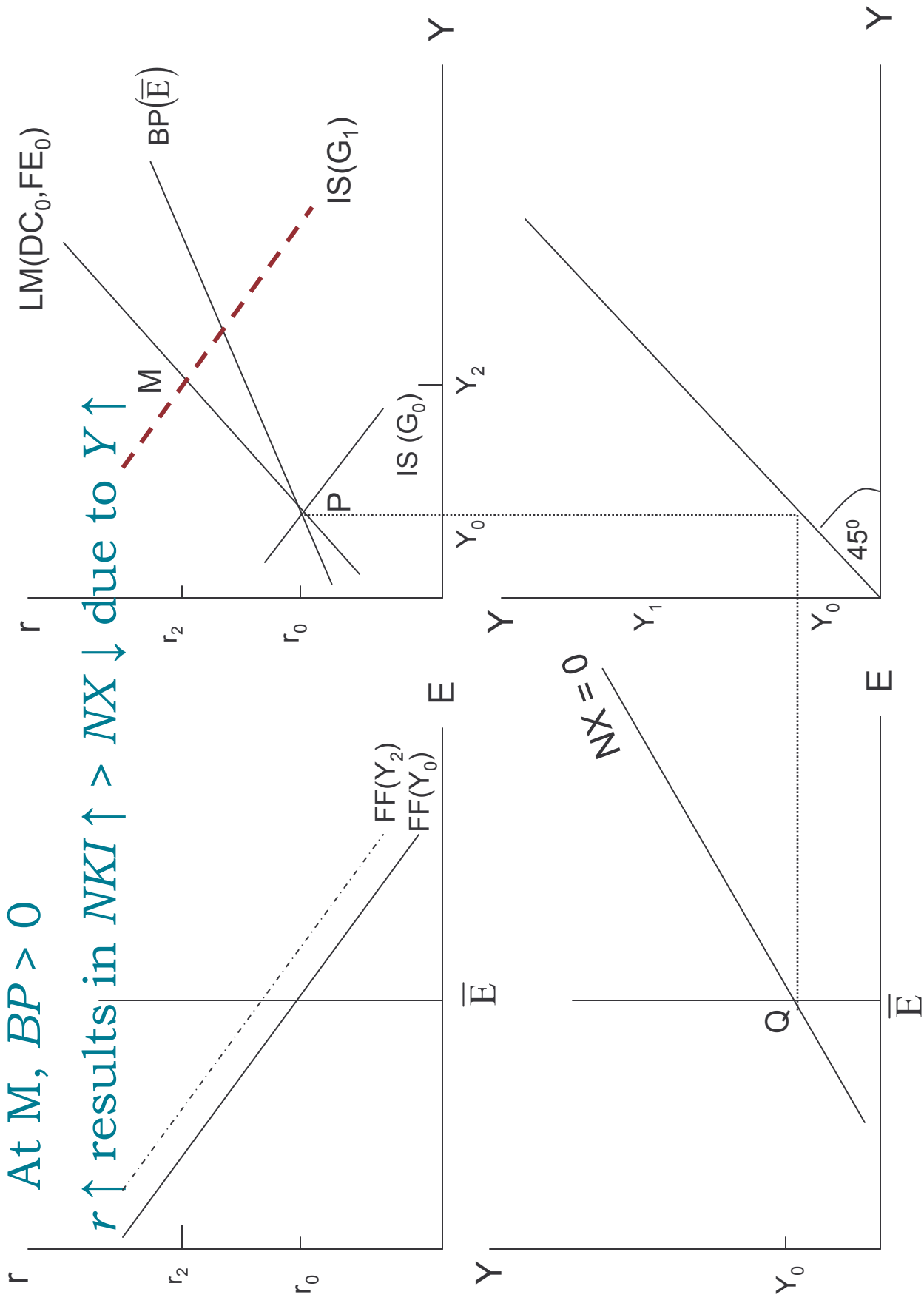


Figure VII: Fiscal Policy with Fixed Exchange Rates

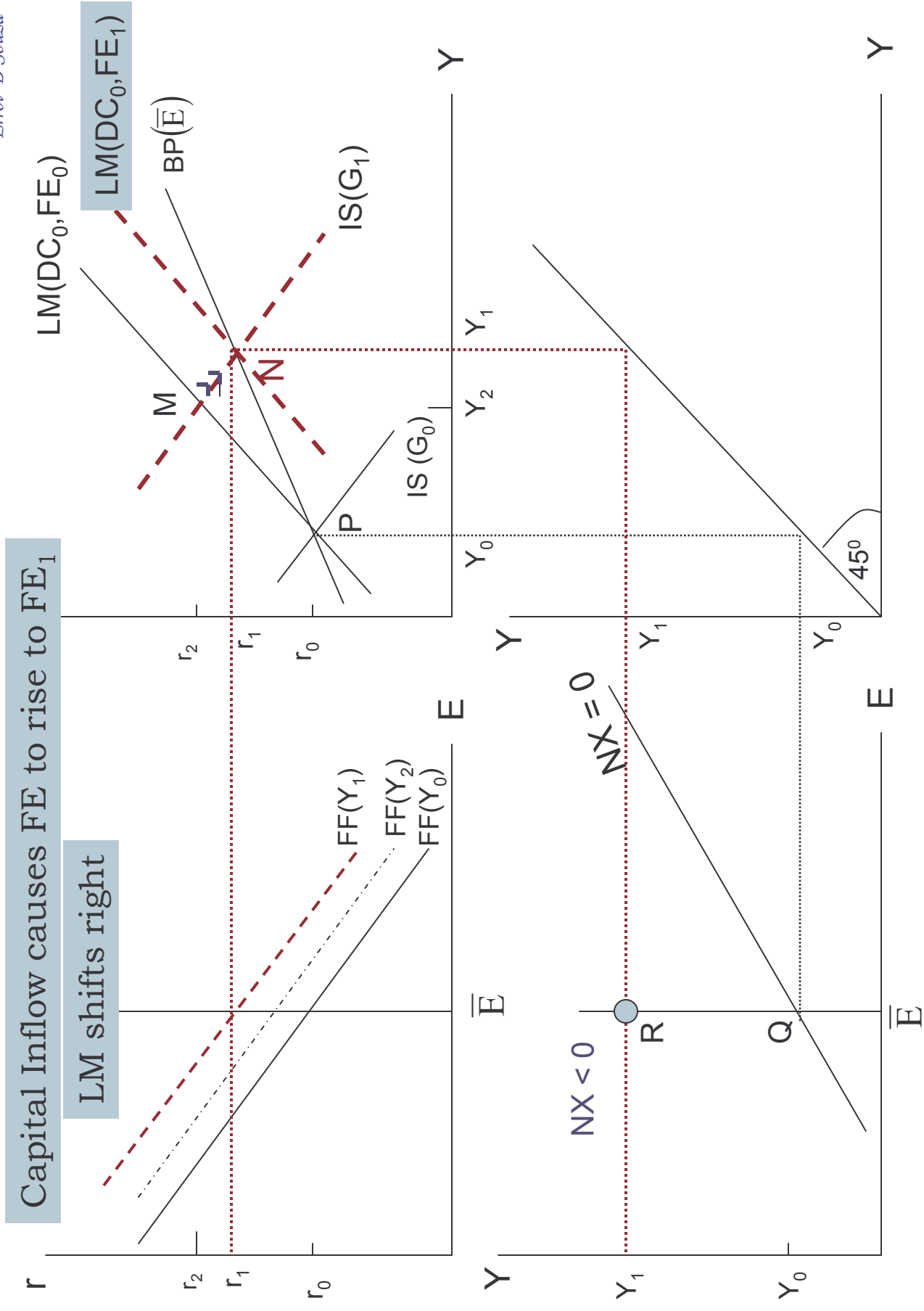


Figure VII: Fiscal Policy with Fixed Exchange Rates

Fiscal Policy with Fixed Exchange Rates

Short run:-

1. $r \uparrow$
 2. $Y \uparrow$
 3. $NX \downarrow$
 4. $NKI \uparrow$
- } $BP \uparrow$ as $NKI \uparrow > NX \downarrow$

Long run:-

1. Decline in r from short run level
 2. Y increases further from that at short run level.
 3. NX deteriorates further
 4. NKI declines from short run position.
- } No change in BP

1. Unemployment, $Y < Y_f$
2. Balance of Payments Surplus, $BP > 0$

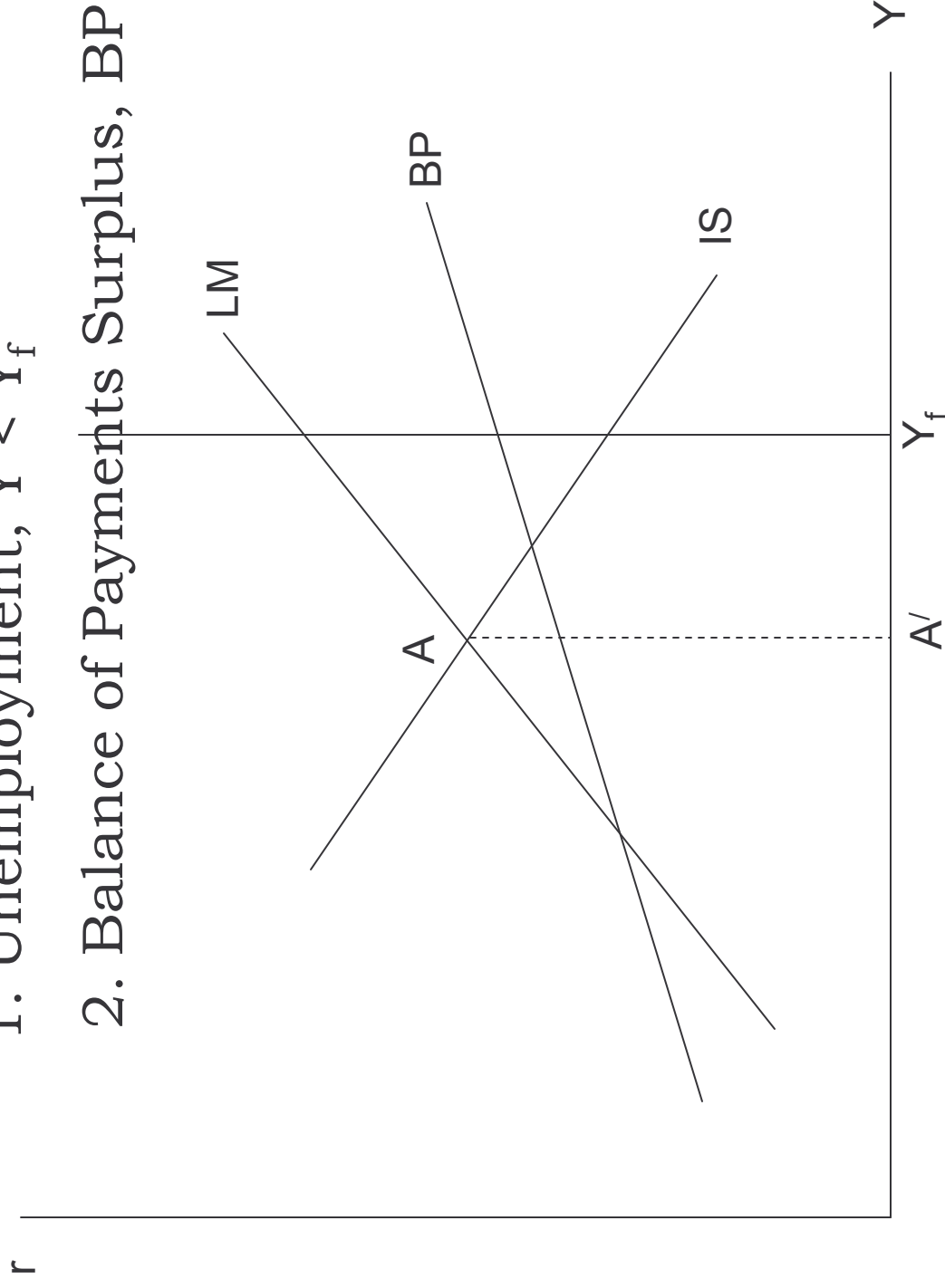


Figure VIII: Demand Deficiency and a Payments Surplus

Contractionary fiscal policy restores
balance of payments equilibrium

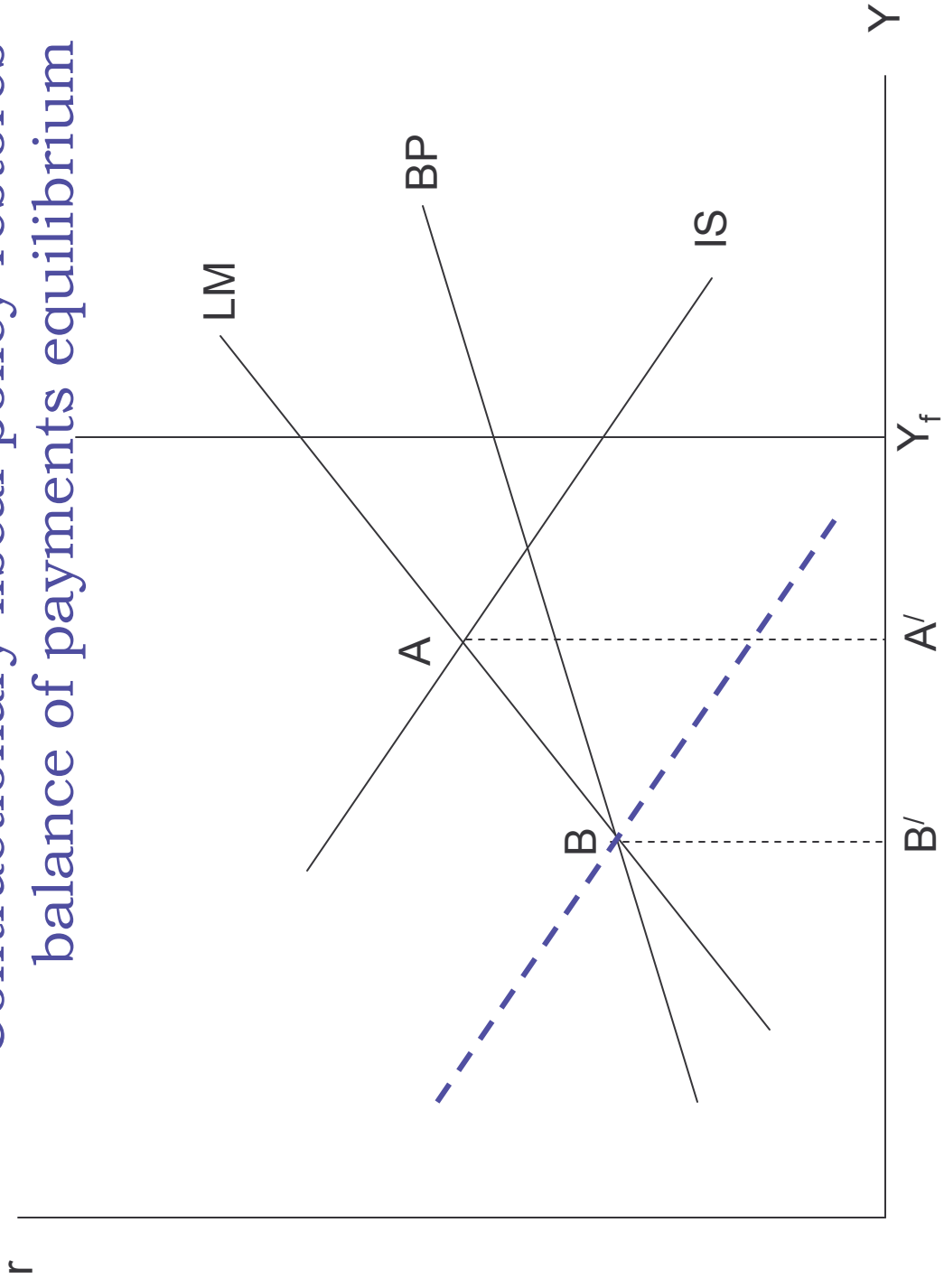


Figure VIII: Demand Deficiency and a Payments Surplus

Expansionary monetary policy can also restore external equilibrium at higher income $C' > B'$.

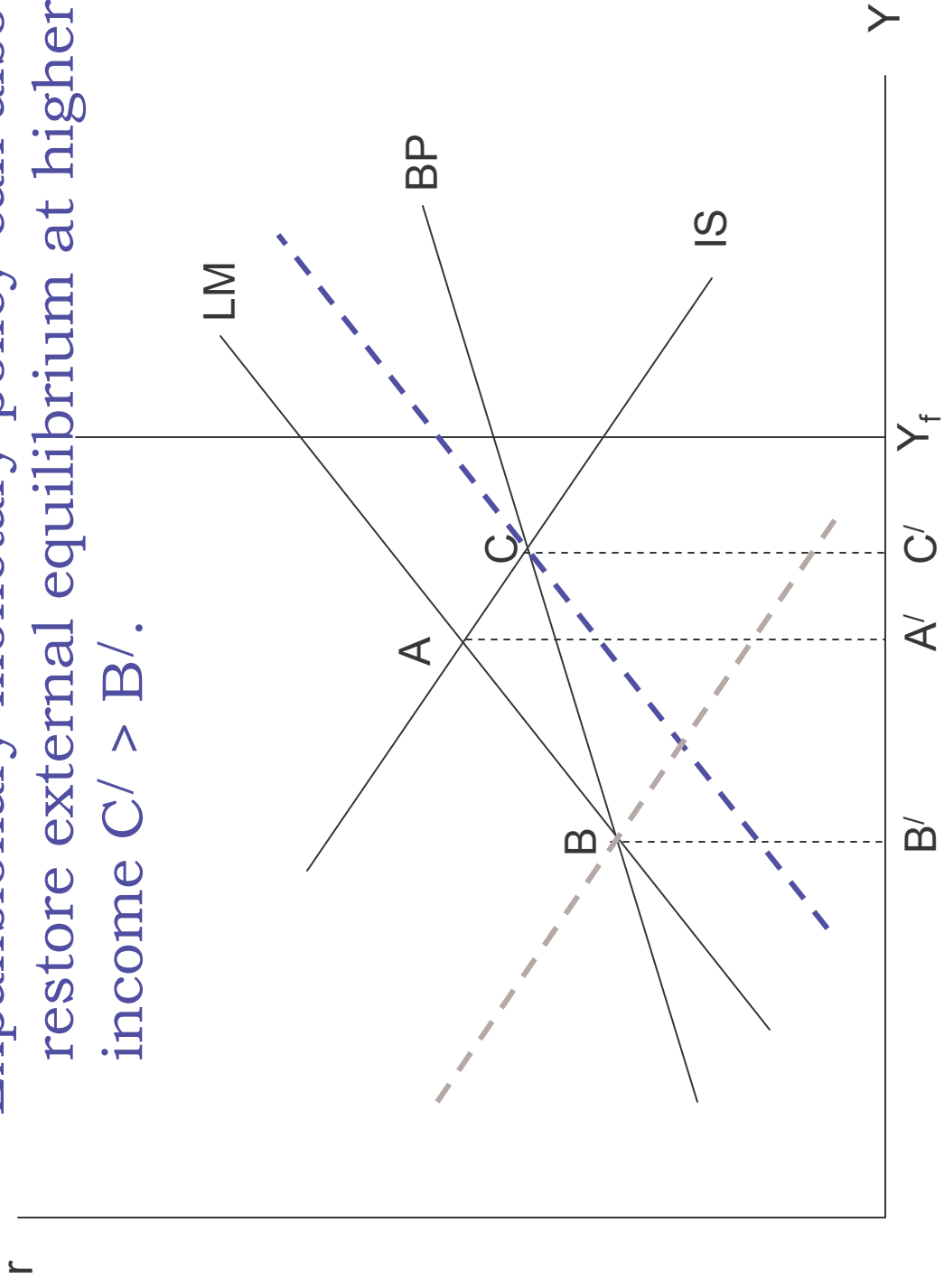


Figure VIII: Demand Deficiency and a Payments Surplus

If full employment is the goal, then expansionary fiscal policy results in B'' with $BP > 0$.

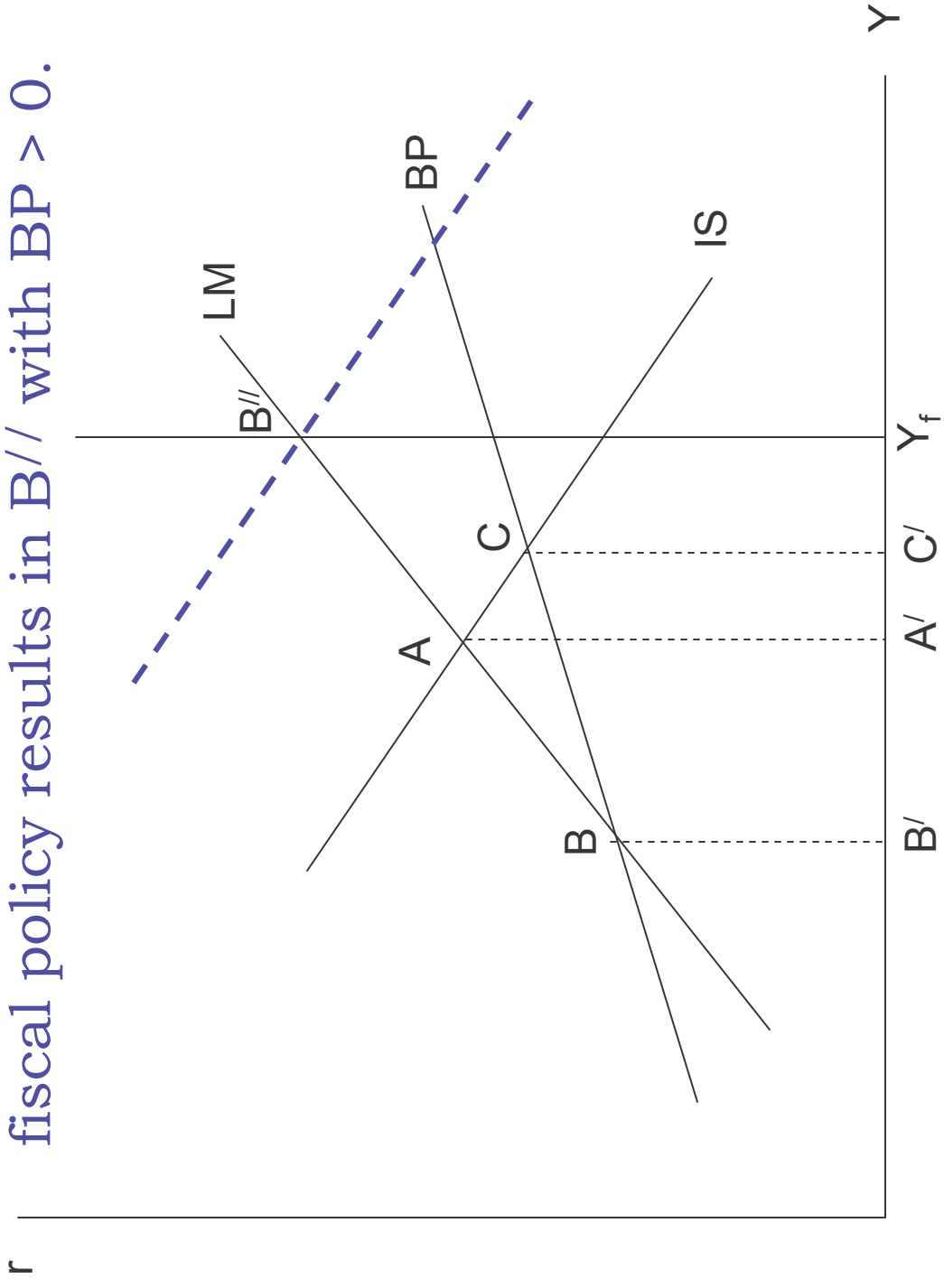


Figure VIII: Demand Deficiency and a Payments Surplus

Expansionary monetary policy takes economy to C'' with $BP < 0$.

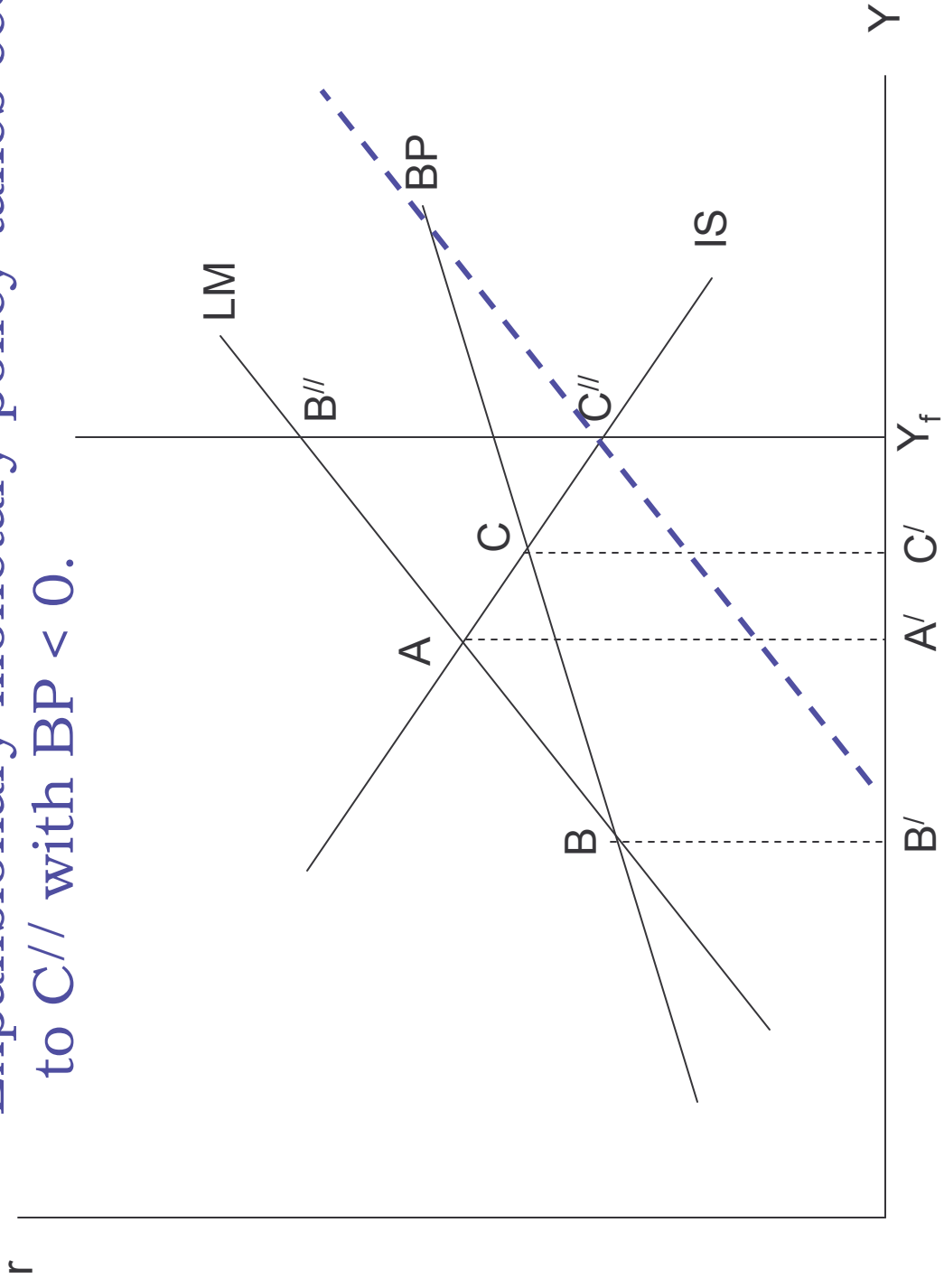




Figure VIII: Demand Deficiency and a Payments Surplus

Objective	Full employment goal	External equilibrium
Monetary policy	$BP < 0$	$Y \uparrow$ 
Fiscal policy	$BP > 0$ 	$Y \downarrow$

Monetary and fiscal policy used simultaneously

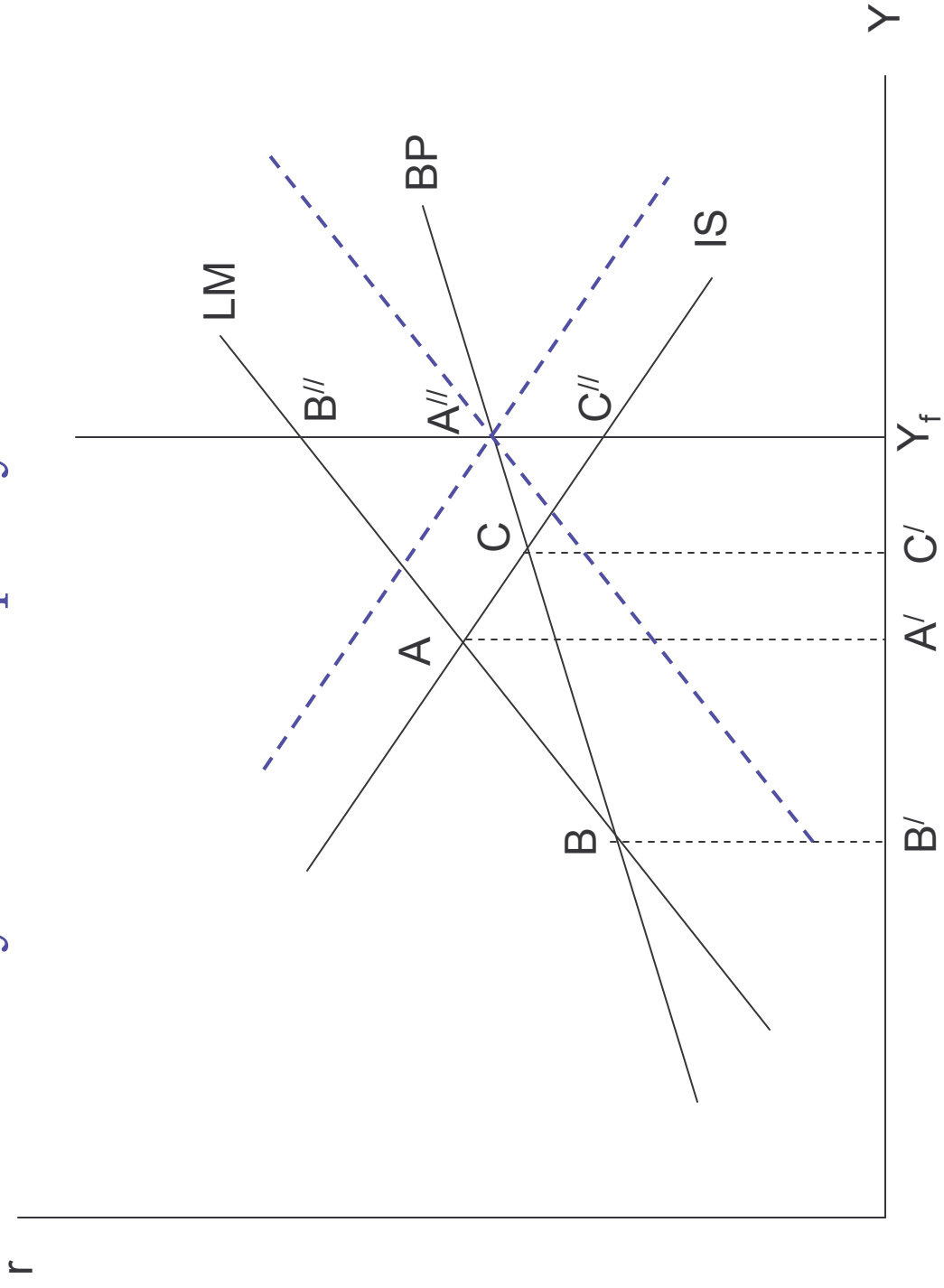


Figure VIII: Demand Deficiency and a Payments Surplus