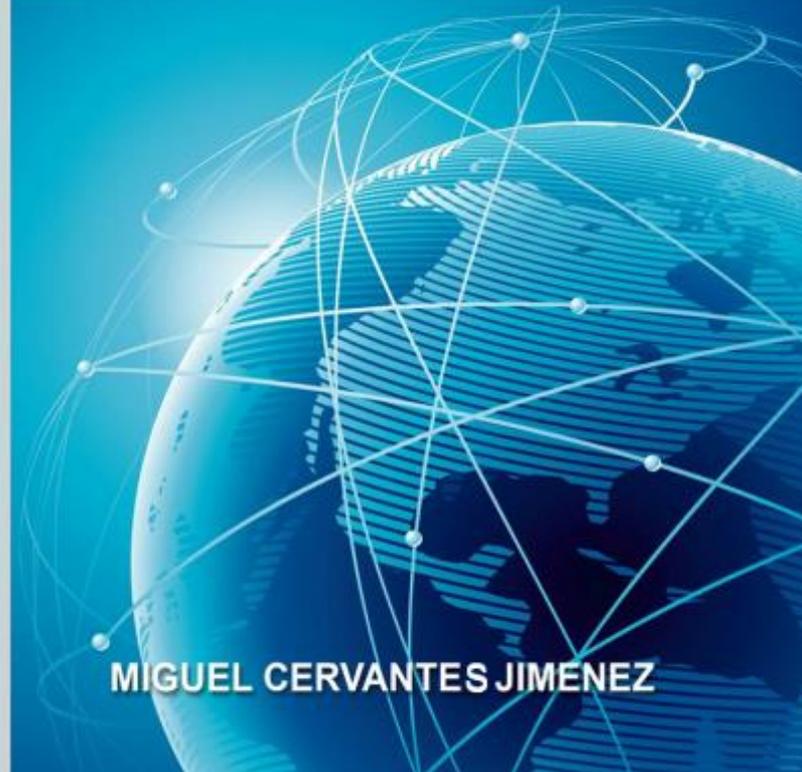


TEORÍA, POLÍTICA, SIMULADORES COMPUTACIONALES Y RETOS

MACROECONOMÍA ABIERTA



MIGUEL CERVANTES JIMENEZ

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Versión online Tomo I

TEORÍA, POLÍTICA, SIMULADORES COMPUTACIONALES Y RETOS

**MACROECONOMÍA
ABIERTA**

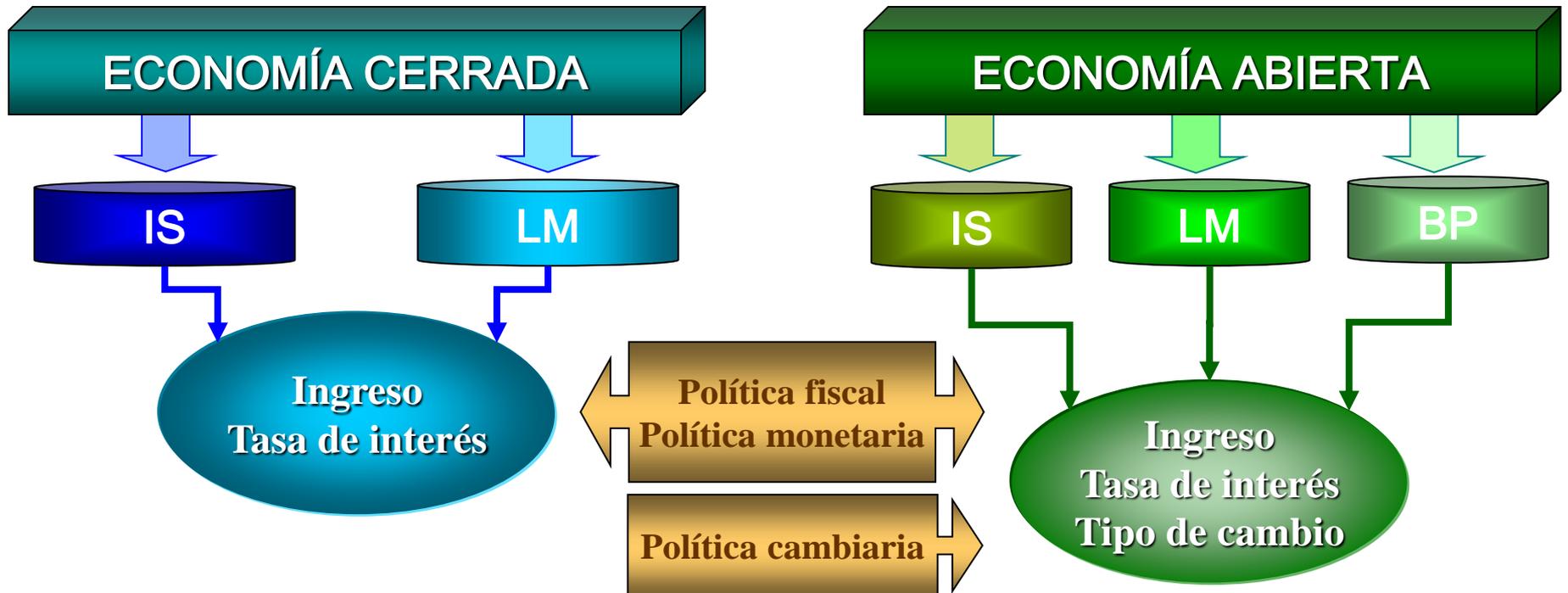
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Versión online Tomo II

TEORÍA, POLÍTICA, SIMULADORES COMPUTACIONALES Y RETOS

**MACROECONOMÍA
ABIERTA**

El modelo IS-LM-BP



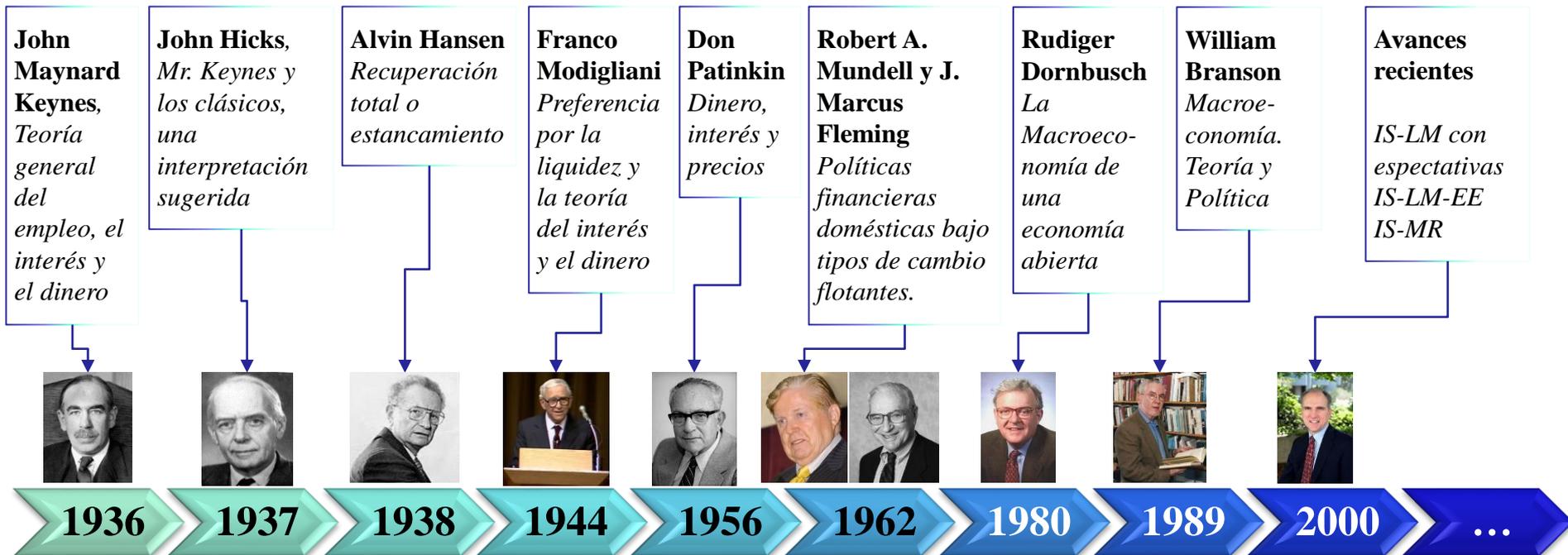
Objetivo general

- Construir paramétricamente el modelo IS-LM con precios rígidos y flexibles e IS-LM-BP y presentar las propuestas y eficacia de política económica.

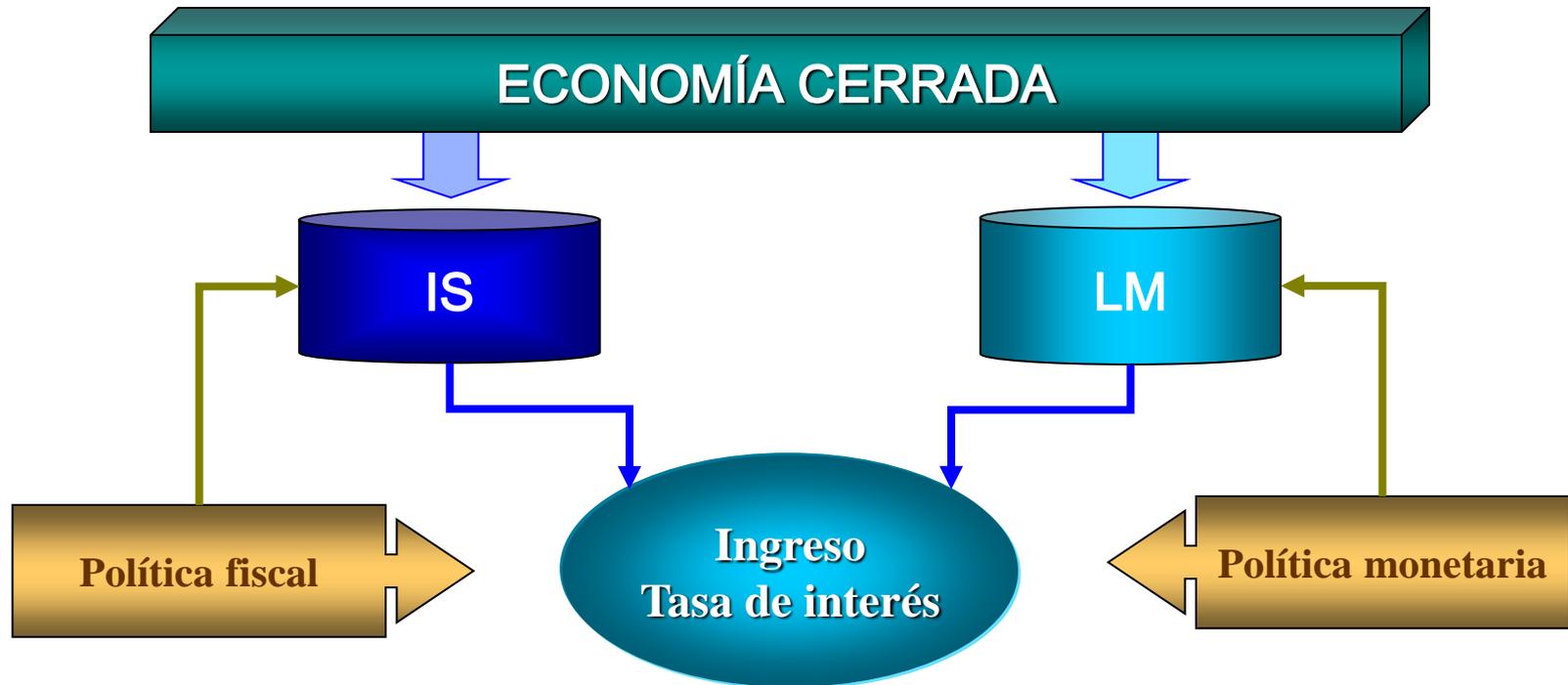
Objetivos específicos

- recordar los principales autores del modelo IS-LM-BP;
- generar las curvas IS y LM de una economía cerrada, con gobierno y precios fijos;
- calcular el ingreso y la tasa de interés de equilibrio del modelo IS-LM;
- evaluar la eficacia de la política fiscal y monetaria del modelo IS-LM;
- levantar el supuesto de precios rígidos para flexibilizarlos;
- construir las curvas IS, LM y BP de una economía abierta con gobierno y precios fijos;
- calcular el ingreso, la tasa de interés y el tipo de cambio de equilibrio, y
- evaluar la eficacia de la política fiscal, monetaria y cambiaria del modelo IS-LM-BP.

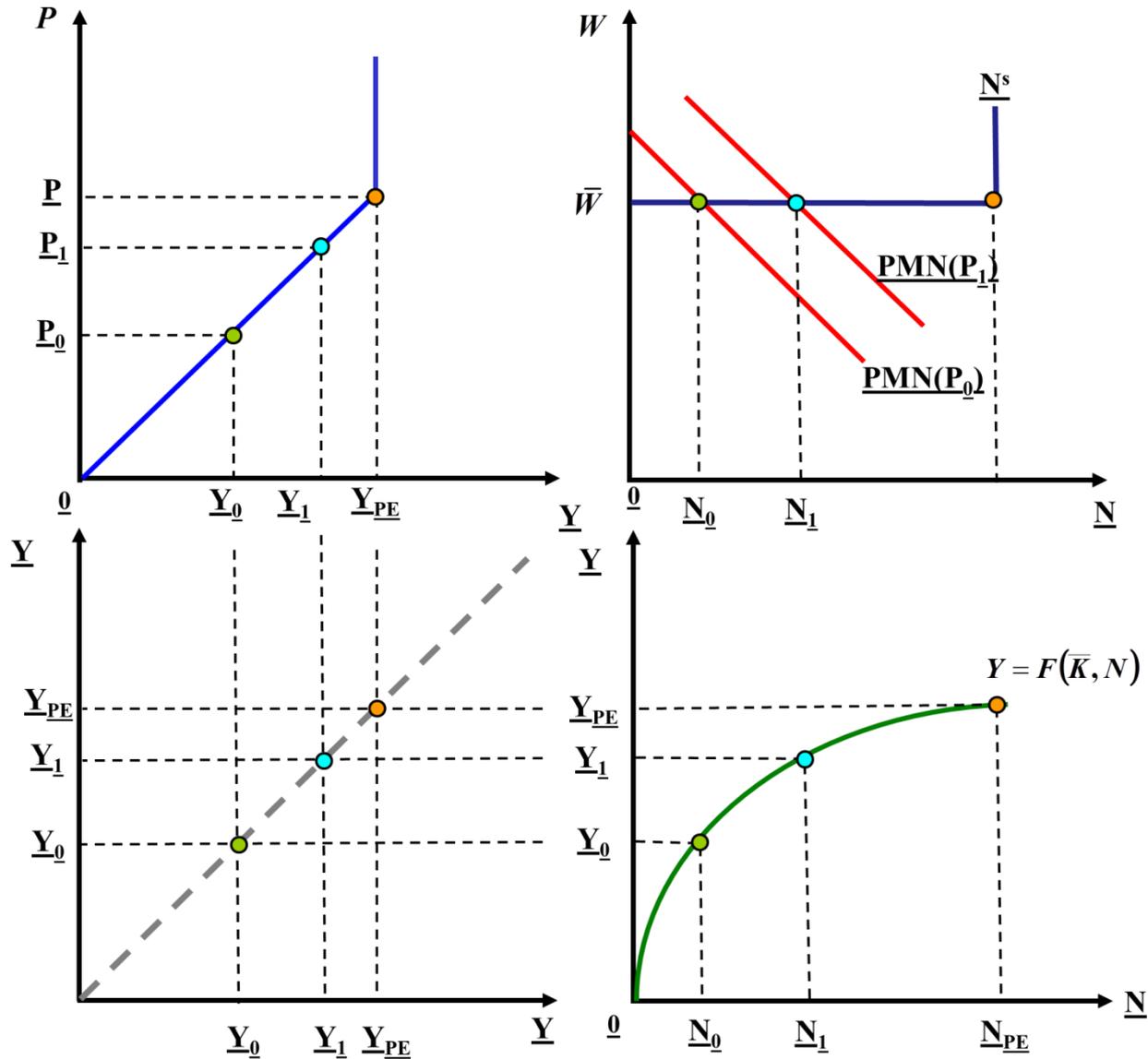
Línea del tiempo



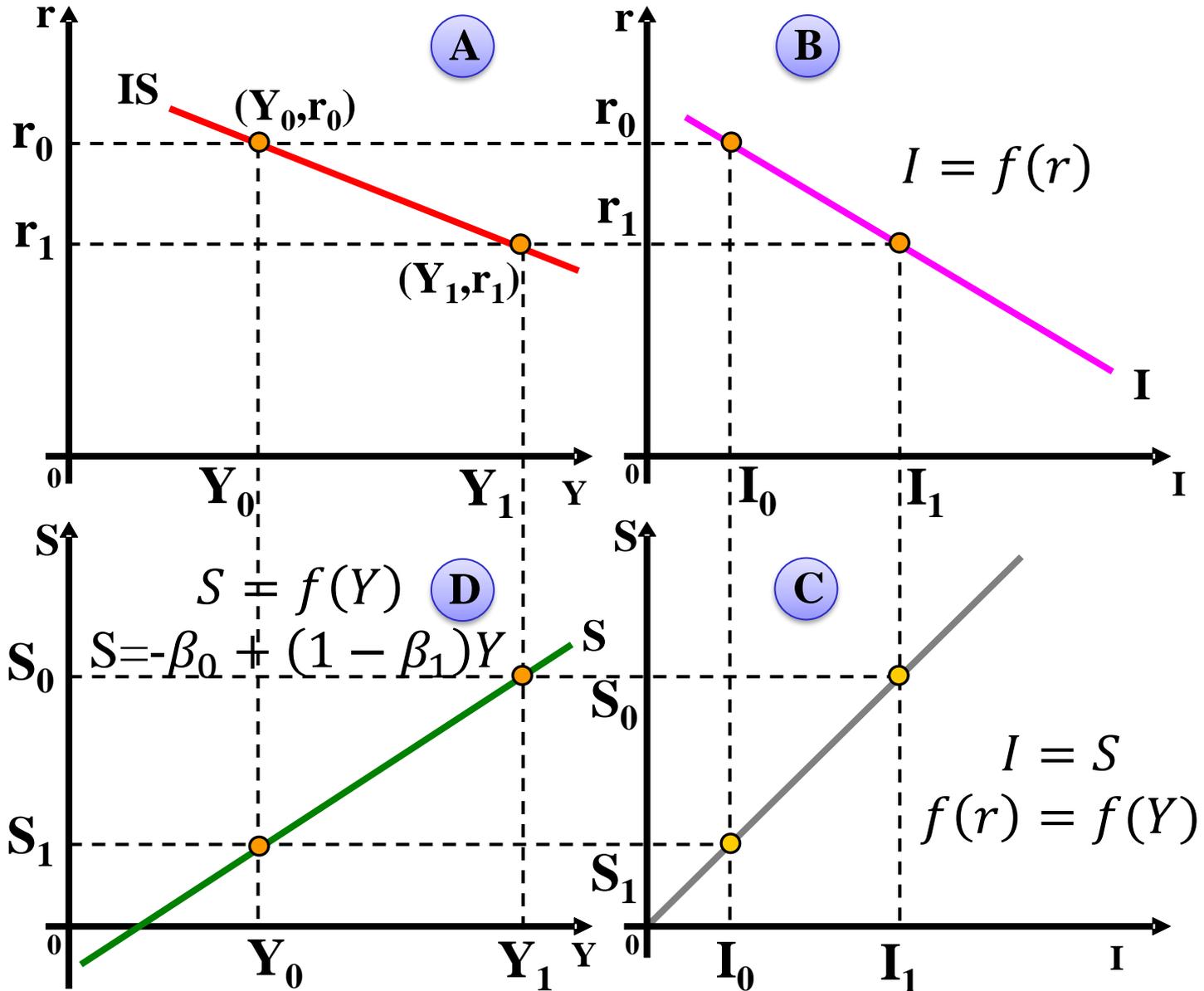
IS-LM: economía cerrada con gobierno y precios rígidos



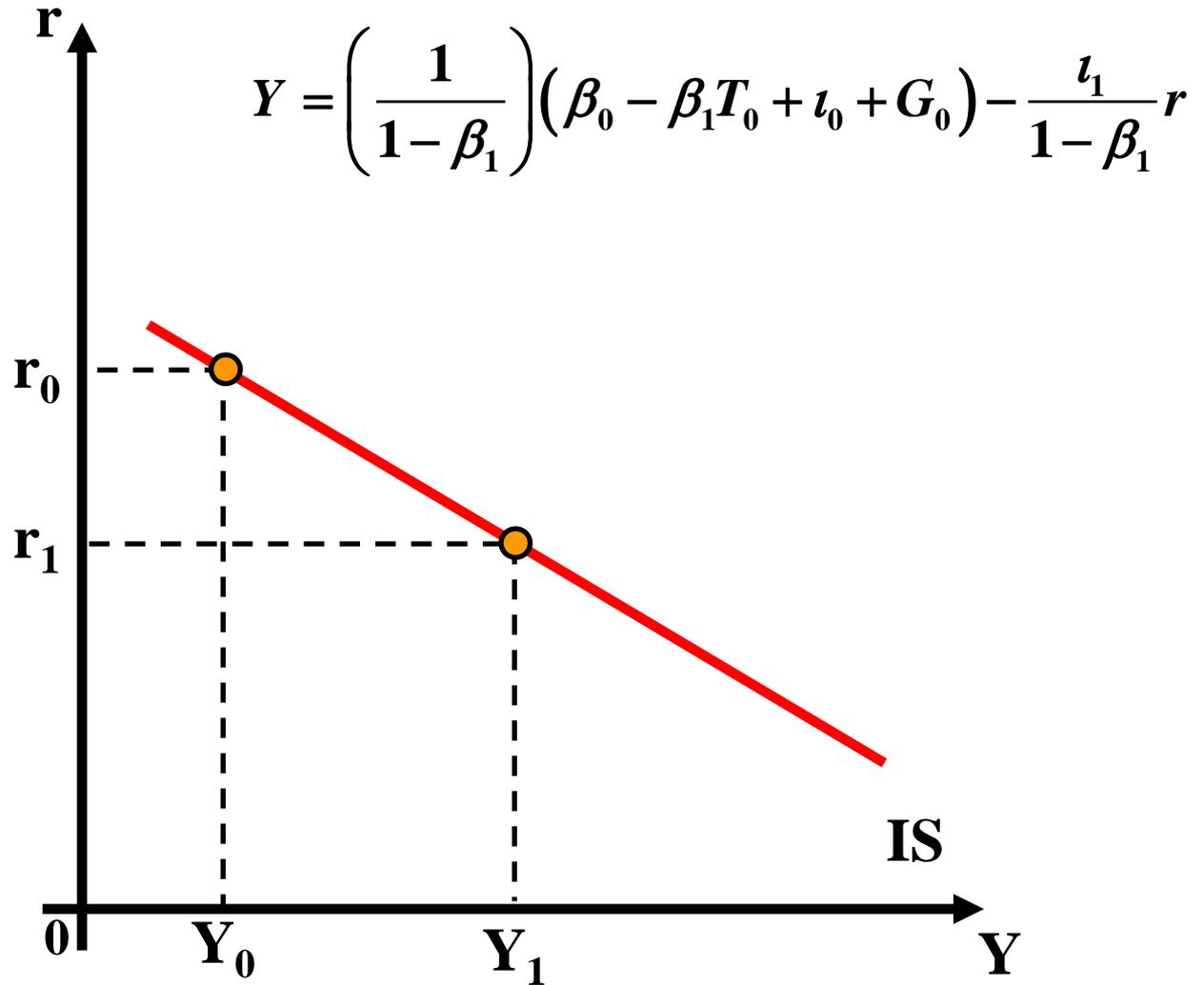
Mercado de trabajo



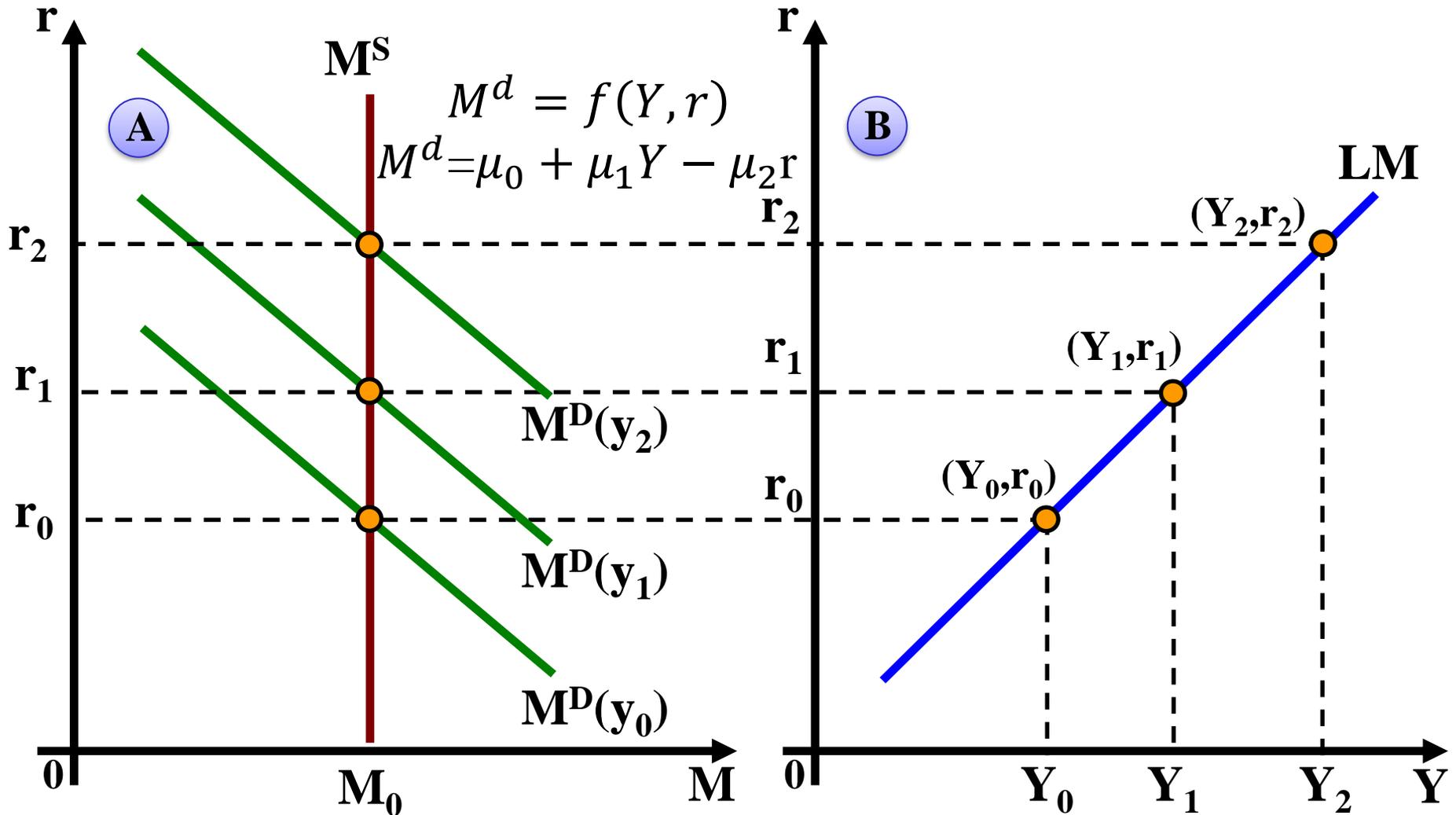
Construcción curva IS



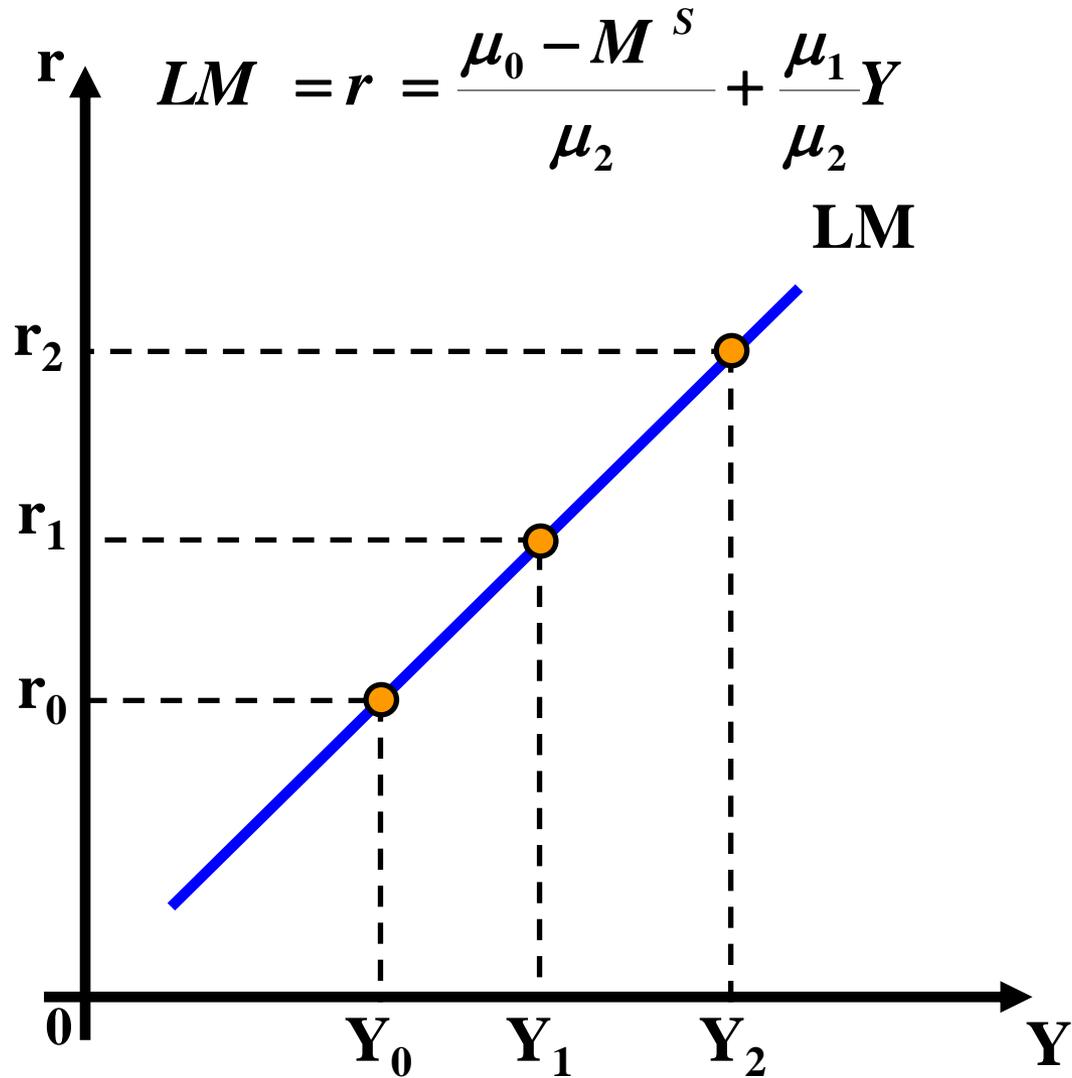
Curva IS



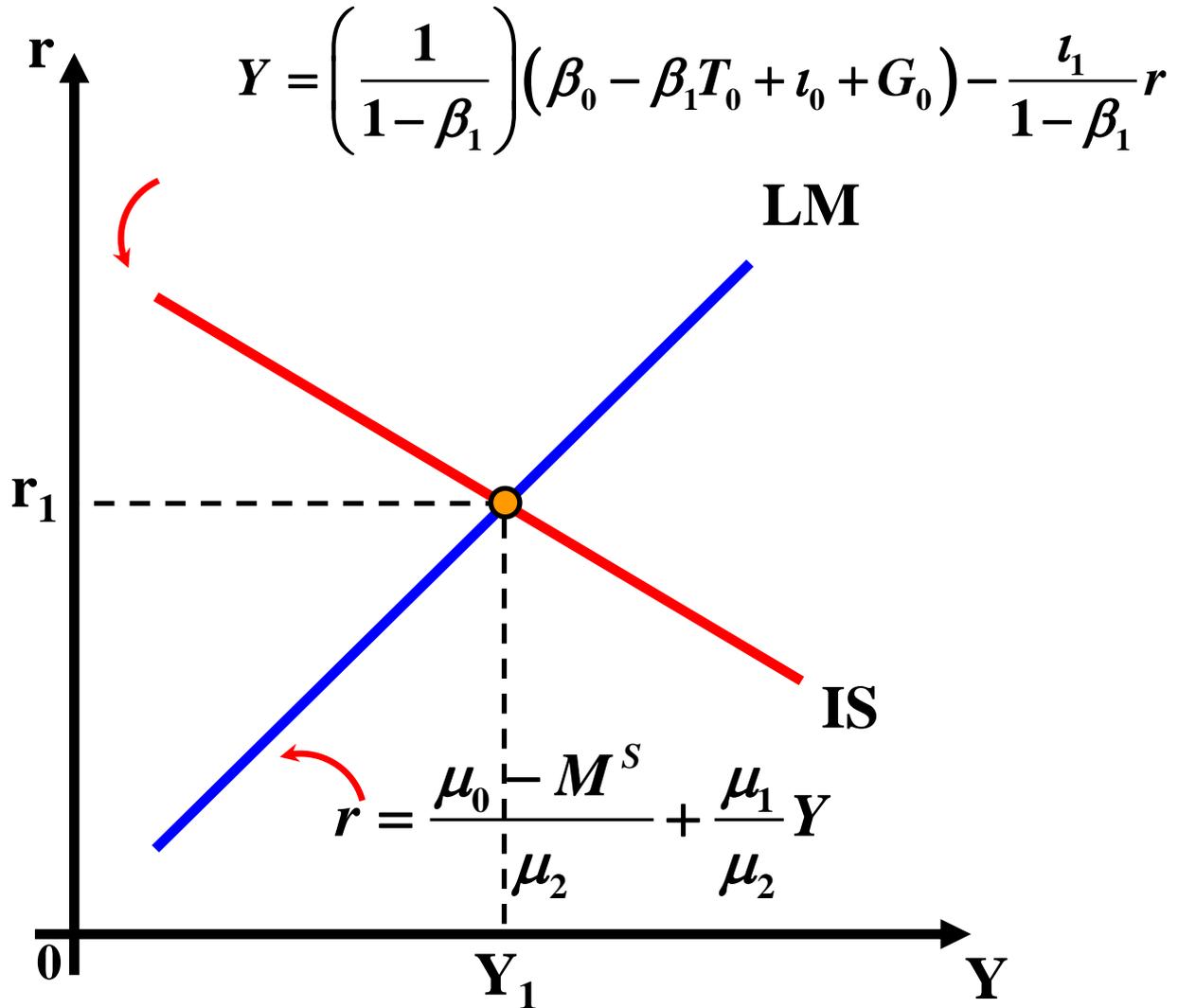
Construcción curva LM



Curva LM



Equilibrio IS-LM



Equilibrio IS-LM

$$Y = \left(\frac{1}{1 - \beta_1} \right) (\beta_0 - \beta_1 T_0 + \iota_0 + G_0) - \frac{\iota_1}{1 - \beta_1} r \quad \curvearrowright \quad r = \frac{\mu_0 - M^S}{\mu_2} + \frac{\mu_1}{\mu_2} Y$$

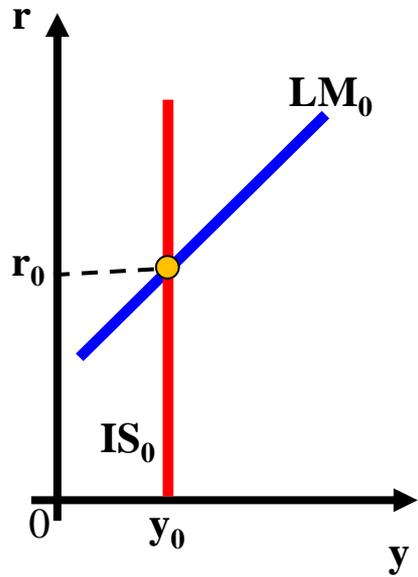
$$Y^* = \left(\frac{1}{1 - \beta_1 + \frac{\iota_1 \mu_1}{\mu_2}} \right) \left((\beta_0 - \beta_1 T_0 + \iota_0 + G_0) - (\iota_1) \left(\frac{\mu_0 - M^S}{\mu_2} \right) \right)$$

$$r = \frac{\mu_0 - M^S}{\mu_2} + \frac{\mu_1}{\mu_2} Y \quad \curvearrowright \quad Y = \left(\frac{1}{1 - \beta_1} \right) (\beta_0 - \beta_1 T_0 + \iota_0 + G_0) - \frac{\iota_1}{1 - \beta_1} r$$

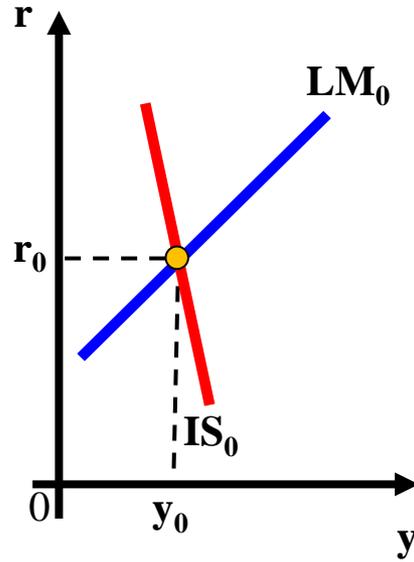
$$r^* = \left(\frac{1}{1 - \beta_1 + \frac{\mu_1 \iota_1}{\mu_2}} \right) \left([1 - \beta_1] \left(\frac{\mu_0 - M^S}{\mu_2} \right) + \frac{\mu_1}{\mu_2} (\beta_0 - \beta_1 T_0 + \iota_0 + G_0) \right)$$

CURVA _____: eficacia de la política _____

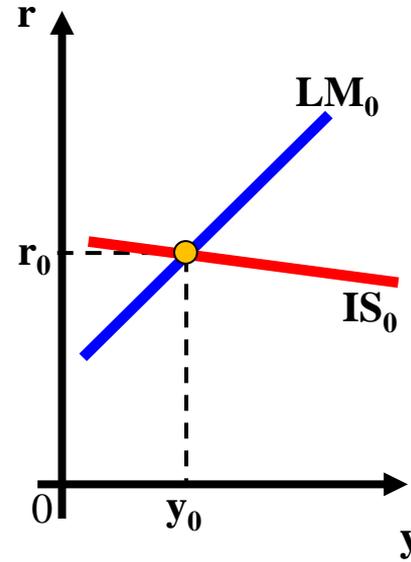
Vertical



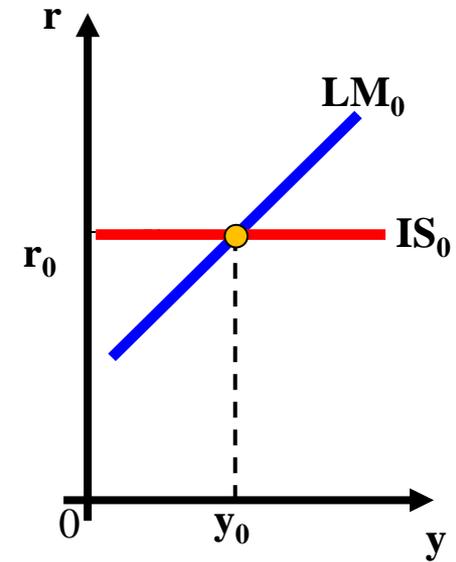
Inclinada



Aplanada

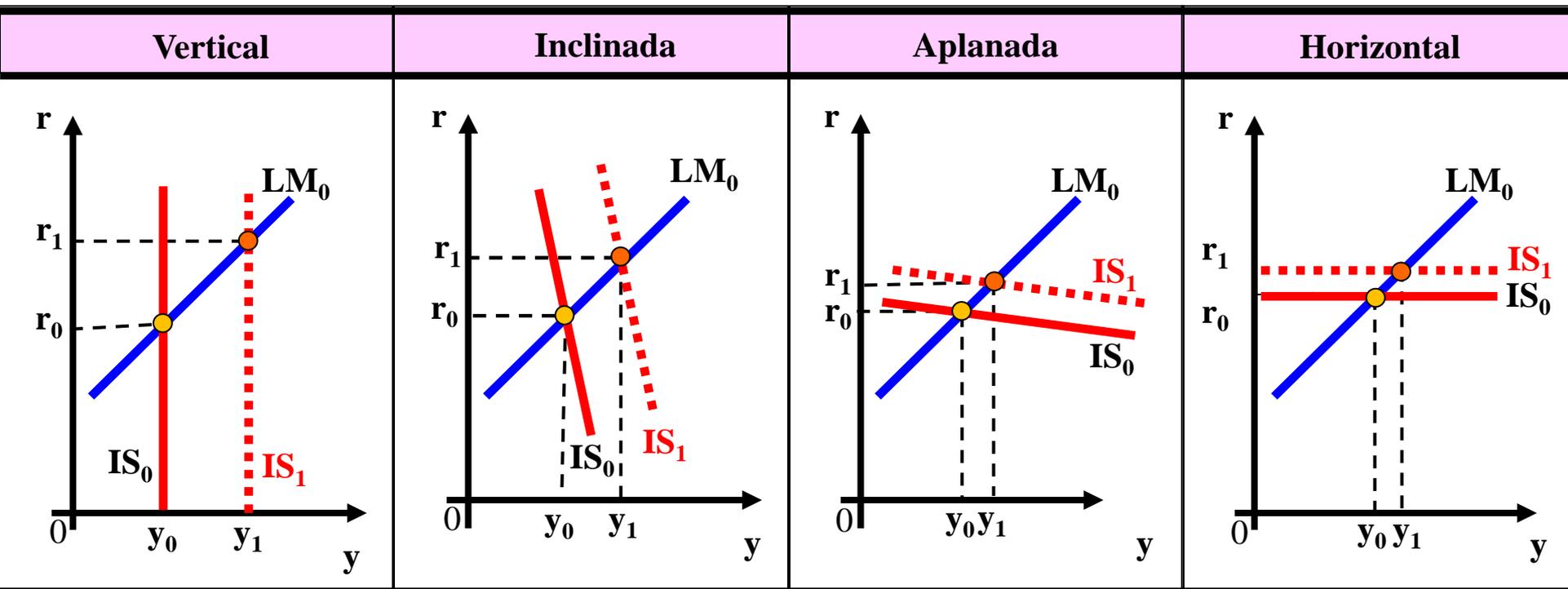


Horizontal



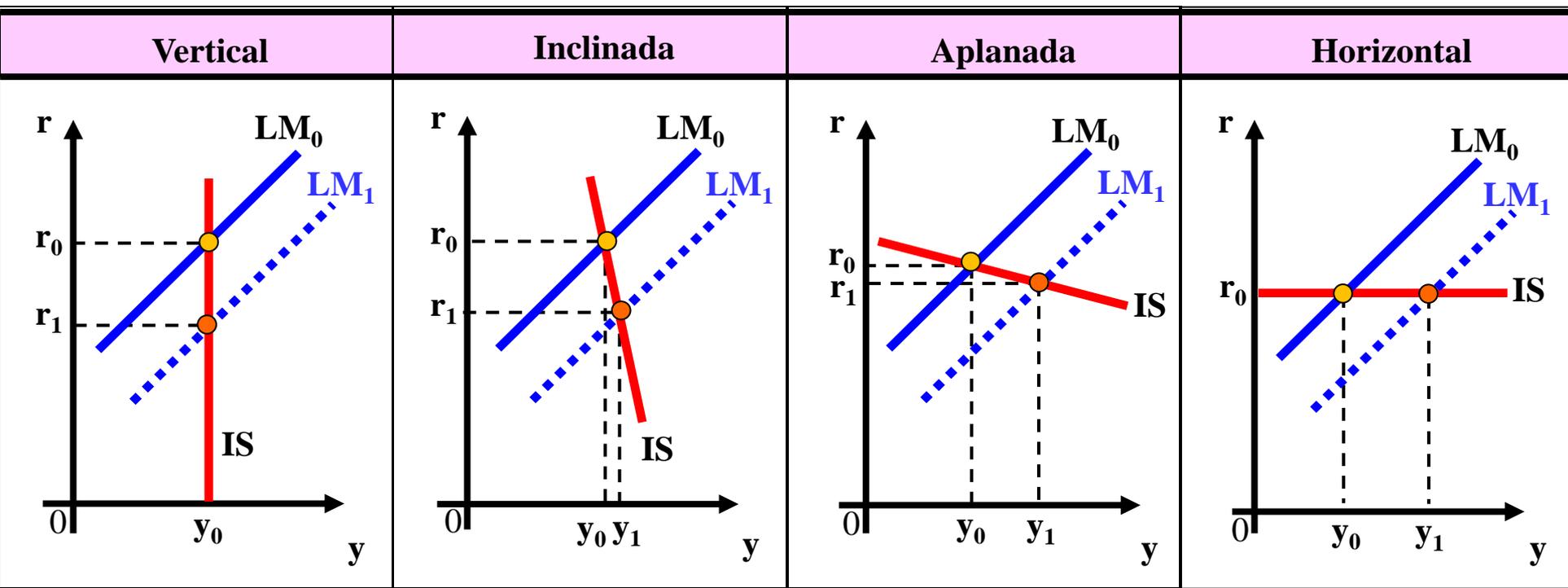
CURVA IS: eficacia de la política fiscal

IS	POLITICA	VARIABLE Y CARACTERISTICA	VERTICAL	INCLINADA	APLANADA	HORIZONTAL
	FISCAL	Δy	Muy grande ($y_1 - y_0 = \text{Pleno}$)	Grande ($y_1 - y_0$)	Pequeño ($y_1 - y_0$)	Muy pequeño ($y_1 - y_0 = \text{tiende a } 0$)
		Δr	Muy grande ($r_1 - r_0$)	Grande ($r_1 - r_0$)	Pequeño ($r_1 - r_0$)	Muy pequeño ($r_1 - r_0$)
		EFICACIA	Muy eficaz	Eficaz	Poco eficaz	Ineficaz



CURVA IS: eficacia de la política monetaria

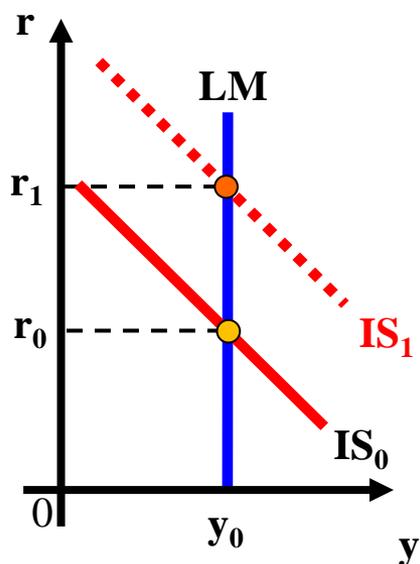
IS	POLITICA	VARIABLE Y CARACTERISTICA	VERTICAL	INCLINADA	APLANADA	HORIZONTAL	
	MONETARIA	SENSIBILIDAD "I"		NULA SENSIBILIDAD DE "I"	BAJA SENSIBILIDAD DE I	ALTA SENSIBILIDAD DE I	COMPLETA SENSIBILIDAD DE "I"
		Δy	Nulo ($y_1 - y_0 = 0$)	Pequeño ($y_1 - y_0$)	Grande ($y_1 - y_0$)	Muy grande ($y_1 - y_0$)	
		Δr	Muy grande ($r_0 - r_1 = \text{pleno}$)	Grande ($r_0 - r_1$)	Pequeña ($r_0 - r_1$)	Nula ($r_0 - r_1 = 0$)	
		ΔI	Nula	Baja	Alta	Muy Alta	
		EFICACIA	Ineficaz	Poco eficaz	Eficaz	Muy eficaz	



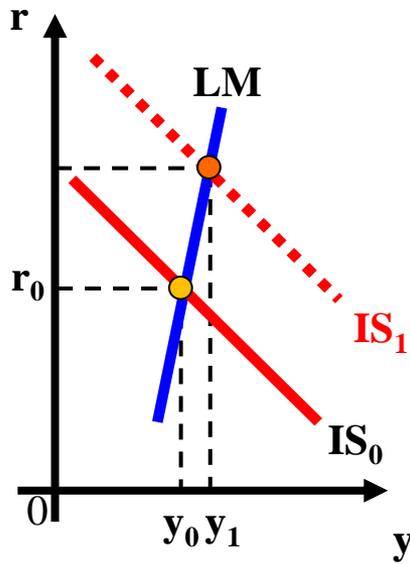
CURVA LM: eficacia de la política fiscal

LM	POLITICA	VARIABLE Y CARACTERISTICA	VERTICAL	INCLINADA	APLANADA	HORIZONTAL	
	FISCAL	SENSIBILIDAD "DEMANDA DE DINERO"		NULA SENSIBILIDAD	BAJA SENSIBILIDAD	ALTA SENSIBILIDAD	INFINITA SENSIBILIDAD
		Δy		Nula ($y_1 - y_0 = 0$)	Pequeña ($y_1 - y_0$)	Grande ($y_1 - y_0$)	Muy grande ($y_1 - y_0 = \text{Pleno}$)
		Δr		Muy grande ($r_0 - r_1 = \text{Pleno}$)	Grande ($r_0 - r_1$)	Pequeña ($r_0 - r_1$)	Nula ($r_0 - r_1 = 0$)
		EFICACIA		Ineficaz	Poco eficaz	Eficaz	Muy eficaz

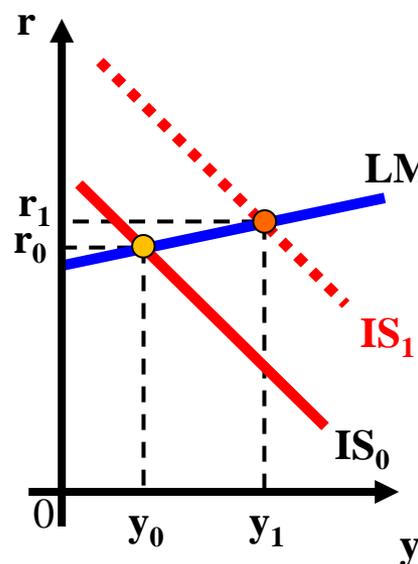
Vertical



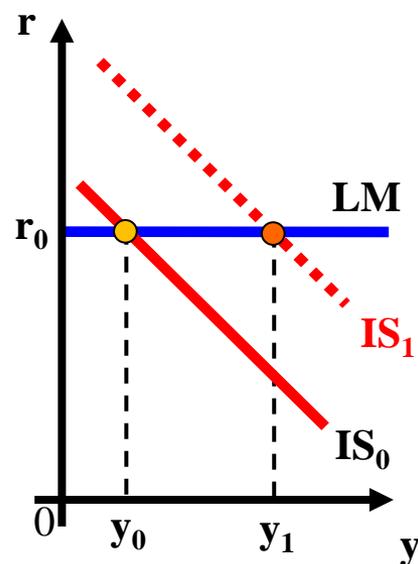
Inclinada



Aplanada

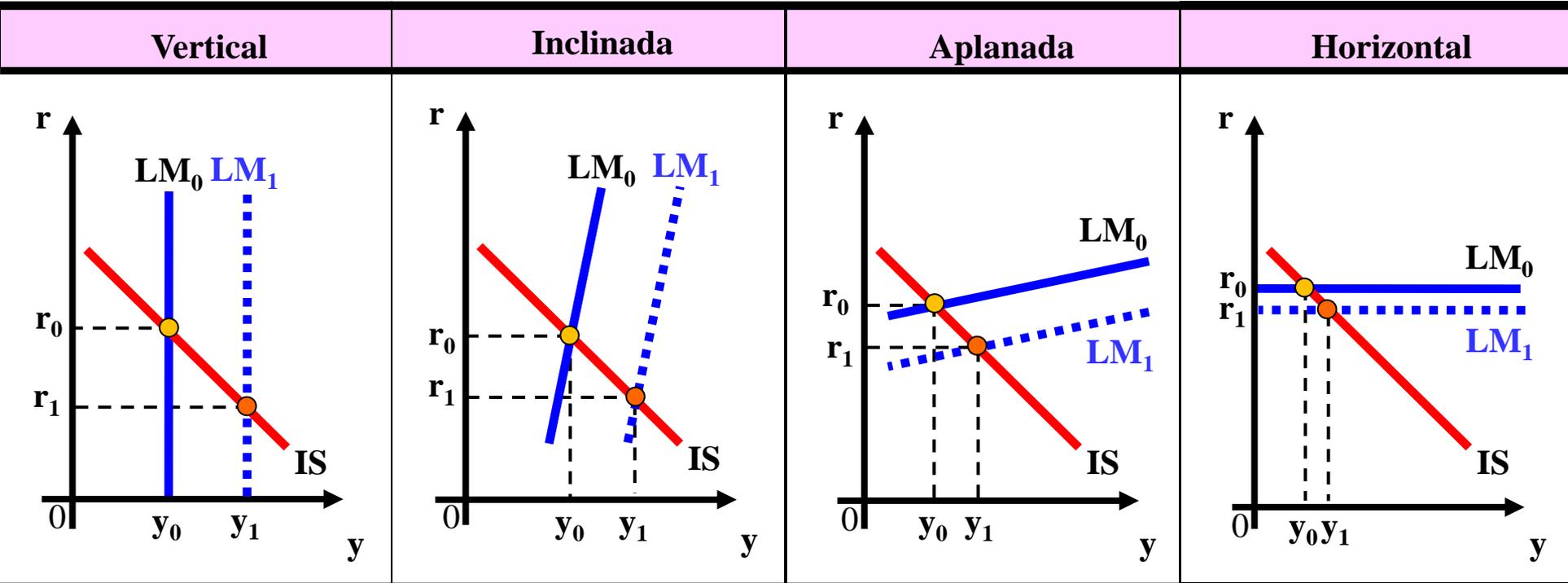


Horizontal



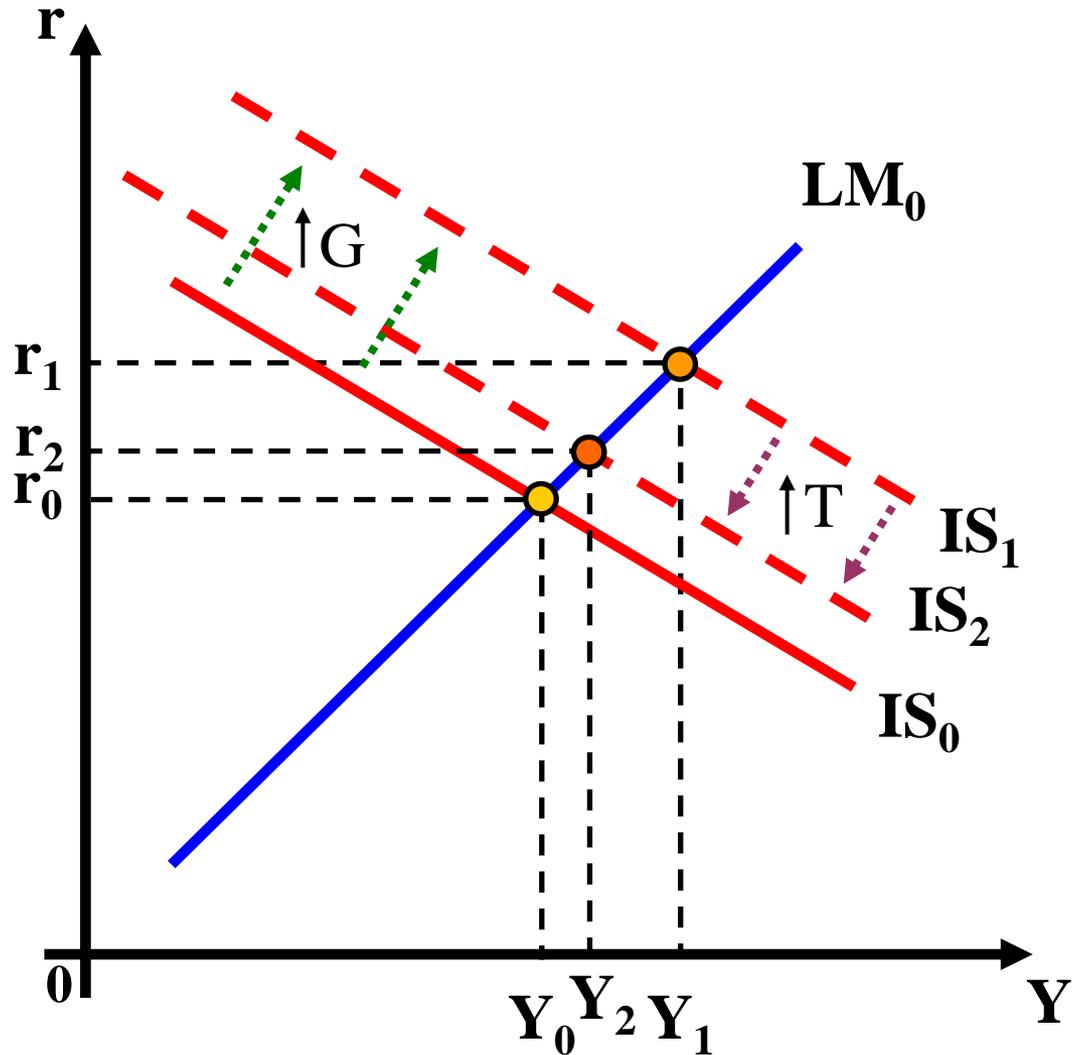
CURVA LM: eficacia de la política monetaria

LM	POLITICA	VARIABLE Y CARACTERISTICA	VERTICAL	INCLINADA	APLANADA	HORIZONTAL
	MONETARIA	Δy	Muy grande ($y_1 - y_0 = \text{Pleno}$)	Grande ($y_1 - y_0$)	Pequeña ($y_1 - y_0$)	Muy pequeña ($y_1 - y_0 = \text{tiende a } 0$)
		Δr	Muy grande ($r_1 - r_0$)	Grande ($r_1 - r_0$)	Pequeña ($r_1 - r_0$)	Muy pequeña ($r_1 - r_0 = \text{tiende a } 0$)
		EFICACIA	Muy eficaz	Eficaz	Poco eficaz	Casi ineficaz

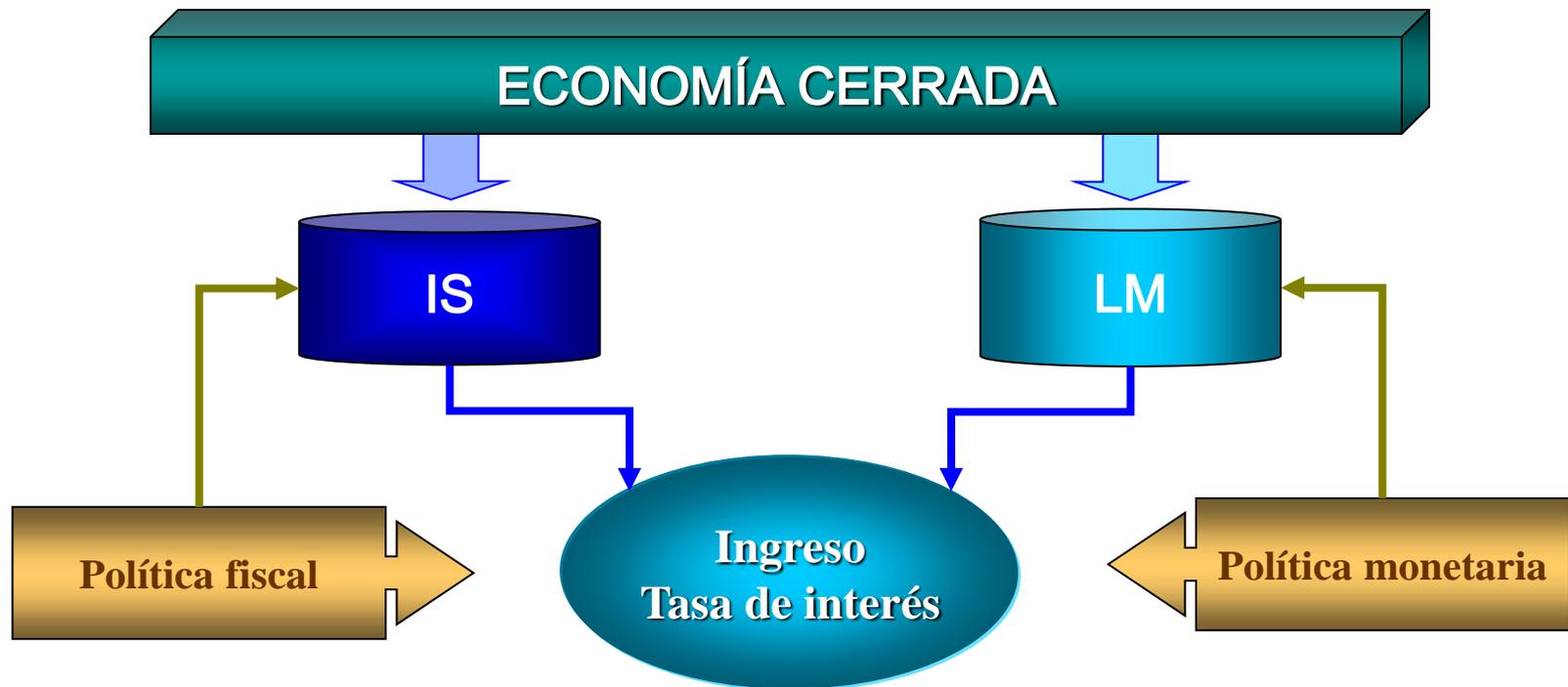


Curva IS-LM

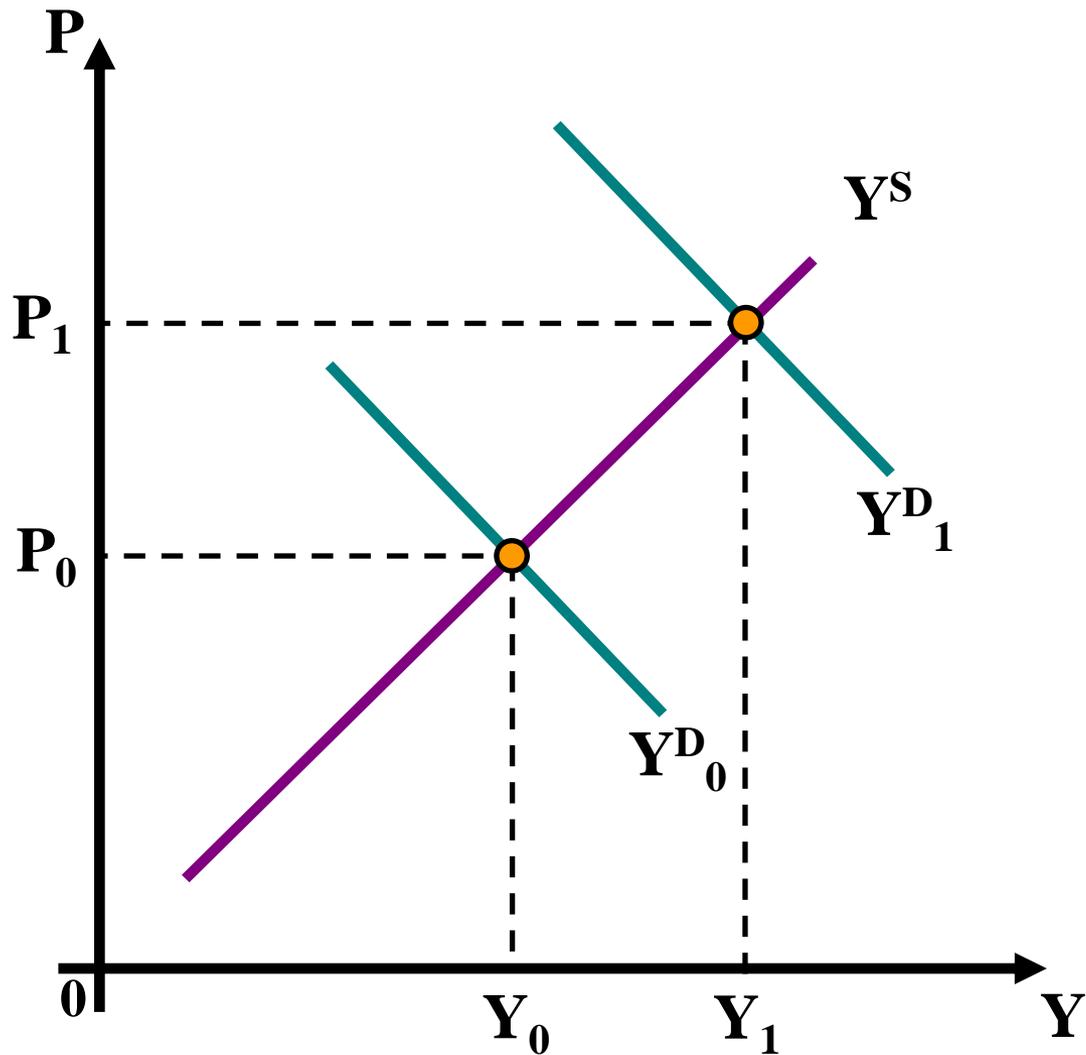
(política fiscal expansiva financiada con impuestos)



IS-LM: economía cerrada con gobierno y precios flexibles



Demanda y oferta agregada con precios flexibles



Equilibrio IS-LM, precios flexibles

$$PY = P(\beta_0 + \beta_1 Y - \beta_1 T_0 + \iota_0 - \iota_1 r + G_0)$$

$$Y = \left(\frac{1}{P(1-\beta_1)} \right) P(\beta_0 - \beta_1 T_0 + \iota_0 + G_0) - \frac{P(\iota_1)}{P(1-\beta_1)} r$$

$$Y = \left(\frac{1}{(1-\beta_1)} \right) (\beta_0 - \beta_1 T_0 + \iota_0 + G_0) - \frac{(\iota_1)}{(1-\beta_1)} r$$

$$PM^D = M^S = P\mu_0 + P\mu_1 Y - P\mu_2 r$$

$$LM = r = \frac{\mu_0 - M^S / P}{\mu_2} + \frac{\mu_1}{\mu_2} Y$$

$$Y^* = \frac{1}{P(1-\beta_1) + P(\iota_1) \frac{P\mu_1}{P\mu_2}} P(\beta_0 - \beta_1 T_0 + \iota_0 + G_0) - P(\iota_1) \left(\frac{P\mu_0}{P\mu_2} - \frac{M^S}{P\mu_2} \right)$$

$$r^* = \left[\frac{1}{P(1-\beta_1) + P(\iota_1) \frac{P\mu_1}{P\mu_2}} \right] P(1-\beta_1) \frac{P\mu_0 - M^S}{P\mu_2} + \frac{P\mu_1}{P\mu_2} (P\beta_0 - P\beta_1 T_0 + P\iota_0 + PG_0)$$

Equilibrio IS-LM, precios flexibles

$$Y^* = \left(\frac{1}{P(1-\beta_1) + P(l_1) \frac{P\mu_1}{P\mu_2}} \right) \left(P(\beta_0 - \beta_1 T_0 + l_0 + G_0) - P(l_1) \left(\frac{P\mu_0}{P\mu_2} - \frac{M^s}{P\mu_2} \right) \right)$$

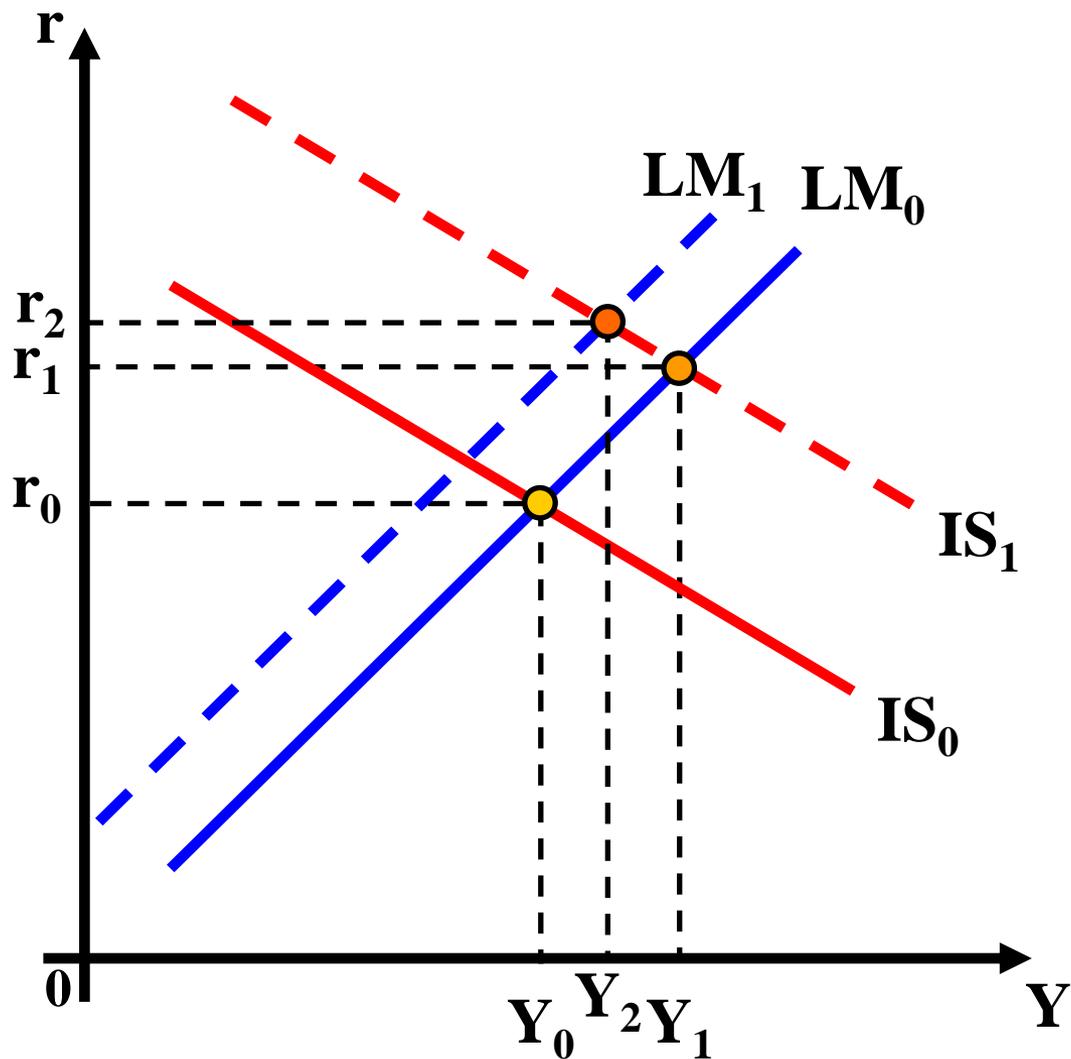
$$Y^* = \left(\frac{1}{(1-\beta_1) + (l_1) \frac{\mu_1}{\mu_2}} \right) \left((\beta_0 - \beta_1 T_0 + l_0 + G_0) - (l_1) \left(\frac{\mu_0}{\mu_2} - \frac{M^s}{\mu_2} \right) \right)$$

$$r^* = \left[\frac{1}{P(1-\beta_1) + P(l_1) \frac{P\mu_1}{P\mu_2}} \right] P(1-\beta_1) \frac{P\mu_0 - M^s}{P\mu_2} + \frac{P\mu_1}{P\mu_2} (P\beta_0 - P\beta_1 T_0 + Pl_0 + PG_0)$$

$$r^* = \left[\frac{1}{(1-\beta_1) + (l_1) \frac{\mu_1}{\mu_2}} \right] (1-\beta_1) \frac{\mu_0 - M^s / P}{\mu_2} + \frac{\mu_1}{\mu_2} (\beta_0 - \beta_1 T_0 + l_0 + G_0)$$

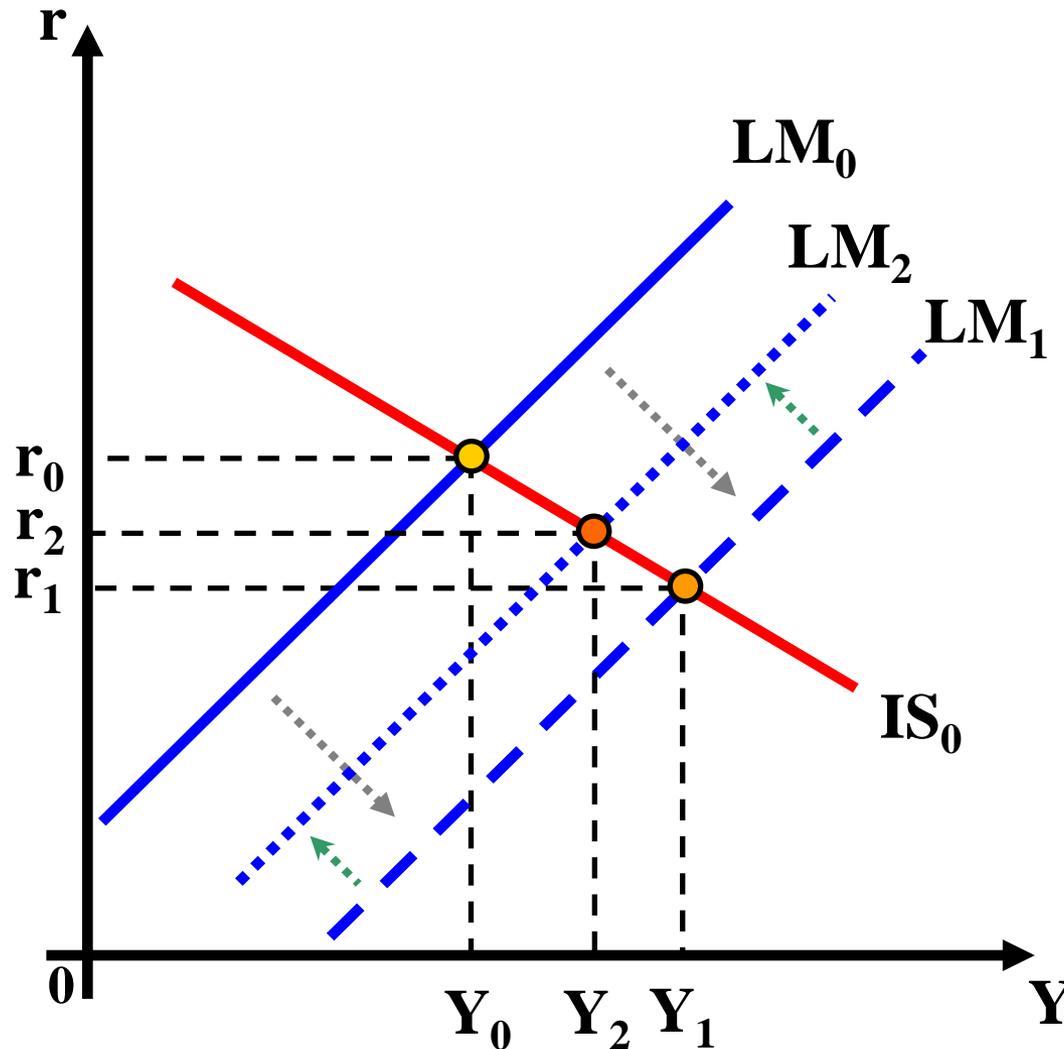
Curva IS-LM

(política fiscal con precios flexibles)

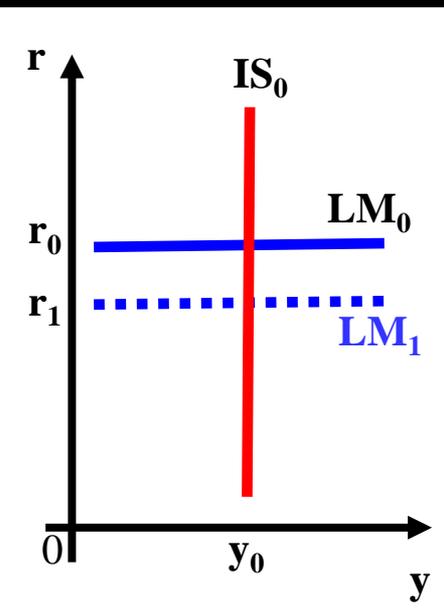
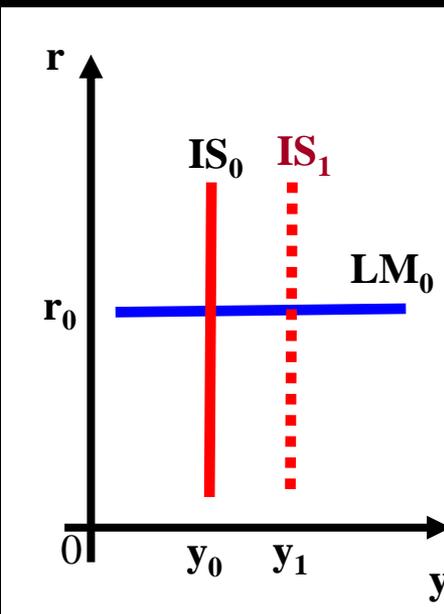
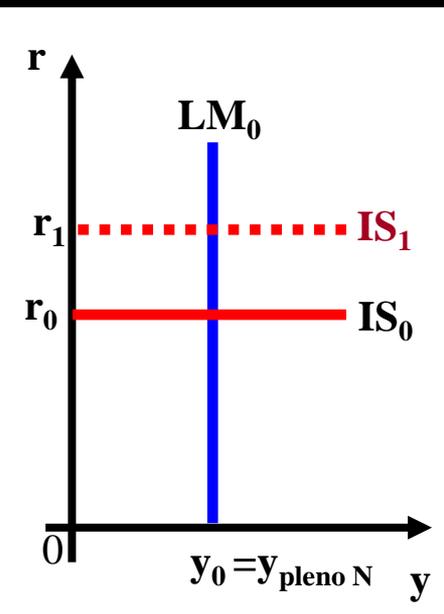
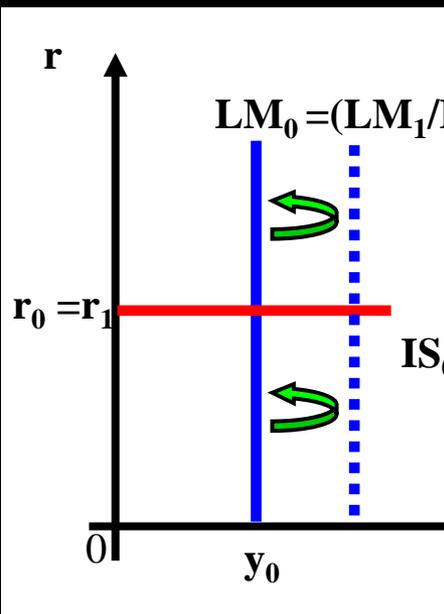


Curva IS-LM

(política monetaria con precios flexibles)



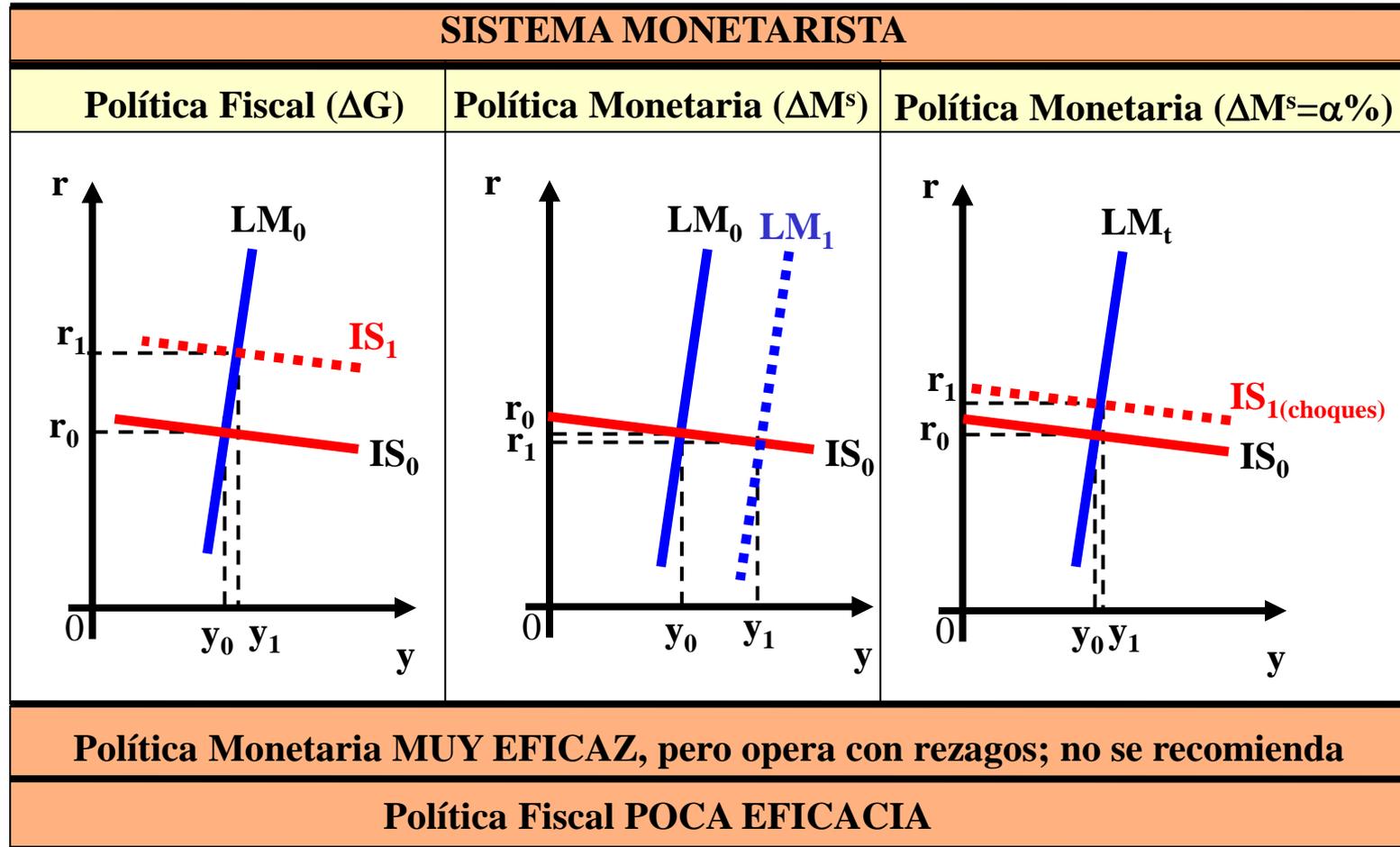
IS-LM: sistema clásico y keynesiano

SISTEMA KEYNESIANO		SISTEMA CLÁSICO	
Política Monetaria (ΔM^s)	Política Fiscal (ΔG)	Política Fiscal (ΔG)	Política Monetaria (ΔM^s)
 <p>Graph showing the effect of monetary policy in the Keynesian system. The vertical axis is the interest rate r and the horizontal axis is output y. A vertical red line represents the IS curve (IS_0). A solid blue line represents the initial LM curve (LM_0), and a dashed blue line represents the new LM curve (LM_1) after a decrease in the money supply. The equilibrium moves from (y_0, r_0) to (y_0, r_1).</p>	 <p>Graph showing the effect of fiscal policy in the Keynesian system. The vertical axis is the interest rate r and the horizontal axis is output y. A vertical red line represents the initial IS curve (IS_0), and a dashed red line represents the new IS curve (IS_1) after an increase in government spending. A solid blue horizontal line represents the LM curve (LM_0). The equilibrium moves from (y_0, r_0) to (y_1, r_0).</p>	 <p>Graph showing the effect of fiscal policy in the classical system. The vertical axis is the interest rate r and the horizontal axis is output y. A vertical blue line represents the LM curve (LM_0). A solid red horizontal line represents the initial IS curve (IS_0), and a dashed red horizontal line represents the new IS curve (IS_1) after an increase in government spending. The equilibrium moves from $(y_0 = y_{pleno\ N}, r_0)$ to (y_0, r_1).</p>	 <p>Graph showing the effect of monetary policy in the classical system. The vertical axis is the interest rate r and the horizontal axis is output y. A vertical blue line represents the LM curve ($LM_0 = (LM_1/P)$). A solid red horizontal line represents the initial IS curve (IS_0), and a dashed red horizontal line represents the new IS curve (IS_1) after an increase in government spending. The equilibrium moves from $(y_0, r_0 = r_1)$ to (y_0, r_1).</p>
Política Monetaria INEFICAZ		Política Monetaria INEFICAZ	
Política fiscal MUY EFICAZ		Política Fiscal INEFICAZ	

Efecto en precios: poco perceptible

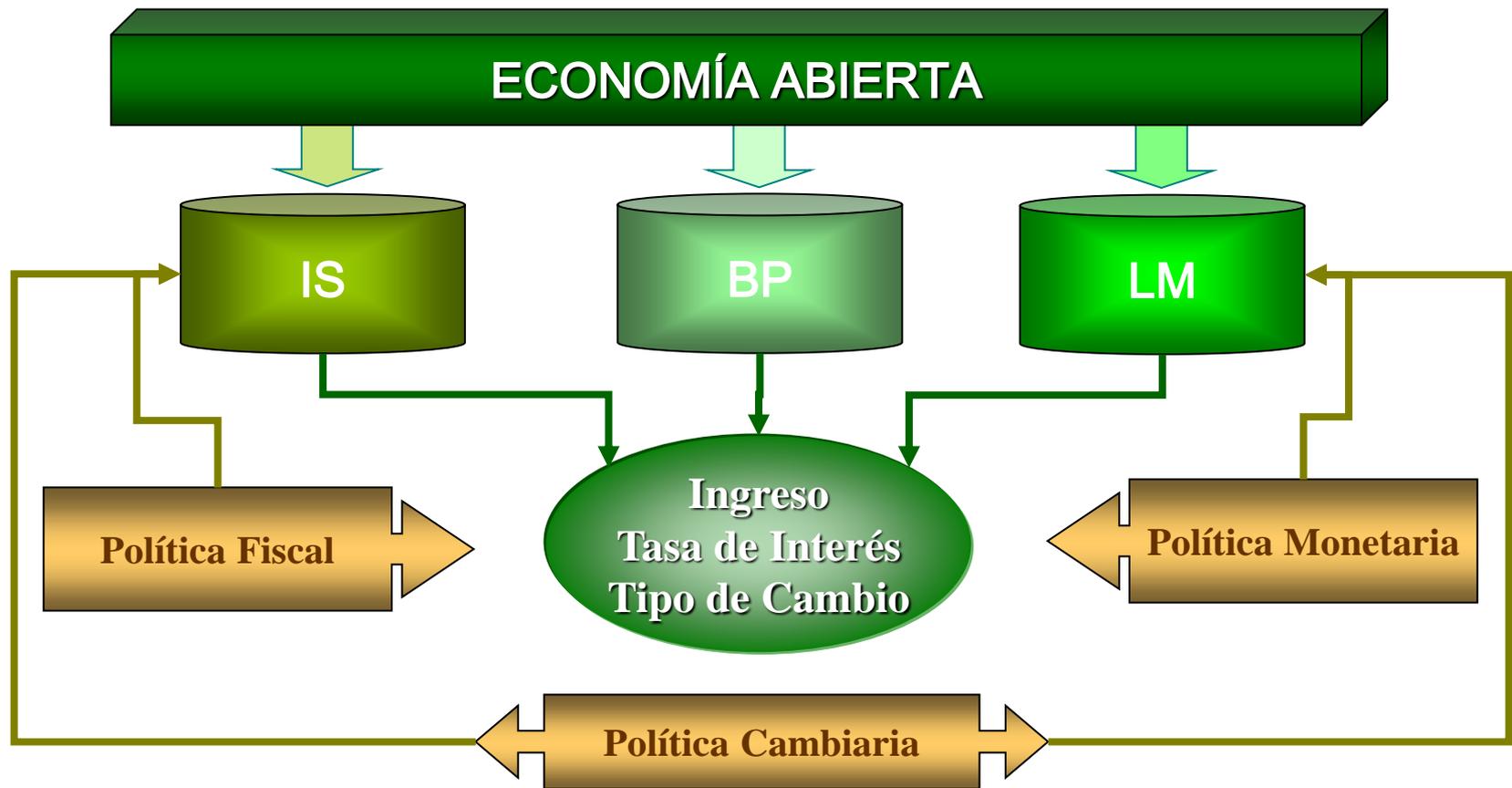
Efecto en precios: $(\Delta\alpha\%)P = ((\Delta\alpha\%)M)/ky$

IS-LM: sistema monetarista



Efecto en precios: $(\Delta\alpha\%)P = ((\Delta\alpha\%)M)/ky$

IS-LM-BP: economía abierta con gobierno y precios rígidos



Modelo IS-LM-BP

NOMBRE	FUNCIÓN PARAMÉTRICA	PARÁMETROS
Función consumo	$C = \beta_0 + \beta_1 Y - \beta_1 T_0$	$\beta_0 > 0, \quad 0 < \beta_1 < 1; \quad T_0 \geq 0$
Función inversión	$I = i_0 - i_1 r$	$i_0, i_1 > 0$
Función gasto de gobierno	$G = G_0$	$G_0 \geq 0$
Función exportaciones	$X = \xi_0 + \xi_1 Y^{RM} + \xi_2 Tc$	$\xi_1, \xi_2, \xi_3 > 0$
Función importaciones	$Q = \theta_0 + \theta_1 Y - \theta_2 Tc$	$\theta_0, \theta_2 > 0; \quad s\theta_1 \in (0,1) < \beta_1$

NOMBRE	FUNCIÓN PARAMÉTRICA	PARÁMETROS
Oferta de dinero	$M^S = \mu(CIN + RI)$	$\mu > 0; \quad CIN > 0; \quad RI > 0$
Función demanda de dinero	$M^D = \mu_0 + \mu_1 Y - \mu_2 r$	$\mu_0 > 0; \quad \mu_1 > 0; \quad \mu_2 > 0$

NOMBRE	FUNCIÓN PARAMÉTRICA	PARÁMETROS
Balanza de pagos	$X - Q = -IEN$ $X - Q + IEN = 0$	
Función exportaciones	$X = \xi_0 + \xi_1 Y^{RM} + \xi_2 Tc$	$\xi_1, \xi_2, \xi_3 > 0$
Función importaciones	$Q = \theta_0 + \theta_1 Y - \theta_2 Tc$	$\theta_0, \theta_2 > 0; \quad 0 < \theta_1 < 1$
Función inversión exterior neta	$IEN = \rho_0 (r - r^{RM})$	$\rho_0 \geq 0$

Curvas IS-LM-BP

$$IS = Y = \left(\frac{1}{1 - \beta_1 + \theta_1} \right) (\beta_0 - \beta_1 T_0 + G_0 + \iota_0 + \xi_1 Y^* + \xi_0 - \theta_0 + (\xi_2 + \theta_2) Tc) - \left(\frac{\iota_1 r}{1 - \beta_1 + \theta_1} \right)$$

$$LM = r = \frac{\mu_0 - \mu CIN - \mu RI}{\mu_2} + \frac{\mu_1}{\mu_2} Y$$

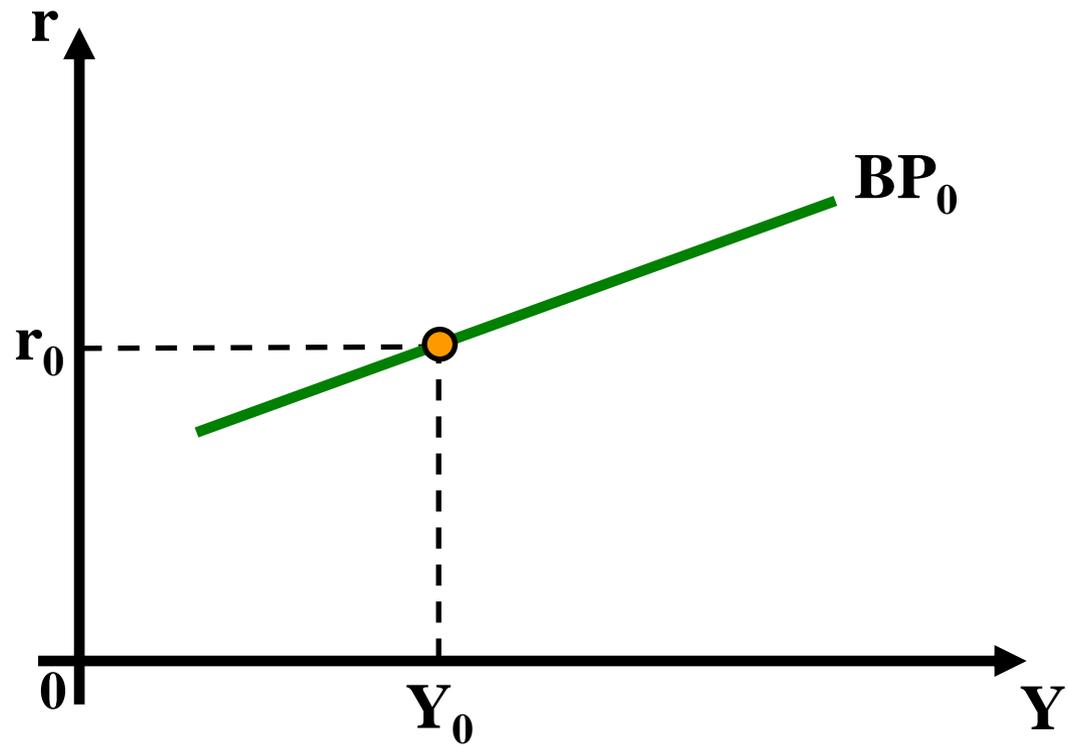
$$BP = r = r^{RM} + \frac{-\xi_0 + \theta_0 - \xi_1 Y^{RM} - (\xi_2 + \theta_2) Tc}{\rho_0} + \frac{\theta_1}{\rho_0} Y$$

Modelo IS-LM-BP

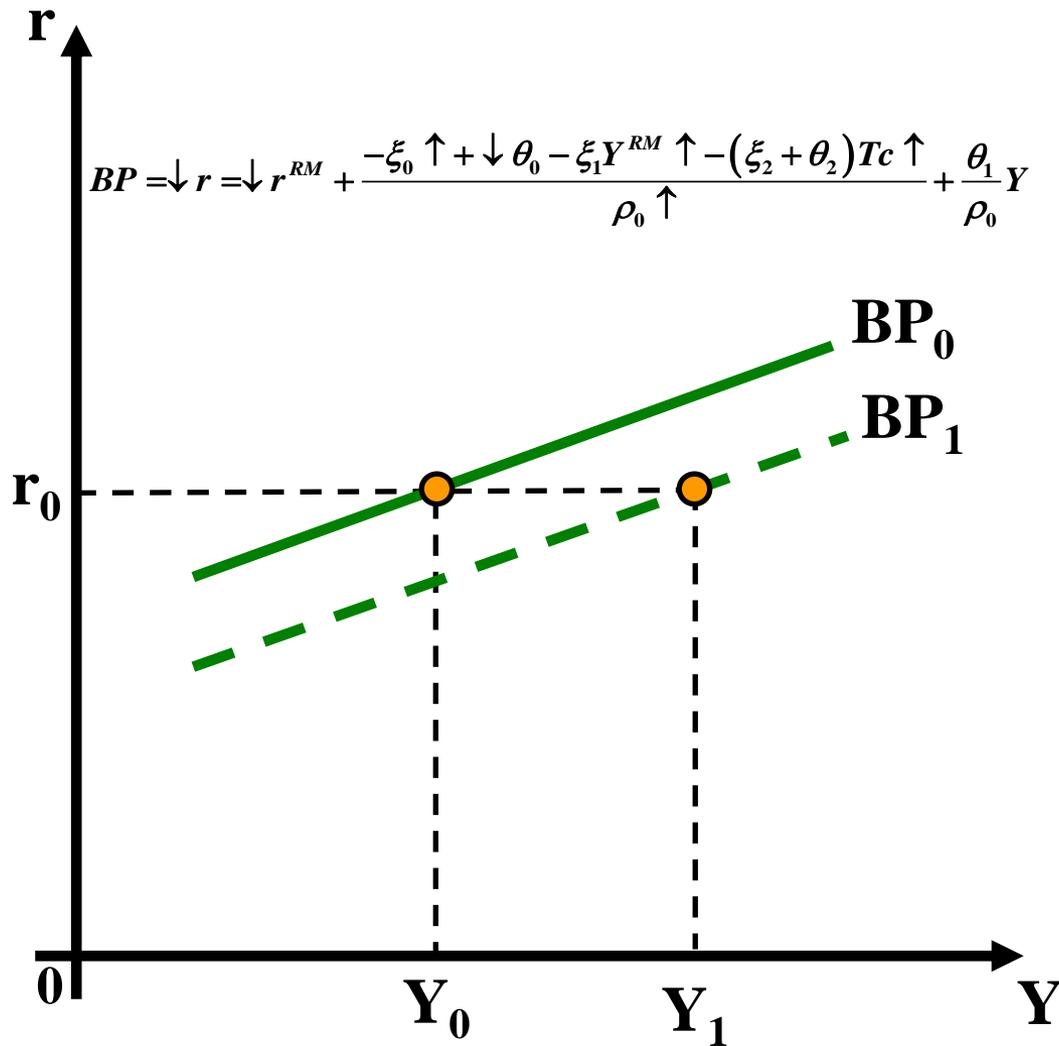
$$\left(\begin{array}{ccc|c} BY & l_1 r & 0 & A \\ -\theta_1 Y & \rho_0 r & 0 & F \\ -EY & \mu_2 r & \mu RI & D \end{array} \right) = \begin{bmatrix} B & l_1 & 0 \\ -\theta_1 & \rho_0 & 0 \\ -E & \mu_2 & \mu \end{bmatrix} \begin{bmatrix} Y \\ r \\ RI \end{bmatrix} = \begin{bmatrix} A \\ F \\ D \end{bmatrix}$$

$$\left(\begin{array}{ccc|c} 1 & 0 & 0 & \frac{A}{B} - \frac{l_1}{B} \left(\frac{F + \frac{A}{B}\theta_1}{\rho_0 + \frac{l_1}{B}\theta_1} \right) \\ 0 & 1 & 0 & \left(\frac{F + \frac{A}{B}\theta_1}{\rho_0 + \frac{l_1}{B}\theta_1} \right) \\ 0 & 0 & 1 & \left(D + \frac{A}{B}E \right) - \left(\mu_2 + \frac{l_1}{B}E \right) \left(\frac{F + \frac{A}{B}\theta_1}{\rho_0 + \frac{l_1}{B}\theta_1} \right) \end{array} \right)$$

Curva BP

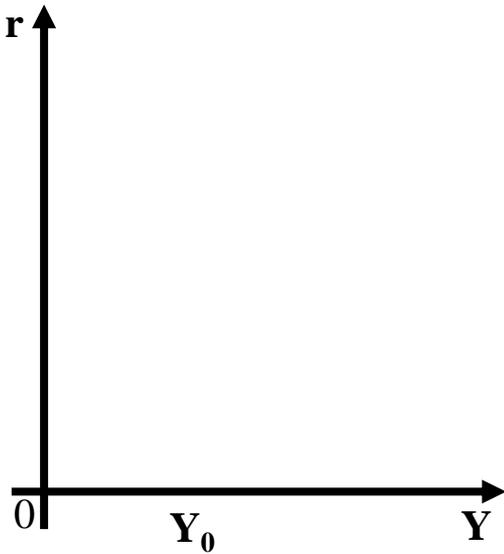


Curva BP

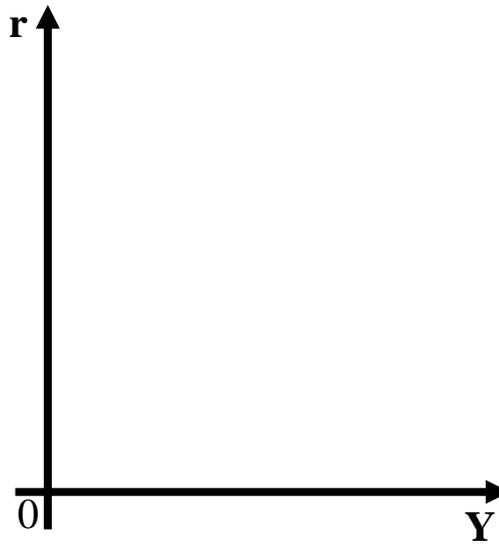


IS-LM-BP:

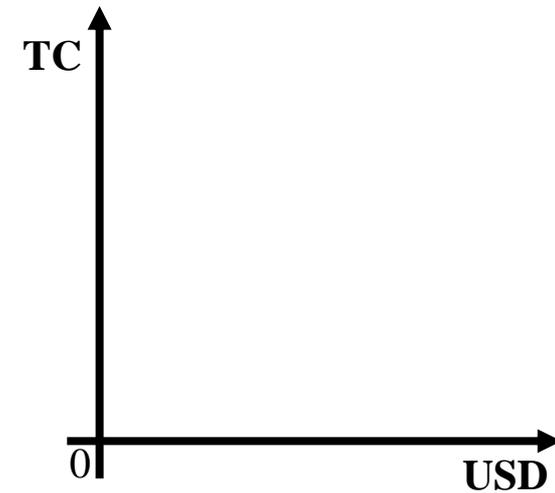
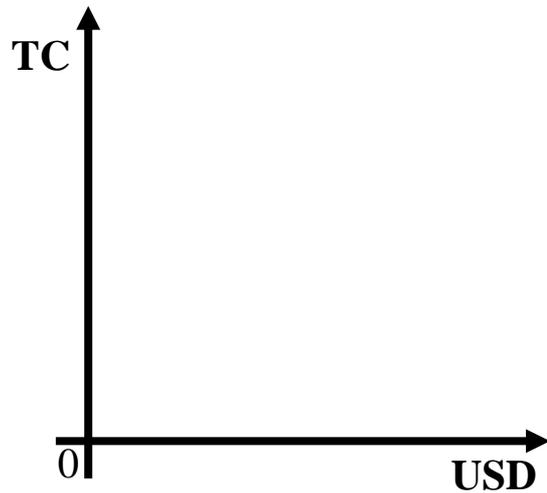
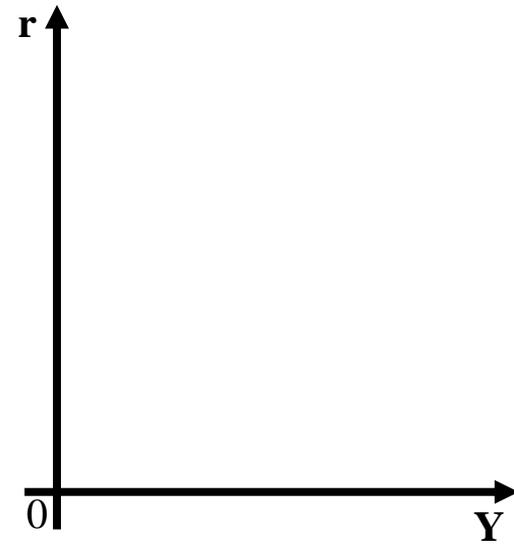
Perfecta movilidad de capitales



Imperfecta movilidad de capitales

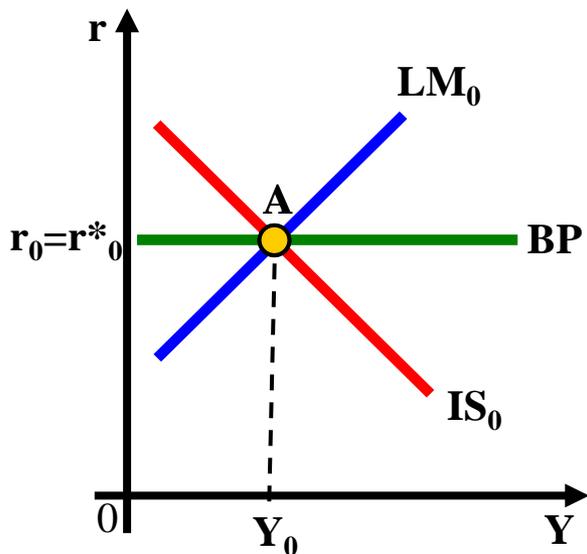


Perfecta inmovilidad de capitales

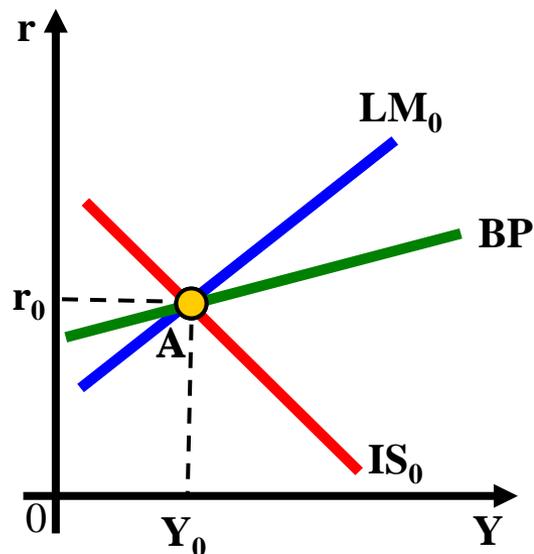


IS-LM-BP: POLÍTICA ECONÓMICA

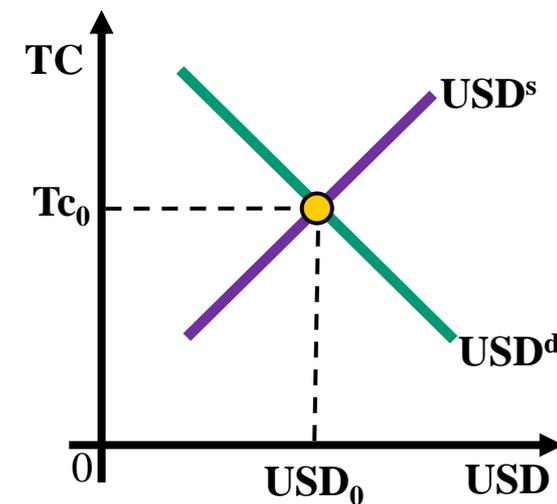
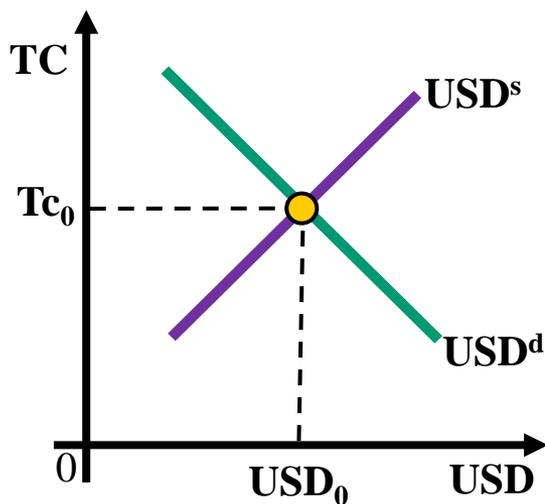
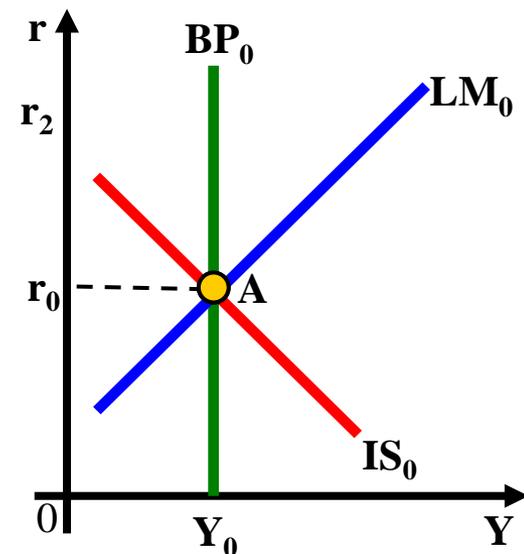
Perfecta movilidad de capitales



Imperfecta movilidad de capitales



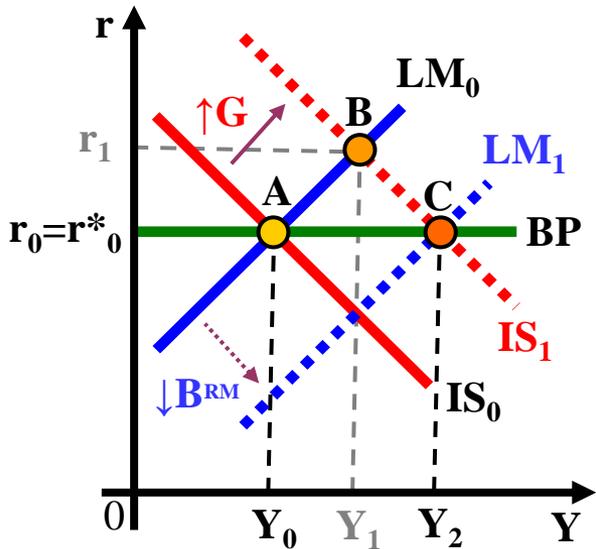
Perfecta inmovilidad de capitales



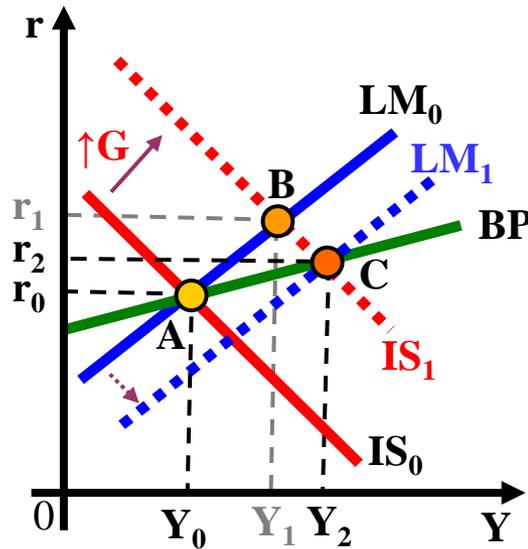
Curva BP: política fiscal con tipo de cambio fijo

BP	POLITICA	VARIABLE Y CARACTERISTICA	HORIZONTAL	INCLINADA	VERTICAL
	FISCAL (Tipo de Cambio Fijo)	ΔY	Muy Grande ($Y_0 < Y_2$)	Grande ($Y_0 < Y_2$)	Transitoria ($Y_0 = Y_2 < Y_1$)
		Δr	Nulo ($\Delta r = 0$)	Pequeño ($r_0 < r_2$)	Grande ($r_0 < r_2$)
		ΔTc	Fijo ($\Delta Tc = 0$)	Fijo ($\Delta Tc = 0$)	Fijo ($\Delta Tc = 0$)
		EFICACIA	Muy eficaz	Eficaz	Ineficaz

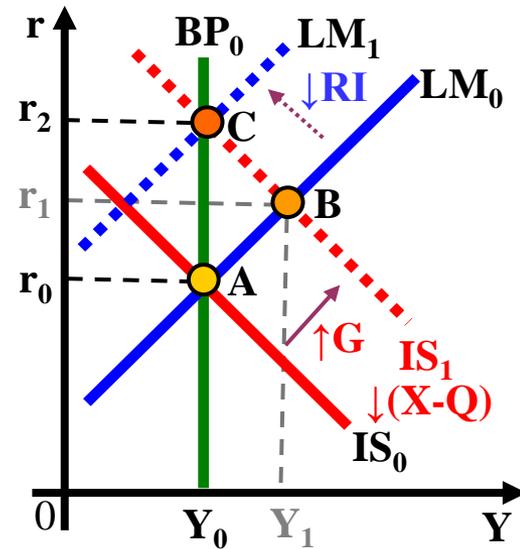
Horizontal



Inclinada



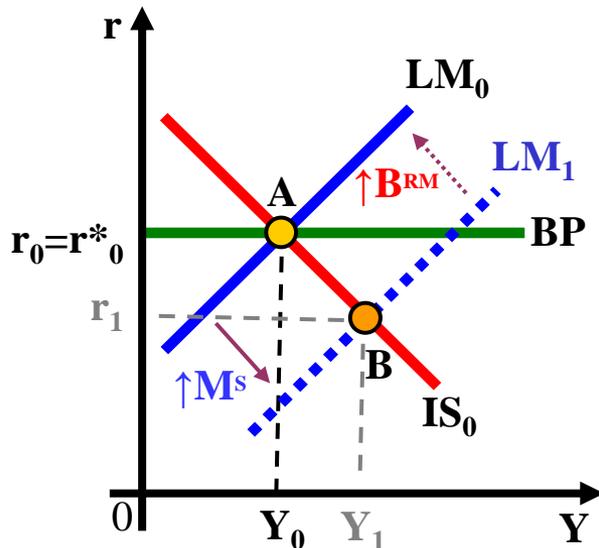
Vertical



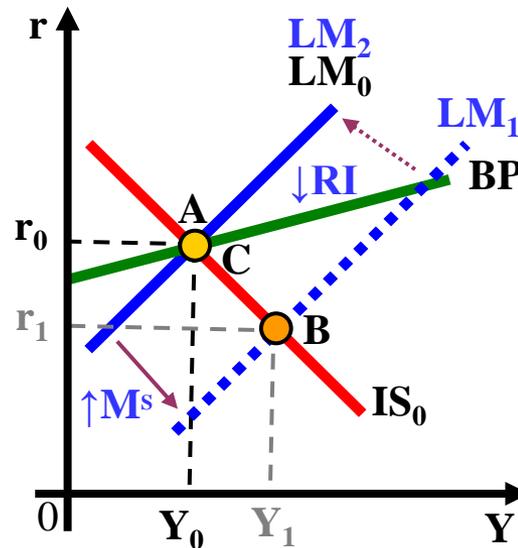
Curva BP: pol. monetaria, tipo de cambio fijo

BP	POLITICA	VARIABLE Y CARACTERISTICA	HORIZONTAL	INCLINADA	VERTICAL
	MONETARIA (Tipo de Cambio Fijo)	ΔY	Nula ($Y_0 = Y_2$)	Pequeña ($Y_0 < Y_1$)	Transitoria ($Y_0 = Y_2 < Y_1$)
		Δr	Nula ($r_0 = r^{RM}$)	Grande ($r_0 > r_1$)	Transitoria ($r_0 = r_2 < r_1$)
		ΔTc	Fijo ($\Delta Tc = 0$)	Fijo ($\Delta Tc = 0$)	Fijo ($\Delta Tc = 0$)
		EFICACIA	Ineficaz	Ineficaz	Poco eficaz y transitoria

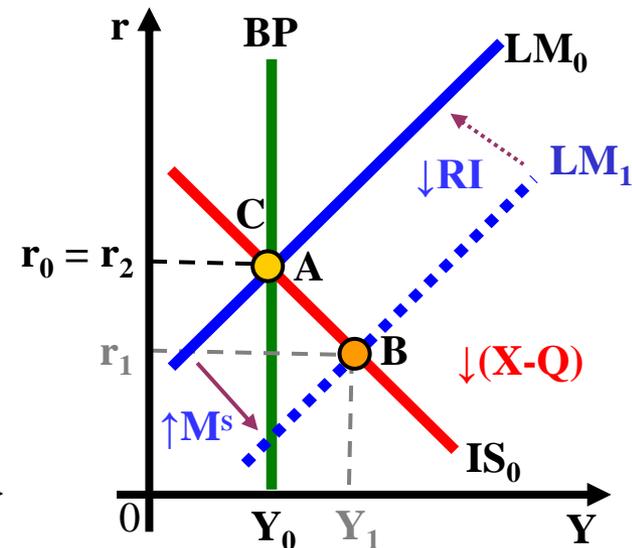
Horizontal



Inclinada



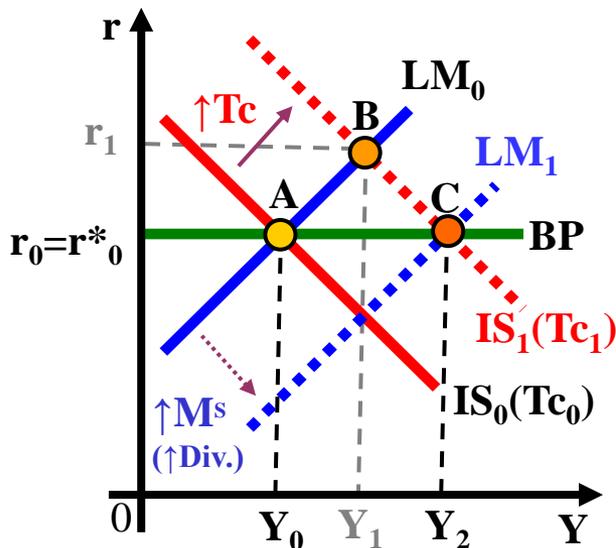
Vertical



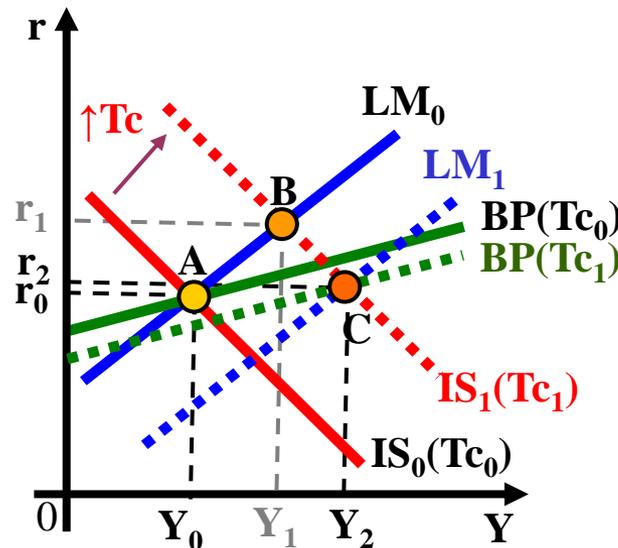
Curva BP: pol. cambiaria, tipo de cambio fijo

BP	POLITICA	VARIABLE Y CARACTERISTICA	HORIZONTAL	INCLINADA	VERTICAL
	CAMBIARIA (Tipo de Cambio Fijo)	ΔY	Muy Grande ($Y_0 < Y_1 < Y_2$)	Grande ($y_1 - y_0$)	Muy Grande ($Y_0 < Y_1$)
		Δr	Nulo ($r_1 = r^{RM}$)	Grande ($r_1 - r_0$)	Nulo (r_0)
		ΔTc	Devaluación ($Tc_0 < Tc_1$)	Devaluación ($Tc_0 < Tc_1$)	Devaluación ($Tc_0 < Tc_1$)
		EFICACIA	Muy eficaz	Eficaz	Muy eficaz

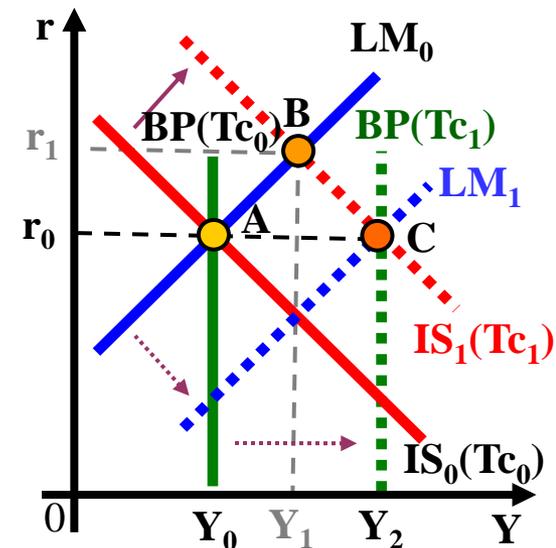
Horizontal



Inclinada



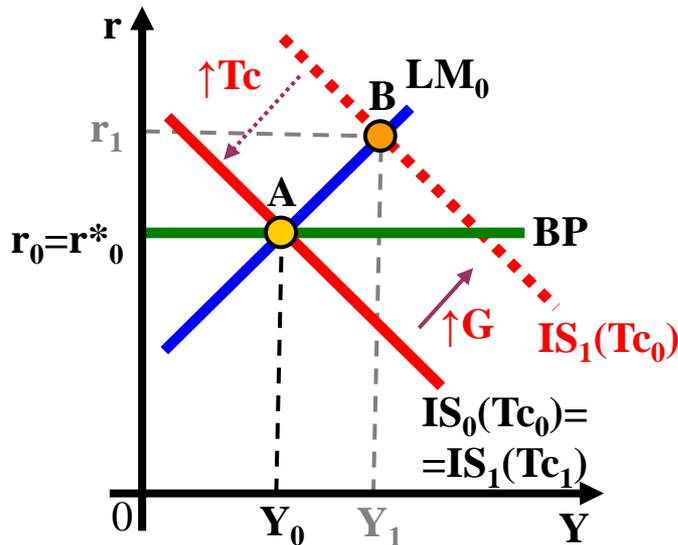
Vertical



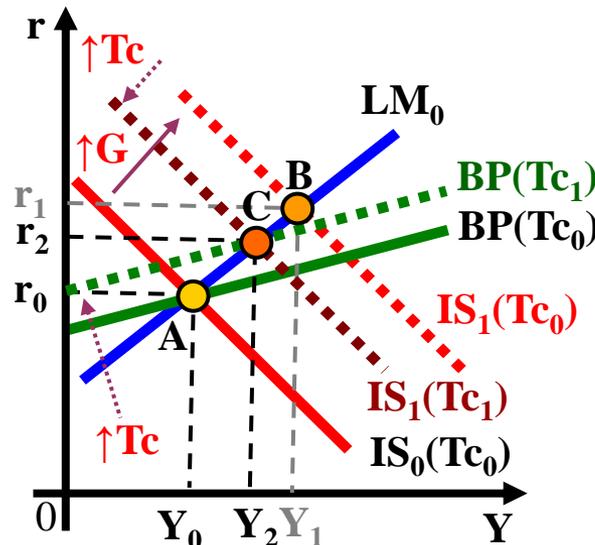
CURVA BP: pol. fiscal, tipo de cambio flexible

BP	POLITICA	VARIABLE Y CARACTERISTICA	HORIZONT AL	INCLINADA	VERTICAL
	FISCAL (Tipo de Cambio Flexible)	ΔY	Nula ($Y_0 < Y_2$)	Mediana ($Y_0 < Y_1 > Y_2$)	Alta ($Y_0 < Y_1 < Y_2$)
		Δr	Nula ($r_1 = r^{RM}$)	Mediana ($r_0 < r_1 > r_2$)	Alta ($r_0 < r_1 < r_2$)
		ΔTc	Apreciación ($Tc_0 > Tc_1$)	Apreciación ($Tc_0 > Tc_1$)	Depreciación ($Tc_0 < Tc_1$)
		EFICACIA	Ineficaz	Eficaz	Muy Eficaz

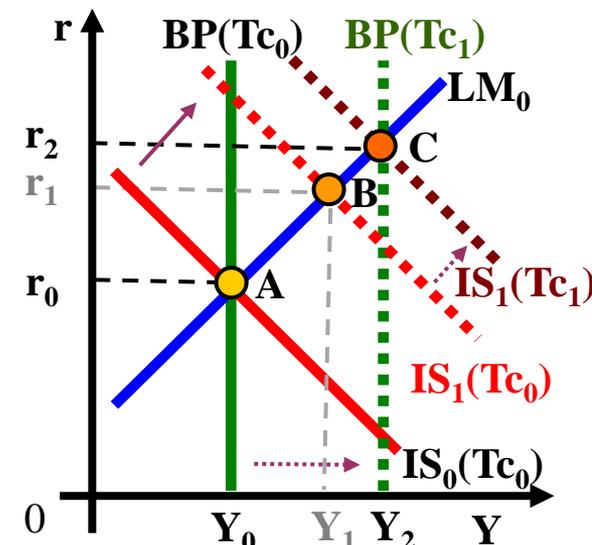
Horizontal



Inclinada



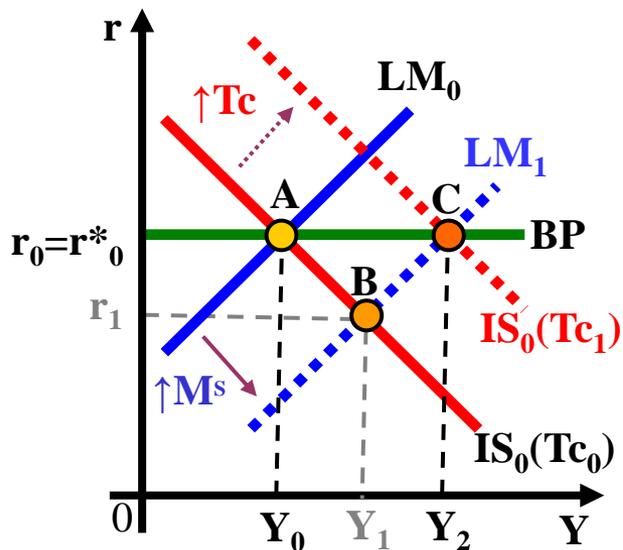
Vertical



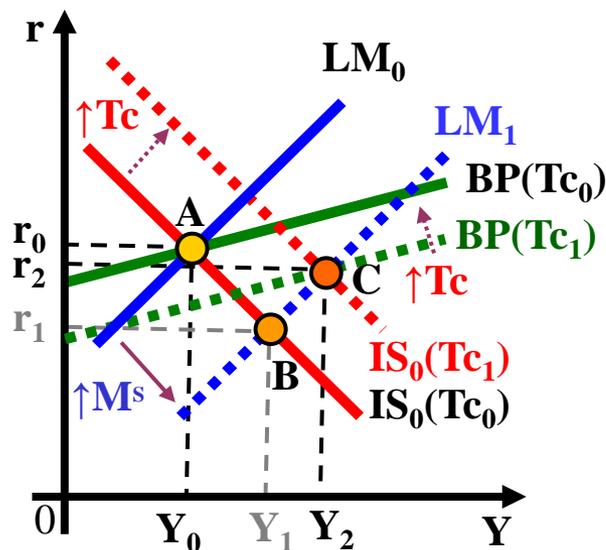
CURVA BP: pol. monetaria, paridad flexible

BP	POLITICA	VARIABLE Y CARACTERISTICA	HORIZONTAL	INCLINADA	VERTICAL
	MONETARIA (Tipo de Cambio Flexible)	ΔY	Muy Grande ($Y_0 < Y_1 < Y_2$)	Grande ($Y_0 < Y_1 > Y_2$)	Muy Grande ($Y_0 < Y_1 < Y_2$)
		Δr	Nula ($r_1 = r^{RM}$)	Grande ($r_0 > r_1 < r_2$)	Grande ($r_0 > r_1 > r_2$)
		ΔTc	Depreciación ($Tc_0 < Tc_1$)	Depreciación ($Tc_0 < Tc_1$)	Depreciación ($Tc_0 < Tc_1$)
		EFICACIA	Muy eficaz	Eficaz	Muy Eficaz

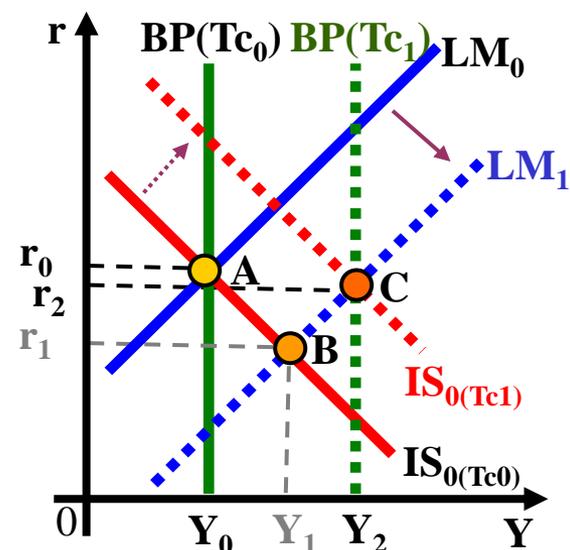
Horizontal



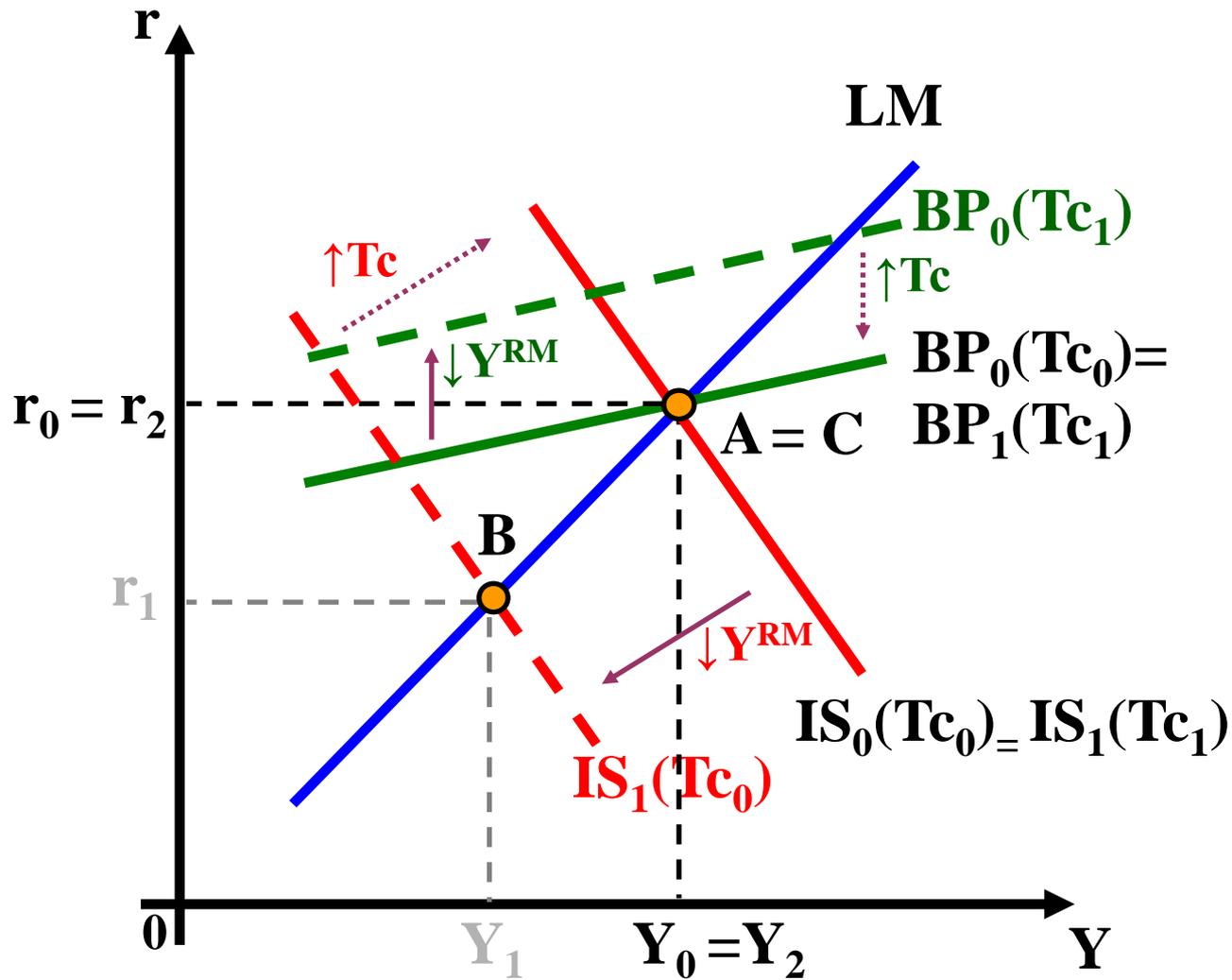
Inclinada



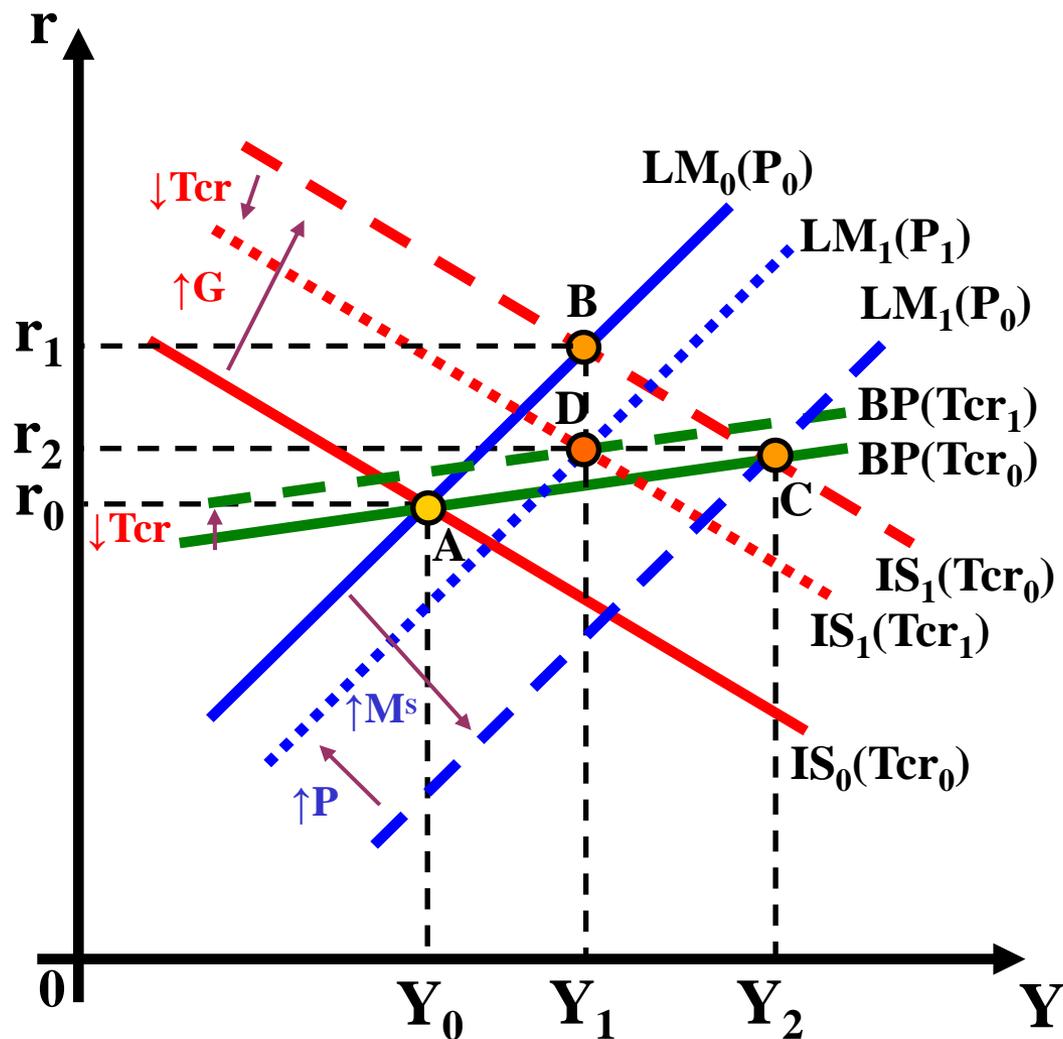
Vertical



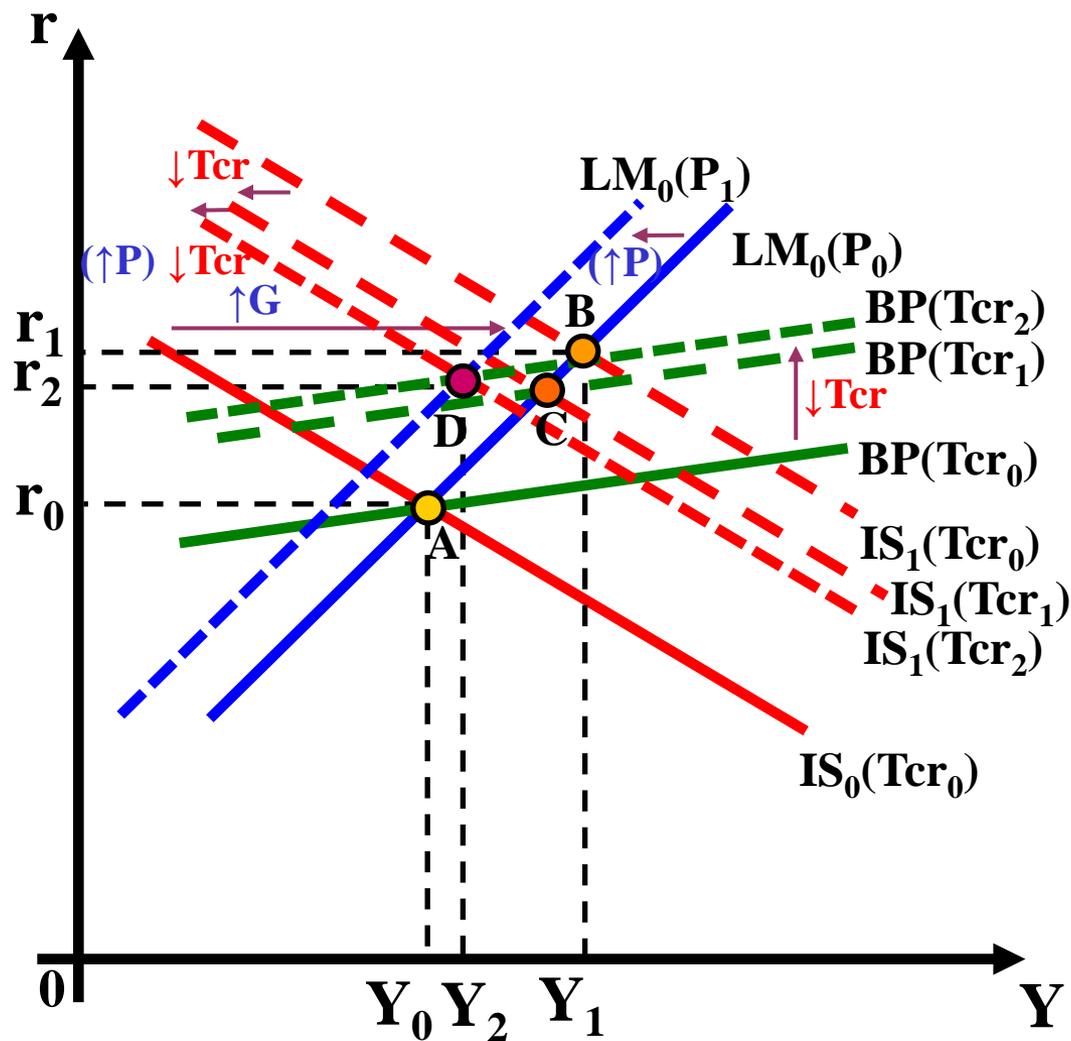
IS-LM-BP, tipo de cambio flexible (aislamiento ante choques externos)



IS-LM-BP, tipo de cambio fijo (política fiscal con precios flexibles)



IS-LM-BP, tipo de cambio flexible (política fiscal con precios flexibles)



IS-LM-BP, tipo de cambio flexible (política monetaria con precios flexibles)

