

Macroeconomic Theory and Policy

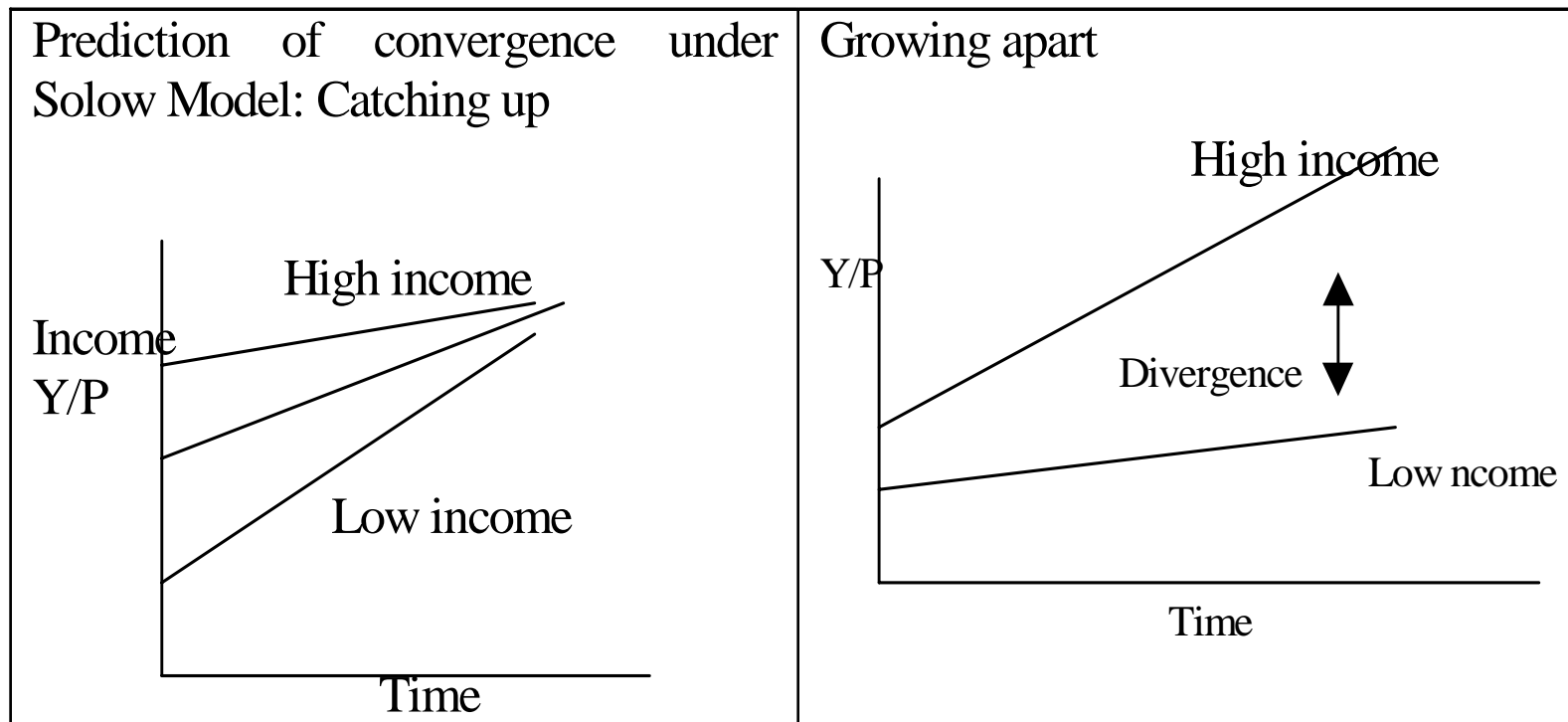
Lecture 15

Convergence or Conditional Convergence

Contents

- Definition of Convergence and Divergence
- Evidence of divergence among UK regions
- Labour and capital mobility and convergence
- Steady State in Autarky and Globalisation
- Evidence for Conditional Convergence
- Poverty Trap: why pigs cannot become elephants?
- Does more trade lead to convergence?
- Results of growth studies
- Exercises

Meaning of Convergence and Divergence

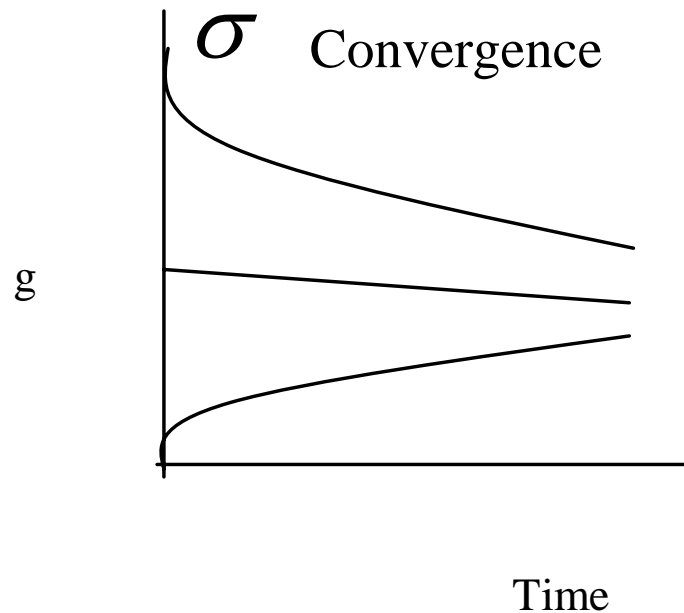


Poor country should grow at faster rate than a rich country

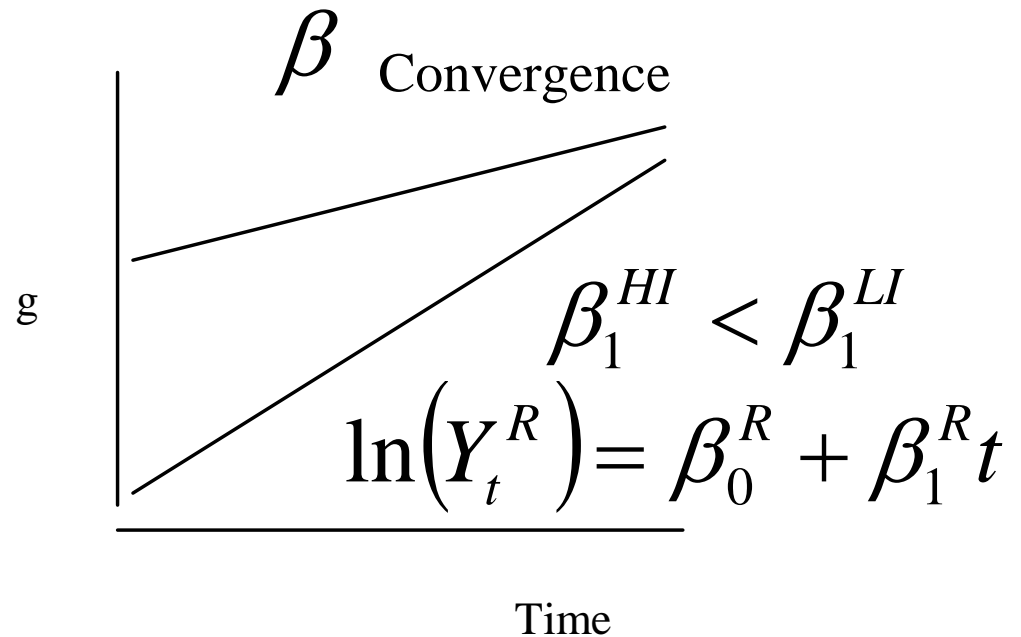
Experience of African countries

Two concepts of Economic Convergence

Dispersion Measure



Mean Difference

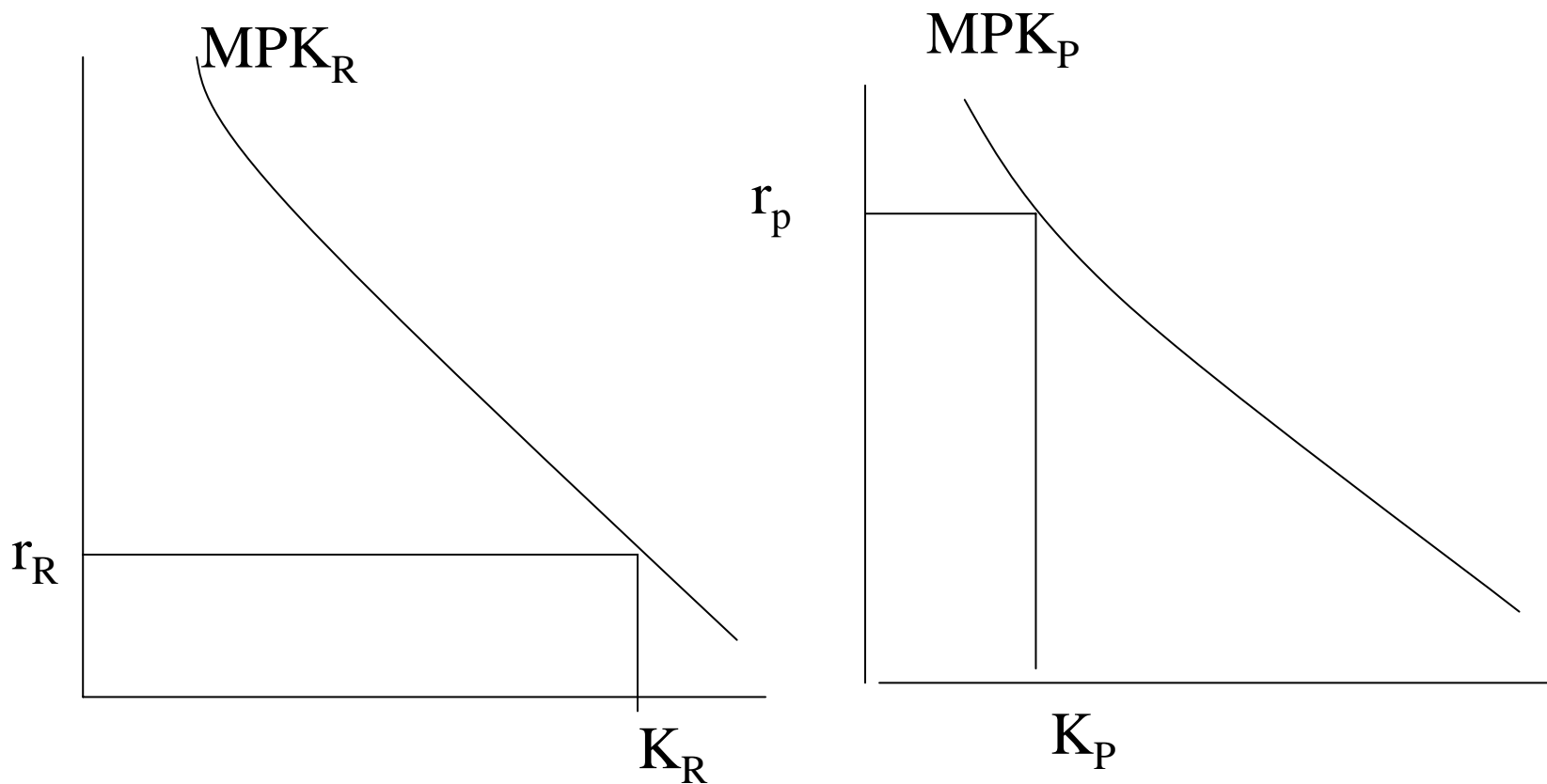


Standard Deviation

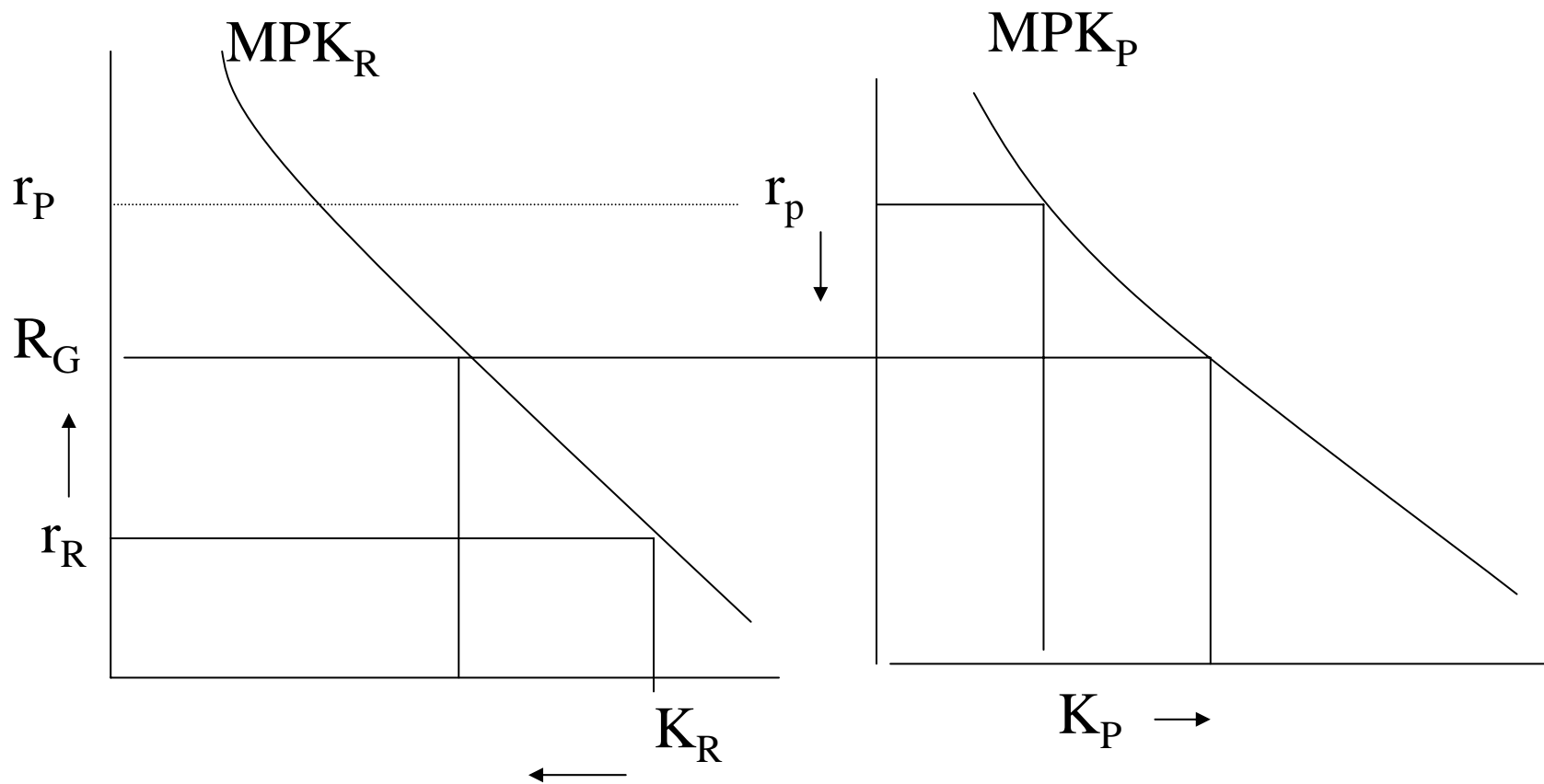
$$\sigma_t = \sqrt{\frac{\sum_i [\ln(y_{i,t}) - \ln(\bar{y}_t)]^2}{(N-1)}}$$

Low income regions should grow faster than high income region

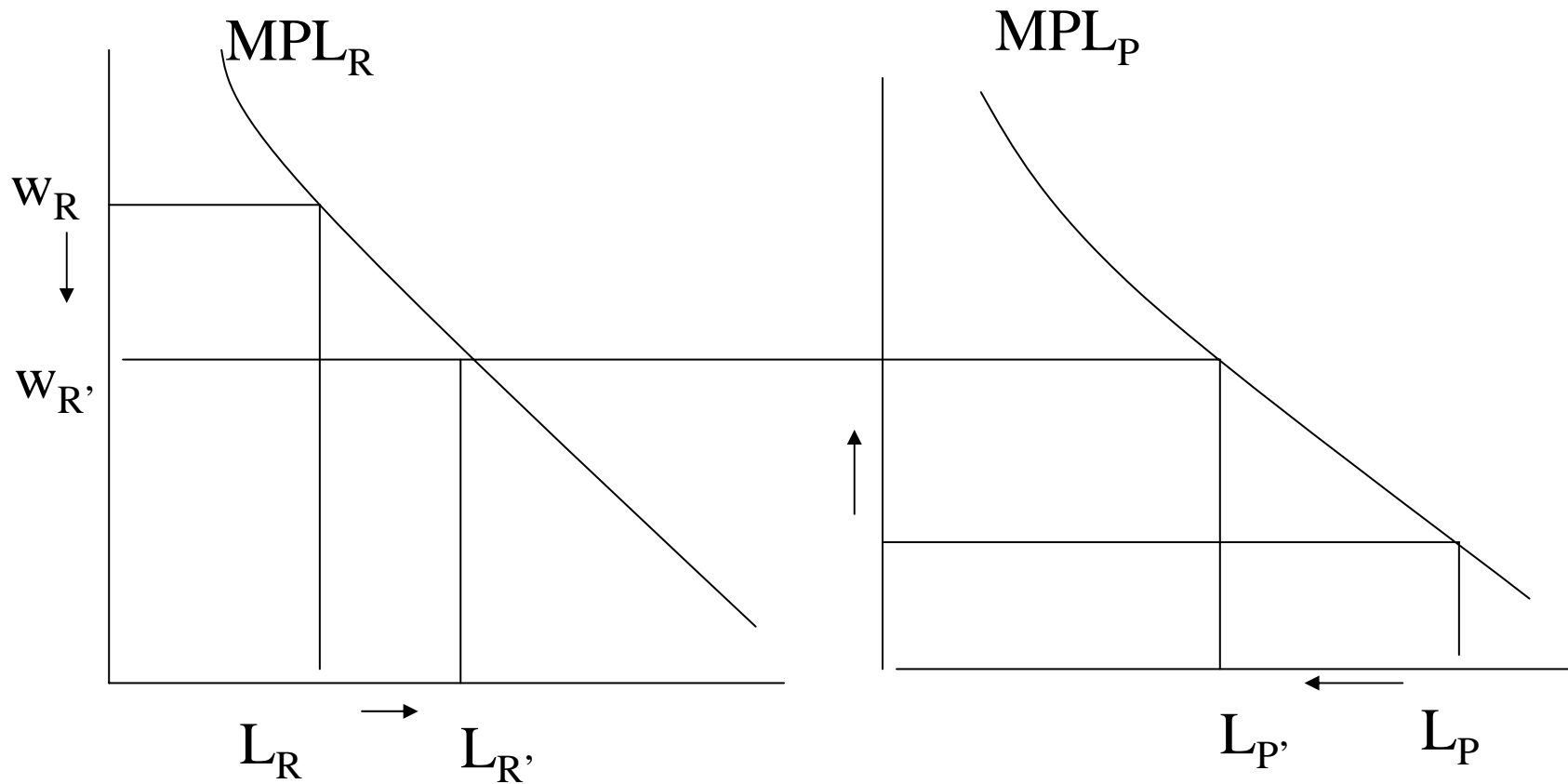
Marginal productivity of Capital in Rich and Poor Countries and Capital Accumulation in Autarky



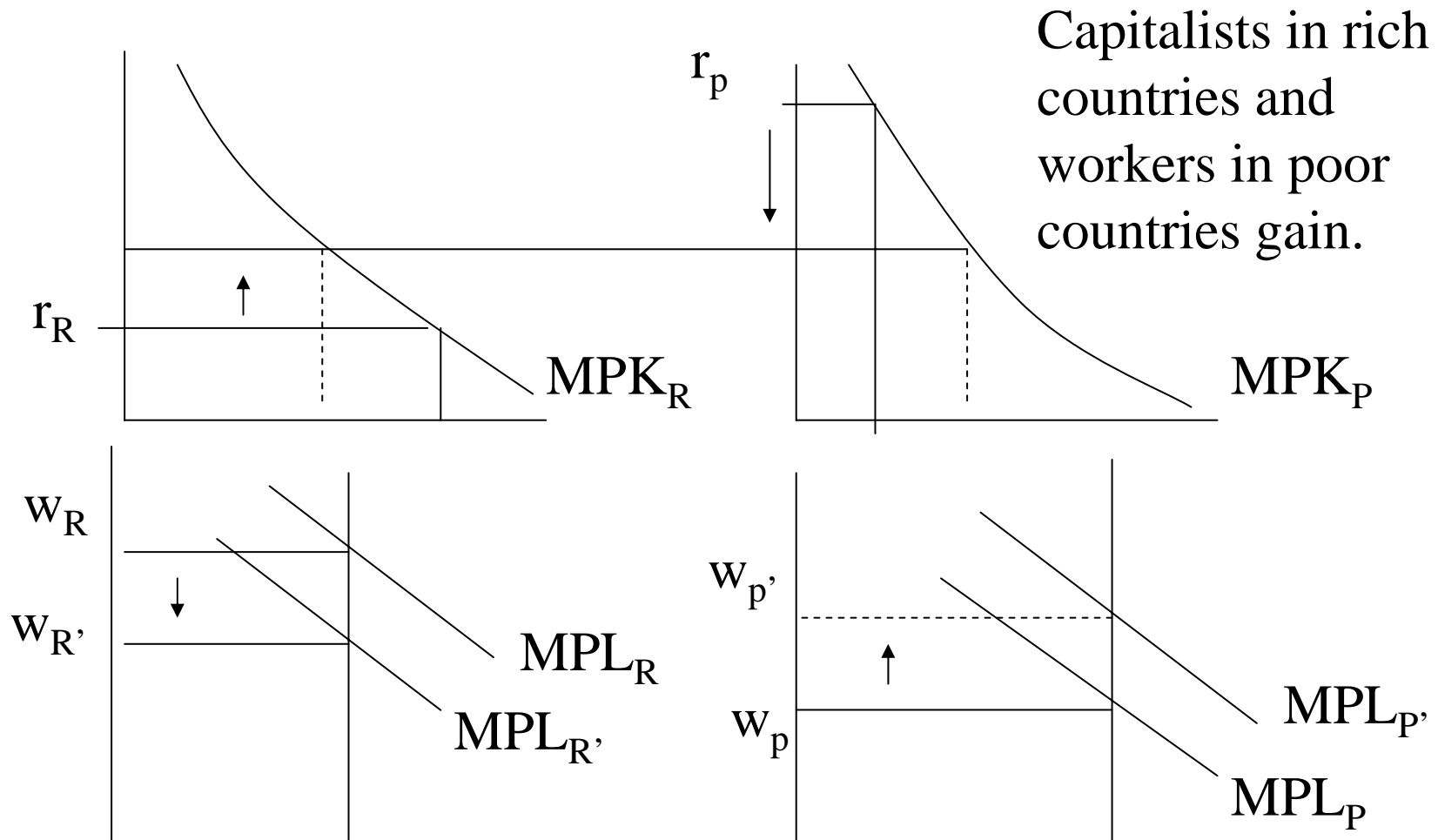
Marginal productivity of Capital in Rich and Poor Countries and Capital Accumulation After Globalisation



Marginal productivity of Labour in Rich and Poor Countries Before and After Globalisation



Who Gain and Who Lose From Globalisation?



Factor Mobility and Convergence

$$Y_i = A_i K_i^\alpha L_i^\beta$$

	$\alpha + \beta = 1$		$\alpha > 1$ and $0 < \beta < 1$		$0 < \alpha < 1$ and $\beta > 1$	
	K-Mobile	L-mobile	K-Mobile	L-mobile	K-Mobile	L-mobile
Convergence	yes	yes	no	yes	yes	Yes
No convergence	no	no	yes	no	no	no

Factors Promoting Convergence

- Domestic factors
 - Saving
 - Investment
 - Population growth rate
 - Human capital
 - Technology
 - Development of infrastructure
 - Sound economic policy
 - Homogenous and stable society
 - Transparent rules and regulations
- Global factors
 - Trade of goods and services
 - Inflow and outflow of capital
 - Emigration or immigration of skilled and unskilled labour
 - Adoption of better technology
 - Growth of the global economy
 - Peace/Oil prices

Autarky and Saving and Capital

(Gartner (2003:262) has similar example)

Country A	Country B
$Y_A = K_A^{0.5} L_A^{0.5}$ $\delta_A = 0.1$ $s_A = 0.2$ <p>What is the capital stock in the steady state in A in Autarky? How much do workers get? How much do owners of capital get?</p> $sK_A^{0.5} L_A^{0.5} = \delta_A K_A$ $0.2K_A^{0.5} 10 = 0.1K_A$ $\rightarrow K_A = 400$ $Y_A = 200$	$Y_B = K_B^{0.5} L_B^{0.5}$ $\delta_B = 0.1$ $s_B = 0$ <p>What is the capital stock in the steady state in B in Autarky? How much do workers get? How much do owners of capital get?</p> $0.0K_B^{0.5} 10 = 0.1K_B$ $\rightarrow K_B = 0 \quad Y_B = 0$ $\rightarrow \text{Becomes a beggar country.}$

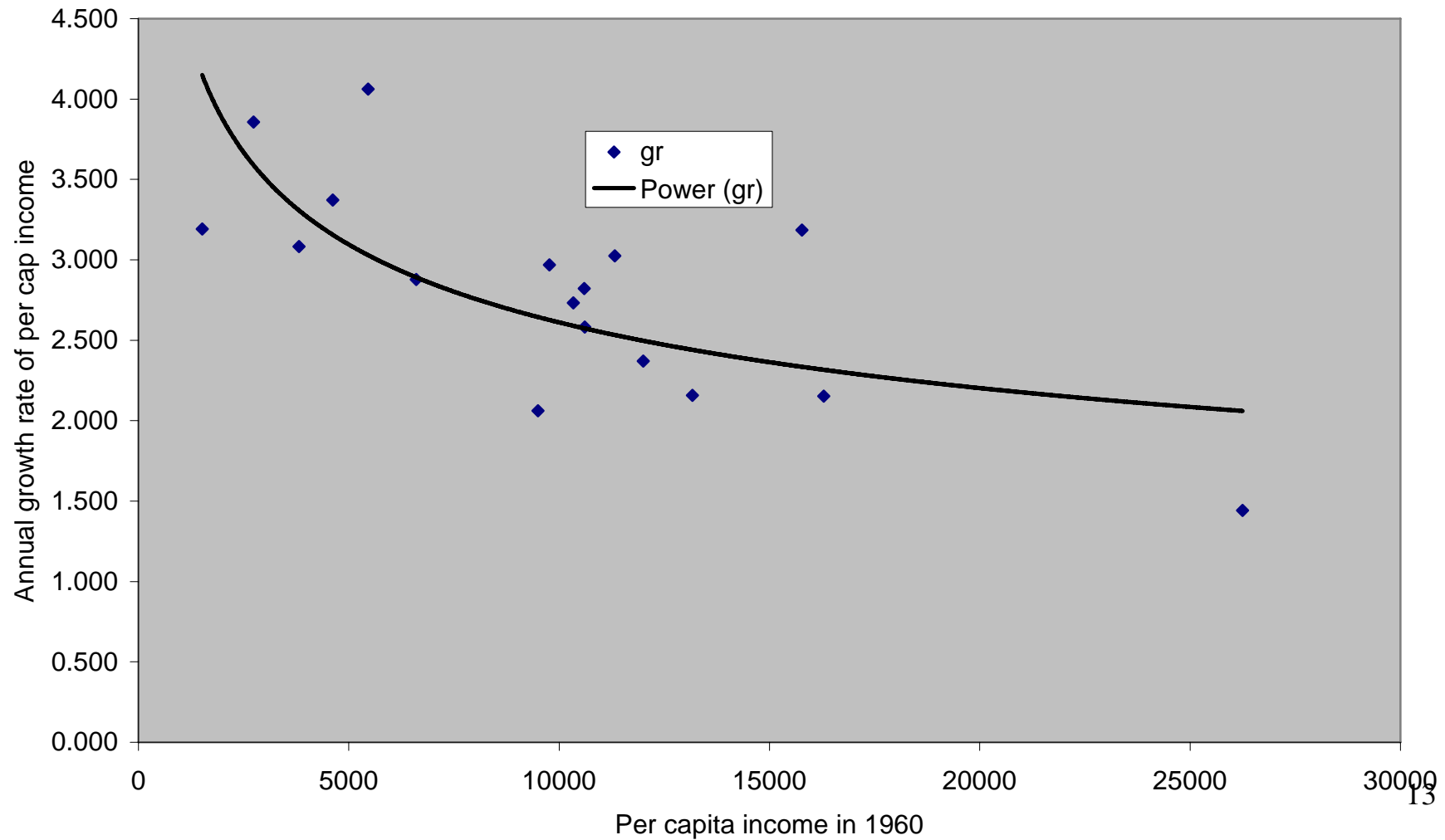
Impacts of Globalisation in Output and Income

What is the capital stock in the steady state in A and B if there is a free mobility of capital?

Country A	Country B
$K_A = K_B = K$ Country A saves for both countries. It receives rental income from country B. $0.2(10K^{0.5} + 0.5 \times 10K^{0.5}) = 0.1(K + K)$ $K = (15)^2 = 225$ $Y_A = K^{0.5} L_A^{0.5} = 225^{0.5} \times 10 = 150$ GNP in country B = GDP + Investment Receipts $GNP_A = 150 + 75 = 225$ Capitalists gain and workers lose in country A.	$K_A = K_B = K$ Country B does not save but can borrow capital from country A. $Y_B = K^{0.5} L_B^{0.5} = 225^{0.5} \times 10 = 150$ Country B need to pay capital income to Country A. GNP in country B = GDP - Investment Payments $GNP_B = 150 - 75 = 75$ Country B gains from the capital transfers.

Evidence for Beta-Convergence in Europe: Growth Rate of Per Capita Income and Its level in 1960

Evidence of Convergence in Europe



GDP per capita (constant 1995 US\$)

	1960	2000	Y00/Y60	growth rate
Austria	10596	32763	3.092016	2.822
Belgium	10335	30830	2.983067	2.732
Denmark	16287	38521	2.365138	2.152
Finland	9769	32024	3.278125	2.968
France	10611	29811	2.809443	2.582
Greece	3818	13105	3.432425	3.083
Hungary	1514	5425	3.584302	3.191
Ireland	5462	27741	5.079002	4.063
Italy	6606	20885	3.161663	2.878
Luxembourg	15772	56372	3.574182	3.184
Netherlands	11999	30966	2.580715	2.370
Norway	11322	37954	3.352235	3.024
Portugal	2735	12794	4.678735	3.858
Spain	4620	17798	3.852798	3.372
Sweden	13165	31206	2.370376	2.158
Switzerland	26245	46737	1.780796	1.443
United Kingdom	9496	21667	2.281698	2.062

Lack Evidence of Convergence among Middle and Low Income Countries: Average Annual Growth Rate of Per Capita Income (%) and Its level in 1960

	1960 angrate			1960 agrate	
Central Afr	457	-0.746708			
Chad	290	-0.713465	China	112	4.989179
Ghana	450	-0.2145	Hong Kong	3008	5.214552
Haiti	547	-0.997717	Ireland	5462	4.062741
Madagascar	383	-1.106759	Korea, Rep	1325	5.720737
Nicaragua	638	-0.785382	Japan	8399	4.186912
Niger	386	-1.606578	Malta	1177	5.404178
Senegal	670	-0.238649	Portugal	2734	3.858026
Sierra Leon	223	-1.041848	Singapore	2676	5.890155
Venezuela	3720	-0.299503	Thailand	465	4.492804
Zambia	648	-1.256572			

Conditional Convergence

Results from Cross Country Growth Studies -1

A low initial level of income is associated with higher growth rate in subsequent period when other variables are held constant.

Growth rates are higher when the ratio of investment to GDP is higher.

Growth rates are higher in countries which have larger stock of human capital per capita. These are reflected in terms of enrolment in the primary and secondary schools.

Population growth rates are negatively associated with growth rates.

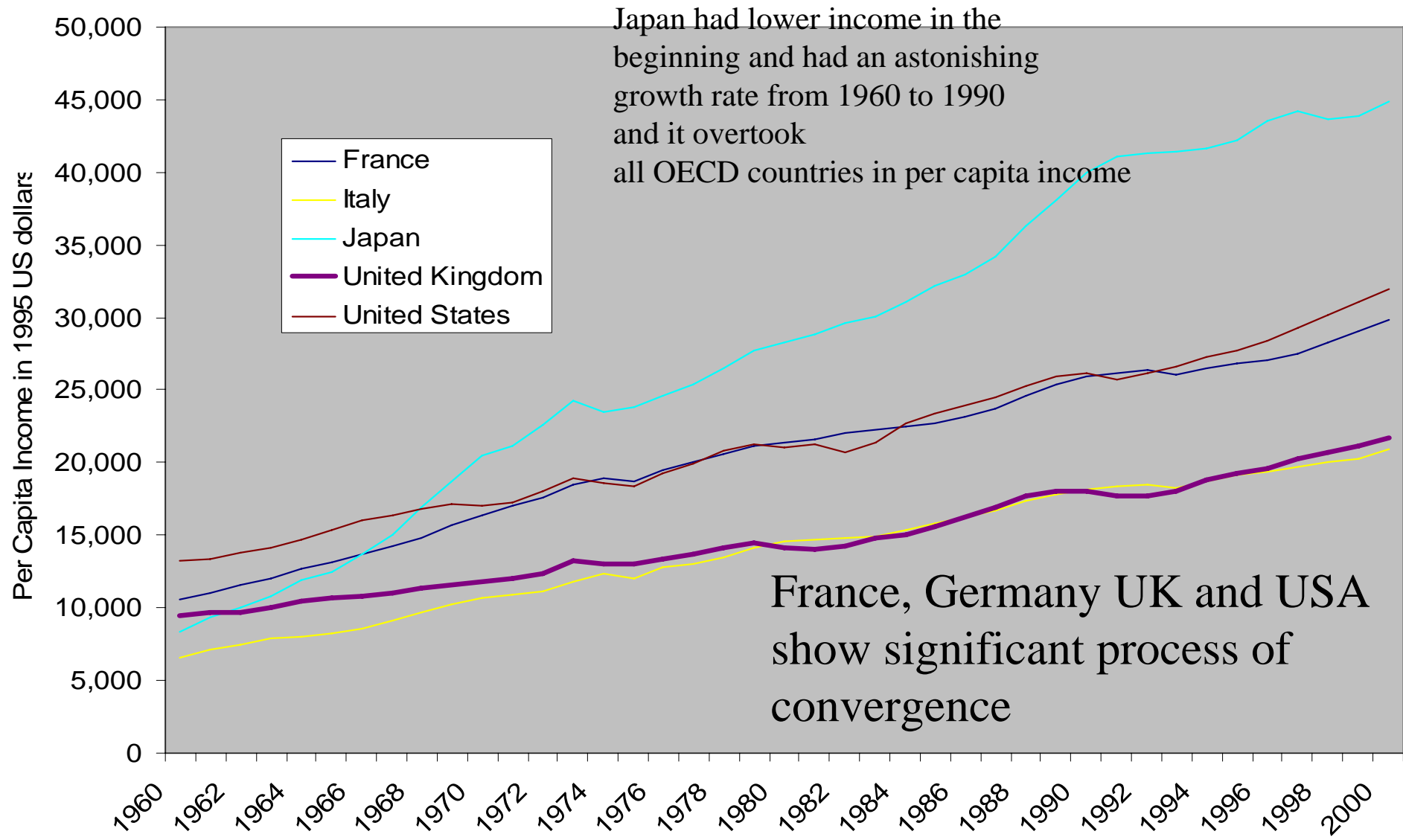
Results from Cross Country Growth Studies -2

Countries with distorted markets have lower growth rates. Distortions occur in exchange rates and prices or by impediments to a free and fair trade.

Countries with efficient financial system have higher growth rates. Size of the financial markets is measured as a ratio of liquid assets to the GDP.

Countries with political instability have lower growth rates. Frequency of revolutions, wars and coups are used to measure political instability.

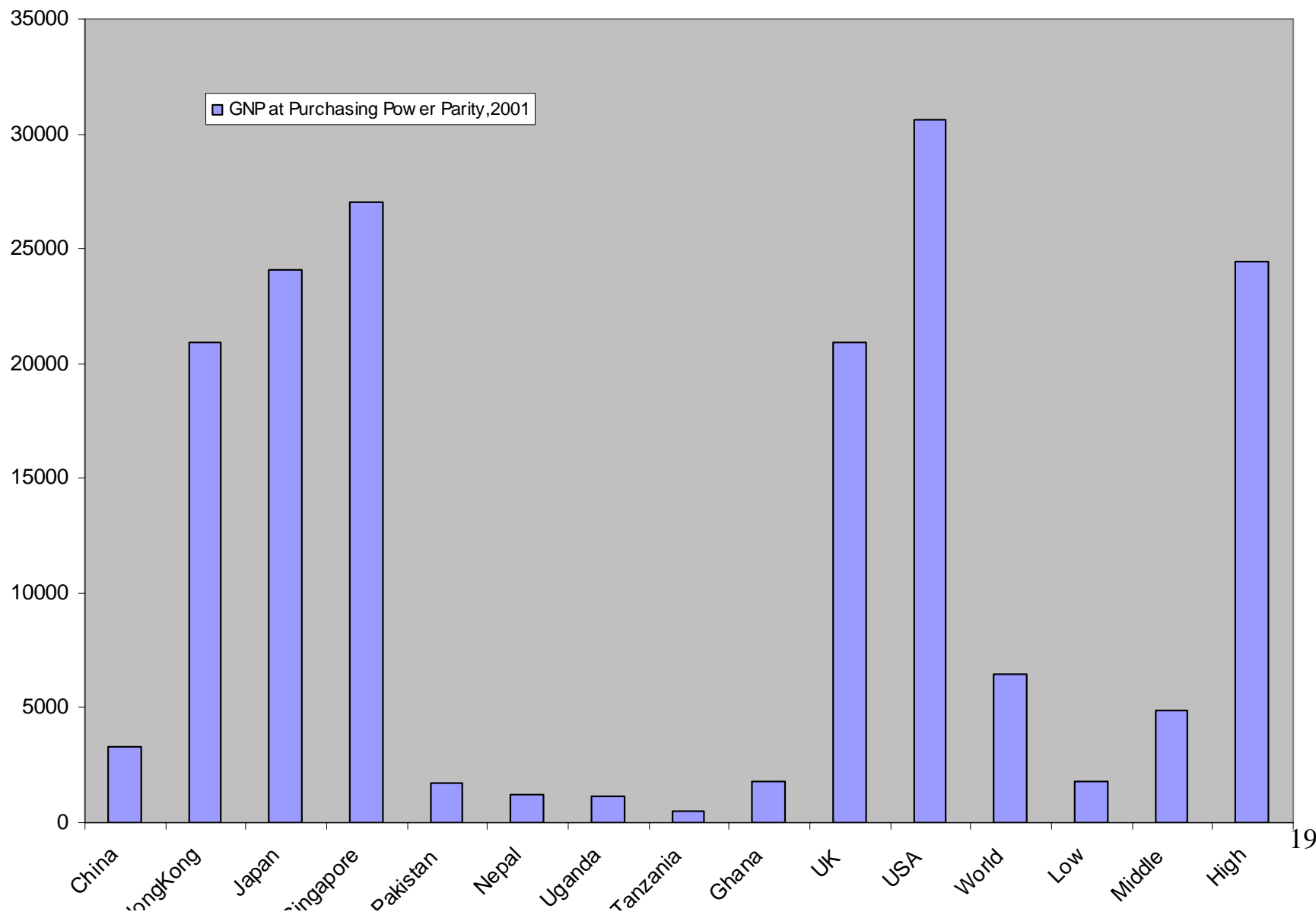
Economic Convergence Across Major Industrial Countries



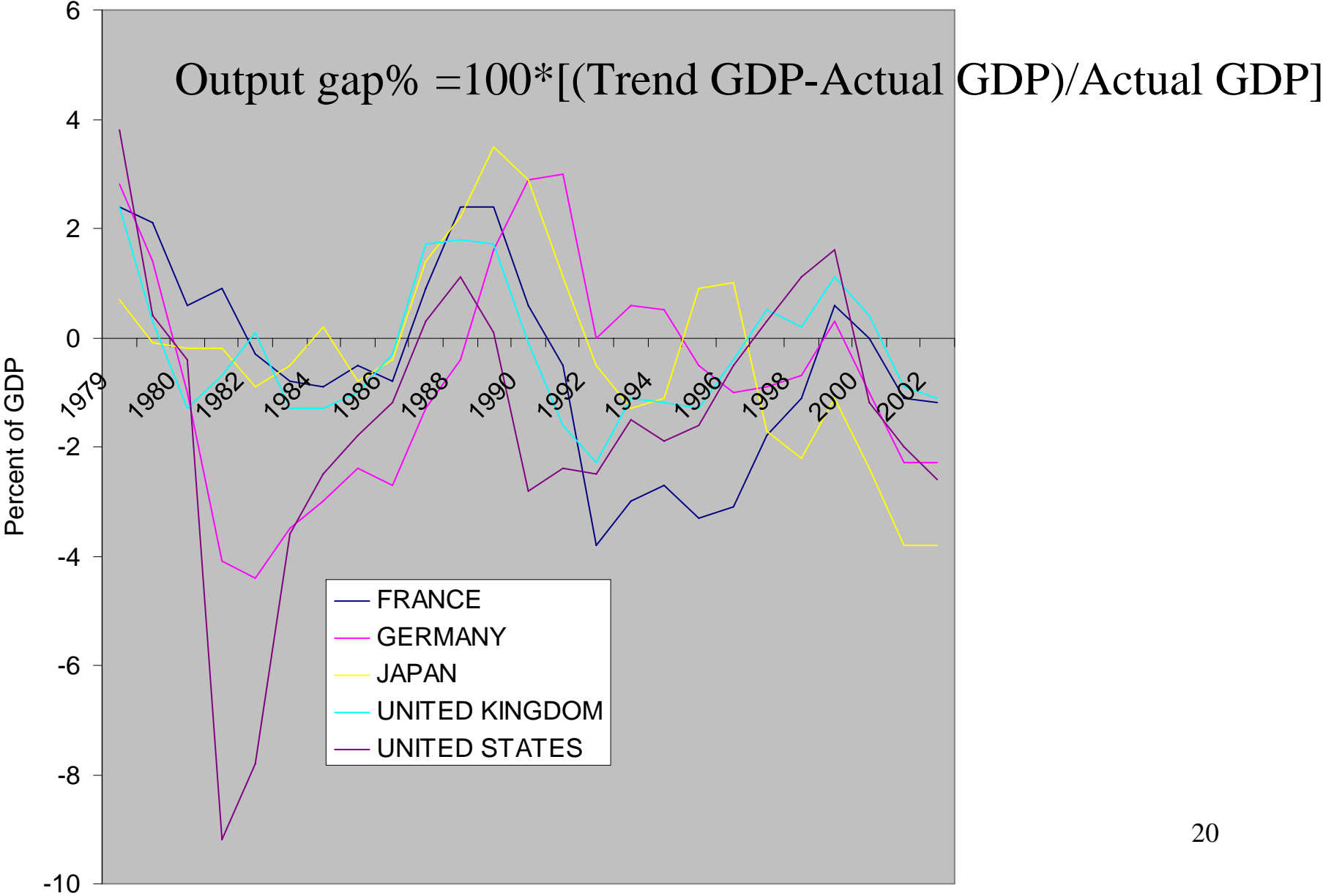
Japan had lower income in the beginning and had an astonishing growth rate from 1960 to 1990 and it overtook all OECD countries in per capita income

France, Germany UK and USA show significant process of convergence

Disparity in GNP Per Capita at Purchasing Power Parity, 2001 (US \$): A Lot of Divergence

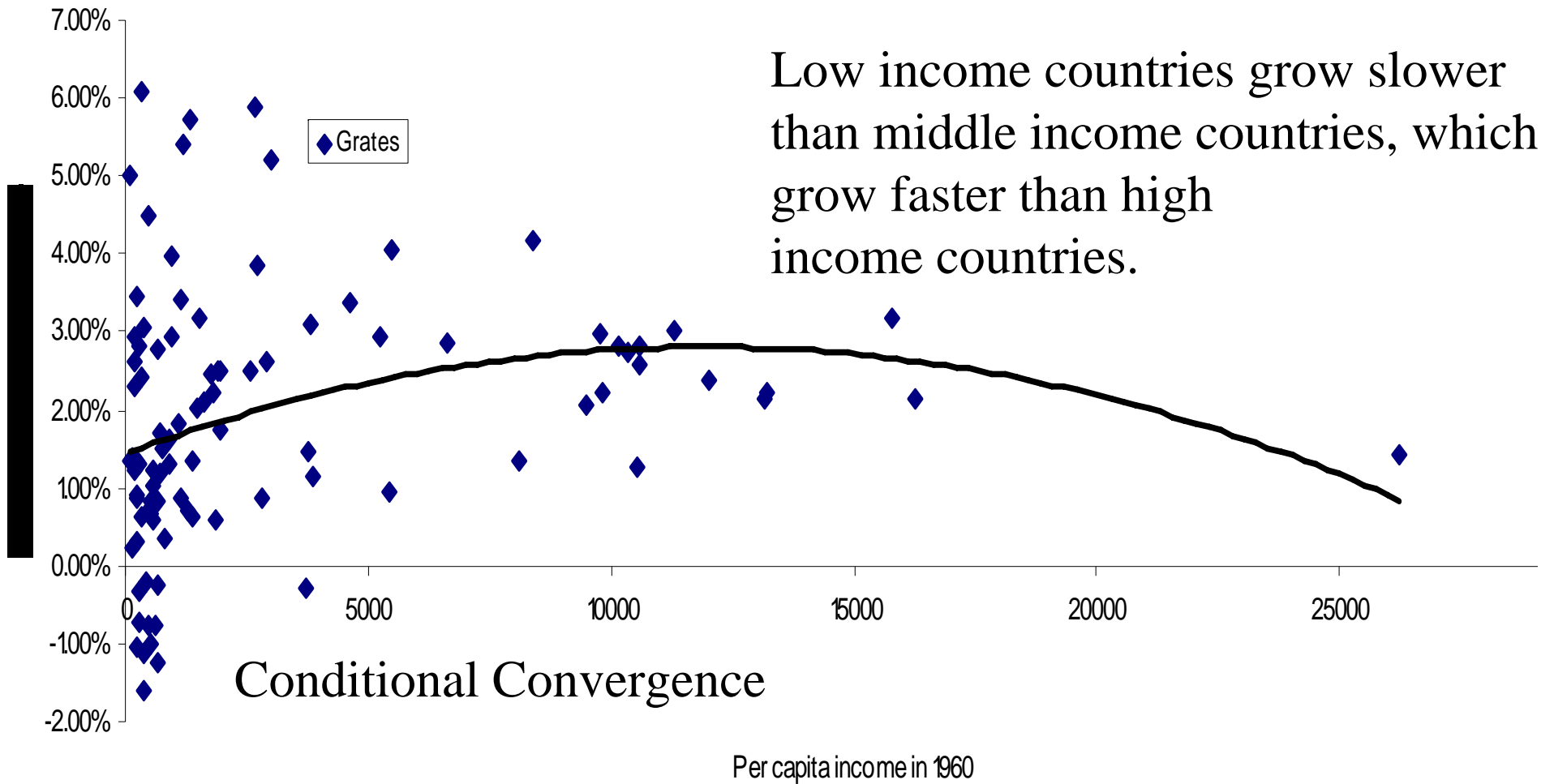


Evidence for Convergence of Output Gap Among Major Industrial Countries
(IMF)



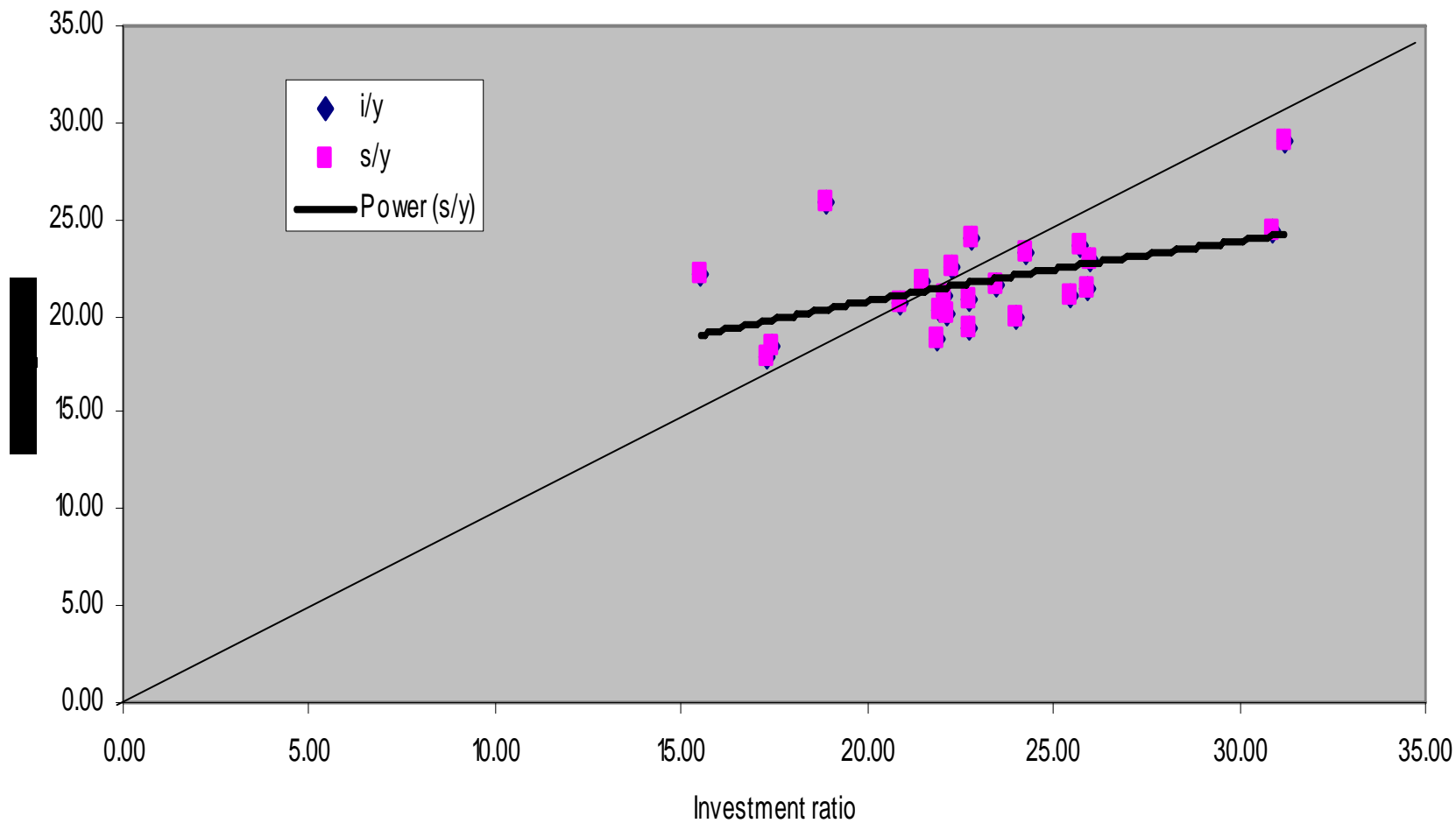
Evidence for Conditional Convergence Across All Countries

Growth Rates against the Initial Per Capita Income 97 Countries

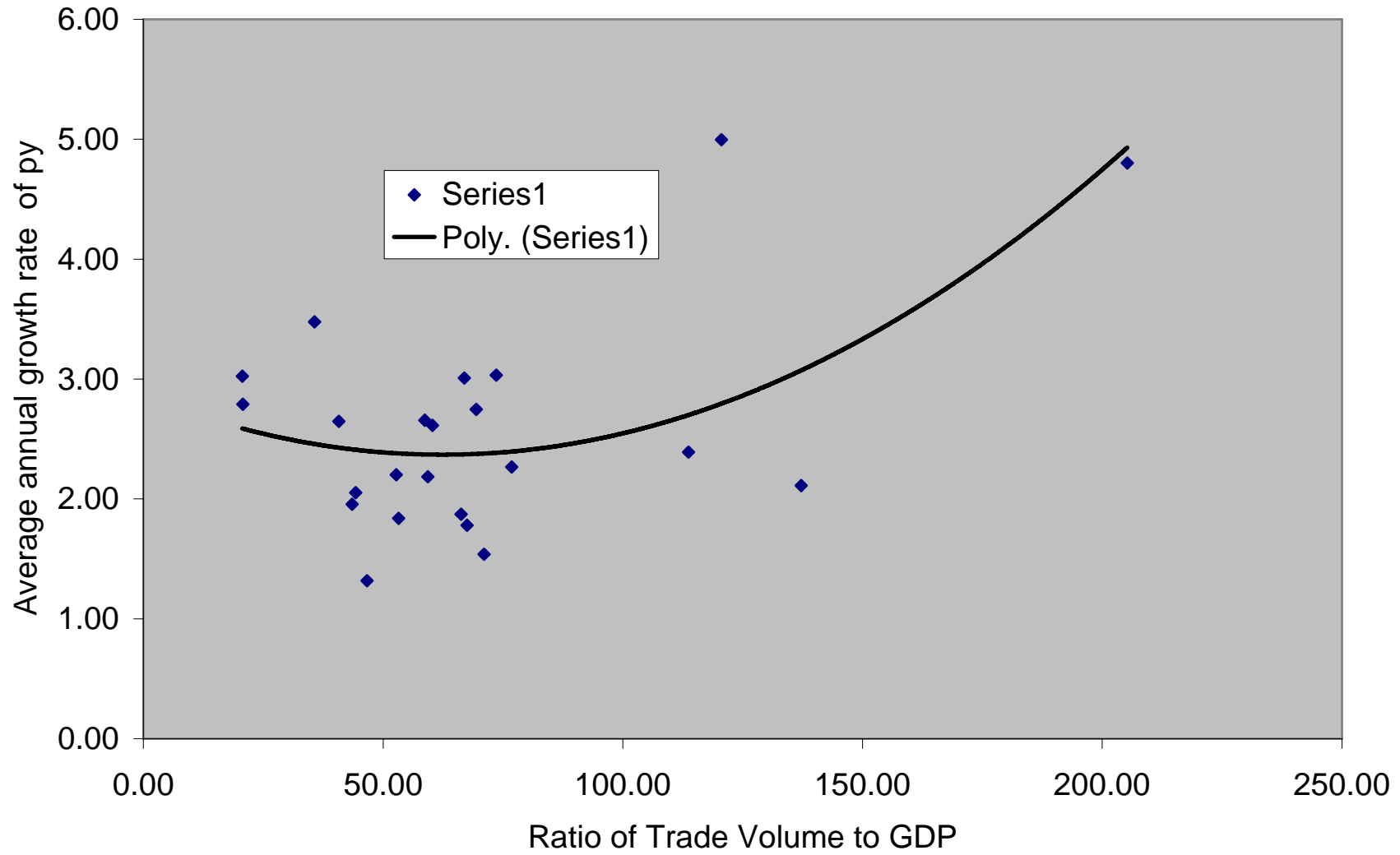


Why the investment rate is not the same across all OECD Countries? Feldstien-Horioka Puzzle

Investment and Saving in OECD Countries: average 1980-2000
(WDI2002)



Openness and Growth: Evidence from the OECD Countries 1980-2000



Conditional convergence

1. There is no relation between initial GDP (most studies take 1960 as the base year) and the growth rates if both developed and developing economies are taken together.
2. Many studies suggest evidence for convergence among OECD countries (so called rich country club), states of the US, provinces of Canada and prefectures of Japan.
3. There are arguments suggesting that developing economies have different steady state than of developed economies.

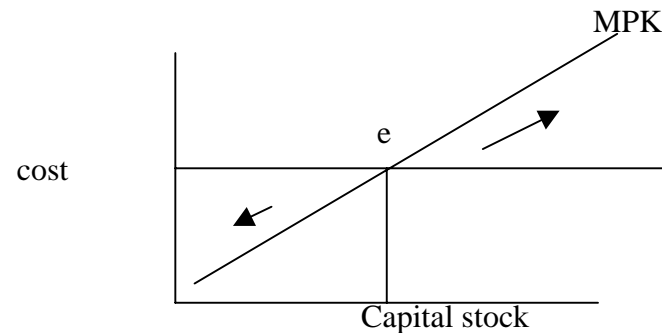
Why?

Story of squirrel and elephant.

Poverty Trap

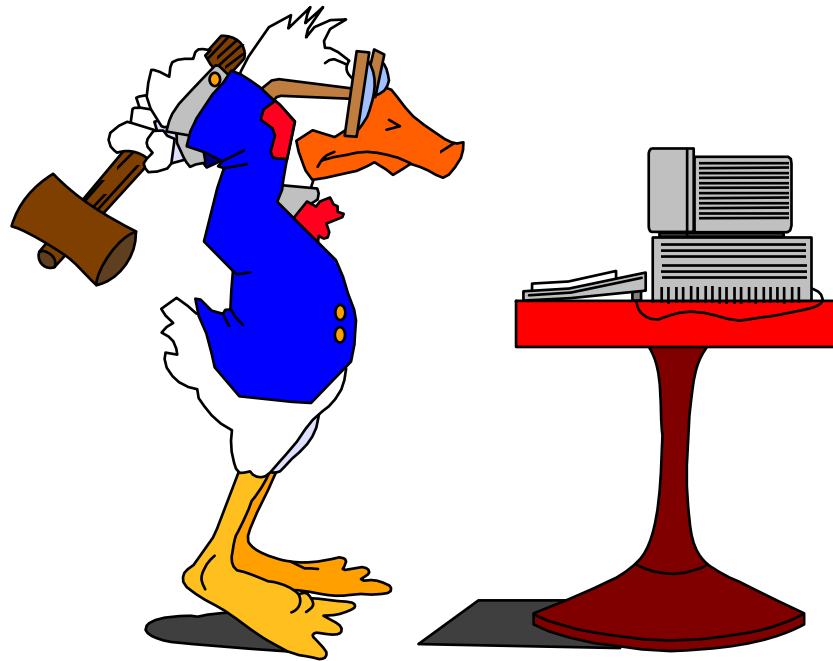
Productivity of capital does not only depend upon the amount of capital but depends upon amount of human capital.

Countries with lower human capital are in danger of being caught in poverty trap.

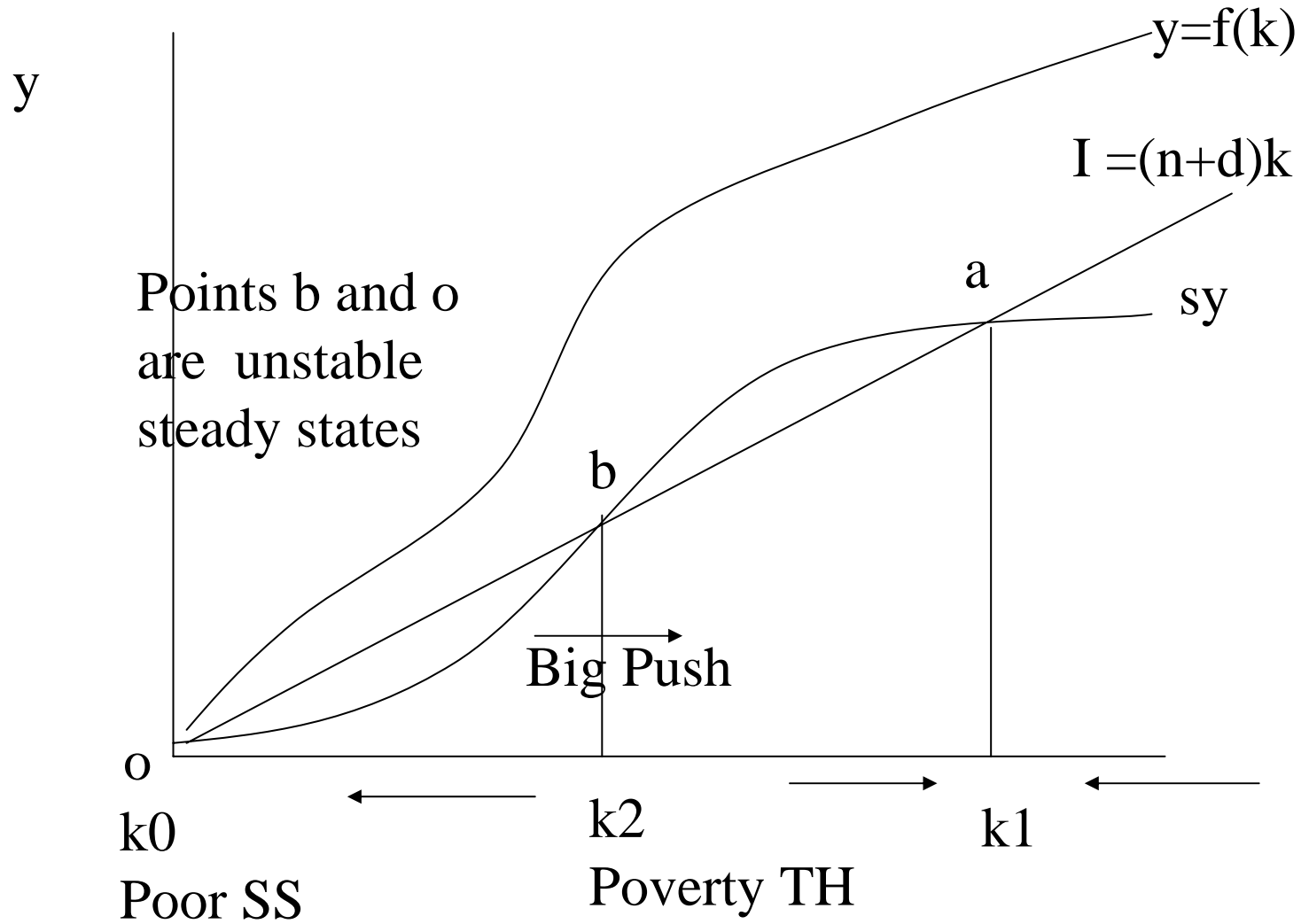


Marginal product of capital is less than the cost of capital and capital stock gradually diminishes before point e. Cost is less than MPK after e more capital is accumulated.

Is this caused by the barriers to adopt a good technology? Or by Lauddites?



Increasing Return, Poverty Threshold and Stability of the Steady State



Economic Growth Policies

- Increase in public and private saving
- Development of human capital
- Removal of distortions in investment
- Institutional reform (rule of law)
- Macroeconomic stability
- Carefully designed redistribution policy
- Social security reform

Policy Issues: Tax, Saving and Consumption

- What is the impact in consumption and saving in the above model
 - If there is a 20 percent tax on interest income?
 - If there is a 20 percent subsidy in it?
 - What sort of tax system is better for increasing the ratio of saving? Does a higher rate of VAT promote saving or consumption?
 - Does a higher rate of tax on labour income encourage or discourage saving?
 - Does a higher rate of tax on pension income increase saving or consumption?

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