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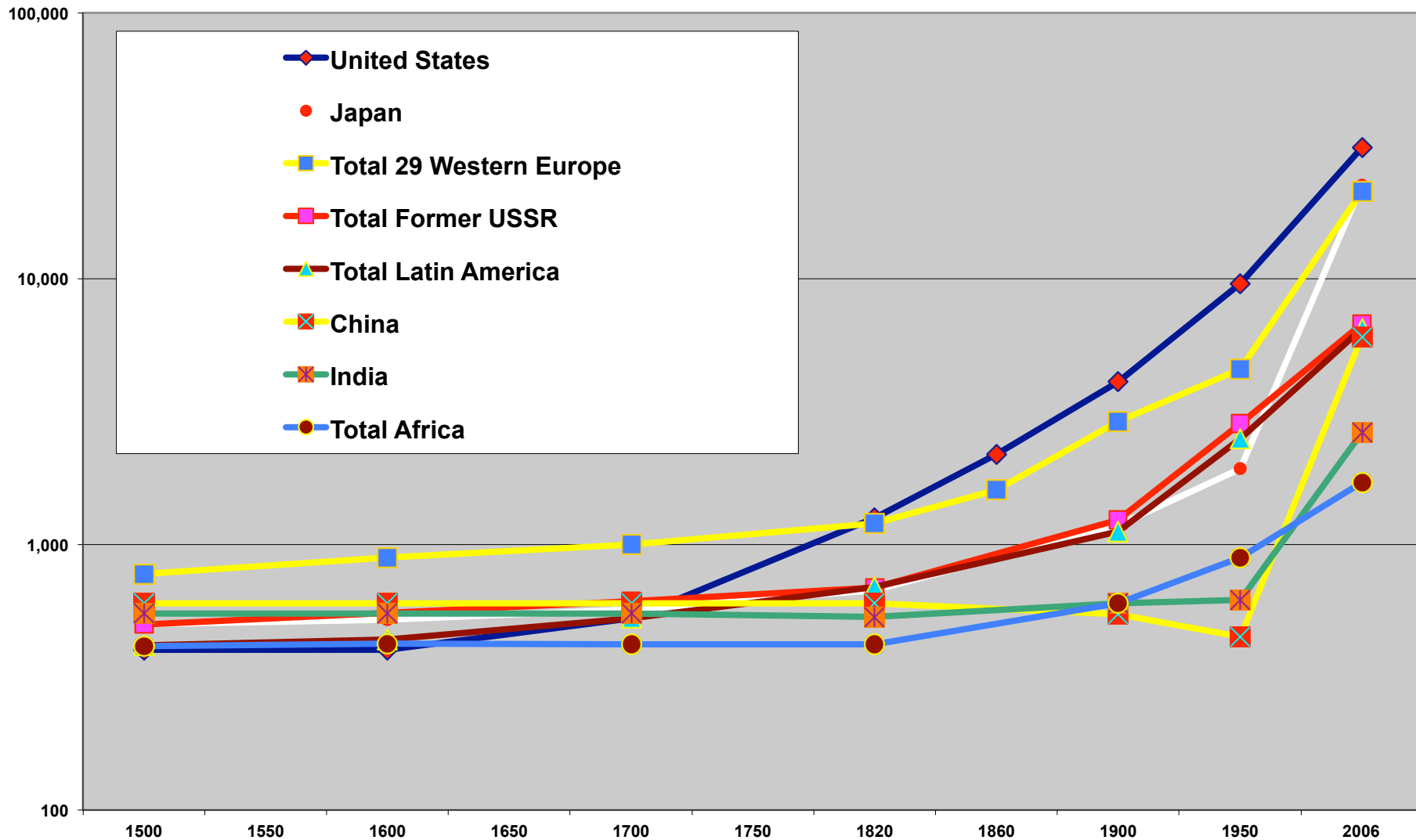
**Life Cycle of the Centrally Planned  
Economy: Why Soviet Growth Rates  
Peaked in the 1950s**

**Table 1. Growth in the USSR and Asian economies, Western data, 1928-87 (average annual percent)**

<b>Period/ country</b>	<b>Output per worker</b>	<b>Capital per worker</b>	<b>Capital/output ratio</b>	<b>TPF growth (unit elasticity of substitution)</b>	<b>TPF growth assuming 0.4 elasticity of substitution</b>
<b>USSR (1928-39)</b>	<b>2.9</b>	<b>5.7</b>	<b>2.8</b>	<b>0.6</b>	
<b>USSR (1940-49)</b>	<b>1.9</b>	<b>1.5</b>	<b>-0.4</b>	<b>1.3</b>	
<b>USSR (1950-59)</b>	<b>5.8</b>	<b>7.4</b>	<b>1.6</b>	<b>2.8</b>	<b>1.1</b>
<b>USSR (1960-69)</b>	<b>3.0</b>	<b>5.4</b>	<b>2.4</b>	<b>0.8</b>	<b>1.1</b>
<b>USSR (1970-79)</b>	<b>2.1</b>	<b>5.0</b>	<b>2.9</b>	<b>0.1</b>	<b>1.2</b>
<b>USSR (1980-87)</b>	<b>1.4</b>	<b>4.0</b>	<b>2.6</b>	<b>-0.2</b>	<b>1.1</b>
<b>Japan(1950/57/65/-85/88/90)</b>			<b>2.3 - 3.2</b>	<b>1.7 - 2.5</b>	
<b>Korea (1950/60/65-85/88/90)</b>			<b>2.8 – 3.7</b>	<b>1.7 - 2.8</b>	
<b>Taiwan (1950/53/65-85/88/90)</b>			<b>2.6 – 3.1</b>	<b>1.9-2.4</b>	

**Source: Easterly, Fisher, 1995.**

PPP GDP per capita in major countries and regions since 1500, 1990 international Geary-Khamis dollars; source: A. Maddison; log scale)



# Catch up development: only Japan (+Korea, Taiwan, HK, Singapore) managed to reach the level of GDP per capita of developed countries

Fig. 1. GDP per capita in 1990 international dollars as a % of the US level

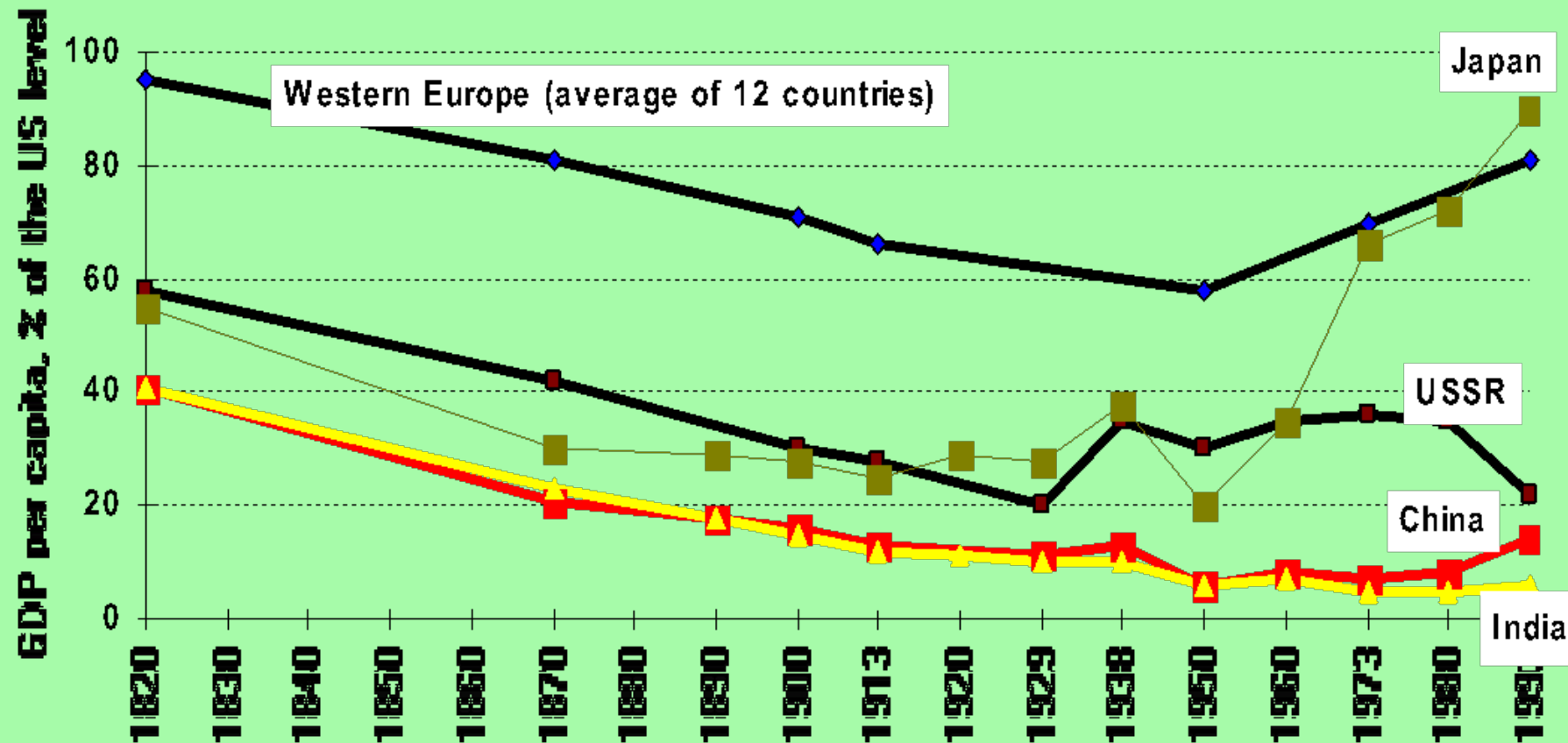
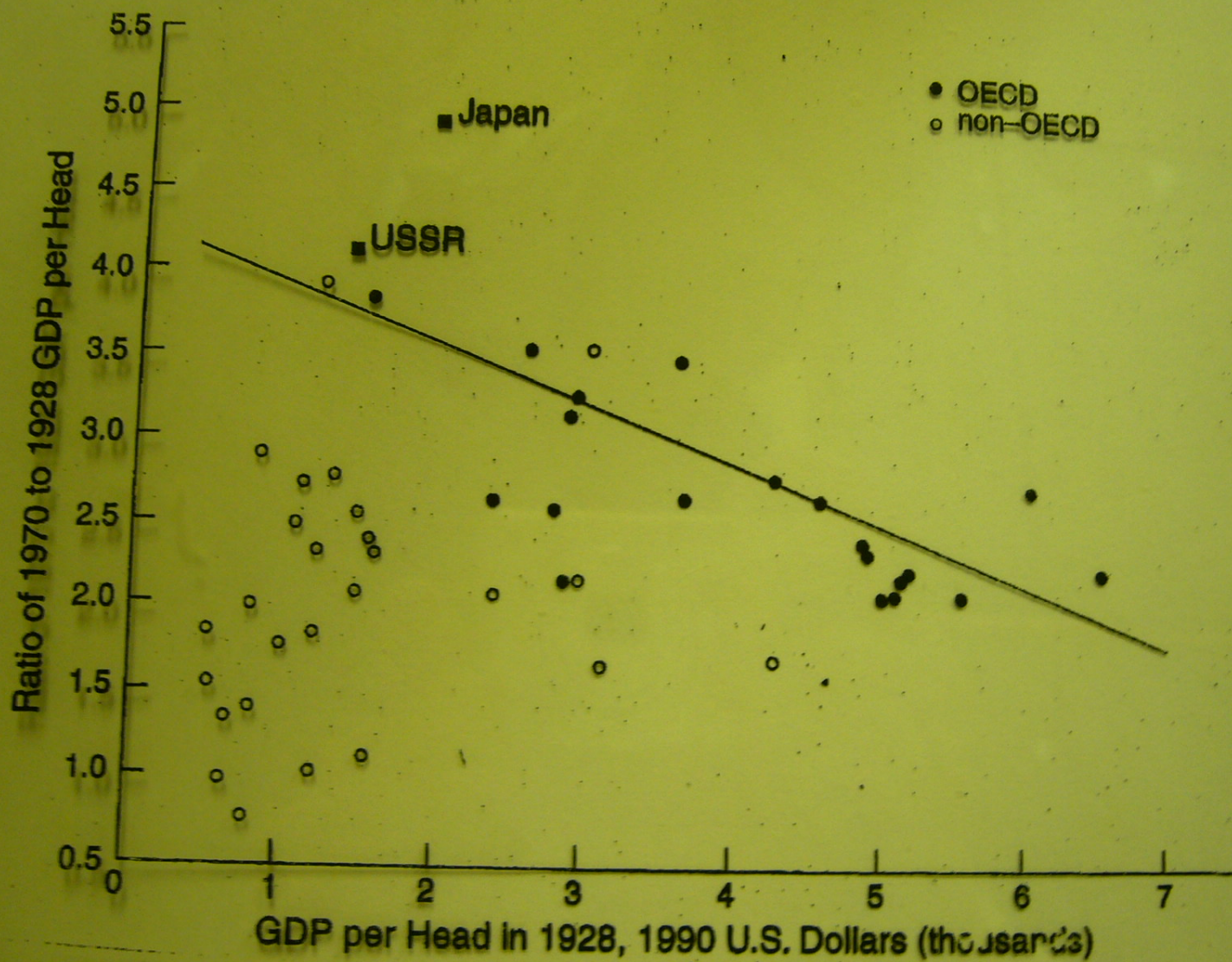


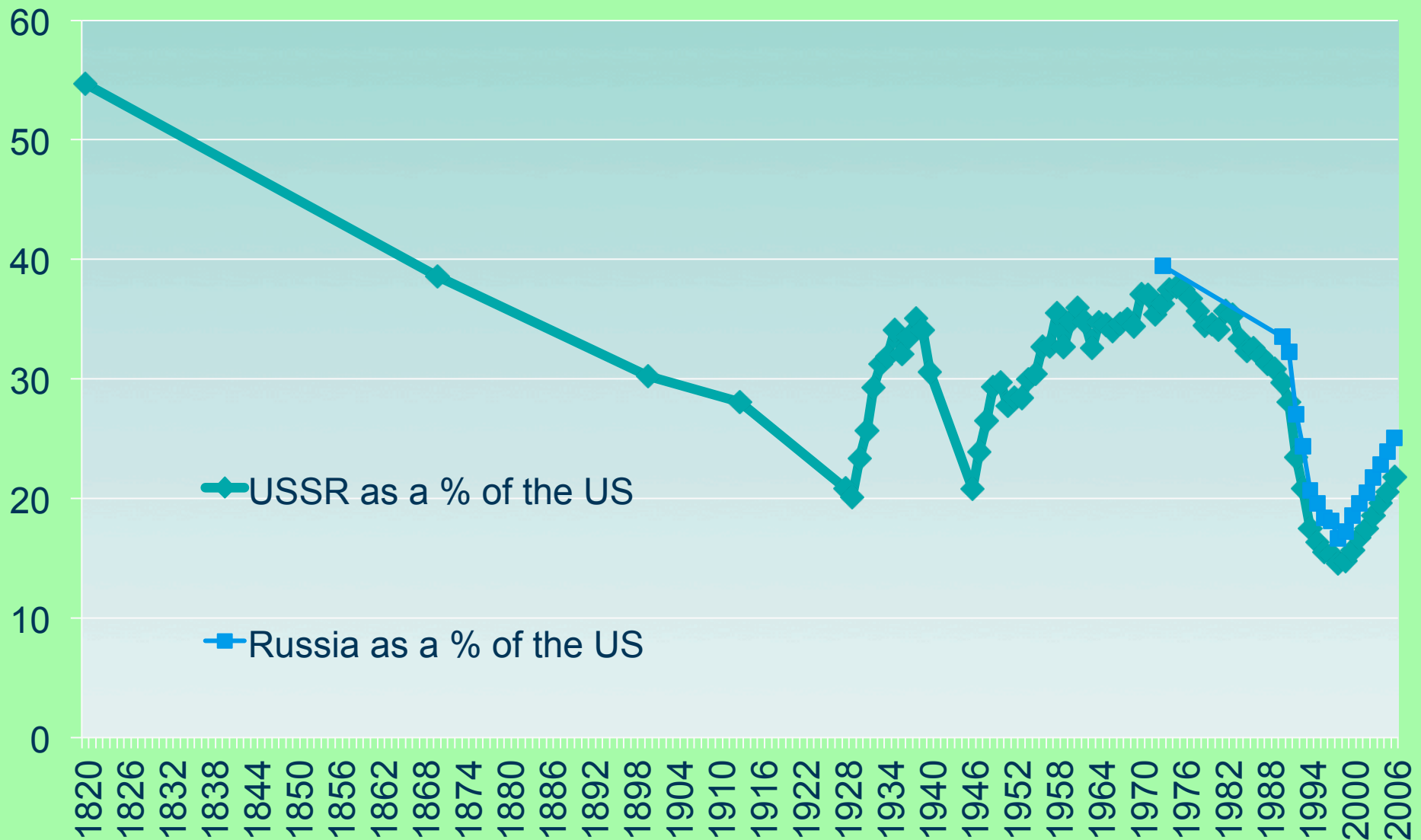
Figure 1

Economic Growth, 1928-1970



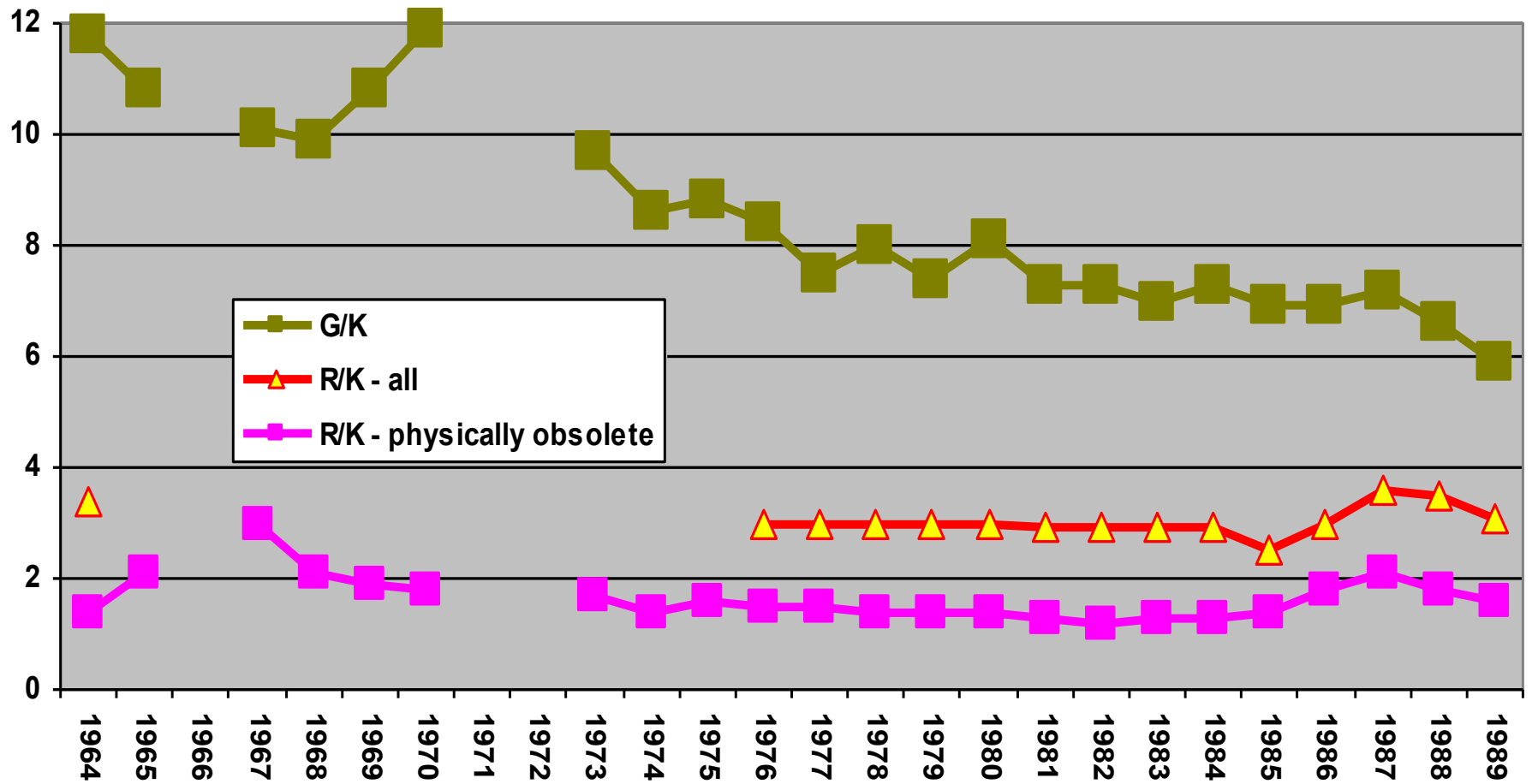


# GDP per capita in the USSR and Russia, % of the US level (source: A. Maddison,



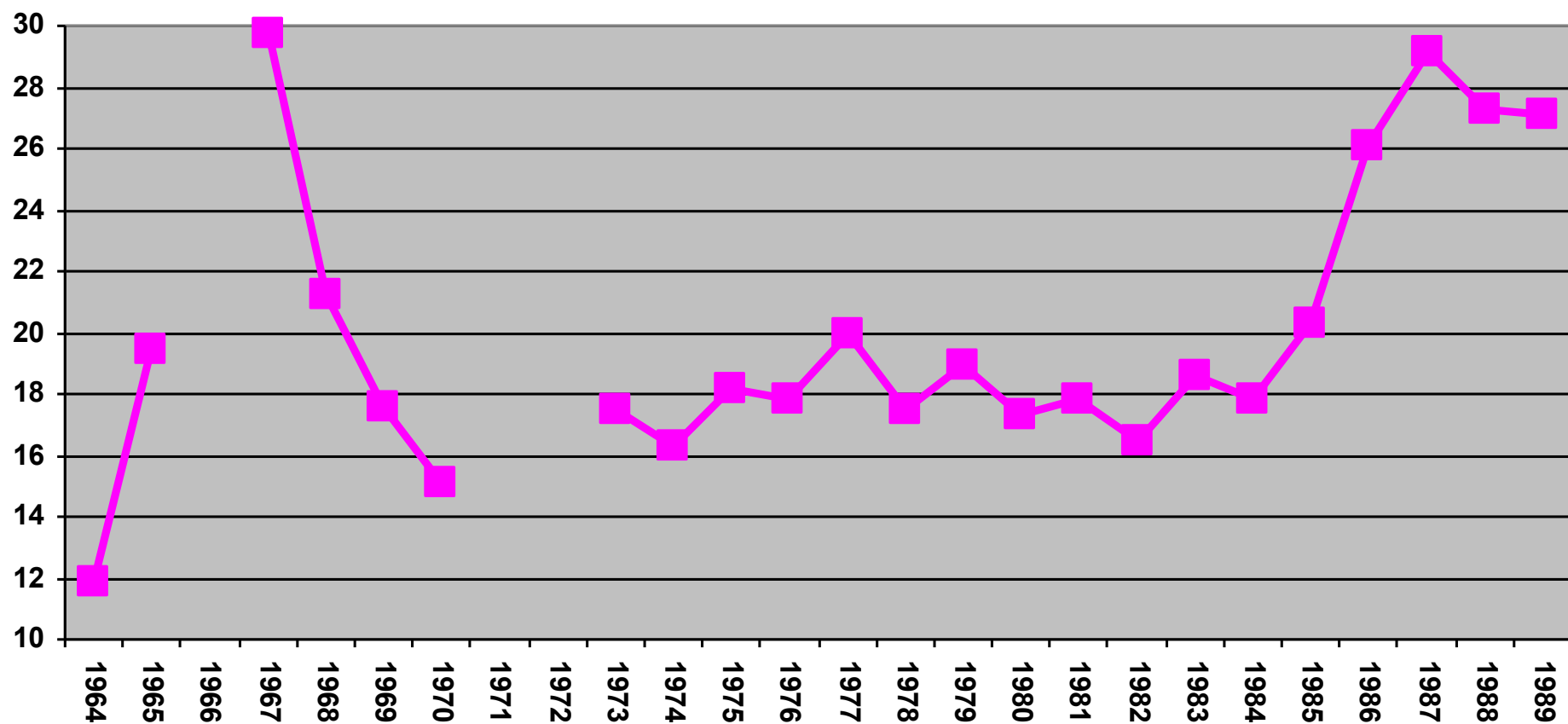
# Retirement ratio in Soviet industry was low

Fig. 1. Gross investment and retirement in Soviet industry, as a % of fixed capital stock



# Share of investment to replace retirement was growing only after 1965 reform and in 1885-87

Fig. 2. Share of investment to replace retirement in total gross investment in Soviet industry, %





# Equipment was getting older...

**Table 2. Age characteristics of equipment in Soviet industry**

<b>Years</b>	<b>1970</b>	<b>1980</b>	<b>1985</b>	<b>1989</b>
<b>Share of equipment with an age of:</b>				
- less than 5 years	41.1	36.0	33.7	31.6
- 6-10 years	29.9	28.9	28.5	28.6
- 11-20 years	20.9	24.8	25.5	26.2
- over 20 years	7.8	10.3	12.3	13.7
<b>Average age of equipment, years</b>	<b>8.3</b>	<b>9.31</b>	<b>9.91</b>	<b>10.32</b>
<b>Average service life, years</b>	<b>24.0</b>	<b>26.9</b>	<b>27.9</b>	<b>26.2</b>
<b>Accumulated depreciation as a % of gross (initial) value of capital stock</b>	<b>26</b>	<b>36</b>	<b>41</b>	<b>45</b>

**Source:** *Narodnoye Khozyaistvo SSSR* (National Economy of the USSR) for various years.

# Investment in retirement is higher than actual wear and tear of capital stock

➤  $R(t) = G(t-m) + 0.1 G(t)$  (1)

➤  $K(t) = K(t-1) + G(t) - R(t)$  (2)

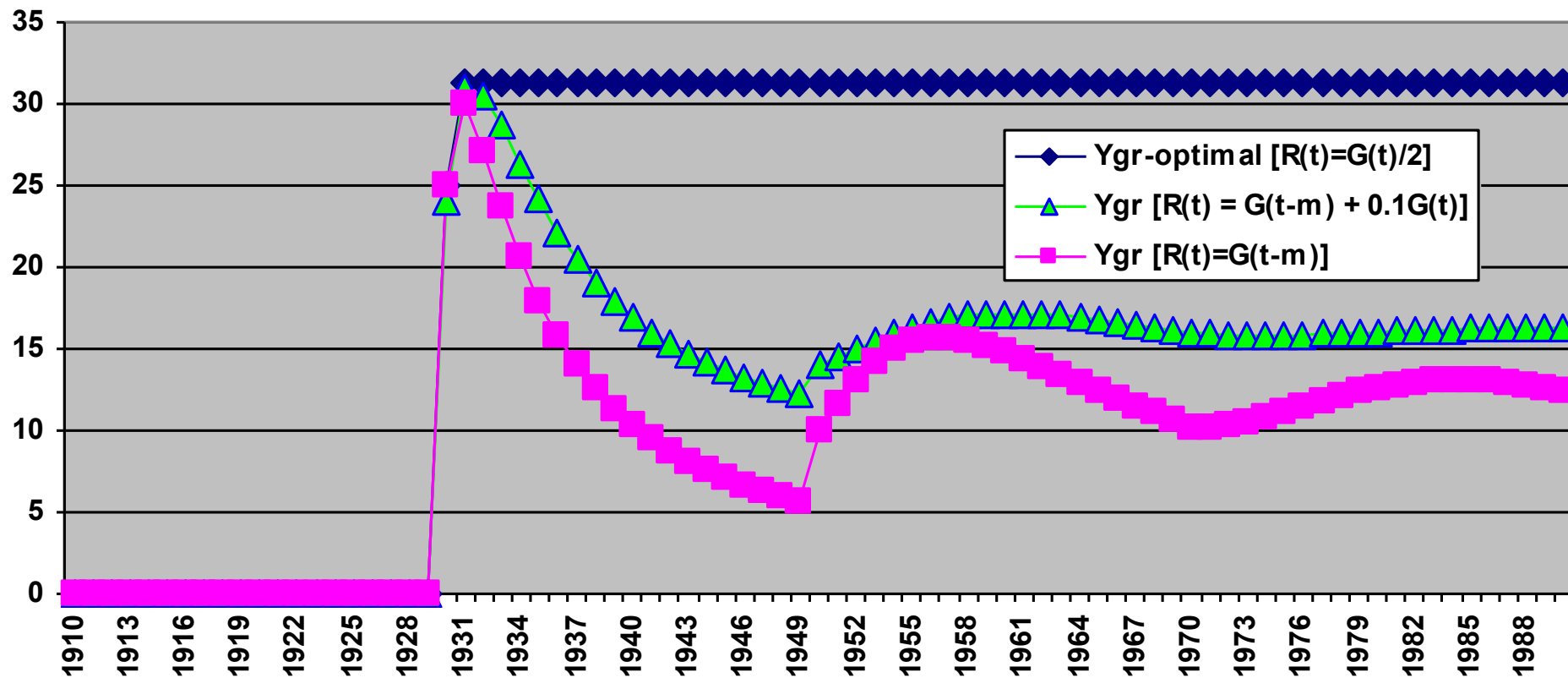
➤  $G(t) = a Y(t)$  (3)

➤  $\text{delta } Y = b[G(t) - R(t)] * R(t) / G(t)$  (4)

➤  $Y(t) = Y(t-1) + \text{delta } Y(t-1)$  (5)

$$R(t) = G(t-m) + 0.1G(t)$$

Fig. 3. Growth rates after the "big push" in a market economy (with investment to replace retirement higher than actual physical retirement of capital stock), %



Investment in retirement is lower than physical wear and tear of capital stock

➤  $R(t) = cG(t)$  (1')

➤ [Instead of:

➤  $R(t) = G(t-m) + 0.1G(t)$  (1)]

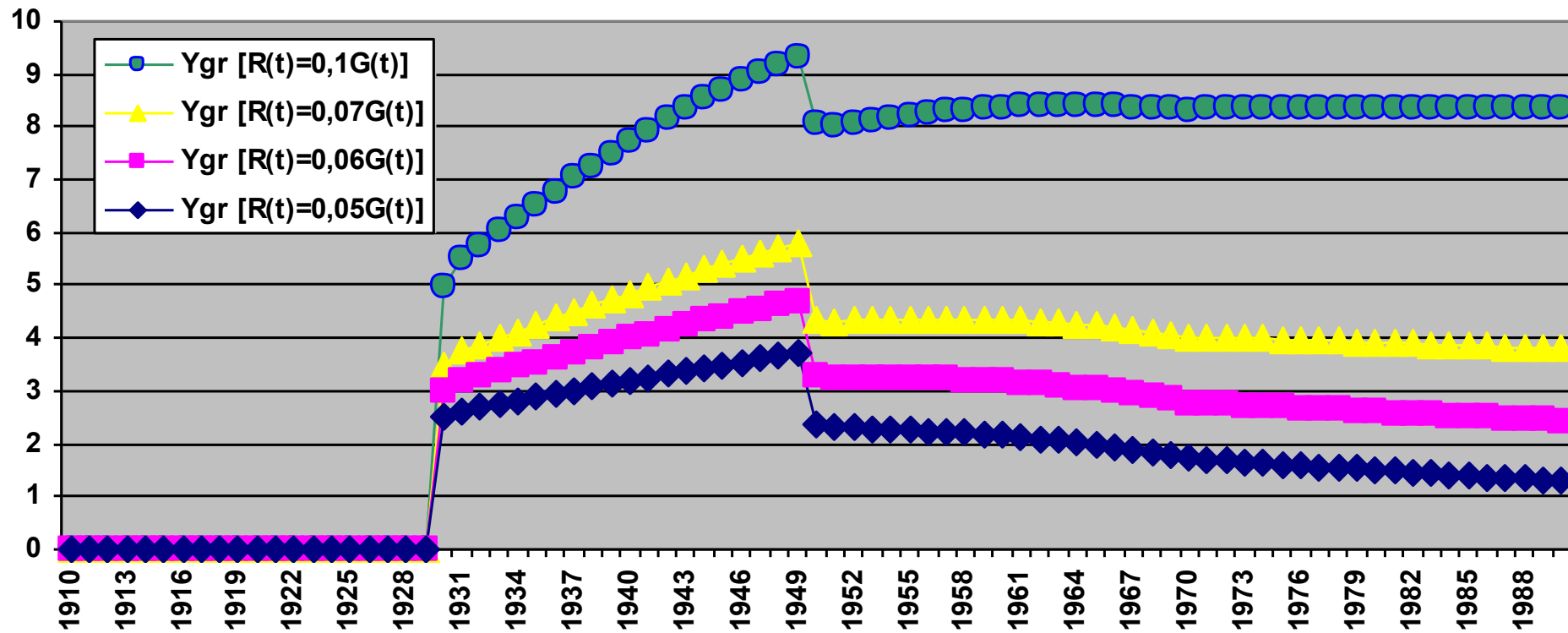
➤  $\Delta Y = b[G(t) - G(t-m)]*R(t)/G(t)$  (4')

➤ [Instead of :

➤  $\Delta Y = b[G(t) - R(t)]*R(t)/G(t)$  (4)]

$$R(t) = cG(t)$$

Fig. 4. Growth rates after the 'big push' in a CPE (with constraints on investment to replace retirement of capital stock), %



# CONCLUSIONS

- The TFP growth rates by decades increased from 0.6% annually in the 1930s to 2.8% in the 1950s and then fell monotonously becoming negative in the 1980s.
- The CPE under-invested into the replacement of the retiring elements of the fixed capital stock and over-invested into the expansion of production capacities.
- The task of renovating physical capital contradicted the short-run goal of fulfilling plan targets, and, therefore, Soviet planners preferred to invest in new capacities instead of upgrading the old ones.
- Hence, after the massive investment of the 1930s in the USSR, the highest productivity was achieved after the period equal to the service life of capital stock (about 20 years) – before there emerged a need for the massive investment into replacing retirement.
- Afterwards, the capital stock started to age rapidly reducing sharply capital productivity and lowering labor productivity and TFP growth rates.