



Ekonomski rast i tehnološki progres

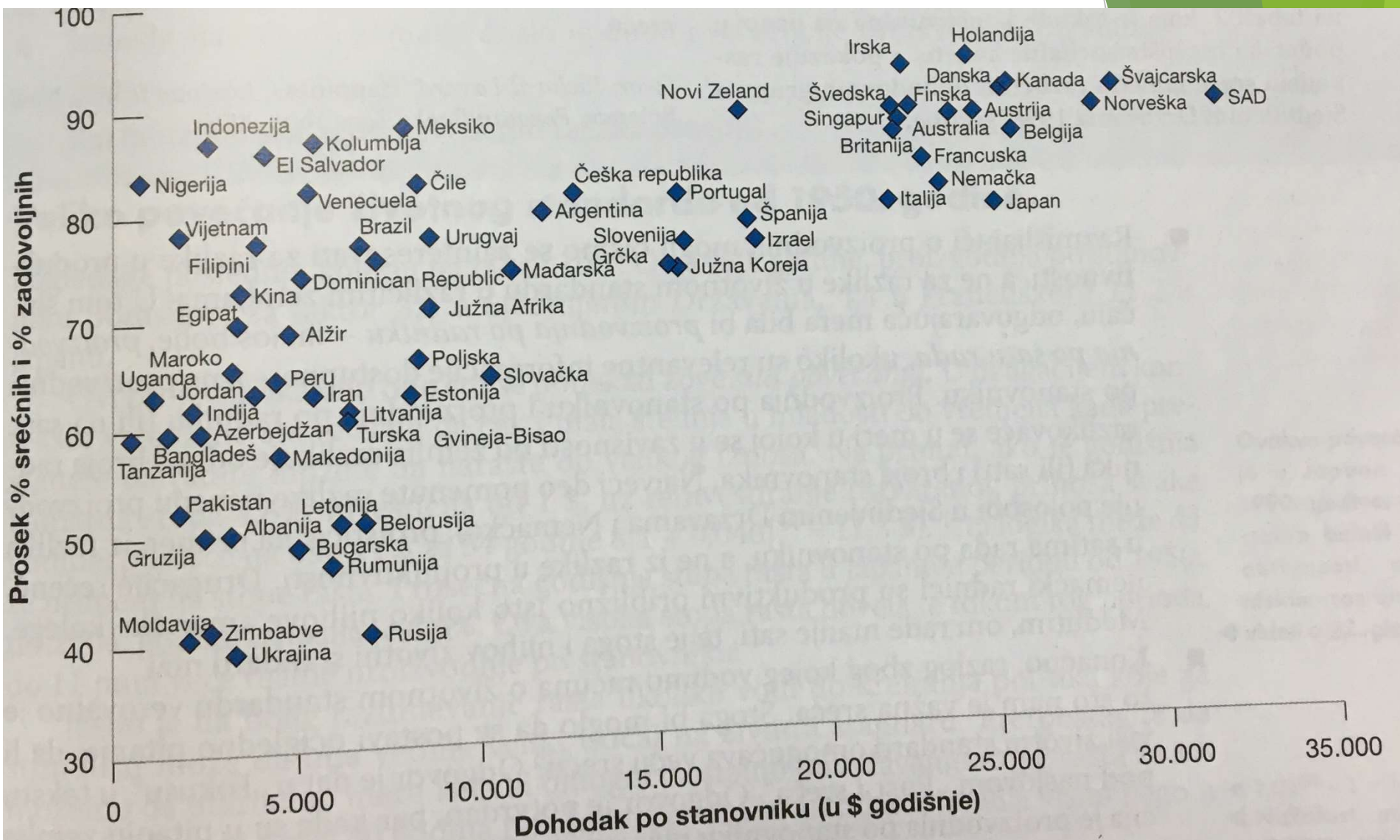
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08.03.2019.

Ekonomski rast

- ▶ Promjena BDP-a po stanovniku
- ▶ Praćenje promjene životnog standarda
- ▶ Međunarodno poređenje



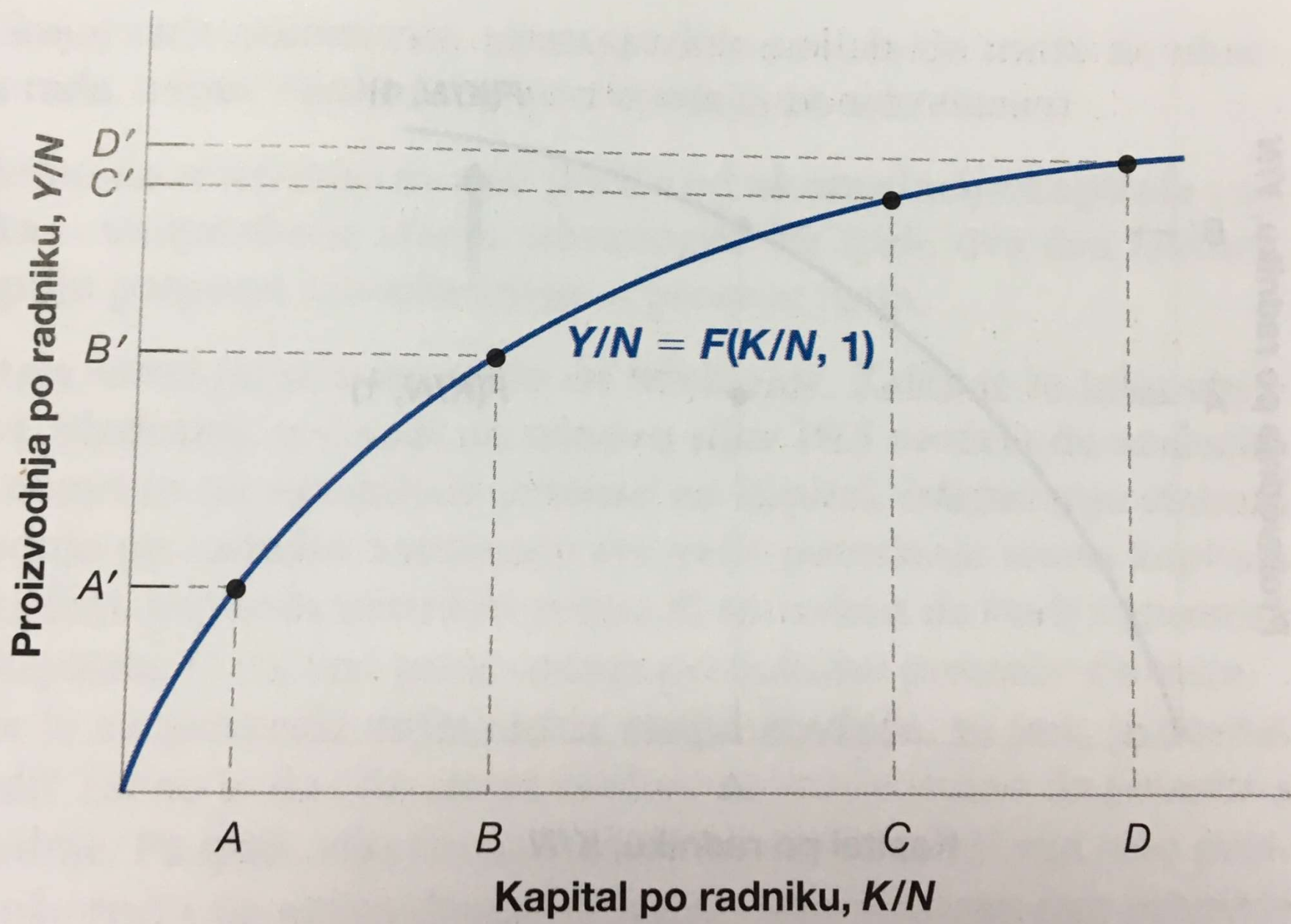


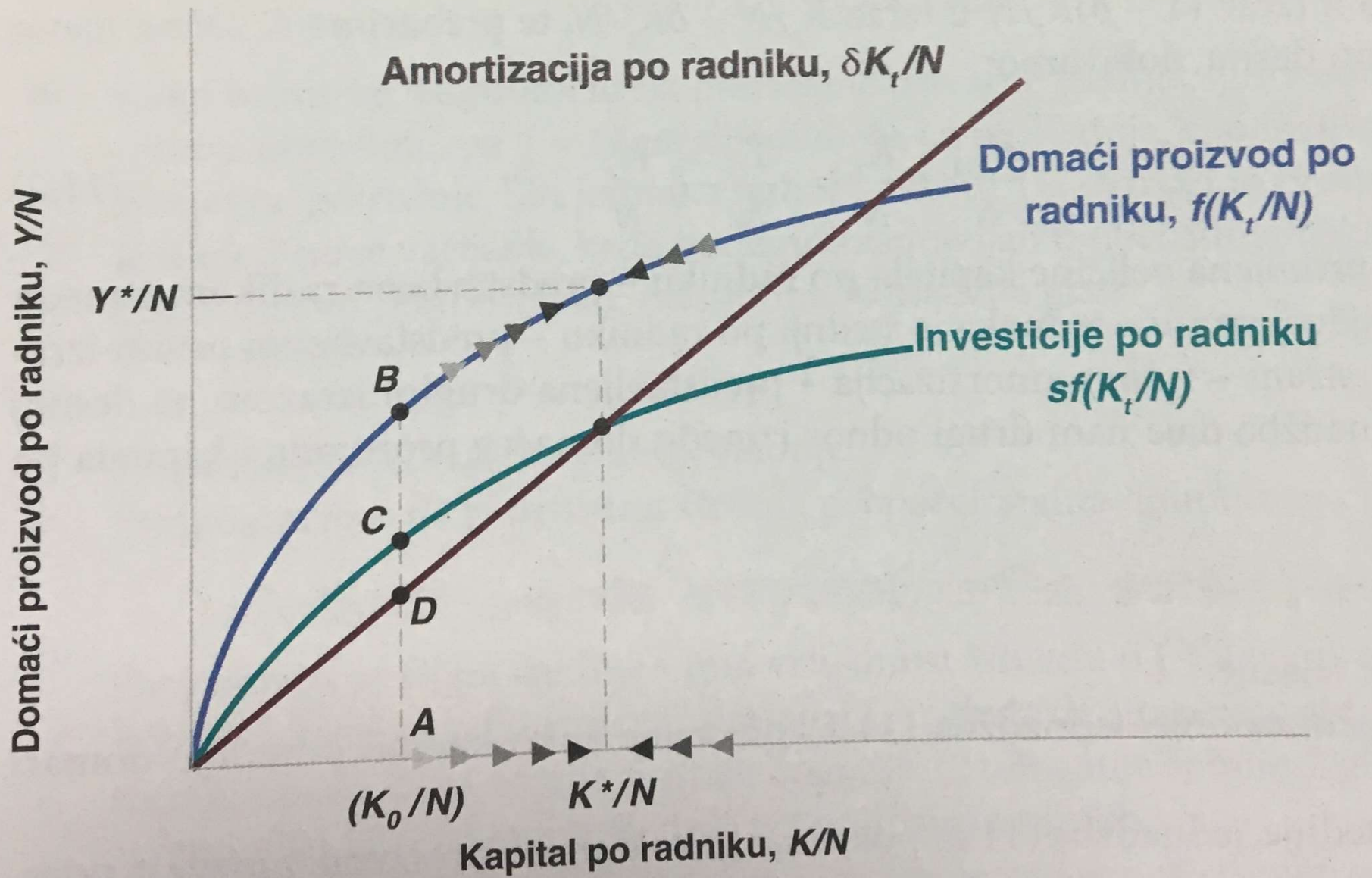
Slika 1 Sreća i dohodak po stanovniku u različitim zemljama

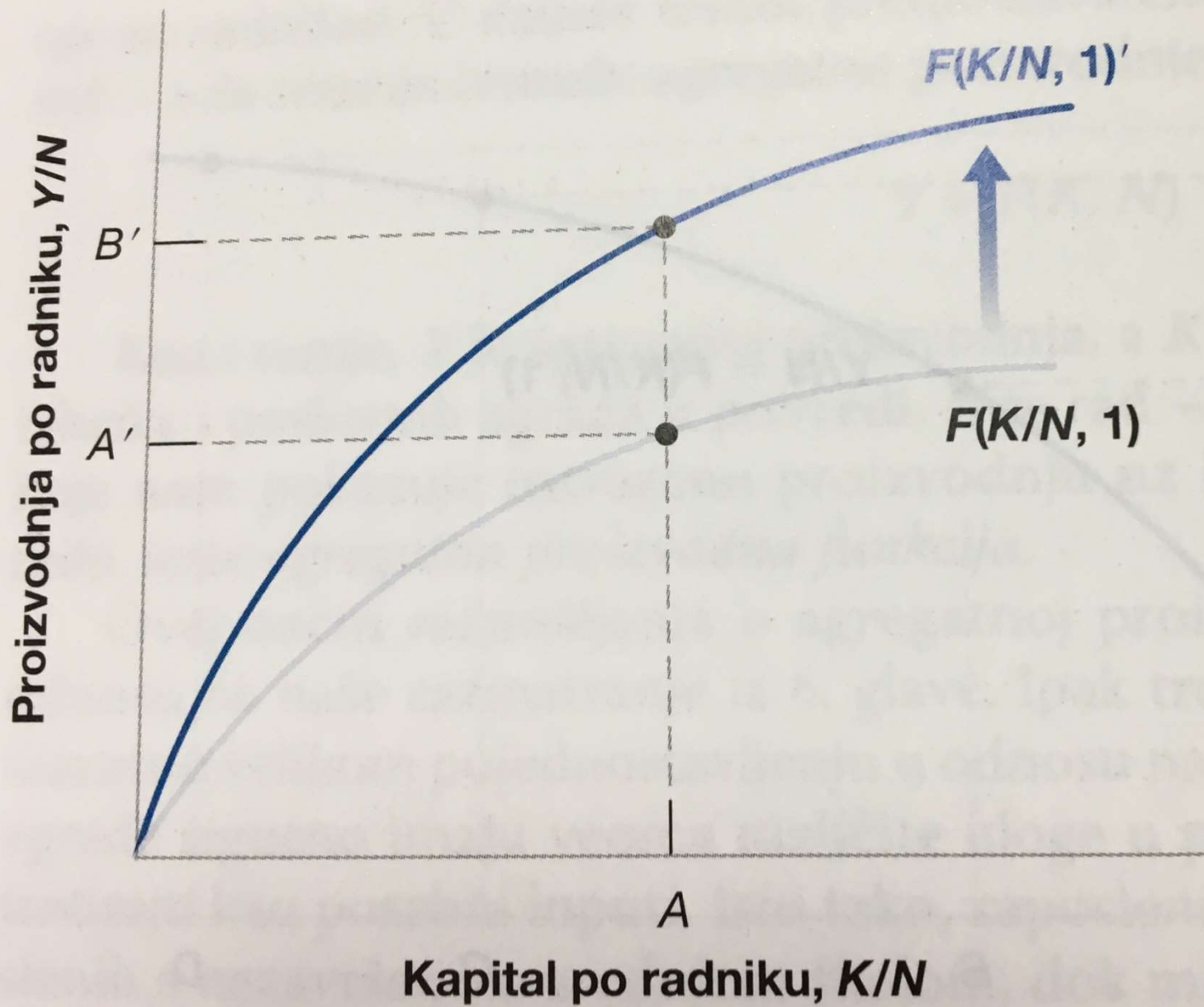
Izvori ekonomskog rasta (rasta BDP)

- ▶ Rast veličine radne snage
- ▶ Rast kvaliteta radne snage
- ▶ Rast u veličini fiksnog kapitala
- ▶ Rast u kvalitetu kapitala
- ▶ Unapređenje u načinu kombinovanja rada i kapitala









GDP real growth rates



— Middle-income countries — Euro area

Ekonomski rast razvijenih zemalja

	Godišnja stopa rasta BDP per capita		GDP per capita (\$), stalne cijene iz 1996.		2000/1950
	1950-1973	1974-2000	1950	2000	
Francuska	4.1	1.6	5,489	21,282	3.9
Njemačka	4.8	1.7	4,642	21,910	4.7
Japan	7.8	2.4	1,940	22,039	11.4
UK	2.5	1.9	7,321	21,647	3.0
SAD	2.2	1.7	11,903	30,637	2.6
Prosjek	4.3	1.8	6,259	23,503	3.7

Gross domestic product per capita, current prices, US \$

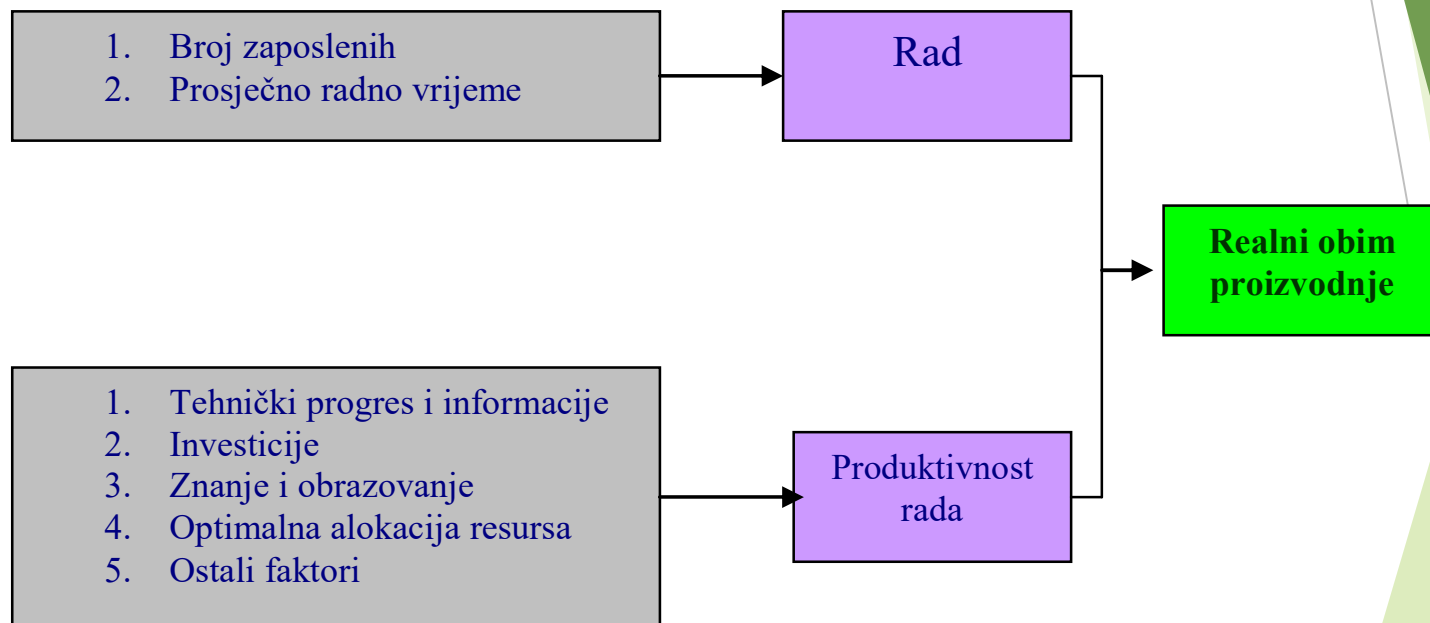
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	24,589.2	24,510.8	26,444.1	32,176.9	36,754.6	38,319.4	40,469.9	46,652.9	51,629.6	47,785.6	46,757.1	51,192.6	48,381.4	50,533.3	51,390.0	43,749.6	44,498.4
Belgium	23,303.1	23,193.7	25,197.3	30,863.1	35,722.7	37,146.7	39,021.8	44,638.3	48,850.7	45,176.0	44,691.3	47,951.0	44,900.1	46,610.9	47,635.7	40,520.1	41,283.3
Cyprus	14,464.9	14,903.7	16,188.3	20,388.9	23,969.9	25,526.7	27,448.8	31,774.8	36,030.5	32,635.9	31,262.5	32,692.5	29,032.1	27,791.7	27,208.1	23,105.4	23,351.9
Estonia	4,072.2	4,494.4	5,308.9	7,163.8	8,835.5	10,320.6	12,576.7	16,579.4	18,144.1	14,757.5	14,654.3	17,441.5	17,398.4	19,004.3	19,953.5	17,111.3	17,632.7
France	23,317.9	23,342.1	25,226.2	30,808.7	35,153.8	36,209.5	37,900.0	43,155.5	47,273.3	43,234.2	42,249.1	45,430.3	42,333.1	44,104.9	44,413.1	37,612.9	38,127.7
Finland	24,347.5	24,967.8	26,958.5	32,921.4	37,748.1	39,106.6	41,240.5	48,463.3	53,785.1	47,337.9	46,391.7	50,960.2	47,553.4	49,766.1	50,087.9	42,487.1	43,169.2
Germany	24,008.7	23,949.8	25,576.5	30,785.6	34,657.5	35,239.9	37,020.3	42,531.4	46,681.1	42,576.3	42,641.7	46,853.2	44,089.7	46,545.1	47,978.6	41,197.4	41,902.3
Greece	12,268.1	12,579.2	14,178.2	18,533.8	22,014.6	22,626.1	24,858.3	28,899.9	32,198.0	29,819.2	26,972.9	25,896.9	22,171.9	21,805.3	21,639.9	17,955.2	17,900.7
Italy	20,116.6	20,423.1	22,303.0	27,527.4	31,319.7	32,066.4	33,486.0	37,890.2	40,953.9	37,130.1	35,969.2	38,379.3	34,918.7	35,706.6	35,456.7	30,032.1	30,507.2
Ireland	26,081.8	28,059.8	32,347.7	40,854.6	47,307.5	50,405.9	53,749.2	60,756.4	60,881.5	51,837.7	48,439.1	52,504.3	49,133.3	51,853.3	55,371.6	60,896.2	62,562.3
Latvia	3,336.9	3,548.5	4,116.2	5,111.5	6,315.4	7,533.8	9,635.2	14,010.2	16,316.8	12,131.3	11,228.1	13,735.6	13,762.2	14,951.8	15,689.5	13,614.5	14,060.4
Lithuania	3,297.5	3,530.2	4,146.1	5,505.6	6,706.0	7,880.3	9,246.5	12,313.2	15,047.3	11,866.6	12,010.7	14,386.6	14,354.2	15,714.8	16,594.6	14,259.6	14,890.1
Luxembu rg	49,442.4	47,996.0	52,676.7	65,275.0	75,590.0	80,308.4	89,428.3	105,825.1	114,522.9	102,359.7	105,573.6	116,502.7	107,540.5	114,635.0	119,116.1	100,950.5	103,198.8
Malta	10,440.7	10,391.7	11,338.4	13,649.2	15,126.5	15,898.4	16,754.9	19,584.6	22,116.1	20,806.3	21,150.4	22,914.6	22,043.5	24,053.2	26,343.5	23,973.0	25,214.3
Netherla nds	25,996.4	26,607.3	28,919.2	35,313.3	40,008.3	41,648.0	44,493.2	51,311.4	57,197.2	52,033.2	50,433.3	53,589.9	49,502.0	51,591.9	52,240.3	44,322.8	45,282.6
Portugal	11,536.1	11,739.2	12,927.9	15,802.9	18,070.0	18,817.2	19,838.8	22,811.6	24,933.2	23,122.5	22,580.7	23,217.4	20,588.9	21,625.5	22,112.5	19,225.7	19,831.6
Slovenia	10,286.0	10,501.9	11,837.1	14,906.0	17,282.6	18,222.6	19,777.1	23,959.2	27,784.0	24,785.0	23,499.6	25,040.5	22,517.1	23,170.3	24,069.3	20,746.9	21,320.2
Slovak republic	3,832.6	3,976.1	4,620.7	6,330.1	8,027.2	9,129.1	10,683.5	14,349.9	18,048.5	16,567.2	16,634.7	18,223.7	17,294.6	18,205.9	18,633.7	16,105.1	16,498.5
Spain	14,724.6	15,368.5	17,083.1	21,532.5	24,989.0	26,550.3	28,531.2	32,748.1	35,724.8	32,412.2	30,802.8	31,867.8	28,582.2	29,236.0	29,663.9	25,717.6	26,608.9
Average	17,340.2	17,583.4	19,336.5	23,971.1	27,663.1	29,102.9	31,376.9	36,750.3	40,427.3	36,230.2	35,470.7	38,356.9	35,584.1	37,205.6	38,189.4	33,346.5	34,096.9

Regional GDP per inhabitant in the EU27 in 2008
(in PPS, EU27 = 100)

The twenty highest:			The twenty lowest:		
1	Inner London (UK)	343	1	Severozapaden (BG)	28
2	Luxembourg (LU)	279	2	Nord-Est (RO)	29
3	Bruxelles-Cap. / Brussels Hfdst. (BE)	216	3	Severen tsentralen (BG)	30
4	Groningen (NL)	198	4	Yuzhen tsentralen (BG)	30
5	Hamburg (DE)	188	5	Yugoiztochen (BG)	36
6	Praha (CZ)	172	6	Sud-Vest Oltenia (RO)	36
7	Île de France (FR)	168	7	Severoiztochen (BG)	37
8	Stockholm (SE)	167	8	Sud-Est (RO)	39
9	Bratislavský Kraj (SK)	167	9	Podkarpackie (PL)	39
10	Wien (AT)	163	10	Sud-Muntenia (RO)	39
11	Oberbayern (DE)	162	11	Lubelskie (PL)	39
12	Bremen (DE)	158	12	Észak-Magyarország (HU)	40
13	Utrecht (NL)	157	13	Észak-Alföld (HU)	40
14	North Eastern Scotland (UK)	157	14	Podlaskie (PL)	41
15	Darmstadt (DE)	156	15	Nord-Vest (RO)	41
16	Berkshire, Buckinghamshire & Oxfordshire (UK)	154	16	Warmińsko-Mazurskie (PL)	42
17	Noord-Holland (NL)	152	17	Dél-Alföld (HU)	43
18	Hovedstaden (DK)	152	18	Dél-Dunántúl (HU)	44
19	Southern & Eastern (IE)	148	19	Centru (RO)	45
20	Åland (FI)	145	20	Swietokrzyskie (PL)	45

Gross domestic product per capita, current prices, US \$																	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Albania	1127.6	1283.6	1425.1	1846.1	2373.6	2673.7	2975.6	3594.1	4377.0	4130.9	4098.1	4439.6	4249.0	4413.3	4574.8	3943.2	4203.4
BIH	1468.9	1522.8	1753.1	2197.0	2611.8	2789.9	3178.8	3912.4	4784.5	4508.2	4404.4	4788.8	4430.5	4681.9	4784.8	4206.7	4308.2
Bulgaria	1613.9	1783.7	2074.6	2689.8	3344.6	3839.4	4444.5	5812.7	7152.8	6859.7	6743.7	7836.6	7401.9	7703.5	7877.1	7017.1	7368.5
Croatia	4970.2	5409.8	6243.6	8048.9	9365.6	10224.2	11359.5	13544.0	15889.1	14142.3	13505.0	14538.0	13234.7	13573.7	13468.7	11578.5	12095.5
Hungary	4618.4	5264.4	6639.9	8385.9	10249.5	11149.6	11392.4	13828.5	15658.6	12956.4	13007.6	14029.5	12819.3	13591.7	14102.9	12344.2	12778.3
Macedonia	1878.2	1839.6	1974.1	2440.8	2796.6	3071.9	3359.6	4076.3	4838.1	4579.1	4576.2	5174.9	4728.3	5239.7	5498.6	4854.2	5262.9
Montenegro	1607.7	1886.7	2089.1	2776.1	3373.9	3673.4	4382.7	5965.4	7360.4	6714.9	6694.3	7325.7	6590.4	7189.2	7389.9	6464.7	6628.6
Poland	4476.2	4978.1	5195.3	5691.3	6643.2	7974.8	8996.3	11256.8	13909.5	11454.2	12601.9	13886.7	13157.8	13776.9	14336.8	12552.3	12315.6
Romania	1670.0	1817.0	2118.6	2768.1	3541.5	4662.7	5811.4	8124.7	10160.4	8220.8	8277.3	9213.9	8542.1	9568.4	10000.6	8934.0	9465.4
Serbia	1238.9	1640.9	2156.9	2836.5	3315.3	3504.3	4145.0	5486.5	6689.0	5820.5	5353.6	6424.0	5656.3	6351.7	6199.1	5244.3	5376.3
Turkey	4218.9	3053.2	3589.4	4642.9	5952.7	7278.2	7899.1	9562.9	10691.7	8881.7	10475.6	11141.0	11552.7	12395.4	12022.1	10909.7	10742.7
Average	2626.3	2770.9	3205.4	4029.4	4869.9	5531.1	6176.8	7742.2	9228.3	8024.4	8158.0	8981.7	8396.6	8953.2	9114.1	8004.5	8231.4

Produktivnost kao izvor rasta

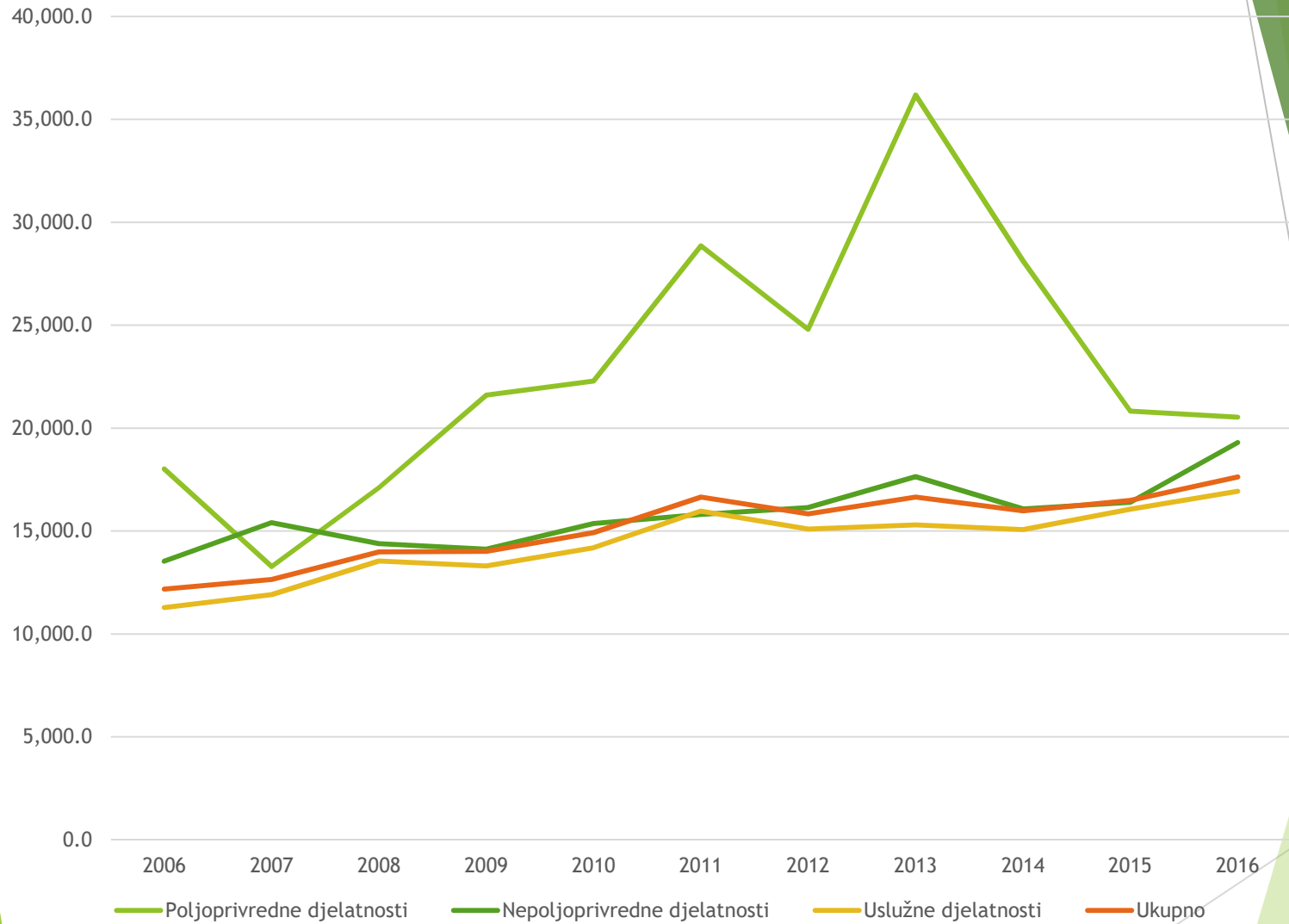


Most Productive Countries, 2015

RANK	COUNTRY	GDP PER HOUR WORKED	EMPLOYED POPULATION	GDP (USD)	AVERAGE WORK WEEK (HRS)
1	Luxembourg	\$ 93.4	405,600	\$57b	29
2	Ireland	\$ 87.3	1,989,400	\$302b	33.5
3	Norway	\$ 81.3	2,753,000	\$318b	27.3
4	Belgium	\$ 69.7	4,601,200	\$498b	29.8
5	United States	\$ 68.3	151,000,000	\$18,037b	33.6
6	Denmark	\$ 67.6	2,829,000	\$270b	27.2
7	France	\$ 65.6	27,523,000	\$2,648b	28.2
8	Germany	\$ 65.5	43,057,000	\$3,857b	26.3
9	Netherlands	\$ 65.4	8,792,000	\$818b	27.4
10	Switzerland	\$ 64.2	4,962,600	\$506b	30.6
11	Austria	\$ 60.2	4,290,700	\$415b	30.9
12	Sweden	\$ 59.1	4,809,700	\$458b	31
13	Finland	\$ 54.8	2,497,400	\$225b	31.6
14	Australia	\$ 54.6	11,860,000	\$1,101b	32.7
15	United Kingdom	\$ 52.1	31,293,000	\$2,701b	31.9
16	Italy	\$ 51.9	24,476,100	\$2,191b	33.1
17	Spain	\$ 51	18,490,800	\$1,594b	32.5
18	Canada	\$ 50.9	18,285,700	\$1,589b	32.8
19	Iceland	\$ 45.1	183,700	\$16b	36.1
20	Japan	\$ 41.9	65,801,200	\$4,741b	33.1
21	New Zealand	\$ 40.9	2,360,600	\$170b	33.8
22	Slovenia	\$ 40.4	941,500	\$64b	32.5
23	Israel	\$ 40.3	3,947,100	\$300b	36.3
24	Slovak Republic	\$ 39.7	2,267,100	\$158b	33.7
25	Czech Republic	\$ 38	5,179,700	\$346b	33.8
26	Portugal	\$ 35.4	4,575,800	\$303b	35.9
27	Greece	\$ 35.3	4,019,800	\$288b	39.1
28	Hungary	\$ 33.5	4,327,500	\$254b	33.6
29	Lithuania	\$ 32.6	1,334,700	\$81b	35.8
30	Korea	\$ 31.9	25,936,300	\$1,749b	40.7
31	Estonia	\$ 31.6	622,900	\$36b	35.6
32	Latvia	\$ 28.3	887,900	\$48b	36.7
33	Chile	\$ 25.9	7,802,200	\$402b	38.2
34	Russia	\$ 25.1	72,187,700	\$3,580b	38
35	Mexico	\$ 20.3	50,262,900	\$2,188b	41.2

Crna Gora (2015): 7,46 euro (procjena autora)

Produktivnost u Crnoj Gori



Dimenzije tehnološkog progresa

- ▶ Veće količine BDP-a uz date količine rada i kapitala
- ▶ Bolji proizvodi
- ▶ Novi proizvodi
- ▶ Veća raznolikost proizvoda



Prosječne godišnje stope rasta BDP-a pc i tehnološkog napretka, 1950-1987

	Stopa rasta BDP-a pc			Stopa tehnološkog napretka		
	1950-1973	1973-1987	promjena	1950-1973	1973-1987	promjena
Francuska	1.8	2.2	4.9	2.3	2.6	
Njemačka	4.9	2.1	2.8	5.6	1.9	3.7
Japan	8.0	3.1	4.9	6.4	1.7	4.7
V.Britanija	2.5	1.8	0.7	2.3	1.7	0.6
SAD	2.2	1.6	0.6	2.6	0.6	2.0
Prosjek	4.3	2.1	2.2	4.4	1.6	2.8

Tabela 12.2 Prosečne godišnje stope raste proizvodnje po radniku i tehnološkog napretka u četiri bogate zemlje od 1950. godine

	Stopa rasta proizvodnje po radniku (%) ,1950-2004	Stopa tehnološkog napretka (%) 1950-2004
Francuska	3,2	3,1
Japan	4,2	3,8
Velika Britanija	2,4	2,6
Sjedinjene Države	1,8	2,0
Prosek	2,9	2,9

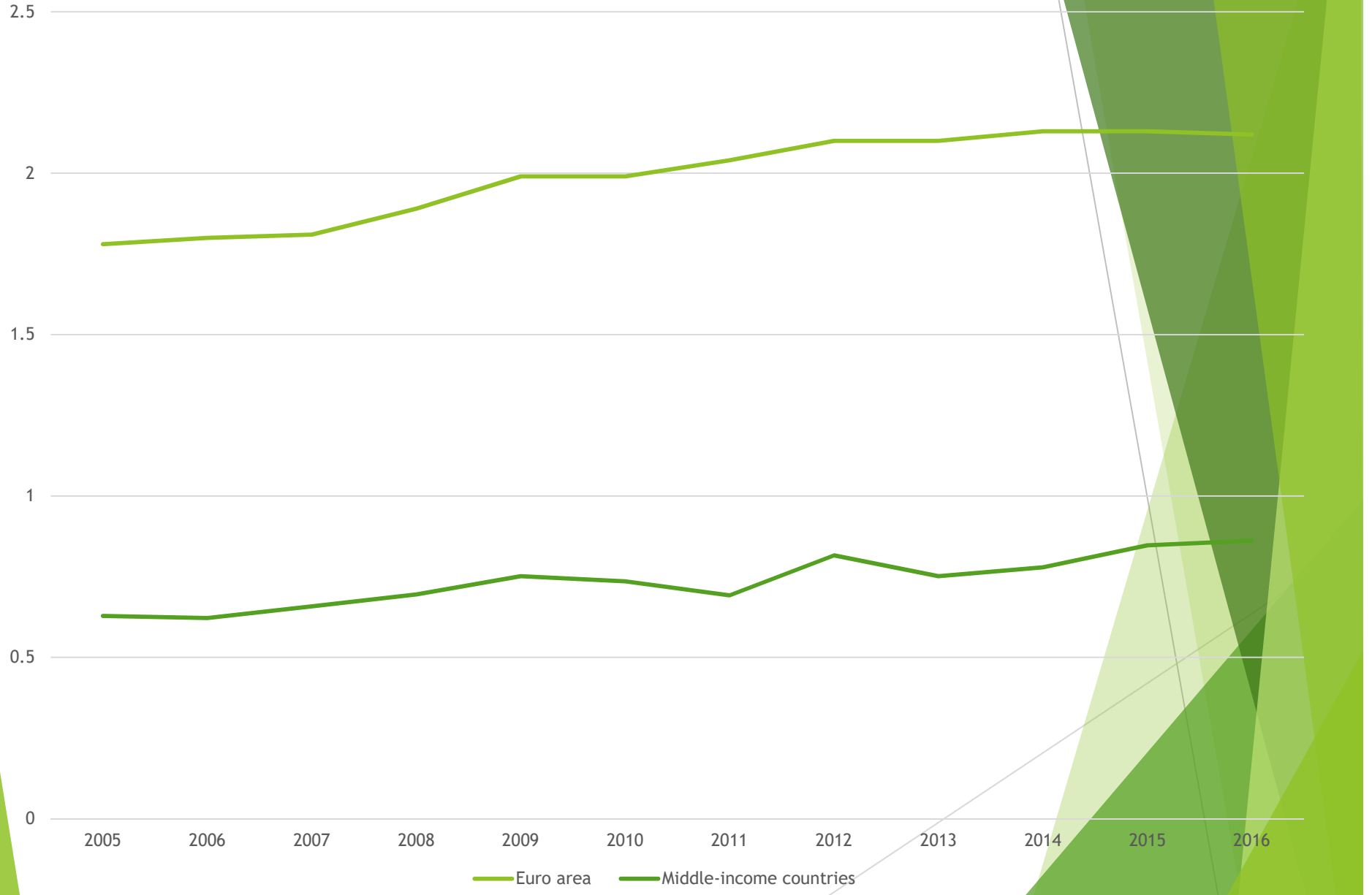
izvor: Za period 1950-1970: Angus Maddison, *Dynamic Forces in Capitalist Development*, Oxford University Press, Njujork, 1997
 od 1970-2004: OECD *Economic Outlook*, baza podataka. „Prosek“ znači jednostavan prosek stope raste u svakoj koloni.

Determinante tehnološkog progressa

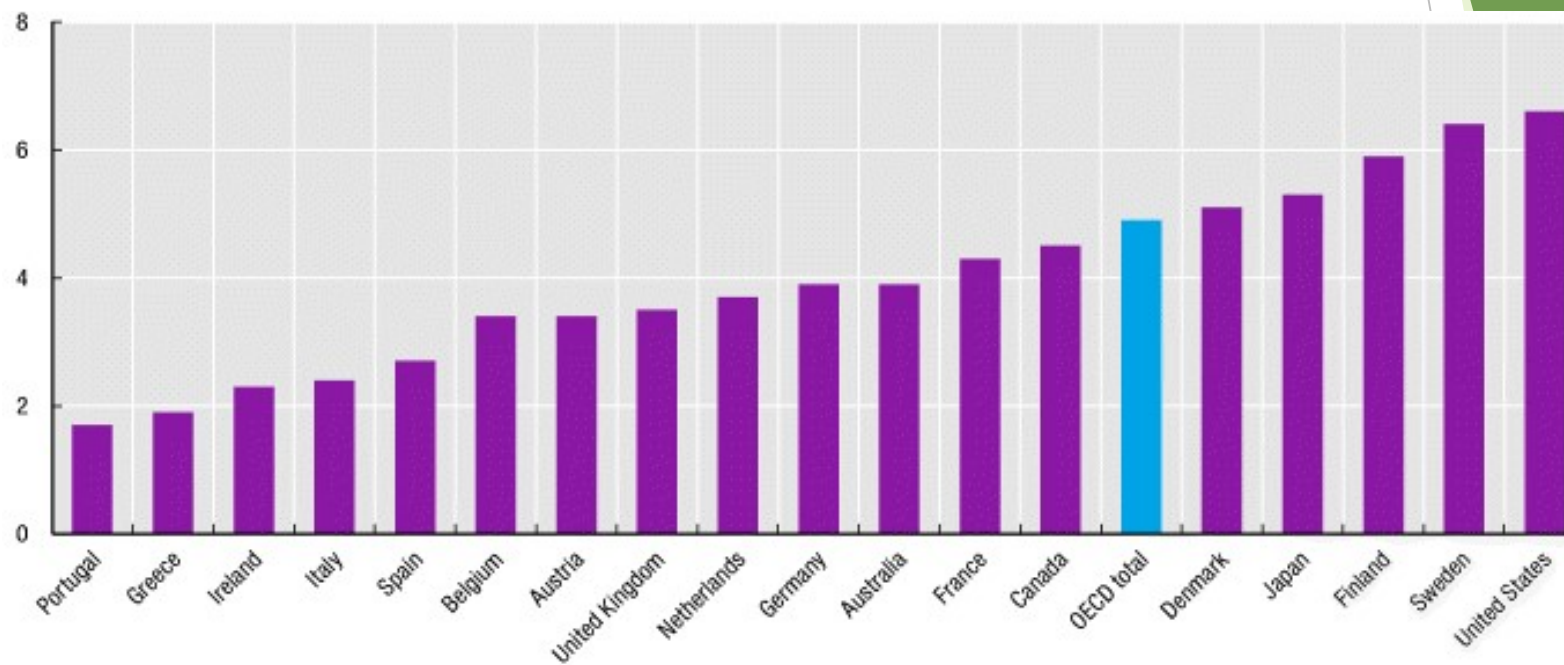
- ▶ Ulaganje u istraživanje i razvoj
- ▶ Upotrebljivost rezultata istraživanja



Research and Development Expenditures, % of GDP

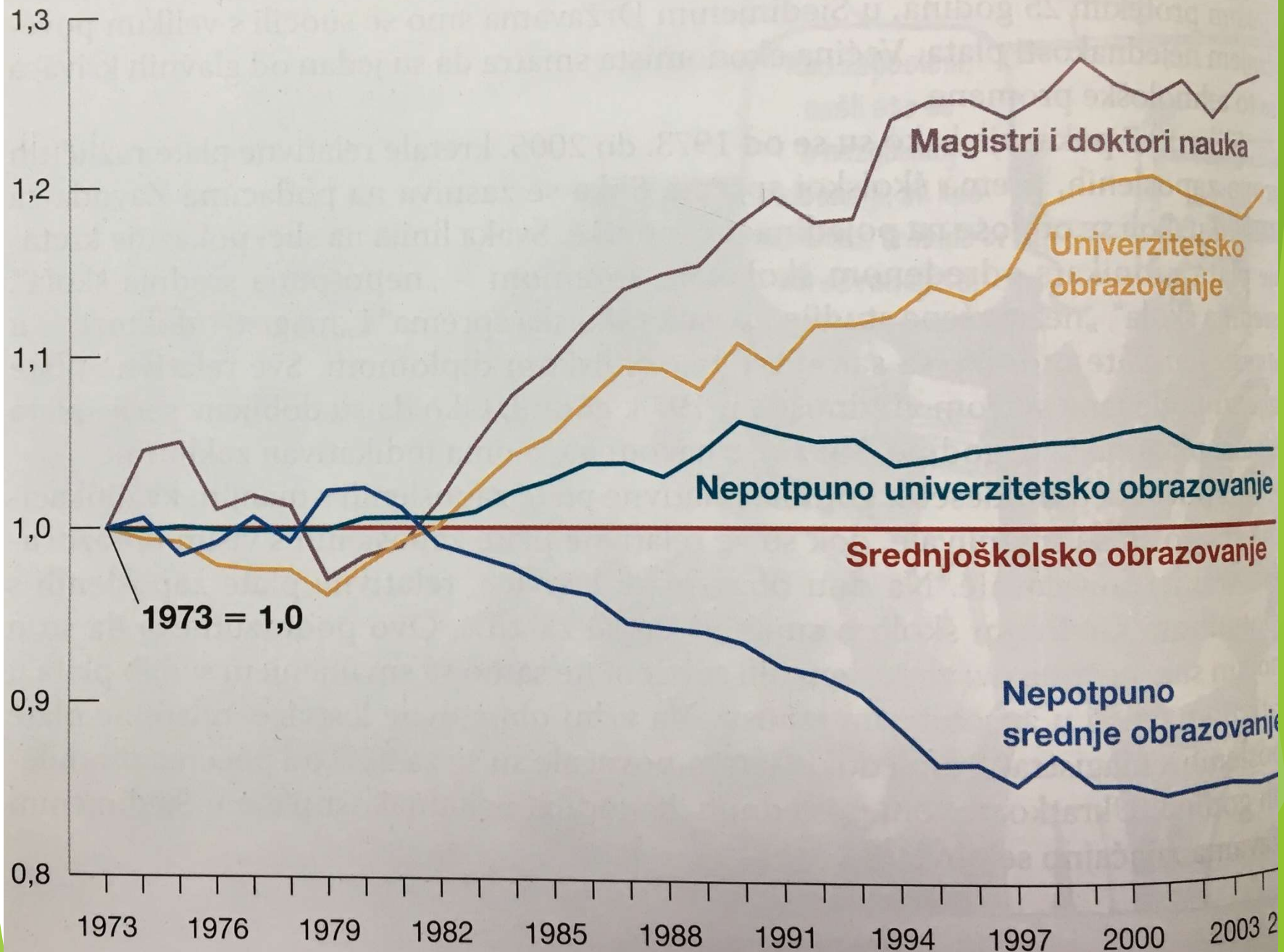


Investicije u R&D - 2004



Investicije u znanje i BDP

Dependent Variable: <i>GDPPC</i>				
	Coefficient	Std. Error	t-Statistic	Prob.
<i>PEE</i>	0.105223	0.038687	2.719778	0.0074
<i>R&D</i>	0.138798	0.038593	3.596437	0.0004
<i>Const</i>	0.013208	0.002136	6.183721	0.0000
Effects specification				
Cross-section fixed				
R-squared	0.586463			
Adjusted R-squared	0.355267	Mean dependent var		-0.01211
S.E. of regression	0.098437	S.D. dependent var		0.12259
Sum squared resid	1.327515	Akaike info criterion		-1.61592
Log likelihood	175.7772	Schwarz criterion		-0.95974
F-statistic	3.707917	Hannan-Quinn criter.		-1.34971
Prob (F-statistic)	0.000000	Durbin-Watson stat		1.87824



Izvori finansiranja istraživanja

- ▶ Drzava
- ▶ Privatni fondovi (korporacije)
- ▶ Odnos drzavnih i privatnih fondova:
 - ▶ EU 25 – 41%
 - ▶ USA – 39%
 - ▶ Japan – 22%



Tehnološki napredak i zaposlenost

- ▶ Tehnološki napredak - produktivnost rada
- ▶ Produktivnost rada - zaposlenost
 - ▶ Da li BDP raste brže od produktivnosti?
 - ▶ Ako se produktivnost poveća za 2%, potrebno je da BDP poraste za najmanje 2% da se zaposlenost ne smanji

$$Y = f(K, AN)$$

$$Y = AN$$

$$N = Y / A$$

Tehnološki napredak i zaposlenost

- ▶ Produktivnost rada - zarade
 - ▶ Rast produktivnosti preko 3% - rast zarada
- ▶ Tehnološki napredak - promjena tražnje za zanimanjima

