HUMBOLDT-UNIVERSITÄT ZU BERLIN

The Economics of German Unification, Twenty-Five Years Later

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Korean Unification: Prospects and Global Implications
Washington DC, 27-28 February 2017

Overview

- Initial conditions for the German Democratic Republic in 1990
- East-West German integration, as seen through the lens of Solow and Swan (1956)
- East-West German integration, as seen through the lens of Ramsey (1928) – maximizing discounted utility
- East-West German integration, as seen through the lens of Solow (1957) – the role of TFP
- Lessons for Korean unification

Lens of Solow and Swan (1956)

- Neoclassical growth model
- Originally closed economy, Barro and Sala-i-Martin (1991, 1995) opened it to include factor mobility
- Assumes common production function (TFP convergence is instantaneous)
- Empirically, (conditional) convergence rate of GDP per capita is impressively robust at about 2%/year (Barro and Sala-i-Martin (1991, 1992)
- Consistent with the Solow/Swan neoclassical model without any factor mobility and a capital share of 2/3

Convergence

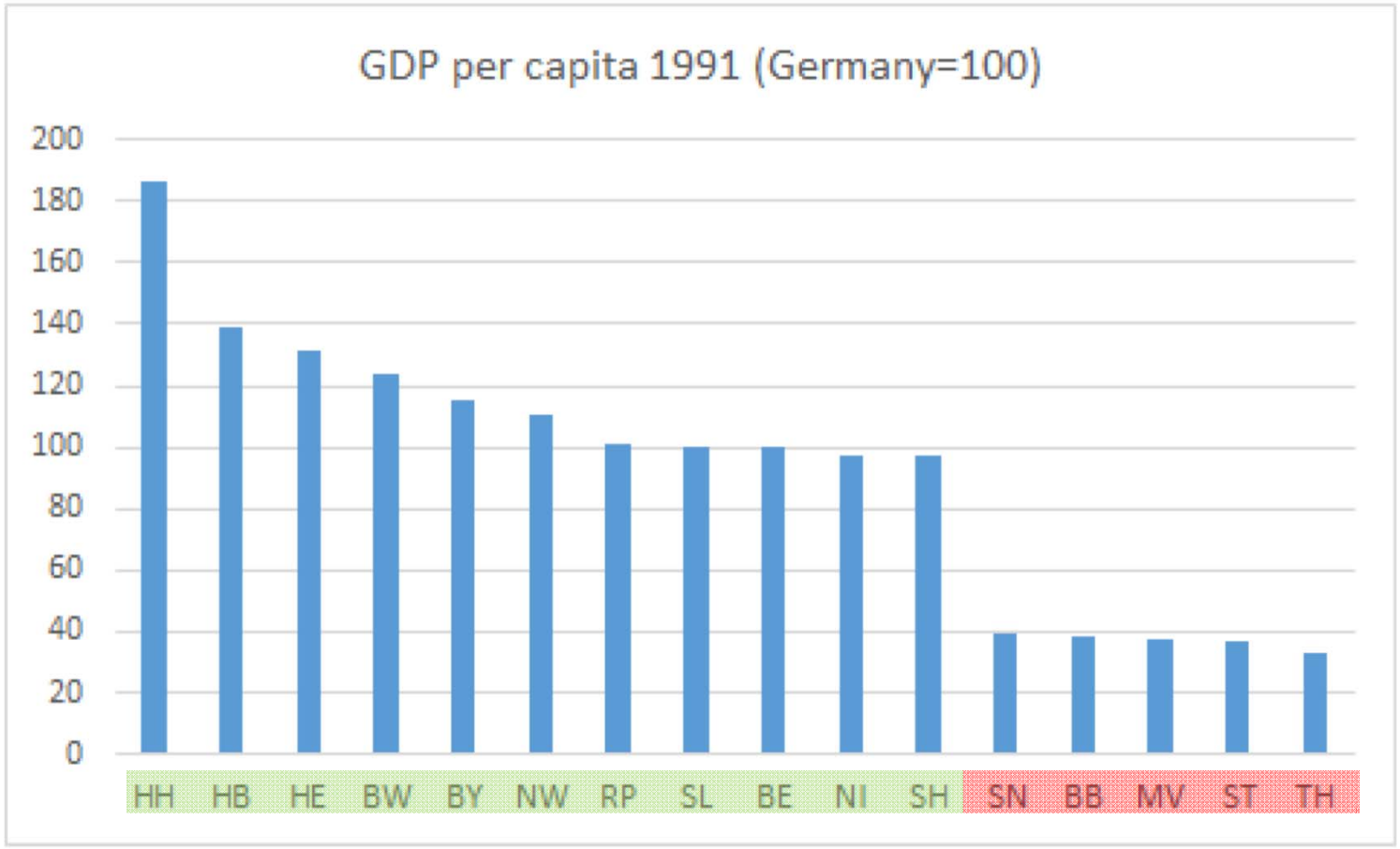


Figure 1: Per capita GDP. German states, 1991

Convergence

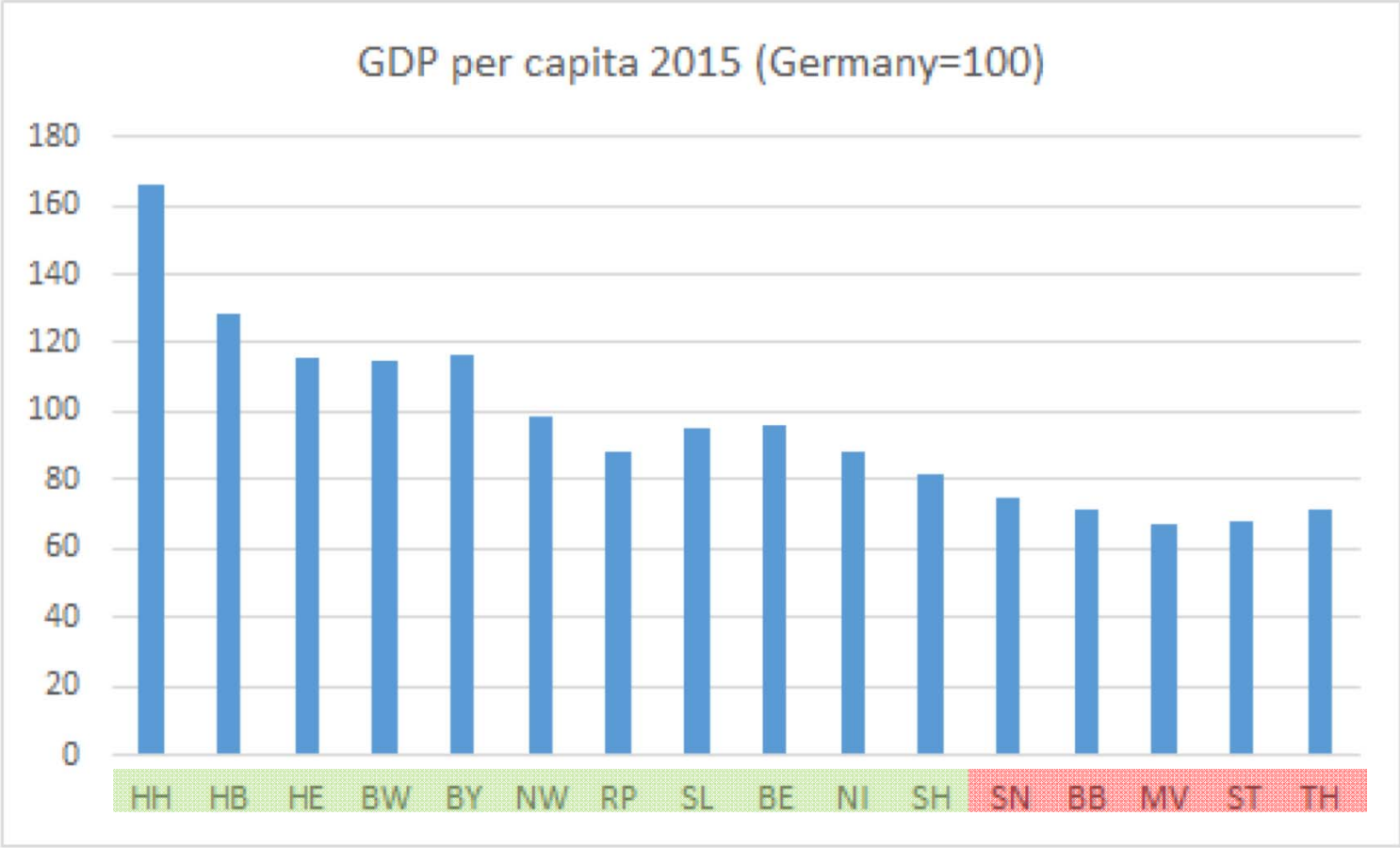


Figure 2: Per capita GDP, German states, 2015

Lens of Solow and Swan (1956)

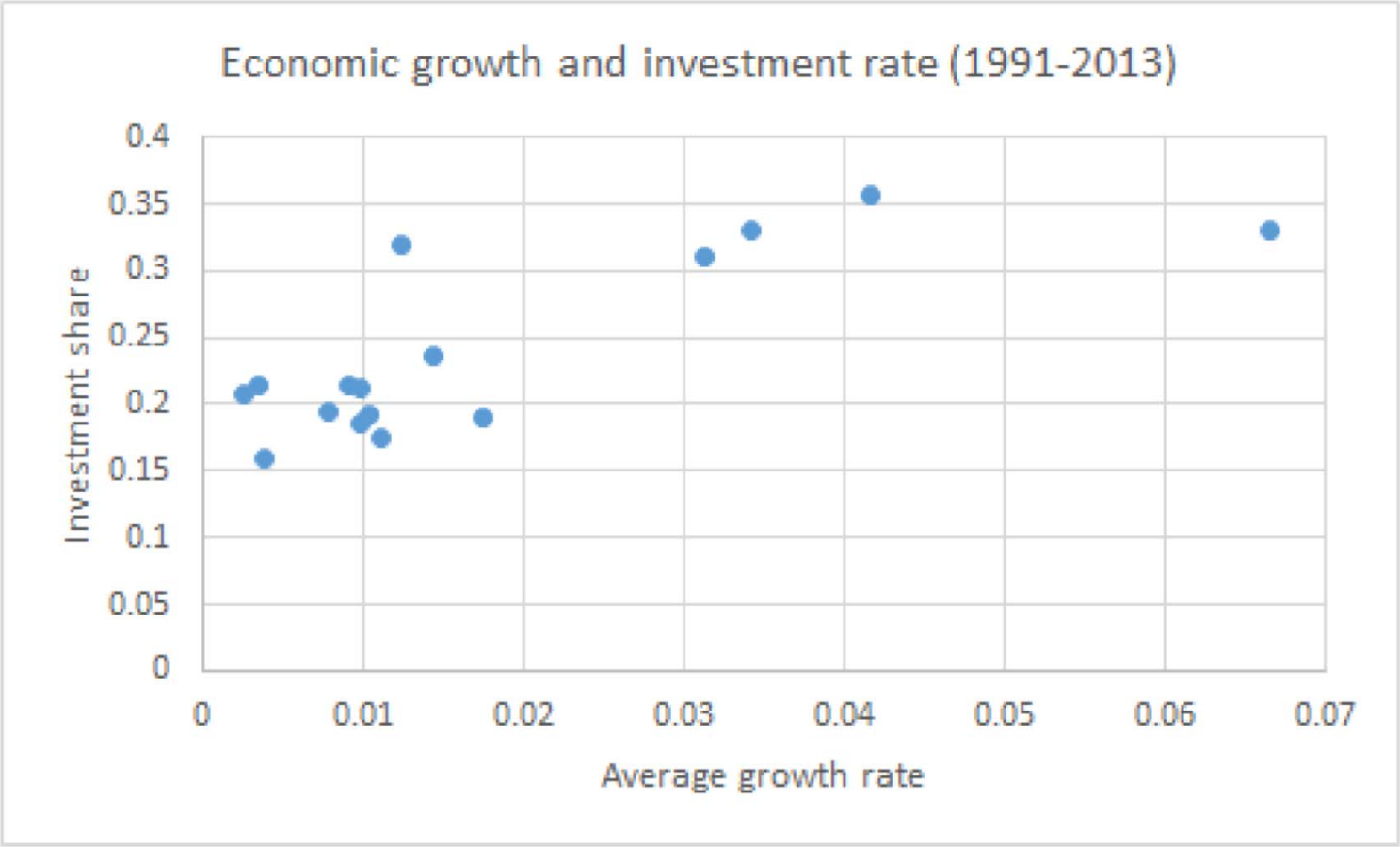


Figure 3: Growth and Investment in the German states

Lens of Solow and Swan (1956)

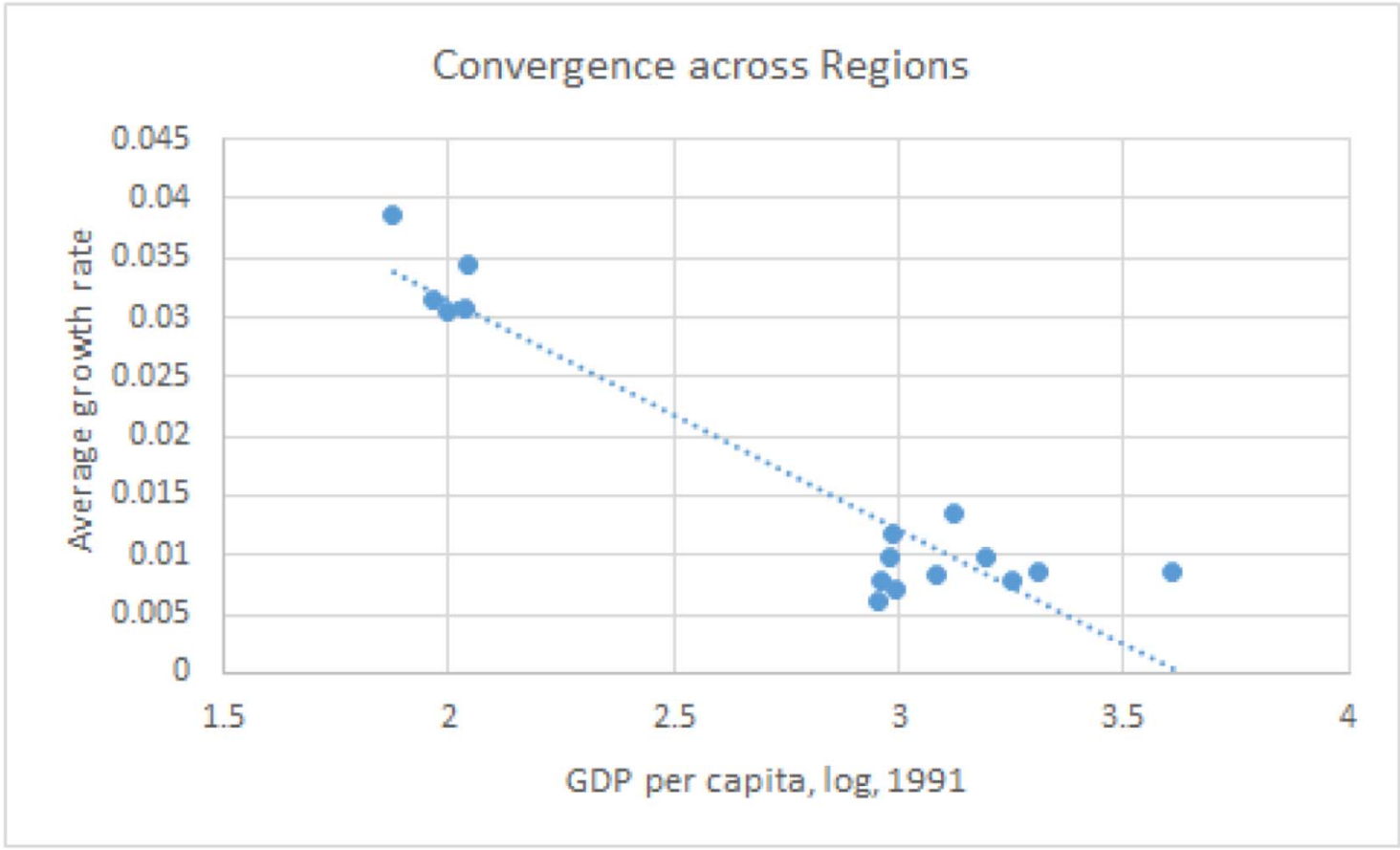


Figure 4: Convergence

Lens of Ramsey (1928)

- What is the social planner‘s optimum as opposed to the market outcome? How closely did Germany approximate it?
- First obligation of the social planner: Maximize the pdv of utility in east and west, possibly equally weighted
- Constrained by overall resources, fixed factors, cost of adjustment, externalities with respect to public goods and congestion, as well as a distortionary financing constraint
- Separate production from consumption decisions – frontload „investment“ in structural change but raise consumption immediately
- Subsidize housing to reduce migration; tax labor income

Lens of Ramsey (1928)

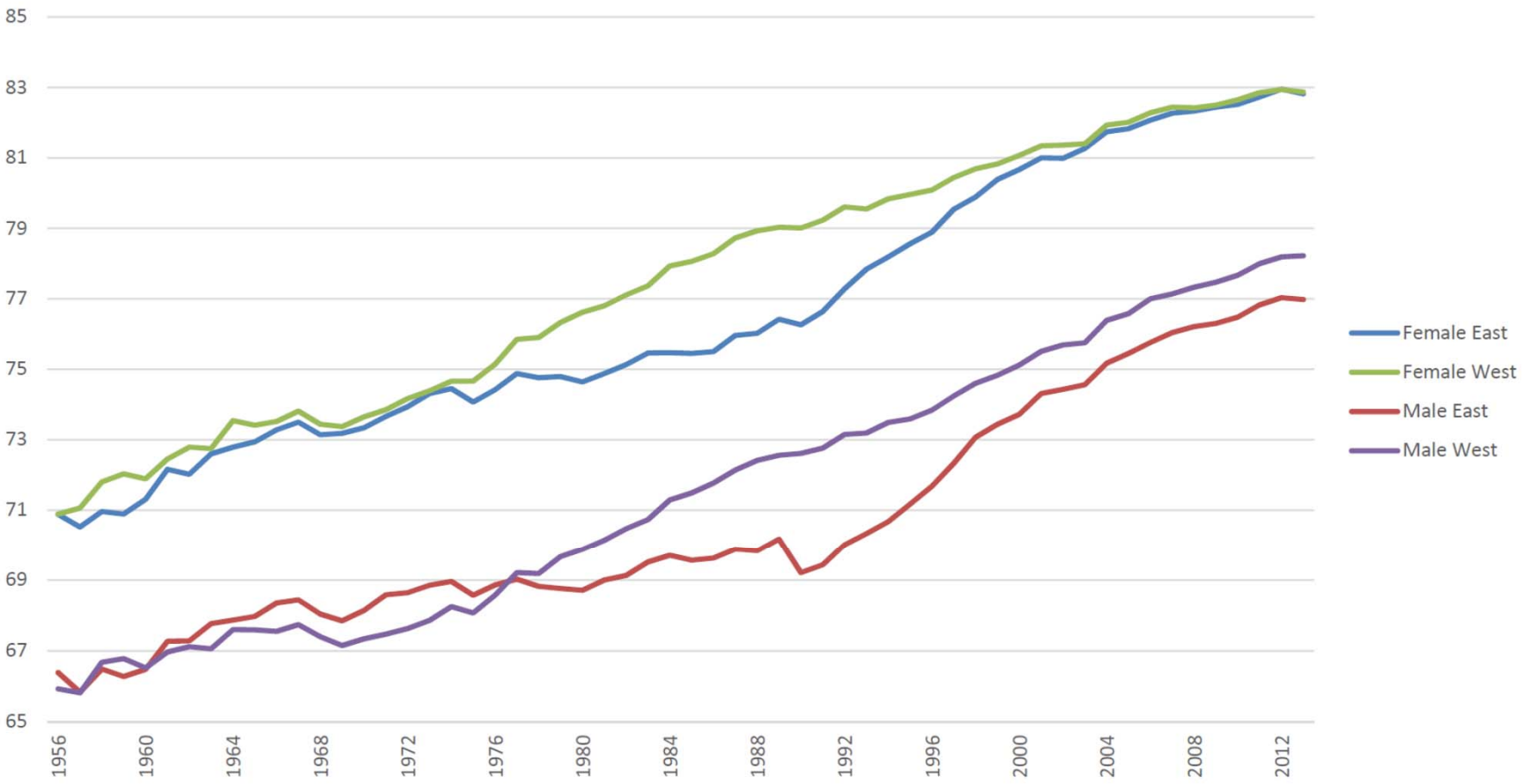
Convergence in the Small: Access to Consumption Goods

	1993	1998	2008	2016
Durable Good	**East/West**	**East/West**	**East/West**	**East/West**
Automobile	66/74	71/76	73/78	70/79
Landline telephone	49/97	94/97	86/91	100/92
Cell phone	-/-	11/11	86/86	95/95
Personal Computer	16/22	34/40	72/76	87/89
Internet access	-/-	5/9	58/66	88/90
Television	96/95	98/95	95/94	98/98
Cable access	-/-	64/51	55/46	55/43
Satellite dish	-/-	30/29	34/40	39/50
Video recorder	36/49	61/63	-/-	-/-
Refrigerator	**95/97**	99/99	99/99	100/100
Microwave oven	15/41	41/53	70/70	74/73
Dishwasher	3/38	26/49	55/64	64/71
Washing Machine	91/88	94/91	-/-	98/96
Dryer	2/24	14/33	22/42	24/46

Source: German Federal Statistical Office (2016)

Lens of Ramsey (1928)

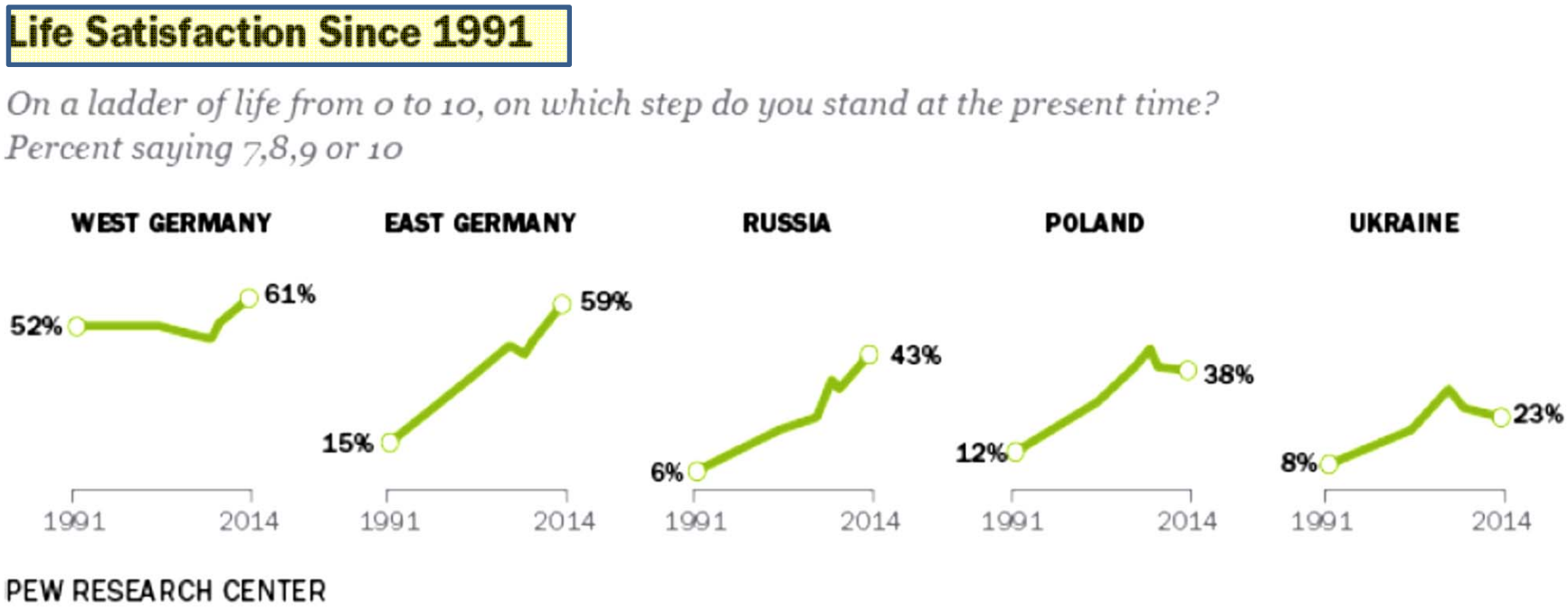
Life Expectancy



Source: Human Mortality Database (2016)

Lens of Ramsey (1928)

Happiness



Source: Pewglobal (2014)

Lens of Ramsey (1928)

Convergence in the Large: Macroeconomic Indicators in East Germany in relation to West Germany

Year	Private consumption	Nominal wages per hour	Nominal wages per worker	Labor producitvity per hour	Labor productivity per worker	GDP per capita	Unemployment rate	Participation rate
1991	64	n.a.	57	n.a.	45	44	165	116
1993	75	n.a.	74	n.a.	67	59	193	107
1995	82	n.a.	78	n.a.	72	67	163	109
1997	83	n.a.	79	n.a.	74	68	177	109
1999	84	n.a.	79	n.a.	75	68	195	108
2001	85	73	80	72	76	67	235	106
2003	86	74	80	73	78	69	216	106
2005	85	75	81	73	78	69	187	103
2007	85	74	80	73	78	70	201	104
2009	87	75	81	74	80	72	186	105
2011	85	76	82	74	79	71	188	104
2013	80	76	82	75	80	71	173	103
2015	n.a.	79	81	78	n.a.	72	161	n.a.

Source: German Federal Statistical Office, Bundesagentur für Arbeit

The traces of structural change

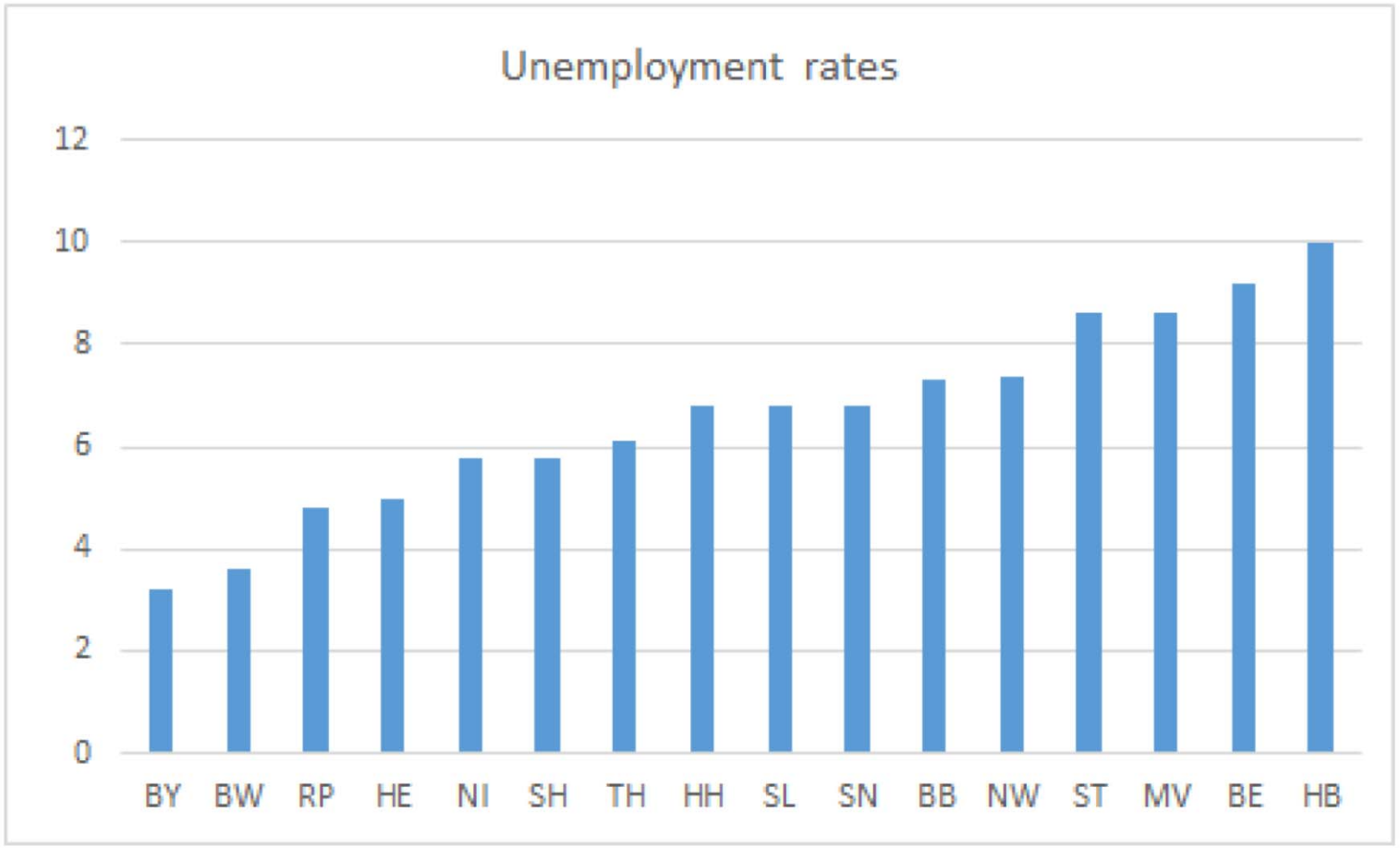
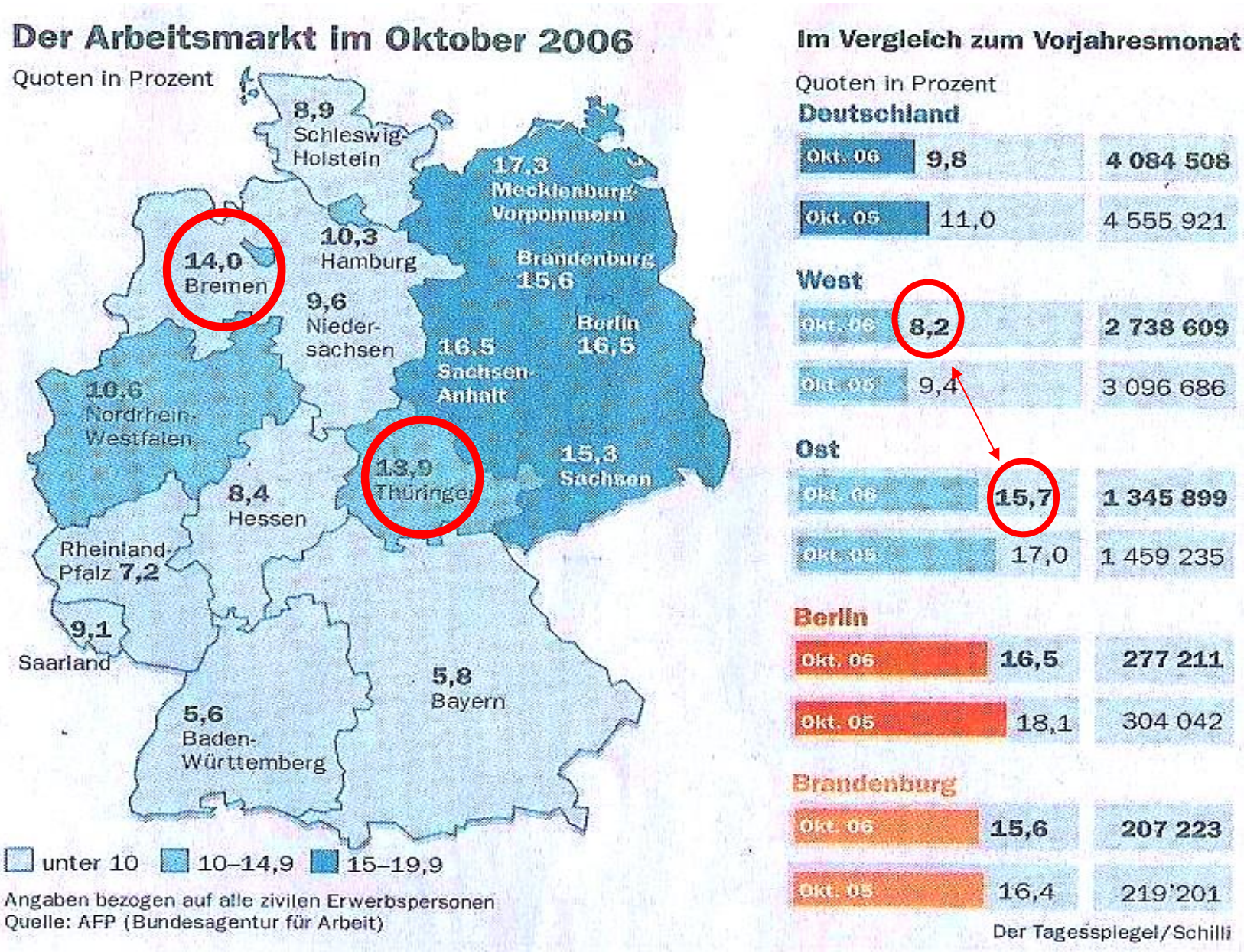
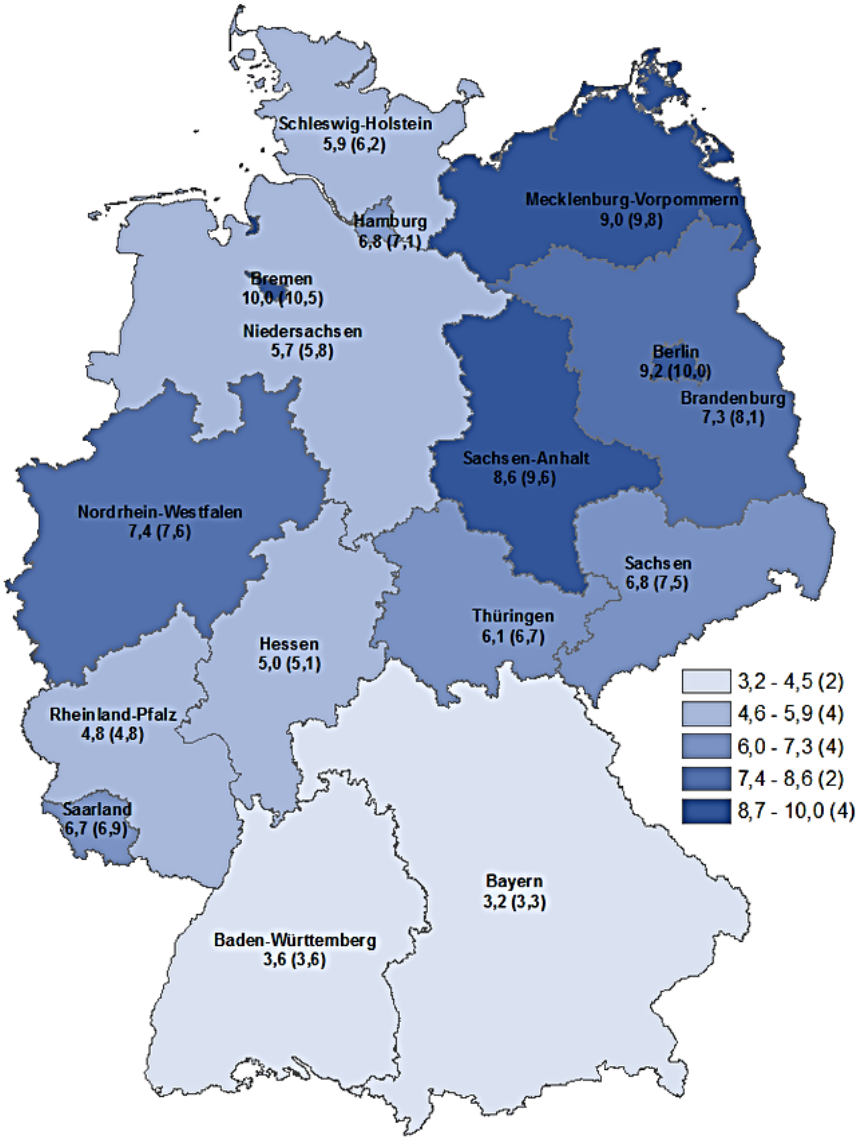


Figure 9: Unemployment rates, October 2016


Der Arbeitsmarkt im Oktober 2006
Quoten in Prozent
8,9 Schleswig-Holstein
17,3 Mecklenburg-Vorpommern
10,3 Hamburg
14,0 Bremen
9,6 Nieder-sachsen
Brandenburg 15,6
Berlin 16,5
16,5 Sachsen-Anhalt
10,6 Nordrhein-Westfalen
13,9 Thüringen
15,3 Sachsen
8,4 Hessen
Rheinland-Pfalz 7,2
9,1 Saarland
5,8 Bayern
5,6 Baden-Württemberg
unter 10
10–14,9
15–19,9
Angaben bezogen auf alle zivilen Erwerbspersonen
Quelle: AFP (Bundesagentur für Arbeit)
Im Vergleich zum Vorjahresmonat
Quoten in Prozent
Deutschland
Okt. 06 9,8 4 084 508
Okt. 05 11,0 4 555 921
West
Okt. 06 8,2 2 738 609
Okt. 05 9,4 3 096 686
Ost
Okt. 06 15,7 1 345 899
Okt. 05 17,0 1 459 235
Berlin
Okt. 06 16,5 277 211
Okt. 05 18,1 304 042
Brandenburg
Okt. 06 15,6 207 223
Okt. 05 16,4 219'201
Der Tagesspiegel/Schilli

Labor market in November 2016



Unemployment rate (%)

Germany

5.7 **Nov 16**

6.0 **Nov 15**

West

5.3 **Nov 16**

5.4 **Nov 15**

East

7.8 **Nov 16**

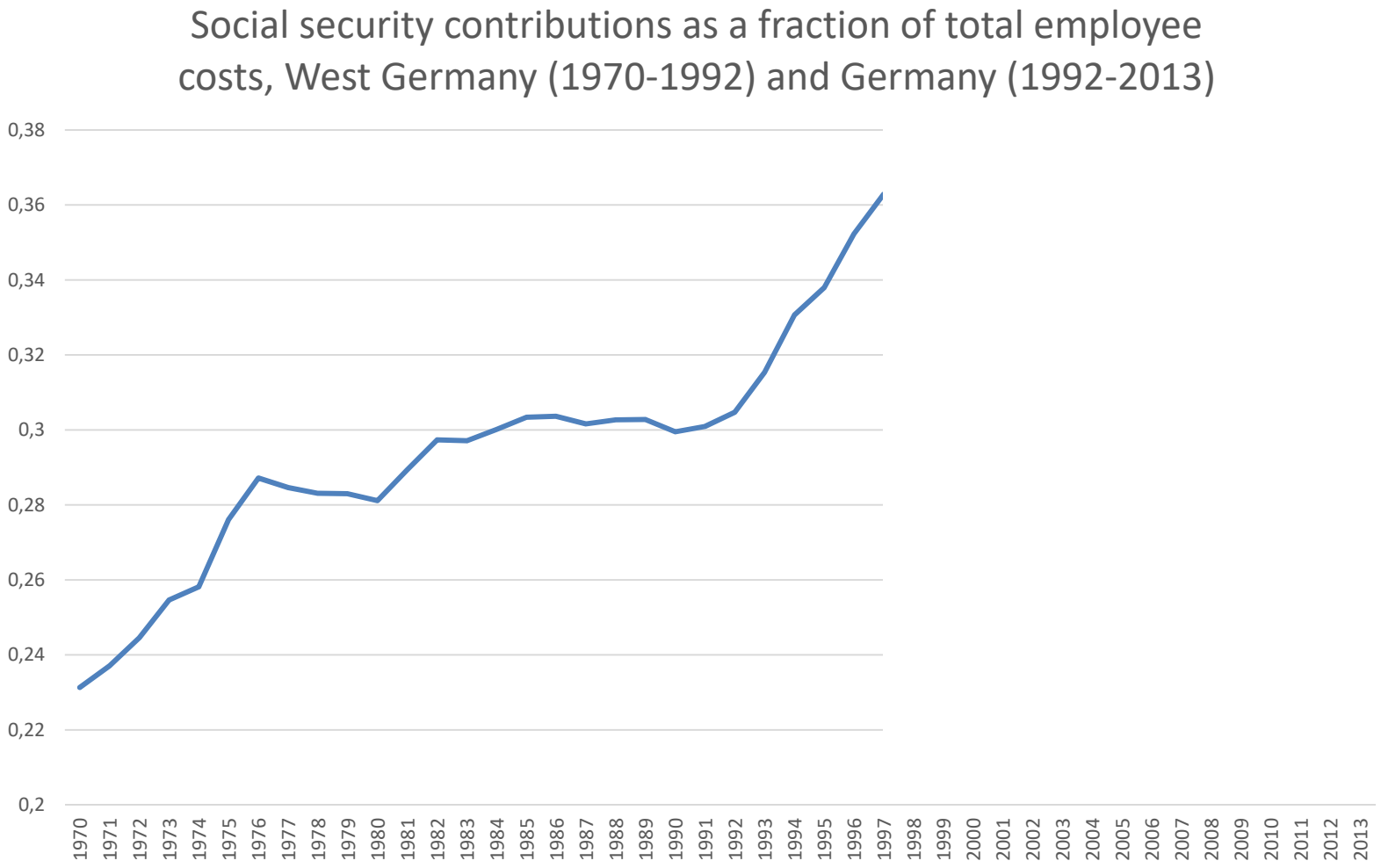
8.5 **Nov 15**

Berlin

9.2 **Nov 16**

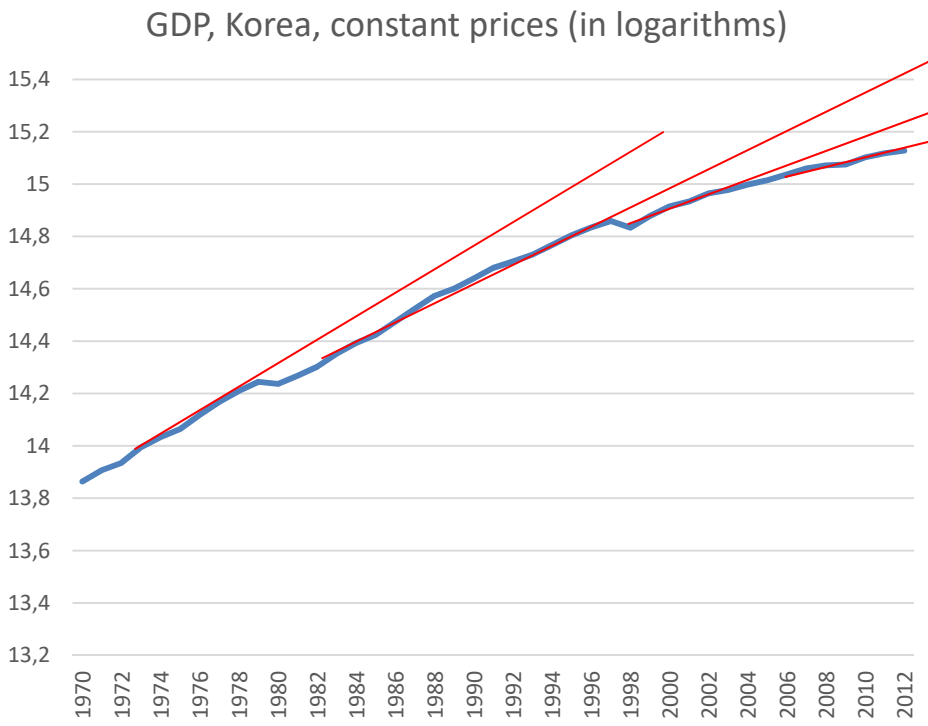
10.0 **Nov 15**

The curse of Bismarck?

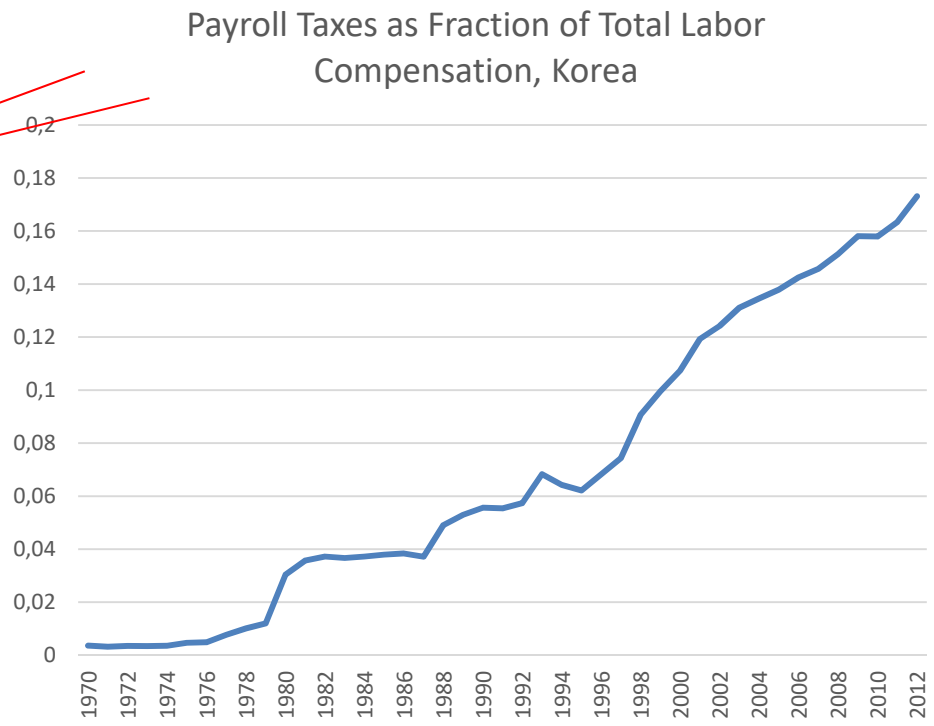


Source: OECD

Also in Korea?



Source: OECD



Source: OECD

Lens of Solow (1957): TFP Convergence?

- While the 2% rule seems to work for Eastern Germany over the whole sample, it didn‘t for the first ten years – in the past decade labor productivity and GDP/capita have *ceased*
- More likely a conditional proposition – to a different steady state (different production function, different steady state level of TFP)
- Refers to research with Battista Severgnini (2015)

Lens of Solow (1957): TFP Convergence?

Denison-Hall-Jones TFP estimates and GDP per capita, 2011

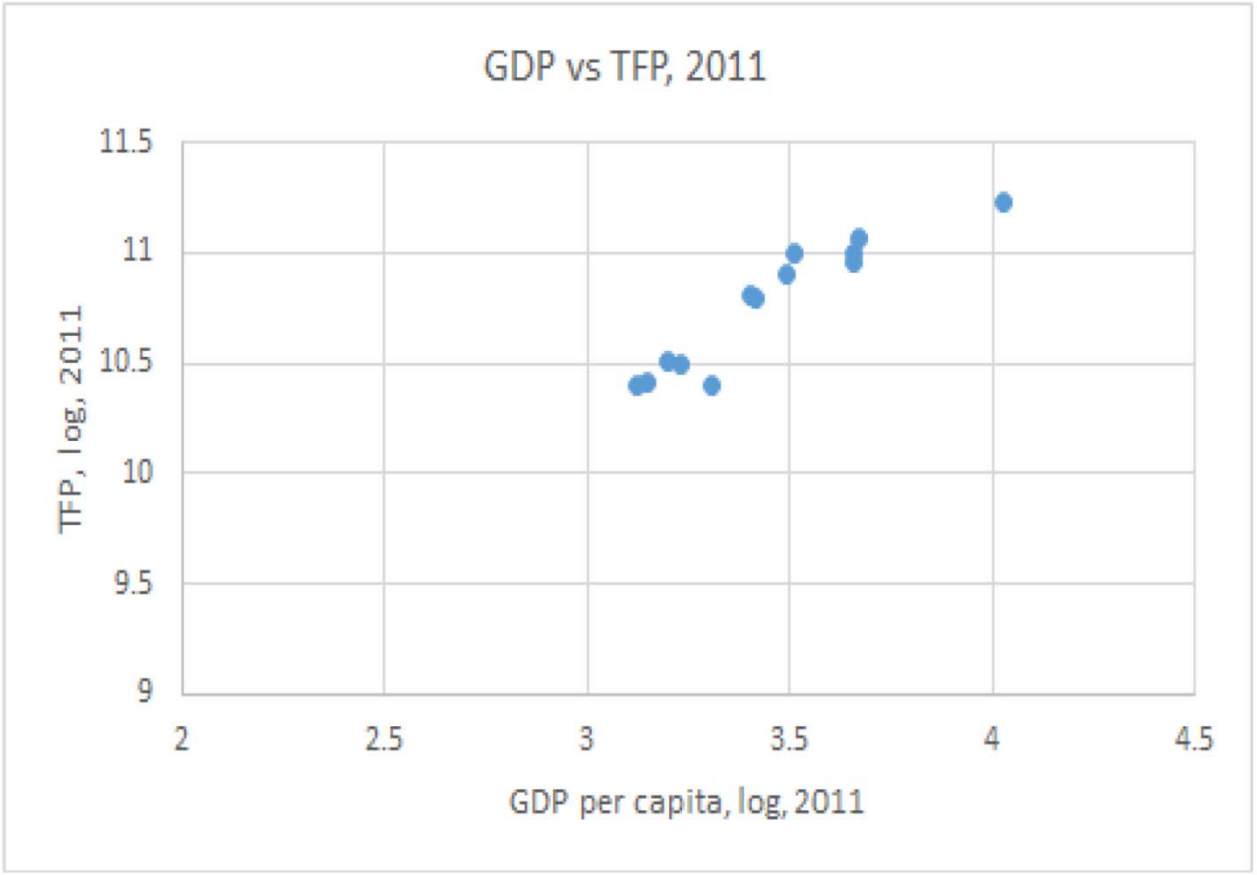


Figure 5: Total factor productivity (TFP) and GDP levels

Lens of Solow (1957): Counterfactuals

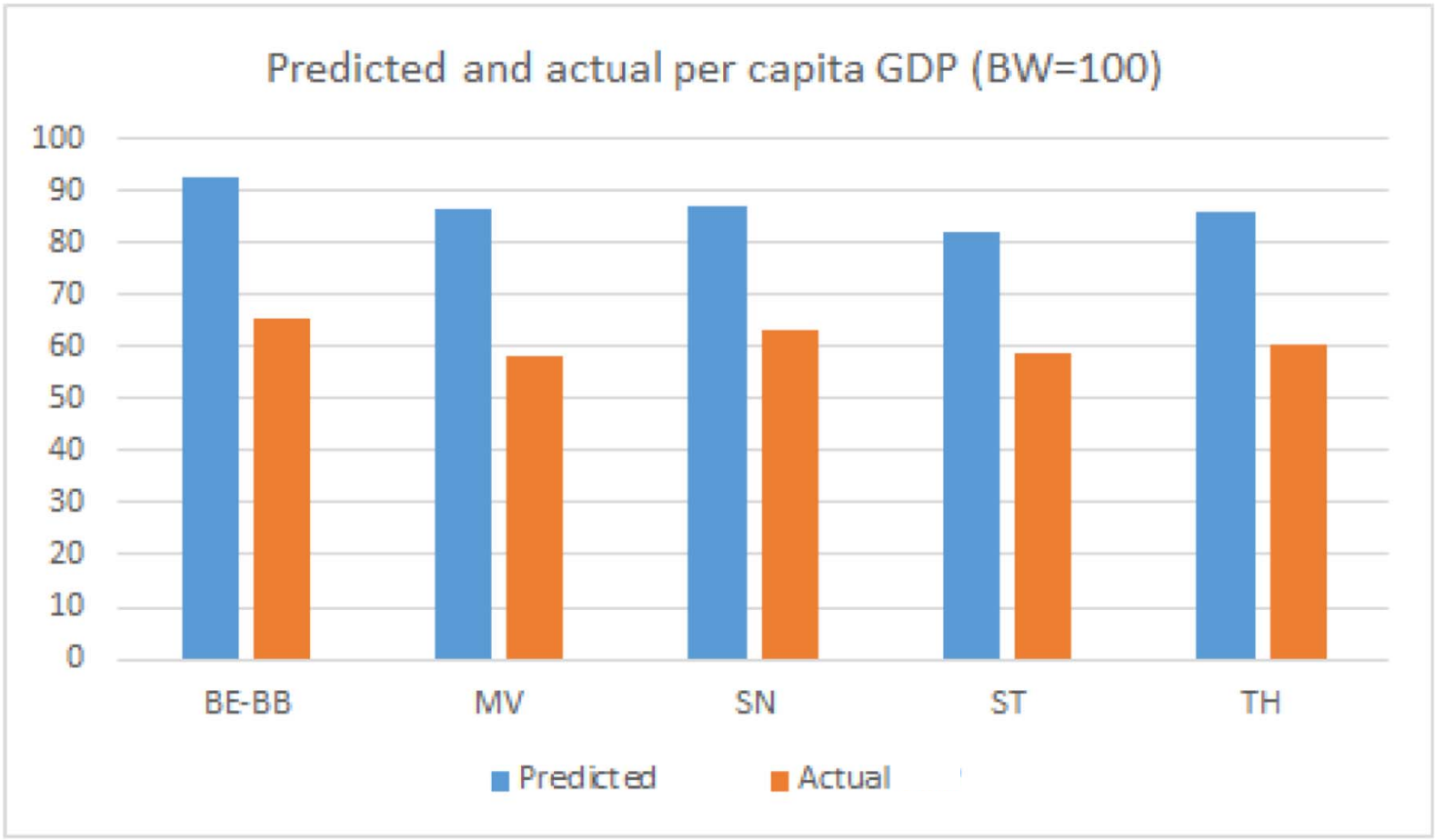


Figure 7: Counterfactual Output

So

Lens of Solow (1957): Counterfactuals

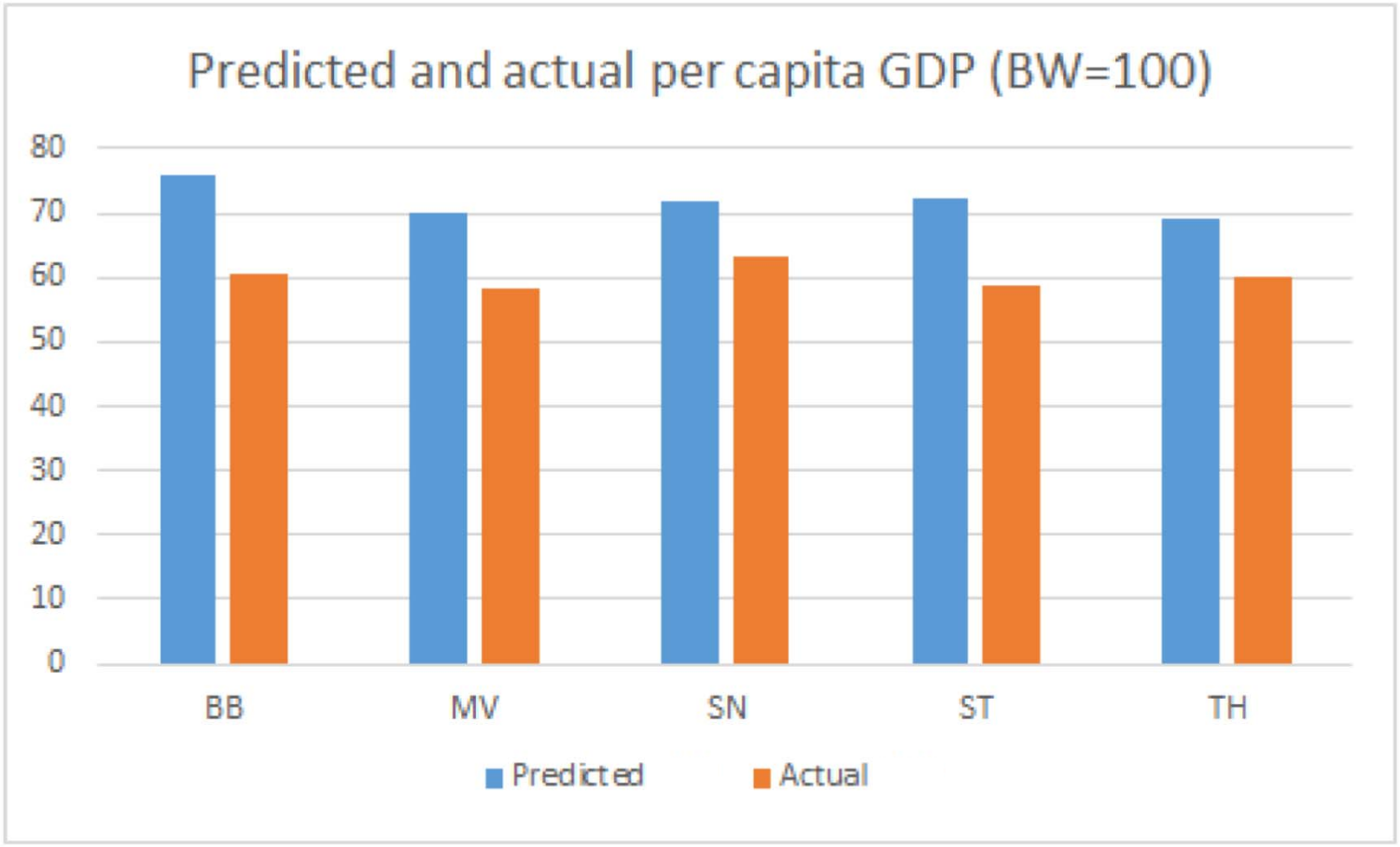
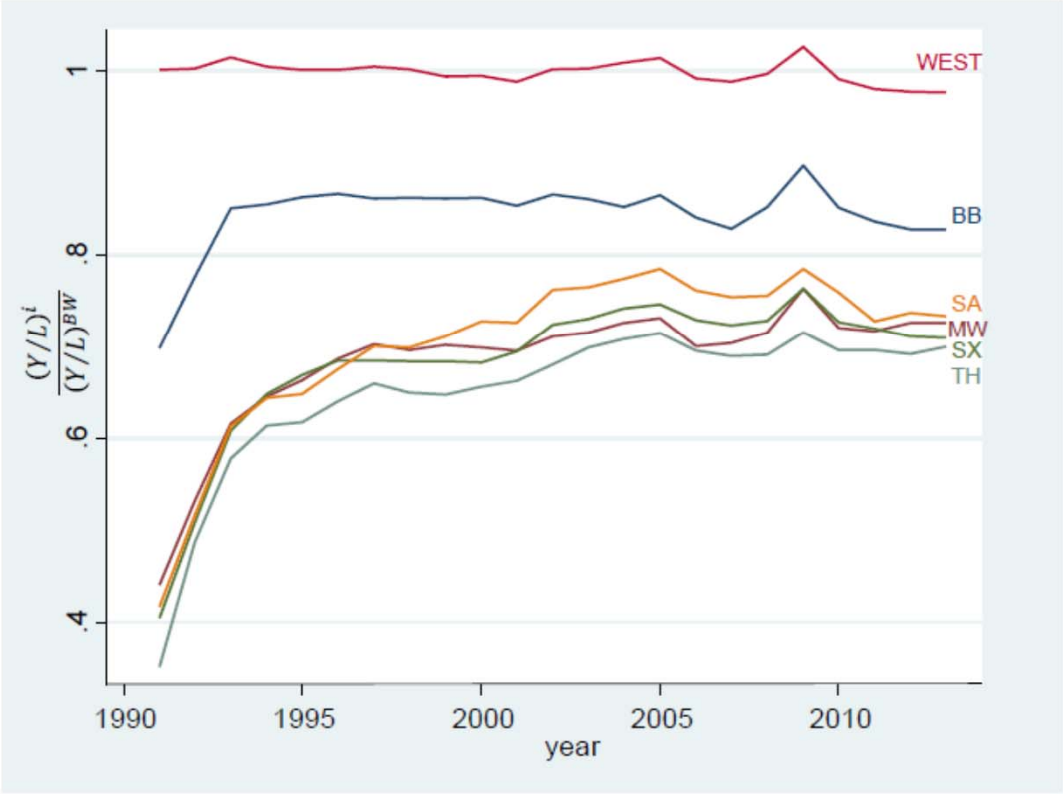


Figure 8: Counterfactual employment ratios

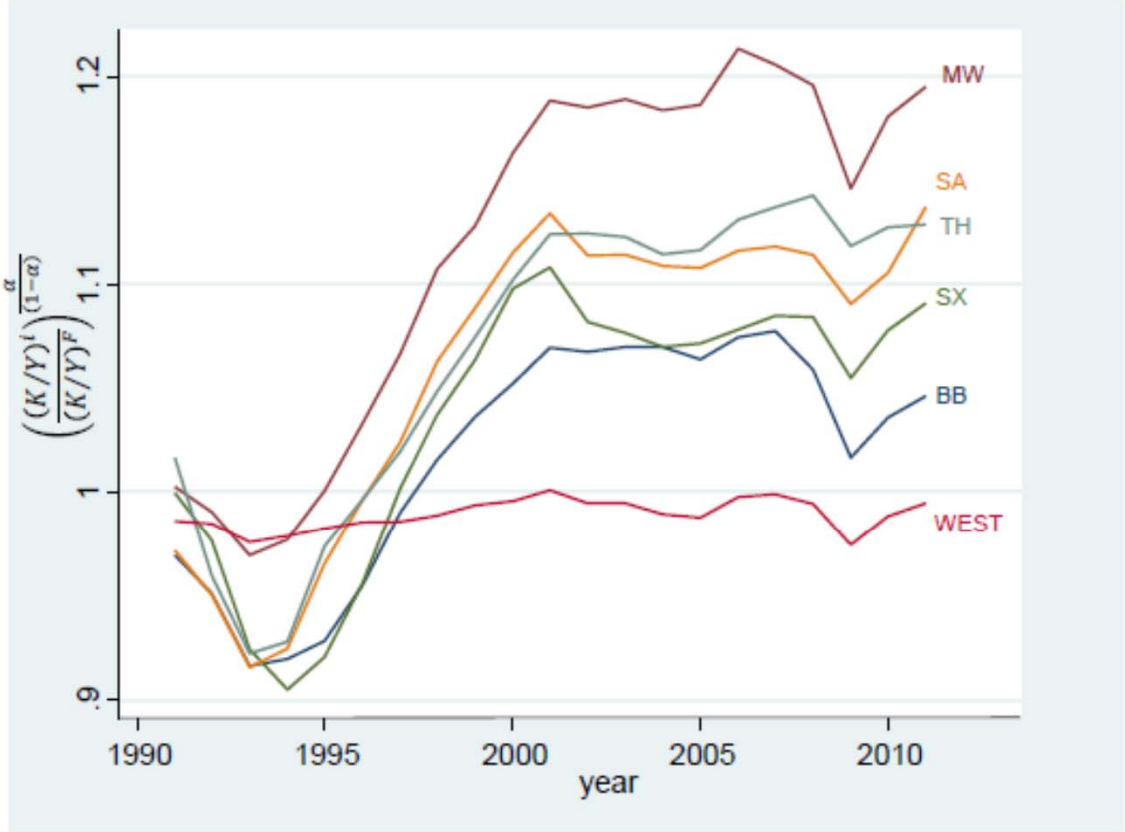
TFP: What is it?

Figure 1: **Labor productivity, expressed as a fraction of Baden-Württemberg (BW)'s, 1993-2013**



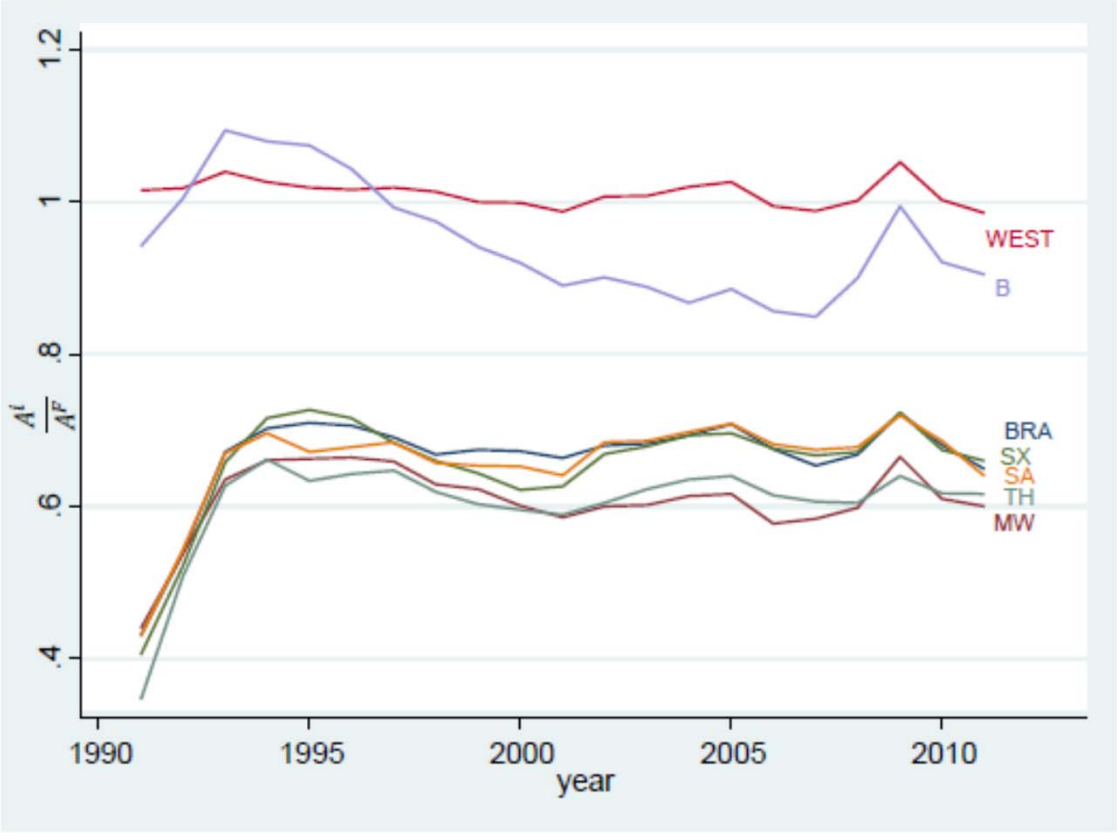
TFP: What is it?

Contribution of capital to labor productivity $(K/Y)^{\alpha/(1-\alpha)}$.



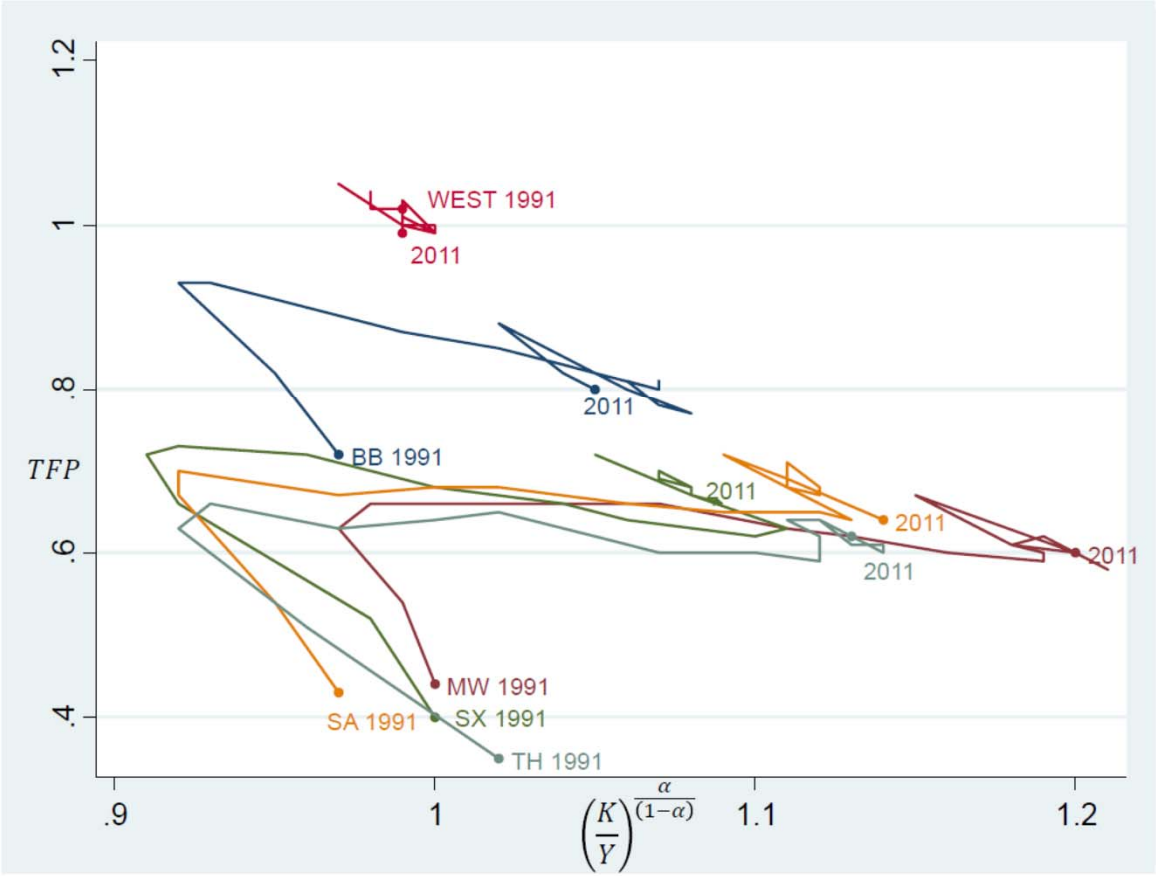
TFP: What is it?

Contribution of total factor productivity (TFP).



TFP: What is it?

Figure 3: Contributions of capital and TPF in the East-West. Denison-Hall-Jones Decomposition 1991-2011.



TFP: Where is it?

Table 2: **Denison-Hall-Jones decomposition of labor productivity in German region-states, 2011, relative to Baden-Württenberg**

Region/State	Total Economy			Agriculture			Industry			Service		
	$\frac{Y}{L}$	$(\frac{K}{Y})^{\frac{\alpha}{1-\alpha}}$	TFP	$\frac{Y}{L}$	$(\frac{K}{Y})^{\frac{\alpha}{1-\alpha}}$	TFP	$\frac{Y}{L}$	$(\frac{K}{Y})^{\frac{\alpha}{1-\alpha}}$	TFP	$\frac{Y}{L}$	$(\frac{K}{Y})^{\frac{\alpha}{1-\alpha}}$	TFP
Baden-Württemberg	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bavaria	1.01	1.05	0.95	0.98	1.12	0.87	1.01	1.02	0.99	1.03	1.03	1.00
Berlin / Brandenburg	0.84	1.05	0.80	0.94	1.03	0.91	0.84	1.29	0.65	0.89	0.94	0.94
Lower Saxony / Bremen	0.91	1.01	0.90	1.36	0.88	1.55	0.96	1.10	0.87	0.93	0.95	0.98
Hamburg / Schleswig-Holstein	1.04	0.99	1.05	0.98	1.01	0.97	0.95	1.13	0.84	1.14	0.87	1.30
Hessen	1.07	0.95	1.13	0.99	1.07	0.93	0.95	1.05	0.91	1.15	0.87	1.33
Mecklenburg-West Pomerania	0.72	1.20	0.60	1.69	0.94	1.79	0.59	1.66	0.36	0.79	1.05	0.76
North Rhine-Westphalia	0.96	0.93	1.03	1.34	0.87	1.53	0.94	1.10	0.85	1.00	0.86	1.16
Rheinland-Palatinate	0.89	1.08	0.82	1.22	0.80	1.52	0.94	1.08	0.87	0.89	1.06	0.84
Saarland	0.89	1.04	0.86	0.86	1.13	0.76	0.91	1.13	0.80	0.90	1.01	0.89
Saxony	0.72	1.09	0.66	1.16	0.91	1.28	0.68	1.52	0.45	0.75	0.99	0.76
Saxony-Anhalt	0.73	1.14	0.64	1.80	0.90	1.99	0.72	1.56	0.46	0.74	1.03	0.72
Thuringia	0.70	1.13	0.62	1.29	0.89	1.44	0.66	1.42	0.46	0.72	1.07	0.68
Eastern Germany including Berlin	0.76	1.09	0.69	1.33	0.93	1.42	0.72	1.45	0.50	0.80	0.99	0.81
Western Germany excluding Berlin	0.98	0.99	0.99	1.13	0.97	1.16	0.97	1.06	0.92	1.02	0.94	1.08
All Germany	0.94	1.01	0.93	1.17	0.96	1.21	0.93	1.12	0.83	0.98	0.95	1.03

Source: Authors' calculations based on *Statistische Bundesamt, Volkswirtschaftliche Gesamtrechnungen.*

Summary of Burda/Severgnini (2015)

- Significant TFP differentials explain persistent East-West gaps in GDP per capita and labor productivity
- Sectoral differences exist, manufacturing dominates
- Capital intensity in East Germany now *exceeds* that of West Germany in industrial sectors
- Frontier approach of Griffith, Redding and van Reenen (2004) links TFP growth to distance to the frontier and R&D
- Very strong explanatory power of manager intensity and density of semi-professionals
- Suspicion that it may also have to do with distrust and lack of social capital

Lessons for Korean Unification

- Back of the envelope: It will be really big and expensive
- Providing North Korea's 25 million with ***half*** of South's 2015 per capita consumption would cost about $160 billion, or about 11% of South GDP ($1.4 trillion).
- This can be expected to last until the North ramps up output, which judging from Germany will take five years (for TFP) or ten years (for West German K/Y)
- Matching Germany's per capita investment in the East for first seven years about (4000 EUR annually of GDP at the time) adds another 2-3% of SK GDP

Lessons for Korean Unification

- Expensive! 13-15% of GDP. Who's gonna pay?
- South Korea may not be „scalable" to the North – low TFP in East Germany has hardly moved in 15 years
- Social system will be a massive burden to Korea's competiveness if extended without qualification to the North (see German experience)
- At currently low (and possibly rising) interest rates, it makes sense to create a sovereign fund to prepare for the day – otherwise unaffordable

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