World Development Indicators

Which country will develop more?

THE WORLD BANK

kaggle

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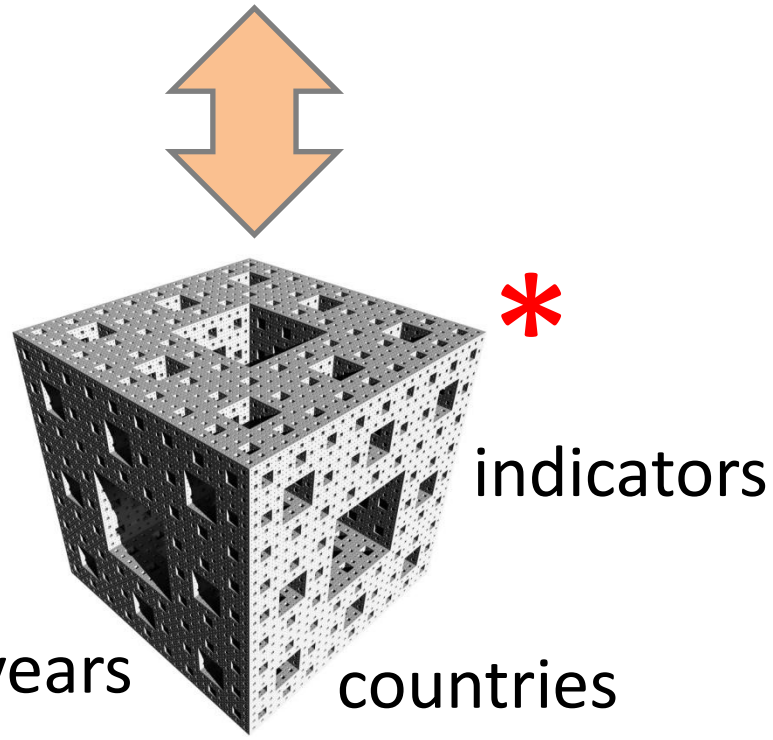
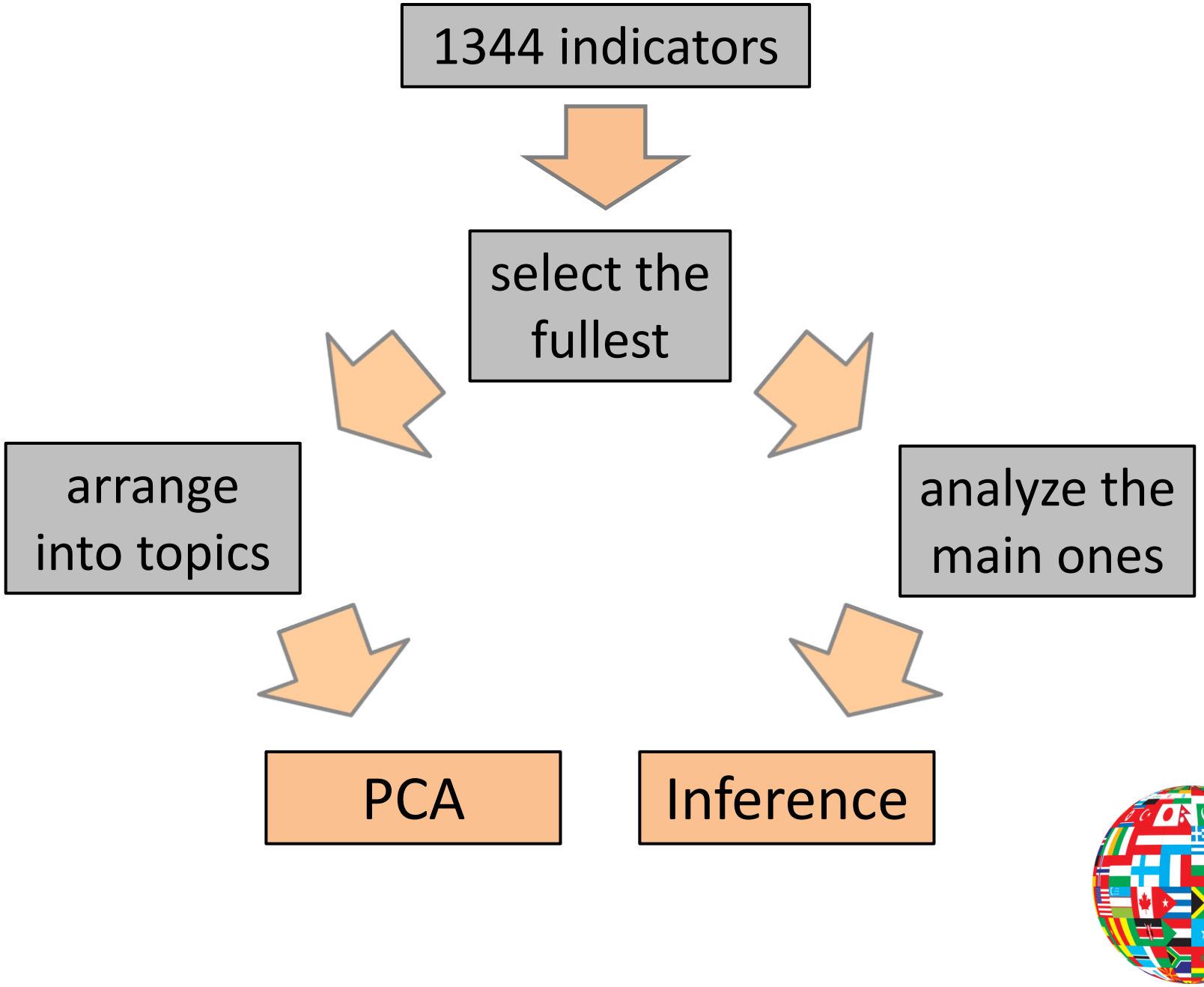
	CountryName	CountryCode	IndicatorName	IndicatorCode	Year	Value
1	Arab World	ARB	Adolescent fertility rate (births per 1,000 women age…	SP.ADO.TFRT	1960	1.335609e+02
2	Arab World	ARB	Age dependency ratio (% of working-age population)	SP.POP.DPND	1960	8.779760e+01
3	Arab World	ARB	Age dependency ratio, old (% of working-age populati…	SP.POP.DPND.OL	1960	6.634579e+00
4	Arab World	ARB	Age dependency ratio, young (% of working-age pop…	SP.POP.DPND.YG	1960	8.102333e+01
5	Arab World	ARB	Arms exports (SIPRI trend indicator values)	MS.MIL.XPRT.KD	1960	3.000000e+06
6	Arab World	ARB	Arms imports (SIPRI trend indicator values)	MS.MIL.MPRT.KD	1960	5.380000e+08
7	Arab World	ARB	Birth rate, crude (per 1,000 people)	SP.DYN.CBRT.IN	1960	4.769789e+01
8	Arab World	ARB	CO2 emissions (kt)	EN.ATM.CO2E.KT	1960	5.956399e+04
⋮	⋮	⋮	⋮	⋮	⋮	⋮
5656455	Zimbabwe	ZWE	Time required to start a business (days)	IC.REG.DURS	IC.PRP.DURS	9.000000e+01
5656456	Zimbabwe	ZWE	Time to prepare and pay taxes (hours)	IC.TAX.DURS	2015	2.420000e+02
5656457	Zimbabwe	ZWE	Time to resolve insolvency (years)	IC.ISV.DURS	2015	3.300000e+00
5656458	Zimbabwe	ZWE	Total tax rate (% of commercial profits)	IC.TAX.TOTL.CP.ZS	2015	3.280000e+01



*much more irregular


1344 indicators
select the fullest
analyze the main ones
Inference
PCA
arrange into topics

Ease to start a business

Agriculture

Economic indicators

Natural resources

Topics

Telecommunication

Productivity

*

Trade

* others may be added

dimensionality
reduction

PCA

2D representation

identification of
particular behaviours

Telecommunications

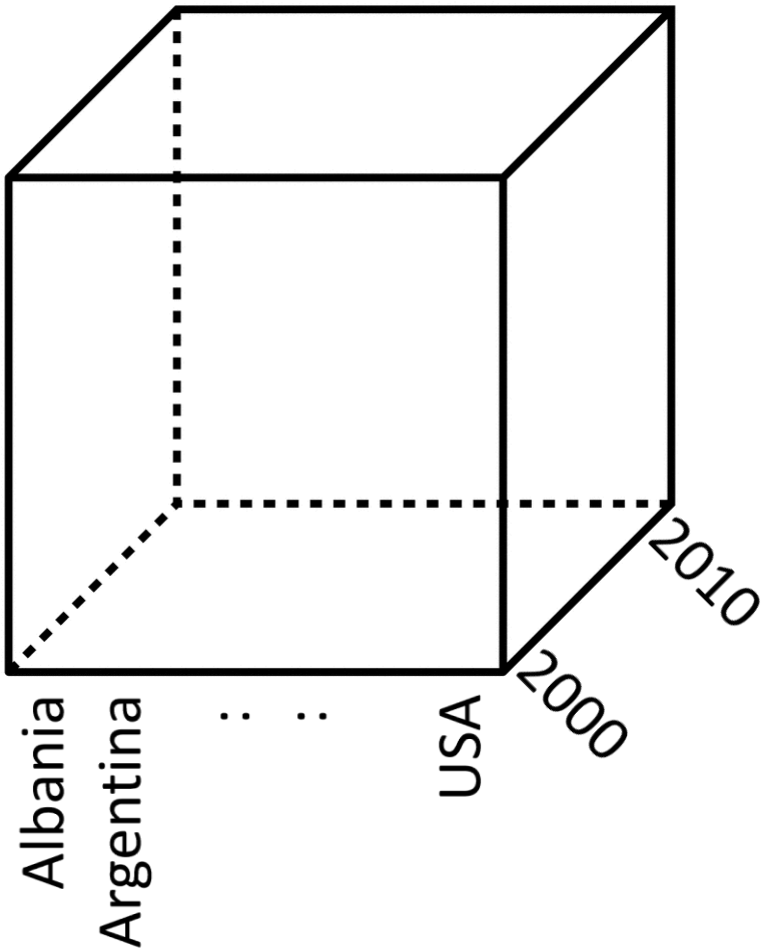
Population growth

Fixed telephone subs

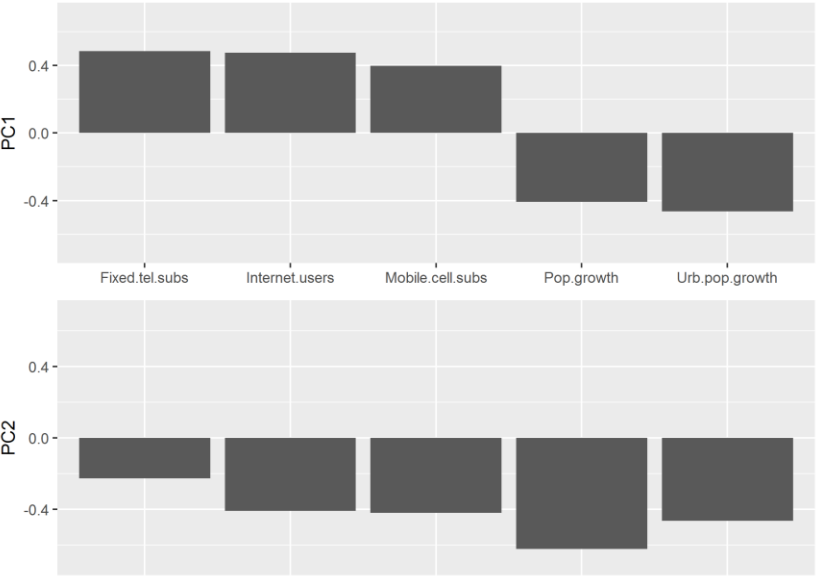
Mobile cellular subs

Urban population growth

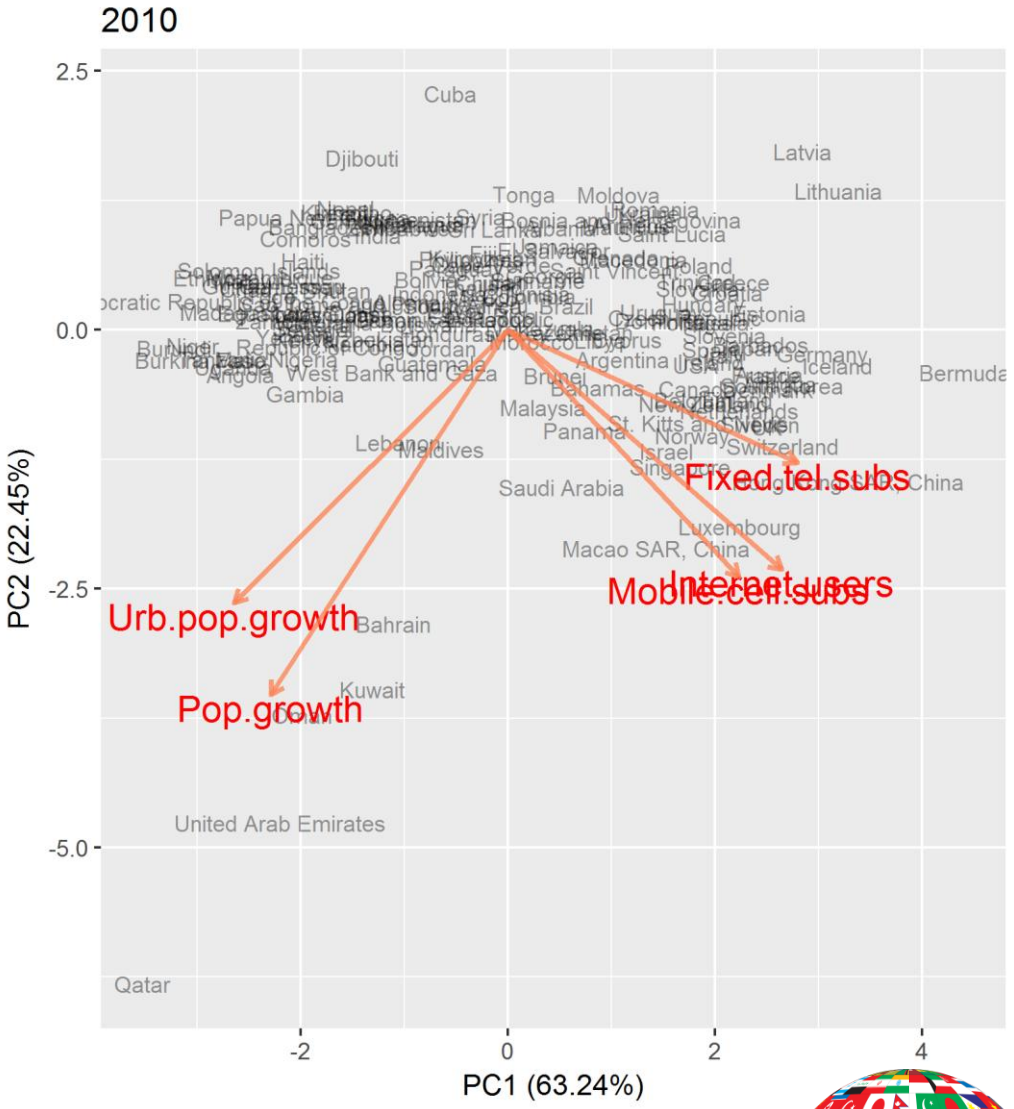
Internet users



PCA for 2010

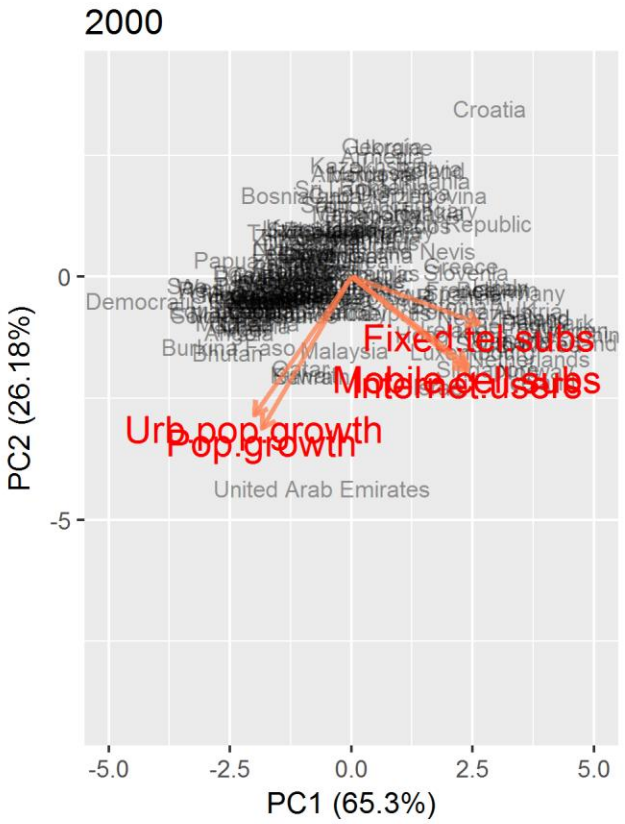


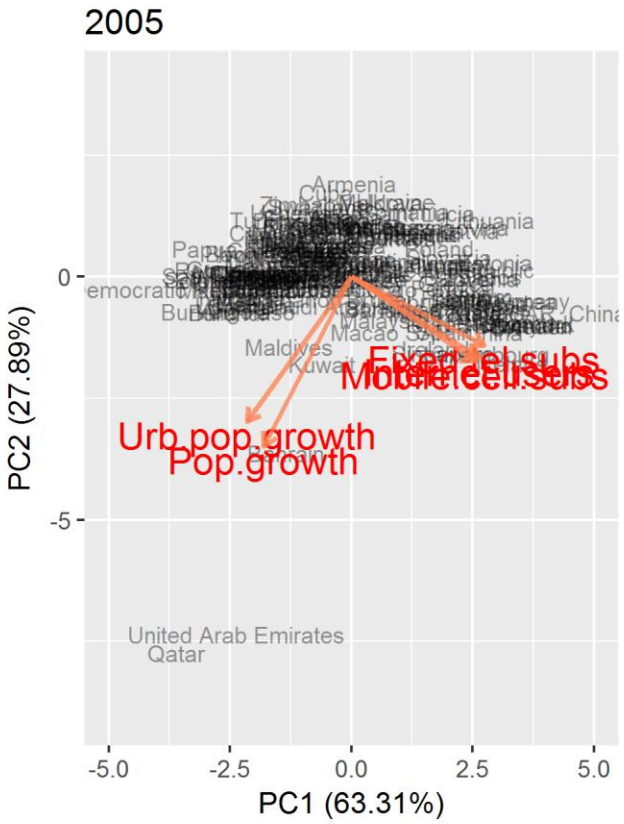
PC1
0.4
0.0
-0.4
Fixed.tel.subs
Internet.users
Mobile.cell.subs
Pop.growth
Urb.pop.growth
PC2
0.4
0.0
-0.4

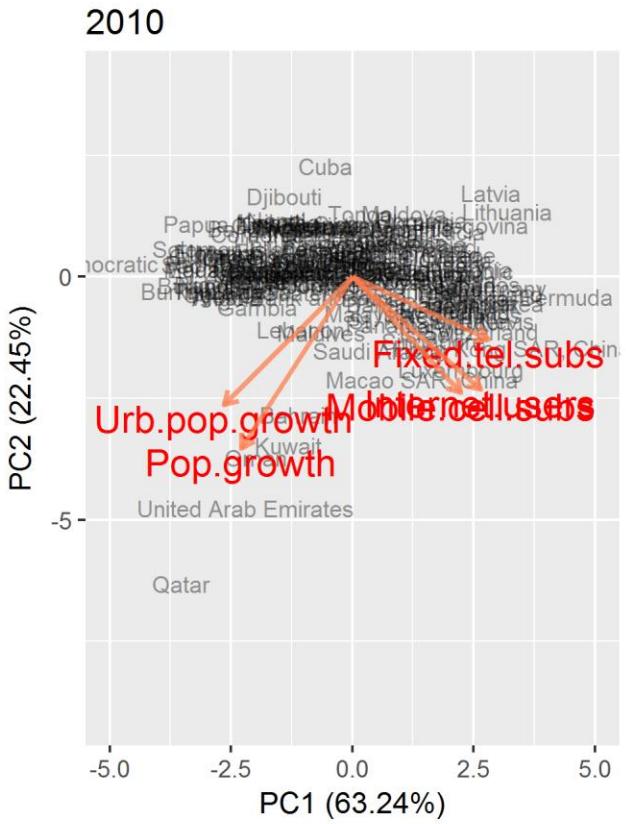


2010
PC2 (22.45%)
PC1 (63.24%)
2.5
0.0
-2.5
-5.0
-2
0
2
4
Cuba
Djibouti
Latvia
Lithuania
Tonga
Moldova
Bermuda
Gambia
Malaysia
Panama
Saudi Arabia
Luxembourg
Macao SAR, China
Bahrain
Kuwait
United Arab Emirates
Qatar
Fixed.tel.subs
Internet.users
Mobile.cell.subs
Urb.pop.growth
Pop.growth

Comparing results 2000-2010





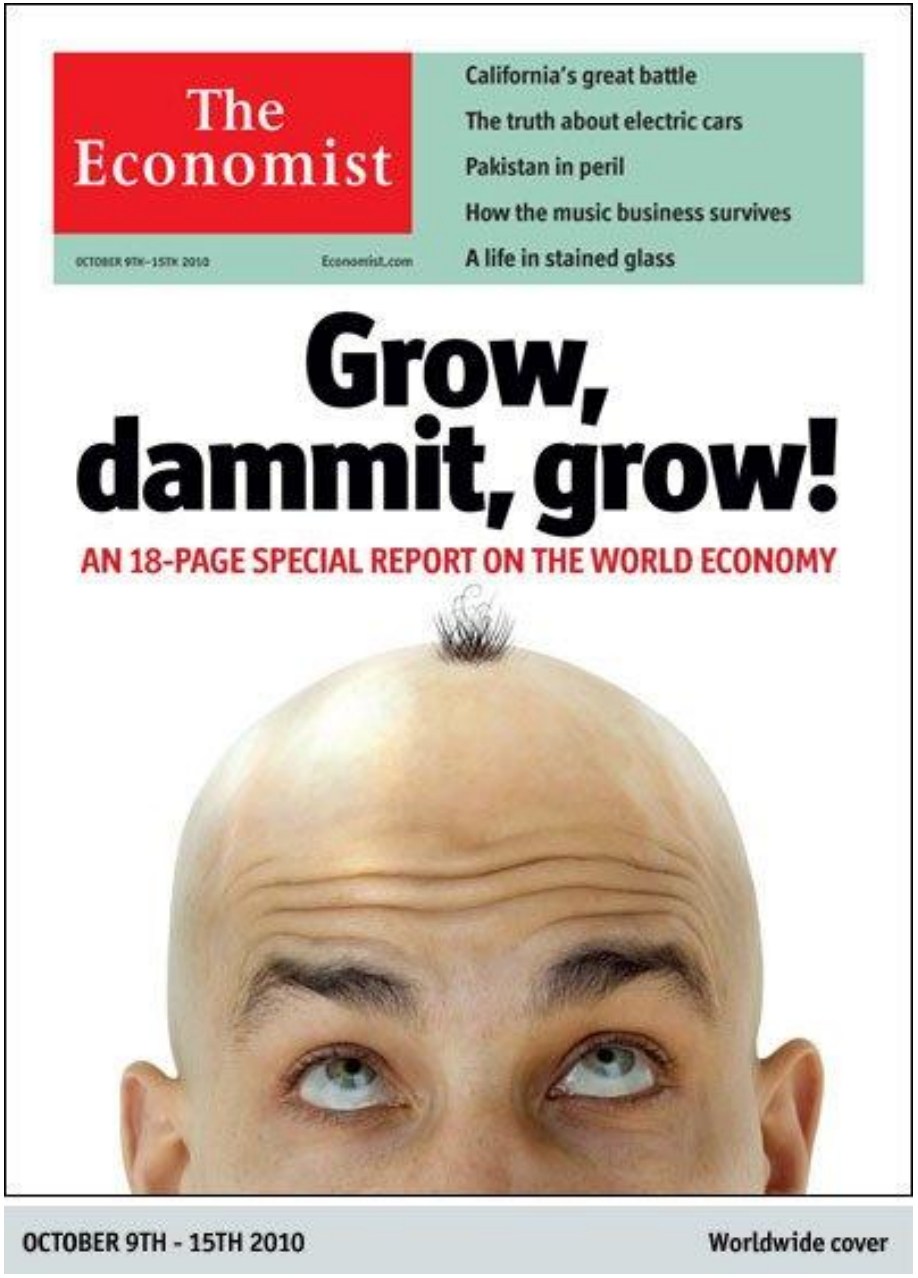


growth

inference

growth during
the 2008 crisis

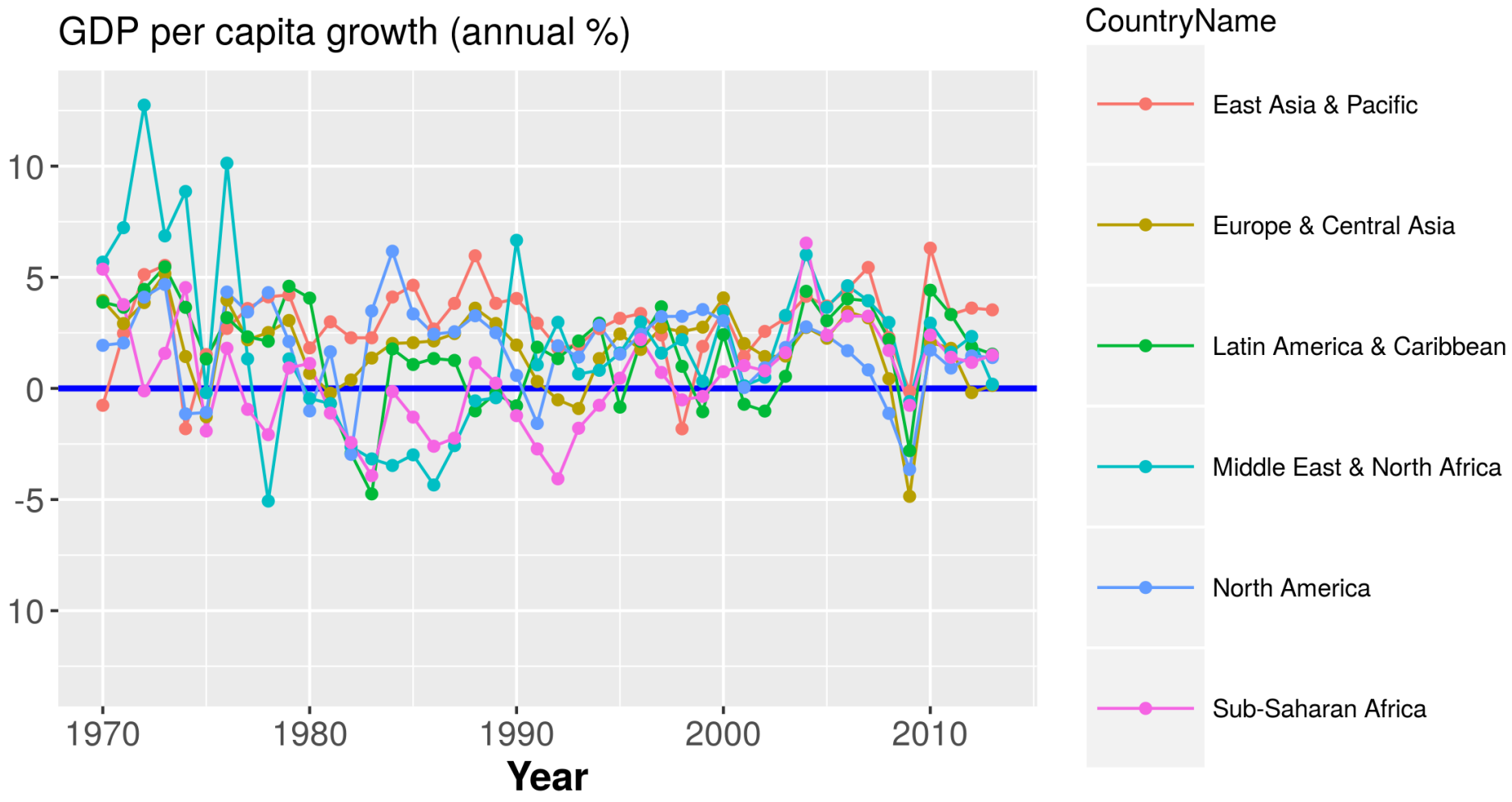
growth vs Income,
Region, and Year



by **growth** we mean the annual percentage variation of the GDP per capita in local currency.
More formally,

$$Growth_t := \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}$$

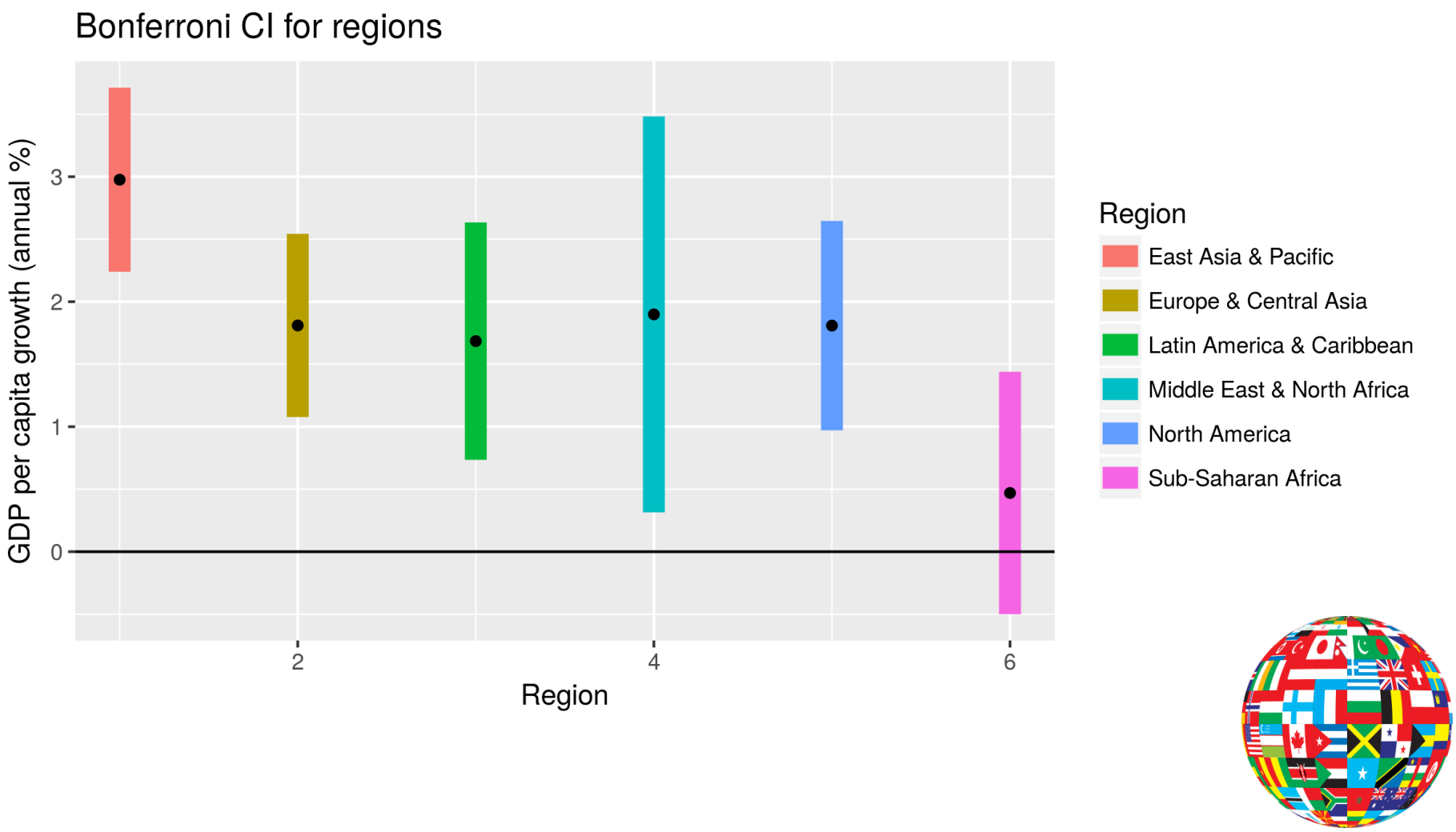
where GDP is the Gross Domestic Product per capita



- ❑ Can we say that there was no growth over this time span?
- ❑ What happened in 2008/2009?

T2 test

$$\begin{cases} H_0 : \underline{\mu} = \underline{0} \implies \text{no growth over the considered time span} \\ H_A : \underline{\mu} \neq \underline{0} \end{cases}$$

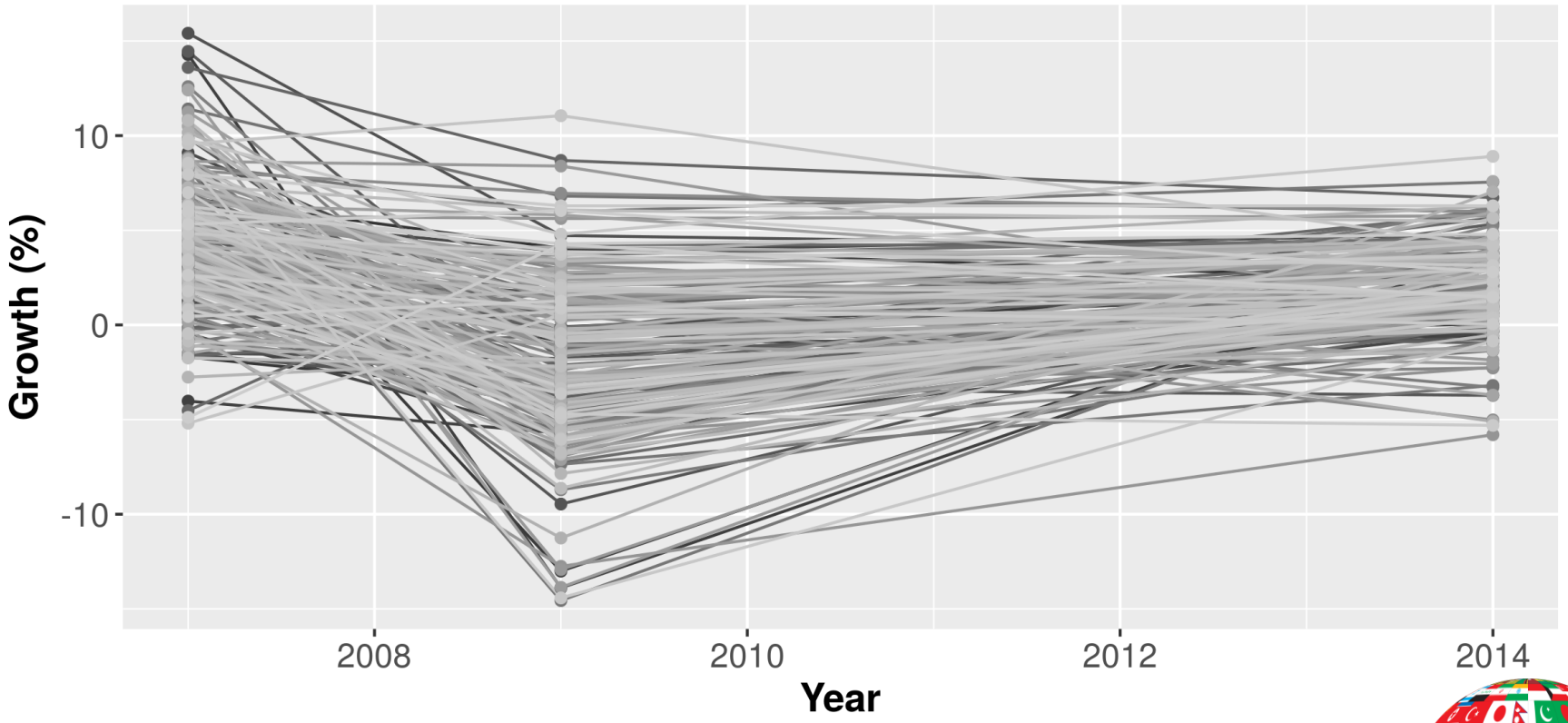


Repeated measures test

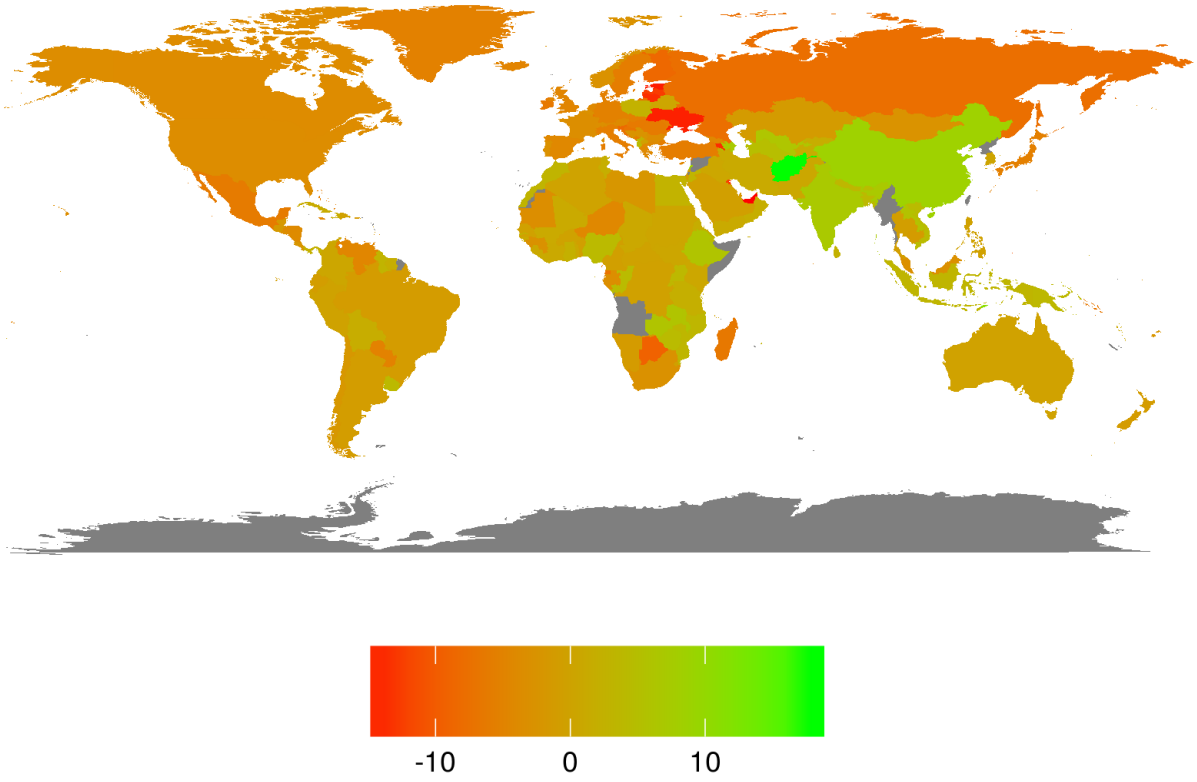
$$\begin{cases} H_0 & : C\underline{\mu} = \underline{0} \implies \mu_1 - \mu_2 = 0 \quad \text{and} \quad \mu_1 - \mu_3 = 0 \\ H_A & : C\underline{\mu} \neq \underline{0} \end{cases}$$

$p.value = 0$

GDP per capita growth (annual %) during the financial crisis



GDP per capita growth (annual %) in 2009



- During an economic crisis does geography play a role?
- Does an economic crisis strike heavier high-income countries than low-income ones?

ANOVA two-way

During crisis

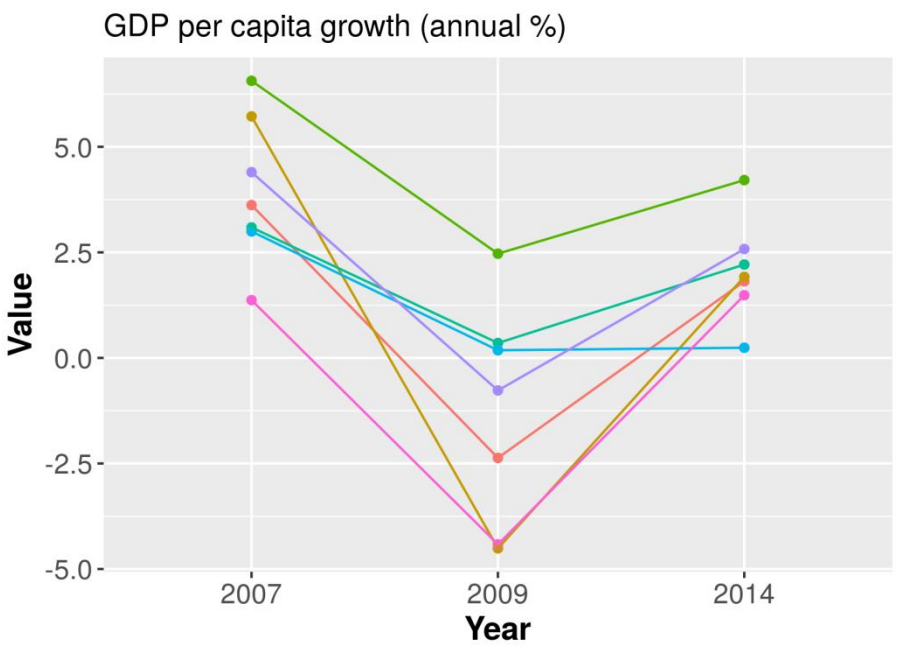
Year = [2007, 2009, 2014]

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
fRegion	6	315.58	52.60	4.43	0.0002
Year	2	3362.03	1681.01	141.59	0.0000
fRegion:Year	12	894.73	74.56	6.28	0.0000
Residuals	533	6328.06	11.87		

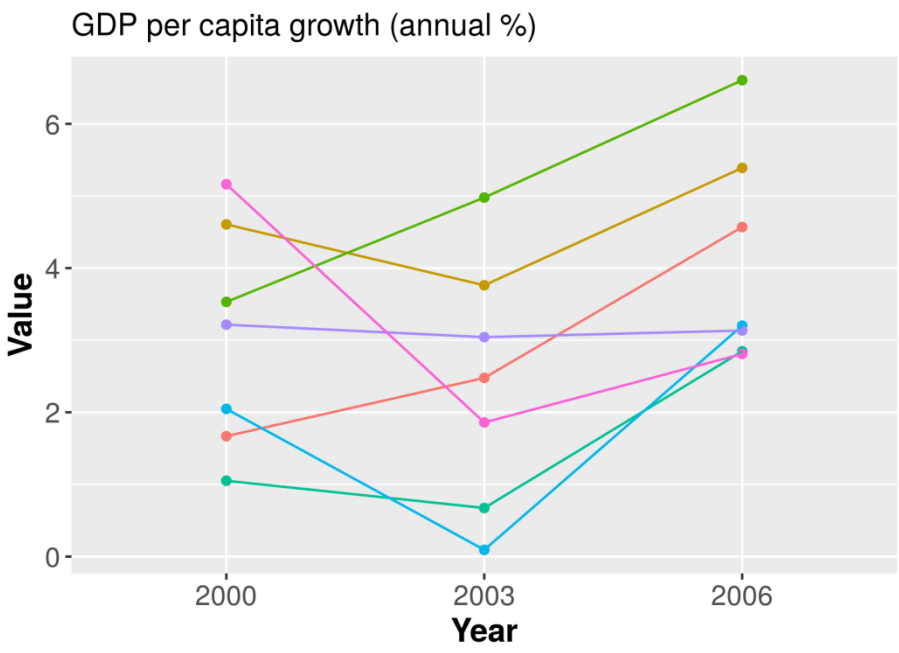
No economic turmoils

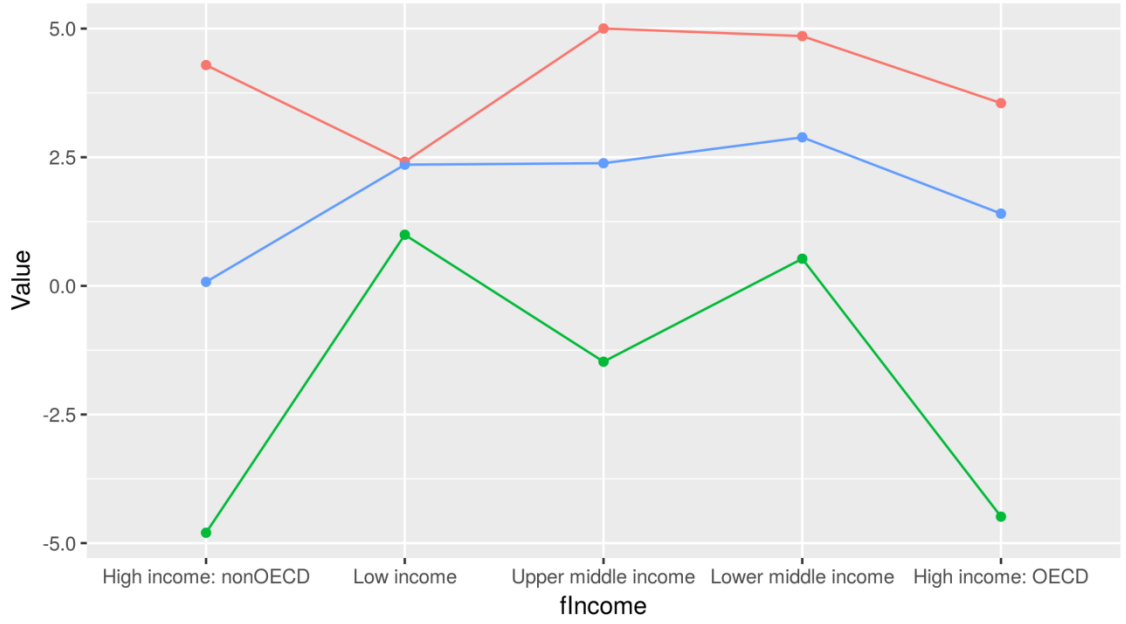
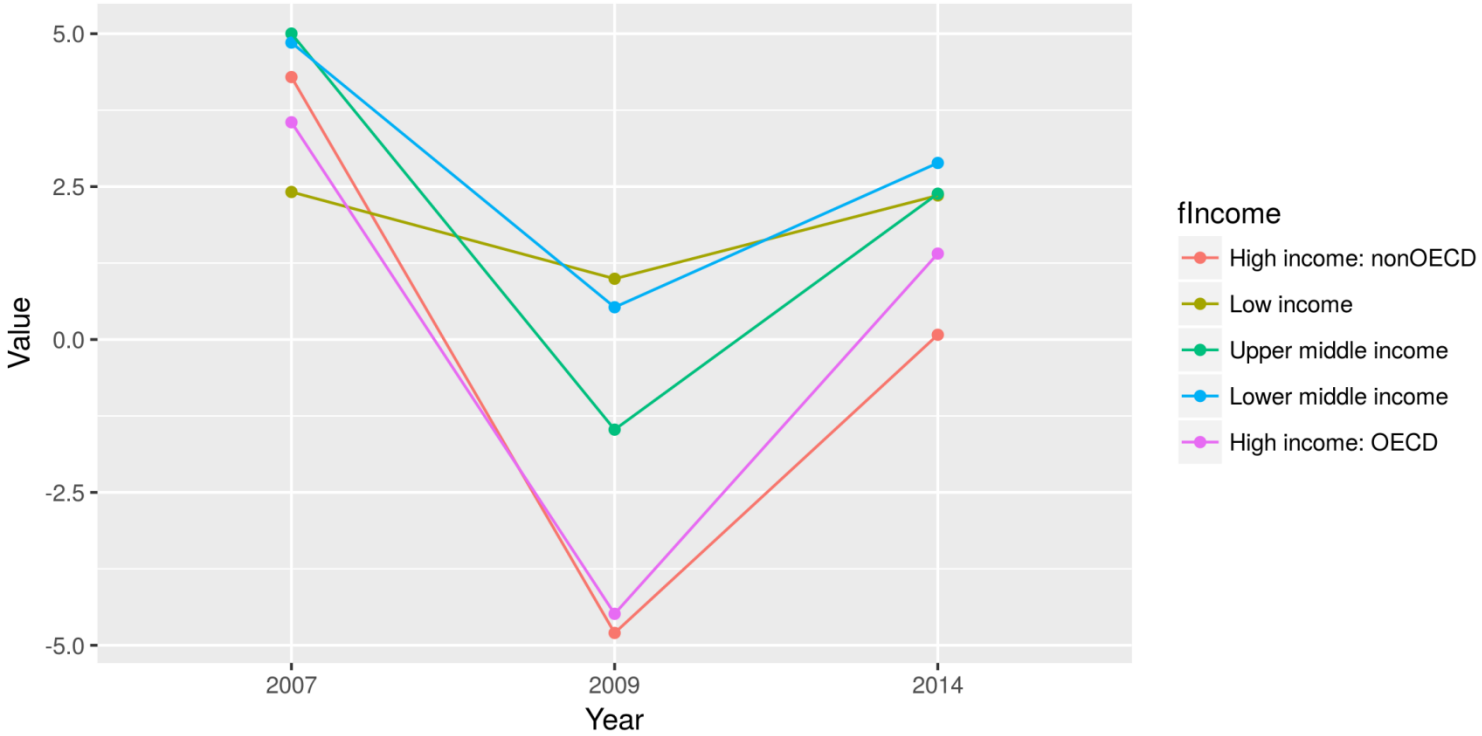
Year = [2000, 2003, 2006]

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
fRegion	6	875.35	145.89	7.37	0.0000
Year	2	317.40	158.70	8.02	0.0004
fRegion:Year	12	171.12	14.26	0.72	0.7318
Residuals	556	11001.81	19.79		



visualize the interaction





Does IncomeGroup affect Growth?