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Exploring relative instances of exposure in equilibrium of migration processes based on population characteristics

1. Introduction

Unfortunately, migration is a relevant topic in the global economy even now, resulting, for example in intercultural and religious conflicts, social pressure, and the structural change of labor markets, because relevant decision makers do not practice – parallel to the classic intuitive approaches – the principles of data-driven policy making. Big Data-like information is supplied, and sophisticated analytical methods are also accessible.

From another perspective, migration could be a source of economic growth, because the modern global economy depends on the production and dissemination of knowledge (if rational constellations can be ensured for the goal of integration). Randomized mixed teams are less effective and less efficient than optimal mixed teams/populations in general, where ideal teams involve members with different characteristics, ensuring that the catalytic effects affect each other. The more the variability of the potential team member is, the greater chance there is to increase the value of the objective function in the frame of an optimization process about team building.

It can be assumed that the relocation of highly skilled people is an opportunity to absorb the most-valuable workforce, enhancing idea generation or intensifying cross-cultural cooperation. However, if elderly women are needed in a highly qualified region, then this sort of person can't be found in each population/culture

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with the same probability. This example increases the necessity of well-prepared optimization applicable to migration processes.

Migration can be both a continuous supply of new knowledge (which is a condition for economic renewal) and a continuous source of problems between unbalanced force fields. It should also be repeated: The ideal population (or an ideal team) should have specific characteristics in specific ratios.

The aim of this article is to advance our understanding of knowledge-based issues of migratory flows in the frame of equilibrium-oriented modeling for estimating a rational level of the "cybernetic state of law" idea; in other words, the creation of a new case for socio-cybernetics (Raven, 2015). If migration policy should change to absorb a more-valuable workforce, then the models should be capable of deriving potentials in each aspect that have a real influence towards success. If the labor market should change by highly skilled human resources, constellations should be identified where even highly educated people are really needed. Average-oriented declarative rules can't cover the complexity of the related phenomena. It is important to be able to derive non-declarative rules (dynamic norms) based on all of the force fields of compared objects (like countries) in a parallel and consistent way in order to respond to the emergence of new cultures and intercultural issues in an optimal way through the educational system. It is also important to implement the future society based on our knowledge about quasi-ideally designed migration processes, because the randomized distribution of people in a given dynamic system can't lead to the optimal solution in an automated way.

This article tries to demonstrate two layers of similarity-oriented principles (in the frame of the MY-X FREE TOOL) about sustainability with the trivial operationalization of these principles even through simulated "Robot-Politicians." The article shows the connection of migration and innovation based on the methodological level in order to be able to derive immigration policies from knowledge transfer perspectives like Big Data and artificial intelligence-oriented modeling. This is done in order to ensure that placing highly skilled immigrants in labor markets leads to a real increase in efficiency instead of a clash between intercultural force fields. In order to ensure a dynamic framework for knowledge-based entrepreneurial ecosystems through optimized intercultural collaboration and improve the education system in a multicultural society, the implementation of the above-mentioned modeling possibilities can be interpreted at the micro-, mezzo-, and macro-levels, locally, regionally, and globally – where matured statistical systems are available.

This article tries to operationalize the artistic principles of Kazohinia by Szathmáry (1941) based on multi-layered artificial intelligence solutions, which were developed to increase the objectivity of human decision-making processes.

2. Basic information before modeling

The following modeling steps are built on a trivial basic decision: each human individual has an unlimited human right to exist. Therefore, segregation/discrimination can't be accepted as a solution for migration problems in general. Parallel to this, it should be assumed that each potential phenomenon can have a solid impact towards migration processes, but a cybernetic force field (a state of law) can only handle existing statistics during the planning phase in order to ensure the highest level of objectivity. An information society has to manage a statistical system where each rational measurable phenomenon will be measured and evaluated in an effective and efficient way. Therefore – based on each set of existing data assets – models can be built without limits. The hermeneutics for the models handling more or less data (phenomena) should try to manage the risks originating from a lack of information. Methodologies can support the maximization of consistency in multi-layered modeling. Models always have a competitive connection to each other. Models with less data can never be seen as better when compared to models handling more data (as long as the modeling approaches are rational and flexible). Model-evaluation can define a set of quasi-unlimited evaluation indicators; therefore, the best model should be derived from each potential fitting value (c.f. Occam's razor). Partial results can only be substituted with more-complex results. The following analyses try to demonstrate a trivial way to robotize the preparations of complex (political) decisions based on a limited set of phenomena.

3. Data asset and analytical steps

As mentioned above, each phenomenon can have an impact on another phenomenon (like migration). The article involved a minimal set of statistical data in order to be capable of interpreting both content and methodology according to the sustainability of migration processes.

3.1. Data assets

The selection of phenomena tries to follow the most-trivial (c.f. Maslow-pyramid) logic: to live in a sustainable way, it is necessary to have land, water, and motivation to work effectively/efficiently, and the population needs to be fertile (see the latter attributes). The depth-level of the analyses became defined via countries and years (see the objects below). The permanently limited number of phenomena is in character for the human intuition processes, where this process is very effective but not risk-free (c.f. demagogy).

3.1.1. Objects

Processes should be analyzed in space and time dimensions. Space is interpreted through countries, because the country profiles are the most-frequently-reported statistics. Time is presented through years (especially 5-year intervals – like 1990–1995, 2000–2005, 2010–2014) because the annual reports are the most-used process in the international statistics system. Though the space and time raster got chosen rationally, the volume of the lack of data couldn't be limited arbitrarily. The ratio of the lack is ca. 10%: Countries with an acceptable volume of data are as follows: HUN / ISL / EST / CAN / CZE / ESP / SWE / FRA / NOR / SVK / JPN / PRT / FIN / POL / DNK / ITA / LUX / DEU / GBR / AUS / BEL / NZL / NLD / AUT / KOR / SVN / USA / IRL / CHL / TUR / ISR / MEX / CHE + an artificial average object supporting calibration processes or sensitivity analyses. The number of countries is 33+1. The number of year-intervals is 6. The number of objects is about 204.

3.1.2. Attributes

The so-called 'independent' attributes as such are freshwater/capita, cropland/capita, grassland/capita, pasture/capita, child/woman, wage/capita, ratio of working population, and (as a dependent variable) the annual growth rate:

– https://data.oecd.org/lprdty/gdp-per-hour-worked.htm,
– https://data.oecd.org/pop/fertility-rates.htm,
– https://data.oecd.org/pop/population.htm,
– https://data.oecd.org/pop/working-age-population.htm,
– https://data.oecd.org/popregion/national-population-distribution.htm,
– https://data.oecd.org/agrland/agricultural-land.htm,
– http://stats.oecd.org/viewhtml.aspx?datasetcode=WATER_RESOURCES,
– http://stats.oecd.org/viewhtml.aspx?datasetcode=WATER_TREAT.

The directions for the independent variables are as follows: the more resources (water, land, wages/money) are available in a given region during a given time interval, the more the annual growth rate should be (c.f. absorption potential concerning migration). Parallel to this, the lower the fertility rate and ratio of the working population, the more the annual growth rate should be.

Directions can be proven through an inverse logic: without resources, it is hardly possible to live in a given small area without water; and where the fertility is high and a high ratio is currently working, it is hardly possible/necessary for more people to integrate.

3.1.3. Lack of data

As we have already declared, the raw data produced volumes of the lack of data, a total of ca. 10%. Parallel to this, the validity rate of the estimations is ca. 50% concerning the space-time objects. The lack of raw data became filled through the value of the previous given time period for the same spot. In the case of invalid estimations, the lack of data became substituted through the average estimation errors for each country.

3.1.4. Standardization

At first, the raw data became standardized via the creation of relative attributes (like resources/capita). Before modeling, each relative attribute was ranked for similarity analyses, where the potential information lost through ranking can be compensated with the flexible staircase functions of the attributes.

3.2. Models

To be able to derive the migration potentials for countries, it is necessary to create models like production functions where well-known values of the dependent variables should be reproduced based on independent variables. The hermeneutics of estimation errors can be defined as follows: if the estimation is higher than the fact of the given object, then the dependent variable should be higher in the case of the given object (and vice-versa). Of course, it was noted that the correlation between the estimated values and the given facts of the dependent variable should be as high as possible. It is always necessary to derive estimations that are valid.

After producing the raw estimations for the space and time objects, it is necessary to create a second modeling layer where the objects are limited to the countries and the attributes are the selected time periods and their statistics (like average and trend). The model should search for those objects where estimation errors (derived as the difference in % between fact and estimation) are relatively high in the negative interval (which means the dependent variable, like the annual growth rate, could be higher). Parallel to this, the trend of the estimation error of a country should also be minimal (which means the tendency of overestimation is increasing).

3.3. Detailed steps of models

In this complex analysis, there are two model-chains. The first chain produced estimated ranks of countries concerning absorption potential based on valid and invalid estimations and the parallel chain count potential in necessity of educated people The next chapters detail what kind of elementary steps were necessary to produce the above-mentioned figures as final results.

For both chains of the model phases, it was inevitable to identify data sources (URLs) via Google searches. The explored data in diverse tables can have special meta-information sets (like a country name with code or text); therefore, a kind of consolidation of the used terms is always necessary, even if it's just a step in the general quality management process of modeling.

3.3.1. General pressure index of the variable "annual growth rate"

To derive the pressure index of the variable "annual growth rate," the basic data from the OECD adopted the structure shown in the chart below (Tab. 1):

Table 1

Structure of raw data from OECD

Location	Indicator	Subject	Measure	Frequency	Time	Value
Aus	Fertility	Tot	chd_woman	A	1960	3.45
Aus	Fertility	Tot	chd_woman	A	1961	3.55
Aus	Fertility	Tot	chd_woman	A	1962	3.43
Aus	Fertility	Tot	chd_woman	A	1963	3.34
Aus	Fertility	Tot	chd_woman	A	1964	3.15
Aus	Fertility	Tot	chd_woman	A	1965	2.97
Aus	Fertility	Tot	chd_woman	A	1966	2.89

Source: OECD, own presentation – demo view

The next preparation step in the chain is producing the amount-chart based on pivot-services (amount of data per year and country).

The maximum available data for each country is 14 (see Tab. 2), and the minimum value is 2. The rational set of variables is 7 independent variables, and the annual growth rate was a dependent variable for 6 time intervals (incl. lack of data [see red marks] substituted with the previous existing data [see Tables 3, 4, 5]):

Table 2

Number of attributes according to years and countries

Location	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
AUS	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	6	7	6	5	276
AUT	11	10	10	10	10	8	7	7	8	12	13	13	13	13	13	12	9	12	13	12	7	6	8	6	2	245
BEL	12	12	12	12	12	13	13	13	13	13	13	13	13	13	13	12	12	12	12	12	12	6	7	6	5	286
CAN	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	13	12	12	13	6	6	7	6	5	272
CHE	12	7	7	6	6	7	12	13	13	13	13	13	13	12	12	13	12	12	12	12	13	6	7	7	2	255
CHL	12	12	12	12	12	12	12	10	12	12	12	12	12	12	13	12	13	12	12	7	6	6	7	6	5	265
CZE	11	11	11	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	7	7	6	5	292

Source: own calculation – demo view

Table 3

Raw data in object-attribute-matrix

Location	Time	Fresh water	Cropland/capita	Grasland/capita	Pasture/capita	Child/woman	Wage/capita	WKGPOP	Annual growth rate
AUS	1990	16738	2801033	0	24406494	1.9	35	66.90107	1491
AUS	1995	16738	2949181	0	22782560	1.82	38	66.5704	1123
AUS	2000	16738	2500552	0	21437438	1.76	43	66.85059	1153
AUS	2005	16738	1324527	0	20737672	1.85	47	67.31427	1224
AUS	2010	16738	1178649	0	16912309	1.95	49	67.3838	1567
AUS	2014	16738	1178649	0	16912309	1.95	53	66.4595	1578

Source: own presentation – demo view

The 204 objects (33 countries + an average of them) for the 6 time periods with 7 input variables (incl. additional water information) and 1 output variable made it possible to derive a production function (simulator) for the annual growth rate based on layers of similarity analyses with 35 stairs in the framework of 204 objects. The model has 101 invalid positions where the inverse staircase function and the direct staircase function didn't deliver a symmetric estimation-pair for the annual growth rate per year and country. The estimations and facts produced a correlation value of 0.4.

The valid estimations make it possible to derive a cross-chart for countries and time periods with further characteristics (like the trend of differences between facts and estimation [called delta] concerning annual growth rate).

Table 4

Valid differences between facts and estimation according to years and countries

Location	Time						Average
	1990	1995	2000	2005	2010	2014	
AUS	–	–	–2.66	–	–	–0.88	–1.77
AUT	–11.06	7.55	–8.13	–2	–	–	–3.41
BEL	4	–	–	–	–	0.1	2.05
CAN	–0.8	–4.82	–5.67	–5.52	–3.67	–5	–4.25
CHE	7.45	–	–	–	–	–	7.45
CHL	2.09	–5.97	–	1.77	2.52	1.74	0.43

Source: own calculation – demo view

Table 5

Substitutions and trend values for anti-discriminative modeling

Location	Time						Average	Trend
	1990	1995	2000	2005	2010	2014		
AUS	–1.77	–1.77	–2.66	–1.77	–1.77	–0.88	–1.77	0.03
AUT	–11.06	7.55	–8.13	–2	–3.41	–3.41	–3.41	0.07
BEL	4	2.05	2.05	2.05	2.05	0.1	2.05	–0.11
CAN	–0.8	–4.82	–5.67	–5.52	–3.67	–5	–4.25	–0.10
CHE	7.45	7.45	7.45	7.45	7.45	7.45	7.45	0.00
CHL	2.09	–5.97	0.43	1.77	2.52	1.74	0.43	0.15

Source: own calculation – demo view

The similarity analysis only needs the ranked view of the raw data for each attribute, where the lack of data for the time series was substituted with the rank value of the average field. Rank values can be seen on table 6.

Table 6

Ranked inputs for anti-discriminative modeling

Location	1990	1995	2000	2005	2010	2014	Average	Trend	Y
AUS	15	18	15	18	17	22	18	25	1000000
AUT	2	31	4	15	9	13	10	28	1000000
BEL	25	23	26	27	25	24	25	8	1000000
CAN	16	7	5	5	8	8	6	9	1000000
CHE	32	30	32	33	32	32	33	16	1000000
CHL	21	5	21	26	27	27	22	30	1000000

Source: own calculations – demo view

In the case of massive lacks in the time series, the trend value could not be derived (See Table 5 for CHE = Swiss). The estimated trend was 0. The ranked inputs in this second model layer lead to an anti-discrimination model where the dependent variable was an artificial variable consisting of a constant value for each object (country) used for the ability to derive whether each country can be seen as the same object concerning the exposure index of migration pressure.

The second model layer delivered estimations for norm-like behavior, high-exposure, and low-exposure situations as a kind of risk simulation according to migration pressure. The time-period-oriented delta values and their averages have a direct interpretation in the case of the direction of the variables. The trend values (based on the time periods) make the risk of exposure higher in the case of lower values (which means in the case of more and higher differences from the norm values). The know-how in the aggregation of arbitrary risk layers delivers the anti-discrimination model logic, because ranked model inputs will be re-weighted in the frame of an optimization process where the aim is to approximate the same risk potential for each object (each constellation).

Invalid estimations are available for 8 countries from 34 objects (CAN, CZE, LUX, SWE, EST, PRT, KOR, CHE). For anti-discrimination, the models' correlation cannot be calculated.

3.3.2. Detailed indexes for educated human resources

The preparation steps for these models are the same as before until the input sides of the object-attribute-matrixes are created. Only the dependent variables were substituted: first with the HR-ratios for the male population, and later for the female population.

The adapted OAMs were processed using the same logic as before: first, for each question (male/female), a classic production function was generated. These models have only 25 countries with 3 time periods (2005, 2010, 2014) because the data was available only in this volume.

The correlation in the model for males is 0.9. The invalidity rate is 39/75. The correlation in the model for females is 0.86. The invalidity rate is 33/75.

The second model layer (anti-discrimination models) produced only valid estimations for both models.

Further layers for arbitrary detail indexes can be calculated in the same way for completing the analysis and for ensuring consistent control steps between the dependent layers and the general risk values – especially in the case of the estimations for people volumes in capita.

3.3.3. Estimation of annual growth rates

The first model is a standard estimation model where the dependent variable (annual growth rate) in the case of the 204 objects should be derived based on the 7 independent variables. The sum of estimations should be the sum of the values of the dependent variable. The estimation and facts deliver a correlation of 0.4. It's important to note that the inverse model with inverted directions delivers a correlation between estimations and facts at ca. 0.7. This shows that the logic behind the annual growth rate is partially irrational. The lower the volume of the necessary force fields, the more the annual growth rate will be. The amount of invalid estimations can be derived through inverse modeling. Ca. 50% of the objects are invalid. One country (GRC) could not produce valid estimations for the six time periods due to the statistical system of Greece (c.f. OECD, 2011)

The second model-layer expects a new OAM, where the objects are the countries and the attributes are estimation errors of the time intervals and their trends.

3.3.4. Estimation of required education levels

The education levels for male and female (c.f. human resources in science and technology (HRST) – % of active population [source: Eurostat – 2003–2014]) can also be modeled in the same way as before.

The basic idea is that the same independent variables as those of the estimation of the annual growth rate allow us to derive models for the ratio of educated males and females, because the potential of population density runs parallel to the rational portion of potential leaders.

Therefore, the first models (for the male as well as the female population) try to derive a production function where the ratio of the educated population in the case of males and females (Y) should be reflected based on the already-introduced independent variables. The OAMs in these cases consist of 25 EU Member States in 3 time periods (like 2005, 2010, and 2014) – this means 75 space-time objects and the well-known (7) independent variables as attributes.

The second models create a new OAM where the objects were the 25 countries (+ a so called average object for control purposes). The attributes were the three time-intervals, their average, and the trend based on them. Each attribute consists of the values of estimation errors where the negative values show that the ratio of the educated (fe)male population could be higher. The direction (for each time-interval, and their average) is "the less, the more". The same direction is valid for the trends of estimation errors. Summa summarum (see Table 9), this means the country where the estimated ratio for educated people is higher than the facts needs the highest number of educated people, and the trend of these errors shows an increasing necessity.

4. Results

4.1. Annual growth rate

Compared to Table 8, Table 7 allows us to interpret a kind of sensibility for each country. The more characteristic the color scheme for a country is, the more robust the assumption about the exposure potential.

Table 7

Estimated ranks of countries concerning absorption potential based on valid and invalid estimations

Location	Estimation	Location	Estimation	Location	Estimation
AUT	1000094	SVN	1000037	NLD	999966.1
EST	1000093	FRA	1000025	LUX	999964.6
CAN	1000086	GRC	1000017	CHE	999951.1
SVK	1000083	NOR	1000016	JPN	999949.6
HUN	1000080	Average	1000011	NZL	999949.1
DEU	1000065	PRT	1000009	BEL	999937.1
ESP	1000060	ITA	999997.6	MEX	999929.1
POL	1000056	DNK	999990.1	TUR	999912.6
IRL	1000047	SWE	999985.6	GBR	999902.6
FIN	1000046	AUS	999979.1	KOR	999875.1
USA	1000046	CHL	999975.6	ISR	999862.6
CZE	1000040	ISL	999966.1		

Source: self-made calculation

Table 8

Estimated ranks of countries concerning absorption potential, based only on valid estimations

Location	Estimation	Location	Estimation	Location	Estimation
HUN	1000097	LUX	1000028	NLD	999963.1
SVK	1000087	POL	1000028	SVN	999961.1
IRL	1000083	NOR	1000014	CHL	999944.1

Table 8 cont.

CAN	1000082	AUT	1000008	NZL	999940.1
ESP	1000077	PRT	1000008	KOR	999930.1
CZE	1000068	ITA	999997.1	TUR	999908.1
USA	1000067	FRA	999994.1	MEX	999892.1
SWE	1000060	BEL	999989.1	CHE	999889.1
EST	1000058	DNK	999985.1	GBR	999885.1
ISL	1000058	Average	999982.1	ISR	999872.1
DEU	1000051	JPN	999981.1		
FIN	1000040	AUS	999972.1		

Source: self-made calculation

The 'annual growth rate'-oriented analyses based on valid and invalid estimations show that countries like DEU and AUT (as potential targeted countries by migrants) probably see their own positions rationally. SWE gave signs of a relative rush concerning the saturation effects. HUN and SVK try to fight against the given circumstances, because it seemingly could not be understood what the real force fields are, and more notably because the way to accept it can be interpreted in the EU legal system in different approximations. The so-called average-object (average of all countries) has a relatively robust position almost in the center of the estimation values (near the arbitrarily chosen norm value of 1000000). The southern region (GRC, ITA) is already full (like TUR and ISR). This can be seen as a rational force field for migration in general.

Based on only the valid estimations, the interpretation is hard to change. The position of AUT seems to be weaker, and the HUN-SVK positions are more robust. Model-average as such is consolidated to relatively near the norm value of 1000000. SWE has a higher force field than before. On the one hand, the differences of the valid and invalid positions show the impact of a lack of data. On the other hand, the two views make it possible to interpret a kind of sensibility of the modeling, based on multi-layered and consistence-oriented similarity analyses.

4.2. Required education level

Table 9 shows potential in necessity of educated people in case of males and females.

Table 9

Potential in necessity of educated people
(parallel based on valid and invalid estimations)

Human resources in science and technology (HRST) – percent of active population (MALE)						Human resources in science and technology (HRST) – percent of active population (FEMALE)					
Location	**Estimation**	**Location**	**Estimation**	**Location**	**Estimation**	**Location**	**Estimation**	**Location**	**Estimation**	**Location**	**Estimation**
SVK	1000047	EST	1000003	TUR	999980.3	PRT	1000032	FIN	1000010	GRC	999988.3
AUT	1000044	ISL	1000002	SVN	999971.8	FRA	1000031	DEU	1000010	BEL	999981.8
HUN	1000035	DNK	1000001	LUX	999970.3	ESP	1000030	HUN	1000009	TUR	999979.8
PRT	1000035	FIN	999997.8	BEL	999965.8	IRL	1000028	DNK	1000003	NOR	999979.3
ESP	1000029	SWE	999997.8	NLD	999962.8	ITA	1000026	SWE	999995.8	LUX	999964.8
FRA	1000029	IRL	999997.3	CHE	999962.3	AUT	1000022	CZE	999994.3	CHE	999963.3
DEU	1000027	GRC	999994.8	CZE	999960.3	SVK	1000021	EST	999994.3	GBR	999958.8
POL	1000021	NOR	999994.8	GBR	999958.8	ISL	1000020	POL	999994.3	SVN	999956.3
ITA	1000017	average	999994.8			average	1000013	NLD	999993.8		

Source: self-made calculation

DEU, in fact, needs educated people (more males than females). AUT's need level is higher for both genders. HUN needs educated males and seemingly few females. SVK, compared to HUN, has the same position as AUT compared to DEU. ITA needs more females than males. The average objects have a semi-robust position according to the norm value of 1000000 and the estimations as such. GBR, CHE, SVN, BEL, LUX, NDL, TUR, and GRC are full.

Especially in the case of ITA (but also in the cases of countries needing educated people in general), a critical situation is given: whether the expectation of educated people (especially females) can be covered through the recent structure of migrants.

Fortunately, people can be educated (c.f. LLL). The question is this: How many years on average will be necessary until arbitrary migrants will be able to work as preferred?

4.3. Estimation of absorption potentials

Table 10

Estimation errors for all countries

Estimation errors [%]			
average	**invalid**	**valid**	**average**
female	–3.6	0.9	–1.1
male	–3.3	0.2	–1.6
average	–3.4	0.6	–1.3
AGR	–3.8	0.4	–0.1
max	**invalid**	**valid**	**average**
female	23.4	25.5	25.5
male	17.9	19.5	19.5
average	23.4	25.5	25.5
AGR	4.7	10.3	10.3
min	**invalid**	**valid**	**average**
female	–41.9	–25.6	–41.9
male	–41.9	–26.5	–41.9
average	–41.9	–26.5	–41.9
AGR	–18.8	–11.8	–18.8

Source: own calculations

The estimation of the real amount of absorption concerning people in general (or especially educated people) can be approximated through the estimation errors (see Table 10). The number of (educated) people being absorbable in countries with the given statistics for AGR and for the ratios of educated people can be calculated in a way that the estimation errors will be converted into real values in capita.

In the case of DEU, the lack of educated females in 2014 was ca. 1% (c.f. the last value of the estimation errors), but the spontaneous saturation is 0.23%/year, based on the experiences of the time periods of 2005–2014. This means that the saturation has been relatively fast. Assuming that DEU has 80,000,000 people and the active population is ca. 50% (40,000,000), where the ratio of females is also 50% (20,000,000), and the education rate for females is 50% as well (10,000,000), an estimation error of 1% leads to 100,000 capita as required educated females.

The same calculation process for male delivers the following result: 200,000 educated males (based on the double rate of the last lack-value).

If we look at Figure 1 we can note that DEU (blue = fact; red = estimation) should have grown (AGR) massively in general since 2000. The ca. 1% average lack of growth rate makes 800,000 people; among them, ca. 100,000 females are well-educated, and 200,000 males are also well-educated. The 200,000 families may have 4 members, which means 2 children. This estimation may hold a kind of evidence for 2015. And reality seems to deliver the estimated values for DEU in general, but hardly in detail.

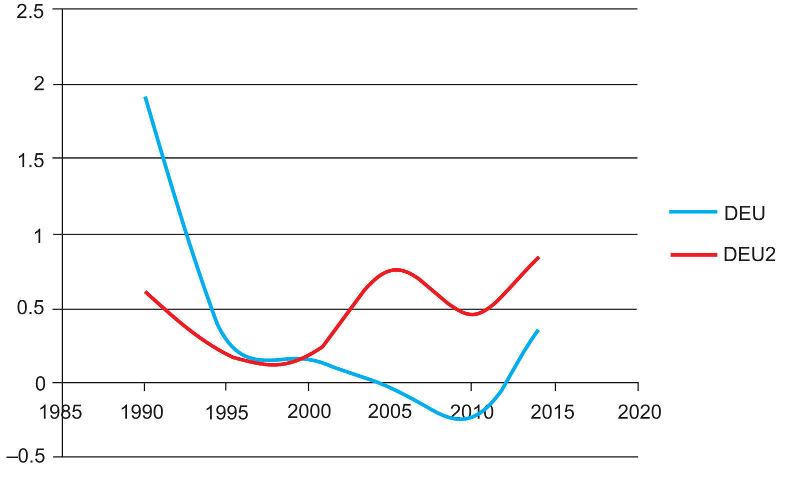

Figure 1. Annual growth rate for DEU – facts and estimations

Source: own calculation

5. Conclusion

We must emphasize that the goal of this article is not to heat the political atmosphere. In this topic, we have presented the facts through data. We have to stress that the logic of this objective and highly operationalized method allows us to analyze any variables if the consistency and concordance of the list of attributes is assured. In this case, we have investigated the question from the perspective of sustainability instead of culture. The analysis confines oneself to "trivial" variables. If the data has a reference to variables like religion, habits, culture, behavior, etc. with which to estimate "annual growth rate" or "population density," these also can be included. This article wants to present the opportunity of data-driven decision making.

The UNO could be seen as an organization with the appropriate potential and legitimacy to be responsible for data-driven policy-making actions, where each member should deliver statistics with high quality, and the robot-politician should be re-run in order to calculate new exposure values for each country.

The same process could be driven in the case of validating the credibility of countries, cities, concerns, etc. (like the services of Moody's, Fitch Ratings, or Standard and Poor's, etc.) in order to generate and publish ranking values as well as their changes in an entirely automated way.

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