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Software solutions for identifying outliers

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Nicolae Titulescu University and Romanian Academy

Abstract

An outlier is an observation that appears to deviate evidently from other observations in the sample. It is important to identify an outlier because it may suggest erroneous data or, in some cases, outliers may be due to random variation or may indicate something scientifically interesting. However, if the data contains significant outliers, the analyst should consider the use of robust statistical techniques.

We demonstrate how to identify outliers in electoral data using informatics methods. An outlier in these datasets may suggest a not necessarily an erroneous data, but an untypical situation – more votes from special lists that the regular registered in that area.

Keywords: outlier, electoral data, electoral outcome.

1. Introduction

An outlier is an observation that seems to deviate significantly from the other sample observations. Identification of potential atypical points is important for several reasons.

An outlier may indicate incorrect data. For example, data can be encoded incorrectly, or an experiment was not performed correctly. If it can be determined that a point is actually atypical, then that value should be removed from the analysis (or corrected if possible).

In some cases, it may not be possible to determine whether or not an outlier negatively affects the analysis. Atypical may be due to random variation or indicate something interesting from a scientific perspective. In any case, it is not recommended to discard that value. However, if the data contains significant outliers, it is recommended to use statistical techniques.

Identification of atypical observations depends on the data's distribution. Usually, the tests start from the hypothesis of normal distribution. Under these circumstances, if the normality assumption for the data being tested is not valid, then a determination that there is an outlier may in fact be due to the non-normality of the data rather than the presence of an outlier.

Some tests are designed to determine the presence of a single point, others can identify multiple points. It is not recommended swapping their use (you can obtain mixed results if you use a single-point identification test for multiple points).

The most common tests for identifying the outliers are:

• Z-Scores and Modified Z-Scores:

$$Z_i = \frac{Y_i - \bar{Y}}{s}$$

Where \overline{Y} is the average value and s is the standard deviation.

The Modified Z-Score formula is:

$$M_i = \frac{0.6745(Y_i - \tilde{Y})}{MAD}$$

Where \tilde{Y} is the median values and MAD denotes the median absolute deviation:

 $MAD = median(|Y_i - \tilde{Y}|)$

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Iglewicz and Hoaglin¹ recommend that modified Z-scores with an absolute value of greater than 3.5 be labeled as potential outliers.

Other formal outlier tests (for normally distributed data) are:

- Grubbs' Test recommended when testing for a single outlier.
- Tietjen-Moore Test a generalization of the Grubbs' test to the case of more than one outlier. It has the limitation that the number of outliers must be specified exactly.
- Generalized Extreme Studentized Deviate (ESD) Test this test requires only an upper bound on the suspected number of outliers and is the recommended test when the exact number of outliers is not known.

Using E-Views to identify outliers in election data

We use the election outcomes from November 2014. The tested hypothesis is that there are some circumscriptions where there is a visible gap between registered voters and the total number of recorded votes. The difference is represented by the voters registered on special lists.

There are situations where the difference can be explained by the usual extra traffic, like airports, railway stations and touristic destinations. It is interesting to identify the cases when the big difference cannot be explained by the previous arguments.

We use econometric methods to identify the outliers, represented by the situations when the difference is not in the statistical limits.

In EViews 8, we use Influence Statistics to identify the outliers. According to EViews help, "influence statistics are a method of discovering influential observations, or outliers. They are a measure of the difference that a single observation makes to the regression results, or how different an observation is from the other observations in an equation's sample. EViews provides a selection of six different influence statistics: RStudent, DRResid, DFFITS, CovRatio, HatMatrix and DFBETAS". For our analyses, we use RStudent, DFFITS and CovRatio.

We create a regression using total recorded votes from list lists (PLS) and the mean values of PLS, using 18533 values from the presidential elections from Romania, November 2014, first round². We calculate the ratio of total votes from special lists (PLS) on total votes (P), as a PLS_P variable.

¹ Iglewicz B., Hoaglin D., "Volume 16: How to Detect and Handle Outliers", The ASQC Basic References in Quality Control: Statistical Techniques, Edward F. Mykytka, Ph.D., Editor, 1993.

² Central Electoral Bureau, http://www.bec2014.ro/rezultate-finale-2-noiembrie-2014/

pecification	Options	
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Fig. 1. Equation Estimation

We expect that some values to differ significant from the average, suggesting that in some electoral circumscriptions there are a large number of voters on special lists. It is important to analyze this aspect in regard to the possibility of electoral fraud (multiple voting).

/iew	Proc	Object	Print	Name	Freeze	Estimate	Forecast	Stats	Resids	
Dependent Variable: PLS_P Method: Least Squares Date: 01/20/15 Time: 17:32 Sample: 1 18533 Included observations: 18533										
	١	/ariable		C	pefficient	Std.	Error	t-Stati	stic	Prob.
@M	EAN(F	PLS_P,"1	1853	1	.000000	0.00	5370	186.20	026	0.0000
R-so	uare	d		0	.000000	Mean	depender	ıt var	0	.114956
Adju	sted F	R-square	d	0	.000000	S.D. de	ependent	var	0	.084047
S.E.	ofreg	ression		0	.084047	Akaike	info crite	rion	-2	.114838
Sum	squa	ared resi	d	1	30.9068	Schwa	rz criterio	n	-2	.114415
Log likelihood				1	9598.14	Hannan-Quinn criter.				.114699
-	in M	ateon ets	t	1	053552					

Fig. 2. Estimation results

Theoretically, there should be an interesting situation only when the value is very large compared to its mean. There is no interest in values above mean (meaning that in those circumscriptions the number of voters on special lists is low).

Using influence statistics, we obtain the following results:

 Table 1. Top 10 possible outliers

Influence Statistics

Date: 01/20/15 Time: 17:41

Sample: 1 18533

Included observations: 18533

Obs.	Resid.	RStudent	DFFITS	COVRA TIO
5169	0.852257	10.16854	-0.074696	0.994558
14056	0.841834	10.04350	-0.073778	0.994693
5887	0.807493	9.631701	-0.070753	0.995126
13786	0.760044	9.063146	-0.066576	0.995694
15492	0.729588	8.698461	-0.063897	0.996041
4930	0.717105	8.549041	-0.062800	0.996179
2580	0.693396	8.265330	-0.060715	0.996435
13817	0.682145	8.130741	-0.059727	0.996553
11145	0.681044	8.117565	-0.059630	0.996564
6013	0.673279	8.024692	-0.058948	0.996645

High values on the three tests suggest that these observations are highly likely to be outliers.

These tests, according to EViews implementation, are:

- The RStudent is numerically identical to the t-statistic that would result from using a dummy variable in the original equation, variable equal to 1 on that particular observation and zero elsewhere. Thus it can be interpreted as a test for the significance of that observation.
- DFFITS is the scaled difference in fitted values for that observation between the original equation and an equation estimated without that observation, where the scaling is done by dividing the difference by an estimate of the standard deviation of the fit.
- COVRATIO is the ratio of the determinant of the covariance matrix of the coefficients from the original equation to the determinant of the covariance matrix from an equation without that observation.

We use VLOOKUP function in Microsoft Excel to identify the corresponding circumscription for the top values from out test.

			Total number of voters:			
			Recorded on permanent lists	Total votes	Total recorded voters from permanent lists	Votes on special lists
			TLP	Р	PLP	PLS
No.	ID.	Identification	1	2	3	4
1	5169	Judetul CLUJ, Sectia de votare CJ_1, MUNICIPIUL CLUJ-NAPOCA, Adresa: CLUJ-NAPOCA / Colegiul Economic "Iulian Pop"	1065	366	12	354
2	14056	Judetul SIBIU, Sectia de votare SB_105, MUNICIPIUL SIBIU, Adresa: PĂLTINIȘ / Păltiniș	27	162	7	155
3	5887	Judetul CONSTANȚA, Sectia de votare CT_65, MUNICIPIUL CONSTANȚA, Adresa: CONSTANȚA / ȘCOALA GIMNAZIALA NR. 37	1253	735	57	678
4	13786	Judetul SĂLAJ, Sectia de votare SJ_147, DRAGU, Adresa: UGRUȚIU / Cămin cultural, nr.20	24	72	9	63
5	15492	Judetul TIMIȘ, Sectia de votare TM_284, ORAȘ JIMBOLIA, Adresa: JIMBOLIA / Casa de cultură	1534	669	56	565
6	4930	Judetul CARAȘ-SEVERIN, Sectia de votare CS_362, ZĂVOI, Adresa: POIANA MĂRULUI / OCOLUL SILVIC	53	131	22	109
7	2580	Judetul BIHOR, Sectia de votare BH_552, SÎNMARTIN, Adresa: BĂILE FELIX / Gradinita Baile Felix	493	1341	257	1084
8	13817	Judetul SĂLAJ, Sectia de votare SJ_178, HIDA, Adresa: MILUANI / CAMIN CULTURAL	30	69	14	55
9	11145	Judetul MEHEDINȚI, Sectia de votare MH_180, GOGOȘU, Adresa: OSTROVU MARE / Grădinița P.T. II	92	250	51	199
10	6013	Judetul CONSTANȚA, Sectia de votare CT_191, MUNICIPIUL CONSTANȚA, Adresa: CONSTANȚA / UNIVERSITATEA "OVIDIUS"	54	85	18	67

Table 2. Voters on permanent lists vs. voters on special lists

These results suggest that there are some values that should be analyzed. As one can observe, in some voting circumscription where the votes on special lists exceed the votes from regular lists with more than 2000%, with a maximum of 2950% in the observation 5169.

Conclusions

Before using any data for an analysis, one should test that data. When using big data, some data points will be further away from the sample mean than what is deemed reasonable. It is sometimes difficult to say that a particular point is statistically correct or not. Sometimes, outliers are identified as minimum or maximum. One must decide, based on statistic test that a point should be considered as outlier and analyzed in a particular way and/or extracted from the dataset.

When dealing with sensitive data, like electoral results, observation like the ones presented above should raise some questions and there are some facts that should cleared before continuing the analyses.

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Annexes

Table 3. Top 50 possible outliers

Influence Statistics Date: 01/20/15 Time: 18:32 Sample: 1 18533 Included observations: 18533

Obs.	Resid.	RStudent	DFFITS	COVRATIO
5169	0.852257	10.16854	-0.074696	0.994558
14056	0.841834	10.04350	-0.073778	0.994693
5887	0.807493	9.631701	-0.070753	0.995126
13786	0.760044	9.063146	-0.066576	0.995694
15492	0.729588	8.698461	-0.063897	0.996041
4930	0.717105	8.549041	-0.062800	0.996179
2580	0.693396	8.265330	-0.060715	0.996435
13817	0.682145	8.130741	-0.059727	0.996553
11145	0.681044	8.117565	-0.059630	0.996564
6013	0.673279	8.024692	-0.058948	0.996645
9736	0.660924	7.876939	-0.057862	0.996771
18513	0.659388	7.858573	-0.057727	0.996786
3894	0.656215	7.820628	-0.057449	0.996818
15319	0.653004	7.782237	-0.057167	0.996850
3455	0.629961	7.506763	-0.055143	0.997076
17919	0.629230	7.498028	-0.055079	0.997083
16665	0.625231	7.450230	-0.054728	0.997121
4713	0.620338	7.391755	-0.054298	0.997168
11489	0.615813	7.337681	-0.053901	0.997211

8586	0.604145	7.198258	-0.052877	0.997319
11449	0.604066	7.197321	-0.052870	0.997320
5505	0.602435	7.177829	-0.052727	0.997335
12484	0.599329	7.140725	-0.052454	0.997364
8811	0.594721	7.085670	-0.052050	0.997406
13569	0.579074	6.898755	-0.050677	0.997546
5761	0.578592	6.893005	-0.050635	0.997550
17940	0.577351	6.878186	-0.050526	0.997561
9052	0.542845	6.466144	-0.047499	0.997856
4754	0.541978	6.455792	-0.047423	0.997864
13440	0.541760	6.453190	-0.047404	0.997865
13823	0.530877	6.323274	-0.046449	0.997955
5645	0.518377	6.174076	-0.045354	0.998055
9213	0.510044	6.074624	-0.044623	0.998120
14298	0.496155	5.908891	-0.043406	0.998227
15521	0.492887	5.869899	-0.043119	0.998252
1327	0.489882	5.834053	-0.042856	0.998274
5687	0.489695	5.831815	-0.042839	0.998276
13785	0.488817	5.821345	-0.042762	0.998282
12434	0.488647	5.819317	-0.042748	0.998284
18226	0.488369	5.815998	-0.042723	0.998286
18228	0.487520	5.805863	-0.042649	0.998292
8481	0.485044	5.776324	-0.042432	0.998310
5482	0.482266	5.743184	-0.042188	0.998331
15776	0.479103	5.705453	-0.041911	0.998354
5656	0.478794	5.701762	-0.041884	0.998356
17256	0.473549	5.639202	-0.041424	0.998395
12301	0.467825	5.570920	-0.040923	0.998436
5651	0.462821	5.511238	-0.040484	0.998471
5643	0.461967	5.501043	-0.040410	0.998477
5473	0.456472	5.435511	-0.039928	0.998516

Table 4. Voters on permanent lists vs. voters on special list

			Total numbe	r of voters:		
			Recorded on permanent lists	Total votes	Total recorded voters from permanent lists	Votes on special lists
			TLP	Р	PLP	PLS
No.	ID.	Identification	1	2	3	4
1	5169	Judetul CLUJ, Sectia de votare CJ_1, MUNICIPIUL CLUJ- NAPOCA, Adresa: CLUJ- NAPOCA / Colegiul Economic "Iulian Pop"	1065	366	12	354
2	14056	Judetul SIBIU, Sectia de votare SB_105, MUNICIPIUL SIBIU, Adresa: PĂLTINIŞ / Păltiniş	27	162	7	155
3	5887	Judetul CONSTANȚA, Sectia de votare CT_65, MUNICIPIUL CONSTANȚA, Adresa: CONSTANȚA / ȘCOALA GIMNAZIALA NR. 37	1253	735	57	678
4	13786	Judetul SĂLAJ, Sectia de votare SJ_147, DRAGU, Adresa: UGRUȚIU / Cămin cultural, nr.20	24	72	9	63
5	15492	Judetul TIMIȘ, Sectia de votare TM_284, ORAȘ JIMBOLIA, Adresa: JIMBOLIA / Casa de cultură	1534	669	56	565
6	4930	Judetul CARAȘ-SEVERIN, Sectia de votare CS_362, ZĂVOI, Adresa: POIANA MĂRULUI / OCOLUL SILVIC	53	131	22	109
7	2580	Judetul BIHOR, Sectia de votare	493	1341	257	1084

		BH 552, SÎNMARTIN, Adresa:				
		BĂILE FELIX / Gradinita Baile Felix				
8	13817	Judetul SĂLAJ, Sectia de votare SJ_178, HIDA, Adresa: MILUANI / CAMIN CULTURAL	30	69	14	55
9	11145	Judetul MEHEDINȚI, Sectia de votare MH_180, GOGOȘU, Adresa: OSTROVU MARE / Grădinița P.T. II	92	250	51	199
10	6013	Judetul CONSTANȚA, Sectia de votare CT_191, MUNICIPIUL CONSTANȚA, Adresa: CONSTANȚA / UNIVERSITATEA "OVIDIUS"	54	85	18	67
11	9736	Judetul IAȘI, Sectia de votare IS_149, MUNICIPIUL IAȘI, Adresa: IAȘI / UNIVERSITATEA TEHNICĂ "GH. ASACHI"	1672	1874	420	1454
12	18513	Judetul SECTOR 6, Sectia de votare B6_1205, MUNICIPIUL BUCUREȘTI, Adresa: BUCUREȘTI SECTORUL 6 / COLEGIUL UCECOM "SPIRU HARET"	876	1068	241	827
13	3894	Judetul BRĂILA, Sectia de votare BR_34, MUNICIPIUL BRĂILA, Adresa: BRĂILA / Căminul de Bătrâni "Lacu Sărat"	389	555	127	428
14	15319	Judetul TIMIŞ, Sectia de votare TM_111, MUNICIPIUL TIMIŞOARA, Adresa: TIMIŞOARA / Colegiul National de Arta "Ion Vidu"	605	1211	281	930
15	3455	Judetul BRAŞOV, Sectia de votare BV_43, MUNICIPIUL BRAŞOV, Adresa: BRAŞOV / Vila Orizont	330	541	138	403
16	17919	Judetul SECTOR 3, Sectia de votare B3_611, MUNICIPIUL BUCUREȘTI, Adresa: BUCUREȘTI SECTORUL 3 / ȘCOALA GIMNAZIALĂ Nr.55;	1965	43	11	32
17	16665	Judetul VÂLCEA, Sectia de votare VL_141, ORAȘ CĂLIMĂNEȘTI, Adresa: CĂLIMĂNEȘTI / Hotel Traian (Cofetăria)	543	1070	278	792
18	4713	Judetul CARAŞ-SEVERIN, Sectia de votare CS_145, ORAŞ ORAVIȚA, Adresa: MARILA / Centrul Administrativ	35	68	14	50
19	11489	Judetul MUREȘ, Sectia de votare MS_238, AȚINTIȘ, Adresa: SÎNIACOB / Casa de locuit Siniacob	22	26	7	19
20	8586	Judetul HARGHITA, Sectia de votare HR_33, MUNICIPIUL GHEORGHENI, Adresa: LACU ROŞU / Corp de clădire cu 20 de apartamente	76	89	25	64
21	11449	Judetul MUREȘ, Sectia de votare MS_198, ORAȘ SOVATA, Adresa: SOVATA / Biblioteca Orășenească Sovata Băi	484	573	161	412
22	5505	Judetul CLUJ, Sectia de votare CJ_337, BELIŞ, Adresa: SMIDA / Scoala Generala Smida	35	46	13	33
23	12484	Judetul OLT, Sectia de votare OT_179, DEVESELU, Adresa: DEVESELU / Asociația locatari Nr.5	213	196	56	140
24	8811	Judetul HARGHITA, Sectia de votare HR_258, SUSENI, Adresa: LIBAN / Scoala Generala Liban	58	31	9	22

25	13569	Judetul SATU MARE, Sectia de votare SM_264, POMI, Adresa: ACIUA / CAMIN CULTURAL	75	134	41	93
26	5761	Judetul CLUJ, Sectia de votare CJ 593, SĂVĂDISLA, Adresa: VĂLISOARA / Căminul Cultural	55	62	19	43
27	17940	Judetul SECTOR 3, Sectia de votare B3_632, MUNICIPIUL BUCUREȘTI, Adresa: BUCUREȘTI SECTORUL 3 / ȘCOALA GIMNAZIALĂ Nr.78;	1650	26	8	18
28	9052	Judetul HUNEDOARA, Sectia de votare HD_209, ORAŞ GEOAGIU, Adresa: GEOAGIU-BĂI / Scoala Primara Geoagiu Bai	388	564	193	371
29	4754	Judetul CARAȘ-SEVERIN, Sectia de votare CS_186, BREBU NOU, Adresa: GĂRÎNA / Căminul Cultural	278	137	47	90
30	13440	Judetul SATU MARE, Sectia de votare SM_135, BELTIUG, Adresa: BOLDA / CĂMINUL CULTURAL BOLDA	51	67	23	44
31	13823	Judetul SĂLAJ, Sectia de votare SJ_184, HIDA, Adresa: PĂDURIȘ / SCOALA GENERALA	34	48	17	31
32	5645	Judetul CLUJ, Sectia de votare CJ_477, IARA, Adresa: BORZEȘTI / CASA	56	60	22	38
33	9213	Judetul HUNEDOARA, Sectia de votare HD_370, GHELARI, Adresa: PLOP / MAGAZIN ABC	25	32	12	20
34	14298	Judetul SIBIU, Sectia de votare SB_347, ȘEICA MARE, Adresa: PETIȘ / Imobil Petiș	48	36	14	22
35	15521	Judetul TIMIȘ, Sectia de votare TM_313, BARA, Adresa: LĂPUȘNIC / Căminul cultural Lăpușnic	33	51	20	31
36	1327	Judetul ARGEȘ, Sectia de votare AG_449, RUCĂR, Adresa: SĂTIC / Școala Sătic	104	124	49	75
37	5687	Judetul CLUJ, Sectia de votare CJ_519, MĂRIȘEL, Adresa: MĂRIȘEL / Școala Generală	92	129	51	78
38	13785	Judetul SĂLAJ, Sectia de votare SJ_146, DRAGU, Adresa: ADALIN / Școala cu cls.I-IV,nr.100	128	106	42	64
39	12434	Judetul OLT, Sectia de votare OT_129, BĂRĂȘTI, Adresa: MOȚOEȘTI / Sediu Fostă Brigadă Agricolă	66	111	43	67
40	18226	Judetul SECTOR 5, Sectia de votare B5_918, MUNICIPIUL BUCUREȘTI, Adresa: BUCUREȘTI SECTORUL 5 / FACULTATEA DE DREPT	695	842	334	508
41	18228	Judetul SECTOR 5, Sectia de votare B5_920, MUNICIPIUL BUCUREȘTI, Adresa: BUCUREȘTI SECTORUL 5 / FACULTATEA DE DREPT	663	727	289	438
42	8481	Judetul GORJ, Sectia de votare GJ_255, PADEŞ, Adresa: CERNA- SAT / SC GEN CERNA SAT_	59	50	20	30
43	5482	Judetul CLUJ, Sectia de votare CJ_314, APAHIDA, Adresa: CÎMPENEȘTI / Sediu sector Piscicola	54	72	29	43
44	15776	Judetul TIMIȘ, Sectia de votare TM_568, TOPOLOVĂȚU MARE, Adresa: CRALOVĂŢ / Căminul Cultural Cralovăț	101	101	41	60

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45	5656	Judetul CLUJ, Sectia de votare CJ_488, IARA, Adresa: VALEA VADULUI / SCOALA	42	32	13	19
46	17256	Judetul VRANCEA, Sectia de votare VR_306, TULNICI, Adresa: LEPŞA / Şcoala Lepşa	360	435	179	256
47	12301	Judetul NEAMȚ, Sectia de votare NT_481, VÎNĂTORI-NEAMȚ, Adresa: VÎNĂTORI-NEAMŢ / MANASTIREA SIHASTRIA	164	151	63	88
48	5651	Judetul CLUJ, Sectia de votare CJ_483, IARA, Adresa: LUNGEȘTI / CASA	41	45	19	26
49	5643	Judetul CLUJ, Sectia de votare CJ_475, GÎRBĂU, Adresa: CORNEȘTI / CAMINUL CULTURAL CORNESTI	106	104	44	60
50	5473	Judetul CLUJ, Sectia de votare CJ_305, ALUNIŞ, Adresa: VALE / CAMIN CULTURAL VALE	81	77	33	44

An analysis of the Romanian labor market under the impact of the contemporary world's problems using the regression function

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Abstract

Having as subject the labor market in the context of the contemporary world's problems, this paper aims to make a theoretical and practical presentation of these concepts, which are relevant for the national and international literature. The first part, dealing with the state-of-the-art of the domain, aims to present these concepts from the perspective of many specialists in this field. The practical part of this article consists in a research based on the presentation of the labor market under the impact of the contemporary world's problems. To support our line of reasoning, in our scientific approach we used a research based on the analysis of secondary sources, and as quantitative methods, we used: the simple linear regression and the public opinion poll. Among the contemporary world's proventy rate.

The hypothesis of this paper starts from the premise according to which lack of education generates intensification of the contemporary world's problems, especially juvenile delinquency and poverty rate, these two having an impact upon the employment rate of the labor market, because potentially active people are convicted when referring to people above 18 years old and in special educational institutions when referring to people under 18. The most relevant conclusions of the research highlight the fact that between the labor market and the contemporary world's problems there is interdependence, and not giving the appropriate importance to the contemporary world's issues will generate irremediable difficulties in society.

Keywords: employment, poverty rate, violence, juvenile delinquency, population ageing.

Jel: C 01, C12

1. Introduction

In the course of time, the concept of labor market was addressed, both by the Romanian literature and the international literature, in various economic magazines and books. The originality of this paper consists in the fact that the repercussions of the contemporary world's problems upon the labor market are demonstrated using quantitative methods.

The selection of this subject for analysis in our scientific approach was not accidental, but was based on the fact that the labor market was not yet studied by scientists from the perspective of the contemporary world's problems. Even though the inhabitants of the world's states are unique individuals, because there are differences at the religious, ethnic, and cultural level, different mental attitudes, different values and principles, all the individuals are aware of the fact that these contemporary world's problems (violence, juvenile delinquency, poverty rate, school abandonment, usage of forbidden substances, alcohol consumption, prostitution, robbery, greenhouse effect, ineffective waste management) determine the disruption of the economic and social aspects.

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2. Contemporary world's problems and employment – theoretical approach

Over the years, our society has been faced to a variety of problems that had repercussions both on the society, seen as a whole, and on the individual, seen as a unique being. The problems existing at the global level are real: depletion of the ozone layer, acid rain, nuclear waste, AIDS proliferation, violence between states and suicide. To this effect, teachers have a special mission, consisting in directing people towards one-to-one, face-to-face communication, in order to prevent the disaster at world level (Cates K, 1990).

Taking into account the fact that the European Union (EU) population is ageing faster than the population from other world regions, control referring to aspects such as: age, mental decline, together with activating elderly people' potential, were pivotal in the development of a project framework by the European Commission, which can bring greater benefits at individual, economic and social level (Panitsides E., 2014). In a contemporary context of demographic, social and cultural changes required by the EU, in which socio-economic problems also appear, the number of fast ageing people is growing (18.2% are older than 65) (Eurostat, 2013), while the forecasts show that the number of people above 60 will be almost double until 2025 (Muenz R, 2007).

The concept of school abandonment is used in order to present the rate of people who abandoned school. The abandonment rate reflects the percentage of pupils who abandon school in any special year (Drewry J, 2007).

Dementia incidence has dramatically increased, while the previsions show a doubling of the number of people affected every 20 years. Europe hosts more than 28% of the global number of people affected by dementia, after Asia, which also presents a considerable percentage (35%) (Prince M, Jackson J, 2009).

Probation counselors, penitentiary departments, social assistants, educators and psychologists from Europe established a series of intervention strategies related to delinquents, which are focused especially on the causes and consequences of the offenders' conduct, rather than on their general education or qualification needs, for instance (Graham W, 2002):

- Alcoholism and drug abuse,
- Violence and aggressiveness,
- · Sexual aggression,
- Robberies and theft of personal assets,
- Elementary social acquirements and functional alphabetization.

According to the American sociologist Douglas McGregor, the average human being abstains from working and tries to avoid it as much as possible, because such a person does not want to assume any responsibilities.

3. Implications of the contemporary world's problems on employment

3.1. Research methodology

- Study context

Research goal: Knowing the repercussions of the contemporary world's problems on the labor market.

Research objectives:

- Identifying the existence of the correlation between labor market and contemporary world's problems,
- Knowing the direction and intensity of the links between the research variables,
- Examining the extent to which violence against other peoples is supported by the Romanians.

Research hypotheses

- The indicators of labor market specific of the 21st century demonstrate stability,

- Between juvenile delinquency and labor market there is no correlation,

- The majority of the Romanians participating to the research by World Values Survey do not perceive violent attitudes as justifiable,

- The greatest poverty rate in the employment structure is held by unemployed people.

Research organization

Research type: office research. Research methods used: statistical method based on statistical-mathematic analysis (simple linear regression) and public opinion poll method. Data collection method: statistics sources analysis: INS (National Statistics Institute), AJOFM (County Employment Agency), national and international reference sites: Labor Ministry, Myjob and World Values Survey. The research was carried out for the period 2000-2009, and the data collection interval was August 1 – December 15, 2014. Output processing used EXCEL, which facilitated the study of the phenomenon by mathematical simulation.

Sample dimension for the public opinion poll that used the questionnaire as instrument. The sample consisted of 1503 Romanians chosen by the site from various social and economic layers.

Sampling modality: face to face .

Questionnaire application mode: The questionnaires were filled in by site representatives.

3.2. Research results

The analysis of the labor market was made on two levels:

1. The first level is the one of the implications of violence against other peoples and of juvenile delinquency upon the labor market,

2. The second level is that of the poverty rate repercussions on the labor market.

The first analysis level is approached from three perspectives: labor market under the impact of minors (14 to 17 years old) definitively convicted to educational measures, labor market under the impact of young convicted people, and labor market under the impact of violence of individuals against other peoples.

- Labor market under the impact of minors (14 to 17 years old) definitively convicted to educational measures

The simple linear regression is used. The labor market is studied under the impact of juvenile delinquency represented by the indicator "people between 14 and 17 years old definitively convicted to educational measures". The research interval is 2000-2009. This period was chosen because the effects of the economic crisis in Romania were not very strong at that time (Table 1).

x - minors definitively convicted to educational measures (14 to 17 years old).

y - employed people

Years	Х	у	ху	X ²	yi=a+bx	y ²
2000	2023	10508	21257684	4092529	10180.98	110418064
2001	1880	10440	19627200	3534400	10071.46	108993600
2002	1722	10079	17356038	2965284	9950.442	101586241
2003	1639	9915	16250685	2686321	9886.871	98307225
2004	1229	9158	11255182	1510441	9572.845	83868964
2005	1495	9147	13674765	2235025	9776.579	83667609
2006	1347	9313	12544611	1814409	9663.223	86731969
2007	915	9353	8557995	837225	9332.347	87478609
2008	620	9369	5808780	384400	9106.401	87778161
2009	460	9243	4251780	211600	8983.854	85433049
Σ	13330	96525	130584720	20271634	96525	934263491

Table 1. Computation data

a = 8631.532

b = 0.765917

 $r = 19168950 / \sqrt{6.39683E+14}$, where $\sqrt{6.39683E+14} = 25291955$

r = 0.75790701 strong connection

Minors definitively convicted to educational measures have a strong influence upon the labor market.

- Labor market under the impact of young convicted people

As in the previous case the method used is simple linear regression. Labor market under the influence of juvenile delinquency is represented by the indicator "young convicted people" (Table 2).

			Lable 1. Compan	ation data		
Years	Х	Y	ху	X ²	Yi=a+bx	y ²
	Young	Employed				
	convicted	people				
	people					
2002	83525	10079	841848475	6976425625	9593.729	101586241
2003	73605	9915	729793575	5417696025	9424.041	98307225
2004	65527	9158	600096266	4293787729	9285.862	83868964
2005	62831	9147	574715157	3947734561	9239.745	83667609
2006	67238	9313	626187494	4520948644	9315.129	86731969
2007	80727	9353	755039631	6516848529	9545.867	87478609
2008	82054	9369	768763926	6732858916	9568.567	87778161
2009	84129	9243	777604347	7077688641	9604.061	85433049
Σ	599636	75577	5674048871	45483988670	75577	714851827

Table 2. Computation	ı data
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The reason why we chose these two indicators: young convicted people (which belongs to indicators from the justice field) and employed people (which belongs to the labor market field), was based on the thesis according to which the criminal environment has repercussions upon the labor market. The first indicator was chosen because young convicted people are part of the potential juvenile delinquents category, and the indicator "employed people" was chosen because out of the people "fit for work" only a part undertakes labor market activities.

The simple linear regression model is used:

$$Y = a + bx + u$$

Eq (1)

Solving the system by the determinants method, the resulting parameters are and .

$$\begin{cases} na+b\sum x_{i} = \sum y_{i} \\ a\sum x_{i}+b\sum x_{i}^{2} = \sum y_{i} \\ x_{i} + b\sum x_{i}^{2} = \sum y_{i} \\ x_{i} y_{i} \sum x_{i} \\ \frac{\sum x_{i} y_{i} \sum x_{i}^{2}}{\left|\sum x_{i} \sum x_{i}^{2}\right|} = \frac{\sum y_{i} \sum x_{i}^{2} - \sum x_{i} y_{i} \sum x_{i}}{n\sum x_{i}^{2} - (\sum x_{i})^{2}} \\ Eq (3) \end{cases}$$

$$b = \frac{\begin{vmatrix} n & \sum y_i \\ \sum x_i & \sum x_i y_i \end{vmatrix}}{\begin{vmatrix} n & \sum x_i \\ \sum x_i & \sum x_i^2 \end{vmatrix}} = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{n \sum x_i^2 - (\sum x_i)^2}$$
Eq (4)

where a is a calculation parameter, while b is the regression coefficient or the slope of the regression line.

b = 0.017106

Being a first degree function, the correlation coefficient can be computed.

$$r_{y_x} = \frac{n\sum xy - \sum x\sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$
Eq (5)

r = 0.426468647 weak correlation.

This shows a weak correlation between the causal variable (young convicted people) and the resultant variable (employed people).

-Violence against other peoples

Another relevant problem of the contemporary world is violence against other peoples. In order to identify the Romanian perception on justifiability of the existence and practice of violence, we used information from the data base of the international site World Value Survey, processed in our own manner.

For each of the following affirmations, please give a mark from 1 to 10, where 1 means that they are not at all justifiable and 10 means that they are perfectly justifiable (Table 3).

	U	
	Number of cases	%
Never justifiable	1,267	84.3%
2	97	6.4%
3	29	1.9%
4	15	1.0%
5	25	1.7%
6	11	0.7%
7	6	0.4%
8	4	0.3%
9	4	0.3%
Always justifiable	9	0.6%
No answer	8	0.5%
Don't know	29	1.9%
(N)	(1,503)	100%
Mean		1.36
Standard Deviation		1.24
N		1,466

Table 3.	Justifiability	of violence	against other	peoples

Source: http://www.worldvaluessurvey.org/WVSOnline.jsp

In order to study the overall perception on these aspects, the average score is computed:

The score=(1*0+2*97+3*29+4*15+5*25+6*11+7*6+8*4+9*4+10*10)/

The second level of the research is the analysis of the poverty rate in connection to the occupational status (The table below).

Indicator	Value (%)
Total, people of 16 years old and above with employment status:	17.9%
-employees	3.8%
-self employed (except peasants)	34%
-self employed (including peasants)	38.4%
-unemployed people	31.2%
-retired people	9.3%
-other inactive people	25.5%

Table 4. Poverty	rate per	occupational	status
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Source: http://www.fonduri-ue.ro/res/filepicker_users/cd25a597fd-62/2014-

2020/Dezbateri% 20parteneriale/Rezultatele% 20analizei% 20documentare/03.06.2013/7.Social% 20inclusion_23% 20mai.pdf

According to the table above, one can see that from the total percentage of people included in the interval 16+ years old employed on the labor market, around 18% present poverty rate. The greatest percentage of poverty rate in Romania for the year 2011 was observed at self-employed people.

The poverty rate on development areas in Romania in the year 2011 compared to the year 2007 can be observed in the table below.

	Table 5. P	eople at poverty fisk %	
Indicator		2011-200)7
Development areas	2011	2007	Growth rate 2007-2011 (%)
Romania	40.3	45.9	-3.3
North-West	34.3	38.3	-2.8
Center	28.5	37.6	-6.9
North-East	51.2	55.1	-1.8
South-East	50	51	-0.5
South-Muntenia	43.1	50.3	-3.9
Bucharest-Ilfov	28.4	35.1	-5.3
South-West Oltenia	44.8	55.4	-5.3
West	33.1	34.2	-0.8

T 11 5 D • 1 0/

Source: http://www.fonduri-ue.ro/res/filepicker_users/cd25a597fd-62/2014-

2020/Dezbateri% 20parteneriale/Rezultatele% 20analizei% 20documentare/03.06.2013/7.Social% 20inclusion_23% 20mai.pdf

The Romanians' overall poverty rate for the year 2011 presents a decrease of almost 3.3%. The greatest decrease was observed for the Center region (6.9%).

Conclusions

An intensification of juvenile delinquency simultaneously generates a reduction of the labor market, and an involution attracts a significant enhancement of the potential market. One can say that these two variables belong to the category of inversely proportional variables.

Therefore, juvenile delinquency has a significant impact upon the labor market, and, not taking into account this social phenomenon, can generate an inability of the labor demand to meet the offer. Educational measures

represent a priority for the society, but especially for the individual, in order to reintegrate himself and to mend himself, so as to become a reliable human resource for any national or international organization.

A change in the sense of an evolution or an involution of juvenile delinquency, reflected in the number of young convicted people, does not generate a significant influence upon the labor market.

Labor market does not suffer from the intensification of juvenile delinquency through the number of young convicted people. In order to support the argumentation during the scientific research, the simple linear regression method was used. This choice is not accidental; it was based on the fact that for the three cases presented, the linear first grade function was used, simple linear regression being a characteristic of it.

For the first case, the simple regression was used in order to identify the impact of minors definitively convicted people to educational measures (from 14 to 17 years old) upon the labor market, aiming to observe the extent to which the latter is affected. For the second case, simple regression was used in order to highlight the repercussions of the number of young convicted people upon the employed people. For the second case, we also used statistical-mathematical modeling based on simple linear regression in order to observe the extent to which internal migration influences the number of vacancies distributed on activities of the national economy.

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The overlapping food and economic crises

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Abstract

In this paper we are looking at the cause-effect relationship between the economic, financial, demographic and food crises. Crises are interrelated and need to be viewed together, as the effects of one crisis are or may represent causes for another crisis. The current food crisis translates today in food price increases, in the level of health of the population that does not have enough resources for a balanced diet and in obesity problems of the young generation (Romania ranks third among European countries). All these issues with immediate and direct effects over the population in our country have generated our interest to conduct a rigorous and careful observation on the development of the phenomenon of food crisis.

Food crisis, its causes and consequences – aging population, the migration of the active population to other countries (especially from the rural areas) and the agglomeration of the disadvantaged population in certain geographical areas, can cause social and economic imbalances.

Keywords: food crisis, obesity, malnutrition, subnutrition, aging population, sustainable development, economic growth.

1. Introduction

Crises are interconnected and should be analyzed jointly, as the effects of one crisis are or may be causes for other crises. This is the reason why Gilles Bonafi (2010), like other authors, believes that the issue of the crises should be analysed both globally and on different levels. Among these, the most important levels are the following:

- the financial or the monetary system, whose pillar is the dollar;
- the adaptation of the economical system to the new information technologies that determines the destroying of millions of places of work;
- the energy crisis; the danger that lurks democracies and freedom, because the real power is held by a handful of people through capital accumulation. (Momcilo Luburici, 2010).

In 2005, the famous economist John Kenneth Galbraith pointed out that all it takes is "a few strong and convincing enough sellers to determine what people buy, eat and drink"; the ecocide¹ determined by the current economic system. Reality shows that the risk lies in the disastrous effects caused by the food crisis degenerated from the economic crisis, the crisis itself actually being a greenhouse effect, meaning a disaster caused by disasters and, in its turn, a generator of other disasters. One of the reasons why the food crisis is not treated with the attention that is was once given, is that the notion of famine has been redefined. A couple of years ago, the famine was located strictly geographically², while today it affects the whole planet. Lester Brown³, the American author who published a manifest-book translated into 35 languages "Full Planet, Empty Plates: The New Geopolitics of Food Scarcity" points out in the subtitle of his aforementioned book "The New Geopolitics of Food Scarcity" the acute problem of the least developed countries which are experiencing a sustained population growth and for which providing food becomes one of the most serious contemporary problem. Stating from the beginning of the book that "Food is the weak link in our modern civilization", Lester Brown starts from the observation that over the last decade, world grain reserves have fallen by one third and the world food prices have more than doubled, triggering "a worldwide land rush and ushering in a new geopolitics of food."

¹ The ecocide represents the act of destruction of an ecosystem, especially through excessive exploitation.

² Blanchet, J., and Lefebvre, D. (1995). PAC, GATT, OMC. Le grand Chambardement, Paris, Edition France Agricole.

³ Lester R. Brown is the president of Earth Policy Institute, a neoliberal environmental research institution based in Washington DC, and one of the best known researchers in the field of global environmental issues, sustainable development and environment protection (the work *Outgrowing the Earth: The Food Security Challenge in an Age of Falling Water Tables and Rising Temperatures,* Tehnica Publishing House, Bucharest, 2005).

Taking into consideration the globalization of the grain market and the ability to transport them, famine is less concentrated in certain geographic regions and more in low-income groups. At present, the food crisis translates in rising prices globally, growth that is affecting low-income populations, forcing many to end up even below the limit of subsistence. Thus, we start wondering today whether the current world economic crisis is either cause or effect of deepening the demographic, financial, food, energy resources and other crises.

Nowadays it is believed that the causes of the food crisis could be linked to:

1. Population growth⁴, population growth on Earth. If in 1950 there were about 2.6 billion people, in 1975 their number reached over 4 billion, while in October 2011 their number reached 7 billion. According to demographic forecasts for 2050, the Earth's population will exceed 9.3 billion people.



Fig.1. Population growth between 1950 and 2050

Source: Gabriela Molanescu – The Bucharest University of Economic Studies, Theoretical and Applied Economics, Volume XIX (2012), No. 4(569), page 57-69 Contributions to the Substantiation of the National, Original and Coherent Strategy of Interruption of the Involution of Romania's Agriculture

2. The insufficient production of agricultural goods worldwide. It is estimated that at present over 1.2 billion people are facing hunger. Therefore it will be necessary to obtain increases of agricultural food production to ensure and provide food for 2.3 billion people in addition to the current population.

3. Climate changes. Summers are becoming drier and winters frostier but without significant precipitation which will destroy crops.

4. Bio-fuels. It is impossible for the agriculture from the European Union to produce as much wheat so that to be used as bio-fuel without affecting the agricultural products market.

5. Speculators. The speculation on the financial market led to price increases that cannot be explained. Thus, the price of wheat and rice increased by 30% in one day, which inevitably caused the emergence of speculators.

6. Changing consumption habits. About 40 years ago meat was considered to be a luxury food, but nowadays people eat meat in large and exaggerated quantities.

2. Theoretical background

According to an international study conducted once in two years by World Wildlife Fund (WWF) the Zoological Society of London and the Global Footprint Network⁵, humans will need two Earths to support our lifestyles by 2030 because we are draining the world's resources so quickly and only another planet in addition

⁴ Gabriela Molanescu – The Bucharest University of Economic Studies, Theoretical and Applied Economics, Volume XIX (2012), No. 4(569), page 57-69 Contributions to the Substantiation of the National, Original and Coherent Strategy of Interruption of the Involution of Romania's Agriculture.

⁵ Produced by WWF in collaboration with Global Footprint Network and the Zoological Society of London, the report examines the state of our natural world, and our impacts upon it.

will be able to cover our demand for natural resources. According to the same study, if people continue with the same lifestyle, three planets will soon be needed just to cover the survival needs of the human civilization. Qatar, Kuwait, United Arab Emirates, Denmark, the United States of America and Belgium are countries considered to be currently large consumers of natural resources. In the first half of this classification, Italy and the Russian Federation are ranked as countries with a moderate consumption of natural resources. Romania is ranking 60 and the list of large consumers closes with the poorest countries of the world, such as Afghanistan, Congo, Burundi, Eritrea or Sudan which are countries that are still facing malnutrition and subnutrition. There are currently 850 million people malnourished in the world, of which 200 million are children.⁶

The study suggests that if the expected global population of 9.2 billion people in 2050 were to eat a typical Malaysian diet, we would need 1.3 planets to sustain us. The situation changes radically if everyone were to eat an Italian diet, humanity would need closer to two planets in order to survive.

David Nussbaum, one of the WWF specialists involved in the project noted that "the massive loss of biodiversity and habitats undermines the natural systems upon which we depend for the food we eat, the air we breathe and the stable climate we need. The depletion of natural resources caused by human consumption also poses risks to our economic security: for instance, scarcity of resources and degraded natural systems will increase the price of food, raw materials and other commodities".

Also, the reports provided by the FAO (Food and Agriculture Organization of the United Nations) believe the currently a billion people worldwide suffer from hunger. The current food crisis that emerged in 2010 can rival that of 2007-2008.

These are observations that can only lead to the following questions: is there a connection between the great economic crisis of 1929-1933, also known as the Great Depression, and the current economic crisis or their causes are radically different? Is there a link between the commencement of the previous food crisis (2007-2008) and the commencement of the current economic world crisis? What do we know until now?

The Great Depression was caused by overproduction, took place between 1929-1933 and was characterized by a dramatic drop in global economic activity. The first signs of the crisis occurred in 1928. The commencement of the Great Depression in the United States is usually attributed to the sudden devastating collapse of US stock market prices on October 29, 1929. The Great Depression had devastating effects in both industrialized countries, as well as in less developed countries whose economies were depending mostly on exports of raw materials. The level of global trade decreased rapidly, as personal income, tax revenue, profits and prices dropped also. Cities all around the world were severely affected, especially those dependent on heavy industry. Mining and logging had perhaps the most dramatic decline as demand plummeted and re-employment alternatives for miners or forest workers in other sectors were the lowest. Construction activity was virtually halted in many countries. Farming and rural areas suffered as crop prices and agricultural commodities fell by approximately 40-60%.⁷

The Great Depression in different countries of the world ended at different times. In most countries recovery programs were designed and most of them have gone through various political transformations that have driven them towards left or right extremes. Societies based on liberal democracy were very weak because of the crisis and dictators, such as Adolf Hitler came to lead some of the most powerful states and prepared the political and military conditions to trigger the Second World War in 1939. He who learns from past mistakes can avoid repeating them in the future.

The experts of the International Monetary Fund (IMF) revised radically the economic growth forecasted for 2009 estimating that, globally, the advance shall not exceed 3%. Strongly affected by the financial crisis, the situation for industrialized countries is even worse: only a maximum of 0.5% growth. Reports from the Fund warned gradually on the delicate situation in which the world economy finds itself, perhaps the most serious in the last eight decades. The experts' thought are once again populated by the recession from the early '30s, given the fact that the events seem to unfold exactly the same: stocks fall, companies go bankrupt, and banks face liquidity shortages. Even the chief economist of the International Monetary Fund, Olivier Blanchard, has called

⁶ According to the Food and Agriculture Organization of the United Nations.

⁷ Willard W. Cochrane, Farm Prices, Myth and Reality (1958), page 15; World Economic Survey 1932–33, League of Nations, page 43.

for urgent fiscal interventions designed to rebalance the market, especially to avoid feelings of panic. In harsh times, the global economy needs consumer confidence.

In 1929, Wall Street had become for years the financial centre of the Western world, and it was considered that America already has a decade of prosperity. Only a few economists warned of imminent decline that was to come. The market simply could not sustain such rhythm. In the days before "Black Thursday", as the day of October 24, 1929 remained and accepted in history as triggering moment for the Recession of the early '30s, the stock market was highly volatile. The investors' main worry was not the accelerated decline of the stock market indexes, but rather the large volume of shares traded, which was perceived as a sign of latent distrust. The stock market crash of 1929 was, in fact, more complex than it has been traditionally spread. Suddenly, the shares value began to decline, investors began to sell and panic took over the global finances. On October 24, 1929, nearly 13 million shares were traded. On October 28, the most important stock index lost 13% in one day. The next day, the threat becomes a reality: 16 million shares were traded, causing stock prices to decrease to minimum rates. Wall Street ceased to be an indestructible legend. The major American financial companies have tried to remedy the situation by buying large quantities of shares as a sign of confidence that they still have and invest in the "market reason".

On February 1, 2007 a law to increase the minimum wage was enacted (Fair Minimum Wage Act of 2007), law which has blocked investments and, implicitly, the crediting process. It has also reduced drastically the efficiency of U.S. companies that were competing with emerging economies, especially China. On February 17, 2007 the British bank Northern Rock was nationalized by the British Government. After one month, JPMorgan Chase & Co Bank bought the investment bank Bear Stearns at a very low price, with the help of the U.S. central bank (Federal Reserve) and on September 7, 2008 the largest mortgage banks in the United States (Freddie Mac and Fannie Mae) were placed under federal supervision. After a week, the company Merrill Lynch (the third largest investment bank in the world) is taken over by Bank of America and Lehman Brothers (the fourth largest investment bank in the world) declared bankruptcy. On September 16, 2008, the United States Federal Reserve Bank and the U.S. government nationalized the largest insurance group in the world, American International Group (AIG) which was threatened by bankruptcy, and led to a rescue agreement with the Federal Reserve Bank for a US\$85 billion dollar secured loan facility.

The United States of America announces the recession, and from that moment chaos begins. But a close analysis of economic history shows us that periods of economic depression have usually followed a pattern that was not so little predictable. Almost without exception, major economic crises in history, had similar developments⁸. Of course, each crisis has its own specificity, but there are some key similarities in the sequence of stages that all these crises have gone through.

The first common feature we observe when we analyze the way most economic crises unfold relates to the periods that precede such crises. Thus economic crises are usually preceded by a period of sustained economic growth. But if this economic growth is initially a healthy one, as the population's optimism in general and entrepreneurs' in particular increase, an "overheating of the economy" takes place. That economic growth which was initially healthy is becoming more and more one built more on speculative grounds, and one can easily observe an increasingly pronounced distance of the economic growth from the real economic basic rules.

The thinking trends of Keynesian inspiration, as well as the institutionalist ones, consider that there has been a overproduction phenomenon combined with a lack of aggregate demand in the period before the crisis, while monetarists believe that a determining cause of the Great Depression was the application of bad monetary policy by the U.S. authorities, which led to an unfortunate restriction of the money supply in circulation, that turned an ordinary recession into the worst and bleakest economic depression the world economy would face. The severe drought period in the Mississippi River basin in 1930, caused great difficulties to the U.S. farmers. Many of them were forced to sell their properties just to be able to pay their taxes or debts accumulated. Such circumstances led to the significant decrease in aggregate demand for all social categories. It also determined the decrease in the production of goods, and also, people's income. They were about to face bigger and bigger difficulties in paying their rates on already purchased goods. Are we somehow in a similar stage of unprecedented development of the consumption?

⁸ Alexandru Asavoaei "The economic crisis - a predictable phenomenon", the Faculty of Economics and Business Administration, July 18, 2012

China is more and more taking into account the process of controlling the commodity prices so that to decrease inflation. The Russian Federation has suspended external deliveries of wheat because of the danger of insufficient supplies of wheat to meet the domestic demand of the country. The United Nations Organization warns of the situation in North Korea, a country that is headed towards a new stage of "chronic" food crisis. As we already showed at the beginning of this paper, a classification of the high risk countries ranks among the first 5 positions countries such as Afghanistan, Congo, Burundi, Eritrea and Sudan. At the opposite end are countries such as Oatar, Kuwait, United Arab Emirates, Denmark, the United States of America and Belgium. A global food crisis is imminent! This warning which is released periodically by competent experts and specialized institutions, should normally compel countries to a more rational attitude and behaviour to food consumption. Especially since, according to experts of the United Nations (UN), one billion people worldwide suffer from hunger and food prices will remain high on a medium term. Nevertheless, according to a study conducted by the Swedish Institute for Food and Biotechnology, an estimated one-third of food produced for human consumption is lost or wasted globally, amounting to 1.3 billion tonnes per year, namely 33% of everything that it is produced worldwide. Such reality represents a paradox, given that nearly one billion people worldwide suffer from hunger. In the same vein, the experts of the Food and Agriculture Organization of the United Nations warn that we are approaching a crisis of food prices. It seems that there is food, but many countries (especially those who were "richer" after the economic crisis - an example could be the BRIC group - Brazil, Russia, India and China) have decided to make supplies of domestic production but at the same time, they are buying goods in large quantities from anyone selling.

The UN Food and Agriculture Organization (FAO) foresees that the grain offer of the Asia-Pacific region will decrease considerably in 2050, so it will not be able to meet the growing demand. Consequently, investments in agriculture aimed at expanding productivity represent a priority for all countries. The agriculture, a sector highly dependent on climatic conditions and human factors, is conducted under the global impact of climate change. According to some market reports, if the current global warming continues, the productivity of major crop yields in tropical countries could decrease by 20 to 30%. On the other hand, the process of supplementing new farmlands was minimal and was done by tropical deforestation which, in turn, involves substantial environmental costs. In many countries, primary agricultural lands are restricted in favour of industrial and residential constructions. Moreover, the insufficient water resources and the underdeveloped irrigation systems affect the development of agriculture. Most food markets face major challenges arising from the growing demand, the changes in climate, the increase of production costs and commodity prices and poor crops, based on the diminishing of food reserves and agricultural areas. As we already mentioned, the main causes are the decrease of grain reserves because of unprecedented weather and hydrological conditions, the restriction on exports and a low dollar that has favoured the inflation. In 2011, the price of butter has reached the highest price in history; the price of sugar is hit a record of the last 30 years, while the price of wheat and corn increased by 40%.

The price of wheat increased by 91% since the beginning of 2010 until the end of 2011, and the causes for such price increase are, among others, the extreme weather events in 2010: the Russian heat wave, fires in Israel, flooding in Pakistan and Australia, landslides in China, snowfall in the U.S. and the 12 hurricanes in the Atlantic Ocean⁹. To all these causes we can add up the protectionist measures of countries such as the Russian Federation and Ukraine, measures that, in the fall of 2010, limited grain exports because of low production and fears that they will not meet internal needs.

The quotations for corn increased by 57% over the same period, because crops were fewer, but surprisingly, the demand continued to go up, especially in China. In fact, grain consumption increased most in East Asia, the region becoming at present the largest consumer of grain. Oilseed consumption recorded an increase of over 1000% in East, South, and Southeast Asia. Sugar consumption has gone up exceptionally in South Asia since 1960 with a compounded annual growth rate of over 12%, more than four times the global growth rate. Livestock, the most expensive of the analyzed food commodities, saw demand move up without precedent over the past five decades in East Asia, with China accounting for almost 90% of the consumption. Note that sugar reached the maximum peak of the last 30 years. The general food price index for December 2010 was one percent higher than in June 2008, but cereal prices were still 13% below the level reached in 2008.

⁹ University Professor, PhD Marian Ianculescu – The global warming and the food crisis – challenges that can be reduced by foresters.



Source: http://www.fao.org/worldfoodsituation/wfs-home/foodpricesindex/en/

Man "consumes" on average 4.1 liters of diesel oil, 29 kilograms of soil and 2.2 tonnes of fresh water per day. "These are the resources consumed to feed one person. Multiply this number by 7 billion people and you will realize that all this huge amount of resources consumed is almost impossible to replace", said researcher Julian Cribb¹⁰ at a conference of the Academy of Science in Canberra. In his paper entitled "The coming famine. The global food crisis and what we can do to avoid it" Julian Cribb says that the biggest personal impact of humans on the planet is how they consume food. He argues that most people do not realize what impact has such consumption for the planet. The reasearcher warns that in less than half a century the global food system will reach "points of no-return" unless there is radical change to farming systems, cities and the world diet.

"Take soil for instance. According to the Food and Agriculture Organization of the United Nations, the planet is deteriorating at a rapid pace, and we're losing up to 100 billion tonnes of topsoil a year, mostly into the oceans. Soil takes thousands of years to form, so it is not going to be replaced any time soon. Despite progress in countries like Australia, soil degradation is getting worse, not better. Some scientists say we will face a shortage of good farming soils within 70 years" argues the same Julian Cribb.

The situation is similar in the case of water. Over 4,000 cubic kilometers of water are extracted from the soil each year, the extraction being mostly unsustainable. Regions of the planet such as China or the Middle East will face a severe water crisis by 2030. However, the researcher says, what most governments and authorities on food security have failed to admit publicly is the scarcities of resources such as water and arable lands.

The reasearcher warns that "There is still time to act – but the action must be fast and it must be universal. Julian Cribb also says there are opportunities for major new developments in food production. "There are also 25,000 edible plants on Earth, 99% of them unfamiliar to most people. So we have not yet begun to explore the culinary potential of our home planet. For example, Australia alone has 6,100 edible plants of which we currently eat just five or six!" explains the researcher.

Professor Alyson Warhurst, chief executive of Maplecroft, points out the importance of food: "Food security is a critical geopolitical issue and an important factor for investors concerned with sovereign risk, food and agricultural business with respect to supply chain integrity and foreign direct investments." Lester Brown also, in the aforementioned paper "Full Planet, Empty Plates: The New Geopolitics of Food Scarcity" starts from the observation that over the last decade, world grain reserves have fallen by one third, and the world food prices have more than doubled, triggering "a worldwide land rush and ushering in a new geopolitics of food."

¹⁰ Julian Cribb is a science communicator and author of *The Coming Famine: the global food crisis and what we can do to avoid it.* He is a member of *On Line Opinion's* Editorial Advisory Board. Source Article from http://www.jurnal.md/ro/news/criza-alimentara-mondiala-ameninta-omenirea-707756/

3. Conclusions

In line with the increase in household income levels, food expenditure patterns have also undergone changes¹¹. Generally, in countries with lower income, food takes a much bigger share in the total household expenditures than in the higher income countries. Thus statistics show that a level of a Gross Domestic Product (GDP) per capita of less than USD 5,000 usually implied at least 30% of consumer expenses went toward food. This percent can reach even 50% for a number of countries with the lowest GDP per capita levels. Thus, the share of food in total expenditures tends to decline as a country's per capita income moves up. In high-income countries the share of food in total expenditures had an average share of 10.9%. Similarly, the composition of the food basket has also changed in tandem with the income increase. A larger share of food expenditure is allocated to higher value products such as meat or sugar and confectionery, leaving a lesser percent for basic commodities like bread and rice. However, the analysis of expenditure may not always be accurate. For instance, the breads and cereals category has a similar contribution to the total of food budgets.

However, the number of calories derriving from this category account for 57% of total calories consumed in low-income countries and only 36% in high-income countries. This indicates that low-income countries consume larger amounts of simple breads and cereals (corn, rice) compared to other food categories. On the other hand, higher-income countries buy smaller amounts of more expensive products (packaged and processed cereals like breakfast cereals), which explains their relatively high share in total food expenditure. Therefore, in order to get a reasonably clear picture of the basket's composition, the analysis needs to cross-reference and collate data related to the share of individual food groups and the calories/nutritional value derived from them. Furthermore, product prices need to be considered too, since some more expensive products in lower-income countries can have a similar contribution to household expenditures despite much lower consumption volume.

Low-income countries will experience most severely the food crisis because in such countries population growth is sustained. One can consider that, at the same time with the unfolding of the financial crisis, we are also in a powerful food crisis and Romania is seen among the vulnerable countries being ranked 12th in the world within a classification of vulnerability to food price increases. Our country imports too much food not be affected by what happens on the international market. Moreover, in the last couple of years, Romania has faced dry and very warm summers. According to the National Institute of Statistics, in 2010, Romania had the highest inflation in the last five years. Among the products whose prices gone up the most we mention vegetables, cigarettes, canned food, as well as some service or administered prices.



Fig. 3. Monthly increase in prices for 2010 (overall and by categories of goods and services) Sorce: The National Institute of Statistics

Following the analysis made by experts according to some generally accepted criteria, it was concluded that Romania meets all the requirements to qualify among the countries with poor food security. This result is supported by the following aspects: low agricultural production, vast areas of uncultivated land or lands worked

¹¹ Blominvest Bank - F&B in the MENA Region Marie Dumitrescu, Romanian Center for Trade and Investment (CRPCIS)

rudimentary, food price explosion superimposed over a continuously lower purchasing power because of the economic crisis. This situation determines large segments of the population to no longer afford to provide their food needs from their monthly income. The seriousness of the situation also lies in the fact that a food crisis may become a succession of crises at any time should the market imbalances persist, and the competition for energy sources will continue to affect the production and the commodity market. The causes of the food crisis in Romania may be grouped as follows¹²:

1. About half the food products consumed in our country is imported, which means that any price increase on the international market will affect immediately our domestic market.

2. A large part of the domestic food production is exported, which means that we cannot trust the assumption that the domestic production will save us from the food crisis. Should the prices rise all over the world, then all the Romanian wheat will be exported as before to Europe.

3. Romania's population spends more than 50% of their income for purchasing food products, which means that the limit of endurance has either already been reached or exceeded. The consumer cannot afford and support new price increases because he simply does not have the money needed to purchase expensive product.

4. The speculative factor on the food supply chain is very long, with an endless string of intermediaries who will take advantage of the occasion to obtain greater profit on the consumers' expense.

Price increases affect mostly people with medium and below-medium income who limit their consumption in return as a reaction to the price increase. Another direct effect is the deterioration of the quality of life due to the fact that people cease to invest anymore in their own comfort and wellbeing.

From the data and observations presented within this paper, it is evident that a food crisis overlapping the global economic crisis will seriously affect household budgets and, implicitly, the food consumption. As a solution we can argue that: the lack of food products on the market could be resolved by motivating the domestic producers and by targeting the domestic market. Also, another controversial solution would be a larger production of genetically modified foods that have adverse effects on human health, but that might solve the problem of food scarcity. Therefore, public policies ought to consider encouraging the domestic production, the increase of foreign investment in agriculture, the increase of the levels of leasing and alienation of land, the increase of technology and invariably the reduction of prices.

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Migrant Labor, Unemployment and Optimal Growth

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Abstract

One of the arguments against migrant labor is that it has negative ef- fect on the employment of domestic labor. The question is now if the immigration has also negative effects on the other variables of the econ- omy. To examine these effects we develop an optimal growth model with migration and unemployment and then we analyze these effects, restricting our analysis to the steady state. We introduce a simplify- ing hypothesis concerning the skill level of human capital. We assume that the average skill level of domestic employed labor differs from the average skill level of migrant labor, but the two kinds of labor grow at the same constant rate. We prove that the immigration process could have both positive and negative effects on consumption, human capital and physical capital, depending on the skill level of the migrant labor. The numerical simulations confirm our theoretical results.

Keywords: immigration; optimal growth; unemployment rate.

JEL Classifications: F2, J6, O4.

Introduction

The phenomenon of migration is present in several developing countries and the existing literature has offered insightful results on the effects of migrant labor. There are many important contributions in this fi Among them we mention the papers of Hazari and Sgro, (2003), Angrist and Kugler (2003), Borjas (2003), Moy and Yip (2006), Dustmann et al. (2008), Fan and Stark (2008), Palivos (2009) and Ottaviano and Peri (2012).

Palivos studied fi the case where there are two types of domestic labor, skilled and unskilled, and second, he introduces a minimum wage, which leads to job competition between domestic unskilled workers and immigrants and, consequently, to unemployment in the domestic labor. The model developed by Palivos is a simply one and it should be viewed as a fi attempt to show that the existence of unemployment can have a significant impact on agents welfare. The key element in its analysis is that he introduces a minimum wage, which applies only to unskilled workers and is assumed to be binding. One of the questionable consequences of the model introduced by Palivos is the fact that an increase in the immigration ratio will leave the capital stock unchanged.

Dustmann, Glitz and Frattini present a stylized model of the labor mar- ket impact of immigration and discuss the mechanisms through which an economy can adjust to immigration. Finally they explain the problems of empirically estimating how immigration affects labor market outcomes of the resident population and review some strategies to address these.

Fan and Stark developed a model of rural-to-urban migration with an emphasis on the role of human capital in both economic activities. Their model assumes that the urban sector produces manufactured goods using labor and physical capital as factors of production, and that the rural sector produces agricultural goods using labor and land as factors of production. This kind of model has been widely used as a basic analytical framework for studying rural-to-urban migration in developing countries and as a platform for policy formation.

In their paper, Angrist and Kugler estimate the effect of migration on native employment in Western Europe countries. Their estimates show that an increase in the foreign share of 10% reduces native employment rates by 0, 2 to 0, 7 of a percentage point. Such an effect may be explained by the fact that there has been little aggregate employment creation in most of Western Europe countries in the last two decades, while immigrant employment has grown considerably.

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In our paper we chose to use the case of the centralized problem, which means a social planner solution via a model of Lucas type. There are many reasons to explain this approach, but at least two reasons have to be mentioned here.

- The fi reason is given by the minimum wage. This one is a parameter that characterizes a limited number of economies, and the migration process is a universal process.
- The second reason comes from the migration phenomena. As it is well known in many countries the number of migrants is limited by legal regulations. Consequently, the migrant ratio could be considered as a control variable in such a model.

Our approach introduces a simplifying hypothesis concerning the skill level of human capital. We assume that the average skill level of domestic employed labor differs from the average skill level of migrant labor, but the two kinds of labor grow at the same constant rate. This hypothesis can be considered realistic because on the labor market, both domestic and migrant labor follows an educational process to improve their skills. Of course, the alternative hypothesis of different growth rates could be considered, but this one can create some difficulties in the computation procedure. Our fi hypothesis refers to the existence of a constant permanent unemployment rate that is not affected by the migration process.

The rest of the paper is structured as follows. The fi section is this introduction. In the second section we present a model with migrant la- bor and unemployment and in the third and fourth sections we analyze the equilibrium properties in the long run. In the last section, we present some numerical simulations and fi some conclusions.

A growth model with unemployment and migrant labor.

The economic system produces a single commodity $Y = F(K, L_{DE}, L_M)$, under a Cobb-Douglas technology with constant return to scale in physical capital K, domestic employed labor L_{DE} and migrant labor L_M . Under this hypothesis, the production function assumes imperfect substitution between migrant and domestic employed labor since they are considered as separate factors of production.

$$F(K, L_{DE}, L_M) = A_1 K^{\beta} L_{DE}^{\alpha} L_M^{\gamma}, \alpha + \beta + \gamma = 1$$

Domestic labor is divided into two distinct parts: potentially employed and permanent unemployed $N_D = N_{DPE} + N_{DPU}$. Domestic labor potentially employed consists of two types of labor, skilled and unskilled and write $N_{DPE} = N_{DE} + N_{DUS}$. Migrant labor is a perfect substitute for domes- tic unskilled labor, but not for domestic skilled labor, that is $N_M = N_{DUS}$. Therefore, domestic unemployed labor consists in fact of two distinct types of labor: permanent unemployed and perfect substituted by migrant labor, $N_{DU} = N_{DPU} + N_{DUS}$. Therefore, the effective of total labor employed by the economic N > NDE is given by

$$N = N_{(t)} = N_{DE}(t) + N_M(t)$$

Now we introduce the following notations:

a. Let u = u(t) be the unemployment ratio of domestic labor

$$u(t) = \frac{N_{DU}(t)}{N_{D}(t)}$$

b. Let e = e(t) be the employment ratio of domestic labor

$$e(t) = \frac{N_{DE}(t)}{N_D(t)} \Longrightarrow e(t) = 1 - u(t)$$

c. Let $u_P = u_P(t)$ be the permanent unemployment ratio of domestic labor

$$u_{\rm P}(t) = \frac{N_{DPU}(t)}{N_{\rm D}(t)}$$

d. Let $u_M = u_M(t)$ be the unemployment ratio generated by migrant labor

$$u_M(t) = \frac{N_M(t)}{N_D(t)}, \Longrightarrow u(t) = u_P(t) + u_M(t)$$

e. Let $\omega = \omega(t)$ be the migrant ratio

$$\omega(t) = \frac{N_M(t)}{N(t)}$$

f. Let *n* be the constant growth rate of N = N(t), that is $n = \frac{N(t)}{N(t)}$

Now we can write:

$$N = N_{DE} + N_M = (1 - u)N_D + \omega N \Longrightarrow N_D = \frac{1 - \omega}{1 - u}N \text{ and } N_{DE} = (1 - \omega)N$$
$$N_D = N_{DE} + N_{DPU} + N_M = (1 - \omega)N + u_P N_D + \omega N$$

and finally we get

$$u_P = rac{u-\omega}{1-\omega} \Leftrightarrow u = u_P + (1-u_P)\omega$$

A similar computation procedure yields

$$u_M = \frac{\omega(1-u)}{1-\omega} \Longrightarrow u_M + u_P = u$$

We denote by $h_{DE} = h_{DE}(t)$ the average skill level of domestic employed labor, by $h_M = h_M(t)$ the average skill level of migrant labor and by h = h(t) the average skill level of total labor. Hence we can write:

$$L_{DE}(t) = N_{DE}(t)h_{DE}(t), L_M(t) = N_M(t)h_M(t)$$

and without loss of generality we assume the ratio h_M / h_{DE} is constant. This is equivalent to say that:

$$h_M(t) = \mu_M h(t)$$
 and $h_{DE}(t) = \mu_D h(t)$

where μ_M and μ_D are positive constants and thus the production function can be written

$$F = AK^{\beta}N^{1-\beta}h^{1-\beta}\omega^{\gamma}(1-\omega)^{\alpha}, \qquad A = A_{1}\mu_{D}^{\alpha}\mu_{M}^{\gamma}$$

Now we introduce the three main hypotheses of our paper.

1. The first one claims that the ratio of migrant labor is a controlled variable.

2. The second one assumes that the dynamics of the average skill level of total employed labor is described by the following differential equation

$$h = (\delta + \pi \omega)h, \qquad \delta > 0, \qquad \pi \in \mathcal{R}$$

According to this equation, if there are no migrant labor, then h(t) grows at a rate δ . If $\pi > 0$ then the migrant labor has a positive effect on the the growth rate of human capital and if $\pi < 0$ then the migrant labor has a negative effect on the the growth rate of human capital.

3. The third one assumes that the permanent unemployment ratio u_P is constant.

Of course, these parameters could be estimated via econometric methods. In order to simplify the computation procedure we consider all variables as per capita quantities and hence the production function becomes:

$$f = f(k, h, \omega) = Ak^{\beta} h^{1-\beta} \omega^{\gamma} (1-\omega)^{\alpha}$$

Remark 1 If there are no migrant labor, that is to say $\omega(t) = 0$ for all $t \ge 0$, then we have: $\gamma = 0$, $N_M(t) = 0$, $N(t) = N_D(t)$, $\mu_D = 1$,

$$\lim_{\omega \to 0, \gamma \to 0} \omega^{\gamma} = 1 \text{ and } f = f(k, h) = Ak^{\beta} h^{1-\beta}$$

Of course, the two state variables and the two control variables as well as the variable u, are all functions of times, but when no confusions are possible, we simply write k, h, c, ω and u. Concluding, our model is characterized by the well-known optimization problem.

Definition 1 The set of paths $\{k, h, c, \omega\} = \{k(t), h(t), c(t), \omega(t)\}$ is called an optimal solution if it solves the following optimization problem:

$$V_0 = \max_{c,\omega} \int_0^\infty \frac{c^{1-\theta} - 1}{1-\theta} e^{-\rho t} dt,$$
(1)

subject to

$$\begin{cases} k = Ak^{\beta}h^{1-\beta}\omega^{\gamma}(1-\omega)^{\alpha} - c - nk, \\ h = (\delta + \pi\omega)h, \\ k_0 = k(0) > 0, k_0 = h(0) > 0 \end{cases}$$
(2)

and

$$u = u_P + \left(1 - u_p\right)\omega,\tag{3}$$

where k_0 and h_0 are given, k is the physical capital, h is the human capital, c is the consumption, β is the elasticity of output with respect to physical capital, α is the elasticity of output with respect to domestic human capital, γ is the elasticity of output with respect to migrant human capital, ρ is a positive discount factor, A > 0, $\delta > 0$, $\pi \in IR$, and θ^{-1} represents the constant elasticity of intertemporal substitution.

The system (2) gives the resources constraints and initial values for the state variables k and h. To solve the problem (1) subject to (2), we defi the Hamiltonian function (note that unemployment equation doesn't enter):

$$H = \frac{c^{1-\theta} - 1}{1-\theta} + \left[Ak^{\beta}h^{1-\beta}\omega^{\gamma}(1-\omega)^{\alpha} - c - nk\right]\lambda_1 + (\delta + \pi\omega)h\lambda_2$$

The boundary conditions include initial values for human and physical capital and the transversality conditions:

$$\lim_{t\to\infty} e^{-\rho t} \lambda_1(t) k(t) = 0 \text{ and } \lim_{t\to\infty} e^{-\rho t} \lambda_2(t) h(t) = 0$$

In this model, there are two control variables, *c* and ω , and two state vari- ables, *k* and *h*, and the optimal trajectory of variable u will be determined as a function of the optimal trajectories of the other variables. In an optimal program the control variables are chosen so as to maximize *H*. We note that along the optimal path, λI and $\lambda 2$ are functions of *t* only. The necessary fi order conditions for the pair (*c*, ω) to be an optimal control are:

$$\frac{\partial H}{\partial c} = 0 \implies \lambda_1 = c^{-\theta},$$
$$\frac{\partial H}{\partial \omega} = 0 \implies \frac{\lambda_1}{\lambda_2} = \frac{\pi \omega (1 - \omega)h}{[(1 - \beta)\omega - \gamma]f'},$$
$$\frac{\lambda_1}{\lambda_1} = \rho + n + \beta \frac{f}{k'},$$
$$\frac{\lambda_2}{\lambda_2} = \rho - \delta - \frac{\alpha \pi \omega}{(1 - \beta)\omega - \gamma'},$$
$$\frac{\omega}{\omega (1 - \omega)} = \frac{q(\omega)}{g(\omega)} + \beta \frac{(1 - \beta)\omega - \gamma}{g(\omega)} \frac{c}{k'},$$

where

$$g(\omega) = \omega\beta(1-\beta)\omega^2 - 2\gamma\beta\omega + \gamma(1-\gamma)$$

and

$$g(\omega) = (1-\beta)\{\pi\beta\omega^2 - [\pi(1-\gamma) + (1-\beta)(\delta+n)]\omega + \gamma(n+\delta)\}$$

First observe that $g(0) = \gamma(1 - \gamma) > 0$, $g(1) = \alpha(1 - \alpha) > 0$ and since the discriminant $\Delta_g = -\alpha\beta\gamma < 0$ we conclude that $g(\omega) > 0$ for all $\omega \in [0, 1]$. For the function q we have. $q(0) = \gamma(1-\beta)(n+\delta) > 0$, $q(1) = -\alpha(1-\beta)(\pi+n+\delta)$ and the discriminant Δ_q is given by

$$\Delta_q = (\alpha + \gamma \beta)^2 \pi^2 + 2(\delta + n)(\alpha - \gamma \beta)(1 - \beta)^2 \pi + (1 - \beta)^4 (\delta + n)^2$$

 Δ_q as a function of π is always positive because $(\alpha + \gamma\beta)^2 > 0$ and its discriminant $\Delta = -4\alpha\gamma(1-\beta)^4(\delta + n)^2$ is always negative. Consequently, if $\pi > -n - \delta$ then there exists a unique $\omega_0 \in [0, 1]$ such that $q(\omega_0) = 0$ and, for all $\omega \in [0, \omega_0]$ the function $q(\omega) > 0$ and for all $\omega \in [\omega_0, 1]$ the function $q(\omega) < 0$. Of course, if $\pi < -n - \delta$ then there exist two real roots outside of the interval (0, 1) and the function $q(\omega) > 0$ for all $\omega \in [0, 1]$. After some algebraic manipulations, we can close the system and write down the final form

$$\begin{cases} \frac{\dot{k}}{k} = A \left(\frac{h}{k}\right)^{1-\beta} \omega^{\gamma} (1-\omega) x^{\alpha} - n - \frac{c}{k}, \\ \frac{\dot{h}}{h} = \delta + \pi \omega, \\ \frac{\dot{c}}{c} = \frac{\beta A}{\theta} \left(\frac{h}{k}\right)^{1-\beta} \omega^{\gamma} (1-\omega)^{\alpha} - \frac{\rho+n}{\theta}, \\ \dot{\omega} = \frac{\omega(1-\omega)}{g(\omega)} \left\{ q(\omega) - \beta [\gamma - (1-\beta)\omega] \frac{c}{k} \right\} \\ \frac{\dot{\lambda}_{1}}{\lambda_{1}} = \rho + n - \beta A \left(\frac{h}{k}\right)^{1-\beta} \omega^{\gamma} (1-\omega)^{\alpha}, \\ \frac{\dot{\lambda}_{2}}{\lambda_{2}} = \rho - \delta - \frac{\alpha \pi \omega}{(1-\beta)\omega - \gamma'} \end{cases}$$

and

$$u = u_P + (1 - u_p)\omega$$

The balanced growth path

In this section we examine the properties of the balanced growth path (BGP). The system described above reaches the balanced growth path if there exists a finite $t_* > 0$, such that for all $t \ge t_*$, $r_{\omega} = 0$ and $r_k = r_c = r_h$, where r_x denotes the growth rate of variable x, x_* is its value at $t = t_*$ and x^* is its value for $t > t_*$. The following proposition gives our fi result that characterize the balanced growth path.

Proposition 1 Let $\pi \in \mathbb{R}$ and $\theta > 1$. If for all $t \ge t_*$, $r\omega = 0$, then the above system reaches the BGP and the following statements are valid

i.
$$r_{f^*} = r_{k^*} = r_{c^*} = r_{h^*} = r_* = \delta + \pi \omega_*$$

ii. There exists at least one
$$\omega_* \in [0, 1]$$
, solution of the equation $A_0\omega^2 + A_1\omega + A_2 = 0$, given by

$$\omega_* = \frac{-A_1 \pm \sqrt{A_1^2 - 4A_0 A_2}}{2A_0}$$

where

$$A_0 = \omega \theta (1 - \beta), \qquad A_2 = -\gamma [\delta(\theta - 1) + \rho]$$
$$A_1 = (1 - \beta) [\delta(\theta - 1) + \rho] - \pi(\alpha + \gamma \theta)$$

iii.

iv.

$$\frac{c_*}{k_*} = \frac{(\theta - \beta)r_* + \rho + n(1 - \beta)}{\beta}$$

 $u_* = u_P + (1 - u_p)\omega_*$

v.

 $\frac{f_*}{k_*} = \frac{\theta r_* + \rho + n}{\beta}$

$$\frac{h_*}{k_*} = \left\{ \frac{\theta r_* + \rho + n}{\beta A} \frac{1}{(1 - \omega_*)^{\alpha} \omega_*^{\gamma}} \right\}^{\frac{1}{1 - \beta}}$$

Proof of Proposition 1. At (*BGP*) ω is constant and therefore $\omega = 0^{\circ}$ From the fourth equation of the system (4) we obtain

$$\frac{c_*}{k_*} = \frac{q(\omega_*)}{\beta[\gamma - (1 - \beta)\omega_*]}$$

This is equivalent to say that there exists a common constant growth rate for both variables c and k, for any $t > t_*$. Let us denote by r_* this common and constant growth rate. The fi equation of the system (4) can then be written

$$r+n+\frac{c}{k}=A\left(\frac{c}{k}\right)^{1-\beta}\omega^{\gamma}(1-\omega)^{\alpha}$$

At *BGP*, the left side of the above relation and ω are both positive real constants. Taking the logarithm and then diff tiating with respect to time we obtain

$$(1-\beta)(r_h-r_k)=0 \implies r_h=r_k=r_*$$

Now, the common growth rate can be determined from the second equation of the system (4) and is given by $r_* = \delta + \pi \omega_*$. Combining the fi and the third equation of the system (4) we get

$$r_* + \frac{\rho + n(1 - \beta)}{\theta - \beta} = \frac{\beta}{\theta - \beta} \frac{c_*}{k_*}$$

from where it follows

$$\frac{c_*}{k_*} = \frac{\theta - \beta}{\beta} (\delta + \pi \omega_*) + \frac{\rho + n(1 - \beta)}{\beta}$$

Equalizing the two results from the equations (10) and (11) we obtain

$$G(\omega_{*}) = A_{0}\omega_{*}^{2} + A_{1}\omega_{*} + A_{2} = 0$$

The discriminant Δ_G of the function $G(\omega_*)$ is given by

$$\Delta_G = (\alpha + \gamma \theta)^2 \pi^2 + 2(1 - \beta)(\gamma \theta - \alpha)[\delta(\theta - 1) + \rho]\pi + (1 - \beta)^2[\delta(\theta - 1) + \rho]^2$$

 Δ_G as a function of π is always positive because $(\alpha + \gamma \theta)^2 > 0$ and its discriminant $\Delta = -4\alpha\gamma\theta(1-\beta)^2 [\delta(\theta-1) + \rho]^2$ is always negative. Consequently, because $G(0) = -\gamma [\delta(\theta-1) + \rho] < 0$ and $G(1) = \alpha [(\pi + \delta)(\theta - 1) + \rho]$, we can distinguish here two possibilities:

1. If $\pi > -\delta - \frac{\rho}{\theta - 1}$ then $(\pi + \delta)(\theta - 1) + \rho >$, and we deduce that there exist two real solutions, one solution $\omega_1 \in [0, 1]$ and one solution $\omega_*^2 \notin [0, 1]$, such that $G(\omega_*^1) = G(\omega_*^2) = 0$ given by (5).

2. If $\pi < -\delta - \frac{\rho}{\theta - 1}$, then then $(\pi + \delta)(\theta - 1) + \rho < 0$ and we deduce that there exist two solutions $\omega_* \in [0,1]$ such that $G(\omega_*) = 0$ given by (5).

The last two results follow immediately by direct computation and thus the proof is completed.

Short analysis of the BGP

At this stage, a short analysis is absolutely necessary. As we can observe from the above relations, the values at steady state depend only on the parameters of our economy. This claim is obviously true since the optimal level of the migration rate - given by the relation (5), depends only on these parameters and all other optimal values of the economy are affected by the optimal level of the migration rate. As we pointed out in the introduction section, one of the arguments against immigration is that it increases the unemployment of the domestic labor. Unfortunately it is too diffi to analyze this effect for the transitional dynamics and therefore we restrict our analysis only to the steady state. The question is now which are the effects of immigration on the other variables. The following proposition tries to give a coherent answer to this question.

Proposition 2 The balanced growth path determined in the previous section has the following properties.

- 1. For any real value of the efficiency parameter of migrant labor π , the immigration has negative effects on the unemployment rate.
- 2. If the efficiency parameter of migrant labor $\pi > 0$, then the immigration has positive effects on all the other variables of the economy.
- 3. If the efficiency parameter of migrant labor $\pi < 0$, then the immigration has negative effects on all variables of the economy.

Proof of Proposition 2. First we introduce the following functions.

$$P_1(\omega_*) = u_*, \qquad P_2(\omega_*) = ur_*, \qquad P_3(\omega_*) = \frac{c_*}{k_*}, \qquad P_4(\omega_*) = \frac{f_*}{k_*}, \qquad P_5(\omega_*) = \frac{h_*}{k_*}$$

Taking now the derivative of each function with respect to ω_* , denoted by P_k , $k = 1 \div 5$, we obtain

$$P_{1}(\omega_{*}) = 1 - u_{P} > 0, \qquad P_{2}(\omega_{*}) = \pi, \qquad P_{3}(\omega_{*}) = \frac{(\theta - \beta)\pi}{\beta}, \qquad P_{4}(\omega_{*}) = \frac{\theta\pi}{\beta}$$
$$P_{5}(\omega_{*}) = \frac{P_{5}(\omega_{*})}{(1 - \beta)\omega_{*}(1 - \omega_{*})} \frac{C_{0}\omega_{*}^{2} + C_{1}\omega_{*} + C_{2}}{\theta\pi\omega_{*} + \delta\theta + \rho + n}$$

Where

$$C_0 = -\omega\theta\beta, \qquad C_2 = -\gamma(\theta\delta + \rho + n)$$
$$C_1 = (1 - \beta)(\theta\delta + \rho + n) + \pi\theta(1 - \gamma)$$

Let us we denote by $P(\omega) = C_0 \omega^2 + C_1 \omega + C_2$. The discriminant Δ_P of the function P (ω) is given by

$$\Delta_P = \theta^2 (1 - \gamma)^2 - 2\theta (\alpha - \gamma \beta) (\delta \theta + n + \rho) \pi + (1 - \beta)^2 (\delta \theta + n + \rho)^2$$

 $\Delta_{\rm P}$ as a function of π is always positive because $\theta^2 (1 - \gamma)^2 > 0$ and its discriminant $\Delta = -4\alpha\gamma\beta\theta^2(\delta\theta + \rho + n)^2$ is always negative. Consequently, because

$$P(0) = -\gamma(\theta\delta + \rho + n) < 0 \text{ and } P(1) = \alpha[\rho + n + \theta(\delta + \pi)]$$

we can distinguish here two possibilities:

1. If $\pi \in (-\delta - \frac{\rho + n}{\theta}, 0)$ then $\rho + n + \theta(\delta + \pi) > 0$, and we deduce that there exist two real solutions, one solution $\omega_P \in [0, 1]$ and one solution $\omega^2 \notin [0, 1]$. Therefore, for all $\omega \in (\omega_P, 1)$ the function $P(\omega) < 0$, the function $\theta \pi \omega_* + \delta \theta + \rho + n > 0$ and consequently the function $P_5^{\hat{}}(\omega_*) < 0$.

- 2. If $\pi > 0$ then $\rho + n + \theta(\delta + \pi) > 0$, and we deduce that there exist two real solutions, one solution $\omega_P \in [0, 1]$ and one solution $\omega^2 \notin [0, 1]$. Therefore, for all $\omega \in (\omega_P, 1)$ the function $P(\omega) > 0$, the function $\theta \pi \omega_* + \delta \theta + \rho + n > 0$ and consequently the function $P_4^{\hat{}}(\omega_*) > 0$.
- 3. If $\pi < (-\delta \frac{\rho+n}{\theta}, 0)$, then then $\rho + n + \theta(\delta + \pi) < 0$ and we deduce that there exist two solutions $\omega \notin [0,1]$. Therefore, for all $\omega \in [0,1]$ the function $P(\omega) < 0$, the function $\theta \pi \omega_* + \delta \theta + \rho + n > 0$ and consequently the function $P_5(\omega_*) < 0$

and thus the proof is completed.

Concluding, we may claim that the immigration process could have both positive and negative effects on consumption, human capital and physical capital, depending on the skill level of the migrant labor. These results con- tradict those obtained by Palivos, where it was shown that, if expanded, in a rather simple way, to allow for unemployment in the labor force, consumption and welfare decrease.

Conclusions and numerical simulations

As we pointed out above, one of the arguments against immigration is that it increases the unemployment of the domestic labor and has negative effects on all the other variables of the economy. The main aim of this fi section is to confirm by numerical simulations the theoretical aspects presented in this paper. In order to do this we close this section presenting the results of a numerical simulation procedure. The benchmark values for economy we consider are the following:

a. $\beta = 0.25$, n = 0.01, $\delta = 0.15$, $\pi = 0.05$, $\rho = 0.04$, $\alpha = 0.60$, $\gamma = 0.15$, $\theta = 1.2$, A = 1.05 and the corresponding steady state equilibrium is given by:

$$\omega_* = 0.0728, \, u_* = 0.0821, \, r_* = 0.1536,$$

$$\frac{h_*}{k_*} = 1.5424, \qquad \frac{c_*}{k_*} = 0.7738, \qquad \frac{f_*}{k_*} = 0.9375$$

b. $\beta = 0.25$, n = 0.01, $\delta = 0.15$, $\pi = -0.05$, $\rho = 0.04$, $\alpha = 0.60$, $\gamma = 0.15$, $\theta = 1.2$, A = 1.05 and the corresponding steady state equilibrium is given by:

$$\omega_* = 0.0690, u_* = 0.0783, r_* = 0.1465,$$

 $\frac{h_*}{k_*} = 1.4791, \qquad \frac{c_*}{k_*} = 0.7469, \qquad \frac{f_*}{k_*} = 0.9034$

Under the above baseline of the parameters, the model conform roughly to standard empirical evidence and to other results obtained by the above cited authors. The numerical simulation confirm our theoretical results. As we can observe, the two coefficients δ and π play a crucial role in the effects of the migration process. As we claimed above, the three coefficients δ , π and uP could be estimated only via econometric methods.

In this paper we have examined the existence and some properties of the

balanced growth path of a model with migrant labor and unemployment under a Cobb-Douglas production technology. We have also proved that the immigration process could have both positive and negative effects on consumption, human capital and physical capital.

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XXI Century Education and its contribution to the employment rate of romanian labour marketⁱ

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,, Education is the most important weapon you have in order to change the world " Nelson Mandela

Abstract

The reason for choosing this theme is that the employers show a lack of interest in the workforce that has benefited from the educational process, a lack of interest which begun to intensify lately, educational process meaning formal education, namely that obtained in universities. The development in the modern society in terms of information and communication technology makes employers modify their preferences.

If up to the intensification of the financial crisis the university graduates were the ones being employed, now less educated people are sought. The central idea of the article is that young people show a skeptical attitude on further education after high school, and the fact that they do not want to surpass themselves and not focus on lifelong learning, poses a threat to society, an education that does not end once the individual no longer has the status of pupil or student.

To support the argument over the scientific approach, we're using linear regression, experiments, and opinion surveys using a questionnaire. The importance of this scientific endeavor is that it is a warning for the entrepreneurs, emphasizing the fact that labor resources with limited knowledge cannot perform tasks at the work place, practically do not perform well, and this is reflected in the company's financial data.

Keywords: education, self-education, teaching skills, employment rate, unemployment rate.

Jel: J 62, R 23,C 01, C12

1. Introduction

Education and employment rate were and continue to be the focus of the experts in this field. European policies and strategies are aimed at supporting these two pillars of contemporary society. If according to the Lisbon 2020 strategy that aims to reach the 70% employment rate, in the education area it's aimed to improve the situation focusing on preparing young people for the labor market and helping them to pursue studies abroad. If Nelson Mandela sees the education as a way to change the world, Immanuel Kant emphasizes the fact that man acquires human traits, it humanizes himself and projects personality traits through education, while Aristotle mentions that the road is long, but the results are sweet, regarding education.

The education does not have the desired effect without work, it's like a flame that's slowly burning out, and work without education doesn't bring satisfying results. Education is what makes labor's role change in our society. If in the past work was associated only with supporting one's self, like buying food and clothes, now things are changing, the individual wants to satisfy his needs of knowledge rather than the daily existence needs.

The academy member Augustin Doinaş was an advocate of education all through his life, saying that no one died due to long-term exposure to education. Since information today might be novelty, but over time it will no longer be valid.

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2. Theoretical aspects of education and employment concepts

Education lowers the health problems, reduces mortality and results in increased life expectancy. If health education would be a part of general education, this would reduce the costs involved, (insertion of concepts into existing materials, concepts that empower young people). In our century education plays an essential role. There is a social institution of higher rank, which can help increase democracy and equality, facilitating the relationship between man and nature (Pargaru I, Gherghina R, Duca I, 2009).

The strategic framework for European cooperation in education and training is aimed at supporting EU Member States in the development of national education and training, including initiatives regarding lifelong learning for all members of society and the means to reach their potential. This framework establishes a benchmark, namely that by 2020, an average of at least 15% of adults aged between 25 and 64 years old have to participate in the process of lifelong learning. (http://epp.eurostat.ec.europa.eu/ statistics_explained/ index.php/Education_statistics_at_regional_level/ro#.C3.8Env.C4.83.C8.9Barea_pe_tot_parcursul_vie.C8.9Bii).

Getting an lifelong education is as important if not more important than ever, simply "getting an education" is not enough. What matters the most is the quality of education defined by the level of knowledge and skills acquired by the pupil or student (Craig D, 2009).

Parents will be encouraged to support learning by (Jardin D, 1996):

- Taking an active role in their children's learning,
- Engaging in a cooperative relationship with their children and the teachers,
- Assisting school in establishing a common set of values and expectations,
- Strengthening school's goals,
- Opportunities to get involved in school activities,
- Opportunities to participate in school decision-making.

Students in our society focus not only on traditional forms of education (formal, informal and non-formal) but also on educating on their own (self-education). This capacity for independent learning is essential for their future because it brings wealth (Brown S, 2006). There are eight critical factors that, according to the researchers, should generate educational success (Lombardi M, 2007): content, instructional design, student tasks, trainers roles, the roles of beneficiaries, equipment, technology, assessment.

The key to understanding education is to recognize the fact that it is not an isolated phenomenon or a dependent one; lifelong education is received and contributes to the success of the individual; it creates character (Singh R, 1991). Self-education may be the most important especially now in our ever changing world, when people can acquire skills to manage their own life, to be independent, but this doesn't mean that it can be done without help.

Effective teaching focuses on student involvement in deep thinking about the subject matter. College graduates working in a laboratory, focusing intensively on solving real physics problems after several years of working in that environment they become experts, not because there is something magical in the air of the research laboratory, but because they are engaged in cognitive processes needed to develop specialized skills (Levy F, Murnane R, 2005). Most entrepreneurs and college graduates think college should provide a balance between education, knowledge and well-rounded skills in a specific field (Peter D, 2006).

Teacher education focuses on a series of key skills that are not well developed through traditional training programs. These include: student discipline, student motivation, dealing with individual differences / or inadequate resources. organization insufficient and of classwork parents (http://www.ascilite.org.au/conferences/perth04/procs/ferry.html). Learning to teach is the ability to pursue and persist in learning, to organize your own learning process through effective management of time and information, both individually and in a group. This means obtaining, processing and assimilating new knowledge and skills, searching guidance. (http://www.alfa-trall.eu/wp-content/uploads/2012/01/EU2007and also for keyCompetencesL3-brochure.pdf).

The labor market is the meeting between labor demand and labor supply. Labor demand is the need for employment and labor supply are available jobs. In this labor market, the labor resources play a key role. Schuele and Madison (2010) mentioned that in order to find a job, human resources must be able to convince the employers that they will bring value to an organization (Kay A, Lear J, 2011).

Hard work was and still is performed in today's society, although prohibited by law, especially regarding children. ILO Convention defining hard work focuses on coercion measures. But does this mean that there's a link between the concept of hard work and slavery Kaye M, 2007). The employee is any individual who works under the supervision of the employer and receives a salary. Employee - people in the labor market that have been reported as part of this structure. (http://www.nscb.gov.ph/ru12/DEFINE/DEF-LABO.HTM):

At the workplace - those who have done some work, even for one hour during the reference period. b) At a job or a business but not at the work place - those who have a job or a business, but not at the work place during the reference period due to temporary illness / injury, vacation or other holidays, bad weather or strike / labor dispute or other reasons.Flexible working arrangements (FWAs) generate a greater flexibility at the workplace, hours worked according to the schedule and in appropriate amount. This provides the human resources a greater control and also generates greater opportunities for employees who can enjoy a greater balance between work and life responsibilities. (http://www.shrm.org/research/surveyfindings/articles/documents/ 090464_workplace_ flexibility_survey_report_inside_finalonline.pdf).

3. Study of employment rate under the impact of education

Education and employment rate dynamics analysis

Relevant indicators of education are presented in Tables 1, 2, 3

Thousand people								
	2010	2011	2012	2013				
Unemployed total	627	461	494	512				
Of which : women	264	204	211	216				
Primary, secondary,	442	321	347	356				
vocational								
Of which: women	164	127	131	134				
High school and	135	101	110	120				
secondary								
Of which: women	71	53	57	60				
University	50	39	37	36				
Of which: women	29	24	23	22				

Table 1. Registered unemployed, by level of education

Analysis of unemployment in 2011-2013 in Romania highlights the existence of nonlinearity. Statistics reveal that at the university educational level, there has been a decrease in the number of unemployed people that went from 50000 to 36000.

Source: http://www.insse.ro/cms/files/pdf/ro/cap8.pdf

		2003/	2004/	2005/	2006/	2007/	2008/	2009/	2010/	2011/
		2004	2005	2006	2007	2008	2009	2010	2011	2012
18	Т	12,4	13,3	12,9	13,1	17,9	18,4	12,6	9,6	7,6
years	F	14,7	15,6	15,4	16,1	21,6	21,7	15,2	11,6	9,0
	М	10,2	11,1	10,5	10,1	14,4	15,1	10,2	7,8	6,1
19	Т	31,2	29,9	33,1	31,7	36,4	37,4	31,9	36,9	30,3
years	F	37,1	34,8	40,4	37,2	44,8	43,8	37,4	43,1	36,6
	М	25,6	25,2	26,1	26,3	28,3	31,3	26,6	31,0	24,4
20	Т	30,0	31,6	31,4	34,1	33,6	36,3	34,7	31,8	30,3
years	F	34,7	36,7	36,6	39,9	39,9	43,2	40,1	37,2	34,9
	М	25,6	26,8	26,5	28,6	27,6	29,6	29,4	26,6	25,8
21	Т	26,2	29,2	31,6	31,4	34,8	30,1	31,2	31,5	26,7
years	F	29,7	33,0	36,7	36,8	40,9	34,1	35,8	36,3	30,1

Table	2. Evolu	tion of spe	cific rates	of enrollm	ent in hig	her educat	ion (2003	-2012)
								-

	Μ	22,8	25,7	26,7	26,4	28,9	26,2	26,8	23,9	23,5
22	Т	22,0	23,4	26,5	30,4	31,6	25,3	20,0	22,8	20,1
years	F	24,1	26,2	30,0	35,2	37,2	27,3	31,2	24,5	20,2
	М	20,0	20,8	23,2	25,9	26,2	23,4	18,9	21,2	20,0
23	Т	15,3	16,3	18,4	21,4	23,7	18,4	16,1	12,8	11,7
years	F	16,2	17,4	19,2	22,7	25,5	19,3	17,0	13,2	11,4
	М	14,5	15,2	17,6	20,1	22,0	17,5	15,2	12,3	12,0

Source: http://www.insse.ro/cms/files/pdf/ro/cap8.pdf

Enrolment in higher education in the table above shows that for most age groups there has been a decrease for the period 2003-2012.

	Number of c	out-bound Erasmu	s students p	per country
	studying or	r doing traineeship	os abroad in	2012-13*
Country	Erasmus studies	Erasmus traineeships	Total	Share of traineeships
BE	6329	1412	7741	18%
BG	1521	431	1952	22%
cz	6185	1114	7299	15%
DK	2565	1081	3646	30%
DE	28887	6004	34891	17%
EE	789	364	1153	32%
GR	3325	924	4249	22%
ES	33548	5701	39249	15%
FR	26740	8571	35311	24%
IE	1976	786	2762	28%
IT .	21925	3880	25805	15%
CY	277	73	350	21%
LV	1399	750	2149	35%
LT	2470	1059	3529	30%
LU	400	5	405	1%
HU	3351	1036	4387	24%
MT	141	67	208	32%
NL	6853	3208	10061	32%
AT	4602	1112	5714	19%
PL	11961	4260	16221	26%
PT	5449	1592	7041	23%
RO	3212	1799	5011	36%

For the 2012-2013 academic year there has been a number of 5011 students who benefited from the Erasmus program.

Sursa: http://ec.europa.eu/education/library/statistics/ay-12-13/annex-6_en.pdf

The analysis of labor market indicators

The labor market is represented by statistical indicators such as: young people aged between 18 and 24 which are found neither in employment nor in the educational process or training, by NUTS 2 regions (since 2000), the number of unemployed and the unemployment rate, labor market indicators in relation to the EU.

Table 4.Young people aged between 18 and 24 which can't be found neither in employment nor in the educational process or training, by NUTS 2 regions (since 2000) - NEET% rates.

At EU level there is an increased rate of young people aged between 18-24 years of age who do not participate in the educational process or in activities which take the form of labor.

GEO/TIME	2007	2008	2009	2010	2011
European Union	14,1	13,9	16,1	16,5	16,7
Romania	16,0	13,4	16,5	20,0	20,9
Macro-region one	13,5	12,1	17,6	22,3	24,4
North- West	10,8	9,9	13,7	15,5	16,5
Center	16,4	14,3	21,9	29,8	33,5
Macro-region two	17,2	13,9	15,4	19,5	20,1
North – East	13,5	10,7	12,7	16,8	16,3
South -East	22,4	18,3	19,1	23,2	25,5
Macro-region three	16,4	14,2	17,4	21,4	22,1
South – Muntenia	20,3	16,7	21,9	26,3	27,6

Bucharest-Ilfov	10,6	10,4	10,5	13,5	13,2
Macro-region four	16,5	13,4	16,0	16,2	16,4
South-West Oltenia	18,6	15,0	18,1	18,5	17,0

Source: http://www.insse.ro/cms/files/pdf/ro/cap8.pdf

Table 4. Labor market indicators in relation to the EU	J
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	2007	2008	2009	2010	2011
Total pop	ulation (20-64 ani)	%		
EU 27	69,9	70,3	69,0	68,6	68,6
Romania	64,4	64,4	63,5	63,3	62,8
Women ei	nployme	nt rate (2	0-64 ani)	%	•
EU 27	62,1	62,8	62,3	62,1	62,3
Romania	57,9	57,3	56,3	55,9	55,7
Men empl	oyment i	rate (20-64	ani) %		•
UE 27	77,8	77,9	75,8	75,1	75,0
Romania	71,0	71,6	70,7	70,8	69,9

At EU level the total percentage of population between the ages of 20-64 decreased by 1.3% compared to 2007. The employment rate for men within this age range has decreased by 2% at the EU level, while in the case of women it increased by 0.2%.

Source: http://media.hotnews.ro/media_server1/document-2014-10-13-18295270-0-balanta-fortei-munca-1-ianuarie-2014.pdf



Figure 1. Number of registered unemployed people and unemployment rate Source: http://media.hotnews.ro/media_server1/document-2014-10-13-18295270-0-balanta-fortei-munca-1-ianuarie-2014.pdf

According to the statistics the highest unemployment rate was registered in the Central region (94.8), while the lowest value was recorded in the Bucharest-Ilfov region 25.3%.

4. Study on education and its impact on employment rates in Romania

4.1. Labor market analysis based on experiment and on the regression function

Research Methodology

Research Objectives:

- Knowing the effect of employment rate on the labor market,
- Identifying the link between internal migration intensity and rate of vacancies,
- Observing the extent to which the Romanian educational system forms young people's skills in order to be fit for the labor market.

Research hypotheses

- 1. Employment rate influences the labor market,
- 2. Between internal migration and vacancy rate there is a strong direct link.
- **3.** The majority of respondents approves that university-level education is more important for men than for women,

4. Respondents at a rate of over 50% believe that Romanian educational system is a good trainer making the individual suit for the labor market.

In this research the survey and the regression function are used. The sample for the two cases consists of Romanian citizens. The period in which research was conducted is 2000 to 2012.

The results

1. The effect of employment rate on the labor market

Through the experiment with one experimental factor we try to determine the effect of the employment rate on the labor market in three developing regions. The experiment takes place over three years: 2000, 2005, 2010, within the three development regions: South Muntenia, South West and North West, the employment rate after those three years of reference is presented in the table below. Table 4 presents the data for calculation.

Table 4: Calculating data							
Years	Region						
	South	South East	North West				
	Muntenia						
2000	64,7%	60,8%	63,4%				
2005	58,1%	54,7%	56,0%				
2010	59,7%	55,5%	57,7				

In conclusion, as a result of the experiment we notice that the employment rate affects the labor market.

2. Analysis of the impact of internal migration on the rate of vacancies

Through quantitative methods which are based on simple linear regression we can calculate the correlation between internal migration in terms of percentage and rate of vacancies. The data to which the simple linear regression is applied can be seen in the table below.

Table 5: Calculating data						
Internal						
migration-	Rate of					
percentage	vacancies					
X	У	ху	X ²	y ²		
22,7	0,59	13,393	515,29	0,3481		
16,1	0,64	10,304	259,21	0,4096		
18,6	0,59	10,974	345,96	0,3481		
17,5	0,72	12,6	306,25	0,5184		
74,9	2,54	47,271	1426,71	1,6242		

Calculations reveal a medium connection.

The analysis of Romanian citizen's perception on education and its role in the labor market.

Marketing research based on the analysis of secondary sources, the instrument used for the research being the questionnaire. Information was retrieved and processed from a website specializing in the analysis of living standards- World Value Survey. From the questionnaire only the questions related to education and the labor market were selected.

The following tables show the responses of Romanian respondents.

1. What is your level of education?

	Number	%
No answer	13	0.9%
No school	19	1.2%
Incomplete primary	36	2.4%
Complete primary	100	6.7%
Incomplete gymnasium	47	3.1%
Complete gymnasium	149	9.9%
Upper secondary: lower level of vocational training (apprentice school)	39	2.6%
Vocational upper secondary	244	16.2%
Incomplete highschool	73	4.9%
Highschool	369	24.6%
Post highschool	77	5.1%
Complete secondary school: technical/ vocational type	42	2.8%
Incomplete university degree	54	3.6%
University: short term formation	11	0.7%
University: long term BA	186	12.3%
MA	41	2.8%
PhD	2	0.1%
(N)	(1,503)	100%

Table 6. Level of education of respondents

Source:http://www.worldvaluessurvey.org/WVSOnline.jsp

2. How old were you when you completed your studies?

Tuble 71 Inge ut wille.	in they complete	a the studies
Options	Answer	%
1-10	4	0.3%
11-19	816	54.3%
20 and more	541	36.0%
No answer	56	3.8%
Don't know	85	5.7%
(N)	(1,503)	100%

Table 7.	Age at	which	they	com	pleted	the	studies
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Source:http://www.worldvaluessurvey.org/WVSOnline.jsp

3. What is your level of trust in the university education?

Table 8. Level of trust in Universities	
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	Number	%)
A great deal	264	17.6%
Quite a lot	660	43.9%
Not very much	348	23.2%
None at all	104	6.9%
No answer	11	0.8%
Don't know	115	7.6%
(N)	(1,503)	100%

Source:http://www.worldvaluessurvey.org/WVSOnline.jsp

4. Is the university education more important for a boy than for a girl?

	Number of cases	%/
Agree strongly	106	7.0%
Agree	205	13.6%
Disagree	462	30.8%
Strongly disagree	647	43.0%
No answer	12	0.8%
Don't know	71	4.7%
(N)	(1,503)	100%

Source:http://www.worldvaluessurvey.org/WVSOnline.jsp

5. Does your country's educational system give people abilities / skills to find a job?

	%
Yes	55,4
No	27,7
Not applicable (DZ,IQ,JO,LB,TN,YE: No formal Education)	10,5
No answer	0
Don't know	6,4
(N)	1,2

Table 10.	Education as a	trainer	for	finding	a job

Source: http://www.worldvaluessurvey.org/WVSOnline.jsp

6. Does your country's educational system give people skills / competencies consistent with the specific workplace?

Yes	No	Notapplicable(DZ,IQ,JO,LB,TN,YE:No formal Education)	No answer	Don't know
52,9	27,7	10,5	0,2	8,7

Table 11. Education as a trainer in dealing with the job requirements

Source: http://www.worldvaluessurvey.org/WVSOnline.jsp

Discussions

The experiment

In the experiment above there is only one experimental factor- the employment rate. Through the one-factorial analysis of variance, we can determine whether the employment rate as experimental factor has a strong influence on the resulting variable- the labor market. From the table we can see that the highest rate of employment is in South Muntenia. In order to see if the differences between the three regions are statistically significant, we have to define the experimental factor influence from the random factors.

⁻x=530,6/12, ⁻x=44,21

We have to calculate the variance between groups, total deviation variation and variation within groups.

We have to calculate this phenomenon's explained error by absolute deviation.

Absolute deviation:

 $(64,7-44,21)^2 + (58,1-44,21)^2 + (59,7-44,21)^2 + (60,8-44,21)^2 + (54,7-44,21)^2 + (55,5-44,21)^2 + (63,4-44,21)^2 + (56,4,21)^2 + (57,7-4$

The influence of the causal variable is determined by calculating the deviation explained which is also known as the variation between groups.

The variation between groups:

 $3*[(182,5/3-44,21)^2+(171/3-44,21)^2+(177,1/3-44,21)^2]$

3*(276,27+163,58+219,68)

3*659,53=1978,59

The influence of random variation is determined by variation within groups.

Variation within groups = 2054.66 to 1978.59;

Vig = 76.07

Testing the method

In order to verify the statistical significance of the results, we're using the F test.

Calculated F = Vig / NK, calc F = (1978.59 /) / 76.07 / 7), calc F = 989.29 / 10.86 calc F = 91.04

The null hypothesis argues that the employment rate does not influence the labor market

Theoretical F is 4.26 for a 95% probability.

For theoretical F <F calc, the null hypothesis is rejected.

Linear regression

The analysis of the impact of internal migration on the number of job vacancies by economic activity was achieved through simple linear regression. As a first degree function we can calculate the correlation coefficient. The calculation reveals a correlation coefficient of - 0.55. This result shows that between the two variables there is an average reverse link, meaning that when the internal migration rate increases, the rate of vacancies decreases.

The survey

This survey was taken by Romanians during 2012 to observe their perception regarding the contribution of education as an important factor in the labor market in terms of providing a high quality of life. Most people that took part in this research have a high school education (24%), have completed their studies at a rate of over 50% in a period exceeding 30 years. 43% of respondents have a fairly high confidence in the university education. The majority (43%) rejects the claim that the university level education is more important for a boy than for a girl. 55% of Romanian citizens who participated in the research think that the Romanian educational system prepares the individual for finding a job. 27% of respondents do not see the educational system as a key factor in the development of the individual regarding his competence at the job.

Conclusions

This paper brings added value with a dynamic analysis of education and employment rate in Romania, besides the research conducted by the three methods. Not all assumptions made at the beginning of the research were checked. The first hypothesis is verified(Employment rate influences the labor market). Between internal migration and vacancy rate there is not a strong direct link(The hypothesis two is not verified). The next assumption is not substantiated, because the majority of respondents not approves that university-level education is more important for men than for women. Also the last hypothesis is not substantiated (Respondents at a rate of over 50% not believe that Romanian educational system is a good trainer making the individual suit for the labor market).

This research highlights as a main conclusion that the Romanian educational system has the resources needed to prepare the individual to search for a job, but also to deal with workplace tasks.

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Large-scale natural disaster analysis in European transition countries

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Abstract

The first aim of this study is to identify possible natural disasters and catastrophes and to summarize the state of economic literature in the domain. Further are analyzed the methodologies used for estimating the economic impacts of disasters and catastrophes.

The second aim is to compare disasters and catastrophes from several transition countries (Bulgaria, Czech Republic, Hungary, Republic of Moldova, Poland, Romania and Ukraine) in the 1900-2014 time period, underlining their negative impact on the economy.

Keywords: disasters, catastrophes, transition countries,

Introduction

The primary question that this study wants to answer to is: *How much the economy of a transition country is affected by disasters?*, having in mind that every disaster costs money and may overwhelm the local economy. Also, many such events cost human lives, destroys infrastructure and crops, displace population. Another problem after a disaster is the loss of jobs for the population.

Most of the theories predict that natural disasters usually lower GDP per capita, but there are some studies that have found a positive correlation between disaster occurrences and economic growth (Albala-Bertrand, 1993; Skidmore and Toya, 2002). In the study of (Albala-Bertrand, 1993), a mild positive effect is found, but only in the short run, but in the study of (Skidmore and Toya, 2002) positive effects are found also on long-run growth. Also, even if the impacts of natural disasters are negative the stimulatory impulse of reconstruction activity may dominate (Loayza et al., 2009).

Related work

Although disaster analysis, from an economical point of view, seems to be an interesting subject, browsing the related work is rather difficult. According to (Cavallo & Noy, 2010) the economic research on natural disasters and their consequences is fairly limited.

(Cavallo et. al., 2010) examines the impact of natural disasters on GDP per capita (on the short- and long-run) and provides new evidence that natural disasters do not have any significant effect on subsequent economic growth, except the truly large natural disasters that are followed by an important decline in GDP per capita and where the natural disaster are followed by radical political revolution, which severely affected the institutional organization of society.

(Noy, 2007) describes the macroeconomic dynamics of natural disasters. The research shows that natural disasters have a statistically observable adverse impact on the macro-economy in the short-run. Developing countries and smaller economies face much larger output declines following a disaster of similar relative magnitude than do developed countries or bigger economies. Countries with a higher literacy rate, better institutions, higher per capita income, higher degree of openness to trade, and higher levels of government spending are better able to withstand the initial disaster shock and prevent further spillovers into the macro-economy. These all suggest an increased ability to mobilize resources for reconstruction. Financial conditions also seem to be of importance; countries with more foreign exchange reserves, and higher levels of domestic

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credit, but with less-open capital accounts appear more robust and better able to endure natural disasters, with less adverse spillover into domestic production.

(Rasmussen, 2004) provides in his paper a cross-country comparison of the incidence of natural disasters in the Caribbean proving that the relative costs tend to be far higher in developing countries than in advanced economies.

Disasters make both direct and indirect damages to an economy. The direct damages are on fixed assets and capital, raw materials or natural resources and on human capital. The indirect damages are on the production of goods and services. These distinguishes between types of damages are treated in (Pelling et al., 2002) and (ECLAC, 2003).

Econometric methods in the literature

In the existing literature, there are many different approaches when analyzing disasters and their impact to the economy. Just a few of them will be brought in attention in this section.

(Raddatz, 2009) uses a panel vector autoregression and provides estimates of the average impact on GDP of several types of disasters at various frequencies. The study concludes that disasters have modest but economically meaningful output consequences, resulting on a decline in output per capita.

(Okuyama, 2003) uses a Solow model in order to analyze the long-term recovery problems. The study shows that the introduction of new technology would lead to a slightly slower recovery and a new, higher, stable equilibrium.

(Benson & Clay, 2003) base their study on the endogenous Schumpeterian model of growth (having a positive impact theory).

(Skidmore and Toya, 2002) found a positive correlation between disaster occurrences and economic growth using a cross-sectional ordinary least squares technique.

(Loayza, 2009) applies a dynamic Generalized Method of Moments panel estimator to a 1961–2005 crosscountry panel having three major conclusions. First and most important is that disasters not always affect economic growth negatively and that they affect economic growth differently across economic sectors. Second, the assumption that severe disasters can have a positive growth effect in some sectors is ruled out. Third, growth in developing countries is more sensitive to natural disasters—more sectors are affected and the magnitudes are non-trivial.

There are studies that analyze specific disaster incidents like (Horwich, 2000) and there are also studies that analyze more than one country/incident like (Raschky, 2008), where a multicountry framework is developed in order to show that countries with better institutions experience less victims and lower economic losses from natural disasters. As for the econometric method applied in (Raschky, 2008), a pooled time-series regression model is used to estimate the relationship between economic development, institutional vulnerability and disaster impacts.

Some of the variables used in these studies are annual GDP growth rate, per-capita real GDP growth, square of per capita GDP growth and the measure of disaster magnitude – number of people killed, number of people affected and damages caused –, lagged value of GDP growth, destruction of a country's capital stock.

Data

The data used in this study is gathered from the Emergency Events Database (EM-DAT) database at the University Catholique de Louvain in Brussels, Belgium and from the PreventionWeb database (both consulted on 20.12.2014).

In this study data for 1900-2014 time period was gathered and only disasters with economic damages bigger than 1 million US\$ were considered.

Data on disasters can also be found on databases like: NatCat; Sigma; Disaster Database Project; Regional Databases.

Disasters in transition countries

Transition countries struggle for economic growth and a natural disaster may be a major setback for the economy. As stated in (Sharma, 2009), *disasters and their implications on development, therefore, need to be examined and analyzed in view of a nation's economic, social, institutional and political structure.*

From the data collected it can be seen that disasters hit the selected transition countries rather often and the most frequent type of disaster in European transition countries are floods. The least affected by major disasters is the Republic of Moldova.



The occurrence of disasters:

Figure 1. Occurrence of disasters by type, grouped on countries.

The disaster type that has cost the most money in most of the analyzed countries is floods. Only in Ukraine drought produces more damage (in US\$) than floods.

From figure 2 it can be seen that over the years disasters can cost a lot of money. The costs of the disasters (in 000 US\$):



Figure 2. The combined costs of large natural disasters for 1900-2014 time period in the selected countries

Analyzing the natural disasters that occurred in Romania it can be stated that eight floods have a combined cost of 3304428 (in 000 US\$) and that the most expensive flood was in 2010 with a damage of 1111428 (in 000 US\$), meaning a 6.09% of the country's GDP in that year. The 1977 earthquake (the biggest natural disasters in economic terms) has made a damage of 2000000 (in 000 US\$), meaning a 7.19% of the country's GDP in that year. In spite of this major event, Romania had an economic growth next year, reflected in its GDP.

Other natural disasters that made a lot of damage in US\$ are two floods from Poland. The first one, in 1997, made a total damage of 3500000 (in 000 US\$) and the second one, in 2010, made a total damage of 3080000 (in 000 US\$). The disaster that happened in 2010 made total damages of nearly 0.8% of that year's GDP, and the one from 1997, 1.52%.

Conclusions

The review of the existing economic literature on disasters impacts shows that different researchers have come to different conclusions about the influence of a disaster over the economy. There are studies that underline the negative impact, others that suggest some positive impact in the economy and a third category of inconclusive research papers. Also, there are many different econometric methods used in the literature to analyze the impact of disasters over the economy.

Trying to draw conclusion only by looking at statistical data about the costs of natural disasters is not enough. By doing so, we can only see the damage in US\$ of a disaster or a group of disasters and we can compare it to the GDP of that year. Even so, it can be stated that any economy is affected by unpredicted loss of money, no matter the cause. For better understanding of the damages done by a natural disaster, analyzing microeconomic indicators would be of interest.

As further research, an analysis whether a specific major natural disaster has slowed economic growth of a country is of interest. For example, Romania's GDP, would had been significantly bigger in the next years if the '77 disaster had not happened?

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