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## MIGRATION COSTS IN ASYMMETRIC ENVIRONMENTS AND EDUCATION OUTSOURCING. THE CASE OF ROMANIA.

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### Abstract

*In the conditions of the international mobility of the labor forces, there is a complex set of incentives to provide an international applicability of a given type of education. But there is a specific cost of providing such education for the countries that face an education outsourcing.*

*The objective of this study is to provide an assessment of such cost for an emerging economy like the Romanian one. We are adopting a modified version of the analytical framework proposed by Poutvaara (2005). This framework describes the link between public education and migration, and can be used to test the migration incentives from Romania to EU15 countries. Further, we estimate the loss of Romanian economy as a result of such a process using a dataset for a 7-year period prior and post- Romanian accession to EU in 2007.*

**Keywords:** migration cost, public education, migration, public expenses, Romania, European Union

**JEL Classification:** H52, I28, F22

### 1. INTRODUCTION

International mobility of labor induces in modern or ongoing modernization societies changes of which provision may prove critical in many situations. For Romania, the public awareness of the past 10-15 years has been populated with the image of migrants who, once they reached foreign markets, had a good influence on the source economy. They sent money back home that accumulated for the entire migration, this becoming an important vector of welfare. Calculated as a percentage of GDP, through the ages, remittances have become an end in itself, before other basic needs of the individual. As demonstrated by the extent of the phenomenon and the success of migrants in the destination country, the workforce has been well trained in the country of origin; temporary migration has been gradually turning into a permanent phenomenon. Most of the skills and knowledge were cultivated in the public education system, in part a mandatory system that provided for beneficiaries training with international facets. A part of the academic literature refers even to a very dynamic effect of educational activities that individuals would voluntarily undertake, when people left in the country are exposed to the intellectual or material success information concerning fellow immigrants.

The main beneficial effect previously mentioned undertook in recent years a change of direction. This manifests itself amid the economic turmoil of this period that led to reduced earnings hence reduced transfers of money in the country by the immigrants. Transformation of a temporary migration in a permanent one becomes a reality, the individual experiencing the first shock after a period of relative prosperity, in a country that is becoming less and less foreign. Once overcome the structural difficulties, the immigrant becomes aware of his/her own resources of adaptability and takes the first steps toward citizenship, he/she establishes the relationship with the destination country and sees the possibility of building a new future in the adopting country. The primary effects of this situation in Romania translate into additional pressures over disfavored geographical areas or proliferation of the already existing ones, abandoned children in the care of relatives or neighbors (social dramas), retirees (retirement system) abandoned, the public health system in a very difficult situation due to poorer and fewer taxpayers, unemployed for whom the local efforts are very limited in nature, consolidated public/general state budget into poverty. In other words, these effects are firstly questioning the real social security, shake the grounds of the social security system and lower, at the level of desire and hope, the sustainability of local public social security. Secondary and tertiary repercussions of such a situation are bleak, accelerated and difficult to estimate, especially in the absence of pragmatic, empirical determinations which can be used as a basis for formulating hypotheses and support demonstrations.

We aim at developing a concept that would allow direct *financial* impact estimates of the effect of migration on an emerging economy in general and the Romanian one in particular. Being essentially an evaluation process, we follow an approach of the value based on cost due to its historical and prudential in nature valences (based on past actions and determinations instead of forecasts). It is an approach that leans on the International Valuation Standards when determining a market value, in this case the issue being the labor market.

## 2. LITERATURE REVIEW

The dedicated studies in the literature of recent years and the concerns about public policies, pays special attention to labor migration of higher education, observing a bi-univocal relationship between migration and education. The importance of the subject lies also in the momentum of building a social European Union, particularly relevant in the current economic and financial context. Existing studies analyze and describe the institutional framework in which various models can be applied. The current European social context, countries of origin of immigration are unevenly developed and the migration flows are different, specific from case to case.

One of the existing studies in the area of migration in connection with the provision of education is the work of Poutvaara (2005). It examines the effects of migration given that public education should be considered in two categories namely country-specific and internationally applicable, where public and private effort in human capital is complementary. Through mathematical modeling that is done, one can use a general methodological framework developed to specific situations, such as the one followed in our research. One result of this study is testing the hypothesis that if the total tax is kept constant when replacing part of existing work taxation by charging fees on graduation or loans

connected to the potential future income of individuals who emigrate, that would improve the efficiency of public funds' spending.

The loans connected to the potential future income (ICL's - Income Contingent Loans) are loans such as funding for tuition and / or financial support during the studies, whose recovery depends on the future capacity of the borrower to pay (Chapman, 2005). This study takes into account both types of education (public and private), with different tax systems. First the education is seen as dependent only on the individual skills and public investment (the particular case considered in our study), and then introduces the possibility of private efforts. Poutvaara (2005) examines the possibility of including simultaneous investment in human capital in terms of both public and private, complementary, to see if analysis of the "brain drain" effect is covered or influenced by the reverse effect of "brain gain" in public education efforts, which should lead to increased public education efforts.

Docquier and Sekkat (2006) consider that cash flows from the destination country towards the originating one are an important channel through which the "brain drain" could generate indirect positive effects of migration for countries of origin. Our intention is to study whether these indirect positive effects which undoubtedly exist, are not only a step to transform the immigrant status into the one of citizen. The relative influence of the positive effects in our selected case falls within the boundaries of Beine et al (2011) where the *ex-post* migration led to the critical levels estimated by OECD (2010) of more than 40%. This level is more than the threshold considered for the exponential increase of the brain drain effect on the Romanian human capital loss.

A simple explanation is provided Wahba (2007) who argues in the case of Egypt that the experience and knowledge of former emigrants returned to their countries of origin now lead to an increase in their income and as such, are reflected in the higher income levied for the public budget.

Beine et al (2001, 2008) showed, on the other hand, that brain drain promotes investment in human capital in the source countries, leading to lower losses of human capital. Source countries can also benefit from the contribution of migrants who have gained extra knowledge through migration by the progress through technology transfer to the countries of origin (Burns and Mohapatra 2008, Docquier and Sekkat 2006). However, in our opinion, this involves returning to their countries of origin and is linked with the previous hypothesis that we support, the one concerning the migration stages. Schiff and Wang (2008) believe that technology absorption and productivity growth are negatively affected by immigrants who have completed higher education and returned in their countries of origin. Brain Drain can affect the way in which a society wants or decides to fund tertiary education and the distribution of public revenues (Romero, 2009). In a model with an economy in which individual skills are heterogeneous and public policies are chosen by the vote of majority, the willingness of the society to finance tertiary education is lower in the presence of the brain drain phenomenon. A separate note introduced by Romero (2009) refers to the dimensions of migration, meaning the extent to which migration can produce positive effects.

On this streamline of ideas, our study aims to assess the actual burden on the public budget of Romania associated with migratory flows. Some motivations lay within the broader theme of sustainability of social security systems, and subsidiary ones are related to and connected with the fact that migration has an important impact on labor fluctuation in Romania, and the dimensions of migration as well as economic growth are dependent on education. The chosen asymmetrical federation is set to have an illustrative purpose as the

net evolution of the past years is clear enough and the data available. Migration has an impact on labor fluctuation anywhere, but in order to see whether it is significant as compared to other measurements, first we needed a reliable enough measurement that opens analysis possibilities, a scalable tool. This tool is what we focus on so that later it could be used in various comparisons between countries, inputs and outputs from migratory phenomena etc.

In the following section we introduce the methodology framework where we adopt the analytical model described by Poutvaara (2005). We extended this framework by including several elements such as the cost of education, the employment taxes (the tax burden on labor) and the consumption taxes. The methodology we propose to estimate the cost of migration takes into account elements that may lead to new results / effects on fiscal policies.

The relations in the methodology are using data extracted from the EUROSTAT database. The empirical results are using international data to assess the cost of migration in the EU15 countries.

We assume that all emigrants have an education with international applicability, based on the assumptions resulting from the application of the Bologna process in Romania; all education is internationally applicable and human capital variation is influenced by labor migration. In this paper we only consider the public sector of education in an asymmetric federation (new Member States and old EU countries).

The base Poutvaara (2005) model derives its results in the absence of externalities. Following a line proposed by Bhagwati and Hamada (1974, 1982) he considers that effective education and migration decisions are achieved and welfare of those left behind is maximized, when the marginal rate of taxation of foreign income and on the income earned domestically are equal and close to unity and the intercept of the linear tax program abroad equalsthetax schedule intercept at home, minus the unitary cost of migration. In the following we want to complete mathematical proof with empirical data on both unit and the total cost of migration.

The paper is structured as follows: Section 2 presents the methodological framework; Section 3 shows the international data we have used in our study for the computations, Section 4 presents empirical findings and conclusions.

### **3. METHODOLOGICAL FRAMEWORK**

As we have previously shown, in the migration literature and policy debates in the recent years an important attention was given to the issue of migration of the highly educated workers. There is a bi-univocal linkage between migration and the educational process with emphasis on internationally applicable skills. The subject's relevance and importance resides from the present context leading to a social European Union.

Following the dedicated literature provisions, our study proposes to evaluate the costs supported by Romania's public budget associated with the labor force flow. We have previously mentioned that one of the studies in this area of migration and with regard to public policies on internationally applicable education influencing migration is the paper of Poutvaara (2005). References to the influence of migration over the loss of fiscal revenues are also made by other authors, e.g. Romero (2009), but in order to address the issue of the emigration impact on the overall Romanian economy, we adopt the

methodological framework proposed by Poutvaara (2005) and propose the following cost carriers:

- the total public expenditure on education per capita of Romanian employee, for all levels of education combined, applied to the number of migrants;
- the wage taxes not levied from the migrants, due to the shift of the country origin of the earned, taxable revenues;
- consumption taxes transcending the Romanian national fiscal system as the consumption takes place in the destination country.

The original Poutvaara (2005) assumptions are hereby taken into account, considering the inherent features particular to our case, in the following research hypothesis:

*H1: There is an asymmetric federation between Romania, a new EU member state, and EU15, the old EU member states.*

*H2: Romanian education is applicable in EU15 in case of migration.*

*H3: There is a productivity differential between Romania and EU15 countries which provides an incentive for Romanian citizens to migrate.*

*H4: Romanian individuals with education applicable in EU15 have an individual-specific multiplicative random component related to productivity greater than productivity differential.*

Both member states considered in H1 are populated with heterogeneous citizens who become educated and are able to work.

The two consecutive periods involved in the model, the first in which the citizens become educated in the origin state and the second that involves a choice for where to live, work and pay taxes are similar in both member states considered with production taking place in the second period.

This study focuses only on publicly provided education, both in Romania and EU15, as private education does not generate a migration cost for the originating country. We only used actual, historical costs and let aside other influences like those on future national income or the financial performance in the destination countries as those would have to be addressed by a completely different set of explorations. We tackled this issue as a limit in the final part.

The taxes levied according to the model, namely  $\tau_w$  the wage tax and  $\tau_g$  the graduate tax in the sense used by Poutvaara (2005), are considered in the particular case of an asymmetric federation where migration is viewed one way only, with EU15 as a destination.

$$\tau = \tau_w + \tau_g \quad [1]$$

In the case of Romania the  $\tau_g$  is not applicable in the considered public educational system, so the total tax levied equals the tax on all wage income domestically generated.

Considering such arguments, we consider the requirements enclosed in the first hypothesis (H1) as being fulfilled.

Given the Romanian predisposition to democracy and EU values that led to a revolution in 1989, the overall societal reformation of the former communist block member came only natural to be synchronal with its western historical roots. The EU accession negotiations made only the final and trend-setting adjustments to the Romanian systemic development, accelerated by EU founders' long-lasting experience. Education was among the chapters that influenced the least the existing Romanian establishment which later was fast to fit in the European Bologna educational system. It was fully introduced beginning with 2005 and continued to further provide the two types of education embedded in the

model, specifically internationally pertinent (*i*) and country specific (*s*). The two types of education are provided in both of the two federation states, articulated by the stipulations inside the above mentioned educational system. The  $\gamma$  share of internationally applicable education in the originating member state that is also suited in the destination country can therefore be equaled to unit as a result of a fully harmonized educational system.

$$\gamma = \frac{h_{iRom}}{h_{iEU15}} = 1 \quad [2]$$

where:

– $\gamma$  is the share of internationally applicable education in Romania that is also applicable in EU15 countries;

– $h_i$  stands for the internationally applicable education provided (in Romania or EU15).

Consequently the second hypothesis (H2) is also confirmed.

The H3 and H4 hypothesis will be empirically examined in the next section.

The data used in our computations to assess the cost incurred by migration is synthesized hereafter.

*Table no. 1 Data Synthesis*

Variable, name	Code	Description	Measurement	Source
<b>GDP, Romania</b>	GDPRo	Gross domestic product at market prices (ESA95, 8.89).	EUR PPS current prices, millions	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>
<b>GDP, EU15</b>	GDPEU15	Gross domestic product at market prices (ESA95, 8.89).	EUR PPS current prices, millions	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>
<b>Expenditure on education, Romania</b>	ExpEduRoTtl	Total public expenditure on education for all levels of education combined. It encompasses the expenditure for all programs from pre-primary level of education (ISCED 0) to (ISCED 6). Moreover, it includes the expenditure reported in the UOE data collection on education statistics that could not be allocated by level.	EUR Purchasing Power Standard, current prices, millions	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>
<b>Expenditure on education, Romania 2006, 2008</b>	ExpEduRo2006,2008	Total public expenditure on education for all levels of education combined, projected by authors based on data provided by local institute of statistics, for all programs ISCED 0 to 6 (International Standard Classification of Education)	EUR Purchasing Power Standard, current prices, millions	Romanian National Institute of Statistics <a href="http://www.insse.ro/cms/rw/pages/index.en.do">http://www.insse.ro/cms/rw/pages/index.en.do</a>
<b>Employment, Romania</b>	EmplRo	Employment, domestic concept, total. It covers, by the ESA95 system, all persons engaged in some productive activity (within the production boundary of the national accounts). Employed persons are either employees (working by agreement for another resident unit and receiving remuneration) or self-employed (owners of unincorporated enterprises).	1000 units	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>

Variable, name	Code	Description	Measurement	Source
<b>Emigration from Romania to EU15</b>	Emigr	Emigration by country of next usual residence. Usual residence denotes the place at which a person normally spends the daily period of rest, regardless of temporary absences for purposes of recreation, holiday, visits to friends and relatives, business, medical treatment or religious pilgrimage, or, in default, the place of legal or registered residence. "Emigration" denotes the action by which a person, having previously been usually resident in the territory of a state, ceases to have his or her usual residence in that state for a period that is, or is expected to be, of at least 12 months.	units	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>
<b>Expenditure on education per capita, Romania</b>	ExpEduRoPc	Total public expenditure on education for all levels of education divided by Total Employment in Romania	EUR PPS, current prices per capita employed	computation
<b>Employment, EU15</b>	EmplEU15	Employment, domestic concept, total. It covers, by the ESA95 system, all persons engaged in some productive activity (within the production boundary of the national accounts). Employed persons are either employees (working by agreement for another resident unit and receiving remuneration) or self-employed (owners of unincorporated enterprises).	1000 units	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>
<b>Earnings, Romania - total in full time unit</b>	EarnRo	Average annual gross earnings for All NACE activities. The earnings data should relate to all enterprises, i.e. enterprises with 1 or more employees. Gross earnings cover remuneration in cash and in kind before any tax deductions and social security contributions payable by wage earners and retained by the employer.	Purchasing Power Parities	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>
<b>Implicit tax rate on labor</b>	LbrTxRate	Implicit tax rate on labor. Target population is the whole economy. Data are computed as the ratio of total tax revenues of the category (consumption, labor and capital) to a proxy of the potential tax base defined using the production and income accounts of the national accounts.	rate	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>
<b>Consumption expenditure, Romania</b>	Cons	Final consumption expenditure per inhabitant. Final consumption expenditure consists of expenditure incurred by residential institutional units on goods or services that are used for the direct satisfaction of the individual needs or wants or the collective needs of members of the	EUR Purchasing Power Standard, current prices	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>

Variable, name	Code	Description	Measurement	Source
		community.		
<b>Implicit tax rate on consumption</b>	ConsTxRate	Implicit tax rate on consumption. Data are computed as the ratio of total tax revenues of the category (consumption) to a proxy of the potential tax base defined using the production and income accounts of the national accounts.	rate	Eurostat <a href="http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/">http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/</a>

Source: Eurostat, Romanian National Institute of Statistics

For the value measurements of the variables we have chosen the Euro Purchasing Power Standard (PPS) in current prices instead of Euro or Romanian National currency. The leveling effect of the PPS in the price levels of different countries will allow us to extrapolate the findings based on more reliable and also more relevant figures at the international level. The quantitative measurements are given in units or 1000 units, the end result being calculated in per capita (unit) values.

The statistical properties of the data are presented in Table 2.

Table no. 2 Data Characteristics

code	obs.per.	freq.	obs.,no.	min.	max.	avg.	st.dev.	skewness	kurtosk
GDPRo	2003-2009	Year	7	141,043.90	251,307.30	195,990.89	40,727.34	0.001	-1.583
GDPEU15	2003-2009	Year	7	9,061,233.50	10,971,654.10	10,146,384.00	721,852.77	-0.316	-1.136
ExpEduRoTtl	2002-2008	Year	7	4,604.30	10,801.73	6,981.22	2,453.54	0.679	-1.333
EmplRo	2003-2009	Year	7	9,174.80	9,569.30	9,354.73	122.46	0.450	1.316
Emigr	2003-2005,2008	Year	4	4,321.00	7,179.00	5,792.25	876.97	-0.156	1.327
EmplEU15	2003-2009	Year	7	137,344.80	145,725.90	141,590.21	3,156.93	-0.073	-1.574
EarnRo	2001-2007	Year	7	4,722.90	7,944.70	5,832.56	1,198.67	0.979	0.073
LbrTxRate	2002-2008	Year	7	28.10	31.20	29.67	0.98	-0.097	0.624
Cons	2003-2009	Year	7	5,500.00	9,600.00	7,628.57	1,484.04	-0.169	-1.360
ConsTxRate	2002-2008	Year	7	16.20	18.00	17.39	0.75	-1.168	-0.744

Source: own computation based on Table 1 data

The observation took place on a period of 7 years between 2003 and 2009 of which 4 years are prior and 3 years after Romanian EU accession in 2007. The selection of the period took into account the relevance of comparison with the reference used in the asymmetric federation considered (the European Union) and the data availability. The inherent exceptions are explained henceforward. For the total expenditure on education in Romania (ExpEduRoTtl) we used combined available data from Eurostat and the Romanian National Institute of Statistics also for a 7 years' period but between 2002 and 2008. We used conversion from the Romanian National currency to EurPPS at Purchasing Power Parities computed for education sector for the years of 2006 and 2008. The implicit tax rates (on labor and on consumption) were also only available for the same 2002-2008 period whilst the average annual gross earnings were taken into account for the period between 2001 and 2007. The gross earnings data was available for all NACE activities excepting



agriculture, fishing, activities of households and extra-territorial organizations. The data for emigration from Romania to EU15 (Emigr) considered by country of next usual residence, was only available for a 3-year period between 2003 and 2005 and 1 year in 2008. The data extraction date was January, 2011.

The productivity differential ( $\chi$ ) constituent of the third hypothesis (H3) would indicate that a further incentive to migrate from Romania to EU15 exists if  $\chi < 1$ .

It is computed as a ratio between Romanian and EU productivity in EUR PPS per capita employed. The productivity itself is in both cases ( $Z_{Rom}$  and  $Z_{EU15}$ ) seen as a quotient of the employment in the GDP, leading to a GDP per capita employed, pertinent to the scope of our study:

$$\chi = \frac{Z_{Rom}}{Z_{EU15}} \quad [3]$$

where

$\chi$  = productivity differential

$Z = \frac{GDP}{\text{Employment}}$  , the productivity in GDP per capita employed

The computations and results are presented below in the Table 3. The synthesis of the data used is found above in Table 1 and the data characteristics in Table 2.

It appears from the Table 3 that the values of  $\chi$  range between 0.24 and 0.34 with a 0.29 average.  $\chi$  satisfies  $\chi < 1$  hence proving the validity of the third hypothesis (H3).

The random individual-specific multiplicative component related to productivity (found in the fourth hypothesis, H4) takes the form  $1+\varepsilon$  so that  $\varepsilon$  is uniformly distributed between -0.5 and 0.5. The H4 hypothesis takes the following form:

$$\gamma (1 + \varepsilon) > \chi \quad [4]$$

where  $\gamma$  is the share of internationally applicable education in Romania that is also applicable in EU15 countries and

$1 + \varepsilon$  is the individual-specific random component related to productivity abroad; the distribution between -0.5 and 0.5 means that some individuals lose an individual-specific share of their productivity in case of emigration while others benefit from a boost in their productivity abroad (Poutvaara, 2005: 8).

The  $\gamma$  share of education that is germane to the related state, was already considered equal to unit as stated in the H2 reasoning. The original relationship [4] with the productivity differential, now becomes

$$1 + \varepsilon > \chi \quad [5]$$

With values given at the margins of the value interval for  $\varepsilon$ ,  $1 + \varepsilon$  takes a minimum value of 0.5 and a maximum at 1.5, both greater than the 0.29 average value of  $\chi$  ascertaining that in both cases the H4 hypothesis is sustained:

$$\gamma (1 + \varepsilon) \in [0,5 ; 1,5] \Rightarrow \gamma (1 + \varepsilon) > 0,29 \quad [6]$$

With all four hypotheses confirmed, the model is placed in the case of an asymmetric federation of the two members considered, featured by the above mentioned characteristics, where migration is likely to emerge from Romania to EU15.

Table no. 3 Productivity differential,  $\varepsilon$  comparison

Yr.obs. Indic.	7	6	5	4	3	2	1
GDPRo	230,150.10	251,307.30	223,380.90	195,837.60	170,040.30	160,176.10	141,043.90
GDPEU15	10,321,478.80	10,971,654.10	10,948,450.50	10,388,429.00	9,860,497.30	9,472,944.80	9,061,233.50
EmpIRo	9,569.30	9,410.40	9,267.20	9,330.70	9,364.80	9,365.90	9,174.80
EmpEU15	137,344.80	138,478.30	139,791.10	142,095.50	144,653.80	145,725.90	143,042.10
Zrom=GDPRo/EmpIRo	24.05	26.71	24.10	20.99	18.16	17.10	15.37
Zeul5=GDPEU15/EmpEU15	75.15	79.23	78.32	73.11	68.17	65.01	63.35
$\chi$ =Zrom/Zeul5	0.32	0.34	0.31	0.29	0.27	0.26	0.24
Average $\chi$ :	0.29						

Source: own computation based on Table 1 data

#### 4. EMPIRICAL FINDINGS

The migration cost formula we have used in our study, based on the variables and specific measurements displayed in Table 2, is the following:

$$\text{Migration cost} = \text{Emigr} \times \left( \frac{\text{ExpEduRoTtl}}{\text{EmplRo}} \times 1000 + \text{EarnRo} \times \frac{\text{LbrTxRate}}{100} + \text{Cons} \times \frac{\text{ConsTxRate}}{100} \right) \quad [7]$$

where:

- Emigr stands for the number of emigrants from Romania to the next usual residence (EU15).
- Inside the brackets we have ExpEduRoTtl as the total public expenditure on education for all levels of education combined (in millions of EurPPS),
- EmplRo– the total of Romanian employment (in thousands),
- EarnRo - the average annual gross earnings (in EurPPS),
- LbrTxRate is the implicit tax rate on labour,
- Cons comprises the final consumption expenditure per Romanian inhabitant and the
- ConsTxRate the implicit tax rate on consumption.
- The whole parentheses would then be the cost per Romanian emigrant in EurPPS, at lower Romanian level of education expenditure, earnings and consumption (purchase of education, labor and goods/services).

The values for each of the variable and the results are reported in Table 4.

The migration cost was computed in the last line of the table using the above formula for each year of observation and the average of the 7 years was provided below.

The values for the Emigration from Romania to EU15 by the country of next usual residence (Emigr) in the years for which data were missing (2006, 2007, 2009) was completed with averages of available data (2003-2005, 2008). The ratio between ExpEduRoTtl and EmplRo multiplied with 1000 gives the Romanian public education expenditure per capita of Romanian employed.

The average annual gross earnings (EarnRo) multiplied by the percentage of the Implicit tax rate on labor provides information on the taxes raised as a result of income taxes and social security contributions on the total compensation of employees. Our variant of Migration cost calculation does not contain the loss from social security contributions and other related various taxes that are also levied on the total compensation of employees, but falls as an obligation to the employer. This obligation is separate from income tax, excises or any other charges related to financial or operational activities of the employer and solely connected to the gross wages.

The Consumption tax rate (ConsTxRate) was considered to its full implicit value as the most of it consists of Value Added Tax (VAT) and no exemption or deduction is permitted nor allowed in the Romanian tax system. Also, other various taxes included in the Implicit tax rate on consumption are paid in full by the final consumer. Moreover, there are cases in the taxation system used in Romania in which the VAT is also paid on excises (tax on tax or double taxation), another constituent of the tax rate on consumption, e.g. tobacco and car fuels.

Table no. 4 Assessment of Emigration Cost for Romania

Yr. of ost obs. elem.	7	6	5	4	3	2	1
GDPRo	230,150.10	251,307.30	223,380.90	195,837.60	170,040.30	160,176.10	141,043.90
GDPEU15	10,321,478.80	10,971,654.10	10,948,450.50	10,388,429.00	9,860,497.30	9,472,944.80	9,061,233.50
ExpEduRoTtd	10,801.73	9,486.10	7,956.93	5,910.40	5,249.30	4,859.80	4,604.30
EmplRo	9,569.30	9,410.40	9,267.20	9,330.70	9,364.80	9,365.90	9,174.80
Emigr	5,792.25	4,321.00	5,792.25	5,792.25	6,346.00	7,179.00	5,323.00
EmplEU15	137,344.80	138,478.30	139,791.10	142,095.50	144,653.80	145,725.90	143,042.10
EarnRo	7,944.70	6,833.60	5,953.80	5,639.80	4,930.30	4,802.80	4,722.90
LbrTxRate	29.50	30.20	30.10	28.10	29.00	29.60	31.20
Cons	8,800.00	9,600.00	8,600.00	7,800.00	6,800.00	6,300.00	5,500.00
ConsTxRate	17.70	18.00	17.80	17.90	16.40	17.70	16.20
MIGR. COST	29,135,460.18	20,739,899.03	24,220,325.47	20,935,622.29	19,707,643.85	21,936,232.29	15,257,776.95
Average:	<b>21,704,708.58</b>						

Source: own computation based on Table 1 data

The analysis of each factor's influence on total cost requires to break the formula no. [3] into components. We then mark each factor with X, Y and Z as follows:

Education :

Labor :

Consumption :

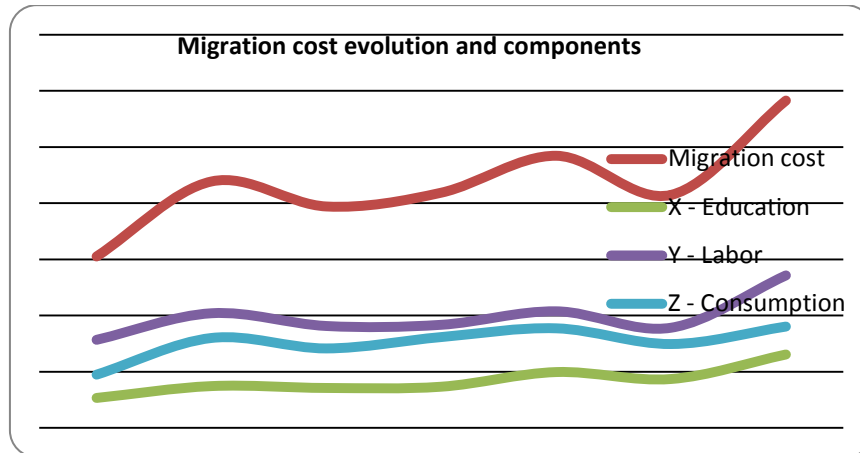
$$X = \text{Emigr} \times \frac{\text{ExpEduRoTtd}}{\text{EmplRo}} \times 1000 \quad Y = \text{Emigr} \times \text{EarnRo} \times \frac{\text{LbrTxRate}}{100} \quad Z = \text{Emigr} \times \text{Cons} \times \frac{\text{ConsTxRate}}{100}$$

Table no. 5 Cost Component Breakdown

Yr. obs. Cost/ element	1	2	3	4	5	6	7	8
Col. no.	1	2	3	4	5	6	7	8
	value	% of cost	value	% of cost	value	% of cost	value	% of cost
MIGR.COST	15.257.776.95	100,00%	21.936.232.29	100,00%	19.707.643.85	100,00%	20.935.622.29	100,00%
X	2.671.304.98	17,51%	3.725.056.24	16,98%	3.557.156.35	18,05%	3.669.018.87	17,53%
Y	7.843.678.97	51,41%	10.205.873.16	46,53%	9.073.428.30	46,04%	9.179.463.97	43,85%
Z	4.742.793.00	31,08%	8.005.302.90	36,49%	7.077.059.20	35,91%	8.087.139.45	38,63%
Yr. obs. cost /element	5		6		7			
Col. no.	9	10	11	12	13	14	15	
	value	% of cost	value	% of cost	value	% of cost	avg.	
MIGR.COST	24.220.325.47	100,00%	20.739.899.03	100,00%	29.135.460.18	100,00%	<b>100,00%</b>	
X	4.973.293.85	20,53%	4.355.759.38	21,00%	6.538.233.45	22,44%	<b>19,15%</b>	
Y	10.380.255.31	42,86%	8.917.451.65	43,00%	13.575.218.13	46,59%	<b>45,75%</b>	
Z	8.866.776.30	36,61%	7.466.688.00	36,00%	9.022.008.60	30,97%	<b>35,10%</b>	

Source: own computation based on Table 1 data

From the above calculations (Table 5) we can conclude that the largest contribution to cost comes from the taxes raised from labor (Y), on an average of 45.75% (Column 15). The second largest contribution comes from consumption taxes (Z), 35.10% while the impact of education expenses (X) counts for about 19.15% of the total.



Source: own projection

Figure no. 1 Migration cost evolution

The results show an average of about 22 million EurPPS per year loss in direct link to the migration, with an upward trend. The results can be extended in space and time, taking into account a longer period in the past and other countries with the same economic characteristics as EU15. We computed the data for approximately 40,500 Romanian emigrants with an average of about 5,800 emigrants per year in EU15. Alternative sources like the Interior Ministry of Spain reported for Spain alone 13,603 immigrants in 2001 in Anuario Estadístico de Extranjería (2001) or 407,159 in 2006 by the Instituto Nacional de Estadística (2006). At most, the total migration effect on Romanian economy could be computed since the Romanian economy and migration opportunities opened in 1989. The average 22 million EurPPS cost divided by the average of 5,800 emigrants per year implies a cost of a roughly 3,800 EurPPS per emigrant per year. With an estimated total migration between 2 and 2.5 million which would lead to a minimum, prudent approach, of a total cost of migration between 7.6 and 9.5 billion EurPPS. OECD estimations (OECD, 2010) of a total migration between 2.5 and 2.7 million places the maximum cost to a 10.26 billion EurPPS. Considering the Eurostat's Purchasing Power Parities of 1.057 Euro for 1 EurPPS in 2009, that would lead to a total migration cost in Euro between 8 and 11 billion, in lost opportunities from education expenses, wage and consumption taxes calculated with the base in the originating and not the destination country for migration.

## 5. CONCLUDING REMARKS

In this paper we tried to assess the direct influence emigration had on Romanian economy in a period of seven years, prior and post Romanian EU accession that led to peaks in the ongoing migratory phenomenon. We followed a cost approach by taking into

consideration the effective value subjects carried out of the country in the form of education they received before the emigration took place and latent value, as taxes (on work and consumption) not levied because of the benefits being hoisted in and for the destination country. The initial hypothesis considered in the asymmetric federation has implied right from the beginning that such a cost would not be carried out by the emigrants but by the Romanian state budget (the citizens left behind) as there has not yet been embedded a link between the burden of education and the carrier's benefits in the educational system. In fact, it appears from the state of the past and current policies that emigration was even encouraged not only by the missing link but also by standard education curricula that promotes the mandatory study of internationally applicable abilities.

The main results, when extrapolated to total estimated migration, lead to a loss in excess of 10 billion EurPPS which counts for about 15 percent of external medium and long term Romanian debt in 2010 and 4.5 percent of 2010 Romanian GDP. Education's annual budget accounts for about 4 percent of the Romanian's GDP. The limits of our projections include a fair assessment of the inbound flow of money sent back in Romania by EU15 emigrants which was not taken into account. That would also involve an estimation of the value created in the destination country. Our model's computations were based on average Romanian wages.

While we got a good grip on what brain drain can be, we have failed to notice so far any sense of the brain gain brought about by Poutvaara (2005) and subsequently quoted literature.

The limits of our research include the data distortion we have noticed in the official assessment of the migration volume and the calculation of education's value for the migrants, at effective cost.

Since an important objective of our paper involves education as a platform for migration (grounding and decision support), further research directions will have to appropriate the fair value of the education received by the Romanian migrants. The current model takes into consideration the education provided in recent years, over the same period when migration took place and the other data used were collected for. Moreover, due to annual averages per capita being used for all the variables in order to enhance the possibility of extrapolation, the model's consistency and ease of computation, the approach of the cost of education in our model implies that a migrant was in school for just one year prior to the migration taking place. This partially explains the lowest influence education has in the total migration cost as we computed it (Table 5 and Figure 1).

We need to improve the methodology by inserting in our model a migrant's educational profile by levels of education (or total period), the time when education took place and its actual value. More recent 2012 data from the Romanian Medical College (Colegiul Medicilor din România) places training costs of the migrated (since 2007) doctors alone to 3.5 billion euros. Although the calculation method is not explained in a comprehensive manner, this is a credible source that gives a clue over how big the final calculation might end up from our base level considered here.

The indirect influence for the migrant's originating country resides from the benefits emigrants would have produced if given the means and opportunities to value personal abilities and education. This influence was not in the scope of this paper as it would involve a completely different set of arguments and data, and have a projected cumulative effect to already obtained results.

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