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Item 11 – Demographic sustainability and consistency with macroeconomic assumptions

**Economic factors and net migration assumptions for EU countries – how
to incorporate lessons from the recent economic crisis?**

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Abstract:

Recent economic crisis changed dramatically economic conditions in many countries. This contributed to the changes of the volume or even directions of migration flows between EU countries. The aim of this paper is to check to what extent it is possible to apply the simple method of binding the migration assumptions in population projections with economic variables such as unemployment rate and wage level for all EU countries. The results show that despite positive experiences with macroeconomic variables in short term predictions of bilateral net migration migration between countries (example of Poland), the relationships on aggregate levels are visible mostly for countries strongly influenced by the crisis. The paper presents how this relationships can be used to assess to what extent net migration assumptions in EU projections reflect the other long-term macroeconomic assumptions.

1. Introduction

The process of migration is the most variable of all components of the population projection. Traditionally the assumptions are usually set on the basis of the expert knowledge or different trend extrapolation techniques. In the last population projections (European Commission, 2011; EUROSTAT, 2007) EUROSTAT has made attempt to add log-term labour market factor to population projections assumptions. The positive correlation between migration inflow and decrease of working age population (“replacement migration” rule) has been proposed as a method that is justified by probable policy reactions to the shrinking working age population. This method is also easy to implement without any other economic assumptions.

There is an extensive literature regarding macro-economic theories that describes economic factors that determine migration. The most prominent are labour demand and wage differences (Harris and Todaro, 1970). The empirical studies concerning the driving forces of migration as well as the cases of the reverse of the directions (OECD, 2012a) of migration due to recent economic crisis showed that the economic factors such as differences in labour demand and average wages can be important determinants of migration flows (Czaika, 2012; Mayda, 2010). The reverse of migration flows due to the economic crisis were observed both in so far positive net migration countries like Spain or Ireland but reverse from negative to positive net migration was also observed in some countries (like Poland) despite increase in unemployment rate. This fact suggested that migration flows were influenced not only by individual economic situation but also by the international context of economic crisis. The main problem of incorporation of such factors into population projection is that economic variables itself need to be projected in the long run.

Figure 1. Net migration and unemployment - Spain

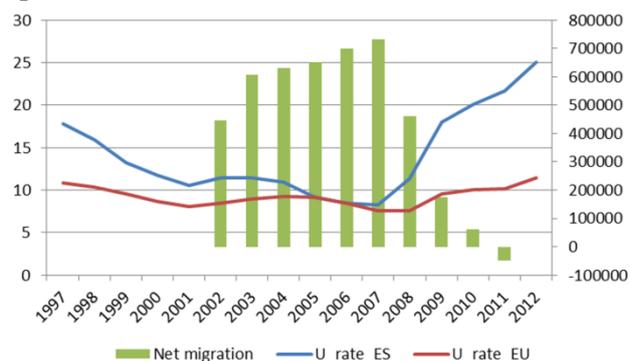
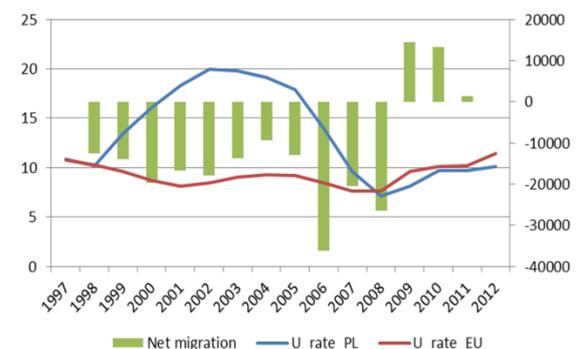


Figure 2. Net migration and unemployment - Poland



Source: Eurostat database

The aim of that paper is to propose an alternative method of preparing migration assumptions in population projections that takes into account long-term projections of economic variables prepared by two European Commission working groups Working Group on Ageing and Output Gap Working Group (European Commission, 2011). The long term economic scenarios are also formulated by other institutions (OECD, 2012b). Such scenarios together create the opportunity to project migration or at least create migration assumptions that are consistent with those projections. The economic determinants of migration seem to be

also important for long term GDP and public finance projections because the risks of high unemployment rate and the drop in net migration are usually positively correlated. It can be also assumed that countries recently heavily affected by the crisis – with both high unemployment rate and period of adverse net migration sooner or later go back to their own potential growth path. That means that net migration recently observed in those countries can bias the projections and it is natural to add expectations about future economic performance to the assumptions about future migration.

In this paper we first present in Chapter 2 the analysis of the justification of the currently used “replacement migration” method of including economic variables into migration assumptions. After the introduction about methodology (Chapter 3) in Chapter 4 we present an example of the short-term projection that based on the correlation between economic variables and estimates of net migration between Poland and main EU countries. After that in Chapter 5. Then the changes of economic variables and net migration in selected EU countries are analysed in order to estimate parameters for projection models. After that the assumptions about long-term net migration are prepared using recent knowledge about determinants of net migration and long-term scenarios regarding economic variables. Chapter 6 concludes the results of the exercises presented in the paper.

2. Past correlation of net migration with changes of economic and demographic variables

In this part we analyse available data on net migration and migration flows in order to check to what extent the changes of economic conditions as well as the changes of the proportions of population have led in the past to the changes of net migration.

The UN estimates of the changes in population and migration in the period 1950-2010 creates the opportunity to check to what extent the changes of the structure of the population itself and the changes of economic factors are correlated with the changes in the number of net migrants. The replacement migration is frequently assumed to be the mechanism that can mitigate labour force decline in the future. However past data for EU countries show that the correlation between changes in old-age dependency ratios and net migration was not clear in the period 1950-2010 when in majority of countries the size of working age population was increasing. In many countries the changes of working age population were significantly and positively correlated with net migration coefficient (figure 1). If replacement migration mechanism was present in the past, the negative correlation between the changes of working age population and net migration should be observed. In fact significant negative correlation was observed only in two countries out of 25 (in Denmark and in Finland). The positive relation between the variables can be explained by the effects of increased migration on increase in working age population in the next periods. This example seem to show that in the past changes in the working age population were rather the results of long-term changes in net migration and not the causes of replacement migration. Net migration can be also connected with another measure of population distribution – Old Age Dependency Ratio (OADR).

Reasonable migration policy can assume that the pressure of increasing OADR can be mitigated by immigration. As a result the correlation between OADR and net migration should be positive. However also this hypothesis is rather not confirmed by the past data (figure 2) for majority of countries. The correlation coefficients are not high and are both positive and negative for different countries.

Figure 3. Changes of the working age population and changes of net migration

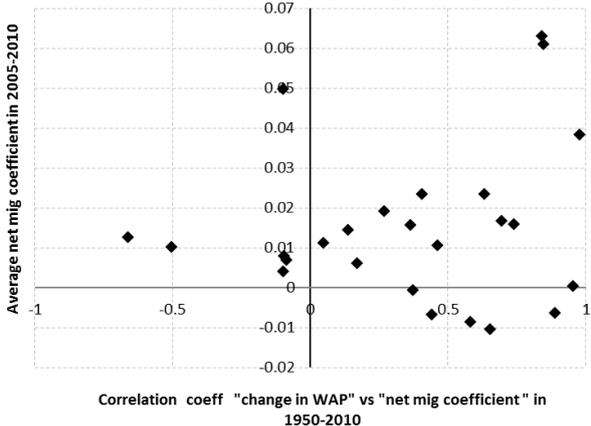
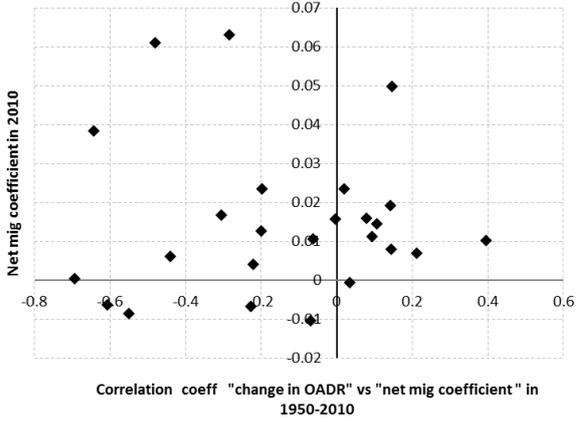


Figure 4. Changes of the OADR and changes of net migration



Source: Own calculations, UN database.

That lead to the conclusion that currently currently used “replacement migration” mechanism of taking into consideration labour market variable is rather an expert anticipation of the future phenomenon than extrapolation of the general tendency from the past.

3. Data and methods

In this paper we check if another simple mechanism of preparing net migration assumptions is possible. We first we build simple regression models to predict net migration flows between Poland and EU countries on the basis of the comparisons of unemployment rates and relations between wages. In the main part of the analysis we use simple regression models to explain net migration rates in EU countries using as explanatory variables relations of unemployment rates and wages to EU averages.

The analysis prepared for Poland base on the official estimates of *de facto* emigration from Poland to EU countries (GUS, 2011) and the Eurostat data on unemployment and income differences between Poland and EU countries. Than the multiple regression models that explains annual net migration of Poles to each of the analysed EU countries.

The starting point to prepare the assumptions about future net migration in EU countries is the Eurostat database. Than for each country the migration flows are explained by the multiple regression model that is prepared to assess the significance of variables like unemployment rate and wages of low skilled labour. The variables representing economic factors are prepared as differences between the level of economic variable in the specific country and the average among EU countries The projections of economic variables like unemployment rates and wage growth are taken from the Working Group on Ageing report (European Commission, 2012).

4. Short-term migration projections based on economic factors – example of Poland

Since the EU enlargement in 2004 emigration flow became an important factor that influences Polish economy. Polish CSO regularly estimates the number of Polish citizens abroad at the end of each year. The estimates are based on *de facto* definition that is useful for economic analysis like for example the estimate of labour supply. Past observations (table 1 – black numbers) show that the major changes of the number of Poles in different EU countries were correlated not only with the dates of the opening of the labour market but also with the changing relations of unemployment rates between each of the countries and Poland.

Table 1. Past data and the projection of the number of emigrants from Poland in the EU countries using simple model with differences in unemployment rates and wages between countries

	Past data										Projection			
	Census 2002	2004	2005	2006	2007	2008	2009	2010	2011	2012	2012*	2013	2014	2015
TOTAL	786	1 000	1 450	1 950	2 270	2 210	2 100	2 000	2 060	2 130	2 090	2 145	2 256	2 370
EU	461	770	1 200	1 610	1 925	1 887	1 765	1 685	1 754	1 816	1 779	1 826	1 921	2 018
<i>Labour market open door policy since 2004</i>														
Great Britain	24	150	340	580	690	650	595	580	625	637	638	662	696	730
Ireland	2	15	76	120	200	180	140	133	120	118	102	89	80	70
Sweden	6	11	17	25	27	29	31	33	36	38	40	44	48	52
<i>Labour market open door policy since 2006</i>														
Spain	14	26	37	44	80	83	84	48	40	37	22	3	1	1
Portugal	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Finland	0	0	1	3	4	4	3	2	2	2	2	2	2	2
Greece	10	13	17	20	20	20	16	16	15	14	9	1	1	1
Italy	39	59	70	85	87	88	88	92	94	97	94	93	90	88
<i>Labour market open door policy since 2007</i>														
Netherlands	10	23	43	55	98	108	98	92	95	97	100	105	109	114
<i>Labour market open door policy since 2008</i>														
France	21	30	44	49	55	56	60	60	62	63	64	66	68	71
<i>Labour market open door policy since 2009</i>														
Belgium	14	13	21	28	31	33	34	45	47	48	50	53	56	59
Denmark	0	0	0	0	17	19	20	19	21	23	22	24	26	28
<i>Labour market open door policy since 2011</i>														
Austria	11	15	25	34	39	40	36	29	25	28	27	29	31	33
Germany	294	385	430	450	490	490	465	440	470	500	506	551	601	651

*The projection prepared in June 2013, recent data for 2012 published 07.10.2013

Source: Own calculations, Polish CSO data.

Table 2. Model of net migration between Poland and selected county – estimate of the regression coefficient of the difference between unemployment in Poland and selected country.

	AT	BE	DK	FI	FR	GR	ES	IR	NE	PT	SE	GB	GE	IT
VARIABLES	d_mig	d_mig	d_mig	d_mig	d_mig	d_mig	d_mig	d_mig	d_mig	d_mig	d_mig	d_mig	d_mig	d_mig
u_comp	-0.873* (0.408)	0.120 (0.422)	0.149 (0.512)	-0.0811 (0.0969)	-1.008 (0.520)	-0.438** (0.154)	-1.566 (0.845)	-3.770 (1.897)	-0.615 (2.113)	-0.0151 0.00834	-0.251 (0.191)	-16.40** (5.836)	-9.587* (4.538)	-1.444** (0.422)
Observations	7	7	7	7	7	7	7	7	7	7	7	7	7	7
R-squared	0.478	0.016	0.017	0.123	0.429	0.618	0.407	0.441	0.017	0.396	0.257	0.612	0.472	0.701

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: Own calculations on Polish CSO data.

Correlation of the net migration and relation between unemployment rates create an opportunity to estimated regression models of net migration changes (table 2) but due to the limited number of the degrees of freedom (very small sample) the number of other covariates was also limited. Than those models together with short-term projections of unemployment in EU countries prepared by European Commission were used to prepare the projection net migration and in cumulated version the projection of the number of emigrants from Poland (table 1 – red numbers). The comparison of the projection of the number of emigrants for the year 2012 and the observed number of emigrants confirms that that method allowed predicting recent changes in net migration.

The example of this projection suggest that on one hand economic factors are important in explaining short term migration, but on the other hand direction of migration flows on between each of the countries and Poland was rarely the same and thus aggregate net migration was a sum of values with different signs.

5. Net migration assumptions consistent with AWG economic projections

There are many reasons why the example of short-term projection method presented in previous chapter can be hardly applied to long-term projections. The uncertainty of projections for decades is much greater than for only a few years. There are many non-economic factors that influence migration and even projections of the long-term changes of economic situation of countries have huge uncertainly. Another source of uncertainty is the potential changes of the relation between economic factors and the volume of migration in the long run. However the necessity to formulate the long-run assumptions of population projections consistent with exogenous macroeconomic scenarios may justify the use the available knowledge of the relations between demographic and economic variables.

Following the method described in Chapter 3 for each of EU countries we estimated the simple regression models that described aggregate net migration where explanatory variables

were two economic variables that can be taken into consideration by potential emigrants: unemployment and net wage of the person that earns 50 % of the average wage in the economy. Both unemployment rates and wages were compared with the values of the same variables with the average in other countries available to emigrate. It allowed including in regression the huge changes in the incentives to migrate created by the EU enlargement and the dates of the opening of the labour markets. The results of such exercise (Table 3) show that the unified approach for each EU country does not lead to useful specification that can explain net migration changes in all countries. For some countries (like Bulgaria, Romania, Malta and Greece) there were too less observations to estimate the models and for many countries the relationships were not statistically significant (grey fields). In many of countries the parameters were statically significant and consistent with economic theory (negative correlation between net migration and relative unemployment and positive correlation with relative value of wages). However in some countries the estimates of parameters were not inconsistent with this simple approach (red values). Significant negative correlation between net migration and unemployment was particularly strong in countries with relatively large fluctuations of unemployment like Spain, Ireland, Italy and Poland.

Table 3. Regression coefficients of explanatory variables (relative unemployment and relative wages) in the models that describe net migration rate.

	Relative unemployment	Relative wages
Belgium	-0.625**	0.00615*
Czech Republic	0.0207	-0.00324
Denmark	-0.706**	-0.000266
Germany	-0.128	0.00519*
Estonia	-0.0123	0.000613
Ireland	-2.427***	-0.00444
Spain	-1.776***	-0.0286*
France	0.145**	-0.00587
Italy	-0.571***	0.00618
Cyprus	-1.266	0.0340*
Latvia	-0.448*	0.00116
Lithuania	-1.728***	0.00900*
Luxembourg	1.089	0.0155
Hungary	0.00242	-0.000752**
Netherlands	-1.093***	-0.00121
Austria	0.742	0.00427
Poland	-0.0353	-0.000343
Portugal	-0.622**	-0.0169
Slovenia	-0.938*	0.0225
Slovakia	0.151**	0.00944***
Finland	-0.357***	0.00396***
Sweden	-0.110	0.00535**
United Kingdom	-0.189	0.00119
Bulgaria	nd.	nd.
Romania	nd.	nd.
Malta	nd.	nd.
Greece	nd.	nd.

Source: Own calculations, Eurostat database

The significant results for the countries where the changes of economic situation that led to unemployment and migration flows were visible allow at least preparing the scenario of future net migration under the assumption that unemployment rates will change according to the AWG macroeconomic assumptions that reflects economic recovery. Two examples of such approach are presented below (figures 5-8).

Figure 5. AWG assumption of the unemployment rate in Spain

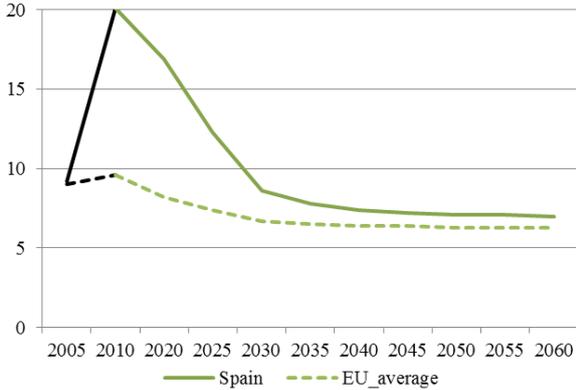


Figure 6. AWG assumptions of the unemployment rate in Ireland

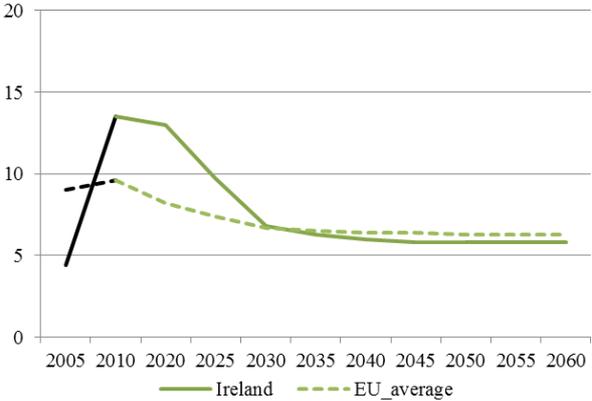


Figure 7. Spain: net migration assumptions - Eurostat vs. pure unemployment recovery

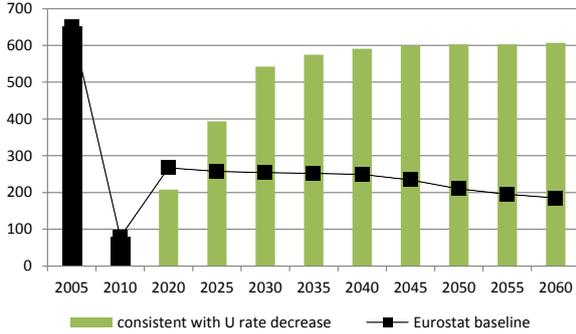


Figure 8. Ireland: net migration assumptions - Eurostat vs. pure unemployment recovery



Source: Own calculations, Eurostat, European Commission (2012)

The example of Spain shows that in the past it attracted massive immigration even despite the fact of relatively high unemployment rate. In 2005 unemployment rate was close to the EU average and net migration amounted to 650 thousands. According to AWG assumptions unemployment rate in Spain will gradually converge to the EU average in the future. The convergence to the levels observed in the past appears if we use the model that takes into account direct relation between relative unemployment and net migration. However it needs to be mentioned that this approach omits any other possible factors that can have significant impact on future migration like for example global ageing that can lead to decreasing migration flows. The comparison of the assumptions the results only from the unemployment decrease and Eurostat long-term assumptions are relatively close until 2020. After that the difference is created by the assumption of the convergence of migration rate to EU average in the far future.

The example of Ireland shows that consistency with AWG unemployment assumption can lead to the return of positive net migration later than it was assumed by Eurostat. The main reason is the inertia of high unemployment assumed in AWG macroeconomic scenario.

6. Conclusions

Migration flows are very volatile and migration data doesn't seem to be as precise as other population change components. Despite that, migration assumptions are included in most population projections. That is why some (at least technical) assumptions should be made about the future migration. The Eurostat population projection prepared for the EU countries is an example of the application of the method that is in principle the same for all EU countries and base on two principles: convergence of migration rates in the far future and partial replacement migration in the future. As it was presented in Chapter 2 there is no convincing evidence from the past that positive changes of net migration were correlated with negative changes of working age population. However in the last 60 years most of the current EU countries experienced almost constant increase in working age population and on the contrary in the next 50 years this process will be probably reversed in most of the countries.

The aim of this paper was to check to what extend it is possible to apply the simple method of binding the migration assumptions in population projections with economic variables such as unemployment rate and wage level for all EU countries. The relationships tested in this paper are explained by economic theory but the complexity of migration processes can hide them even if economic factors really influence migration. The results of the exercise suggest that for many EU countries there are not enough data available or the relations are not significant that can hinder the application of such simple approach in practice. Despite that fact, the significant relationships between net migration changes and unemployment were observed in the countries particularly hit by economic crisis like Spain or Ireland. The estimated parameters for that countries allowed to check to what extend the recovery assumed in AWG projection can translate into changes in net migration under the assumption that the short-term relations between those variables observed in the past will still be present. The results suggest that the results of such exercise in comparison to Eurostat assumptions means the delay in the recovery of net migration flows and the return to the volume of migration close to the average values observed before the crisis that is much higher than the Eurostat assumptions for both countries.

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