
Overview of Demographic Evolution in Romania

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ABSTRACT

The aim of this paper is to analyze the demographic evolution of Romanian population in the last two decades, based on census data and to define main challenges on labour market potential and professional profile. We are referring to aspects of the general demographic characteristics, ethnic composition and age dependency ratios of Romanian resident population. The empirical research was completed by data visualization of demographic data, using R software.

Based on this analysis, we are advancing some signals on the effects produced by the demographic structure dynamics in the last decades on specific groups of population, like school population and working-age population.

Keywords: Demography, Ethnic structure, Age dependency ratio, R Project

INTRODUCTION

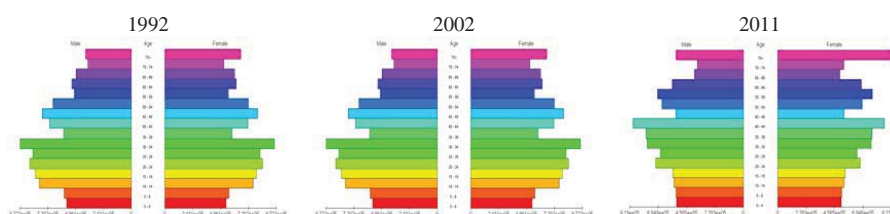
In the last decades, the population in Romania faced significant changes: low level of birth rate, an increased dynamics of external labour mobility. The family model was alliterated, associated with delaying in marriage and first childbirth. Important changes in attendance to education were registered, from increasing early school leave for some population groups to prolonged period in education through increasing participation in higher education. All this aspects influenced the number and profile of the new entrance on the labour market. Based on the challenges of the Romanian economy for future competitiveness and according to new skills demand on labour market in the knowledge based society we are supported through new job creation, is obvious that the human potential (as number and its characteristics) is of the particular importance. We also took into account the cultural model of different ethnic groups of population and the working profile – as level of education, traditional or most common professions, employment pattern and lifestyle.

This paper is based on last three censuses data in Romania (1992, 2002 and 2011). Special insights of demographic changes are given, including changes on ethnic structure and distribution of age groups.

Starting from 1992, Romania's population decreased significantly due to the negative natural growth and the intensive phenomenon of international migration. The population of Romania decreased in twenty years (between Population and Housing Census 1992 and 2011) with 2.7 million inhabitants (11.8%). Between 2002 and 2011, the decrease was of 7.2%. Comparing with 2002, the population distribution by age groups shows a certain accelerating ageing process, whereas the age groups 10-14, 15-19 and 20-24 years old reduced their share in the usual resident population. In the meantime, the share of the old-age groups of 75 and over in the usual resident population increased from 4.9% in Census 2002 to 7.2% in Census 2011.

Population pyramid in Romania

Figure 1



Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

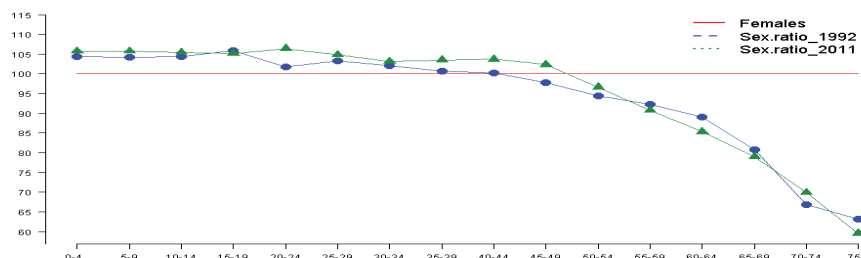
The population is characterized by a higher representation of the female population, both overall and in a higher proportion for age groups over 45 years. Because there are born more boys than girls, until the age of 45 years, the number of men is higher than women.

Although the general trend is maintained throughout the period, some differences in certain age groups are revealed. Age group 15-19 years old is the only below 45 years registering a decreased sex ratio, from 105.9 in 1992 to 105.1 in 2011. A significant increase in the sex ratio occurred in the age group 20-24 years, from 101.8 in 1992 to 106.4 in 2011.

In Romania, in 1992, the average sex ratio was 96.7. In 2002, there were 95.1 males per 100 females and 94.7 in 2011. So, in this respect we faced with a low, but steadily trend to decrease the male born than female, with important implication on long run for labour market supply on professions and qualification, skills profile and employment duration (part time and fix term contracts). In 2011, the sex ratio for ages 75 and older is half (59.5) of the one for ages 25 to 29 (104.8). Therefore, we are losing more male population both by migration and due to the natural causes (accidents, diseases etc.).

Sex ratio in Romania, 1992 and 2011

Figure 2



Source: NIS, Population and Housing Censuses in 1992 and 2011, own calculations

ANALYSIS OF ETHNICAL STRUCTURE OF USUAL RESIDENT POPULATION IN ROMANIA

Ethnicity of Romania's population faces a dynamic change between the last three censuses and it is still going on. The main responsible factors are considered the followings: a) birth rate and average number of children per family; b) health status and life expectancy; c) emigration. For example, if for German ethics the main reason of decreasing population was emigration, for Romanians, the population dynamics was mainly influenced by decreasing number of birth children and increasing average age of the mother at birth of first child. For Roma people, despite the lower expectancy life, average poorer health status, and precarious living conditions, due to the cultural model, the birth rate remains the highest among Romanian's citizens. As result, as special cases, we remark the increase of share of Roma population over 200,000 in twenty years, and the decrease of German ethnic with over two-thirds in the same period.

Romania's usual resident population structure by ethnicity, on last three censuses

Table 1

| Usual resident population | 1992 | | 2002 | | 2011 | | Dynamics 2011/1992 | Structural change |
|---------------------------|-------------------------|-------|----------|-------|----------|-------|--------------------|-------------------|
| | persons | % | persons | % | persons | % | +/-, as % | Percentage points |
| Total | 22810035 | | 21680974 | | 20121641 | | -11.79 | x |
| | Of which, by ethnicity: | | | | | | | |
| Romanian | 20408542 | 89.47 | 19399597 | 89.48 | 16792868 | 83.46 | -17.72 | -6.02 |
| Hungarian | 1624959 | 7.12 | 1431807 | 6.60 | 1227623 | 6.10 | -24.45 | -1.02 |
| Roma | 401087 | 1.76 | 535140 | 2.47 | 621573 | 3.09 | 54.97 | 1.33 |
| German | 65764 | 0.29 | 59764 | 0.28 | 36042 | 0.18 | -45.19 | -0.11 |
| Ukrainian | 119462 | 0.52 | 61098 | 0.28 | 50920 | 0.25 | -57.38 | -0.27 |
| Russian | 38606 | 0.17 | 35791 | 0.17 | 23487 | 0.12 | -39.16 | -0.05 |
| Turkish | 29832 | 0.13 | 32098 | 0.15 | 27698 | 0.14 | -7.15 | 0.01 |
| Serb | 24596 | 0.11 | 22561 | 0.10 | 18076 | 0.09 | -26.51 | -0.02 |
| Tatars | 29408 | 0.13 | 23935 | 0.11 | 20282 | 0.10 | -31.03 | -0.03 |
| Slovak | 19594 | 0.09 | 17226 | 0.08 | 13654 | 0.07 | -30.32 | -0.02 |
| Bulgarian | 9851 | 0.04 | 8025 | 0.04 | 7336 | 0.04 | -25.53 | -0.01 |
| Jewish | 8955 | 0.04 | 5785 | 0.03 | 3271 | 0.02 | -63.47 | -0.02 |
| Croat | 4085 | 0.02 | 6807 | 0.03 | 5408 | 0.03 | 32.39 | 0.01 |
| Czech | 5797 | 0.03 | 3941 | 0.02 | 2477 | 0.01 | -57.27 | -0.01 |
| Polish | 4232 | 0.02 | 3559 | 0.02 | 2543 | 0.01 | -39.91 | -0.01 |
| Greek | 3940 | 0.02 | 6472 | 0.03 | 3668 | 0.02 | -6.90 | 0.00 |
| Armenian | 1957 | 0.01 | 1780 | 0.01 | 1361 | 0.01 | -30.45 | 0.00 |
| Italian | - | - | 3288 | 0.02 | 3203 | 0.02 | | |
| Chinese | - | - | 2243 | 0.01 | 2017 | 0.01 | | |
| Csango | - | - | 1266 | 0.01 | 1536 | 0.01 | | |

Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

It finds and ethnic diversity through the last three categories of population censuses recorded in 2002 and 2011 whose number remains relatively constant for the Italians and Chinese and increases the Csango.

Mean age indicator was computed, in order to ensure a gathering of the data on ethnic groups by population ageing criterion. Mean age of the population in Romania has increased from 34.9 years in 1992 to 37.6 years in 2002 and in 2011; it exceeded the 40 threshold, registering a value of 40.3 years. This value is specific to the adult population countries.

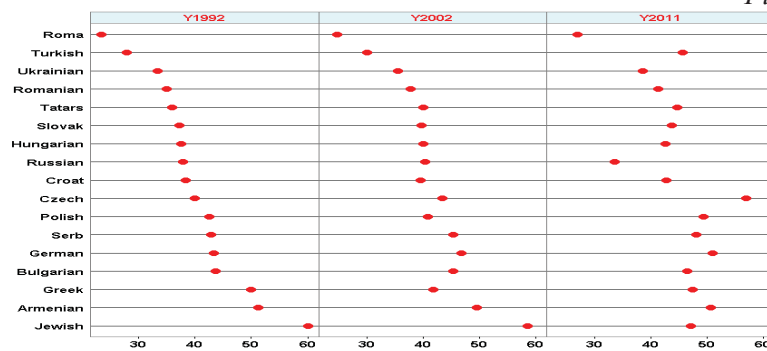
The ethnic groups have evolved differently, following four trends. Age of 40 years was considered as a threshold of aging, age 39 years was the last rated as "young". Therefore, considering mean age indicator, the ethnicity is divided into five categories:

- a) Young ethnic groups with rapid ageing;
- b) Young ethnic groups with slow ageing;
- c) Old ethnic groups with rapid ageing;
- d) Old ethnic groups with slow ageing;
- e) Ethnic groups with a rejuvenation trend.

If in 1992, the mean age was for the most of the ethnic groups below 40, in 2011 significant changes were registered for Turkish, Czech, Germans and Polish population, the main determinants for such higher aging trend being emigration mostly of the young and average age individuals and/or couples. In the case of Greeks, Armenians and Jewish, the average oldest ethnic groups in Romania in 1992, the aging trend was much slower or even was registered a decreasing of the mean age (i.e. Jewish population) due to the lost in number by natural causes. In 2011, the lowest mean-age was registered for Roma, Russians and Ukrainian, ethnic population groups relatively younger compared to Romanians.

Mean-age of ethnic groups in Romania

Figure 3

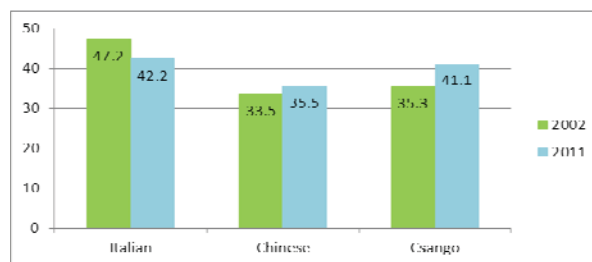


Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

Is important to mention that some ethnic groups were registered at Census 2002 and 2011, but unregistered in Census 1992, e.g. Italian, Chinese and Csango.

Mean age of Italian, Chinese and Csango ethnic groups in Romania

Figure 4



Source: NIS, Population and Housing Censuses in 2002 and 2011, own calculations

Only in the case of Italians, the mean age decrease between 2002 and 2011, the others 2 ethnic groups of the population having a similar trends like most of the other ethnics, but with different “speed” of aging population. It has to be mention that, for all these ethnics, the total number of inhabitants varied in a lower dynamics than the others, based also on the above-mentioned determinants factors.

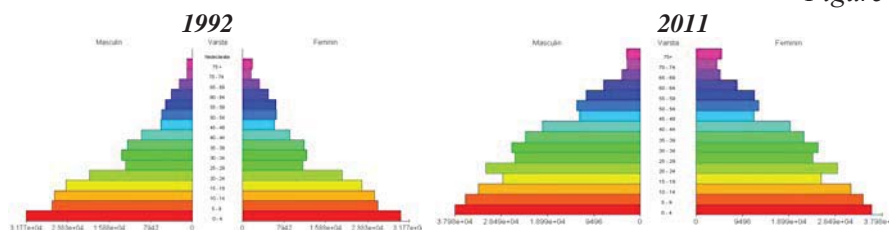
a) *Young ethnic groups with rapid ageing* consist of Roma and Chinese populations.

Mean-age of Roma population has increased with 3.7 years in twenty years. Meanwhile, Chinese population had a mean age of 33.5 years in 2002, and 35.5 years in 2011 (Annex 1).

Gender structure of Roma population, more specifically the sex ratio indicator, has not suffered major changes, as seen in figures below. There is an over plus of the male population: in 1992 and 2002 were about 102 males for 100 females and in 2011 were 103.4 males for 100 females.

Pyramid of Roma Population

Figure 5



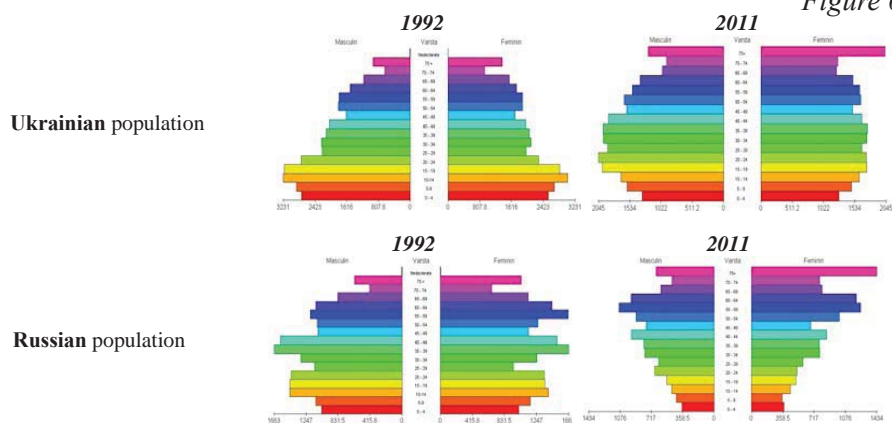
Source: NIS, Population and Housing Censuses in 1992 and 2011, own calculations

b) *Young ethnic groups with slow ageing* consist of Ukrainian and Russian populations.

Ukrainians and Russians follow the same pattern of aging. Ukrainian population had the mean-age of 33.3 years in 1992, and in 2011 it was 38.6 years, the increase being of 5.3 years between the two censuses. Unlike the rest of the ethnic groups who had constantly evolving their mean age upward or downward, the mean-age of Russians increased from Census 1992 to Census 2002 with 2.4 years, and afterwards it decreased by 6.8 years at the Census 2011 against Census 2002. With respect to gender structure, both Ukrainians and Russians stand notable differences in the age group 75 years and over, where the population is predominantly female.

Pyramids of Ukrainian and Russian population

Figure 6



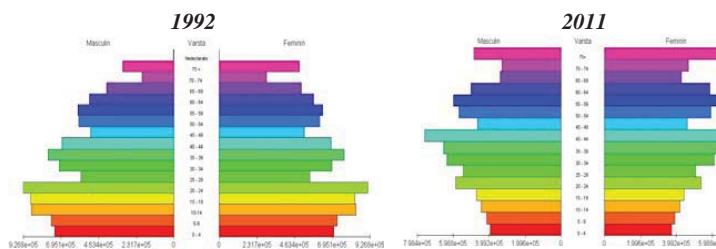
Source: NIS, Population and Housing Censuses in 1992 and 2011, own calculations

c) *Old ethnic groups with rapid ageing* are Romanian, Greek, Polish, Turkish, Serb, Slovak, Czech and German populations (Annex 2).

Romanian population registered in Census 1992 was young, with a mean-age of 34.9 years. In twenty years, it increased with 6.4 years, being set at 41.3 years at Census 2011. With a birth rate of only 1.3 and a sharply increase of long-term external mobility for work, is has to be expected to a continuing trend of population declining and also a faster ageing process than other ethics in the same category.

Population pyramid of Romanian

Figure 7



Source: NIS, Population and Housing Censuses in 1992 and 2011, own calculations

A declining birth rate is noticed in Greek and Slovak ethnic population in all three censuses, at Czechs in 2011 and at Germans in 2002 and 2011. For Greek ethnic group a decrease was registered for the mean-age, from 50

years in 1992 to 41.9 years in 2002, afterwards it increased to 47.4 years in 2011.

Polish population registered almost seven years aging in 2011 compared to 1992.

Although the Turkish were a young population until 2002, at the Census 2011 they had a mean-age of 45.6 years. In 20 years, the Turkish were aging with 17.9 years old, which is the highest recorded value between the three censuses. A similar trend had Czech population, which has aged 17 years in the period 1992-2011, i.e. from 39.9 years to 56.9 years.

German ethnic group have the second from the top mean-age after the Czech, i.e. 51 years in census 2011.

Serbs have increased the mean-age with 5.3 years in 2011 compared to 1992.

Slovaks had a young mean-age at Census 1992 (37.2 years), and in the next two censuses they have been aging with 2.7 years and 3.9 years.

d) *Old ethnic groups with slow ageing* are Croat, Bulgarian, Hungarian, Tatars, and Csango populations (Annex 3).

Tatars, Croats and Hungarians had a decreasing mean-age between 1992 and 2002 (in Census 1992 they were young ethnic groups). Thereafter, their mean-age risen to 44.6 years, 42.8 years, respectively, 42.6 years.

Population pyramid of Hungarian

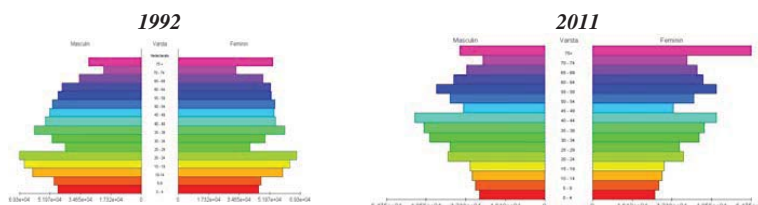


Figure 8

Source: NIS, Population and Housing Censuses in 1992 and 2011, own calculations

Csango's population mean age has widely increased between 2002 and 2011, by approximately 6 percent, from 35.3 years to 41.1 years.

e) *Ethnic groups with a rejuvenation trend*: Armenian, Italian and Jewish

Despite the positive trend of rejuvenation of the population groups, all were and still remain among those with a mean age over 40 (Annex 4). The

mean-age of Italians declined between the two censuses; at Census 2002 it was 47.2 years and in Census 2011 it was 42.2 years. Similarly, the mean-age of Jews decreased between Census 1992 and Census 2002 (from 60.1 to 58.5 years) and between 2002 and 2011 (to 47.1 years).

The Armenians had a mean-age of 51.2 years at Census 1992, and 50.6 years twenty years later, which represented one of the highest mean-ages at Census 2011.

All population pyramids mentioned above were obtained by using R software. Package pyramid (Minato Nakazawa, 2014) was used. This package permits drawing population pyramid using data frames or vectors. A data frame was used including left pyramid numbers in the first column and right pyramid numbers in the second column, where the numbers of males in each age-class was given to left numbers and those of females to right numbers. The data frame includes third column, therefore this column is used as age-class labels. Color palette rainbow was used for coloring the pyramids. The R code used for generating the population pyramids is exposed in Annex 5. These kind of visualizations are the most effective way to depict graphically the age and gender distribution of a population, partly because of the very clear image these pyramids present.

THE IMPACT OF PYRAMID SHAPE CHANGE ON LABOUR MARKET

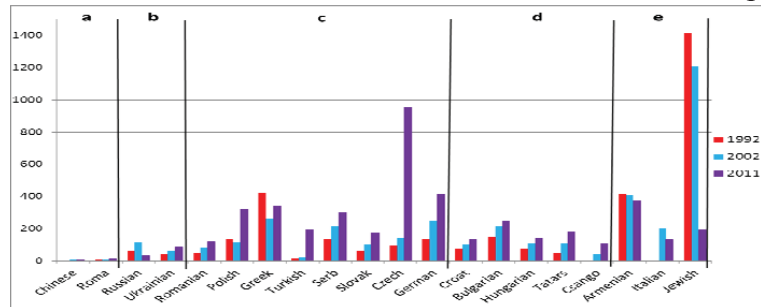
Aging is significant national policy challenge for Romania as past evolution, but also as future expectation. According to Global AgeWatch Index , in 2014 Romania ranked 41, among middle positions in the index classification, but with no significant progresses in policy measures to overcome the main associated risks. Up to 2030, the share of population over 60 years old in Romania will remain below Europe average (in 2014 was 21.4% as against 23.2%, for 2030 estimation are for an increase to 26.7% as comparing to 28.9%). For 2050 is estimate a larger share that Europe average, as 36.7% as against 33.6%.

Population aging raise policy concern regarding: a) enrolment in education, by size and professional profile; b) labour market supply, as insertion rate pressure and skills mismatch; c) increased demand for continuing training, as main instrument to reduce labour market structural disequilibria; d) active aging with average labour productivity decreasing potential and demand for cumulative position, as pensioner and employee; e) pressure on health care system for old age people specific services.

If we consider aging index , for Romania's resident population, was 80 in 2002 and 102 in 2011. For the young ethnic groups (a, b) we observe low values of aging index.

Aging index of ethnic groups in Romania, by the five categories

Figure 9

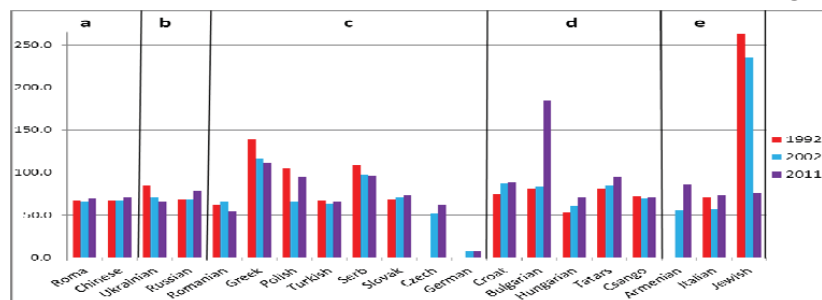


Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

The effects that aging has on both the economic and social life and the prospects of demographic trends are reflected in the age dependency ratio. The demographic dependency ratio (age dependency ratio) dynamics (population under 15 and over 65 as share of population aged 15-64) highlights how severe is this imbalance for the society. Both factors are significant for total dependency ratio, but in different proportion by ethnic groups (birth rate decreasing per couple and increasing life expectancy). Also, in the case of emigration of the working age couple, is important to mention that the children will follow the parents. The total age-dependency ratio in Romania in 2011 was 47. This means that there were 47 people in the dependent ages (0-14 and 65 years and over) every 100 people in the working ages, decreasing from 1992 when the ratio was 51 young and elderly people to 100 people in the working ages.

Total age-dependency ratio of ethnic groups in Romania, by the five categories

Figure 10



Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

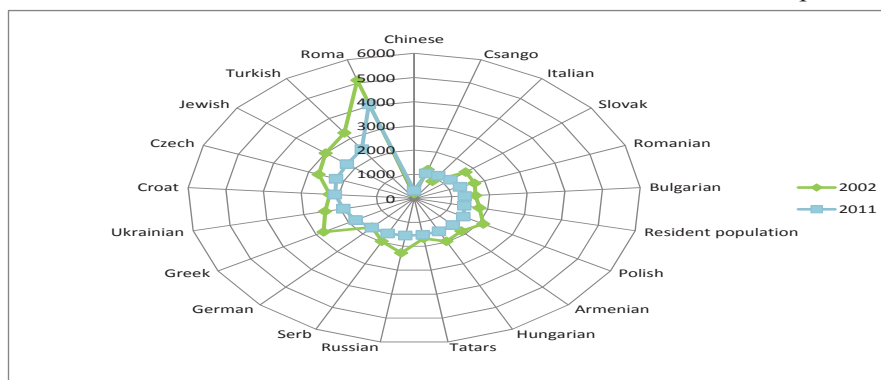
The total-age-dependency ratio consists of the ratio of the sum of youngsters (i.e. under 15 years) and the number of elderly people (i.e. aged 65 and over) at an age when both groups are generally economically inactive, compared to the number of people of working age (i.e. 15-64 years old). It is the sum of the two ratios, the young-age-dependency ratio and the old-age-dependency ratio, presented in the Annex 6. The ethnic groups with the highest total age dependency ratios in 1992 are Jewish, Greek, Serb and Polish. In 2011, the situation changed: the highest number of people in dependent ages for every 100 people in the working age was registered for Bulgarian and Greek. Ethnic groups with high total age dependency ratios have implicitly high birth rates, due to the large share of children in total population: Roma, Hungarians, Ukrainians, Czechs, Italians, Serbs and Bulgarians.

The generations born after 1989, much reduced in size, will be on labor market in the years 2020-2030 and will sustain a larger elderly population, economically inactive and fewer children. Economic dependency ratio is used to calculate the burden that the active population bears to support the inactive persons through social benefits from public social insurance funds (i.e. public pensions) and social assistance (free social services or benefits).

Another important indicator for this analysis is the economic dependency ratio, shown in Figure 11. It has been computed as the number of unemployed and inactive persons per thousand employed persons.

Economic dependency ratio for ethnic groups in Romania

Figure 11
- ‰ persons -



Source: NIS, Population and Housing Censuses in 2002 and 2011, own calculations

The unemployed are considered accordingly to the international standard definition: “all persons above the age specified for measuring the economically active population, who during the reference period were:

-
- (a) Without work, i.e. were not in paid employment or self-employment as specified by the international definition of employment;
- (b) Currently available for work, i.e. were available for paid employment or self-employment during the reference period; and
- (c) Seeking work, i.e. had taken specific steps in a specified recent period to seek paid employment or self-employment.” (ILO, 2003)

The inactive population consists of persons, irrespective of age, who were neither employed nor unemployed in the reference period. Finally, the employed comprise all persons above 15 years old who during the reference period were in the following categories:

(a) paid employment:

- at work: persons who during the reference period performed some work for a wage or salary, in cash or in kind;
- with a job, but not at work: persons who, having already worked in their present job, were temporarily not at work during the reference period and had a formal attachment to their job.

(b) self-employment:

- at work; persons who during the reference period performed some work for profit or family gain, in cash or in kind, for at least one hour;
- with an enterprise, but not at work: persons with an enterprise, which may be a business enterprise, a farm or a service undertaking, who were temporarily not at work during the reference period for any specific reason. (ILO, 1982)

At national level, the economic dependency ratio had decreased by 410‰ in 2011 compared to 2002. In 2002, 1775 inactive or unemployed people were corresponding to 1000 employed people. In 2011, this number had decreased to 1365.

The largest decrease in this indicator was registered for Roma population. Namely, the number of unemployed Roma persons per 1000 persons employed Roma decreased by 1041. However, the economic dependency ratio of Roma is the highest in both censuses. In 2002, every 1000 employed Roma persons were supporting 5105 unemployed persons and in 2011, 4065 unemployed persons. A significant decrease in the economic dependency ratio was observed among Greeks (978‰), Turks (816‰), Russians (727‰) and Jews (724‰). The only economic dependency ratio increase was for Ukrainian population (19‰), Chinese (138‰) and Italian (271 ‰).

The most recent data show that in 2014, at national level, the economic dependency ratio was 1313‰, down from the previous year (1340‰). A higher level of this indicator was registered for females, e.g. 1,704 ‰ against 1008‰ for men. (Pisica S., Moldoveanu R., 2014 based on LFS data, 2014).

CONCLUSIONS

Demographic aging causality differs, depending on the specific socio-economic conditions and in Romania it varies even from ethnic group. Also, the dynamics of the economic dependency ratio is influenced not only by the demographic changes but also by the cultural model of the ethnic group and by the “historic profile” of their presence on the labour market. Moreover, demographic and economic effects of the evolution of the presented indicators will be felt over time and will imply changes in the policies addressed to various subpopulations: the school population, the population of childbearing age, the working-age population, and elder people. If we also consider the challenges on the new graduates’ cohorts of the providing economic growth in the knowledge based society, the ethnic profile and cultural model become very important. The need for demographic statistics on ethnic structure is not linked with discrimination. It represents an implicit factor for sustaining adequate policies for active social inclusion and for equality of opportunity for an increased standard of living achieved. Every ethnic group has its advantages: lifestyle, household organization, openness to education, active life or civic engagement etc. The ethnic attribute, associated with the analysis of age and gender distribution and of demographic and economic dependency indicators, aim to design sound policy instruments or/and recommendations in order to support better responses to the wide diversity of needs of different ethnic groups. We have to keep in mind that the potential labour force, in order to be efficiently activated on the national labour market, should be considered in its own completely specific profile, at least from the following perspectives:

- demographic family model: the average number of children per family and women’s life model participation;
- inclination towards education, the prevailing level of the qualification;
- fields of professional specialization, traditional trades or preferred ranges of economic activity;
- the formal / informal employment model;
- the employment typology (full time, part time etc.), occupational status;
- the social insurance model, etc.

Business environment and hence labor market demand will be defined by jobs’ quality, reflecting technological changes that require new skills and competences, higher labor intensity, high and rising productivity. The response of individuals to future labour market conditions is different, depending on the characteristics described above. The skills’ match with business demand must

be ensured both by: school readiness pathway and continuing education, individual potential and participation in decision making at jobs.

More than two decades of market economy in Romania showed that the inadequacy of supply to labor market demand generated not only waste of resources (low rate of investment in the young generation returned through skills activation on labour market) but also underutilization of the potential labor or its loss through external migration.

Given the demographic challenges outlined above, ethnicity criteria consideration in designing labour market supply becomes of truer important factor. Romania remains a transit country for migrant labor and a source for supply structural deficits on the developed EU labor markets. Therefore, the specialist and policy makers have to find dedicated levers and tools for labor demand in the domestic untapped human potential. It is more efficient and less expensive to stimulate employment among natives. Experience has shown that in the last decade of transition those who left Romania to work abroad may not be replaced with the immigrants of the same potential. Moreover, the limited public resources invested in education and health is not recovered by graduates' activation/valuing on national labor market.

In this context, the development of statistical demographic database of the indigenous population, detailed by qualitative criteria represents the first step in substantiating fair and realistic reforms in education and employment. This will allow identifying the necessary adjustment engines and overcoming the labor migration crisis that Romania is facing, particularly in past decade.

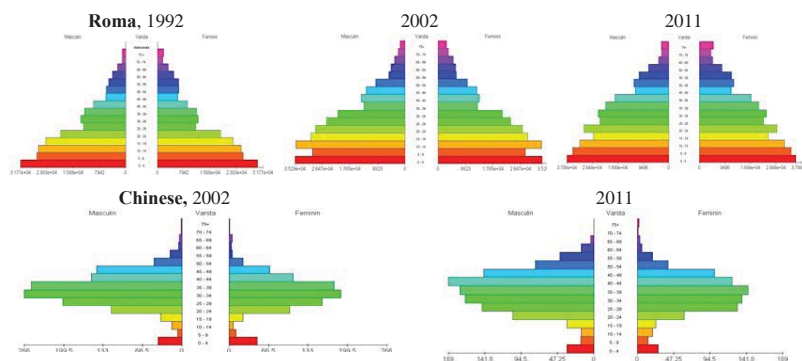
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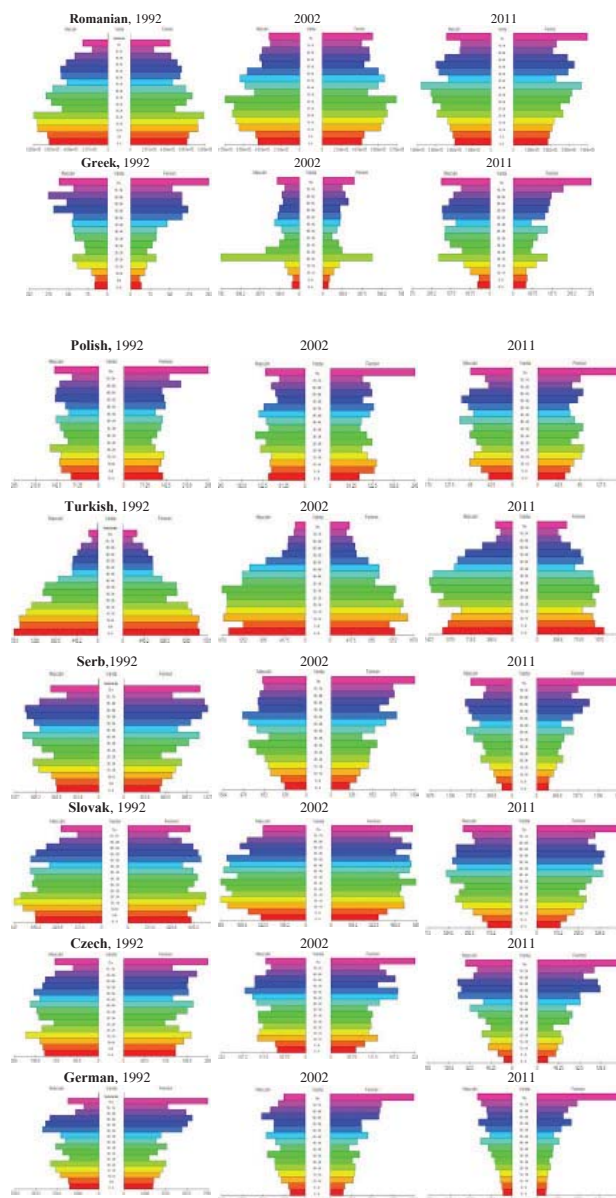
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Annex 1

Young ethnic groups with rapid ageing

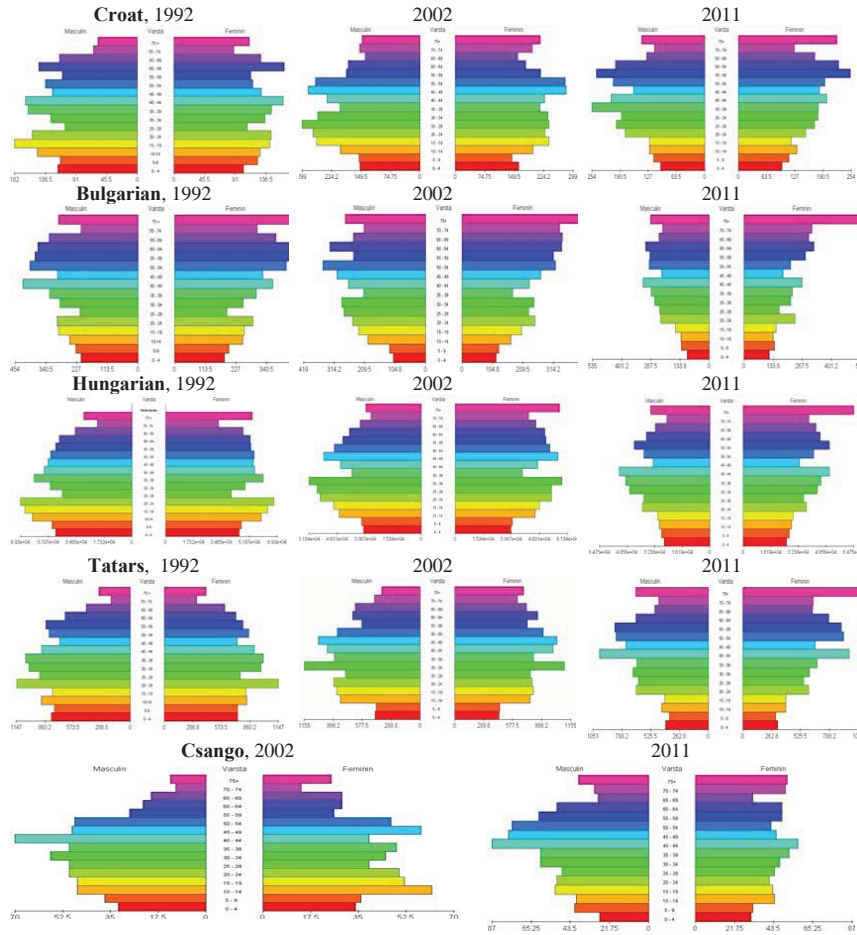


Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

Old ethnic groups with rapid ageing

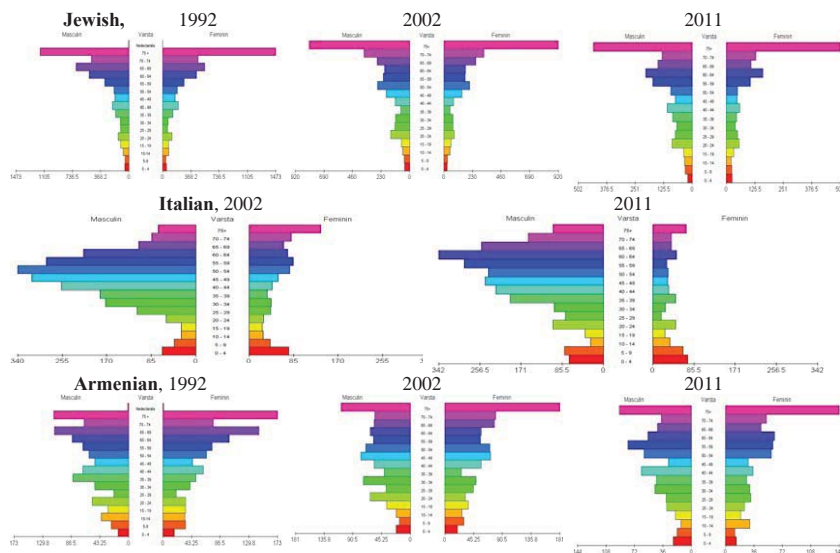
Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

Old ethnic groups with slow ageing



Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

Ethnic groups with a rejuvenation trend



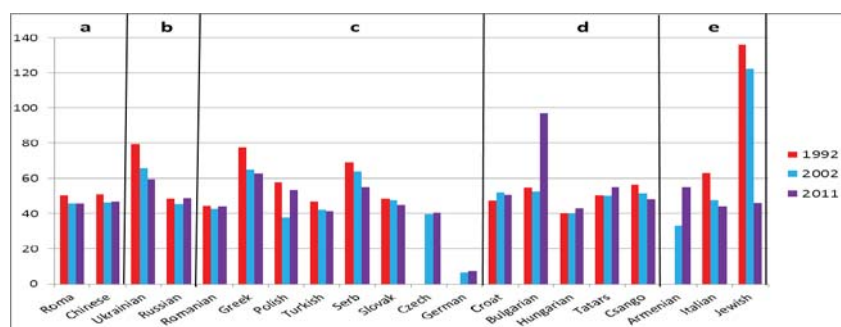
Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

R code used for generating the population pyramids

```
> ages <- popul ati on_pyrami d_2011$Age_groups
> mal es <- popul ati on _pyrami d_2011$Mal e
> femal es <- popul ati on _pyrami d_2011$Femal e
> data <- data. frame(mal es, femal es, ages)
> pyrami d(data, Csi ze=0. 7, LI ab="Mal e", RI ab="Femal e",
  Cl ab="Age group", GL=F, Lcol =rai nbow(17), Rcol =rai nbow(17), Cadj =-0. 02)
```

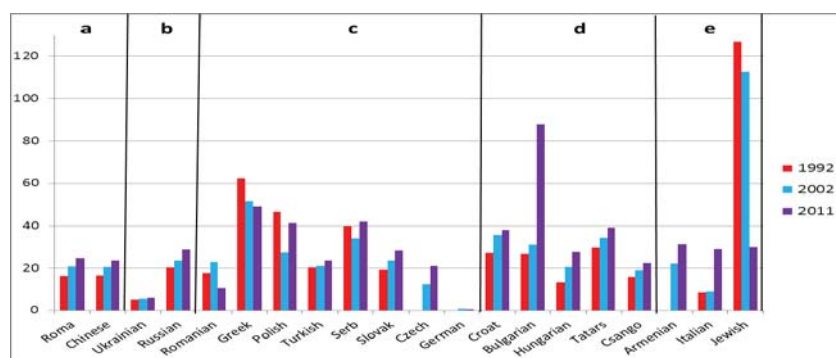
Partial age dependency ratios of ethnic groups in Romania

Young-age dependency ratio of ethnic groups in Romania,
by the five categories
Children up to 15 age old per 100 persons of 15-64 age old



Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations

Old-age dependency ratio, by the five categories
Persons aged 65 and over per 100 persons of 15-64 age old



Source: NIS, Population and Housing Censuses in 1992, 2002 and 2011, own calculations