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Migration of Icelandic citizens in the first three quarters of 2015

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Icelandic summary

Í greinargerðinni er leitast við að svara eftirfarandi spurningum tölfræðigreiningu:

- a) Er brottflutningur og aðflutningur íslenskra ríkisborgara á fyrstu þremur ársfjórðungum 2015 frábrugðinn því sem áður hefur sést?
- b) Hvaða þættir hafa áhrif á búferlaflutninga íslenskra ríkisborgara?

Sé hlutfall íslenskra ríkisborgara sem flytja til og frá landinu á mismunandi aldursbili (af heildarfjölda brottfluttra) árið 2015 borið saman við sambærilegt hlutfall árána 1986 til 2014 fæst niðurstaðan að *engar marktækar breytingar hafi átt sér stað árið 2015*.¹ Aukinn fjöldi brottfluttra er ekki umfram það sem telja má eðlilega sveiflu miðað við fyrri ár. Þessi niðurstaða á við hvort sem horft er til búferlaflutninga hjá einstaklingum eða kjarnafjölskyldum.

Ekki sést neinn munur sé horft til þeirra sem eru yngri en 40 annars vegar og eldri en 45 hins vegar. Þess þá heldur sjást engar vísbendingar um breytta búferlaflutninga þeirra sem eru 20-24 ára eða 25-29 ára. Einu marktæku niðurstöðurnar taka til aldurshópsins 40-44 ára sem eru hreyfanlegri síðustu ár (2009-2015) en áður hefur sést. Árið 2015 fluttu marktækt fleiri í þessum aldurshópi til Íslands en áður og lítillega fleiri fluttu brott. Eftir hrúnið 2008, einkum frá árinu 2010, má almennt greina meiri hreyfanleika fólks á aldrinum 40-60 ára bæði í brottflutningi og aðflutningi.

Breytileiki flutningsjöfnuðar hjá einstaklingum og fjölskyldum, milli tveggja samliggjandi ára, sýnir *ekki marktækar breytingar* sé horft til 12 mánaða (1. október til 30. september) árin 1971-2015. Í því samhengi eru árin 1989 og 2009 frábrugðin sé horft til einstaklinga en aðeins 2009 sé horft til fjölskyldna. Þar eru greinileg áhrif efnahagshrunsins 2008.

Gögn um brottflutta og aðflutta íslenska ríkisborgara (1971-2015) sýna sterka fylgni við líkan sem inniheldur fjölda útskrifaðra stúdenta, þróun vergrar landsframleiðslu og atvinnuleysisstig. Líkanið var þróað vegna mannfjöldaspár Hagstofunnar og er lýst í greinargerð sem gefin var út 18. nóvember 2015.² Líkanið sýnir þó einungis fylgni en gefur ekki upplýsingar um orsök né heldur er það tæmandi. Aðrir þættir gætu hugsanlega varpað frekara ljósi á flutningsjöfnuð, t.d. menntun og starf, en þau gögn eru ekki tiltæk í dag.

Greiningin sem hér fylgir er byggð á þeim lýðfræðigögnum sem til eru um kyn, aldur, fjölskyldustöðu og ríkisfang.

¹ Horft er til fyrstu þriggja ársfjórðunga árána 1986–2015.

² http://www.hagstofa.is/media/49266/hag_151118.pdf

1. Formulation of the problem

We can identify the following meaningful questions which can be answered by statistical hypothesis testing and analysis. The only migration processes we study here are emigration and immigration of Icelandic citizens.

1. First group of statistical hypotheses to test:
 - a) are the proportions of people of various ages (0–4, 5–9, ..., etc.) , out of total migrating people, the same for year 2015 and for past (available data) years?
 - b) are the overall age-dependency functions for various years identical?
 - c) are the migration patterns of all age-groups for 1986-2009 and for 2009-2014 the same? This can be tested indirectly, since the second time series would be too short for any meaningful statistics. However, we can compare the entire time series 1986-2014 (s1) and the slightly shorter series 1986-2009 (s2) with the results of 2015. If the tests give identical conclusions, we can deduce that no significant change happened during s2. If the results are different, we can infer a regime change for s2 versus s1.
2. Second group of statistical hypotheses:
 - a) Is the net migration rate, measured at the end of the first 3 quarters of the year 2015, similar to the net migration in other years?
Note that the net migration is correctly defined over a one year interval, so in this case from 1st of October to 1st of October of any consecutive years. The relevant, mathematically but also meaningful, measure to compare across years is actually the variation of the net migration rate between successive years, due to time series stationarity issues.
 - b) Is the net migration of families (defined by fjölskyldunúmer in data of Registers Iceland) similar to the previous years?
3. What are the factors which have an influence on the migration numbers?

2. Results

If the distributions of proportions of migrants by age-groups, during 1986-2014 or for the shorter period ending in 2009, are generated by stationary ergodic processes for each age-group, one can use them for standard statistical testing as described in what follows.

We cannot reject the hypothesis that the proportions of 2015 are the same , at 99% confidence level of each tested age-groups, which gives 95% overall multiple comparisons (see Bonferroni adjustment) , for most age groups and by using series s1 and s2.

Two cases show small changes as follows:

- For emigrants in age-group 40-44 there is a marginally significant change in 2015 when using 1986-2014 years as comparison and a significant change if using

1986-2009 as comparison. For immigrants in age-group 40-44, both tests give significant (although small) results.

- For emigrating children 0-4, comparing with s1 gives significant results and non-significant when comparing with the shorter time series. The immigrating children 0-4 give non-significant results for s1 and significant for s2 series.

We cannot reject the hypothesis that the age-dependencies are identical at 99% confidence level.

The age-dependency of proportions for the 18 age-groups is shown in the graph below.

We note also in this representation that:

- the proportions of both emigrants and immigrants in the age group 20-24 (the highest in all curves) as well as in 25-29 group, out of the total number of emigrants/immigrants, in the first 3 quarters of 2015, is actually smaller than the average proportion recorded in the past 30 years (the average for 1986-2015); the net proportion is bigger (by 0.1) in absolute value. However, they are not significantly different from the past proportions of these age groups.
- The only marginally significant changes (close to significance confidence level threshold) in the shape of the age dependency curves are for age-groups 40-44 and 0-4.

Figure 1a. Proportions of immigrants (Icelandic citizens) by age-groups 1990–2015

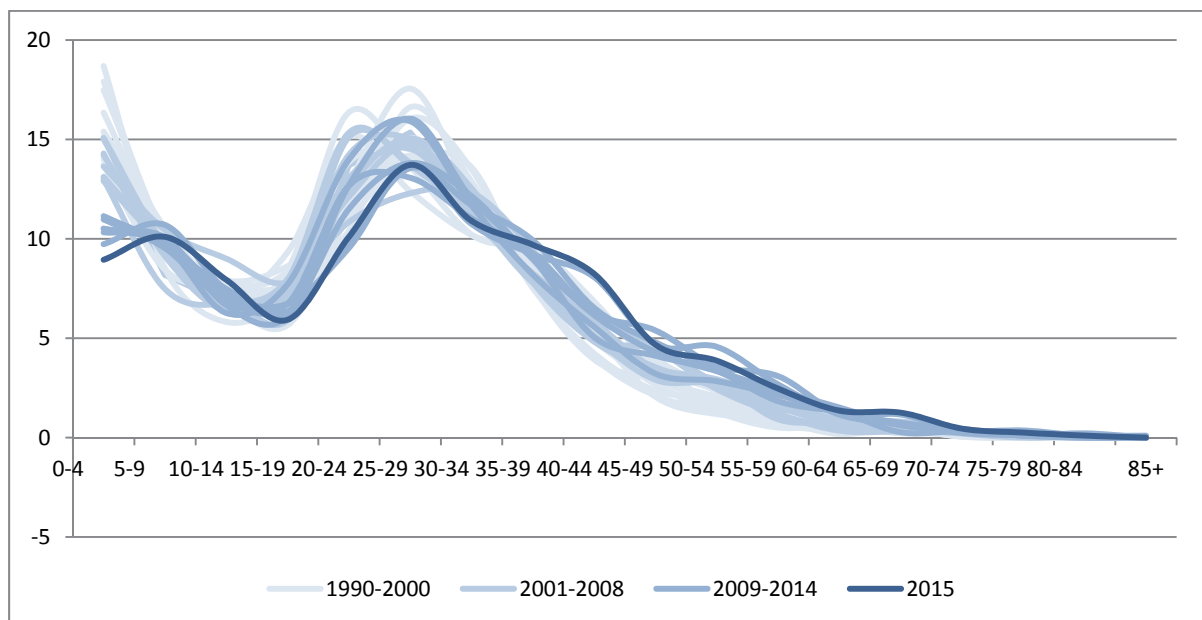
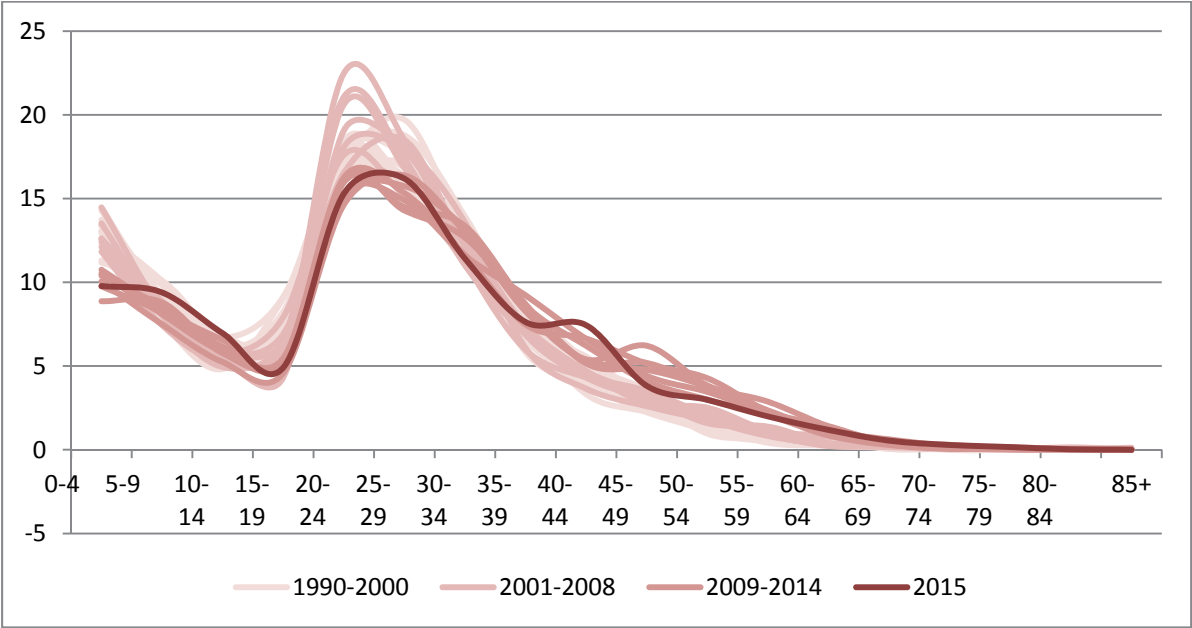


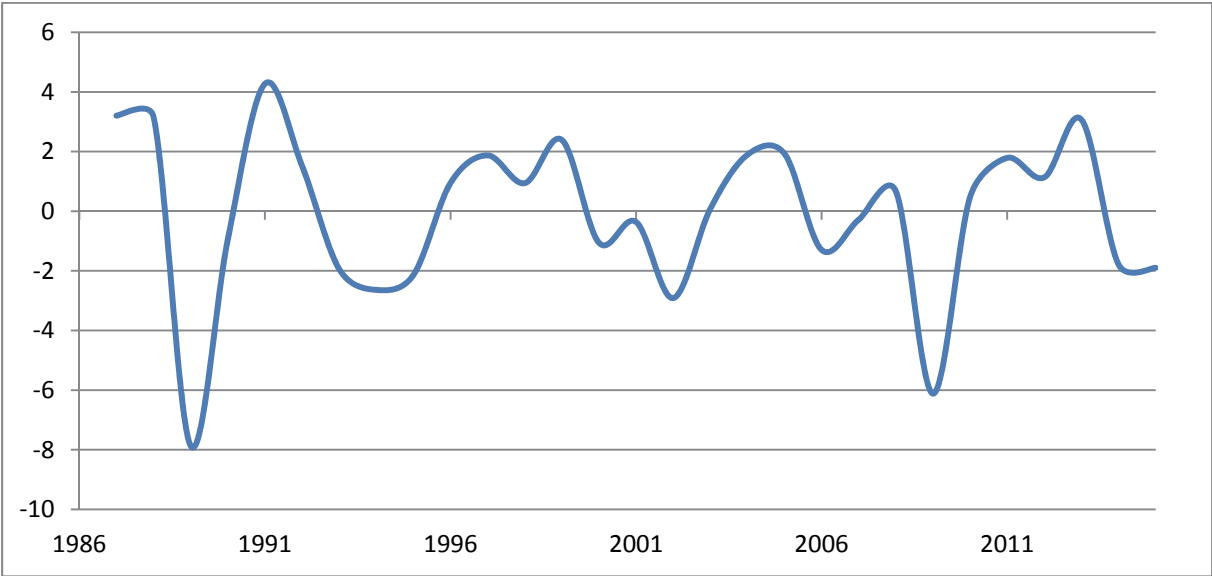
Figure 1b. Proportions of emigrants (Icelandic citizens) by age-groups 1990–2015



The comparisons referring to the net migration rates are meaningful only if done for the changes between successive years, since the time series of migration rates is not stationary but it's corresponding first order differenced series is.

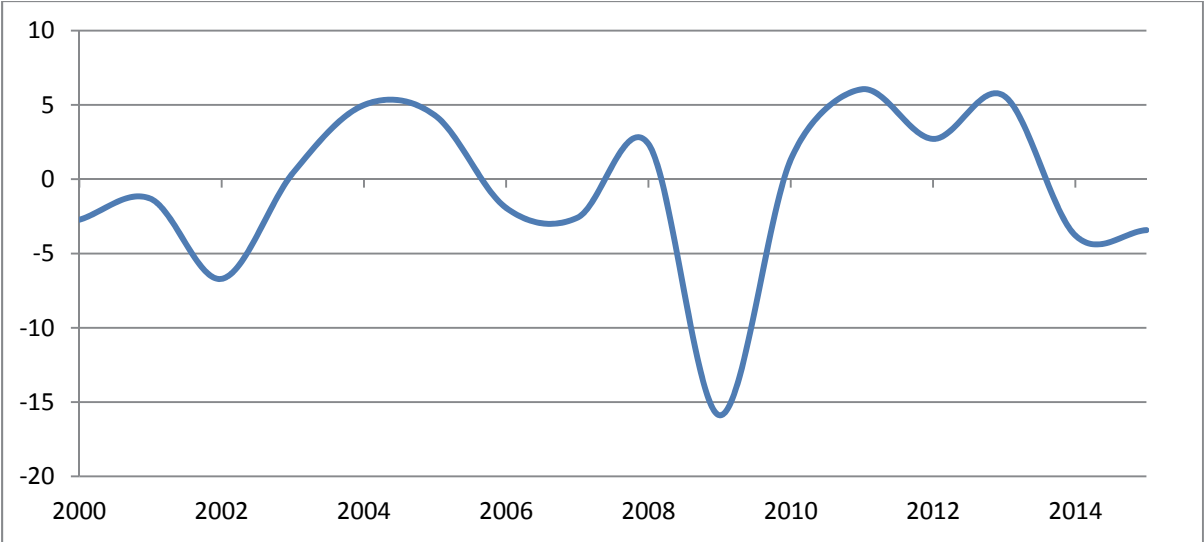
The following graph illustrates the result of the statistical tests, i.e. that we cannot reject the hypothesis that there is no significant difference between the last change in net migration and the historical values for the past 30 years, at 99% and 95% confidence level. The only „outliers“ are 2009 and 1989.

Figure 2. The differences in net migration rates (net migration numbers for each 1000 individuals) between successive years, for individuals (Icelandic citizens) 1986–2015



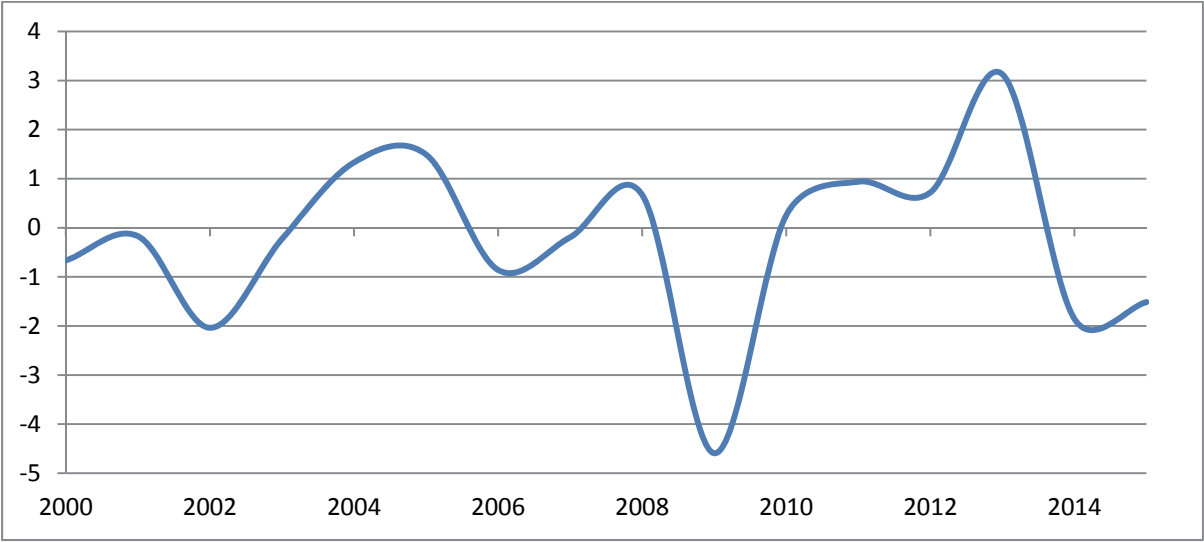
The same conclusion is valid for nuclear family migration rates. It is clear also from figure 3 where the only „outlier“ in a very well behaved time series is the year 2009.

Figure 3. The differences in net migration rates (number of such families gained per year per 1000 families in the total population) of fjölskyldunúmer-units between successive years (Icelandic citizens) 2000–2015



For families with more than one person (no single people) the outlier in 2009 has a smaller companion in the increase of positive net migration between 2012-2013, cf. figure 4.

Figure 4. The differences in net migration rates of families (fjnr) with more than one persons, between successive years (Icelandic citizens) 2000–2015



3. Factors which have an influence on the migration numbers

The data on net migration of Icelandic citizens for the period 1971-2015 is well fitted by a model which has the following significant factors:

- the number of graduating students
- the GDP variation
- the unemployment value.

This is an informative and minimalistic model, but it does not mean either causality or exclusivity, *other meaningful factors (education, type of work, previously living abroad, family types, income, etc) might be found significant if tested when enough data is available.*

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