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The Icelandic Noncontact Crash

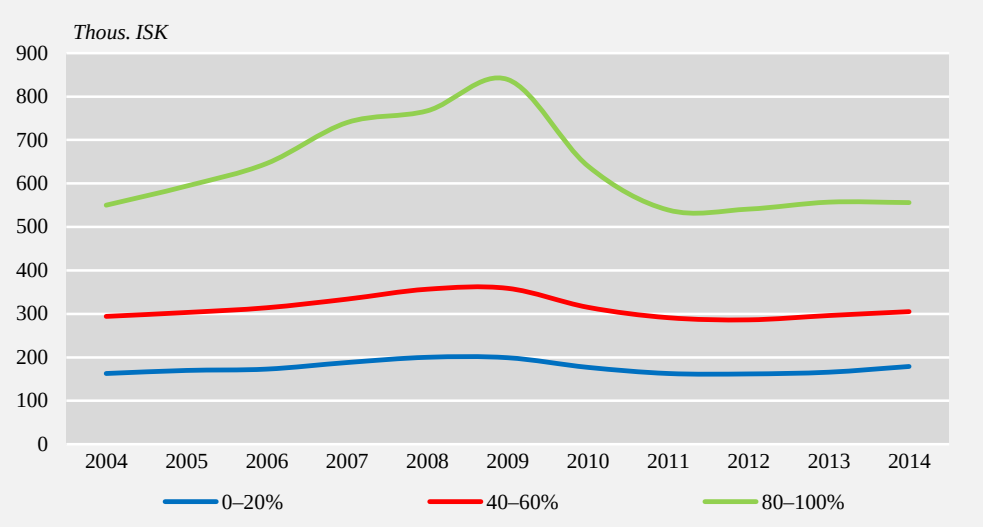
Summary

Most economic indicators in Iceland tell the same story. There was an upswing, a peak and a drop in the period around the year 2008 when all of Iceland´s banks collapsed. Correlation between noncontact rates and income, home ownership, household size and citizenship follows the same trend as the economic indicators during the period from 2004 to 2014. A comparison between the population of foreign and Icelandic citizens reveals that the foreign population did not experience the same rise and fall in income as the Icelandic population. They were also harder to reach in the survey, particularly during the "bubble" years. A comparison of different logistic regression models shows that when foreign citizens were dropped from the analysis the power of the model in explaining noncontacts became less, indicating that different response behavior and different living conditions between Icelandic and foreign citizens may have produced bias in the EU-SILC survey in Iceland. The trend of pseudo R squared from the logistic regression model predicting the noncontact bias takes a similar shape as many of the economic indicators for the period of 2004 through 2014 and could therefore be referred to as the Icelandic noncontact crash.

Household finances in Iceland 2004 through 2014

Most economic indicators in Iceland tell the same story. In the years prior to the collapse of the banks the economy was booming. Year by year the rate of employment increased as well as household income. Households could more easily make ends meet and face unexpected expenses. After the collapse of the banks in 2008 the aforementioned indicators dropped to similar values as before the upswing. However, benefits of the upswing were not evenly distributed nor did the drop hit everyone with equal force as can be seen from figure 1 which shows disposable income fixed in 2013 year´s prices for the first, third and the fifth income quintile.

Figure 1. Real disposable income for income quintiles in 2013 year's prices, CPI

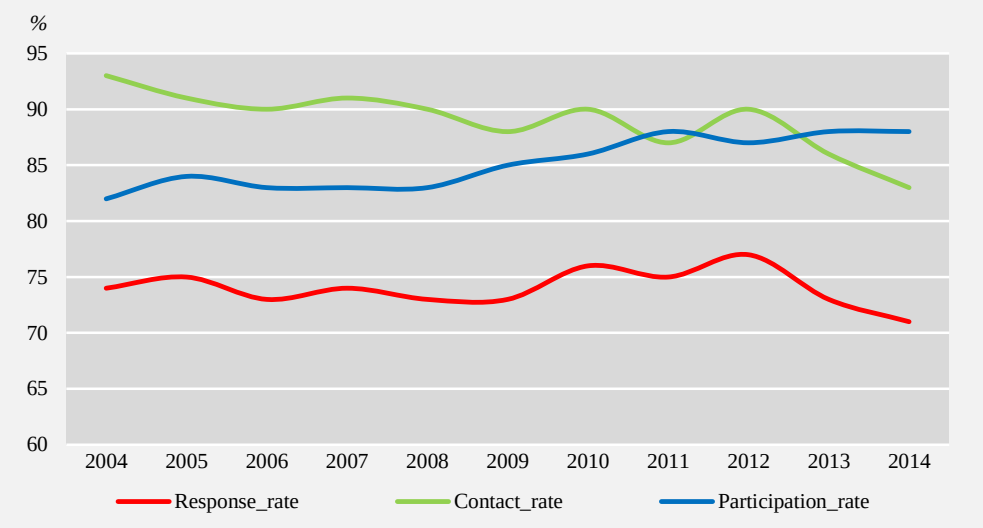


Notes: According to Eurostat procedures the years of the table refer to the survey year, the year the survey was implemented. The income reference period is the previous tax year. The indicators and significance levels are in Tables 1a and 1b in Appendix 1. Disposable income is defined as equvalized disposable income which is the total income from all income sources for all household members added and distributed over the household members with a formula where the first household member gets the value 1 all other household members 14 years and older receive the value 0.5 and children 13 years and younger receive the value 0.3. Therefore a family with two adults and two young children and 500 thousand in total income receives 500 / 2.1 or 238 thousand in equivalized disposable income.

Using register variables to analyze response behavior

Response rate for the EU-SILC (European Survey of Income and Living Conditions) in Iceland has been rather stable over the last 11 years. Contact rate has declined somewhat and participation rate has increased.

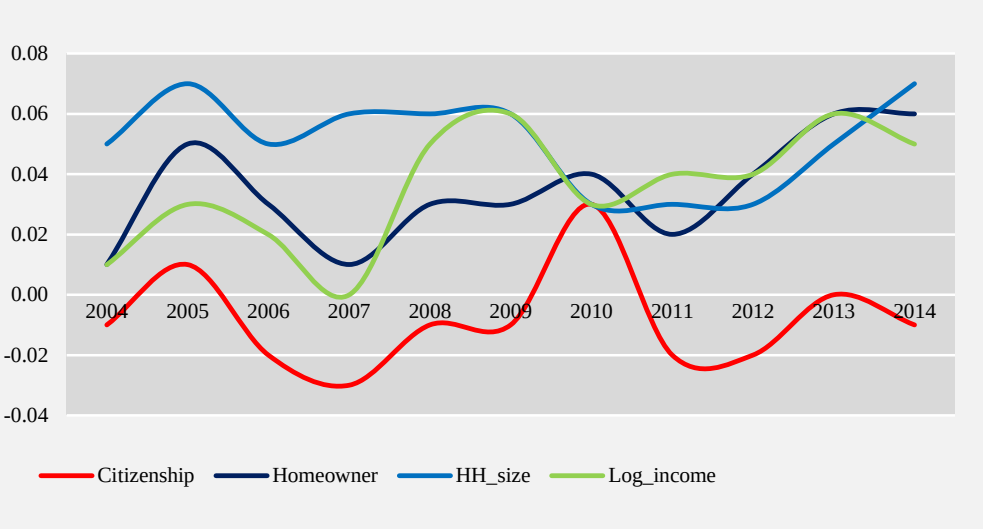
Figure 2. Response-, contact- and participation rate in the EU-SILC in Iceland



Notes: The indicators and significance levels are in Table 2 in Appendix 1.

Although the first glance reveals little of particular interest it might be worth taking a closer look and see if EU-SILC response behavior could be as unevenly distributed as the goods of the society during the period of 2004 to 2014. Icelandic registers offer a selection of variables which can be used for nonresponse analysis. Home ownership, household size, income and citizenship were selected for further analysis as they produced relationship with the tendency to respond and are relevant for the topics of the EU-SILC. Figures 3 and 4 show how the selected variables correlate with refusals and noncontacts.

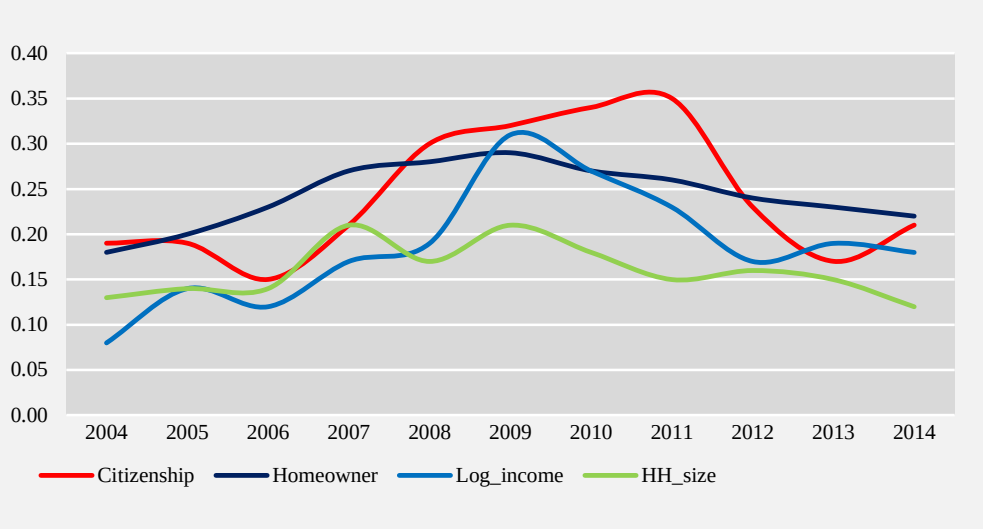
Figure 3. Correlation of citizenship, household size, home ownership and income with refusals



Notes: The indicators and significance levels are in Tables 3a and 3b in Appendix 1.

As can be seen from figure 3, the selected variables have a weak relationship with the tendency to refuse participation in the survey. Hence, bias is unlikely as result of refusals and cannot be related to the economic crash in Iceland. The income variable used in figure 3 is the log of equivalized disposable income. This income concept will be used for the remainder of the paper and will be referred to as income. The citizenship variable is binomial coded 1 for Icelandic citizen and 0 for foreign citizens. The household size variable groups households with four or more members into one category.

Figure 4. Correlation of citizenship, household size, home ownership and income with noncontacts

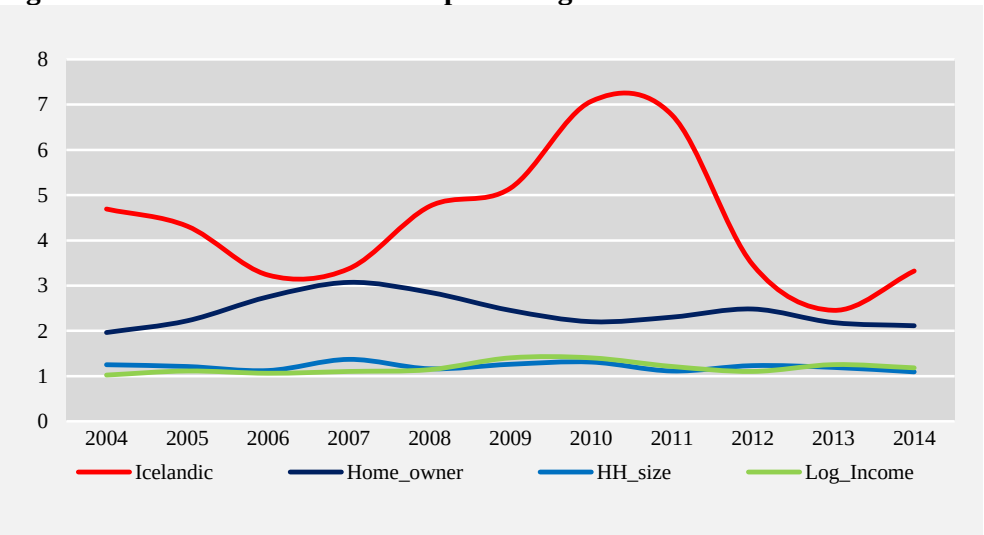


Notes: The indicators and significance levels are in Tables 4a and 4b in Appendix 1.

Citizenship, homeownership and income each show relationship with noncontacts that follows the economic trend before and after the economic crash in 2008. Most notably citizenship shows a strong relationship with noncontacts peaking with Pearson´s R correlation coefficient of 0.35 in the year 2011 but dropping after that.

The relationship between citizenship and tendency to respond is well known and might be worth looking further into in this context. The number of foreign citizens increased during the upswing and they can be hard to reach both because of language issues and limited social integration.

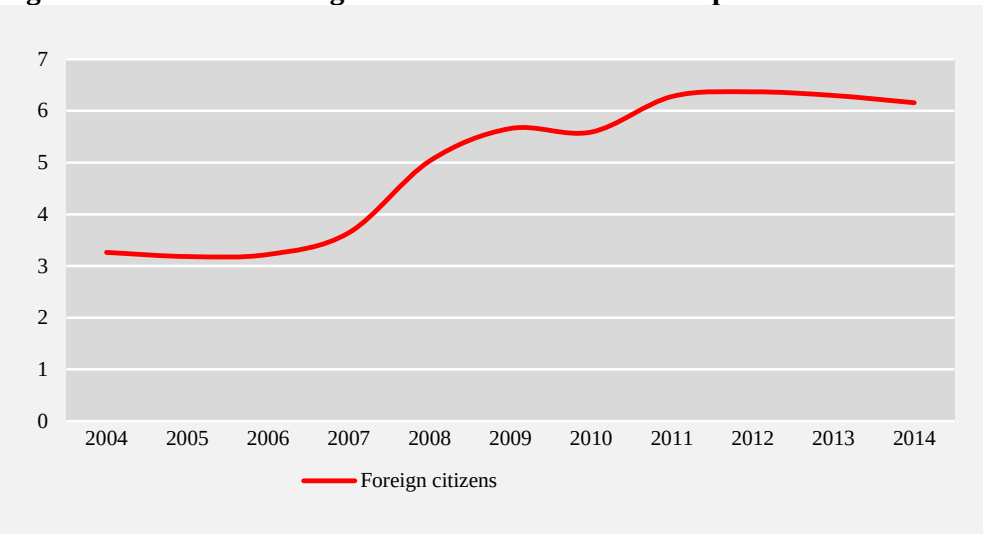
Figure 5. Odds ratio for variables predicting noncontacts



Notes: The indicators and significance levels are in Tables 5a and 5b in Appendix 1.

As can be seen from figure 5, citizenship has the highest odds ratio in a logistic regression model predicting noncontacts over time, using homeownership, household size and income as the other predictors. The odds ratio for citizenship peaked at 7.07 in 2010 showing that Icelandic citizens were more likely to be contacted in the survey than foreign citizens. The second highest odds ratio was for home owners who were more likely to be contacted in EU-SILC than tenants.

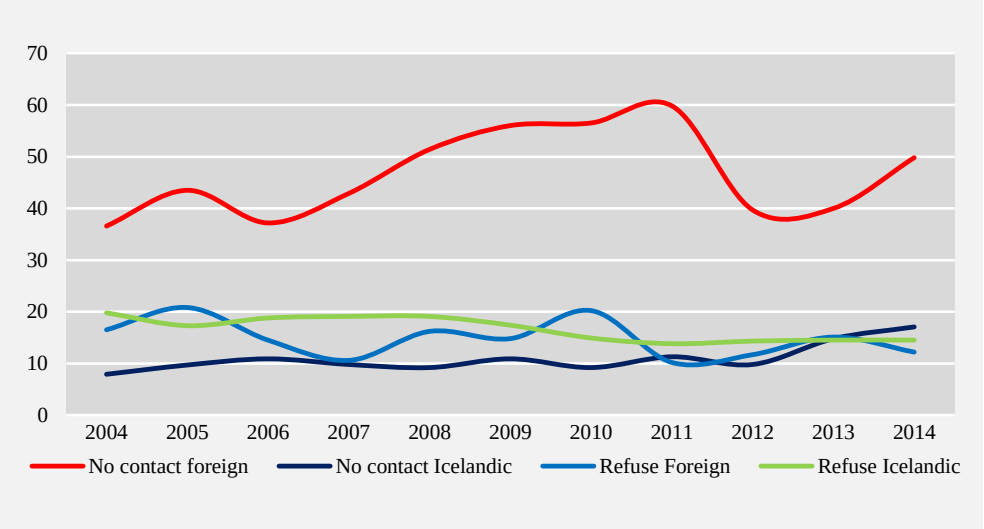
Figure 6. Percent of foreign citizen in the EU-SILC sample



Notes: The indicators and significance levels are in Table 6 in Appendix 1.

The proportion of foreign citizens in the EU-SILC sample kept increasing after the economic crash. The drop in correlation between the selected variables and noncontact after the economic crash can therefore not be explained by a lower percentage of foreigners in Iceland.

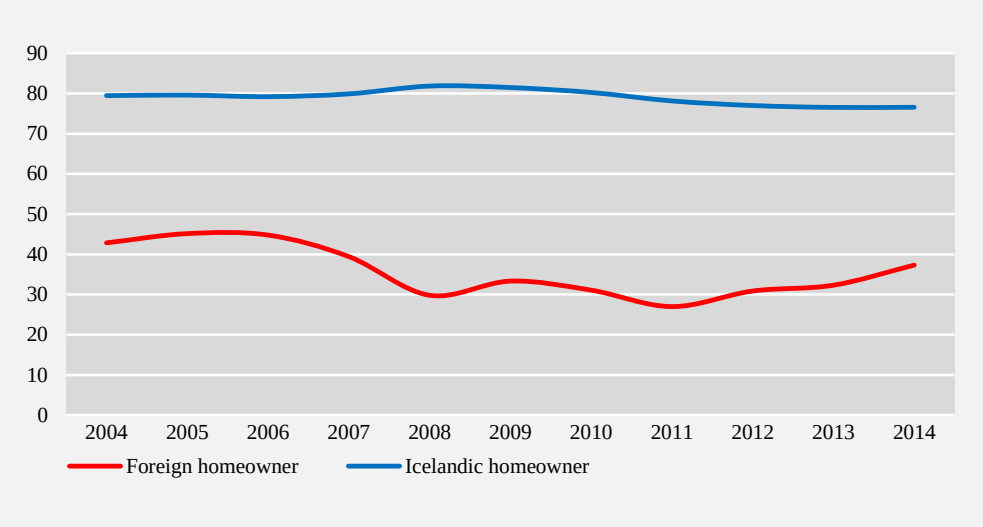
Figure 7. Refusals and noncontacts for foreign citizens and Icelanders



Notes: The indicators and significance levels are in Tables 7a and 7b in Appendix 1.

Figure 7 shows that refusals for both Icelanders and foreign citizens were rather stable between 2004 and 2014 as well as the contact rate for Icelanders. Contact rate for foreign citizens however follows the trend of the economic indicators. An explanation for this could be that the upswing brought a number of short time immigrants looking for work. After the crash the group of foreign citizens may have changed with the least integrated group of foreign citizens leaving or forming stronger social relationships so the foreign population in general may have become more integrated after the crash. As bias is not introduced only by nonresponse but there has to follow correlation to a variable of interest it might be useful look at comparison between the Icelandic and foreign citizens.

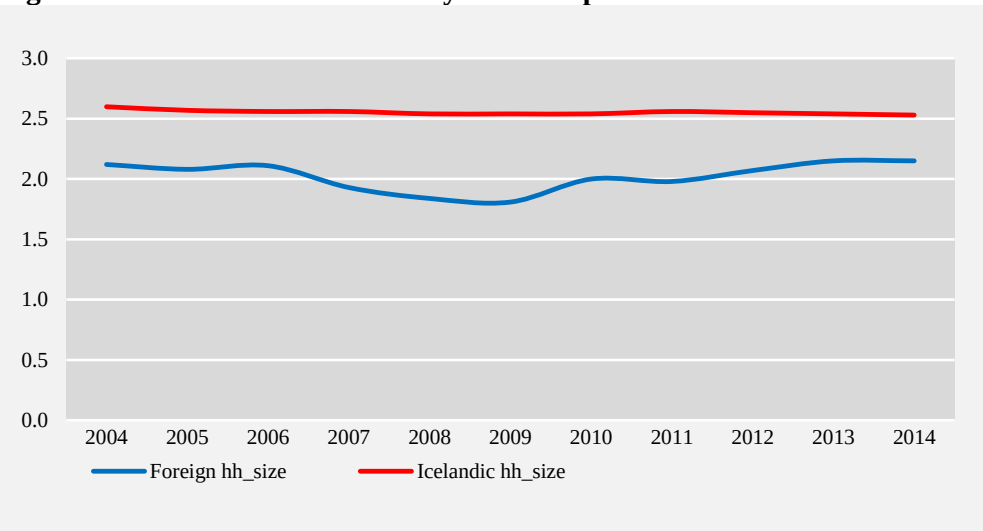
Figure 8a. Homeowners by citizenship



Notes: The indicators and significance levels are in Table 8a, 8b and 8c in Appendix 1.

From figure 8a it can be seen that homeownership for Icelanders has been rather stable in the period between 2004 and 2014 although a slight resemblance can be seen to other economic trends related to the crash. The trend in the foreign citizen population is more decisive with fewer home owners during the bubble years than before and after the bubble indicating that short term dwellers might have been a part of the foreign population during the bubble years.

Figure 8b. Household size income by citizenship

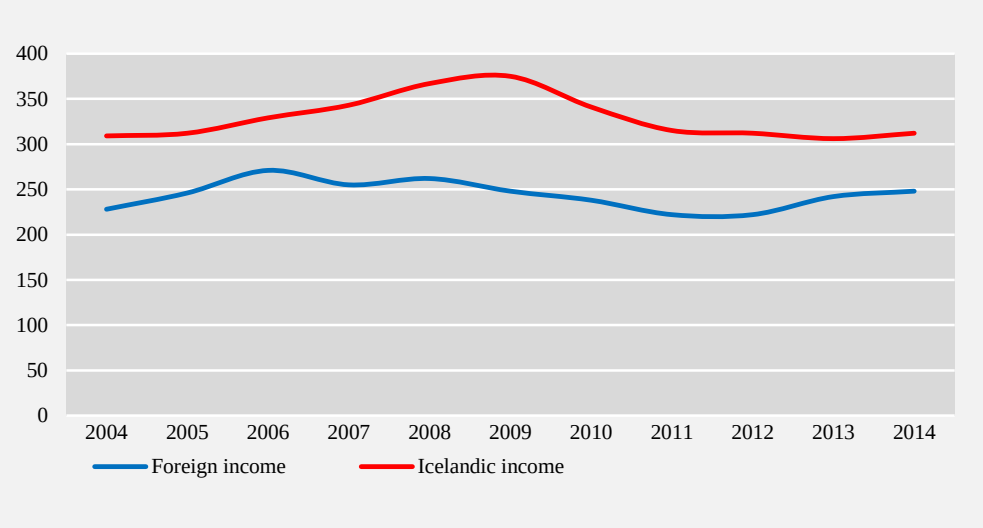


Notes: The indicators and significance levels are in Table 8a, 8b and 8c in Appendix 1.

This is supported by figure 8b which shows that while the household size of the Icelandic population remained stable the same is not the case for the foreign population. Again a trend can be seen that reflects the economy in general. Household size for foreign citizens decreased during the bubble years

and increased again after the collapse of the banks. Foreign citizens living in smaller households who could be less integrated in to society than the average foreign person might have either left or become more integrated into the society after the economic crash.

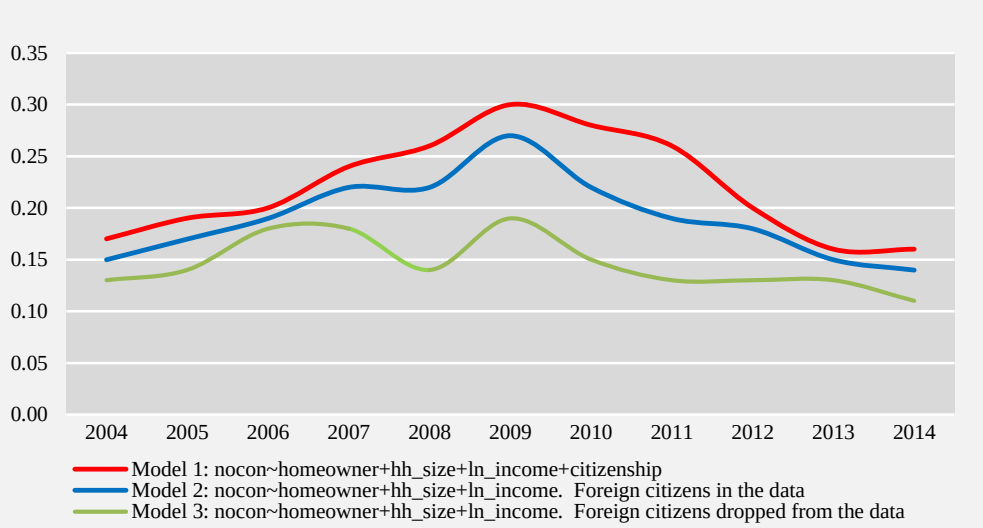
Figure 8c. Disposable income by citizenship



Notes: The indicators and significance levels are in Table 8a, 8b and 8c in Appendix 1.

Figure 8c shows that while income increased for Icelandic citizens in the "bubble" years the trend is not the same for foreign citizens. There is very little sign of the "bubble" when we look at the income of the population of foreign citizens in Iceland. Not only did response behavior of foreign citizens differ from the response behavior of Icelandic citizens but trend of their income, homeownership and household size was quite different from that of the Icelandic citizens.

Figure 9. Pseudo R-square for logistic regression models including and excluding foreign citizens



Notes: The indicators and significance levels are in Table 9 in Appendix 1.

Figure 10 shows trend lines for pseudo R-square from regression models predicting noncontacts in the EU-SILC survey. The first model predicts noncontacts using citizenship, home ownership, household size and log-income. The second model is the same as the first model except the citizenship variable is dropped. The third model is the same as the second model except that it drops all foreign citizens from the data set. It can be seen that when citizenship is included in the model the value of the pseudo R-square is the highest, particularly in the years 2010 and 2011. This indicates as shown with odds ratios in table 5 that foreign citizenship is an important variable in explaining noncontacts. This is not a surprise as language issues and less social integration are likely to have effect. However a comparison of models 2 and 3 shows that income, household size and home ownership become less powerful in explaining noncontacts when the foreign population is dropped from the data than when they are included. Further, the shape of the line without foreigners in the data looks much less like the general Icelandic economic trend lines such as household income, employment and others.

Conclusion

During the “bubble” years there was an increase in the population of foreign citizens in Iceland. Part of this increase was likely to have been migrants with low integration in the Icelandic society. There was also increase in income, particularly for people working in the financial section and elsewhere in the private sector but was felt generally in Iceland to less extent. It seems that the “bubble” and the economic crash affected foreign citizens and Icelandic citizens differently. As foreign citizens are harder to reach in the survey noncontact bias was the result. After the economic crash, bias due to immigrants in the EU-SILC survey decreased. The reason is not that the group of foreign citizens became smaller. Noncontact rate decreased for foreign citizens resulting in less nonresponse bias. The least integrated part of foreign citizens may have left while others became more integrated in the society and therefore more alike the Icelandic citizens. This could be reflected in their response behavior. Another part of the reason could be that the Icelandic citizens dropped in income and living standards and therefore became more like the foreign population. A model explaining noncontacts in the Icelandic EU-SILC using citizenship, income, household size and homeownership (model 1 in Figure 9) as predictors shows a trend line of pseudo R squares which resembles most of the economic indicators in Iceland for the period of 2004 through 2014 and could therefore be referred to as the Icelandic noncontact crash.

Appendix 1 Tables

Table 1a. Real disposable income for income quintiles in ISK 2013 year's prices, CPI

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
0–20%	163	170	173	188	200	199	177	163	162	166	179
40–60%	294	303	314	334	357	359	315	291	286	296	305
80–100%	550	594	646	740	767	839	640	539	541	557	556

Table 1b. Confidence intervals 95% for Table 1a

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
0–20%	4	4	6	4	4	4	4	5	5	4	4
40–60%	1	1	2	2	2	2	2	1	1	1	1
80–100%	22	34	33	42	42	51	23	22	18	19	17

Table 2. Response rate, contact rate and participation rate for EU-SILC in Iceland

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Resp. rate	74	75	73	74	73	73	76	75	77	73	71
Contact rate	93	91	90	91	90	88	90	87	90	86	83
Particip. rate	82	84	83	83	83	85	86	88	87	88	88

Table 3a. Correlation of selected variables with refusals

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Citizenship	-0.01	0.01	-0.02	-0.03	-0.01	-0.01	0.03	-0.02	-0.02	0	-0.01
HH size	0.05	0.07	0.05	0.06	0.06	0.06	0.03	0.03	0.03	0.05	0.07
Homeowner	0.01	0.05	0.03	0.01	0.03	0.03	0.04	0.02	0.04	0.06	0.06
Log Income	0.01	0.03	0.02	0	0.05	0.06	0.03	0.04	0.04	0.06	0.05

Table 3b. Significance values for the correlation coefficients in Table 3a

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Citizenship	0.45	0.42	0.31	0.05	0.46	0.49	0.13	0.28	0.36	0.83	0.46
HH size	0	0	0.01	0	0	0	0.06	0.07	0.09	0	0
Homeowner	0.68	0	0.04	0.39	0.08	0.12	0.04	0.17	0.02	0	0
Log Income	0.54	0.09	0.3	0.86	0	0	0.13	0.03	0.01	0	0

Table 4a. Correlation of selected variables with noncontacts

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Citizenship	0.19	0.19	0.15	0.21	0.3	0.32	0.34	0.35	0.23	0.17	0.21
HH size	0.13	0.14	0.14	0.21	0.17	0.21	0.18	0.15	0.16	0.15	0.12
Homeowner	0.18	0.2	0.23	0.27	0.28	0.29	0.27	0.26	0.24	0.23	0.22
Log Income	0.08	0.14	0.12	0.17	0.19	0.31	0.27	0.23	0.17	0.19	0.18

Table 4b. Significance values for the correlation coefficients in Table 4a

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Citizenship	0	0	0	0	0	0	0	0	0	0	0
HH size	0	0	0	0	0	0	0	0	0	0	0
Homeowner	0	0	0	0	0	0	0	0	0	0	0
Log Income	0	0	0	0	0	0	0	0	0	0	0

Table 5a. Odds ratio for variables predicting noncontacts

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Citizenship	4.69	4.31	3.23	3.37	4.75	5.15	7.07	6.77	3.46	2.45	3.32
HH size	1.96	2.22	2.75	3.07	2.85	2.45	2.2	2.3	2.48	2.18	2.11
Homeowner	1.25	1.21	1.12	1.37	1.16	1.26	1.31	1.11	1.23	1.19	1.09
Log Income	1.02	1.11	1.06	1.1	1.14	1.4	1.4	1.21	1.1	1.25	1.18

Table 5b. 2.5% to 97.5% intervals for the odds ratios in Table 5a

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Citizenship	3.0-7.3	2.7-6.7	2.0-5.0	2.2-5.1	3.3-6.8	3.6-7.3	5.0-10.0	5.0-9.2	2.5-4.8	1.8-3.3	2.5-4.4
HH size	1.4-2.7	1.7-2.9	2.1-3.6	2.3-4.0	2.1-3.8	1.9-3.2	1.7-2.9	1.8-2.9	1.9-3.2	1.8-2.7	1.7-2.6
Homeowner	1.1-1.4	1.1-1.4	1.0-1.3	1.2-1.5	1.0-1.3	1.1-1.4	1.2-1.5	1.0-1.2	1.1-1.4	1.1-1.3	1.0-1.2
Log Income	0.9-1.1	1.0-1.2	1.0-1.2	1.0-1.2	1.1-1.3	1.3-1.6	1.2-1.6	1.1-1.3	1.0-1.2	1.1-1.4	1.1-1.3

Table 6. Proportion of foreign citizens in the EU-SILC sample

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Foreign citizens	3.3	3.2	3.2	3.6	5.0	5.7	5.6	6.3	6.4	6.3	6.2
CI 95%	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.7	0.7

Table 7a. Refusals and noncontacts for foreign citizens and Icelanders

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Nonco. foreign	36.6	43.5	37.2	42.9	51.4	56.0	56.5	59.8	39.7	40.0	49.8
Nonco. Icelan..	7.9	9.7	10.9	9.8	9.2	10.9	9.2	11.3	9.8	14.8	17.1
Refuse foreign	16.5	20.8	14.5	10.6	16.2	14.8	20.2	10.2	11.7	15.1	12.2
Refuse Icelan.	19.8	17.3	18.8	19.1	19.1	17.4	14.9	13.8	14.3	14.5	14.5

Table 7b. Confidence intervals for Table 7a

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Nonco. foreign	8.9	9.4	8.9	8.4	7.3	6.7	6.9	6.2	6.2	6.3	6.3
Nonco. Icelan..	1.0	1.0	1.1	1.0	1	1.1	1.0	1.1	1.0	1.2	1.3
Refuse foreign	7.9	9.1	7.6	6.5	7.0	6.7	7.5	5.7	5.0	5.4	5.4
Refuse Icelan.	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2

Table 8. Income, home ownership and household size by citizenship

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Foreign owner	42,9	45,2	44,8	39,4	29,8	33,3	31,1	27	30,9	32,3	37,3
Icelandic owner	79,5	79,6	79,2	79,9	81,9	81,5	80,3	78,2	77	76,5	76,6
Foreign hh_size	2,1	2,1	2,1	1,9	1,8	1,8	2	2	2,1	2,1	2,2
Icelan. hh_size	2,6	2,6	2,6	2,6	2,5	2,5	2,5	2,6	2,5	2,5	2,5
Foreign income	228	246	271	255	262	248	238	222	222	242	248
Icelan. income	309	312	329	343	367	375	341	315	312	306	312

Table 8. Confidence intervals for table 8

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Foreign owner	4,4	4,5	4,4	4,1	3,3	3,1	3,1	2,8	2,9	2,9	3
Icelandic owner	0,7	0,7	0,7	0,7	0,6	0,6	0,7	0,7	0,7	0,7	0,7
Foreign hh_size	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Icelan. hh_size	0	0	0	0	0	0	0	0	0	0	0
Foreign income	18	26	26	24	27	18	10	12	11	11	21
Icelan. income	5	5	6	7	7	7	8	6	6	5	7

Table 9. Pseudo R^2 for different models and datasets predicting noncontact

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Model 1	0.17	0.19	0.2	0.24	0.26	0.3	0.28	0.26	0.2	0.16	0.16
Model 2	0.15	0.17	0.19	0.22	0.22	0.27	0.22	0.19	0.18	0.15	0.14
Model 3	0.13	0.14	0.18	0.18	0.14	0.19	0.15	0.13	0.13	0.13	0.11

Notes:
Model 1: Noncontact ~ citizenship+home_ownership+hh_size+log_income. Using the whole data set.
Model 2: Noncontact~ home_ownership+hh_size+log_income. Using the whole data set.
Model 2: Noncontact~ home_ownership+hh_size+log_income. Dropping foreign citizens from the data set.