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June 2012

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Households' position in the financial crisis in Iceland

Analysis based on a nationwide household-level database

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June 2012

Abstract

We utilise a unique nationwide household-level database to analyse how households' financial position evolved in the run-up to and aftermath of the financial crisis in Iceland. The main focus of our analysis is to assess how the share of indebted households in financial distress evolved and how it was affected by debt restructuring measures and court decisions. We also analyse the share of indebted homeowners in negative housing equity and those in the highly vulnerable situation of being in distress and negative housing equity simultaneously. The analysis suggests that the share of indebted households in distress grew from 12½ per cent in early 2007 to 23½ per cent on the eve of the banking collapse in the autumn of 2008, when the lion's share of the balance sheet shocks had already taken place. The extent of acute distress nearly quadrupled over the same period. Forbearance efforts provided temporary breathing space, but the share in distress is estimated to have peaked at 27½ per cent in autumn 2009, before declining to 20 per cent at year-end 2010 due to policy and legal interventions. Financial distress is found to be inversely related to income and age, as well as being higher among families with children and those with foreign-denominated debt than among childless couples and those with ISK-denominated loans only. Parents of every fifth child in Iceland were in distress at year-end 2010. The incidence of negative housing equity increased dramatically, from roughly 6 to 37 per cent of indebted homeowners, over the four-year period. Negative housing equity is more widespread among high-income than low-income households. The share of homeowners simultaneously in distress and negative equity rose from roughly 1 to 14 per cent but declined to 10 per cent by the end of the period. Middle-income families with children, most of which had foreign-denominated loans, and low-income singles seem especially vulnerable. Some of the seeds of households' financial difficulties were sown by imprudent lending in 2007 and 2008, when 16 per cent of the total amount of new loans was granted to households already in distress. Up to 34 per cent of households in distress at year-end 2010 were granted loans in 2007-2008, when they were already financially distressed.

JEL Classification: D10, D12, D31, G21

Keywords: household debt, financial distress, financial crisis, microdata, debt restructuring, deleveraging

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1. Introduction

> *"In spite of all Gudbjartur Jonsson's faith, it had come to this, that the merchant no longer existed. Finished, gone up in smoke, the shop empty, the account-books lost, the Tower House sold for the benefit of the creditors. In such a fashion, one fine day, were the foundations upon which the crofter had built his life swept aside; those almighty giants of commerce who stood with one foot in Iceland and the other on the continent itself – one fine day saw them wiped away like so much spit."*
>
> Laxness, H. (1934-35), *Independent People*, p. 389.

This paper aims to portray how the state of Icelandic households' finances evolved in the run-up to and aftermath of the financial crisis in Iceland. Our analysis builds on a unique nationwide household-level database designed and compiled by the Central Bank of Iceland. It combines a comprehensive loan-level dataset including detailed information on each individual loan for nearly all indebted households in Iceland with a household-level dataset covering information on income levels and various demographic characteristics for each individual household; e.g., family type, age, and place of residence. Hence our database contains detailed information on each individual loan and household for an entire country's population of indebted households at a time of unexpected adverse shocks in the form of a banking system collapse and a currency crisis of exceptional magnitude.

Our analysis of households' position centres on six issues. First, we assess the share of indebted households in financial distress, which are defined as having a negative financial margin; that is their disposable income is insufficient to cover both debt service and necessary minimum living expenses. We focus on the extent and evolution of financial distress from January 2007 to December 2010, although we also take into account measures that were actually implemented later on. Second, we analyse the development in homeowners' housing equity over the four-year period, with particular focus on the incidence of negative housing equity; i.e., where the outstanding mortgage balance exceeds the value of the underlying property. Third, we analyse the size of the highly vulnerable group of households simultaneously in distress and negative housing equity, as well as how it has evolved and been affected by the shocks sustained by households and the measures introduced in the aftermath of the crisis. Fourth, we shed light on the main characteristics of vulnerable households in order to support policy-making in this field. Fifth, we analyse the effects of debt restructuring measures, as well as court judgements declaring widely used exchange rate-linked loans illegal and in need of recalculation.[1] Finally, we analyse to what extent imprudent lending in 2007-2008 contributed to exacerbating households' difficulties. Throughout, we provide a breakdown of results for various groups based on factors such as income, currency-denomination of debt, family type, age, and place of residence.

The main strength of our approach lies in the construction of various profiles, which enables us to capture the crisis dynamics and provide an assessment of our specified topics of interest. First, we utilise our detailed database to construct payment profiles for each of the

[1] From the outset, the aim of this extensive data compilation was to analyse the financial position of households, in addition to supplying policymakers with relevant information for the design of debt restructuring measures. Preliminary findings were released over the course of 2009 and 2010 in presentation form (see, for instance, Vignisdóttir and Ólafsson, 2009, 2010).

roughly 424 thousand individual loans which allows us to combine debt payments and outstanding balances for each household so as to assess how their debt service burden and debt level develop over time. We can compare the evolution of financial distress with and without various debt restructuring measures and legal interventions by constructing both payment profiles with these measures and a counterfactual scenario without them. Second, we use individual income data and information on family type to assess each household's disposable income and necessary minimum living costs, which enables us to evaluate each household's capacity to withstand the rise in debt service and living expenses resulting from the currency depreciation and the associated rise in inflation. Third, we construct a housing wealth profile for each homeowner based on the official Land Registry value and the evolution of house prices in the various districts around the country. This, alongside the payment profiles, allows us to assess developments in housing equity.

Icelandic households were among the hardest hit by the global financial crisis, as is reflected in one of the largest contractions in private consumption experienced in any medium- to high-income country. This is not surprising, given that Icelandic households were among the most indebted household sectors in the run-up to the crisis and were the only households with widespread borrowing in foreign currency to experience a currency crisis on top of a banking system collapse leading to a dramatic increase in debt levels and debt service (Ólafsson and Pétursson, 2011). Nominal debt levels rose even further, as the majority of mortgages in Iceland are indexed to consumer price inflation, which rose steeply due to the massive depreciation of the currency. The Icelandic government had limited fiscal space to counteract the effects of the crisis through increased fiscal expenditures, public investment, or tax cuts despite having a strong pre-crisis fiscal position. On the contrary, starting in mid-2009 the government introduced strict austerity measures to ensure public debt sustainability. The scope for monetary policy to soften the contraction was limited in the early stages of the crisis because of the overriding goal of stabilising the currency while domestic balance sheets were restructured and rebuilt. However, the banking restructuring strategy chosen enabled the three resurrected banks, which broadly reflected the domestic operations of the collapsed banks, to withstand considerable write-offs due to deep discounts on the transferred assets.

The analysis suggests that the share of households in financial distress grew rapidly in the prelude to the banking collapse as debt accumulation continued and especially as the domestic currency depreciated and inflation rose. Approximately 12½ per cent of indebted households are estimated to have been in distress in January 2007, as opposed to roughly 23½ per cent on the eve of the banking collapse in October 2008, an increase of close to 100 per cent. The extent of acute distress nearly quadrupled over the same period. Forbearance efforts, debt restructuring measures introduced in the crisis, and court decisions on exchange rate-linked loans reduced the share of households in distress to 20 per cent by year-end 2010 after it peaked at 27½ per cent in the autumn of 2009. Distress is found to be inversely related to income and age, as well as being higher among families with children and those with foreign-denominated debt than among childless couples and those with ISK-denominated loans only. Parents of every fifth child in Iceland were in distress at year-end 2010.

The share of indebted homeowners in negative housing equity rose sharply in the prelude to and aftermath of the crisis, as house prices plunged and mortgage debt levels soared due to the currency depreciation and the accompanying surge in inflation. The share of homeowners in negative housing equity was roughly 6 per cent in January 2007, rose to almost 22 per cent at the time of the banking sector collapse in October 2008, and escalated even further in the aftermath. It seems to have peaked at almost 39 per cent before court decisions and new legislation on foreign-denominated loans reduced it slightly to 37 per cent. As of December 2010, one homeowner out of ten was exceptionally vulnerable – that is, simultaneously in financial distress and negative housing equity, down from the peak of 14 per cent in late 2009. Middle-income families with children, many of which have foreign-denominated loans, and low-income singles seem especially vulnerable.

Our findings show that household deleveraging has progressed more rapidly in Iceland than in many previous crises and that debt relief measures and the recalculation of illegal exchange rate-linked loans have allowed thousands of households to escape from distress. However, we are more critical of measures introduced at year-end 2010, mainly the so-called 110 per cent option and the special interest rebate. Furthermore, we advise against across-the-board write-offs. We assess the effects of a hypothetical 20 per cent reduction of the principal of indexed mortgages and find that roughly 75 per cent of the write-offs would be granted to households not in distress. Two-thirds of distressed households would not escape distress despite the implementation of such an extensive measure.

We emphasise the cost of the second wave of the credit boom in 2007-2008, where foreign-denominated loans were increasingly granted to low- and middle-income households, many of which were already in distress at the time of loan issuance. Roughly 16 per cent of the total amount of new mortgage and motor vehicle loans in this period was granted to households already in distress. Furthermore, up to 34 per cent of distressed households at year-end 2010 were granted loans in 2007-2008 when they were already distressed.

The remainder of the paper is organised as follows: Section 2 discusses briefly the important role of household debt in the global crisis and portrays how the balance sheet of Icelandic households, although sharing many characteristics with households in other advanced economies, also differ in important ways. Section 3 presents the data, describes our construction of payment, income, cost of living, and housing wealth profiles, and presents specific issues and groups of interest. Our empirical results on the evolution of financial distress and negative housing equity are presented in Section 4. We also provide an assessment of measures not included in our baseline scenario, mainly because they were introduced after our four-year period ended. Finally, we offer some international comparison and robustness analysis. We interpret the main economic and policy findings in Section 5, where we focus on the main determinants of households' financial difficulties, the characteristics of vulnerable households, the build-up of balance sheet weaknesses in the prelude to the banking collapse, and the policy implications of our findings. Section 6 contains the conclusion. A more detailed description of the data and our construction of profiles are found in Appendix 1. A survey of the related literature is provided in Appendix 2 and a breakdown of our results by place of residence in Appendix 3. Further information on the total number of households and the income and housing wealth data are found in Appendix 4 and a comparison with aggregate evidence in Appendix 5.

2. The household sector and the financial crisis

> *"This was a new phase in the crofter's eternal struggle for independence, this fight against the normal economic conditions which must of necessity return when the abnormal prosperity […] has passed away; when the unnatural optimism which has betrayed the hut-dwelling peasant into an act of folly so imbecile as to propose living in a house, has evaporated and left not a trace behind. He returned to his senses, now that the boom years were over, to find himself stuck in the bog which, with infinite labour, he had managed to avoid in the hard years; the free man of the famine years had become the interest-slave of the boom years."*
>
> Laxness, H. (1934-35), *Independent People*, p. 505-506.

Household debt played a pivotal role in the global financial crisis. This stands in contrast to many previous crises, where corporate or public sector borrowings were the source for widespread loss of confidence.[2] Cecchetti *et al*. (2011) document that real household debt tripled between 1995 and 2010, far exceeding the debt accumulation in other sectors of the economy. Rising household debt had raised some concerns before the outbreak of the crisis (see Figure 2.1a), its sustainability had been questioned and the possible effects on the financial system and macroeconomic activity were discussed (see, e.g., Debelle, 2004 and Girouard *et al.*, 2006). For instance, it was clear that some households were taking considerable risk by accumulating debt at low initial "teaser" interest rates or even in foreign currency, and it was well known that creditors were expanding their lending activities to low-income and previously credit-constrained groups and distributing risk across the financial system through securitisation. But subprime lending was limited in size, securitisation was seen as channelling risk to those most capable of shouldering it, and the sustainability of the benevolent circumstances of rising house prices, low inflation, stable exchange rates, and low interest rates was overestimated. Analyses using some form of household level data commonly supported this optimistic view, as they showed that most of the debt was held by high-income households with low debt service burdens who were likely to be able to withstand adverse shocks to interest rates and house prices (see, e.g., Girouard *et al.*, 2006, and Johansson and Persson, 2006). Hence the risk associated with rising household indebtedness for the highly leveraged financial sector and the real economy as a whole was underestimated, and the crisis dynamics took many policymakers by surprise.

When the housing bubble burst, mortgage delinquencies began to increase more rapidly in the United States, especially in the non-prime part of the mortgage market. The problems in the subprime market became increasingly visible in the first half of 2007, and confidence in various asset-backed securities deteriorated. This resulted in a run on wholesale funding markets, which undermined the capacity of financial institutions across the globe to manage their balance sheets. Financial system solvency was threatened in a number of countries, and within a month after the failure of Lehman Brothers, the Icelandic banking system collapsed. Hence, what seemed initially to be an increased incidence of arrears in a small subsection of the vast US mortgage market metamorphosed into the worst global financial crisis since the Great Depression and played an important part in triggering a

[2] The most notable case of household borrowing playing a key role in earlier crises is in the Nordic banking crises in the 1990s (see e.g. Norges Bank, 2004, Drees and Pazarbaşioğlu, 1998, Honkapohja 2009).

banking and currency crisis of exceptional magnitude in Iceland. Unprecedented policy measures stabilised the global situation temporarily, but as of this writing, the recovery remains fragile in most advanced economies and significant challenges remain: managing the European debt crisis, avoiding a double-dip recession, and ensuring global financial stability. Social unrest is mounting, which represents another phase of the crisis that Iceland experienced early on, as vociferous protests in January 2009 caused the government to resign and demand elections. Protests and episodes of social unrest have been a recurring theme in post-crisis Iceland, often related to discontent with households' financial position.

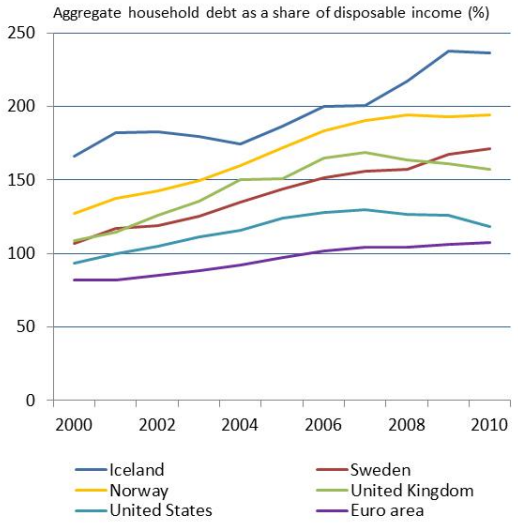
Households in advanced countries have felt the impact of the crisis, most notably through increased unemployment and loss of wealth, which has prompted them to increase savings by cutting back on spending and paying down debt. The macroeconomic effects of changed household behaviour have been widely felt. Some countries have experienced particularly large and sharp contractions in private consumption and overall economic activity (Figures 2.1b-d). This change in consumer behaviour could prove lasting, as households have begun a protracted process of deleveraging to repair their balance sheets. Various debt restructuring and forbearance measures have been introduced by governments in advanced countries in order to assist distressed households, but with mixed results. Steep declines in house prices have left many homeowners with mortgage debt in excess of their property value, so that they have negative housing equity. When this coincides with payment difficulties, the risk of bankruptcies increases substantially.

Icelandic households share many characteristics with households in other advanced countries, both before and after the crisis. In the years leading up to the crisis, the pace and main drivers of household debt accumulation were similar to those in other countries, and when the global crisis struck, Icelandic households were among the most indebted in the world. Like households in many other countries, they took advantage of easy credit – increasingly so as the wave of optimism and asset price increases intensified. The high degree of indebtedness was nevertheless more widespread across sectors in Iceland than it was elsewhere, as abundant global liquidity went hand-in-hand with domestic financial liberalisation and large (mostly government-induced) demand shocks. This proved a dangerous cocktail, spawning credit and asset price bubbles of exceptional magnitude, in addition to allowing the lightly regulated and newly privatised banks to expand with unprecedented speed until, shortly before their collapse, their balance sheets amounted to approximately ten times Iceland's gross domestic product. The government, through the state-owned Housing Financing Fund, played its part in starting the mortgage boom by raising the maximum loan-to-value ratio to 90 per cent and raising the maximum nominal loan amount in the initial phase of the upswing. Soon after, the commercial banks started to offer long-term residential mortgages up to 100 per cent of market value without any nominal limits. Mortgage equity withdrawals also became available for the first time. As predicted, the result was an enormous housing and consumption boom.[3]

[3] See, for instance, Central Bank of Iceland (2004) and Elíasson and Pétursson (2009), which was published in working paper form in February 2006. Gudmundsson (2005) discusses the risks associated with higher loan-to-value ratios.

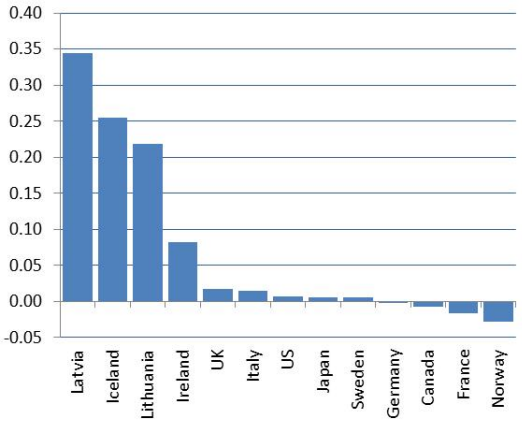
Figure 2.1: Common features for households in many advanced economies in the global crisis

Figure 2.1a
Household indebtedness 2000-2010



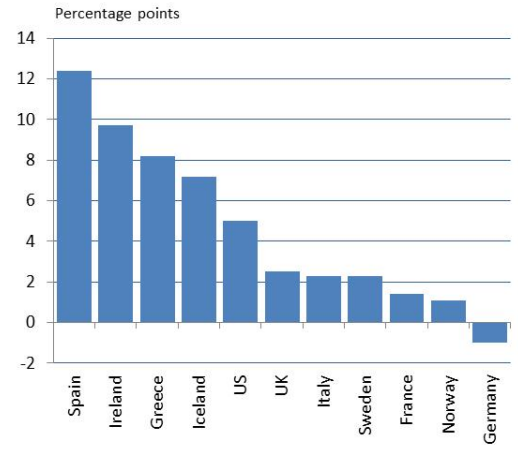
Sources: IMF, Norges Bank, Sveriges Riksbank, Central Bank of Iceland.

Figure 2.1b
Consumption losses in the global crisis



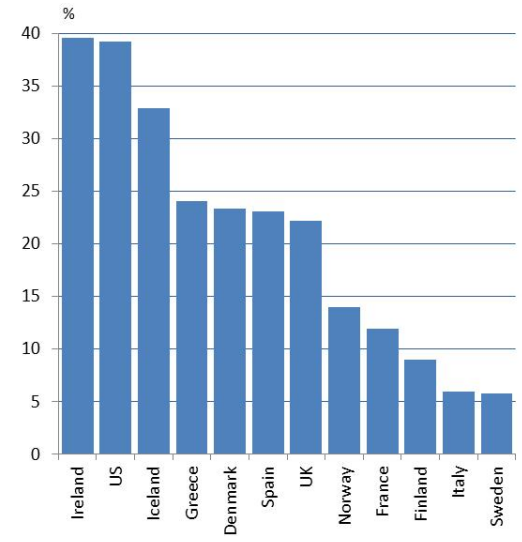
1. Log difference of seasonally adjusted private consumption level from peak in 2007Q1-2008Q4 to 2009Q4.
Source: Ólafsson and Pétursson (2011).

Figure 2.1c
Increase in unemployment in the global crisis



1. Change in percentage points in unemployment from 2007 to peak in the crisis.
Source: IMF.

Figure 2.1d
Housing busts



1. Change in real house prices from peak prior to crisis to trough in the aftermath.
Source: Macrobond.

Despite the parallels with other countries as regards rising household debt, a housing boom, and strong consumption growth, Iceland exhibits some unique characteristics that must be taken into account in any examination of the household sector. First are the large and widespread assets in housing and pension fund savings, making the overall equity position (net wealth) of Icelandic households stronger than what could be expected from its high debt levels. At the end of 2007, when property and stock market prices were close to their peak, gross household assets amounted to nearly 800 per cent of disposable income and household equity approximately 550 per cent of disposable income (Central Bank of Iceland, 2008). Iceland's pension fund assets relative to GDP, which measured 118 per cent of GDP in 2009, are the second-largest in the OECD (Figure 2.2a). Households' access to their pension fund assets tends to be limited; however, as is discussed below, Icelandic households were allowed to withdraw considerable amounts of third-pillar pension fund savings in the aftermath of the crisis. The absence of an organised rental market, together with clear political aims of widespread home ownership and easy access to credit, pushed many low-income families into the mortgage market. Approximately 80 per cent of housing is owner-occupied in Iceland, compared to roughly 54 per cent in Denmark and 66 per cent in Sweden (Figure 2.2b). The strong equity position in the run-up to the crisis nevertheless proved to be a double-edged sword, as any worries over rising debt levels were often disregarded in light of the strong equity position.

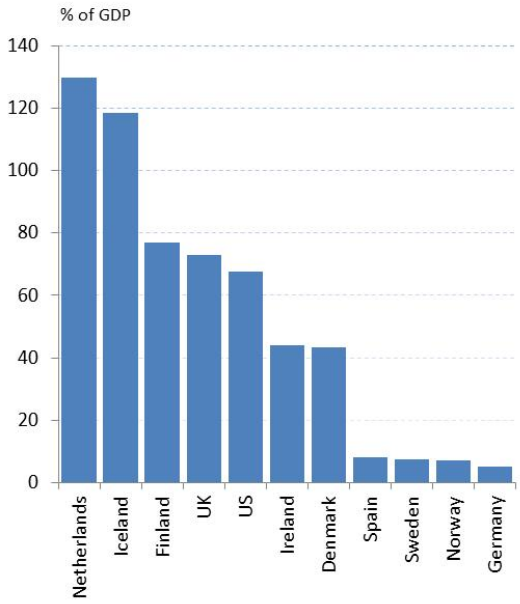
Another salient (and more problematic) feature distinguishing Icelandic households from those in many other advanced countries is the composition of their liabilities. The majority of mortgages are indexed to consumer price inflation with fixed real interest rates, so that households are insulated from fluctuations in nominal interest rates to a large extent but are instead exposed to increases in nominal debt levels when inflation rises. The rise in debt service following sharp inflation increases is less pronounced, as the effects are spread over the remaining maturity of the loan. Indexation to foreign currencies and direct foreign-denominated borrowing increased rapidly in the years leading up to the financial crisis, especially from early 2007, exposing those households' debt levels and debt service to fluctuations in the exchange rate. Consequently, households' currency risk increased rapidly, a feature encouraged by some of the banks themselves, whose implicit credit risk rose accordingly. This composition of debt proved extremely unfortunate, as Iceland experienced the largest currency depreciation of any advanced economy during the crisis[4] (see Figure 2.2c) and was the only country apart from Korea to experience a currency crisis (Ólafsson and Pétursson, 2011). These features played a key role in the erosion of Icelandic household balance sheets.[5]

[4] The depreciation of the Icelandic króna from peak (January 2007 – September 2008) to trough (October 2008 – August 2010) is 53 per cent using BIS effective nominal exchange rate indices. However, using our constructed *household debt exchange rate index*, where currencies are weighted according to their share in households' foreign-denominated loans, the depreciation is even greater, or 60 per cent.

[5] We use the terms *foreign-denominated*, *exchange rate-linked* and *foreign currency-linked loans* interchangeably in this paper to describe household loans that are linked in some direct way to fluctuations in foreign currencies. Following Supreme Court rulings in 2010 and subsequent legislation, it became clear that the majority, if not all, of these loans were illegal, and we recalculate all these loans as explained in Section 3.4.2 and in more detail in Table A.6 in Appendix 1.

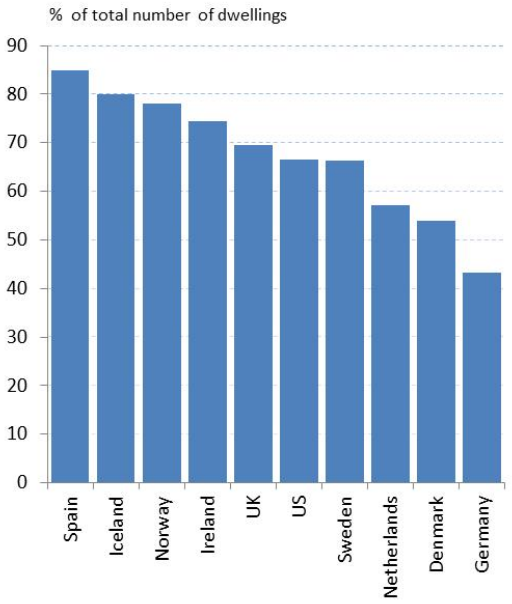
Figure 2.2: Composition of the Icelandic household sector's balance sheet in international comparison

Figure 2.2a
Pension fund assets[1]



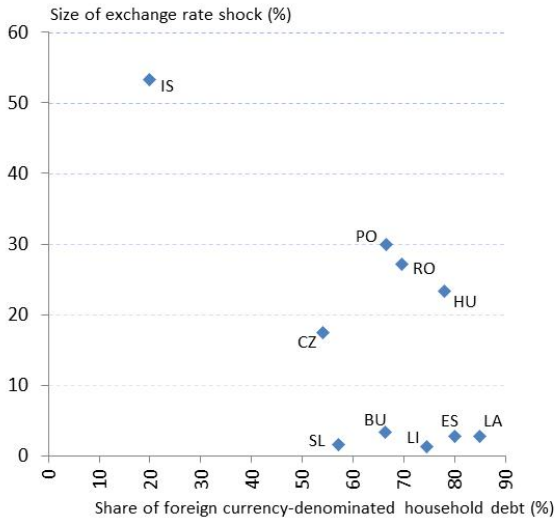
1. Figures for 2009, in some cases 2008.
Source: OECD.

Figure 2.2b
Homeownership rate[1]



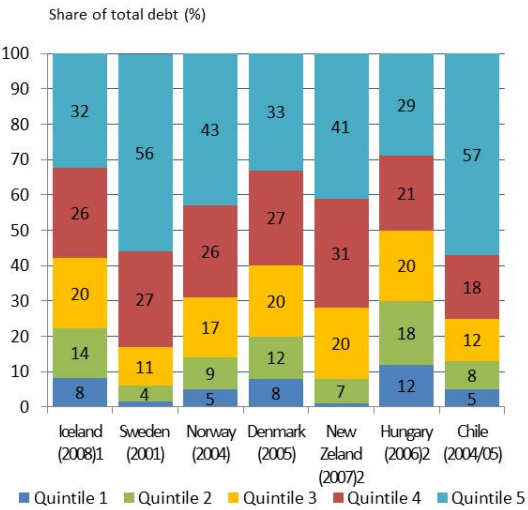
1. Latest available year: US, 2010; Denmark, Iceland, Ireland, and Greece, 2009; Finland, the Netherlands, Spain, and Sweden, 2008; United Kingdom 2007; Norway, 2003.
Sources: Debelle (2004), IMF, Statistics Iceland.

Figure 2.2c
Share of foreign-denominated debt and size of exchange rate shock[1]



1. Share of household debt denominated in foreign currency in 2008 and the maximum size of annual nominal exchange rate depreciation from peak in January 2007-September 2008 to October 2008-August 2010 according to BIS effective nominal exchange rate indices. IS: Iceland, PO: Poland, RO: Romania, HU: Hungary, CZ: Czech Republic, SL: Slovakia, BU: Bulgaria, LI: Lithuania, ES: Estonia, LA: Latvia.
Sources: Magyar Nemzeti Bank, BIS, Central Bank of Iceland.

Figure 2.2d
Distribution of household debt across income quintiles



1. Share of mortgage debt, car loans and short-term debt. 2. Share of mortgage debt.
Sources: Sveriges Riksbank (2004), Danmarks Nationalbank (2007), Cox et al. (2006), Vatne (2006), Magyar Nemzeti Bank (2007), Central Bank of Iceland Household Sector Database.

A third important feature of the household sector in Iceland is the distribution of debt. It is well known that distribution of debt matters. Two countries' vulnerabilities can be very different despite their having the same aggregate household debt level if the share of total debt held by households with a heavy debt service burden differs greatly between the two. Low-income households tend to have a high debt service burden, and the distribution of debt across income quintiles can therefore provide evidence of potential vulnerabilities. In Iceland, the two lowest-income quintiles hold roughly 22 per cent of household debt, compared to 6 and 14 per cent, respectively, in Sweden and Norway. Hungary stands out as having both a larger share of total debt held by the lowest income quintiles and a larger share of foreign-denominated debt, but to date the exchange rate shock has been less pronounced (Figure 2.2c-d).

3. The data, construction of profiles, and issues of interest

This section describes the data analysed in this paper. Furthermore, it introduces the profiles constructed for payments for each individual loan, income and living expenses for each household, and housing wealth profiles for each homeowner. Finally, we introduce our areas of interest, the reference group used in our analysis, and discuss different groups of households that are of special interest to us.

3.1 The data

Traditionally, shortfalls of household-level data limit analysis of households' financial position to aggregate data, surveys, or small samples of micro data. This can be a drawback. Aggregate data measures contain income and assets from debt-free households, and they provide limited information on the distribution of debt – across income groups, for instance – and the size of debt held by households in distress. Hence aggregate data can understate the degree of indebtedness and the vulnerability of debtors. Survey data is usually the main source of household sector analyses, but they allow limited guidance on the effects of debt restructuring measures, and results are associated with sampling uncertainty, interpretations difficulties, and delay.

The Central Bank of Iceland began preparations for extensive data gathering on households shortly after the collapse of the banking system in late 2008. Over the course of 2009, a small working group within the Central Bank designed a data request and subsequently collected detailed data on individuals and households from commercial banks, savings banks, asset financing companies, the Housing Financing Fund, pension funds, the tax authorities, and the Directorate of Labour.[6] Data were gathered by permission from the Icelandic Data Protection Authority (2009), which set strict rules of procedure. The data gathering took place under the supervision of a representative appointed by the Data Protection Authority, and some of the data were encrypted using the Identity Protection System developed by deCODE Genetics. Hence, the analysis is conducted using coded and anonymous data, with access limited to a small group of Central Bank staff. The encryption

[6] Similar data on corporations were gathered in 2009 and 2010, but that analysis is beyond the scope of this paper. See Central Bank of Iceland (2009, 2010a, b).

key was subsequently destroyed in accordance with the permission, obstructing the possibility of adding new data to the database at a later date.

This database was unprecedented for a country that has experienced a financial crisis at the time of its compilation. Efforts have been made to build similar databases in some countries, especially in Ireland,[7] but we are not aware of any household-level database covering a whole nation or any work using a household-level database to build payment profiles for each individual loan on the scale that we do in this paper. A detailed list of variable definitions and sources can be found in Tables A1-A2 in Appendix 1, but the main variables and their motivation are further discussed in the following section.

The data can be categorised into eight groups. The first group consists of three encrypted variables used for *identification* of individuals, households, and loans. This allows for combining information on loans, individuals, and households from different data sources in order to obtain an overview of households' financial position at the household level. Each individual's social security and family number is encrypted, as is each loan's (scrambled) identification number.

The second group of data consists of 21 variables describing *terms, conditions, and loan amounts* for each individual loan, including date of issuance, type of loan, maturity, debt service method, currency composition, interest rate level, interest premium level, number of payment dates per year, type of interest rate (fixed/floating), original loan amount, and outstanding balance on 31 December 2008. The reason for gathering such extensive information was to construct payment profiles for each individual loan, portraying how instalments, interest payments, and outstanding balances develop from the original loan date, as is further discussed in Section 3.3.1.

The third group of data consists of *debt service variables* describing the average payment and the last payment before data submittal took place for each individual loan. These variables were used to analyse how debt service ratios appeared in early 2009, as a first approach to analysing the extent of likely payment problems in the household sector (see Vignisdóttir and Ólafsson, 2009). But at a later stage, when payment and income profiles were fully constructed, allowing for a more detailed analysis of households' financial position, these variables were used mainly for error-checking.

The fourth group of data includes *debt restructuring variables* providing information on whether payments were frozen at the time of data submittal, in addition to indicating whether the borrower had applied for debt restructuring according to so-called payment smoothing prior to data submittal. Payment smoothing and other debt restructuring measures are described in more detail in Section 3.4.1.

The fifth group of data consists of information regarding *assets and collateral*. Commercial banks and savings banks provided data on each individual's deposits by type as of 31 December 2008, and pension funds supplied available data on each individual's pension savings assets, although it soon became apparent that data on pension fund assets were incomplete. Financial institutions also provided data on the official December 2008 Land Registry value of each property used as collateral, which is used as a reference point of homeowners' housing wealth, as discussed in Section 3.3.3. We define all loans backed by

[7] See Kennedy and Calder (2011) and footnote in Appendix 2.

real estate as mortgages, as it is problematic to distinguish between loans taken for real estate purchases and mortgage equity withdrawals. Financial institutions provided some information on the value of other types of collateral, such as motor vehicles and securities, although in most cases the value is from the time of issuance and is not used in the analysis.

The sixth group of data consists of information on household *income*. Annual tax returns provide the best possible overview of household income in Iceland, but the most recent data available from this source at the time of the data gathering were for the year 2007. It was clear from the outset that, in many cases, this would provide a poor representation of household income after the banks' collapse. Therefore, we opted to supplement tax return data on each individual's annual wage and financial income in 2007 with income data from tax withholding records. The tax authorities provided data on each individual's income according to tax withholding records for February 2009, the most recent data available at the time of data gathering, as well as a year earlier; i.e., February 2008. We discuss the quality of our income data in Appendix 4.

The seventh group includes data on *unemployment status and benefits*. Unemployment rose rapidly after the banks' collapse, from a mere 1.2 per cent in August 2008 to 9.1 per cent in April 2009. Our data include the coded security number of each individual registered as unemployed in April 2009 and of individuals who applied for unemployment benefits in May 2009, at the time of data submittal.

The final group of data consists of indicator variables on *demographics*. First, there is an age indicator variable for each individual's age interval, which permits analysis for different age groups. Second, there is an indicator variable for each individual's place of residence. We divide the country into eight districts and received information for each individual and real estate, with regard to the district to which each belongs. This enabled us to analyse households' position for different place of residence groups (see Appendix 3). We also constructed an indicator variable for family type, using the number of individuals with the same family number, which enabled us to analyse households' financial position for different family types; i.e., singles, single parents with children, couples without children, and couples with children.

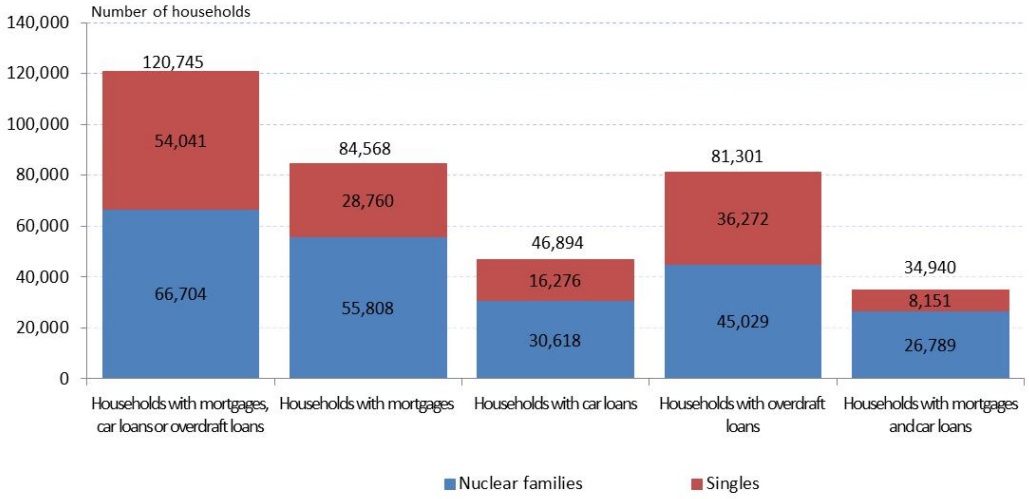
3.2 Characteristics of our data

The data on debt cover 424,081 individual loans, and we construct a payment profile for each loan, as is discussed in Section 3.3.1. However, our analysis is household-level based, which implies that we combine information on assets, debt levels, debt service, and income for individuals and individual loans into corresponding household-level variables. A *household* is defined as individuals with the same (coded) family number, which is equal to the (coded) social security number of the oldest family member. We use the term *nuclear family* for all households consisting of single parents and their children, couples without children, and couples with children. *Singles*, on the other hand, are individuals 18 years or older outside nuclear families. The disadvantage of defining a household in this manner is that individuals receive their own family number when they reach 18 years of age. Our household measure

Figure 3.1: Number of indebted households in total and in the reference group used in the analysis

Figure 3.1a

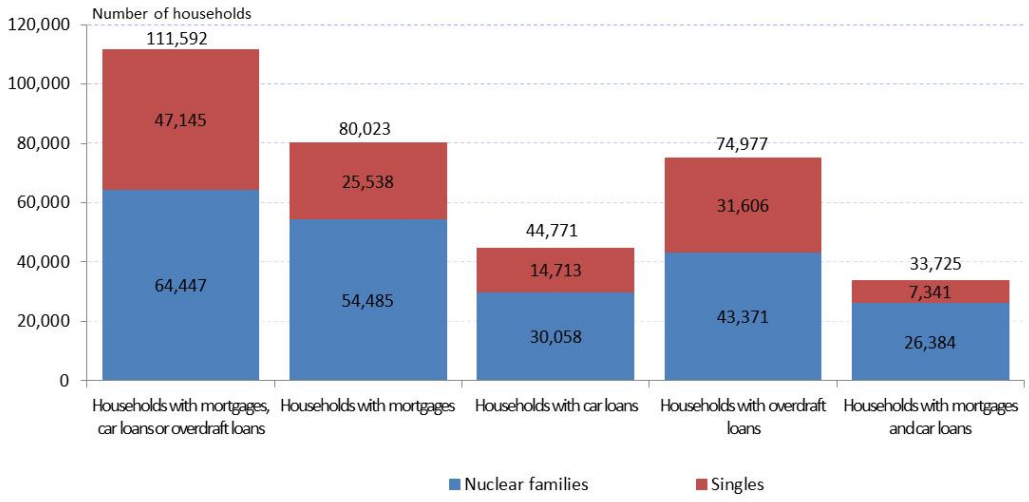
Number of indebted households in total by type of debt divided into nuclear families and singles[1]



1. All loans backed by real estate as collateral are defined as mortgages. Nuclear families are couples with and without children and single parents.
Source: Central Bank of Iceland Household Sector Database.

Figure 3.1b

Number of indebted households in the reference group by type of debt divided into nuclear families and singles[1]



1. All loans backed by real estate as collateral are defined as mortgages. Nuclear families are couples with and without children and single parents.
Source: Central Bank of Iceland Household Sector Database.

therefore underestimates to some extent the number of individuals within households where offspring are still living at home after they reach age 18, which leads us to categorise some households as singles when they are actually households consisting of single parents with children aged 18 years or older. Hence the number of nuclear families is somewhat underestimated. For the same reasons, this measure of households is likely to overestimate the number of households consisting of singles, as some of them still live at home with their parent(s).

We have information on the debt position of 120,745 indebted households in our database, of which 66,704 (55 per cent) are nuclear families and 54,041 (45 per cent) are singles (see Figure 3.1a). Debt-free households are excluded from the analysis. When indebted households are categorised by the type of debt they hold, it becomes evident that almost 84,600 households are mortgagors and 46,900 households have motor vehicle loans, while 34,900 households have both types of debt (see Figure 3.1b). Further information on the total number of households and some precautionary notes on the income and housing wealth data are found in Appendix 4.

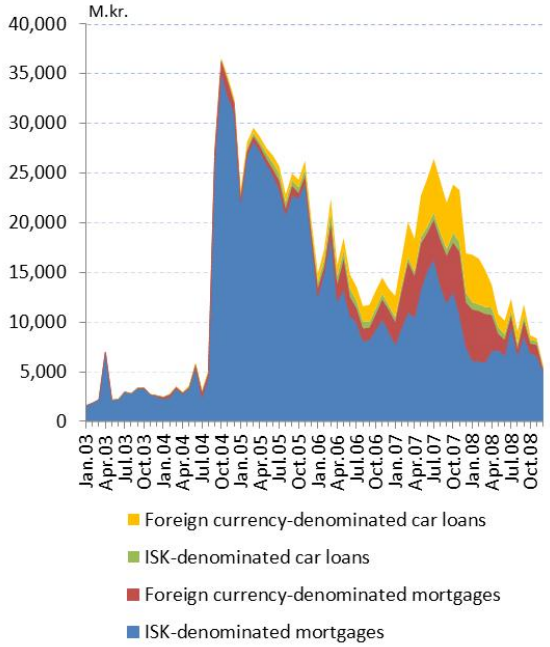
A breakdown of the reported total outstanding balances of each loan at year-end 2008 by year of loan origin also reflects the rapid build-up of credit. Close to 84 per cent of the total outstanding balance of all mortgage debt in the database represents mortgages issued in 2005-2008. The increase in foreign-currency borrowings in the approximately 20 months prior to the banking collapse is also reflected in these figures. Roughly 72 per cent of the total outstanding balance of foreign-denominated mortgages represents mortgage debt issued in 2007 and early 2008. The same applies to more than two-thirds of foreign-denominated motor vehicle loans (see Figures 3.2c-d and 3.3a-b).

Our results show that the currency-denomination of debt has an important effect on households' financial position (despite the recalculation of all foreign-denominated and mixed loans taking place in 2010). Foreign-denominated borrowing was far more widespread among households with motor vehicle debt than among those with mortgage debt. At the end of 2008, close to 90 per cent of all mortgagors had ISK-denominated mortgages only, 2.5 per cent had foreign-denominated mortgages only, and 7.7 per cent had mixed ISK- and foreign-denominated mortgage debt. However, roughly 19 per cent of households with motor vehicle debt had ISK-denominated car loans only, while 47 per cent had foreign-denominated loans only, and roughly a third had mixed ISK- and foreign-denominated car loans (see Figure 3.3c). Therefore, roughly 80 per cent of households (37,838 households) with motor vehicle debt had at least some portion of that debt denominated in foreign currency, while the same applies to only approximately 10 per cent of mortgagors (8,642 households).

Roughly a fifth of total household debt was foreign-denominated at the time of the banking collapse, as is discussed in Section 2. Close to 84 per cent of total outstanding motor vehicle debt was foreign-denominated at year-end 2008, as opposed to only 15 per cent of mortgage debt (Figure 3.3d).

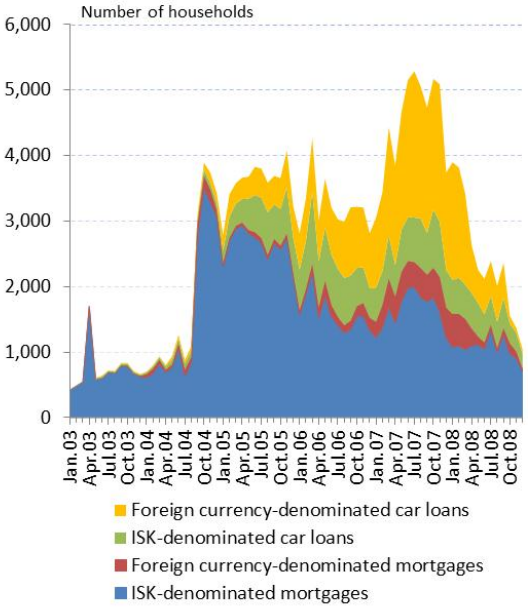
Figure 3.2: Evidence of the credit boom in 2004-2008

Figure 3.2a
New monthly issuance of mortgages and car loans January 2003-December 2008[1]



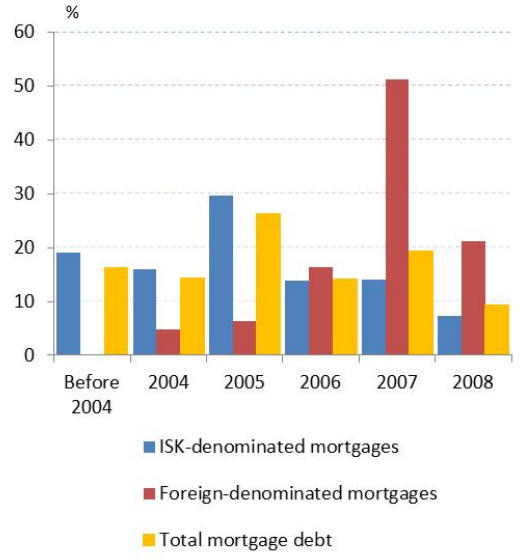
1. Based on the monthly sum of individual loan amount at origin.
Source: Central Bank of Iceland Household Sector Database.

Figure 3.2b
Number of households taking on new mortgage and car loans each month[1]



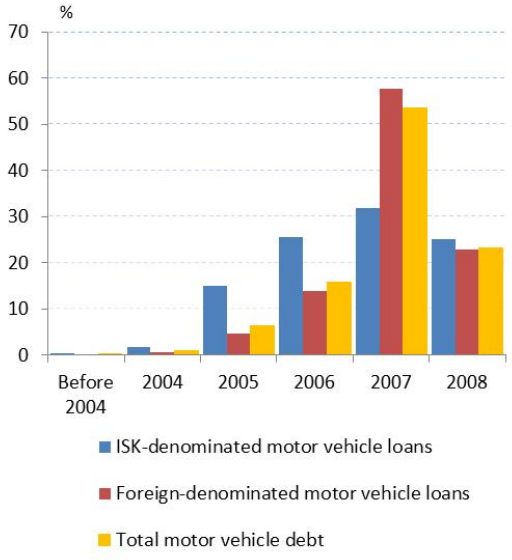
1. Based on the total number of households taking on mortgage and car loans each month.
Source: Central Bank of Iceland Household Sector Database.

Figure 3.2c
Share of total outstanding balances for each mortgage type at 31 December 2008 by year of loan origin[1]



1. According to reported outstanding balance for each loan at 31 December 2008.
Source: Central Bank of Iceland Household Sector Database.

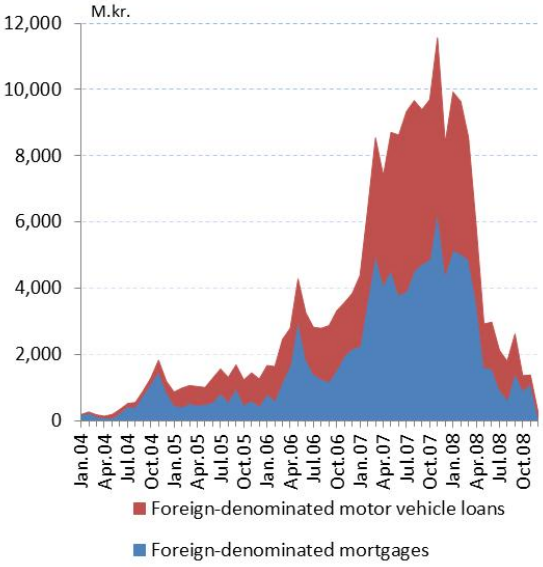
Figure 3.2d
Share of total outstanding balances for each motor vehicle loan type at 31 December 2008 by year of loan origin[1]



1. According to reported outstanding balance for each loan at 31 December 2008.
Source: Central Bank of Iceland Household Sector Database.

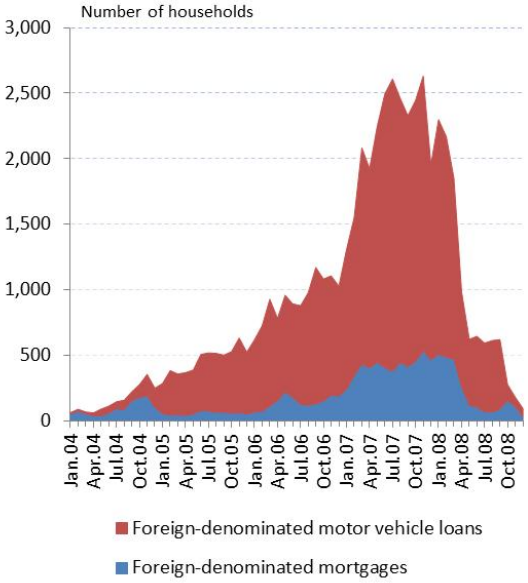
Figure 3.3: Currency-denomination of debt

Figure 3.3a
New monthly issuance of foreign-denominated mortgages and motor vehicle loans January 2004-December 2008[1]



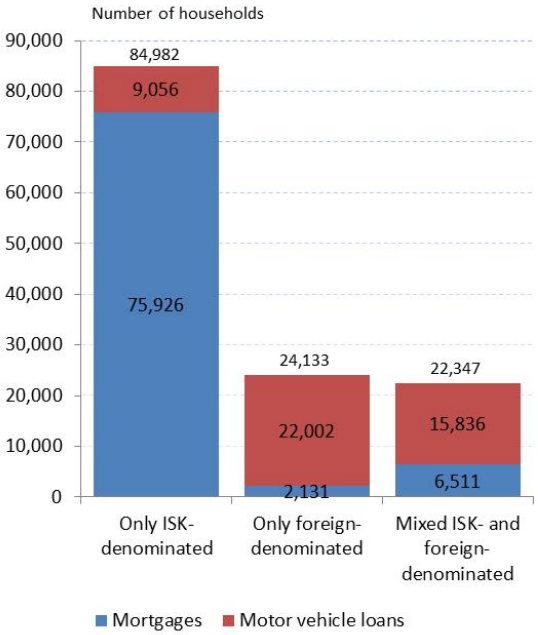
1. Based on the sum of individual loan amount at origin for each month.
Source: Central Bank of Iceland Household Sector Database.

Figure 3.3b
Number of households taking on new foreign-denominated mortgages and motor vehicle loans each month[1]



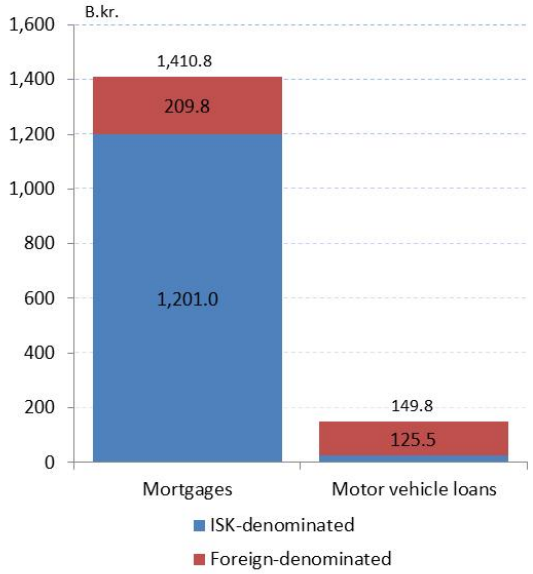
1. Based on the total number of households taking on new foreign-denominated loans each month.
Source: Central Bank of Iceland Household Sector Database.

Figure 3.3c
Number of indebted households by currency-denomination



Source: Central Bank of Iceland Household Sector Database.

Figure 3.3d
Total outstanding balances for mortgage and motor vehicle debt by currency-denomination[1]



1. According to reported total outstanding balances for each loan for 31 December 2008.
Source: Central Bank of Iceland Household Sector Database.

3.3 Construction of payment, income, living expense, and housing wealth profiles

Our database provides a very good overview of households' liabilities and debt service and a decent overview of households' assets and income, and it allows us to take important socio-demographical factors into account. The detailed information on individual loans plays a pivotal role in our analysis, as it allows us to build payment profiles for each individual loan, so that we transform our loan-level database from merely providing information on each loan at a particular point in time to a dataset portraying how debt service and debt levels evolve over time; i.e., from cross-sectional data to panel data. The construction of payment profiles also allows us to take important policy and legal interventions into account in order to analyse how they have affected households' financial position. We are interested as well in capturing differences in living expenses across different family types, and we construct profiles for living expenses using the Debtors' Ombudsman's consumer guidelines for minimum living expenses (adding a 60 per cent margin; to be explained later).[8] Furthermore, we construct profiles for each household's disposable income using the individual wage figures in our dataset and the calculated benefits to assess each household's ability to service its debt and cover necessary living expenses. Finally, we construct profiles for housing wealth for each homeowner, which enables us to evaluate housing equity. This section describes how we construct these different profiles. Further information can be found in Appendix 1.

3.3.1 Payment profiles and different scenarios

The loan-level data described in Section 3.1 and explored more thoroughly in Table A2 in Appendix 1 provide most of the information necessary to build payment profiles for each individual loan. Some assumptions are nevertheless necessary, especially with regard to interest rate and interest rate premium developments for loans with floating rates, for which we only have information on at the time of the data gathering. Fortunately, 80 per cent of indexed ISK-denominated mortgages in our database have fixed (real) interest rates for which we have information for individual indexed mortgages.

We distinguish among *seven types of payment profiles* based on different loan types: (i) foreign-denominated mortgages, (ii) indexed ISK mortgages, (iii) non-indexed ISK mortgages, (iv) foreign-denominated motor vehicle loans, (v) indexed ISK motor vehicle loans, (vi) non-indexed ISK motor vehicle loans, (vii) overdrafts and other short-term loans. We distinguish between loans of the same type with different debt service methods – e.g., annuity loans and fully amortizing payment loans – and construct a payment profile for each currency leg of foreign currency loans.

The payment profiles we construct take different scenarios into account. Our *baseline scenario* allows for explicit debt restructuring measures to lower debt service burden and recalculation of foreign-denominated loans, which are explained in more detail below. This represents our baseline scenario because it allows us to assess the share of households in financial distress and how it has been affected by debt restructuring measures and legal interventions, although we do not take all actual debt restructuring measures into account. Our aim is to capture what the debt restructuring measures can achieve in assisting households in

[8] The Domestic Debt Advisory Service became the office of the Debtors' Ombudsman on 1 August 2010, following the passage of Act no. 100/2010.

distress, but we are also interested in analysing how households' position would have evolved in the absence of these interventions. Our *alternative scenario* reflects the situation where no action is taken to lower households' debt service burden, neither through explicit policy measures regarding debt restructuring nor through judicial rulings. Hence we construct a payment profile for each individual loan without any form of freezing of debt payments, debt restructuring, or recalculation of foreign-denominated and mixed loans. It should be noted that this scenario excludes explicit policy and legal interventions regarding debt restructuring but includes various other policy measures that have affected households; e.g., macroeconomic stabilisation policies, increases in mortgage interest subsidies, etc.

The construction of payment profiles allows us to add together debt service (instalment and interest payments) and debt levels (outstanding balances) on all loans for each individual household on a monthly basis and analyse how households' debt service and debt position evolves. In our discussion of the results, we focus on the period from January 2007 to December 2010, although we also assess the effects of some policy measures introduced at the end of our reference period, as is explained in Section 3.4. Hence we aim to portray how households' position evolved in the run-up to the banking system collapse and developed further in the period after the crisis reached its height.[9]

3.3.2 Profiles for households' living expenses

We construct profiles for living expenses to enable us to add each household's living expenses to its total debt service burden and match that against its disposable income. Our measure for living expenses is based on the Debtors' Ombudsman's consumer guidelines for minimum living expenses for different family types, but we add a 60 per cent margin to cover factors not included in the consumer guidelines (see Figure 3.4c).[10] We also add the cost of motor vehicle operation for households with motor vehicle loans. We use these guidelines, as no standard budgets exist for ordinary living expenses in Iceland over our reference period. Living expenses according to these guidelines increased by roughly 37 per cent over the four-year period. Our use of the consumer guidelines is not beyond dispute. These guidelines are low, but we attempt to adjust for this by adding a 60 per cent margin on top of the estimates, and we define households as being in distress if their total spending on debt payments and necessary minimum living expenses (taking the added margin into account) exceeds their disposable income. Financial institutions have often used these guidelines with a 50 per cent margin in their estimates of living costs and some analysis has also used that margin as a reference point (see, for instance, the baseline scenario in the Working Group of Experts, 2010). Hence our analysis is based on a higher estimate of necessary living costs.

The Ministry of Welfare published a report on budget standards for Icelandic households in February 2011 (Sturluson *et al.*, 2011). Three different types of budget standards are provided in the report: a *median budget standard* based on the median of actual consumption for 15 expenditure groups, a *short-term budget standard*, which represents an

[9] The analysis is carried out using specifically coded programs in Microsoft SQL Server.

[10] This includes a variety of fixed expenses, such as telephone services, subscriptions, property taxes, insurance, and day-care. The Debtors' Ombudsman's consumption guidelines are updated in January and August each year. The analysis of households' position is based on a linear approach so that living costs rise month-on-month instead of increasing in stages each January and August.

assessment of living expenses that can be sufficient over a short horizon of approximately 9 months, and finally, a *minimum budget standard*, which reflects assessed minimum necessary living expenses for different family types.[11] The assumptions we use in our analysis regarding minimum living expenses is most closely related to the Ministry's minimum budget standard, as the purpose of our analysis is to assess the share of households in distress; i.e., those that cannot both service their debt and sustain minimum living expenses. A comparison of our assessment of necessary living expenses and the Ministry's minimum budget standard in December 2010 shows that they are indeed very similar (Figure 3.4d). We assess the effects of using a different estimate of living expenses in our robustness analysis in Section 4.7.

3.3.3 Profiles for disposable income and housing wealth

In order to assess households' ability to service their debt and cover minimum living expenses, it is necessary to extrapolate the given wage figures. Wage income information in the database is therefore extrapolated in accordance with developments in the Statistics Iceland wage index. As is discussed in Section 3.1, the database contains information on wage income for 2007 according to tax returns and total wages in February 2008 and February 2009 according to tax withholding records. We restate the wage figures to provide an income profile for the period from January 2007 to December 2010 for each individual, where we have income information for the year 2007 from tax returns and February 2008 and February 2009 from tax withholding records in the database. Income for the year 2007 is given by income according to tax returns but is distributed throughout the year such that it develops according to the wage index. Income for 2008 is estimated in terms of reported income in February 2008 and extrapolated in line with the wage index. Household income from January 2009 through December 2010 is estimated in terms of reported income in February 2009 and extrapolated in line with the wage index. Consideration is given to changes in taxes and personal tax deductions, and mortgage interest subsidies and child benefits are calculated for each household. Thus we obtain a profile for disposable income for each household for the entire reference period for which we have wage information for all the data points (i.e., for the year 2007, February 2008 and February 2009). We exclude some households for which we only have information for the year 2007 from tax returns, as is described in further detail in Section 3.5.

Finally, we construct a housing wealth profile for each homeowner. Our housing wealth measure is based on the value of each dwelling according to official Land Registry value in December 2008 for all residential properties used as mortgage collateral, as is discussed in Section 3.1. The official Land Registry value should broadly reflect the market value of each residential property in February 2008, and we restate this measure of housing wealth by allowing it to evolve in accordance with our constructed house price index for each district over the period from January 2007 to December 2010. The index is based on the development of average purchasing price per m^2 for each district according to data from Registers Iceland, as is explained in more detail in Table A8 in Appendix 1. The decline in

[11] The median budget standard does not reflect any assessment of necessary living expenses, and it would represent an overestimation of the share of households in financial distress to assume that all households would have to sustain a consumption level that half of them did not choose during the upswing.

average housing wealth from peak to trough differs from district to district. The greatest decline is found in South Iceland, where average housing wealth fell by approximately 24 per cent in nominal terms, while the decline was between 20-22 per cent in the Greater Reykjavik area, on the Reykjanes peninsula and in West and East Iceland. The decline was less pronounced in North Iceland and in the West Fjords, where average housing wealth fell by roughly 6 and 10 per cent, respectively, from peak to trough.

When profiles have been prepared for payments on each loan, as well as profiles for living expenses and disposable income for each indebted household, then it is possible to assess how households' ability to service debt and cover living expenses has developed. Furthermore, we can assess households' housing equity using the outstanding balances according to the payment profiles for mortgages, and housing wealth according to the constructed housing wealth profiles. These are some of the main focus points of this paper as described in more detail in Section 3.4.1. A comparison of our constructed data with evidence from aggregate data from other sources and with reported outstanding balances is shown in Appendix 5.

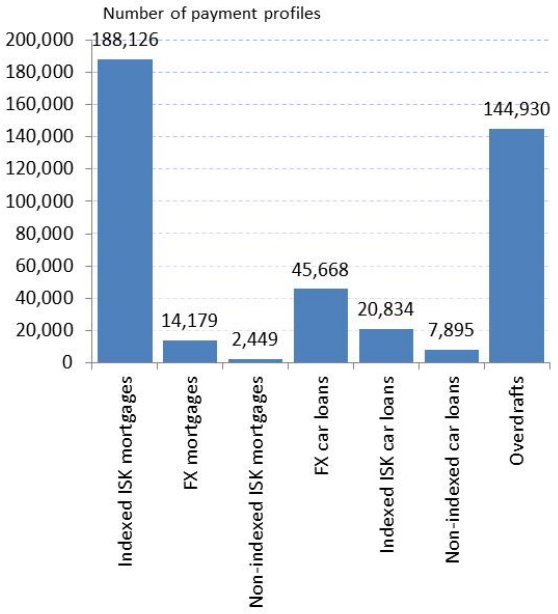
3.4 Issues of interest

We focus our analysis on the following five issues (see Figure 3.6): First, we assess the share of indebted households in financial distress. Our preferred measure to assess the extent of financial distress is based on each household's financial margin. *Household financial margin* is calculated by subtracting total debt service payments and necessary minimum living expenses (based on the Debtors' Ombudsman's consumer guidelines) from each household's disposable income. Given that the consumer guidelines do not include all necessary living expenses, we choose to add a 60 per cent buffer when assessing the extent of financial distress. Hence we define households in *financial distress* as all households with a negative financial margin when the added buffer on the consumer guidelines has been taken into account.

For comparison, we also look at *two debt service ratios* and the share of households above specific danger limits. On the one hand, we calculate the share of disposable income used for mortgage payments for each household with mortgage debt and look at the share of households whose mortgage debt service ratio, thus calculated, is above 30 per cent. On the other hand, we compute the ratio of total debt payments to disposable income for each household and look at the share of households for which the total debt service ratio, thus calculated, exceeds 40 per cent. We choose these threshold levels because they are similar to benchmark danger point values commonly used by central banks and in the literature (see Lytton *et al*., 1991, DeVaney, 1994, Greninger *et al*., 1996, Bucks *et al*., 2009, ECB, 2009, Bricker *et al*., 2011, Bank of Canada, 2011, Gómez-Salvador *et al*., 2011). However, financial ratios of this type do not allow for diversity in family type, economic conditions, or age and life-cycle stages.

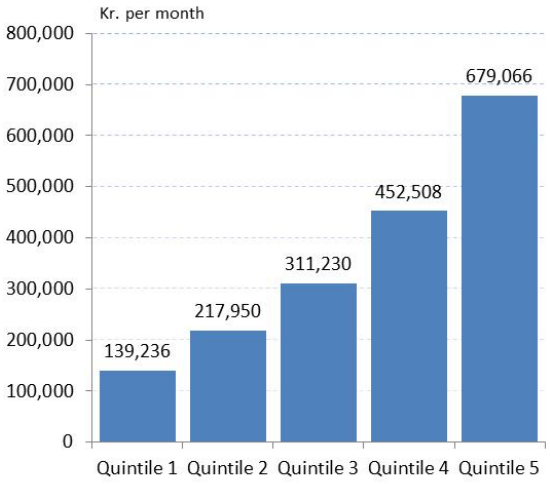
Figure 3.4: Some characteristics of our constructed profiles

Figure 3.4a
Number of constructed payment profiles for each scenario[1]



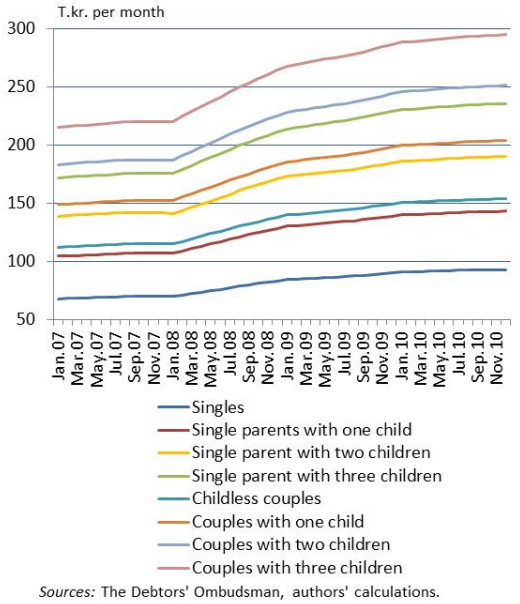
1. Indexed ISK-denominated motor vehicle loans include 8501 loans which are mixed ISK- and foreign-denominated loans.
Source: Central Bank of Iceland Household Sector Database.

Figure 3.4b
Median monthly household disposable income from January 2007 to December 2010 for each income quintile[1]



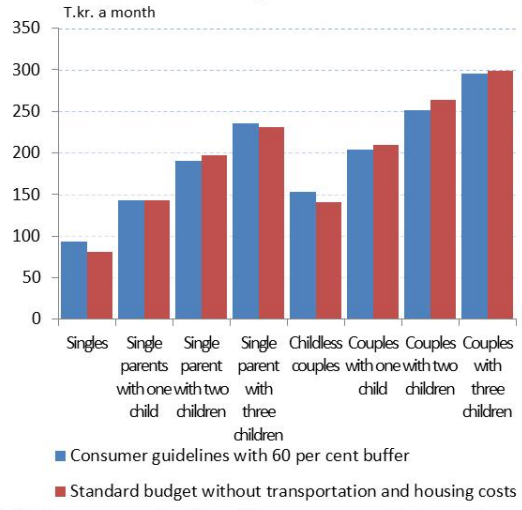
1. Quintile 1 (under 175,120 kr.), Quintile 2 (175,126-263,359 kr.), Quintile 3 (263,369-375,243 kr.), Quintile 4 (375,243-544,691 kr.), Quintile 5 (above 544,691 kr.). Only households in the reference group included, such that there are 22,320 households in each quintile.
Source: Central Bank of Iceland Household Sector Database.

Figure 3.4c
Examples of profiles for necessary living expenses with the 60 per cent added buffer



Sources: The Debtors' Ombudsman, authors' calculations.

Figure 3.4d
Comparison of living expenses profiles used and new standard budget[1]



1. The figure compares the minimum living expenses assumed in the paper for December 2010 with a new minimum budget standard (without transportation and housing cost) from a Ministry of Welfare report published in 2011.
Sources: Debtors' Ombudsman, Sturluson et al, (2011), authors' calculations.

Second, we analyse developments in homeowners' *housing equity* to capture the losses due to the combination of falling house prices and increased mortgage debt resulting from the exchange rate depreciation and the associated rise in inflation on top of the extensive debt accumulation. Our main focus is on the development of the *share of indebted homeowners with negative housing equity*; i.e., those whose outstanding mortgage balance according to our constructed payment profiles exceeds the value of their property according to our constructed housing wealth profiles.

Third, we assess the share of *households that are in both financial distress and negative housing equity,* as they are in the most severe danger of defaulting, according to the so-called 'double trigger' approach for defaults (Elmer and Seelig, 1998, Gerardi *et al.*, 2008 and Foote *et al.,* 2008). The theory implies that defaults result from a combination of excessive debt relative to assets and payment problems, in contrast to the so-called 'option pricing approach', which implies that households opt to default once their housing equity becomes too negative, irrespective of their debt servicing capacity (see Deng *et al.*, 2000).

Fourth, we compare the *characteristics of households* in financial distress, households in negative housing equity, and the highly exposed group of households that are both in financial distress and in negative housing equity. Is it the case, for instance, that households in distress tend to be low-income families, while homeowners in negative housing equity have a tendency to be middle- and high-income households?

Finally, we analyse the effects of various *debt restructuring measures as well as court rulings that deemed widely used exchange rate-linked loans illegal and in need of recalculation*.

3.4.1 Debt restructuring measures included in the analysis

The first debt restructuring measure we assess is the widespread *freezing of instalments and interest payments on foreign-denominated loans*. Of course, this is not an actual debt restructuring measure but a forbearance measure meant to allow households to reassess their financial position while macroeconomic policies restored some form of economic stability. After the collapse of the banking system, households were able to freeze payments on foreign-denominated loans because the domestic currency depreciated rapidly and the foreign exchange market was highly unstable. We base our analysis on our collected information on which loans were frozen at the time of data submittal in the beginning of 2009, and we assume that all loans that were frozen at that time were frozen from November 2008 until mid-2009, while debt payments on other loans were serviced as usual. This means that instalment and interest payments on roughly 35,500 foreign-denominated motor vehicle loans and close to 10,000 foreign-denominated mortgages are assumed to be frozen over this period. This represents approximately 78 per cent of foreign-denominated motor vehicle loans and 69 per cent of foreign-denominated mortgages. Freezing of payments on other types of debt was rare. It should be noted that payments on many loans were indeed frozen for a longer period. According to information from the Icelandic Financial Services Association, payments on roughly 7,600 household loans were frozen at the end of 2010 and approximately 4,600 were frozen in September 2011 (Icelandic Financial Services Association, 2012).

The second debt restructuring method we assess is *payment smoothing of indexed mortgages*. This is a means of temporarily lightening the burden of regular loan instalments by linking them to the modified mortgage payment index instead of the consumer price index. The modified mortgage payment index weighs together developments in wages and employment levels. As before, the loan is linked to consumer price inflation, and the outstanding balance changes accordingly, but actual payments are linked to the modified payment index. As long as the modified mortgage payment index is lower than the consumer price index, payments are reduced correspondingly. The difference between actual and implicit payments is posted to a special account and paid at the end of the loan period, so that the duration of the loan is extended and the number of payments is increased. The duration of the loan is never lengthened by more than three years, however, according to the terms and conditions, as a ceiling is placed on the extension of the maturity date. In order to estimate what this measure could achieve, it is assumed that all index-linked mortgages were subjected to payment smoothing in November 2009 when it became an opt-out option. In reality, approximately 50 per cent were subjected to this measure.

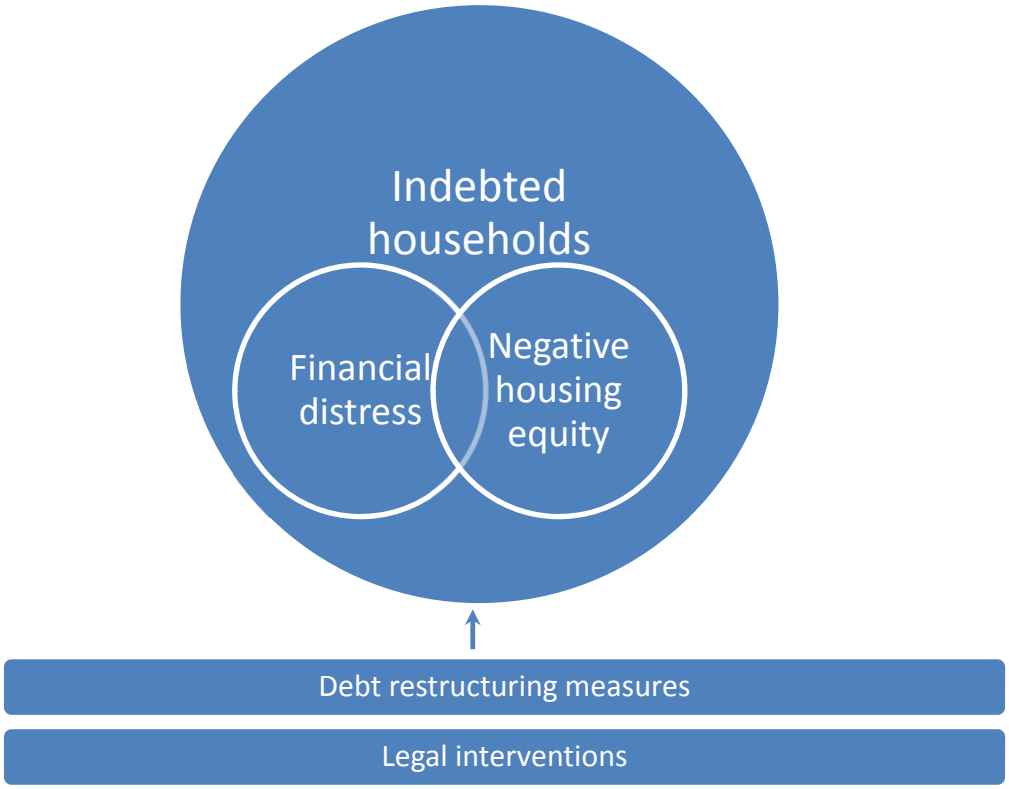
The third debt restructuring method we assess is *payment smoothing of foreign-denominated mortgages*. This method involves setting the original payment at the level (in ISK) that applied in May 2008, or at the level of the first instalment if the loan was taken after that date. Subsequent payments change in accordance with the modified mortgage payment index, as calculated by Statistics Iceland. Instalments due to increases in principal are deferred until the end of the loan period, so that the duration is extended and the number of instalments increases. This option was introduced in March 2009. We base our analysis on the assumption that all foreign-denominated mortgages were subjected to payment smoothing from mid-2009 until August 2010, when all foreign- denominated loans were recalculated due to the Supreme Court ruling described below. According to information from the Icelandic Financial Services Association, roughly 2,500 individuals had actually made use of this measure. This represents roughly 28 per cent of all individuals with foreign-denominated mortgages.

It is important to note that our assessment aims only to examine the short-term effects of these measures. No attempt is made to assess their long-term benefits or costs. Furthermore, no assessment is made of the impact of a variety of other measures, including decentralised debt restructuring, debt mitigation, and others. We do provide assessments of two further debt restructuring measures that took effect after our reference period ended: adjustment of residential mortgages to 110 per cent of the market value of the property and the special interest rebate introduced in 2011. We also provide some rough assessments of the possible effects of third-pillar pension fund payouts (see Section 4.5).

3.4.2 Recalculation of foreign-denominated and mixed loans

In June 2010, the Supreme Court handed down judgments in two court cases pertaining to the question of whether it is legal to index motor vehicle leasing payments in ISK to changes in currency exchange rates. The Court found that it was illegal to index payments denominated

Figure 3.6: Schematic representation of issues of interest and main policy and legal interventions



October 2008

- Moratorium on foreclosures
- Temporary payment freezing of foreign-denominated loans

November 2008

- Payment smoothing of ISK mortgages introduced by law
- Third-pillar pension payouts, later expanded
- Increases in mortgage interest subsidies

March 2009

- Payment smoothing of foreign-denominated mortgages introduced by law

May 2009

- Act on Temporary Mitigation of Residential Mortgage Payments

October 2009

- Law on measures for individuals, households, and corporations due to the banking and currency collapse providing a framework for decentralised debt restructuring
- Agreement on offering payment smoothing for foreign-denominated motor vehicle loans

November 2009

- Payment smoothing applied to all indexed ISK mortgages unless households opt out

June 2010

- The Supreme Court rules that indexation of motor vehicle leasing payments in ISK to changes in currency exchange rates is illegal

August 2010

- Office of the Debtor's Ombudsman created to oversee and provide advisory and mediation services related to debt mitigation procedures

Measures introduced for households with two properties for personal use

September 2010

- Supreme Court rules that interest should be calculated on illegal foreign-denominated motor vehicle loans in accordance with general interest rates on ISK bank loans, published on the Central Bank of Iceland website

December 2010

- Law on recalculation of illegal foreign-denominated loans to Icelandic households
- Adjustment of mortgage debt to 110 per cent of the underlying collateral value
- Expansion of the voluntary debt mitigation framework
- Enhanced and more progressive tax rebate on interest

Special interest rebates for the years 2011 and 2012

*Note that we take measures in blue into account in the analysis but not those in red.

in ISK in this manner. Shortly after these rulings, the Central Bank of Iceland and the Financial Services Authority issued new guidelines for financial undertakings on the treatment of loans linked to currency exchange rates. In September 2010, the Supreme Court ruled that interest should be calculated on illegal foreign-denominated automobile loans in accordance with general interest on ISK-denominated bank loans that are published on the Central Bank of Iceland website. In December 2010, Parliament passed legislation regarding illegal foreign-denominated loans to Icelandic households and, in the following months, financial institutions converted foreign-denominated automobile loans in accordance with the interest rates published by the Central Bank of Iceland, as well as giving households with housing mortgages the option of converting the loans into CPI-indexed or non-indexed loans.[12]

We recalculated all foreign-denominated mortgages and motor vehicle loans, as well as the ISK-denominated portions of all mixed ISK- and foreign-denominated loans. Hence we recalculated 68,348 loans, 14,179 of them foreign-denominated mortgages, 45,668 foreign-denominated motor vehicle loans, and 8,501 ISK-denominated portions of mixed loans. We base our analysis of the effects of this recalculation on the assumption that all foreign-denominated and mixed loans were recalculated as of 31 August 2010. We chose this date because it broadly reflects the timing of the Supreme Court rulings and it allows us to analyse the effects within our reference period, which ends at December 2010. It is also the case that, after the Supreme Court ruling in the summer of 2010, many households could choose to pay ISK 5,000 per million of outstanding balance, which was supposed to broadly reflect the debt service burden prior to the exchange rate depreciation.

Our method of recalculating foreign-denominated and mixed loans involves five steps (see also Tables A6 and A7 in Appendix 1). First, we recalculate the original principal of each loan from the date of loan issuance to 31 August 2010, with interest added once a year using a 360-day interest period (with the exception of the last interest period, which is shorter). Second, each payment in the constructed payment profile of each individual loan is recalculated from the payment date to 31 August 2010 in a similar fashion, with interest added once a year.[13] Third, we calculate a new reference principal for each individual loan by subtracting the sum of all recalculated payments from the recalculated original principal. Fourth, we calculate the adjustment of each loan's outstanding balance by comparing the new reference principal for each individual loan with the outstanding balance in August 2010 according to the constructed payment profiles. Finally, we construct a new payment profile for each of the recalculated loans for which the outstanding balance is still positive after the recalculation. Payment on these loans is assumed to begin in September 2010. We assume that "new" motor vehicle loans are floating non-indexed ISK-denominated loans with the same maturity as the remaining maturity of the original loan, and "new" mortgages are

[12] In February 2012, the Supreme Court issued a new ruling on the recalculation of illegal foreign-denominated loans which is likely to lead to further write-offs but their extent is uncertain at the time of writing. In June 2012, the Supreme Court issued a ruling that foreign-denominated loans of Islandsbanki (previously Glitnir) were legal. The effects of these new rulings are excluded from our analysis.

[13] This is a demanding computational task: in total, these recalculations of payments on foreign-denominated and mixed loans comprise roughly 33.4 million rows of data.

assumed to be floating indexed ISK-denominated loans with fully amortising payments.[14] We do not assume that households reimbursed by their creditors upon the recalculation of foreign-denominated and mixed loans use that income to pay down other debt; we assume instead that it is used for other purposes; for example, consumption.

3.5 The reference group and specific groups of interest in the analysis

This section introduces the reference group of households used in the analysis and the main subgroups of interest for which a breakdown of results is presented in Section 4. The construction of profiles transforms our database into a panel dataset, and we focus our analysis on the period from January 2007 to December 2010. Given that our main interest lies in analysing households' financial margins, we want to focus on households for which we have information on debt service, disposable income, and necessary minimum living expenses. However, it is not obvious that we should base our analysis on the complete dataset, as the panel is unbalanced due to the composition of our income data. Our database includes income for the full year 2007 (from tax returns) and for February 2008 and February 2009 (from tax withholding records). The number of individuals decreases across these three periods, which is likely to reflect both labour market developments at the time and, to a certain extent, the exclusion of low-income singles (e.g., students) from the tax withholding data, as is discussed in Appendix 4. Hence it may be beneficial to restrict which households are included in the analysis so that the interpretation of the results is not complicated by changes in the composition of households in the analysis group as we move between the three income periods.

We chose to base our analysis on indebted households for which we have income information for both 2007 and February 2008 (which is used along with the wage index to extrapolate income for the entire year). This is done to prevent the fact that many low-income singles included in the 2007 income data are not included in the 2008 data from disturbing the interpretation of our analysis. We do not want to make a restriction so tight as to include only those households for which we have February 2009 income data as well. In our view, this would exclude too many households, and the decline in the number of households between 2008 and 2009 is much smaller than that between 2007 and 2008.[15]

The reference group used in our analysis covers 111,592 households, although not all households within this group are included in the analysis at each point in time. The reference group includes 64,447 nuclear families and 47,145 singles outside nuclear families. Hence our analysis of the extent of household distress is based on data covering nearly 97 per cent of our loan-level database for nuclear families (see Figure 3.1b). We provide a breakdown of our

[14] Their maturity is also assumed to be the same as the remaining maturity of the original loan, except when less than one year of the original maturity remains, in which case we extend the maturity to year-end 2013. This is done because most mortgages with such a short remaining maturity were taken in the early years of the last decade. In many cases, this leads to an increase in mortgage debt after the recalculation, as payments on these loans were, in a sense, "too low" over an extended period.

[15] Restricting the reference group to include only indebted households for which we have income data for both 2007 and 2008 is not enough to make the panel data balanced, as many households were debt-free until taking out a loan at some point in 2007 and 2008 and are not included in the database until they start servicing debt, as we want to focus on the financial position of indebted households. Some households also drop out at some point because they become debt-free after having paid down their debt.

results on households' financial position for various specific groups of interest. First, we consider different *income groups* captured by the five income quintiles. This is a classic grouping in analyses of households' financial position. We base our classification on each household's average disposable income over the period from January 2007 to December 2010.[16]

Second, we analyse different *currency groups*. We categorise households by the currency-denomination of their debt, as the results clearly indicate that currency-denomination plays an important role. When we present the results of the financial margin and total debt service ratio analyses, we split households into two currency-denomination groups: (i) households that have some portion of their mortgage or motor vehicle debt denominated in foreign currency (FX borrowers) and (ii) households with ISK-denominated debt only (ISK borrowers). However, when we present the results of the mortgage debt service ratio and housing equity analyses, the focus is restricted to mortgagors, so we split households into (i) mortgagors with some portion of their mortgage debt denominated in foreign currency (FX mortgagors), and (ii) mortgagors with ISK-denominated mortgage debt only (ISK mortgagors). The group of FX borrowers is much larger than the group of FX mortgagors, as is discussed in Section 3.2.

Third, we provide results on households' financial position by *family type*. This is also a popular classification in the literature. A simple distinction is between families with children, singles, and childless couples. A more in-depth classification splits families with children into couples with children and single parents.

Fourth, we group households into different *age groups* in light of the reported age interval for the oldest family member in 2008. We are interested in analysing whether there is a clear difference in households' position given their age. Is it the case, for instance, that families whose oldest member is in his or her thirties and forties tend to be more vulnerable than older families, as they were more inclined to trade up and purchase larger homes in the housing boom? We also assess the financial position of young families who bought property close to the peak of the housing boom. More precisely, we look at couples with children and single parents under age 40 (in 2008) who took out a mortgage in 2006-2008.

Finally, we are interested in analysing households' financial position by their *place of residence*. We split the country into eight districts and look at the extent of financial distress and negative housing equity across different districts. The results are summarised in Appendix 3.

[16] Households in the lowest income quintile have average disposable income under approximately 175,000 kr. per month over the reference period, households in the second-lowest quintile have approximately 175,000-263,000 kr., households in the middle quintile have roughly 263,000-375,000 kr., households in the second-highest quintile have roughly 375,000-545,000 kr., and households in the highest income quintile have average disposable income exceeding 545,000 kr. per month over the reference period.

4. Results

> *"Yes, the bottom fell out of everything, the autumn that Bjartur's house was one year old [...] But this loss he took with the same unflinching fortitude as he had previously shown in the face of famine, spectres and merchants, complaining to no one. The walls of his prison of debt were no doubt growing the thicker, the lower his produce sank in price, but he was determined to keep on running his head against those walls as long as there was a drop of blood or a particle of brain left in it."*
>
> Laxness, H. (1934-35), *Independent People*, p. 505.

In this section, we report the main findings of our analysis of households' financial position. Section 4.1 presents the results of the financial margin analysis, which is based on a comparison of the capacity provided by each household's monthly disposable income with the burden of servicing its debt and undertaking necessary minimum living expenses. The analysis builds on the constructed payment, income and living cost profiles. Its main aim is to assess the share of households in financial distress and how that share evolved over the four-year period from 2007-2010. Section 4.2 portrays the results of the debt service ratio analysis, which provides another method of assessing the scope of financial distress. In Section 4.3 we assess the balance between household's mortgage debt and housing wealth and estimate the share of homeowners in negative housing equity. In Section 4.4 we analyse how the share of homeowners in the especially vulnerable position of being both in financial distress and negative housing equity evolved over the four-year period. In Section 4.5 we analyse the effects of further policy measures, some of which were implemented in 2011, e.g. the adjustment of mortgage debt to 110 per cent of property value and the special interest rebate paid out in 2011 and 2012. In Section 4.6 we provide some international comparison of our results and in Section 4.7 we analyse the robustness of our results. The economic and policy interpretations of our results are for most parts contained in Section 5.

4.1 Results on financial distress from the financial margin analysis

Our preferred method of assessing the share of households in financial distress is based on each household's financial margin. We calculate each indebted household's *financial margin* by subtracting total debt service payments and minimum necessary living expenses (based on the Debtors' Ombudsman's consumer guidelines) from the household's disposable income. Because the consumer guidelines do not include all necessary living expenses, we chose to add a 60 per cent buffer when assessing the extent of financial distress. Hence the financial margin portrays each household's capacity, measured by its disposable income, to withstand the rise in its debt service burden and necessary living expenses over the four-year period. We define *households in financial distress* as all households with a negative financial margin when the 60 per cent buffer on the consumer guidelines has been taken into account. The main focus of our analysis is to assess how the share of indebted households in financial distress evolved in the run-up to and aftermath of the banking and currency collapse and how it has been affected by various policy measures and legal rulings.

It is important to note that financial distress does not necessarily lead households to default on their debt payments. Households whose total spending on debt service and necessary living expenses exceeds their disposable income have various ways to defer default.

They can liquidate some of their assets such as deposits, bonds, motor vehicles, housing, or even pension fund assets, as was made possible in the aftermath of the crisis. They can also increase their overdraft debt, restructure their debt – for instance, take on mortgage equity loans and pay down short-term debt – reduce consumption or increase labour participation or hours worked (some of which could even take place outside the organised labour market).[17] Thus it is likely that households can navigate through temporary periods of distress without defaulting. On the other hand, persistent payment problems are likely to lead to default.

An important factor determining households' possibility of escaping financial distress by liquidating assets or restructuring debt is their equity position, particularly their housing equity. Households' housing wealth in excess of their mortgage debt is important, as it affects both borrowers' opportunity to offer collateral for more favourable loans and thereby restructure their debt and lenders' incentive to push for foreclosure in the event of payment problems. Hence we are interested in assessing the share of households in financial distress and negative housing equity (see Section 4.4).

The results of the financial margin analysis indicate that roughly 12½ per cent of indebted households in the reference group were already likely to be in financial distress in January 2007. This corresponds to roughly 12,350 households. The share of households in distress rose gradually over the course of 2007. The effects of the outbreak of the global financial crisis are evident in August 2007 when the monthly currency depreciation measured roughly 8 per cent using our household debt exchange rate index. The share in distress is assessed to have been roughly 17 per cent at year-end 2007, but households' financial position deteriorated rapidly thereafter as the currency depreciated and inflation rose. The share of households in distress is estimated to have been 23½ per cent on the eve of the banking system collapse in autumn 2008, when the annual drop in our constructed household debt exchange rate index measured 50 per cent and annual inflation was just shy of 16 per cent (see Figure 4.1a). This represents a roughly 96 per cent increase in the number of households in distress from January 2007 and reflects that the lion's share of the shocks to the households' balance sheet had already taken place when the banking system collapsed.

The freezing of payments on the majority of foreign-denominated loans prevented the share in distress from rising to 27 per cent in the immediate aftermath of the crisis. Instead it fell to roughly a fifth, but of course these forbearance efforts only provided short-term breathing space in the aftermath of the banks' collapse and increased the indebtedness of the households that made use of this option, as their interest and principal payments were merely postponed and therefore added to the outstanding balance of their loans.

We assume that full payments resumed on frozen foreign-denominated loans in July 2009. Some payments actually remained frozen for a longer period, but our assessment is based roughly on when the bulk of debt payment freezing ended. Hence the share of households in distress increased dramatically when the freezing ended, despite the introduction of payment smoothing on foreign-denominated mortgages, which affected

[17] For some households found to be in financial distress, it may be that the imbalance between total spending and disposable income is mitigated by financial income, which is not included in our analysis as we only have data for 2007. A rough assessment of the importance of financial income in 2007 indicates that the share of indebted households in distress may be overestimated by roughly 1.3-1.5 percentage points that year due to this factor. However, this problem is probably smaller in the following years as total financial income decreased by over 70 per cent between 2007 and 2010 (see also discussion in Appendix 4).

relatively few households. The share in distress is assessed to have peaked at 27½ per cent in October 2009. Payment smoothing of indexed ISK mortgages is assumed to have begun in November 2009, and it affected a large number of households. The immediate impact was that roughly 2,750 fewer households were in distress at the end of 2009 than before payment smoothing of indexed ISK mortgages began (see Figure 4.1b). However, the share in financial distress continued to decline gradually over the course of 2010, reaching just shy of 23½ per cent in August 2010.[18] This corresponds to roughly 24,500 households in distress.[19]

Our analysis assumes that all foreign-denominated and mixed loans were recalculated at the end of August 2010, following the Supreme Court rulings discussed in Section 3.4.2. After recalculation, the share of households in distress dropped from 23½ per cent of households to 20 per cent, or 3,300 households. In December 2010, at the end of our reference period, an estimated 21,000 indebted households were likely to be in financial distress (see Figures 4.1a and 4.1b). In all, this group of households in distress included roughly 47,660 individuals. Therefore, approximately 15 per cent of all individuals (indebted and debt-free) in Iceland are estimated to have been in distress at year-end 2010.

Out of the group of households in distress in December 2010, over 14,100 households (67 per cent) were not in financial distress in January 2007; 11,000 were not in distress in January 2008, when the currency depreciation started to gain momentum; and roughly 8,800 households were not in distress when the banks' collapsed in October 2008. This is a certain indication of the scope of the consequences of the banking and currency collapse for households' capacity to service debt and cover minimum necessary living expenses.

4.1.1 Alternative scenario

The results above represent our baseline scenario, which allows for explicit debt restructuring measures and recalculation of foreign-denominated and mixed loans. The results indicate that the share of households in distress rose from approximately 12½ per cent in January 2007 to 23½ per cent on the eve of the banking collapse and that it peaked at 27½ per cent when freezing ended but decreased thereafter due to payment smoothing and loan recalculation. However, it is interesting to assess how the scope of households' financial difficulties would likely have developed if there had not been any explicit policy measures taken to reduce households' debt service burden and foreign-denominated loans had not been deemed illegal. This is done in our alternative scenario (see discussion in Section 3.3.1).

If no explicit debt restructuring measures had been introduced to assist households with their debt service burden[20] and foreign-denominated loans had remained intact, the share of households in financial distress would have continued to rise following the collapse of the banking system, instead of declining sharply due to freezing of payments. The share would

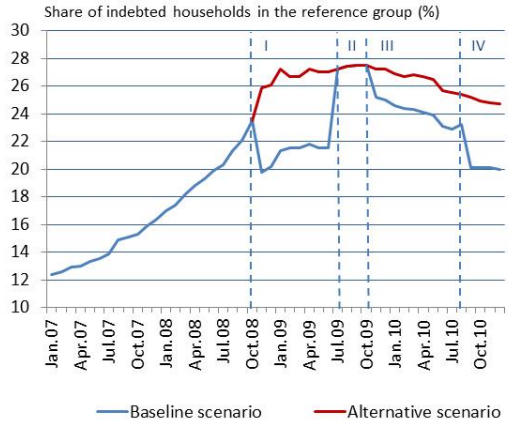
[18] The króna strengthened gradually during 2010 and, according to the trade-weighted exchange rate index, it had appreciated by almost 12 per cent year-to-date by 1 September 2010. However, the constructed household debt exchange rate index, which weights currencies according to their share in households' foreign-denominated debt, rose by only 2½ per cent over the same period.

[19] It is important to note, however, that due to additional measures to assist households with their debt service burden that are not included here, the share of households in financial distress between July 2009 and September 2010 could be overestimated to some extent.

[20] Other policy measures than explicit debt restructuring measures are not excluded, for instance, the increase in mortgage interest subsidies, etc.

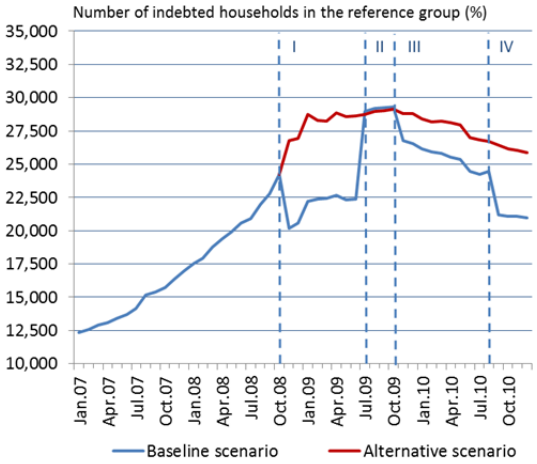
Figure 4.1: Evidence of financial distress from the financial margin analysis, both in total and by income and currency-denomination of debt

Figure 4.1a
Share of indebted households in distress in the baseline and alternative scenario[1]



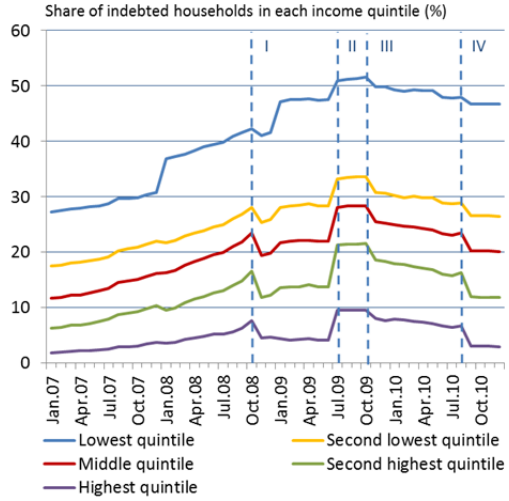
1. Share of households in the reference group with negative margin taking the 60 per cent buffer on the minimum living expenses into account. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.1b
Number of indebted households in distress in the baseline and alternative scenario[1]



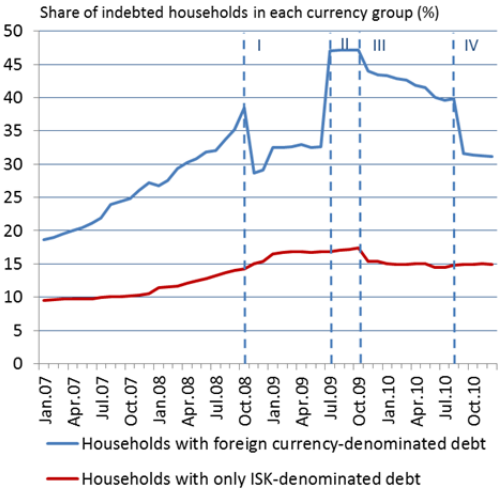
1. Number of households in the reference group with negative margin taking the 60 per cent buffer on the minimum living expenses into account. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.1c
Share of indebted households in distress by income quintiles in the baseline scenario[1]



1. I. Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.1d
Share of indebted households in distress by currency-denomination of debt in the baseline scenario[1]



1. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

have measured roughly 27 per cent in January 2009 (approximately 6 percentage points higher than in the baseline scenario) and would have peaked at 27½ per cent in September 2009. Thereafter, it would have declined gradually to about 24½ per cent in December 2010. This corresponds to 4,850 more households in distress than in the baseline scenario (see Figures 4.1a and 4.1b).

4.1.2 Results for specific groups of interest

Now we return to our baseline scenario and analyse how the extent of financial distress varies across different groups of households; for instance, according to income, currency denomination of debt, family type, and age.

Household income is one of the determinants of the probability of financial difficulties. This is unsurprising, as a household's income level determines its capacity to take on debt and cover necessary living expenses. It is then up to the individual household (and possibly its creditor, if it is credit-constrained) to decide to what extent it makes use of this capacity. We analyse the share of households in financial distress across different income quintiles. The results clearly show that the degree of financial distress is inversely related to income.

The share of households in distress at the beginning of the period varies widely across income quintiles. For instance, it is assessed at roughly 27 per cent in the lowest income quintile, 11½ per cent in the middle group, and only 2 per cent in the highest income quintile. The scope of financial distress also varies at the end of the four-year period. It measures just shy of 47 per cent in the lowest income quintile group, roughly 20 per cent in the middle income quintile, and only 2 per cent in the highest income quintile group (see Figure 4.1c).[21]

Using the second-lowest income quintile as an example, the share of households in this group that were already in financial distress in early 2007 is estimated at around 17½ per cent. Following the financial crisis, the share in distress peaked at roughly 33½ per cent in autumn 2009. After payment smoothing of ISK mortgages was introduced, it fell gradually, to an estimated 26½ per cent at the end of 2010. In the two lowest income quintiles, the assessment indicates almost 14 thousand households were in financial distress at that time, which corresponds to 65 per cent of the total number of distressed households. It is therefore evident that low-income households are much more likely to have experienced financial difficulties than high-income households.

It is noteworthy that the results indicate that households in the second-highest quintile seem to have benefitted most from the recalculation of foreign-denominated loans, as the share in distress declined by 4.3 percentage points afterwards. For comparison, the decline was 1.2 percentage points in the lowest quintile and 2.3 percentage points in the second-lowest quintile. This reflects that high-income households were more likely to have foreign-denominated debt. Over half of all FX borrowers belong to the two highest income quintiles.

[21] It is likely that we overestimate the share of low-income households in distress, as we probably underestimate the income of students, who earn a large share of their income during the summer, and we are counting some young persons as individual households, due to the fact that they receive their own family number at age 18. However, when we compare the relative size of this age group within the lowest income quintile to the size of this age group within the distress group they are the same. Approximately 28 per cent of households in the lowest income quintile are in the age interval 18-24 years old and roughly 28 per cent of the lowest income households assessed to be in distress are in this age interval.

It is not just in terms of income that a clear pattern emerges regarding the extent of financial distress. The currency denomination of debt is also an important factor. We analyse the extent to which financial distress differs across households with at least some foreign-denominated debt (FX borrowers) and those with ISK-denominated loans only (ISK borrowers). In short, it is clear that the share of households in financial distress is considerably higher in the former group, although the recalculation of foreign-denominated and mixed loans has narrowed the difference between the two groups to a certain extent.

Around 18½ per cent of FX borrowers were already in financial distress in January 2007, compared to 9½ per cent of ISK borrowers. Distress among FX borrowers had increased to some extent in 2006 when the currency depreciated abruptly in the so-called mini-banking crisis. The share of FX borrowers in distress rose over the course of 2007, with the largest increase occurring in August, with the onset of the global financial crisis. Approximately 800 FX borrowers were then pushed into distress, as the exchange rate fell roughly 8 per cent that month. The currency depreciation gained momentum in early 2008, paused for a while over the summer months, and then continued in the autumn. Hence, roughly 38½ per cent of FX borrowers are estimated to have been in distress by the time the banks collapsed in October 2008, following the 50 per cent currency depreciation (using our constructed household debt exchange rate index). The share of FX borrowers in distress is estimated to have peaked at 47½ per cent after the temporary freezing of many FX loans ended in mid-2009, although this result should be interpreted with care as payments on many loans remained frozen beyond this point in time. Hence, the number of FX borrowers in distress had almost tripled from January 2007.

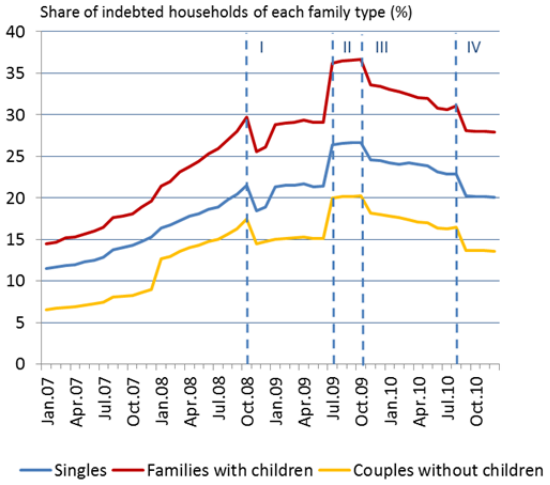
The share of FX borrowers in distress fell to 31 per cent (11,550 households) at the end of 2010 following further debt restructuring measures and recalculation of foreign-denominated and mixed loans. The recalculation was especially influential, as roughly a quarter of FX borrowers escaped distress following the recalculation (see Figure 4.1d).

The share of ISK borrowers in distress rose gradually, from below 10 per cent in early 2007 to 17½ per cent in the autumn of 2009. This represents a 75½ per cent increase in the number of ISK borrowers in distress over this period, when the consumer price index, to which a large share of this group's debt is indexed, rose by 32½ per cent. The share in distress fell by 2 percentage points when payment smoothing of indexed ISK mortgages is assumed to have begun, and remained close to 15 per cent throughout 2010 (see Figure 4.1d). This corresponds to over 9,400 households in distress at year-end 2010. Therefore, there is still a significant difference across currency groups despite the recalculation of foreign-denominated loans, as the share in distress is twice as high for FX borrowers as for ISK borrowers. This is the same relative difference as at the start of the period. A total of 11,580 FX borrowers were in distress in December 2010, as opposed to just shy of 9,420 ISK borrowers.

There is also a clear pattern in financial distress across different family types, as families with children are much likelier to experience payment difficulties than childless households. As early as January 2007, 14½ per cent of families with children were in distress. The share in distress rose until autumn 2009, when it peaked at 36½ per cent. It declined by 3 percentage points after payment smoothing of indexed ISK mortgages was introduced, continued to decline gradually until the recalculation of foreign-denominated loans took place when the share in distress fell by 3 percentage points. At the end of 2010, roughly 28 per cent

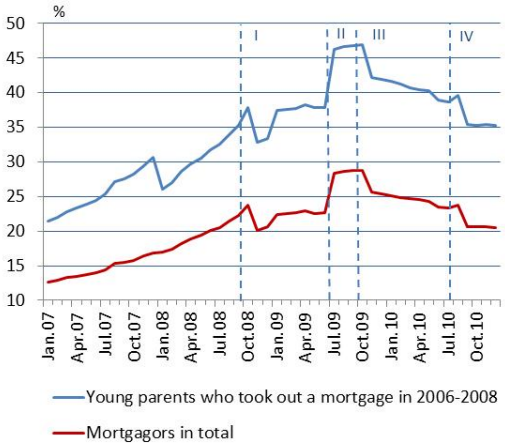
Figure 4.2: Evidence of financial distress from the financial margin analysis by family type, age and other groups

Figure 4.2a
Share of indebted households in distress by family type in the baseline scenario[1]



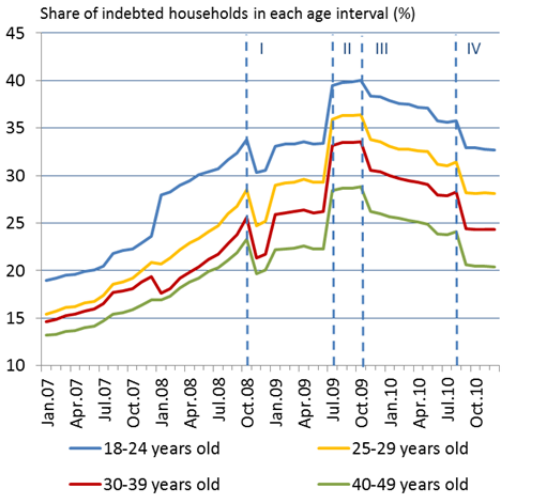
1. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.2b
Share of young parents who entered the mortgage market in 2006-2008 in distress compared to mortgagors in total[1]



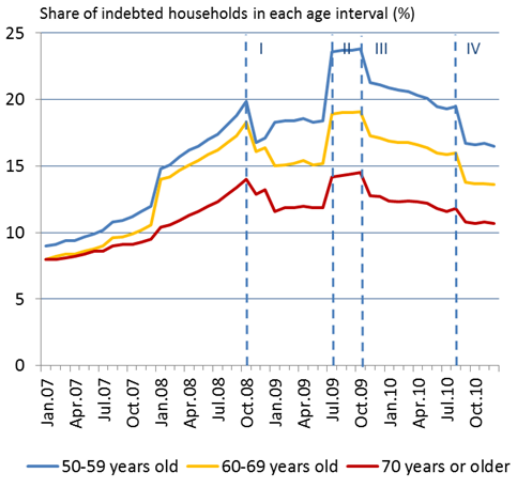
1. Share of households with the oldest member under the age of 40 who took out a mortgage in 2006-2008 with negative margin taking the 60 per cent buffer on the minimum living expenses into account. The baseline scenario allows for explciti debt restructuring and legal interventions.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.2c
Share of indebted households in distress by age in the baseline scenario[1]



1. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.2d
Share of indebted households in distress by age in the baseline scenario[1]



1. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

of indebted families with children were in distress (see Figure 4.2a). Hence roughly one out of every five children had parents in financial distress at year-end 2010.[22]

Childless couples are the least likely to be in financial distress. Only 6½ per cent of these households were in distress in early 2007. The share is assessed to have reached 17½ per cent by the time the banks collapsed, peaking at 20½ per cent in autumn 2009, and then declining to 13½ per cent. The share of singles in distress falls between the childless couples and those with children. One out of nine is assessed to have been in distress in early 2007. The share peaked at just shy of 27 per cent and then decreased to 20 per cent.

A particularly hard-hit group consists of young households with children that took mortgages late in the housing boom. Roughly 21½ per cent of these households were already in distress in January 2007, and by mid-2009 the share was nearly 47 per cent. At year-end 2010, approximately 35½ per cent of these young households were still likely to be in distress. This group includes nearly 6 thousand children, or almost 35 per cent of all children belonging to distressed families. Hence, distress is far more widespread within this group than among mortgagors in total where the share in distress evolves broadly in line with the development for the whole reference group (see Figure 4.2b).

Another noteworthy pattern concerning the extent of financial distress across different groups, partly related to the previous discussion, centres on age.[23] As expected, it is quite clear that distress is inversely related to age. The share in distress at the end of 2010 is roughly 32½ per cent in the youngest age group, 24½ per cent in the 30-39 age group, 20½ per cent in the 40-49 age group, and 11 per cent among indebted households whose oldest member is over 70 years old (see Figures 4.2c-d).[24] The 30-49 age group accounted for over a half of the total number of distressed households at year-end 2010. This is unsurprising, as this group includes households that are purchasing their first home and then trading up.

The effects of the crisis are also evident in changes to households' financial margin distributions across time. Not only did the extent of distress almost double in the run-up to the banking collapse but the extent of *acute financial distress*, defined as having a negative margin exceeding 100,000 kr. a month, close to quadrupled.[25] Most households in distress in January 2007 had only a small negative margin but the situation had deteriorated considerably when the banks collapsed. The share of households in acute distress almost quadrupled to 10½ per cent and a further roughly 13 per cent had a negative margin between 0-100,000 kr. (see Figure 4.3a). By December 2010, the share in acute distress was still just shy of 8 per cent (roughly 8,000 households) and 5 per cent (5,220 households) had a negative margin between 50,000 and 100,000 kr. Roughly half of all acutely distressed households at year-end 2010 were families with children, over 70 per cent of which had foreign-denominated loans.

[22] There are approximately 62,750 children in indebted families in our database. According to Statistics Iceland, the total number of children at the time of data compilation was 80,781. Hence roughly 18 thousand children are members of debt-free households.

[23] The extent of financial distress across different districts of Iceland is discussed in Appendix 3.

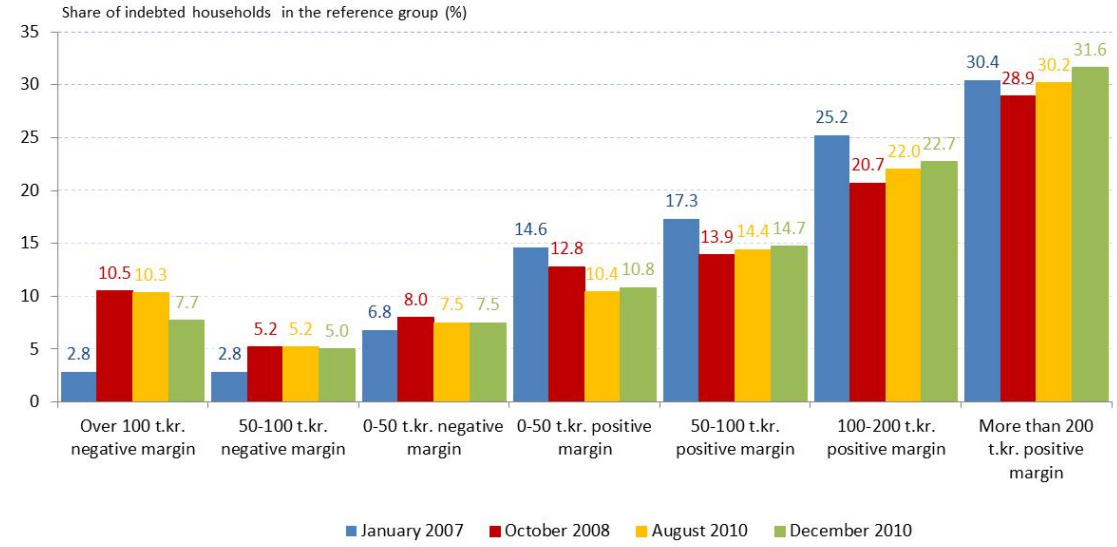
[24] Here, the same applies as in the case of the distribution across income quintiles: the share of indebted households in distress could be overestimated in the youngest age group due to the relatively large number of students in this group. It is also likely that some members of the youngest age group still live in their parents' homes. Furthermore, it should be kept in mind when interpreting these results that debt-free households are excluded from the analysis and that they are distributed unevenly across age groups.

[25] This corresponds to having a negative margin exceeding roughly €650 a month.

Figure 4.3: Comparison of financial distribution at different points in time for the whole reference group as well as FX borrowers

Figure 4.3a

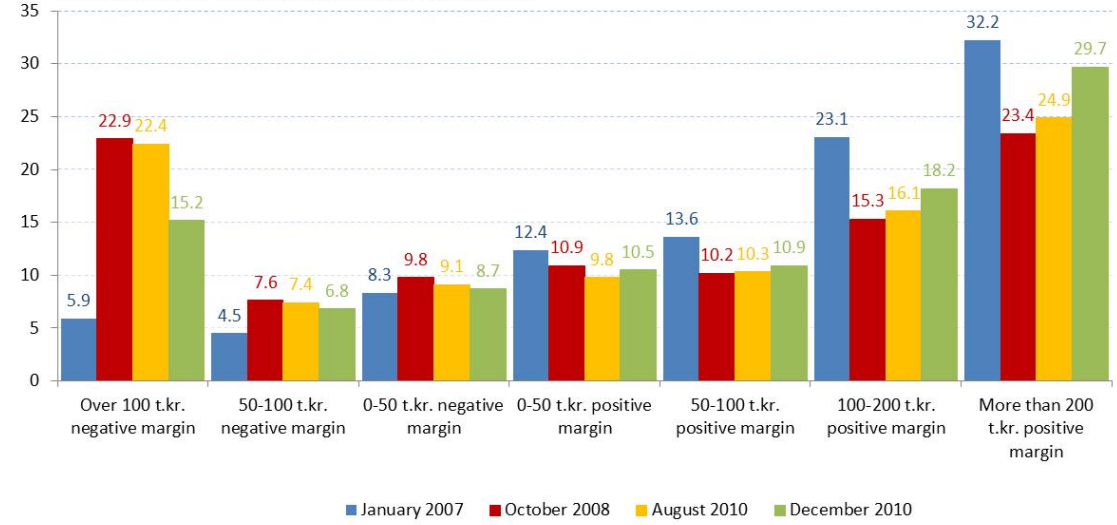
Comparison of financial margin distributions in the baseline scenario at different points in time



Source: Central Bank of Iceland Household Sector Database.

Figure 4.3b

Comparison of financial margin distributions at different points in time in the baseline scenario for households with foreign currency-denominated loans



Source: Central Bank of Iceland Household Sector Database.

Almost 6 per cent of FX borrowers were acutely distressed in January 2007 and they actually represented over 70 per cent of all households in that situation. The share of FX borrowers so acutely distressed had quadrupled to 23 per cent by October 2008 and was still at a similar level before the recalculation took place but decreased thereafter (see Figure 4.3b). It is also noteworthy that the share of FX borrowers with a large positive margin decreased considerably in the run-up to the banking collapse, but the group had almost reached its original size after the recalculation.

4.2 Comparison with the debt service ratio analysis

> *"All that Bjartur felt he could spare for sale that autumn went in wages and rates, leaving nothing for the interest and capital repayments on his loans – had he sold the whole lot it would have been but a drop in the ocean, anyway."*
>
> Laxness, H. (1934-35), *Independent People*, p. 519.

It is useful to verify the robustness of the results from the financial margin analysis by using other methods to assess the share of households likely to experience financial difficulties during this time period, in addition to the interesting comparison it provides. Therefore, we analyse households' debt service ratios and the share of households above specific danger limits, based on both their total debt service ratio and their mortgage debt service ratio.

4.2.1 Total debt service ratio

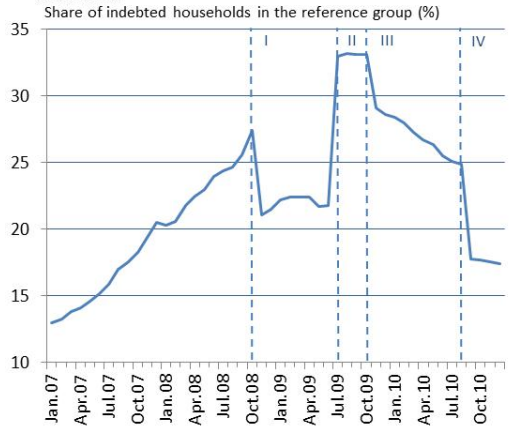
We compute the ratio of total debt payments to disposable income for each household (the total debt service ratio) and look at how the share of households with a total debt service ratio above 40 per cent developed over the reference period. As in the financial margin analysis, it is useful to analyse results based on both the entire reference group and specific groups, in addition to comparing the results to those from the financial margin analysis.

At the beginning of the period, in January 2007, an estimated 13 per cent of households in the reference group had a total debt service ratio above danger limits and were therefore likely to have financial difficulties (see Figure 4.4a). This is roughly the same share as was assessed to be in distress based on the financial margin analysis. In the prelude to the financial crisis, the extent of financial difficulties grew by all measures, and in the autumn of 2008 the share of households with a total debt service ratio above 40 per cent was estimated at 27½ per cent, or 4 percentage points higher than according to the financial margin analysis.

The share of households with a total debt service ratio above danger limits peaked at 33 per cent in the autumn of 2009, after payments on frozen foreign-denominated loans resumed and before payment smoothing of indexed ISK mortgages is assumed to have begun. The immediate impact of placing all indexed ISK mortgages in payment smoothing was to reduce the share of households with a total debt service ratio above danger limits by 4 percentage points, making the extent of financial difficulties by this measure very similar to that implied by the financial margin analysis. The share of households likely to experience financial difficulties declined gradually until the recalculation of foreign-denominated loans is

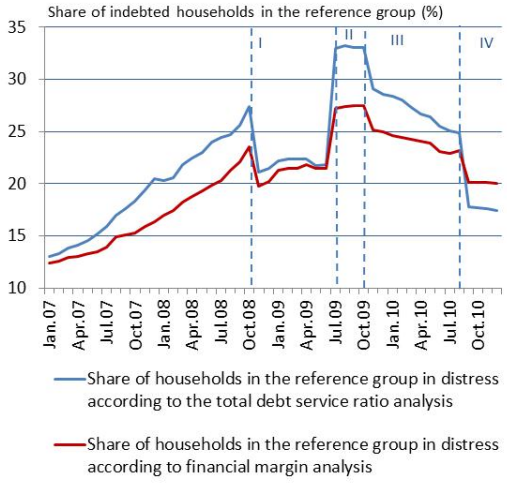
Figure 4.4: Evidence of financial distress from the total debt service ratio analysis

Figure 4.4a
Share of households with total debt service ratio above threshold levels in the baseline scenario[1]



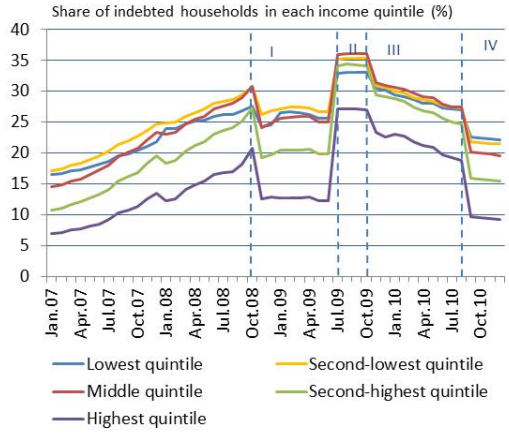
1. Threshold level is when monthly total debt payments exceed 40 per cent of disposable income. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.4b
Comparison of results from total debt service ratio and the financial margin analyses



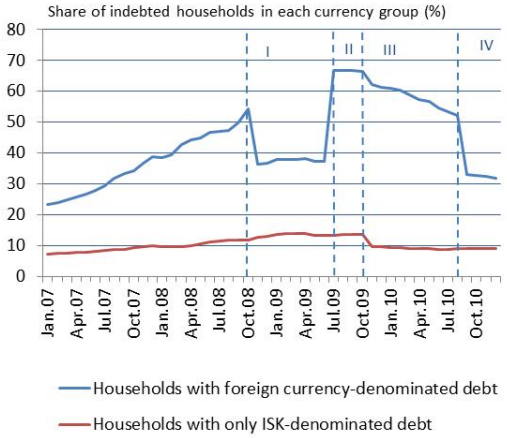
I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.4c
Share of households with total debt service ratio above threshold levels by income[1]



1. Threshold level is when monthly total debt payments exceed 40 per cent of disposable income. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.4d
Share of households with total debt service ratio above threshold levels by currency-denomination of debt[1]



1. Threshold level is when monthly total debt payments exceed 40 per cent of disposable income. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

assumed to take place. Roughly a quarter of households were likely to be in distress in August 2010, according to both the total debt service ratio and the financial margin analyses. However, the two measures diverge to some extent after recalculation took place, as the share of households that had to spend more than 40 per cent of disposable income on debt service fell by more than the share of households with a negative financial margin (taking the 60 per cent buffer on the consumer guidelines into account). Hence, at the end of 2010, around 17 per cent of households (17,500 households) had a total debt service ratio above danger limits, while roughly 20 per cent (or approximately 21,000 households) had a negative financial margin.

Comparing the assessment of households' financial difficulties based on total debt service ratio with the assessment based on financial margin shows that the overall results are similar and follow the same trends (see Figure 4.4b). This does not necessarily imply, however, that these measures identify the same households as distressed. A comparison of the share of households assessed to be in financial difficulties across different family types shows that the total debt service ratio analysis categorises a larger share of childless couples and couples with one child as distressed than the financial margin analysis does. At the same time, a smaller share of single parents is assessed to be in financial difficulties according to the total debt service analysis than according to the financial margin analysis. This reflects the difference of the two approaches. The total debt service ratio analysis does not take account of different living expenses across different family types, as the financial margin analysis does. Childless couples and couples with one child can easily spend more than 40 per cent of their disposable income on debt payments, and therefore be categorised as being in financial difficulties according to the total debt service ratio, and yet have enough left over after servicing their debt to cover necessary minimum living expenses and sustain a positive financial margin. On the other hand, many single parents and couples with a large number of children need to spend less than 40 per cent of their disposable income on debt payments but are nevertheless unable to service their debt and cover necessary living expenses at the same time. This is exactly why we prefer to base our assessment of financial distress on the financial margin analysis and use the debt service ratio analysis for comparison only.

A household's debt burden is highly dependent on its income profile (see Figure 4.4c). As expected, the share of households with total debt service ratios above danger limits is highest among lower-income households. However, across income quintiles there is little difference between the position at the beginning and the end of the reference period. Also, the difference between most income groups is not substantial. In December 2010, over a fifth of households in the lowest and second-lowest income quintile had a total debt service ratio above danger limits, as compared to 15 per cent in the second-highest quintile and 9 per cent in the highest quintile. This stands in contrast to the financial margin analysis where the share in distress was considerably higher, especially for low-income households that can be in distress when living expenses are taken into account despite having a low debt service ratio.

As expected, the results differ widely across currency groups, as households with FX loans sustained a massive shock to their debt service following the depreciation of the króna and rising inflation (see Figure 4.4d). As early as January 2007, 23 per cent of households with foreign-denominated debt had monthly debt payments exceeding 40 per cent of their disposable income. The share peaked at 2/3 of households in autumn 2009, after payment

freezing ended which is higher than according to the financial margin analysis. In December 2010, almost a third (12,100 households) still had a relatively heavy debt burden, even though the recalculation of FX loans managed to reduce the share from 52 per cent. The development is different for households with ISK-denominated debt only. In January 2007, over 7 per cent of these households had a heavy debt burden according to this measurement. The share then peaked at 14 per cent in February 2009 and had fallen to 9 per cent by the end of the reference period.

4.2.2 Mortgage debt service ratio

We also calculate the share of each mortgagor's monthly disposable income devoted to mortgage payments (the mortgage debt service ratio). We consider households whose mortgage debt service ratio is above 30 per cent likely to experience financial difficulties. As is mentioned above, this threshold is similar to benchmark danger point values commonly used in comparable research.

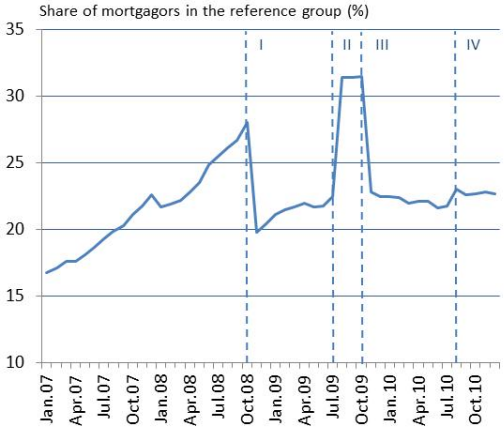
At the beginning of 2007, just shy of 17 per cent of mortgagors had a debt service ratio above 30 per cent, and by October 2008, the eve of the financial crisis, the share had gradually risen to 28 per cent (see Figure 4.5a). The share peaked at 31½ per cent in summer 2009. However, when payment smoothing of indexed ISK mortgages is assumed to have begun in November 2009, the share of households likely to be in financial distress by this criterion dropped by roughly 8½ percentage points to just shy of 23 per cent and is estimated to have remained at roughly this level until year-end 2010. This corresponds to approximately 17,450 households with mortgage payments high enough to increase the risk of financial difficulties substantially, at year-end 2010. According to this measurement of financial distress among mortgagors, it therefore seems as though payment smoothing of indexed mortgages was significant in reducing the share of households with a debt service ratio above the threshold level. Of course, this measure does not capture the possibility that other loan payments might put households into distress.

It is interesting to compare these results with those from the financial margin analysis even though the two measurements differ, as they show two indications of the extent of financial difficulties, albeit from different viewpoints (see Figure 4.5b). From the beginning of the reference period until freezing of foreign-denominated loans began, both estimates of the share of mortgagors in financial distress rose rapidly, although the share was around 4-5½ percentage points higher according to the debt service ratio analysis. Following the financial crisis, the two estimates followed a similar path, peaking in the 29-31½ per cent range in autumn 2009. When payment smoothing of ISK indexed mortgages is assumed to have taken place, there is a sharp decline in the share of mortgagors in distress according to mortgage debt service ratios. The share of households in distress according to financial margins does not decline as much, due to debt service of mortgagors' other loans not subject to payment smoothing. However, following the recalculation of illegal FX loans, the share of mortgagors in distress based on financial margins is assumed to have fallen abruptly, to just over a fifth of mortgagors, not far from the estimate of the share of mortgagors with a high debt service ratio. Overall, the results develop similarly during the reference period, but the effects of

Figure 4.5: Evidence of financial distress from the mortgage debt service ratio analysis

Figure 4.5a

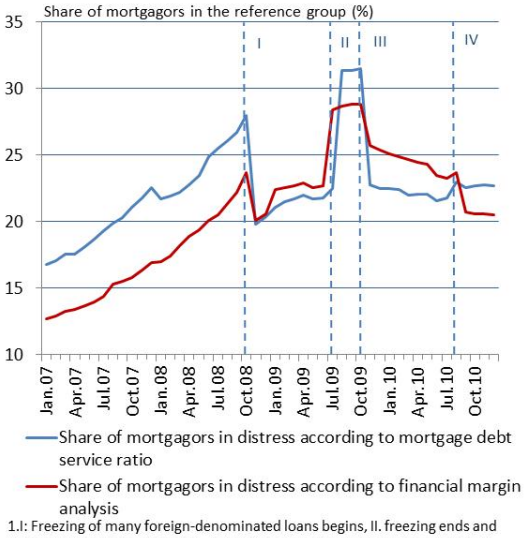
Share of mortgagors with mortgage debt service ratio above threshold level[1]



1. Share of all households in the reference group with mortgages. Threshold level is when monthly mortgage debt payments exceed 30 per cent of disposable income. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.5b

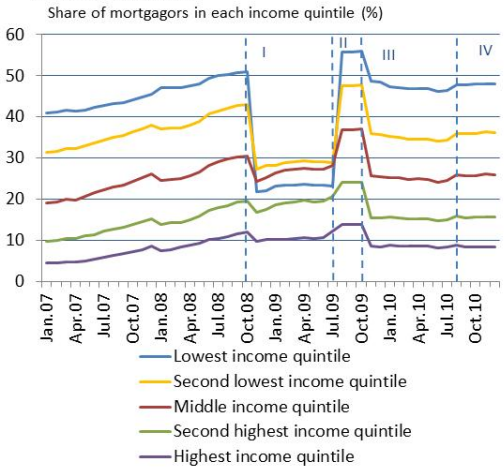
Comparison of results from mortgage debt service ratio and financial margin analyses



1.I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.5c

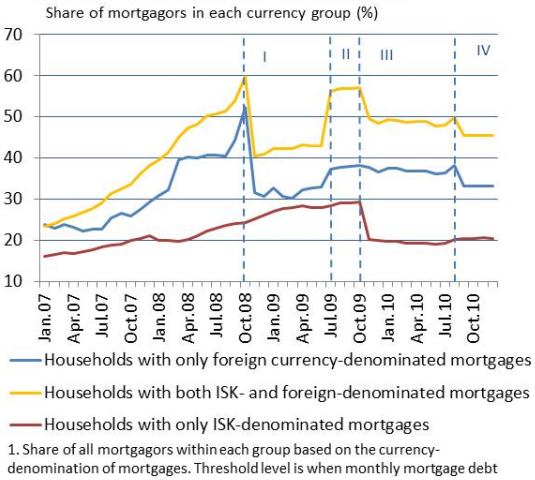
Share of mortgagors with mortgage debt service ratio above threshold levels by income quintiles[1]



1. Share of mortgagors within each income quintile having monthly mortgage debt payments exceeding 30 per cent of disposable income. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.5d

Share of mortgagors with mortgage debt service ratio above threshold levels by currency-denomination of mortgages[1]



1. Share of all mortgagors within each group based on the currency-denomination of mortgages. Threshold level is when monthly mortgage debt payments exceed 30 per cent of disposable income. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

freezing of FX loan payments are larger in the debt service ratio analysis since its results do not consider the rise in necessary living expenses. For the same reason and since debt service on motor vehicle loans is not considered, the effects of payment smoothing are larger in the debt service ratio analysis. Figures 4.5c and 4.5d show how the share of mortgagors with a mortgage debt service ratio above the threshold develops across income and currency groups.

4.3 Results of housing equity analysis

> *"People simply can't afford to live like civilised human beings, as has been so often demonstrated before, and will be again; even middle-class farmers can't afford it, and in a boom year at that. The only sensible course for ordinary folk, the only one that pays, is to live in a little hut on the same cultural level as the negroes of Central America, and to let the merchant keep a flicker of life going in them, as the Icelandic nation has been doing for a thousand years now. People take more upon themselves than they can manage if they aim higher."*
>
> Laxness, H. (1934-35), *Independent People*, p. 504.

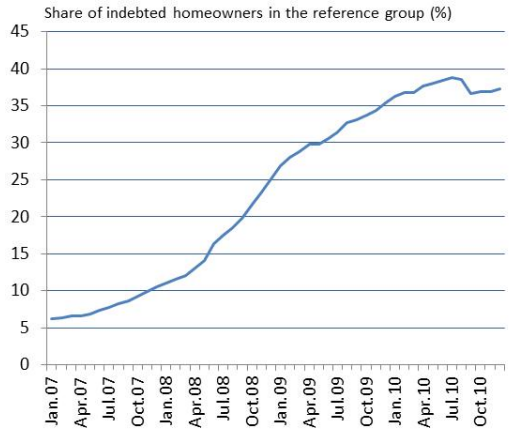
We assess each indebted homeowner's housing equity by relating the value of his/her property according to the constructed housing wealth profiles to the outstanding balance on the mortgage according to the constructed payment profiles. We are particularly interested in assessing the share of indebted homeowners in negative housing equity; i.e., those whose mortgage debt exceeds housing wealth, and to what extent this goes hand-in-hand with financial distress. However, we also look at changes in the distribution of housing equity in order to grasp the extent of the changes in households' housing equity due to the financial crisis.

Negative housing equity can affect indebted homeowners in at least three ways. First, it greatly reduces their bargaining power and can prevent mortgagors with (temporary) payment problems from getting out of distress by liquidating housing assets or negotiating debt restructuring with their creditors. Second, some mortgagors with negative housing equity may opt to default if they assess the costs associated with default to be lower than the costs of continuing to service the mortgage. Third, homeowners with negative housing equity cannot trade up or down in the real estate market in response to changes in family size, or in employment and income status.

For most countries it applies that a household ends up with negative housing equity if the decline in the price of the home from the peak exceeds the combined buffer comprising (i) initial equity (which is, again, a function of the loan-to-value ratio), (ii) the equity built up by house price increases from the house purchase to the peak of the housing prices, and (iii) the reduction in principal due to instalments made since the loan was originally taken. Research has shown that the design of mortgage contracts influences the risk of negative housing equity by affecting the first and third of the aforementioned factors (Ellis, 2008). Icelandic households are relatively more likely to end up in negative housing equity than households in many other countries due to the characteristics of Icelandic mortgage contracts. The first factor is the extensive indexation to consumer price inflation and exchange rate developments, which exposes the debt position to exchange rate and inflation risks. The

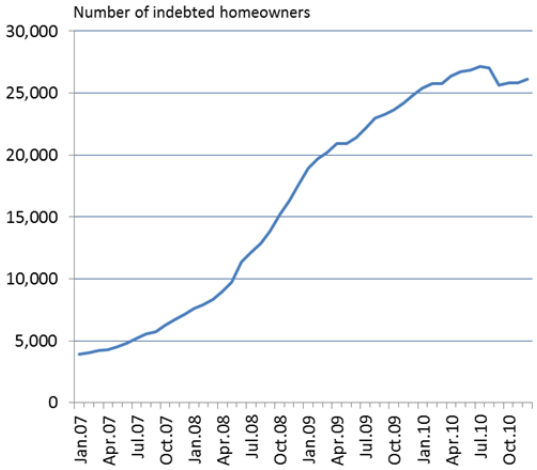
Figure 4.6: Results from housing equity analysis for the whole reference group

Figure 4.6a
Share of indebted homeowners in negative housing equity in the baseline scenario[1]



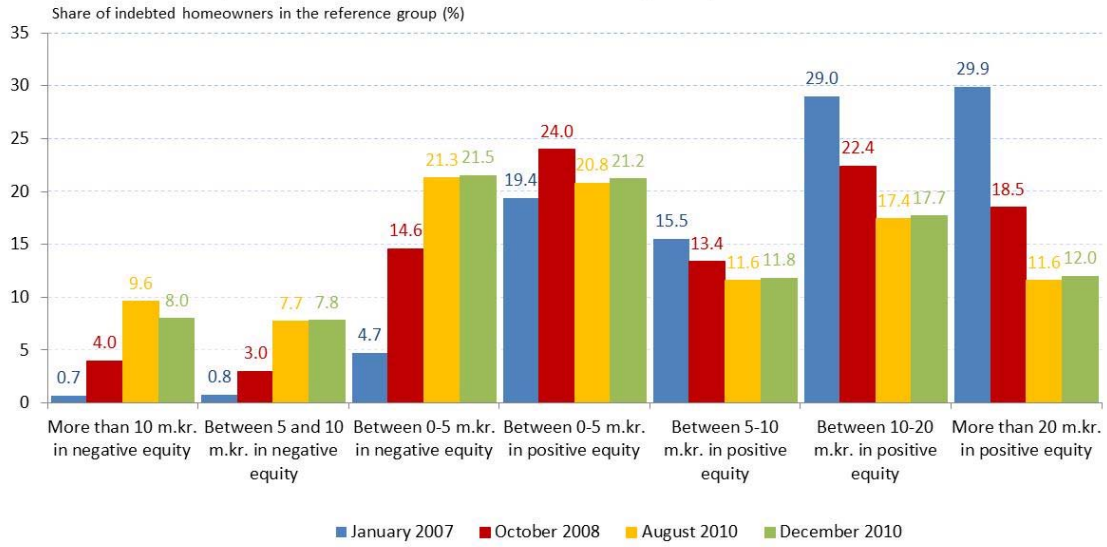
1. Share of homeowners in the reference group in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth. The baseline scenario allows for recalculation of foreign-currency denominated mortgages in August 2010.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.6b
Number of homeowners in negative housing equity in the baseline scenario[1]



1. Number of homeowners in the reference group in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth. The baseline scenario allows for recalculation of foreign-currency denominated mortgages in August 2010.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.6c
Comparison of housing equity distributions in the baseline scenario at the beginning and end of the reference period as well as at the eve of the banking collapse



Source: Central Bank of Iceland Household Sector Database.

second is the popularity of fully amortising payment loans with a long maturity (30-40 years), which means that debt payments consist mainly of interest payments for many years and reduction of principal through instalment payments progresses slowly. Third, like in many other countries, loan-to-value ratios were raised dramatically at the beginning of the housing boom, reducing households' ability to withstand adverse shocks to house prices and debt. Finally, the introduction of mortgage equity withdrawals made it possible for households to run down their equity without trading in the real estate market, which further increased the risk of negative housing equity under adverse conditions.

The incidence of negative housing equity increased considerably in the run-up to and aftermath of the crisis, as house prices declined and mortgage debt levels rose due to the currency depreciation and accompanying inflation on top of the rapid debt accumulation. The share of households with negative housing equity increased gradually from about 6 to 13 per cent from January 2007 to April 2008 and then rose at a more rapid pace thereafter. Almost 22 per cent of indebted homeowners were underwater at the time of the banking sector collapse, and by February 2009, when the currency had more or less stabilised, it had reached 28 per cent. The inflation spike and further house price declines made the share in negative housing equity continue to escalate even further (see Figures 4.6a and 4.6b). It peaked at almost 39 per cent before the court ruling and new legislation on foreign-denominated loans reduced it slightly, to 37 per cent. This corresponds to an increase from roughly 4,000 households in negative housing equity at the start of the period to roughly 26,000 households by December 2010. Hence, roughly 27 per cent of all homeowners (indebted and debt-free) were in negative housing equity at the end of the four-year period.

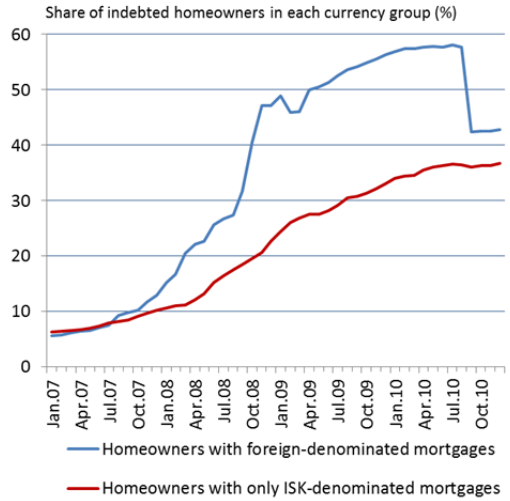
A comparison of housing equity distributions in the baseline scenario at different points in time over the reference period reveals the radical change that took place over this four-year period (see Figure 4.6c). Nearly 60 per cent of indebted homeowners had more than 10 m.kr. in positive equity over the first half of 2007. That share had fallen to 41 per cent by the eve of the banking collapse and measured just under 30 per cent at the end of the period. Hence the share of homeowners with considerable positive housing equity had shrunk by 45 per cent. Less than 5 per cent of homeowners had negative housing equity below 5 m.kr. at the start of the period, and 1½ per cent of homeowners had more than 5 m.kr. in negative housing equity. These groups grew rapidly over the period in question. Our results indicate that 21½ per cent of indebted homeowners were in negative housing equity by less than 5 m.kr. at year-end 2010, while almost 16 per cent were in the latter group. Hence the distribution of housing equity went from being heavily skewed towards positive equity in early 2007 to being more evenly distributed across negative and positive housing equity over the period.

4.3.1 Results for specific groups of interest

Consistent with the comparison of households in financial distress, it is interesting to view the results on negative housing equity across various groups. The results in Sections 4.1 and 4.2 revealed that income and currency-denomination of debt plays an important role in the extent of financial distress. Does the same apply to housing equity?

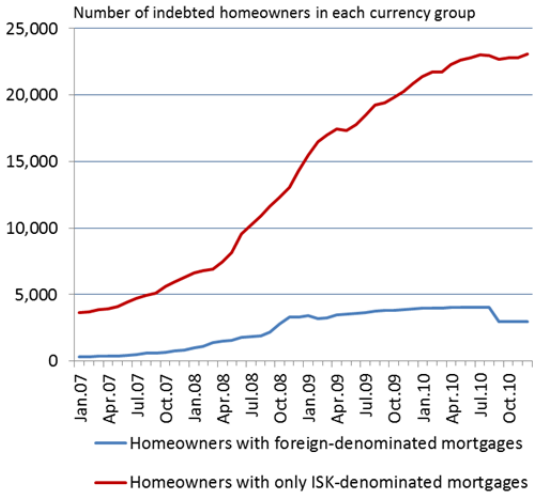
Figure 4.7: Results from housing equity analysis for households with different currency-denominated mortgages

Figure 4.7a
Share of homeowners in negative housing equity by currency-denomination of debt[1]



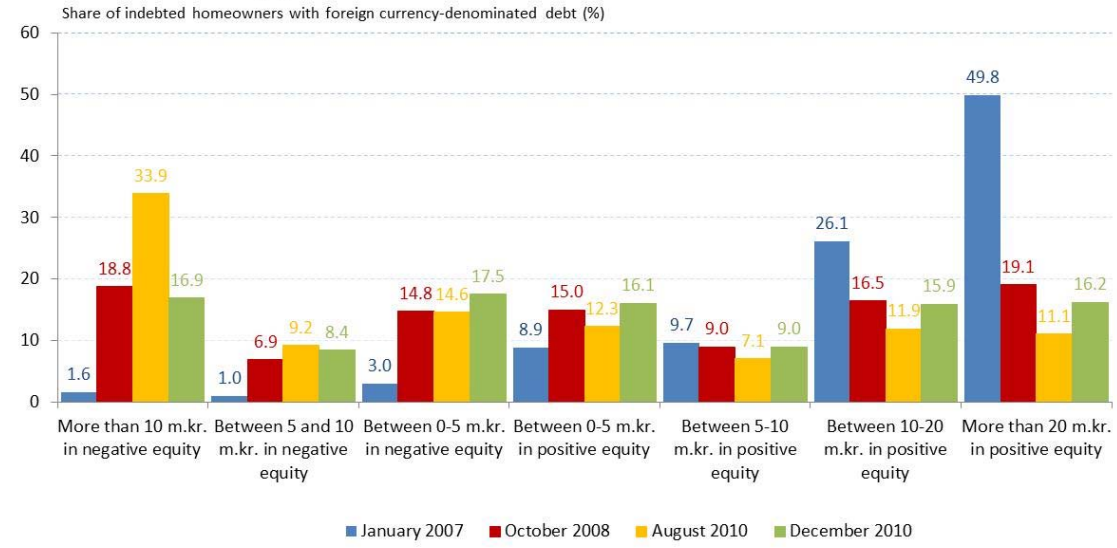
1. Share of homeowners in each currency group in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.7b
Number of homeowners in negative housing equity by currency-denomination of debt[1]



1. Number of homeowners in each currency group in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.7c
Comparison of housing equity distributions for homeowners with foreign currency-denominated mortgages



Source: Central Bank of Iceland Household Sector Database.

It is unsurprising that the share of households in negative housing equity is higher among FX mortgagors than those with only ISK-denominated mortgages, although the difference has narrowed due to the recalculation of FX loans.[26] The share in negative equity among ISK mortgagors increased steadily from 6½ per cent in early 2007 to 37 per cent in December 2010, which corresponds to a rise from 3,620 to 23,091 households. This share increased more sharply for FX mortgagors, especially over the course of 2008, peaking at 58 per cent in August 2010 before the recalculation of FX loans reduced it to 43 per cent. This implies that the number of homeowners with foreign currency-denominated mortgages in negative housing equity increased from only 315 in January 2007 to over 4,000 in August 2010 and then fell to just under 3,000 households after loan recalculation took place (see Figures 4.7a and 4.7b).

A comparison of housing equity distributions for homeowners with FX mortgages shows an abrupt change over the reference period. In January 2007, roughly 50 per cent of homeowners with FX mortgages had substantial positive housing equity (over 20 m.kr.) and 26 per cent had between 10 and 20 m.kr. in positive housing equity. Only 5½ per cent of FX mortgagors were in negative equity at this time (see Figure 4.7c). The situation was radically changed by the time of the banks' collapse in October 2008. The share of FX mortgagors with over 10 m.kr. in positive equity had fallen by 40 percentage points, and the share in negative housing equity had risen by 35 percentage points. The situation continued to deteriorate in the aftermath of the collapse, reaching a low point in August 2010 before the FX loan recalculation, when 18½ per cent of FX mortgagors (1,289 households) were more than 20 m.kr. in negative housing equity, one in six (1,079 households) had negative equity between 10 and 20 m.kr., and 24 per cent (1,660 households) were less than 10 m.kr. in negative housing equity. This reflects the fact that FX mortgagors were seriously underwater before recalculation; in addition, many had seen their equity deteriorate substantially, although they had not reached the stage of being in negative housing equity.

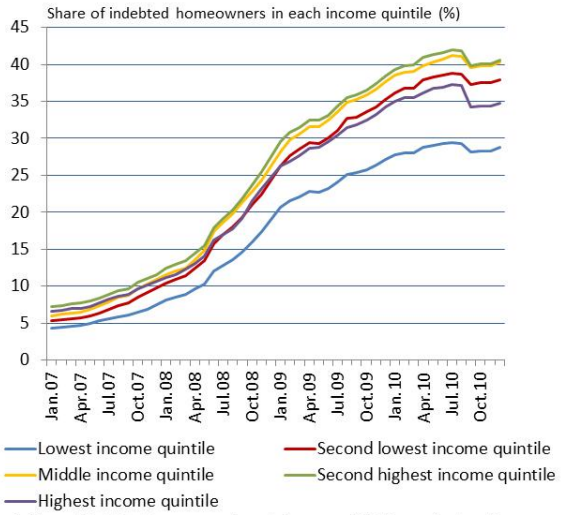
The debt position of many FX mortgagors improved after the recalculation of foreign-denominated loans. The share of FX mortgagors in negative housing equity fell by 17 percentage points (over 1,000 households), mainly reflecting a decrease in the group of FX mortgagors who were in negative housing equity by more than 10 m.kr. The share of FX mortgagors in this group was cut in half, decreasing from 34 per cent to 17 per cent as a result of recalculation. Furthermore, the share of FX mortgagors with more than 10 m.kr. in positive equity increased by 9½ percentage points. The number of FX mortgagors with a small amount of positive or negative equity did not change much from October 2008 onwards.

The housing equity distribution for homeowners with only ISK-denominated mortgages varied much less over the four-year period. The development is actually quite similar to that for the entire reference group, as is discussed in Section 4.3. This is not surprising, as the number of ISK mortgagors far exceeds the number of FX mortgagors.

[26] Not all households with mortgage debt are homeowners (or if they are we do not have information on their property value). In the following discussion of housing equity of FX mortgagors, we focus on the 7,550 households, who are homeowners, of a total of 8,842 households with foreign-denominated mortgages. In the same manner, we analyse housing equity of the 66,123 ISK mortgagors, who are also homeowners, and not the 9,803 households with ISK-denominated mortgages who do not own a home according to our database.

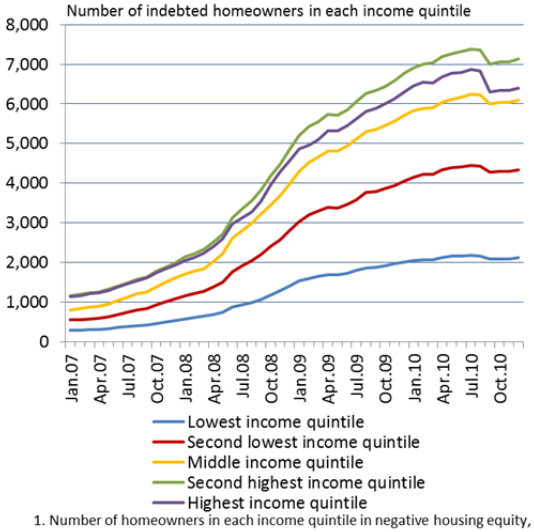
Figure 4.8: Results from housing equity analysis by income

Figure 4.8a
Share of homeowners in negative housing equity by income quintile[1]



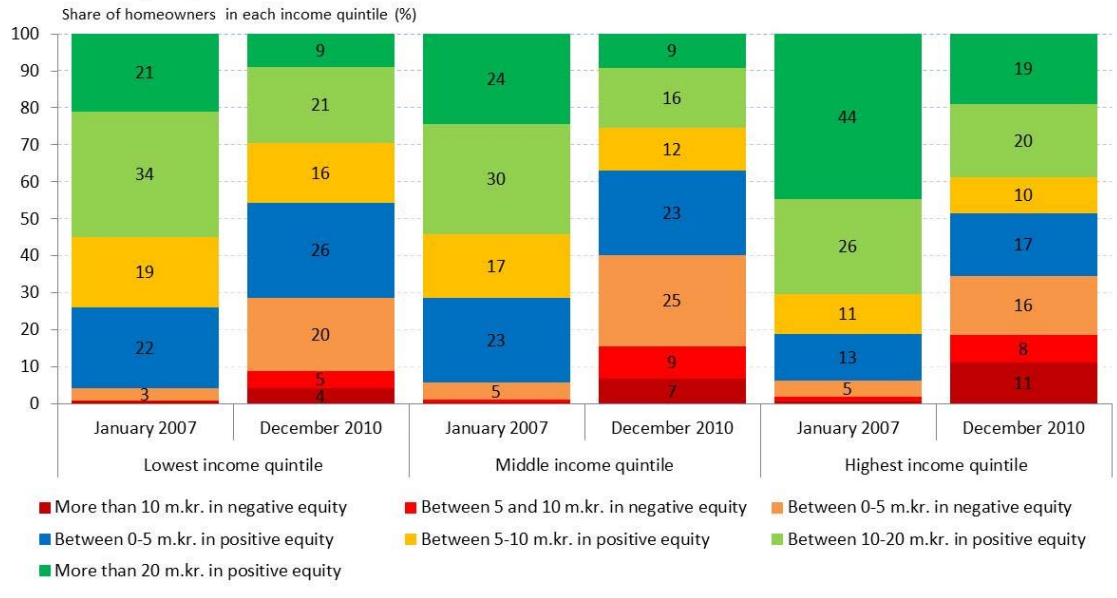
1. Share of indebted homeowners in each income quintile in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.8b
Number of homeowners in negative housing equity by income[1]



1. Number of homeowners in each income quintile in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.8c
Comparison of housing equity distributions in January 2007 and December 2010 for different income groups



Source: Central Bank of Iceland Household Sector Database.

Hence it is clear from the above that the currency-denomination of mortgages plays an important role in determining the incidence of negative housing equity. The share of indebted homeowners in negative housing equity is higher among FX mortgagors, although the recalculation has narrowed the difference considerably, but the fact is that a large majority of homeowners underwater are ISK mortgagors. Now we turn to income groups. Is there a clear difference in the incidence of negative housing equity across different income quintiles?[27]

Our analysis of the share of indebted homeowners in negative housing equity across income quintiles reveals that all income groups except the lowest one (which we discuss later) follow a very similar path over the four-year period. They all start off with a relatively low share in negative housing equity – between roughly 5½ and 7 per cent – and the share increases to between 19 and 24 per cent at the time of the banks' collapse. In August 2010, before recalculation of foreign-denominated loans takes place, all these income groups have between 37 and 42 per cent of indebted homeowners in negative housing equity. The effects of FX loan recalculation on the incidence of negative housing equity increase in line with income, as is discussed below. By year-end 2010, almost 35 per cent of homeowners in the highest income group were in negative housing equity, as opposed to 38 per cent of homeowners in the second-lowest income quintile (see Figure 4.8a).

Homeowners in the lowest income quintile seem to deviate from other income groups, as a smaller proportion is in negative housing equity throughout the four-year period. The share is almost 29 per cent at year-end 2010. It is interesting that roughly a fifth of indebted homeowners in the lowest income quintile had more than 20 m.kr. in positive housing equity at the start of the period. Furthermore, more than a third had between 10 and 20 m.kr. in positive housing equity at that time. Hence many low-income households had considerable ability to withstand adverse shocks to house prices and debt levels before falling into negative housing equity. This stands in stark contrast to their capacity to withstand the rise in debt service and living expenses that resulted from the crisis, as is discussed in Section 4.1.2.

The largest number of households in negative equity come from the two highest income quintiles. This holds throughout the four-year period. In December 2010, roughly 13,500 households in negative housing equity come from the two highest income quintiles, or more than twice as many as from the two lowest income quintiles (see Figure 4.8b). These results confirm that higher-income households were more heavily indebted than lower-income households, especially in FX mortgages, and were therefore more likely to end up in negative housing equity.

The recalculation of foreign-denominated mortgages reduced the incidence of negative housing equity across income groups. However, it is clear that these effects increase in line with income. The number of indebted homeowners in negative housing equity falls by 885 households in the two highest income quintiles, while only 240 households in the two lowest income quintiles escape from negative housing equity due to recalculation.[28]

[27] Homeownership increases in line with income, in our database it increases from roughly one-third in the lowest income quintile to $^5/_6$ in the highest income group.

[28] The relative decline is almost 3 percentage points in the highest income quintile, roughly 2 percentage points in the second-highest income quintile, 1½ percentage points in the middle and second-lowest income quintiles and 1.2 percentage points in the lowest quintile (see Figure 4.8a).

If we look beyond the share in negative housing equity in each income quintile and consider the entire distribution of housing equity for different income groups at different points in time, it is evident that many households, despite remaining in positive equity throughout the period, nevertheless experienced large declines in housing equity. Roughly 44 per cent of households in the highest income quintile had more than 20 m.kr. in positive housing equity at the start of the period, but this share had decreased by over 25 percentage points by December 2010. In fact, this comparison of housing equity distribution over the reference period is very similar to that for homeowners with foreign-denominated mortgages. Households in negative housing equity also fell deeper into negative equity as time progressed over the reference period, at least until recalculation took place. For example, the share of homeowners in the highest-income group whose outstanding mortgage balance exceeded the value of their property by more than 10 m.kr. had risen from less than 1 per cent to 11 per cent over the four-year period.

The change in the distribution of housing equity over time is less extreme for other income groups. Nevertheless, the share of households with more than 10 m.kr. in positive housing equity fell by 25-30 percentage points over the four-year period among those groups. In the three lowest income quintiles, there were large increases (17-22 percentage points) in the share of indebted homeowners whose outstanding mortgage balance exceeded their property value by less than 5 m.kr. (see Figure 4.8c).

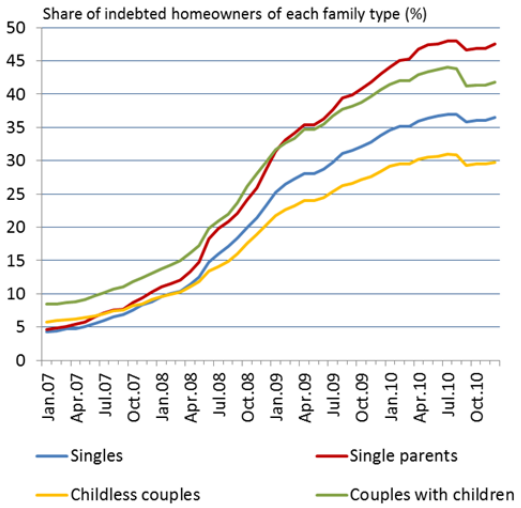
An analysis of the results on housing equity by family type reveals a pattern similar to that found in the results on financial distress. Families with children are more likely to end up in negative housing equity than other groups are. As expected, the most drastic increase occurs among single parents, 48 per cent of which were estimated to be in negative housing equity in December 2010, as opposed to 4½ per cent in January 2007. Almost 42 per cent of couples with children were in negative equity at the end of the reference period, compared to roughly 8 per cent at the beginning. Relatively speaking, childless couples are least vulnerable, even though almost 30 per cent of them were underwater at the end of 2010 (see Figure 4.9a). Similarly, childless couples were least likely to be in financial distress according to the financial margin analysis.

In terms of the number of households, the largest group of homeowners in negative equity during the four-year period are couples with children, with almost 10,700 likely to be in negative equity in December 2010, compared to approximately 2,000 at the beginning of 2007 (see Figure 4.9b). The second-largest group consists of singles, with over 7,700 in negative equity at the end of the reference period. The smallest group consists of single parents (2,200 at the end of 2010). Also, in the financial margin analysis, single parents were the smallest group in financial distress over the entire period, while singles were the most numerous group.

The recalculation of foreign-denominated mortgages seems to have been most effective in helping couples with children to emerge from negative housing equity. Almost 700 homeowners in that group moved into positive housing equity due to recalculation, as did 330 childless couples and 220 singles. Very few single parents emerged from negative equity following recalculation, however, as relatively few of them had FX mortgages.

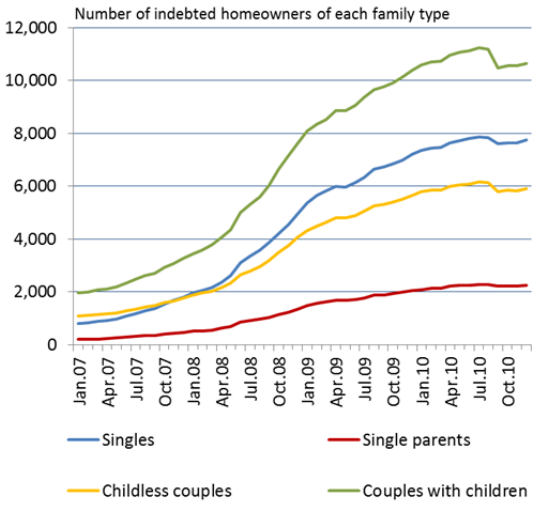
Figure 4.9: Results from housing equity analysis by family type

Figure 4.9a
Share of homeowners in negative housing equity by family type[1]



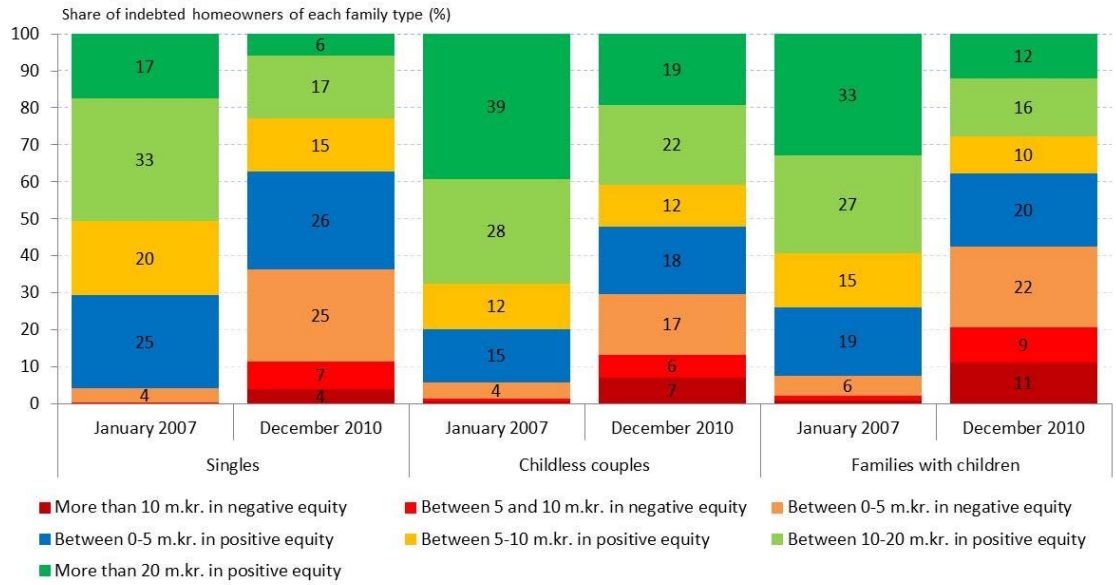
1. Share of indebted homeowners of each family type in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.9b
Number of homeowners in negative housing equity by family type[1]



1. Number of homeowners of each family type in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.9c
Comparison of housing equity distributions in January 2007 and December 2010 for different family type groups



Source: Central Bank of Iceland Household Sector Database.

If we consider the overall distribution of housing equity for different family types at different points in time, it is possible to analyse the extent of lost equity for these groups over the period, whether homeowners have fallen into negative equity or are still in positive equity. Childless couples had the strongest equity position in January 2007, with 67 per cent in positive housing equity by more than 10 m.kr., but by the end of the period the share had fallen to roughly 40 per cent. Families with children that had a comparable equity position experienced an even larger loss of equity position, as 28 per cent of them had more than 10 m.kr. in positive housing equity at the end of the period compared to 60 per cent at the beginning. Furthermore, families with children had the worst equity position in December 2010: one-fifth of them have a mortgage that exceeds the value of their property by more than 10 m.kr., compared to 13 per cent of childless couples and 11 per cent of singles. Among singles, the group with limited positive or negative equity (0-5 m.kr.) rises sharply during the reference period, from just under 30 per cent to around half (see Figure 4.9c).

Now, we assess developments in housing equity across different age groups. From the outset, we expect the share of indebted homeowners in negative housing equity to decrease as homeowners grow older, in line with the evolution in housing equity over the life span of the individual borrower. The results accord with these expectations, as homeowners in negative equity are more likely to fall into the 18-39 age group than any other. In terms of the number of households, however, the largest group of homeowners in negative equity during the four-year period are those in the 30-49 age group.

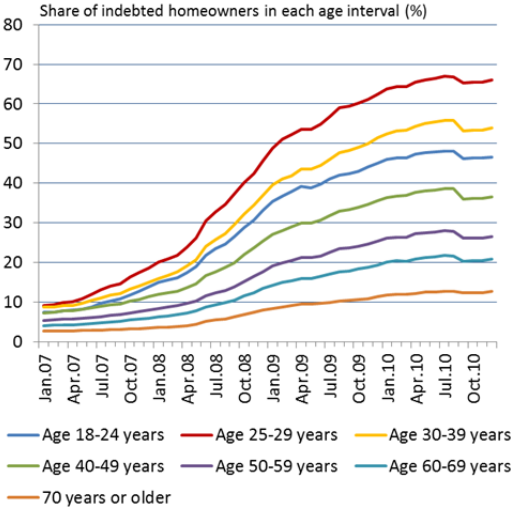
The most dramatic increase in the share of homeowners in negative housing equity is in the 25-29 age group, where a striking 66 per cent are assessed to be in negative housing equity at the end of 2010, as opposed to 9 per cent in January 2007. The increase was also large among homeowners in their forties: from below 9 per cent in early 2007 to roughly 54 per cent at year-end 2010. The share of indebted homeowners in their fifties and sixties in negative housing equity at year-end 2010 is assessed at 36½ and 26½ per cent, respectively. One-fifth of indebted homeowners in their seventies are in negative housing equity (see Figures 4.10a). It seems as the recalculation of foreign-denominated mortgages was most effective in helping homeowners in their forties and fifties to escape negative housing equity.

Analysing developments in negative housing equity among homeowners in different age groups can understate the effects of the crisis, especially in terms of capturing the decline in equity for households that remain in positive equity throughout the period but have nevertheless experienced a sharp drop in housing equity. In the same manner, it is interesting to shed light on how deep underwater homeowners in negative housing equity have sunk.

Homeowners in their sixties and seventies had the strongest equity position in January 2007. Around 40 per cent of each group had more than 20 m.kr. in positive housing equity, and close to 30 per cent had between 10 and 20 m.kr.; however, by year-end 2010 these shares had dropped to 20 and 22-24 per cent, respectively. Thus the effects of the crisis on these age groups are felt to a great extent through the loss of the strong positive equity position that they had accumulated in the run-up to the banking and currency collapse. A somewhat similar evolution can be seen among households in their fifties, while homeowners in their late thirties are more likely to move from limited positive equity to negative housing equity. About a tenth of homeowners in this age group are very seriously underwater, with

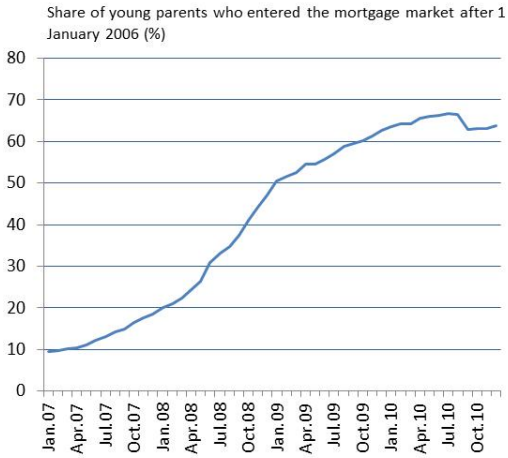
Figure 4.10: Results from housing equity analysis by age

Figure 4.10a
Share of homeowners in negative housing equity by age[1]



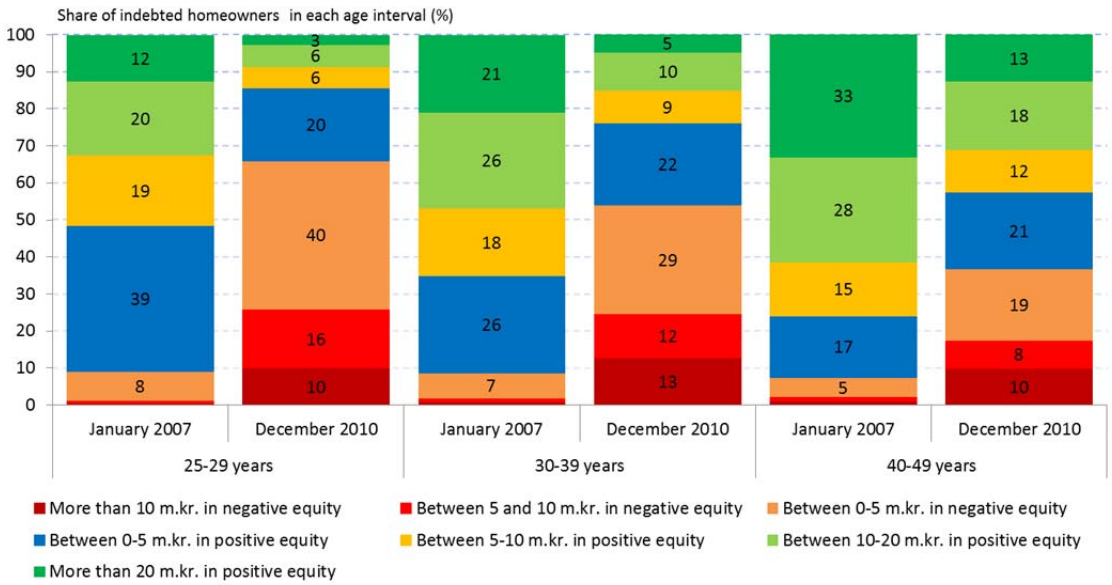
1. Share of homeowners in each age group in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.10b
Share of young parents and late enterers into the mortgage market in negative housing equity[1]



1. Share of young parents who entered the mortgage market after 1 January 2006 in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.10c
Comparison of housing equity distributions in January 2007 and December 2010 for different age groups



Source: Central Bank of Iceland Household Sector Database.

negative equity in excess of 10 m.kr. The share of homeowners in their forties with such a large debt overhang is even higher, or 13 per cent (see Figure 4.10c).

In light of the above-mentioned developments it is clear that young parents who entered the housing market late in the housing upswing were in an exceptionally vulnerable position as regards housing equity. Among these households, the share in negative housing equity rose rapidly over the reference period, reaching 64 per cent in December 2010, compared to just under 10 per cent in January 2007 (see Figure 4.10b).

4.4 Homeowners in both financial distress and negative housing equity: the findings

> *"Those people who owed more than they could ever pay were straightaway declared bankrupt, and might thank their lucky stars for being let off so lightly, but all those who had anything in them at all were allowed to hang on in their halter of debt, with their toes barely touching the ground, in the hope that they might be able to scrape at least the interest together with their broken and bleeding nails – a misfortune even greater, perhaps, than that of being bankrupted and kicked out empty-handed."*
>
> Laxness, H. (1934-35), *Independent People*, p. 506.

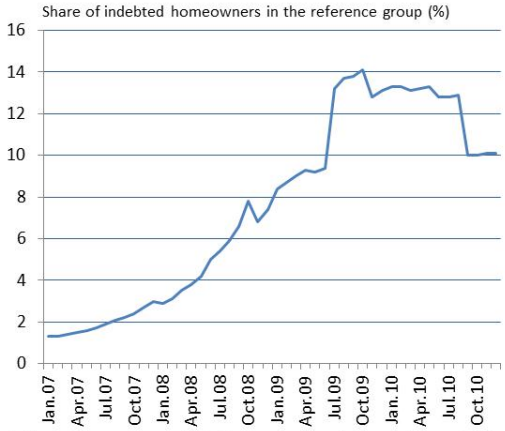
To some extent, households in financial distress have various methods of easing their financial burden and are not always in serious risk of default. They may be able to sell property or other assets, increase their participation in the labour market, work more hours, or renegotiate their loan structure or terms. If a household is in negative housing equity but can service its debt, it will run into difficulties if the property must be sold and debt paid off. In other cases, a homeowner who plans to live in housing that he/she owns and who can handle full mortgage payments will probably not experience financial difficulties despite being in negative equity. Moreover, in light of the rapid pre-crisis rise in indebtedness among Icelandic households, the overall rise in loan-to-value ratios, and the large number of newly issued mortgages with a loan-to-value ratio of up to 90-100 per cent, it is unsurprising that a relatively large number of households should be pushed into negative housing equity by shocks to their balance sheets. In order to estimate the size of the group in greatest danger of default, we assess the share of households that are in both financial distress and negative equity. As is mentioned above, research has shown that default results from a combination of payment problems and excessive debt relative to assets. It is therefore important to analyse the share and number of homeowners in this most vulnerable category, as well as their distribution across specific groups.

As with other measures of financial vulnerability, the share of homeowners in both financial distress and negative housing equity rose sharply over the reference period. At the beginning of 2007, only 1.3 per cent of indebted homeowners in the reference group were estimated to be in this vulnerable group. This share began to escalate shortly thereafter, rising to almost 8 per cent by the banking collapse. It then peaked at 14 per cent in October 2009 and had fallen to approximately 10 per cent by the end of 2010 (just under 7,000 homeowners). This corresponds to 7 per cent of all homeowners (indebted and debt-free)

Figure 4.11: Homeowners in both financial distress and negative housing equity, overall and by income

Figure 4.11a

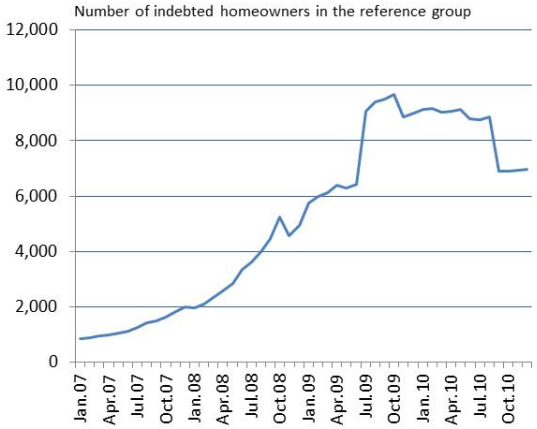
Share of indebted homeowners in both financial distress and negative housing equity[1]



1. Share of homeowners with both a negative financial margin (when the 60 per cent buffer is taken into account) and in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth. The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.11b

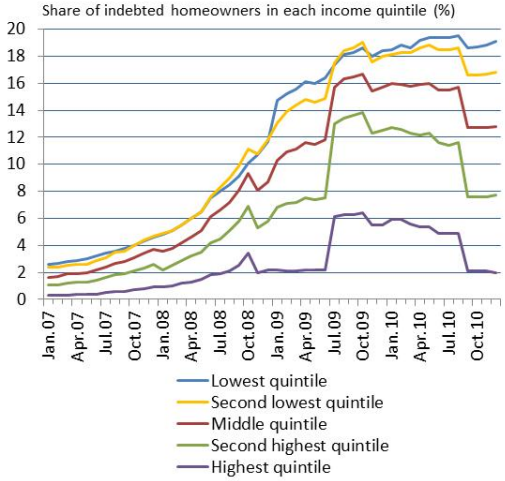
Number of indebted homeowners in both financial distress and negative housing equity[1]



1. Number of homeowners with both a negative financial margin (when the 60 per cent buffer is taken into account) and in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth. The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.11c

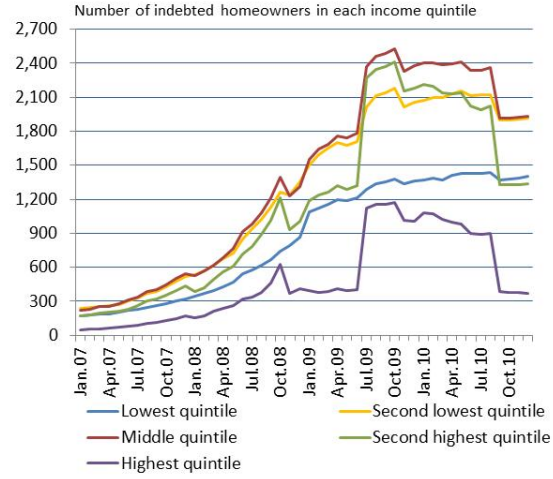
Share of indebted homeowners in both financial distress and negative housing equity by income[1]



1. Share of indebted homeowners in each income quintile with both a negative financial margin and in negative housing equity in the baseline . The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.11d

Number of indebted homeowners in both financial distress and negative housing equity by income[1]



1. Number of indebted homeowners in each income quintile with both a negative financial margin and in negative housing equity in the baseline scenario. The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

being in this vulnerable position. The recalculation of FX loans managed to reduce this group by almost 2,000 households (see Figures 4.11a and 4.11b).

As expected, lower-income homeowners were relatively more likely to be in both financial distress and negative housing equity throughout the time period. In fact, the two lowest income quintiles follow a similar path, where the share of homeowners with both payment and debt difficulties is estimated to have risen from around 2½ per cent in January 2007 to 17-19 per cent in December 2010. The second highest income quintile, however, developed broadly in line with the entire reference group, except that the share in severe financial problems at the end of the period is estimated at almost 8 per cent, which is lower than the share for the entire group. In December 2010, the majority of homeowners both in financial distress and negative housing equity came from the middle and second-lowest income groups (3,850 homeowners), whereas 1,400 homeowners in the lowest income quintile and 370 homeowners in the highest income quintile were so situated (see Figures 4.11c and 4.11d).

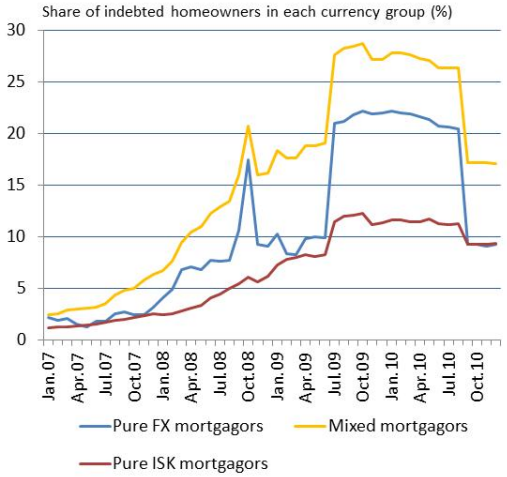
By these measures, homeowners in the second-highest income quintile benefitted the most by FX loan recalculation, with the share of homeowners in both financial distress and negative equity falling by 4 percentage points (700 homeowners). The corresponding reduction was estimated at over 500 homeowners in the highest income quintile and 450 middle-income homeowners. It is noteworthy that the share of homeowners in the lowest-income quintile declined by only 0.9 percentage points when FX loans were recalculated, a further indication that lower-income homeowners were less likely to have foreign-denominated debt than those with higher income.

The currency-denomination of debt plays a crucial role in whether homeowners are simultaneously in payment difficulties and negative housing equity. When the difference between currency groups is analysed by mortgage currency-denomination only, the share of mortgagors who had either pure FX mortgages or mixed mortgages and were in both financial distress and negative equity rose from approximately 2.5 per cent to 20 per cent in the case of pure FX mortgagors and 26 per cent for mixed mortgagors, right before FX loans were recalculated. By December 2010, the share had been reduced to 9 per cent and 17 per cent, respectively. For ISK mortgagors, the share rose from just over 1 per cent at the beginning of the period to almost 9½ per cent, the same as for pure FX mortgagors. However, when only taking mortgages into consideration, the majority of those both in financial distress and negative housing equity in December 2010, or 5,860 homeowners, were pure ISK mortgagors (see Figure 4.12a and 4.12b).

If the results are analysed by currency-denomination of overall debt – i.e., both mortgages and motor vehicle loans – there is a considerable difference in households' position over most of the reference period. The share of those homeowners that had foreign-denominated debt of some kind and were in both financial distress and negative equity rose from just over 2 per cent in January 2007 to almost 23 per cent in August 2010, before FX loan recalculation reduced it to approximately 16 per cent. The number of FX borrowers in severe financial difficulties has fluctuated over the period. In summer 2009, around 4,100 FX borrowers were in both distress and negative housing equity, but in October 2009, after freezing of FX loans ended, that number peaked at 7,000. At the end of the reference period, around 4,500 FX borrowers were in this position, almost 2,000 fewer than before loan

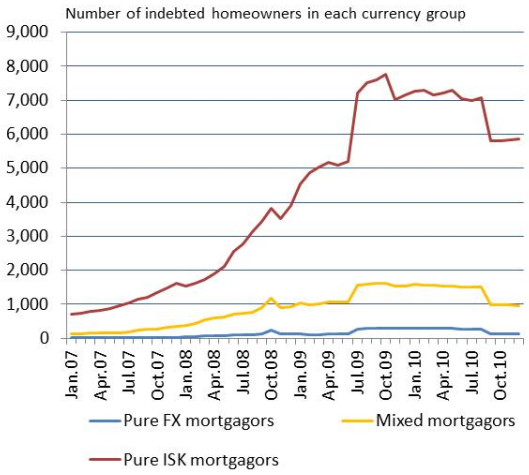
Figure 4.12: Homeowners in both financial distress and negative housing equity across currency groups

Figure 4.12a
Share of indebted homeowners in both financial distress and negative housing equity by mortgage currency-denomination[1]



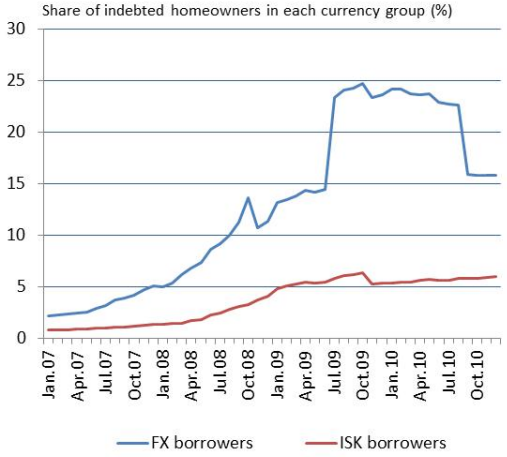
1. Share of mortgagors in each currency group with both a negative financial margin and in negative housing equity in the baseline . The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.12b
Number of indebted homeowners in both financial distress and negative housing equity by mortgage currency-denomination[1]



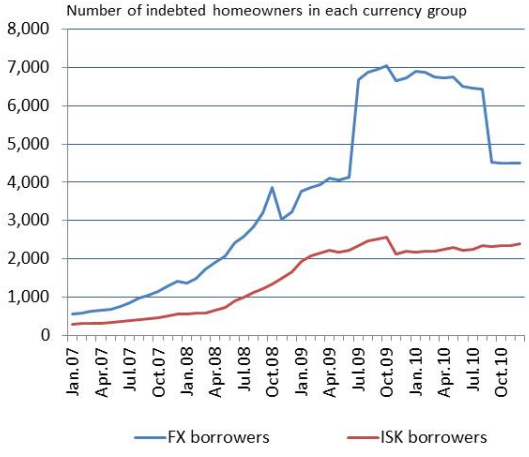
1. Number of indebted homeowners in each currency group with both a negative financial margin and in negative housing equity in the baseline scenario. The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.12c
Share of indebted homeowners in both financial distress and negative housing equity by debt currency-denomination[1]



1. Share of indebted homeowners in each currency group with both a negative financial margin and in negative housing equity in the baseline . The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.12d
Number of indebted homeowners in both financial distress and negative housing equity by debt currency-denomination[1]



1. Number of indebted homeowners in each currency group with both a negative financial margin and in negative housing equity in the baseline scenario. The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

recalculation. Therefore, a large majority of homeowners in severe payment and debt troubles had some kind of foreign-denominated debt. Homeowners that had ISK-denominated debt only were in a much less vulnerable position, as only 6 per cent of them were likely to be in both financial distress and negative equity at the end of 2010, up from just shy of 1 per cent four years earlier. The increase corresponds to roughly 2,000 homeowners (see Figures 4.12c and 4.12d).

When the results are viewed by family type, they confirm previous findings that families with children are most likely to experience payment and debt problems, as they are often buying their first apartment, are highly indebted, and have relatively high consumption expense. Only 2 per cent of families with children were in both financial distress and negative equity in January 2007. The share began to rise at that time and peaked at 18½ per cent in October 2009, before payment smoothing of indexed ISK mortgages began. In December 2010, around 13½ per cent of families with children were assessed to be in distress and negative housing equity, almost 4 percentage points lower than before FX loans were recalculated. In comparison, 8½ per cent of singles and over 6 per cent of childless couples fell into this category at the time. Therefore, at the end of 2010, a large majority of households in payment and debt troubles are families with children, or almost 4,000 homeowners, up from 510 four years earlier, while just shy of 1,200 childless couples and 1,800 singles were in that same position (see Figures 4.13a and 4.13b).[29]

The difference in homeowners' financial position across age groups reflects that, consistent with other evidence, the youngest age groups are relatively more likely to end up in severe financial difficulties. It appears that homeowners in the 25-29 age group are the most vulnerable, as the share in both distress and negative equity rose from just under 2 per cent in 2007 and peaked at 25 per cent in October 2009 before falling to 18½ per cent in December 2010. Approximately 14½ per cent of homeowners in the 30-39 age group and 10 per cent of those aged 40-49 were in the same position at that time. The share of homeowners in older age groups in this vulnerable group was between 3 and 7 per cent in December 2010 (see Figures 4.13c and 4.13d).

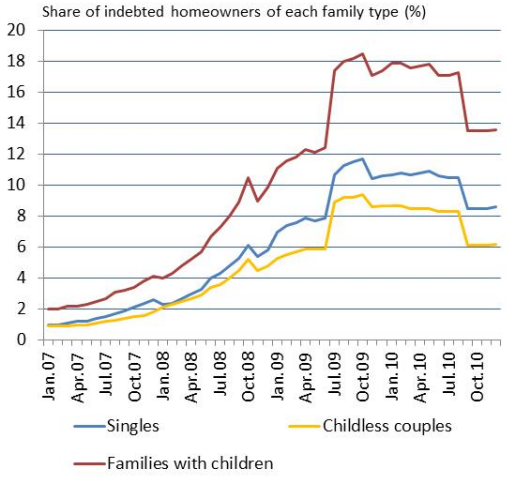
4.5 Effects of further measures: 110 per cent option, special interest rebates, and third-pillar pension fund payouts

Our analysis of the baseline scenario allows for explicit policy and legal interventions; i.e., freezing of payments on many foreign-denominated loans, payment smoothing of mortgages, and recalculation of foreign-denominated and mixed loans. Our income profiles also reflect important changes made to the tax system and benefit schemes over the period, where the tax burden of high-income individuals was increased and mortgage interest subsidies were temporarily raised. In 2010, 67 per cent of income tax revenue was collected from the highest income quintile, compared to 63½ per cent prior to the crisis. At the same time the tax share of individuals with below-median income declined from 24 to 20 per cent (IMF, 2012a). However, there are various policy measures that we have not included in the analysis, some of them introduced during the four-year period that we focus on and others implemented later.

[29] The possibility that the share of singles in financial distress is overestimated is less important in this case, as only homeowners are included.

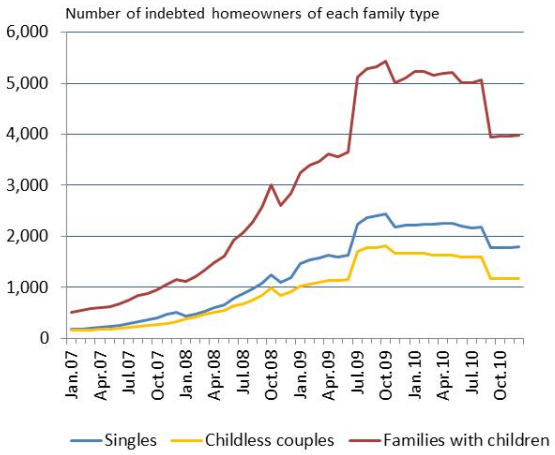
Figure 4.13: Homeowners in both financial distress and negative housing equity, by family type and age

Figure 4.13a
Share of indebted homeowners in both financial distress and negative housing equity by family type[1]



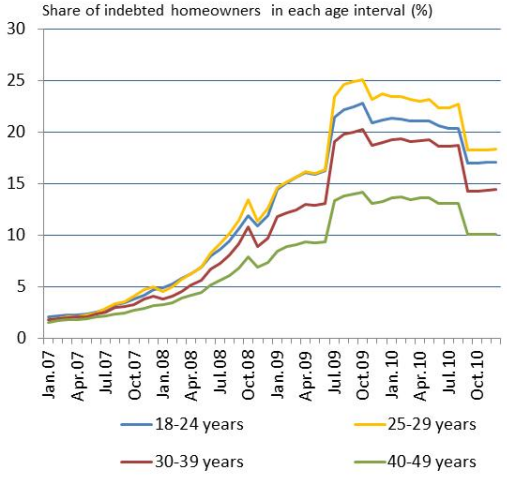
1. Share of homeowners of each family type with both a negative financial margin and in negative housing equity in the baseline . The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.13b
Number of indebted homeowners in both financial distress and negative housing equity by family type[1]



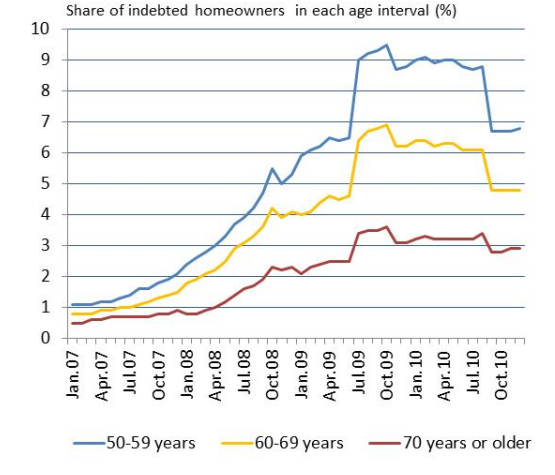
1. Number of indebted homeowners of each family type with both a negative financial margin and in negative housing equity in the baseline scenario. The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.13c
Share of indebted homeowners in both financial distress and negative housing equity by age[1]



1. Share of homeowners in each age interval with both a negative financial margin and in negative housing equity in the baseline . The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.13d
Share of indebted homeowners in both financial distress and negative housing equity by age[1]



1. Share of homeowners in each age interval with both a negative financial margin and in negative housing equity in the baseline . The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

An important measure – one that has been in place since the immediate aftermath of the banking collapse but is excluded from our analysis due to data limitation – is the third-pillar pension fund payouts that have been widely used by households. The question we address in this section is how likely it is that households in distress have been able to make use of this option. Furthermore, we analyse the effects of two further measures announced by the government and the leading financial institutions in December 2010, the end of our four-year period: the reduction of mortgage debt to 110 per cent of the property value, and a special interest rebate paid out in 2011 and 2012 and financed with a tax on financial institutions. These two measures reflect the two single most important measures implemented after our four-year period, and it is of special interest to us to assess the extent to which they change our findings, particularly those regarding financial distress, but also when distress goes hand-in-hand with negative housing equity.[30] In our view, this is the most salient problem faced by households as a result of the risk of their defaulting on their debt.

It should be noted that we cannot take account of various de-centralised debt restructuring measures, such as debt mitigation administered by the Debtors' Ombudsman and voluntary debt restructuring administered by the financial institutions. The Debtors' Ombudsman had received almost 4,000 applications for debt mitigation at the time of writing and had concluded 36 per cent of them, while financial institutions had received roughly 1,300 applications for the voluntary debt restructuring process and had processed 68 per cent of them. Write-offs related to voluntary debt restructuring have amounted to roughly 6.2 b.kr. (Icelandic Financial Services Association, 2012).

We calculate write-offs for each homeowner with mortgage debt according to his/her payment profiles exceeding 110 per cent of his/her property value according to the housing wealth profiles in December 2010. We take into account the limits on nominal write-offs (4 m.kr. for singles and 7 m.kr. for single parents and couples) but do not take into account further restrictions related to other assets (such as cars, deposits, vacation homes) that reduce the write-offs. Hence we assess that, due to the so-called 110 per cent option, almost 22 thousand households should receive 88.8 b.kr. in write-offs, with about 6,400 singles receiving 18.2 b.kr. and some 15,500 single parents and couples receiving 70.6 b.kr. The average write-off is 2.8 m.kr. for singles and 4.6 m.kr. for couples and single parents. According to data from the Icelandic Financial Services Association, roughly 16,500 applications for the 110 per cent option had been received at year-end 2011, and 11,700 had been accepted; just under 900 were still being processed, while the rest had been rejected. Write-offs due to the 110 per cent option amounted to almost 44 b.kr., or roughly half of our assessment. Most likely, this mainly reflects the fact that the restrictions we do not take into account have led to lower write-offs than are reflected in our assessment; furthermore, it is

[30] Changes have also been made to general mortgage interest subsidies and child benefits such that the former have to a larger extent than before been channelled to low-income households while the special child benefits for children under the age of 7 have been made income-dependent. Hence, low-income homeowners have likely received higher general mortgage interest subsidies in 2011 and 2012. However, middle- and high-income families with children may have experienced a loss of income from both lower general mortgage interest subsidies and lower child benefits. Middle-income families with children represent 47 per cent of all homeowners that are simultaneously in financial distress and negative housing equity, as discussed in Section 5.2, and these changes may have decreased their debt servicing capacity. Low-income singles may, on the other hand, have benefitted from higher mortgage interest subsidies, but they represent 22 per cent of the aforementioned group.

likely that many households that would have received only limited write-offs decided not to go through the process, given the uncertain and limited benefits. Roughly 2,600 households receive less than 1 m.kr. in write-offs according to our analysis, and almost 5,300 households receive less than 2 m.kr. It is clear that, in many cases, other assets, such as motor vehicles, deposits or vacation homes, would effectively render the applicants ineligible for write-offs.[31]

We analyse the distribution of the estimated write-offs due to the 110 per cent option. The two highest income quintiles receive 57 per cent of the write-offs, while the lowest ones receive 22 per cent. FX mortgagors receive 14 per cent and ISK mortgagors 86 per cent. More importantly, only 23½ per cent of the write-offs go to households in financial distress, households with a large positive financial margin receive 21½ per cent, and households in between these two groups receive the rest (see Figure 4.14a). The 110 per cent option improves the debt position of all those receiving write-offs, and although none is immediately moved into positive housing equity, the measure can help homeowners to return to positive equity much earlier than would otherwise have been the case.[32] But given our conviction that households in both financial distress and negative housing equity are the most vulnerable, it is interesting to assess how many households are helped out of distress by the 110 per cent option. We recalculate the financial margin of all homeowners receiving write-offs in relation to the 110 per cent option, and for the sake of simplicity we decrease the debt service burden on their mortgage by the same percentage as their mortgage balance decreased due to the write-offs. Our results show that only 650 households exit the distress state due to the 110 per cent option, reflecting the fact that less than a quarter of the write-offs were received by households in financial distress. Hence the share of indebted households in distress decreases by only 0.6 percentage points, to 19.4 per cent.

We calculate the special interest rebate for each mortgagor according to his/her debt and housing equity position in December 2010 based on his/her payment and housing wealth profiles.[33] In total, we assess that roughly 63,750 households (106,300 individuals) should receive 6.9 b.kr. due to the special rebate, which is close to the 6.3 b.kr. paid out to 102,600 individuals in 2011 according to tax data (Kolbeins, 2011: 45). The difference most likely reflects that we define all loans backed by real estate as mortgages, while the rebate is only based on loans actually used for house purchases. Households in the two highest income quintiles receive roughly 61 per cent of the total rebate, while the two lowest quintiles receive just shy of 19 per cent. Only 27 per cent of the rebate is received by households in financial

[31] A special committee set up to supervise debt restructuring in the banking system criticised the process for the 110 per cent option and raised concerns over the fact that fewer households than expected had availed themselves of it (see http://www.efnahagsraduneyti.is/media/Acrobat/Eftirlitsnefnd_.pdf, in Icelandic).

[32] Nominal house prices rose by 4 per cent in the greater Reykjavik area and in North Iceland in 2011, fell by 5 per cent in Reykjanes, rose by 6 per cent in West Iceland and East Iceland, rose by 9 per cent in South Iceland, and rose by 11 per cent in the West Fjords, according to data from Registers Iceland. Hence it is likely that the share of households in negative housing equity has been affected by these price developments, which took place after our reference period.

[33] The special interest rebate amounts to 0.6 per cent of mortgage debt at year-end 2010, although never exceeding 200,000 kr. per year for singles and 300,000 kr. for single parents and couples. The rebate is independent of income but dependent upon housing equity to some extent. Singles with more than 20 m.kr. in positive housing equity do not receive any rebate, and those with positive housing equity exceeding 10 m.kr. receive partial rebates. Similarly, single parents and couples with more than 30 m.kr. in positive housing equity do not receive the rebate, and those with between 15 and 30 m.kr. in positive housing equity receive partial rebates.

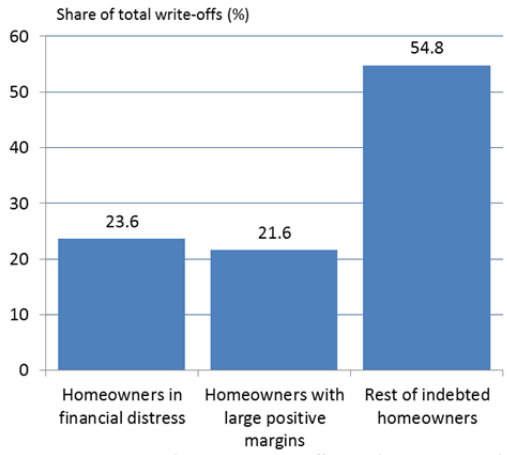
distress, much less than the 35 per cent share received by households with a large positive financial margin (see Figure 4.14b). We recalculate the financial margin taking the rebate into account for each household in distress prior to the rebate and find that only roughly 800 households exit the distress state because of it. Hence the share of households decreases by 0.8 percentage points. This reflects the fact that the majority of the rebate is paid out to households not in distress.

The final measure we wish to assess is third-pillar pension fund payouts. At the time of writing, roughly 74.6 b.kr. had been paid out to roughly 60 thousand individuals since March 2009. However, this measure has been extended and expanded on a number of occasions since its introduction in the aftermath of the banking collapse. Our database does not allow us to recognise which households are eligible to receive these payouts and which ones have actually made use of this option. However, using data from tax returns, we can compare how these payouts have been distributed across income quintiles against the likelihood of being in financial distress, which we find to vary greatly across income quintiles, as is discussed in Section 4.1.2. Our analysis of tax return data implies that roughly two-thirds of the pension fund payouts to singles and single parents in 2009 and 2010 were received by the highest income quintile, a fifth was received by the second-highest quintile, and the remaining 11½ per cent was received by the three lowest quintiles. This distribution stands out in stark contrast to the likelihood of being in financial distress, which is greatest in the lowest income quintiles and declines markedly as income increases (see Figure 4.14c). A similar story emerges from an analysis of couples, where the share of pension fund payouts increases in line with income while the extent of distress falls with rising income (see Figure 4.14d). This indicates that the majority of the third-pillar pension fund payouts were probably received by households not in financial distress. Therefore, the main contribution of this measure could entail supporting private consumption, economic growth, and employment more than directly lowering the extent of household distress, although there could be indirect effects through spill-over effects from stronger economic activity to households in financial difficulties.

In light of this assessment of the 110 per cent option, the special interest rebate, and the third-pillar pension fund payouts, it is clear that these measures are unlikely to have a profound effect on our findings concerning the extent of financial distress, which are presented in previous sections. Of course, the 110 per cent option affects the debt position of households and expedites homeowners' move into positive housing equity as house prices recover and debt is paid down. However, the question remains whether these measures, particularly the 110 per cent option and the special interest rebate, represent an efficient use of the limited resources available for debt restructuring. Should policy makers give greater priority to the fight against debt overhang than to the struggle against financial distress, as is reflected in the 110 per cent option? Should policymakers redistribute limited tax revenue raised by levying a tax on financial institutions to households, irrespective of whether they are in financial distress or not and regardless of their income? We return to these and other policy issues in Section 5.4.

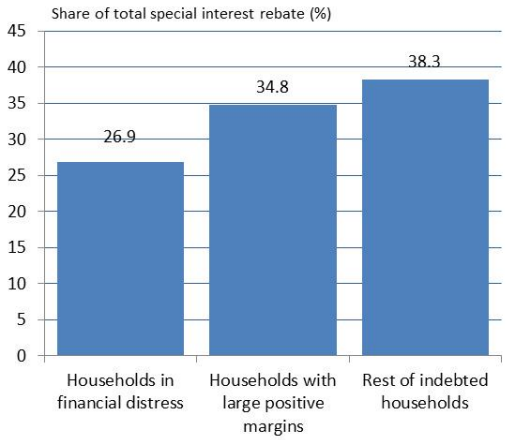
Figure 4.14: Assessment of the 110 per cent option, special interest rebate, and third-pillar pension fund payouts

Figure 4.14a
Distribution of write-offs due to the 110% option across homeowners in distress, those with large margins, and the rest[1]



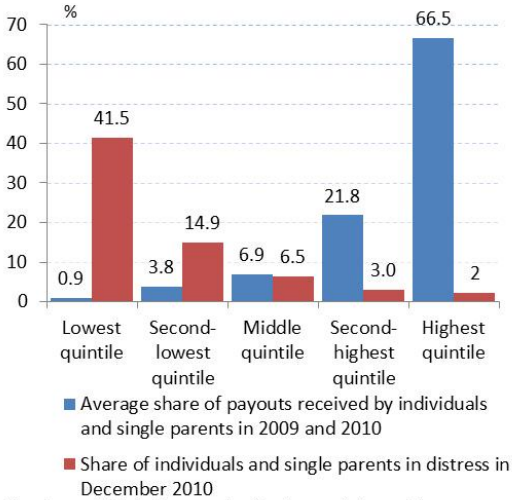
1. Maximum nominal amounts in write-offs are taken into account but not further restrictions, for instance, related to other assets and borrowed collateral. Homeowners with large positive margins are those with more than 200 t.kr. leftover after debt payments and minimum living expenses (with the 60 per cent added buffer).
Source: Central Bank of Iceland Household Sector Database.

Figure 4.14b
Distribution of the special interest rebate across households in distress, those with large positive margins, and the rest[1]



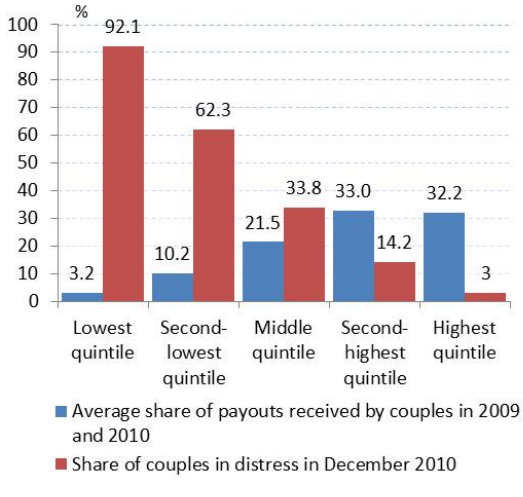
1. The special interest rebate is calculated for each household according to their debt and equity position based on their payment and housing wealth profiles in December 2010. Households with large positive margins are those with more than 200 t.kr. leftover after debt payments and minimum living expenses (taking the added buffer into account).
Source: Central Bank of Iceland Household Sector Database.

Figure 4.14c
Comparison of the likelihood of distress and third-pillar pension fund payouts across income quintiles[1]



1. The share of third-pillar pension fund payouts to each income quintile for 2009 and 2010 is based on tax return data while the share in distress is based on the financial margin analysis for December 2010. The income quintiles are not fully comparable across our database and tax return data.
Sources: Director for Internal Revenue, Central Bank of Iceland Household Sector Database.

Figure 4.14d
Comparison of the likelihood of distress and third-pillar pension fund payouts across income quintiles[1]



1. The share of third-pillar pension fund payouts to each income quintile for 2009 and 2010 is based on tax return data while the share in distress is based on the financial margin analysis for December 2010. The income quintiles are not fully comparable across our database and tax return data.
Sources: The Director for Internal Revenue, Central Bank of Iceland Household Sector Database.

4.6 International comparison

How does the financial position of Icelandic households compare to that of households in other countries hit by the global crisis or to earlier crisis episodes? International data on the extent of households' financial difficulties is scarce, and a comparison with data from individual countries can often be problematic due to differing definitions and metrics regarding households' vulnerabilities. Our preferred method of measuring financial distress is based on the financial margin analysis, but we also provide evidence based on debt service ratios. In this section, we provide some international comparison on the extent of households' financial difficulties, with a focus on evidence from micro data. First, we compare households' position in 2007, before the global financial crisis entered panic stage. Second, we provide some evidence on the situation at the end of our reference period in 2010. Third, we compare the evolution of financial distress in Iceland in the current crisis to developments in the Norwegian banking crisis in the late 1980s and early 1990s.

Our results indicate that, on average, roughly 14 per cent of indebted Icelandic households were in financial distress in 2007; the share rose from 12½ to 16½ per cent over the course of the year. According to survey data from Norges Bank, a similar share, or approximately 11½ per cent, of indebted Norwegian households had negative financial margins in 2007. Our results also indicate that, on average, roughly 16 per cent of indebted households in Iceland had to allocate more than 40 per cent of their disposable income to total debt payments in 2007. The share was only a little lower in the US, or 14.7 per cent, according to survey data (see Bucks *et al*., 2009). We can also compare households' debt service burden in Iceland and Canada. The only caveat is that research within the Bank of Canada tends to focus on the share of households that must use more than 40 per cent of their gross income on debt payments, while we use disposable income. However, based on the assumption that disposable income averages around 75 per cent of gross income, the Bank of Canada threshold corresponds to roughly 53 per cent on our scale. Roughly 4 per cent of indebted Canadian households had such a high debt service ratio in 2007 (Faruqui, 2008), while, on average, just shy of 12 per cent of indebted Icelandic households had a total debt service ratio that exceeded 53 per cent at that time (see Figure 4.15a).

These results regarding households' position in 2007 indicate that the share of Icelandic households with either a debt service burden exceeding common threshold limits or negative financial margins was only a bit higher than in Norway and the US, while the position of Canadian households seems to have been considerably stronger. Of course, these figures do not capture possible underlying vulnerabilities such as those reflected in the composition of liabilities, which can lead to dramatic changes in households' debt service burden in the event of adverse shocks.

The effects of the global crisis have been evident in an overall decline in asset prices, a contraction in consumption, a rise in unemployment, and a surge in non-performing loans and incidence of negative housing equity, as is discussed in Section 2. A comparison of non-performing loans across countries can therefore provide some evidence of the effects of the crisis. Non-performing mortgage loans as a share of total mortgage loans outstanding at year-end 2010 measured roughly 15 per cent in Iceland, 7½ per cent in the US, 6 per cent in Ireland, 2½ per cent in Spain, 2 per cent in the UK, and ½ per cent in both Austria and Canada (see IMF, 2012b). This implies that payment difficulties are more widespread in

Iceland than in most, if not all, other advanced economies. However, while households' financial position is improving in Iceland, it is still deteriorating in some other countries – Ireland, for instance. Hence it is interesting that, at year-end 2010, a similar share of indebted households seems to be likely to have experienced both payment and debt problems in Iceland and Ireland (see Figure 4.15b) (see Kennedy and Calder, 2011).

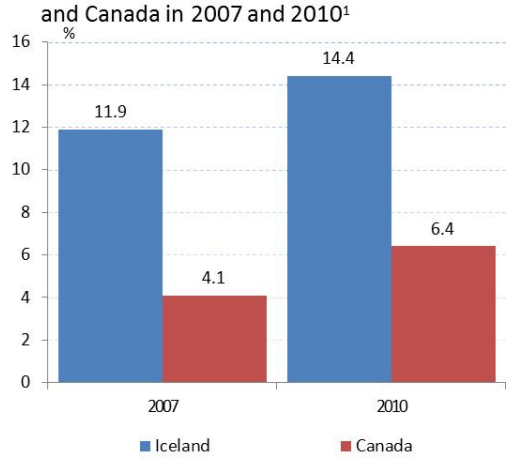
The incidence of negative housing equity in Iceland is also high in an international context. Our results indicate that 37½ per cent of indebted homeowners in Iceland were underwater at year-end 2010, compared to 31 per cent in Ireland, 23-28 per cent in the US in 2011, and 7-11 per cent in the UK in 2009 (see Kennedy and Calder, 2011; CoreLogic, 2011; Gittelsohn, 2011; Hellebrandt and Kawar, 2009). This is unsurprising in light of the combined effect of a drop in house prices and an increase in debt levels due to indexation to the consumer price index and foreign currencies in Iceland (see Figure 4.15c).

The Nordic banking crises in the late 1980s and early 1990s provide an interesting historical comparison to the crisis in Iceland, as well as for the global crisis in general. Norway, Sweden and Finland are small, open economies that underwent a boom-bust cycle where financial deregulation, rapid bank expansion, and low real after-tax interest rates contributed to strong credit and house price bubbles, as well as large increases in aggregate demand and accompanying current account deficits. In Figure 4.15d, the evolution of the share of indebted households with a negative financial margin in the Norwegian crisis is compared to our assessment of distress in Iceland in the current crisis. The Norwegian crisis began in 1988, when a cyclical economic downturn went hand-in-hand with some small bank failures; the crisis became systemic in 1991 but was more or less over in late 1993. The share of Norwegian households in distress was higher in the run-up to the crisis than what we assess for Iceland, but the two crises' peak level of distress is almost identical at 27½ per cent. Higher after-tax real interest rates, a slowdown of income growth, rising unemployment, and declining asset prices all contributed to increased distress among Norwegian households following the boom years in the mid-1980s. For instance, higher nominal interest rates, a decline in inflation, and changes to the tax system caused the real after-tax interest rate for an average Norwegian household to increase from zero in 1987 to more than 7 per cent in 1992 (Norges Bank, 2004).

It is interesting to compare the pace of the decline in distress in the two crisis episodes. It took roughly 7 years for the share of indebted households in distress to fall to 20 per cent in Norway, while we assess that the same decline was achieved in just 15 months in Iceland (from October 2009 to December 2010). No household debt restructuring measures were introduced in the Norwegian banking crisis, but the welfare system provided important support to households' debt servicing capacity (IMF, 2012b). Hence it is interesting that our alternative scenario, where debt restructuring measures and the recalculation of FX loans are excluded, indicates that the decline in distress over the aforementioned 15-month period would only have measured 2.8 percentage points. The debt restructuring measures have therefore played an important role in the relatively more rapid decline in distress among Icelandic households compared to that achieved in the Norwegian banking crisis.

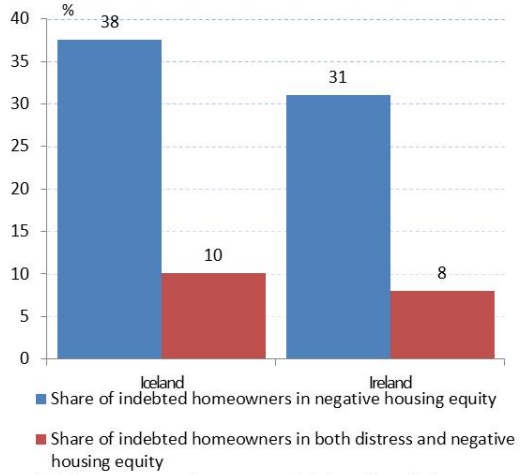
Figure 4.15: International comparison of households' financial difficulties

Figure 4.15a
Comparison of payment difficulties in Iceland and Canada in 2007 and 2010[1]



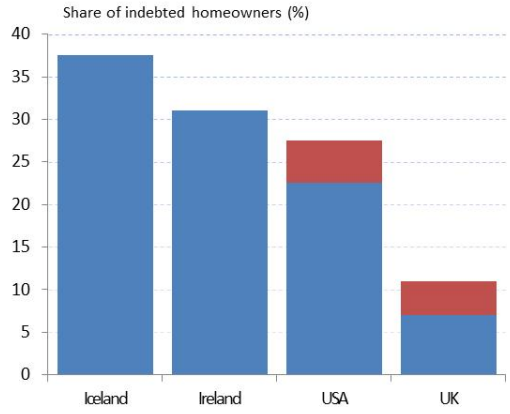
1. The figure shows the share of indebted households with a total debt service ratio exceeding 53 per cent. The Canadian data is based on the share of indebted households having to use more than 40 per cent of their gross income on debt payments. As disposable income in Canada averages about 75 per cent of gross income, 40 per cent of gross income corresponds to 53 per cent of disposable income.
Sources: Faraqui (2008), Bank of Canada (2011), Central Bank of Iceland Household Sector Database.

Figure 4.15b
Comparison of payment and debt problems in Iceland and Ireland in December 2010[1]



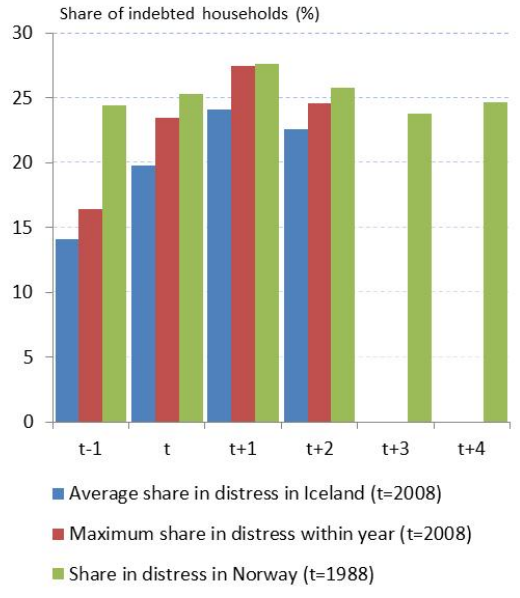
1. For Iceland: homeowners are in payment and debt problems if they are simultaneously in financial distress and negative housing equity. For Ireland: households are in payment and debt problems if they are simultaneously in negative housing equity and in some arrears.
Sources: Kennedy and Calder (2011), McGuinness (2011), Central Bank of Iceland Household Sector Database.

Figure 4.15c
International comparison of incidence of negative housing equity[1]



1. The values for Iceland and Ireland are for December 2010, the values for USA are for early 2011 and early 2009 for the UK. Values for USA and UK represents the interval of various estimates.
Sources: Kennedy and Calder (2011), CoreLogic (2011), Gittelsohn (2011), Hellebrandt and Kawar (2009), Central Bank of Iceland Household Sector Database.

Figure 4.15d
Comparison of financial distress in financial crisis in Norway and Iceland[1]



1. Households in distress are those with a negative financial margin.
Sources: Norges Bank, Central Bank of Iceland Household Sector Database.

4.7 Robustness analysis

It is useful to verify the robustness of our results and their relevance for households' current situation by comparing them with other evidence regarding households' financial position. In order to cast a clearer light on how our results should be interpreted, it is also useful to obtain a more accurate measure of the extent of the uncertainty surrounding the results. Comparison to existing evidence can indicate how much uncertainty exists.

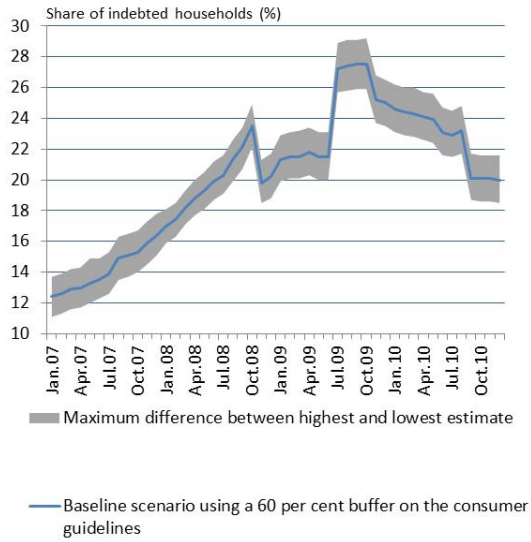
It is interesting to assess how the share of households in distress changes with different estimates of living costs, since such estimates are not beyond dispute. As has been discussed, we add a 60 per cent margin on top of the Debtors' Ombudsman's consumer guidelines for minimum living expenses for different family types in order to capture components missing in the guidelines. A possible method to shed light on the uncertainty about the effects of different estimates of living costs is to assess the extent of distress based on varying margins on top of the consumer guidelines. This makes it possible to obtain an uncertainty interval regarding the development of financial distress among households. Figure 4.16a shows the development of the share of households in financial distress over the period by adding a 50-70 per cent buffer on top of the consumer guidelines, with our baseline scenario showing the incorporated 60 per cent buffer. The results show that, according to this uncertainty interval, between 11 per cent and over 13½ per cent of households were likely to be in financial distress in January 2007. The share peaked at almost 30 per cent based on the upper limit but is assessed to have ranged between 18½-21½ per cent at the end of the period. Therefore, the results do not change dramatically with a change in the added buffer. Furthermore, these calculations indicate that if the added margin had been even larger – for example, 100 per cent – based on the assumption that necessary living expenses were higher, the share in distress would likely be closer to 26 per cent.

In the Statistics on Income and Living Conditions (SILC) survey, performed annually by Statistics Iceland, participants are asked whether they have been in arrears either on mortgage/rent payments or on other loans over the previous twelve months and how difficult it is for the household to make ends meet. Participants are also asked whether housing costs and payments on other loans are a heavy financial burden.[34] Figure 4.16b shows a comparison between the number of households in financial distress according to our estimates over the reference period and the SILC survey results on whether housing costs or payments on other loans are viewed as a heavy financial burden. More households were likely to be in financial distress during most of the reference period according to our results than according to the survey results, even though the two sets of results develop along similar lines. In 2010, when around 25,750 households were likely to be in financial distress, almost 20,000 claimed that housing costs were a heavy financial burden and 23,300 households answered that loans other than mortgages were a heavy burden. In 2011, however, the number of households in financial distress had declined to 21,000 and those that viewed other loans as a burden had declined to 18,400. On the other hand, more households or 23,100, considered housing costs to be a heavy burden. This comparison indicates the possible interval for the number of households experiencing financial difficulties in 2011.

[34] Due to sample uncertainty the estimated results from the SILC survey are presented with an uncertainty interval, here we use the estimated numbers.

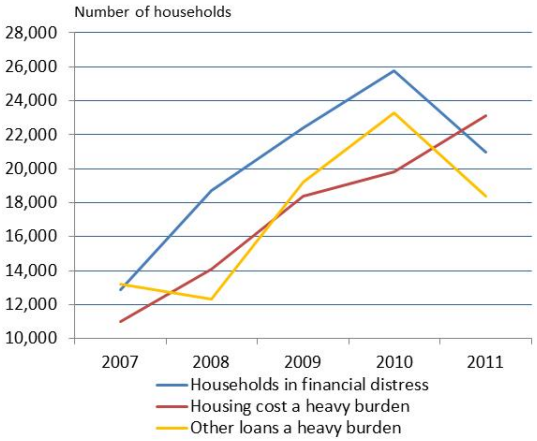
Figure 4.16: Robustness analysis

Figure 4.16a
Share of indebted households in distress based on different minimum living expenses[1]



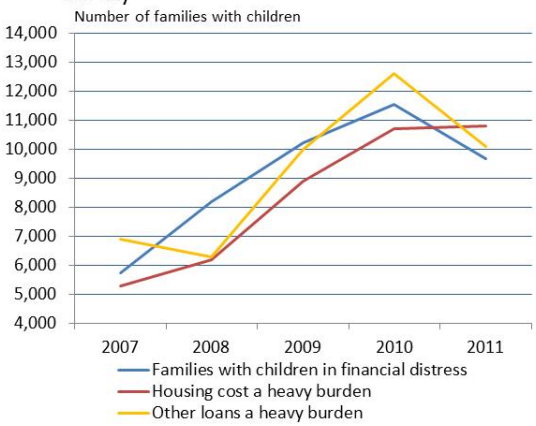
1. Share of indebted households in distress based on different buffers on top of the Debtors' Ombudsman minimum living expenses.
Source: Central Bank of Iceland Household Sector Database.

Figure 4.16b
Number of households in distress compared to those expressing debt service burden as heavy in Statistics Iceland SILC survey[1]



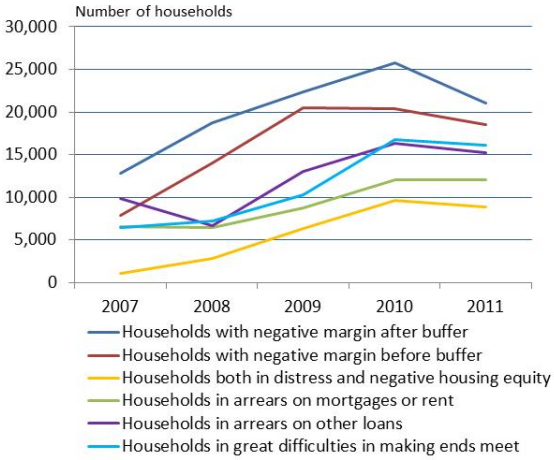
1. Households in financial distress is the average number of households in distress in January-May for each year as the SILC survey is usually conducted in that period. The value for 2011 is the number of households in distress in December 2010.
Sources: Statistics Iceland, Central Bank of Iceland Household Sector Database.

Figure 4.16c
Number of families with children in distress compared to those expressing debt service burden as heavy in Statistics Iceland SILC survey[1]



1. Families with children in financial distress is the average number in distress in January-May for each year as the SILC survey is usually conducted in that period. The value for 2011 is the number of households in distress in December 2010.
Sources: Statistics Iceland, Central Bank of Iceland Household Sector Database.

Figure 4.16d
Number of households in different degree of distress compared to those in arrears or great difficulties in Statistics Iceland SILC survey[1]



1. Households with negative margin is the highest number with negative margin in the 12 month period in the run-up to the undertaking of each SILC survey.
Sources: Statistics Iceland, Central Bank of Iceland Household Sector Database.

If only families with children, a group relatively more vulnerable than other family types, are considered, the difference between the various estimates is even less (see Figure 4.16c). The results concerning the number of families with children in financial distress coincide quite well with the number of those who cite other loans as a heavy burden for most of the period, which could indicate the importance of motor vehicle loans in contributing to households' financial troubles. Interestingly, according to all three estimates, between 9,500 and 10,800 families with children were in some kind of financial difficulties in 2011.

It is also interesting to compare the number of households in different degrees of financial difficulties to the number in arrears or in great difficulties making ends meet according to the SILC survey results. By all of these measurements, financial difficulties escalated considerably over the time period. In 2011, 12,100 households claimed to have been in arrears on mortgages/rent payments over the previous twelve months and 15,200 were in arrears on other loans, compared to 6,600 and 9,900, respectively, in 2007. Furthermore, in 2011, over 16,000 households responded that they had great difficulties in making ends meet, compared to 6,500 in 2007.[35] The number of households in financial distress (with a negative margin) according to our results exceeds the number of those in arrears or in great difficulties in making ends meet, both with an added buffer on living expenses and without it. However, when the added buffer is excluded, almost 18,500 households were estimated to be in distress at the end of the period, which is close to the survey results on the number of households in great difficulties in making ends meet and those in arrears on other loans (see Figure 4.16d).

If we focus on families with children, 8,800 households had been in arrears on other loans over the previous twelve months in 2011, compared to 6,100 in 2007. Our results on the number of families with children with a negative margin (excluding the added buffer) are of a similar magnitude during most of the period. Including the buffer on living expenses, however, more households of this family type, or 11,400, are assumed to be in financial difficulties at the end of the period.

CreditInfo, a firm that gathers and processes various credit-related information, collects information on how many individuals are in serious arrears at each point in time. According to CreditInfo, the number rose by around 10,000 individuals from the end of 2007 to the fall of 2011. Our results on the number of indebted households in financial distress show that, on average, 25,750 households were in distress in 2010, compared to an average of 12,850 in 2007, an increase of almost 13,000 households.[36] Even though these two types of measurements differ in that one measures when a household has entered into serious arrears on its loan payments and the other measures when a household is likely to have difficulties in making ends meet, they show a similar development over the period in question. It is also interesting that the number of households in both financial distress and negative housing equity increased by 8,600 over the same period.

[35] The subjective nature of this question must be highlighted due to the possibility of differing interpretation of the concept "to make ends meet". In addition, households' different living standards affect their possibilities of making ends meet which complicates to some extent the comparison with other evidence.

[36] Here we use the average number of households in distress in the comparison since some time usually passes since a household finds itself in financial troubles until it is registered in arrears at CreditInfo.

5. Interpretation of the findings

> *"It was about the same time as Ingolfur Arnarson was appointed Governor, and the National Bank resuscitated by means of several millions in share capital from the Icelandic State, that is to say from a certain bank in London, that there came a new manager to the Co-operative Society in the Fjord. "Things have got into a hell of a mess here", growled the new manager angrily, and the deeper he probed into the books the angrier he became, people's debt had been allowed to run far too high, things were in an awful state, precautionary measures of a most drastic nature would have to be taken immediately."*
>
> Laxness, H. (1934-35), *Independent People*, p. 506.

In this section we present an economic interpretation of our results and discuss their policy implications. For these purposes, we find it useful to continue distinguishing between two different types of financial difficulties faced by households: (i) payment problems due to financial distress, when household's disposable income is insufficient to cover both debt service and minimum living expenses, and (ii) debt problems due to negative housing equity, when the outstanding balance on a homeowner's mortgage exceeds the value of the underlying property. Furthermore, we are interested in the vulnerable group for which these two problems coincide. In Section 5.1 we focus on the main driving factors of financial difficulties. In Section 5.2 we consider the characteristics of the group of households in financial difficulties, for instance, in terms of income, currency-denomination of debt, and family type. Section 5.3 includes a discussion of the escalation of households' financial vulnerabilities, with emphasis on the role of banks' credit policies. Finally, we discuss some policy implications in Section 5.4.

5.1 Main determinants of households' financial difficulties

The accumulation of household debt in the run-up to the financial crisis in Iceland can be split into two phases (see Figure 3.3a). The former began in August 2004, when the newly privatised and lightly regulated commercial banks responded to looser lending standards at the state-owned Housing Financing Fund by entering the mortgage market with full force, empowered by enhanced access to foreign funding and increased balance sheet capacity. A massive credit boom, especially in indexed ISK-denominated mortgages, followed. The credit expansion lost momentum in early 2006 during the so-called mini-banking crisis, when concerns escalated over mounting evidence of overheating in the Icelandic economy and the banks' business model, especially their high dependency on short-term market funding and their interconnectedness (see, for instance, Fitch 2006, Danske Bank, 2006, and Moody's, 2006). As the banks' access to European debt markets grew tighter, they slowed the pace of new lending to households and the economy showed signs of adjustment as domestic demand eased. Unfortunately, at least in hindsight, concerns over the banking sector eased in the latter half of 2006, especially after an influential report on financial stability in Iceland by Mishkin and Herbertsson (2006) and the successful launch of foreign deposit accumulation.[37]

[37] They concluded that the "[b]alance sheets of both firms and households in Iceland appear to be quite well insulated from exchange rate shocks. […] In conclusion, a fall in the ISK is likely to increase household credit risks for the banking system, but only marginally. There is actually an upside for the banks from a fall in the ISK. As most of the debt is indexed, but liabilities only to a smaller extent, an inflation spike would thus benefit the banks" (Mishkin and Herbertsson, 2006: 45). It should be noted that this was written before the second phase of the household credit boom, when foreign-denominated loans became very popular.

Furthermore, hopes of continuing strong output growth were boosted in early 2007 by indications of further large investment projects in aluminium production and easing of fiscal policy in the run-up to parliamentary elections. Hence any signs of adjustment in the economy soon disappeared, and a second phase of rapid household credit expansion began in early 2007. This was an exceptionally costly endeavour, as it reflected, to a much larger extent than in the earlier phase, short-term foreign-denominated borrowing to finance motor vehicle purchases, although the mortgage market also showed clear signs of recovery. The household sector would therefore have fared better in the crisis if this "after-party", where excessive motor vehicle debt was added to the already high level of mortgage indebtedness, had not taken place.

The main strength of our approach of combining a detailed nationwide household-level dataset with the construction of profiles for payments, income, living expenses, and housing wealth lies in our ability to capture the combined effects of the increased indebtedness during the credit boom and the massive shock sustained by households. Furthermore, it enables us to analyse the implications of policy and legal interventions.

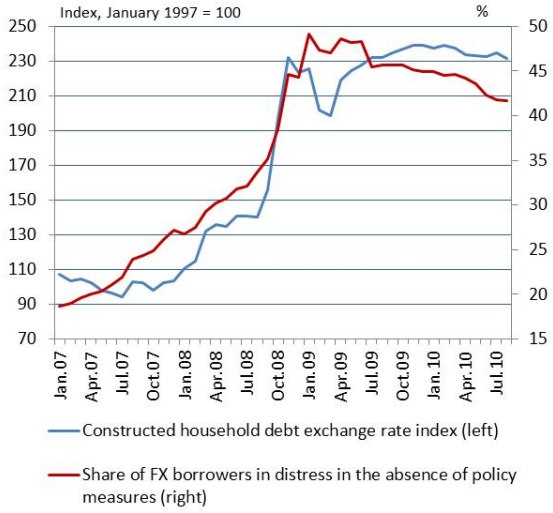
It is beneficial to get a sense of the size of the shocks suffered by households. From peak to trough, the currency depreciation measured 60 per cent (using our constructed household debt exchange rate index), the rise in the consumer price index 37½ per cent, the decline in real wages 13½ per cent, the increase in unemployment 8½ percentage points, and the fall in real house prices 34 per cent over this four-year period. These shocks caused large increases in households' debt service burden, debt levels, and living costs, as well as deep declines in housing wealth and real disposable income.

The currency depreciation and the accompanying rise in inflation on top of the large debt accumulation were the principal force behind the increased frequency of payment difficulties in the run-up to and immediate aftermath of the banking collapse. FX borrowers were the first to feel the impact of the currency depreciation through a rapid increase in their debt service burden and debt position, which caused a sharp rise in the share of households with foreign currency-denominated debt in financial distress (see Figure 5.1a). The increase in payment difficulties among ISK borrowers was more subtle but nevertheless substantial. This is unsurprising, given that the shock these borrowers experienced was smaller and its effects on debt service burden were spread out over the remaining maturity of their loans (see Figure 5.1b). Both FX and ISK borrowers' capacity to withstand the rise in debt service was undermined as real wages declined (see Figure 5.1c), employment decreased, and unemployment rose (see Figure 5.1d). Real wages fell to a low in May 2010 but increased by 3½ per cent in the two following months, when the deferred wage increases resulting from the collective bargaining agreement signed in June 2009 took effect. The share of households in distress fell by 1.3 percentage points (almost 1,450 households) due to those increases. Real wages rose by a total of 7 per cent from May to December 2010 and were at that time 7½ per cent below their January 2008 peak.

Short-term domestic interest rate developments seem to have limited direct effects on the extent of financial distress among Icelandic households. This stands out in stark contrast

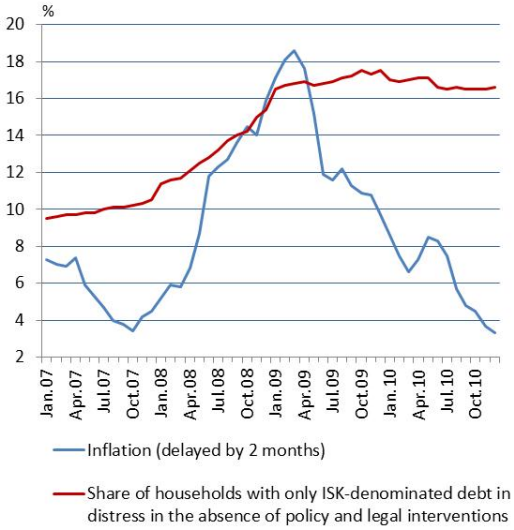
Figure 5.1: Important driving factors of households' debt service burden and capacity in comparison with share of households in distress

Figure 5.1a
Exchange rate developments and the share of FX borrowers in distress in the alternative scenario[1]



1.Constructed exchange rate index reflecting each currency's share of households foreign currency-denominated debt according to constructed payment profiles.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.1b
Inflation developments and share of households with only ISK denominated debt in distress in the absence of policy measures[1]

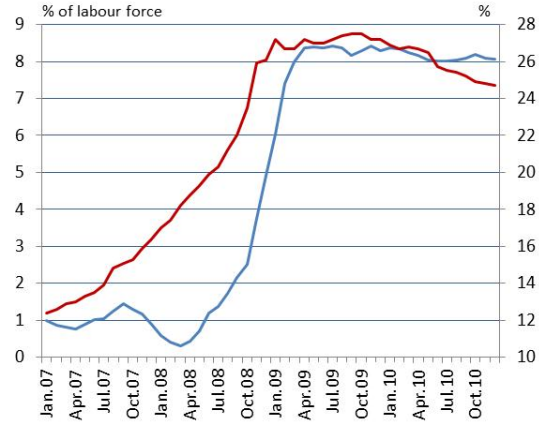


Sources: Statistics Iceland, Central Bank of Iceland Household Sector Database.

Figure 5.1c
Real wage developments and share of households in distress in the absence of policy and legal interventions[1]

Sources: Statistics Iceland, Central Bank of Iceland Household Sector Database.

Figure 5.1d
Unemployment and share of households in distress in the absence of interventions[1]



Sources: Statistics Iceland, Central Bank of Iceland Household Sector Database.

to households in many other advanced economies, which have benefited greatly from the monetary policy accommodation taking place over this four-year period.[38] These differences reflect the different composition of households' debt and the nature of loan contracts. Nevertheless, monetary policy has important effects on households' position, through its impact on the exchange rate and inflation, both of which are among the main determinants of households' debt service burden and their overall debt position. Furthermore, the capital controls introduced during the crisis were crucial in preventing further currency depreciation, which would have increased households' financial difficulties considerably. It is also clear that the direct effects of monetary policy on households' financial position have increased after the recalculation of foreign-denominated loans and, in many cases, their subsequent conversion to non-indexed ISK-denominated loans. In addition, households have increasingly directed their loan demand towards non-indexed mortgages over the last year, as the three large banks have stepped up their non-indexed loan offerings.

The increase in the number of households in negative housing equity is driven by two main factors. On the one hand, households' debt levels rose sharply as a result of the debt accumulation taking place in the run-up to the banking collapse and the effects of the currency depreciation and the associated rise in inflation, through the widespread indexation of debt to the consumer price index and exchange rates. Owing to the combined effects of these factors, the total mortgage debt of households in the reference group increased by 75 per cent from January 2007 to its peak, before the recalculation of foreign-denominated loans. On the other hand, the decline in house prices also played a part in the increased incidence of negative housing equity. Total nominal gross housing wealth of all homeowners in the reference group declined by 14 per cent from peak to trough over the four-year period (see Figure 5.2). Hence it is clear that the increase in mortgage debt has been the main driving factor behind the rise in the number of underwater homeowners.

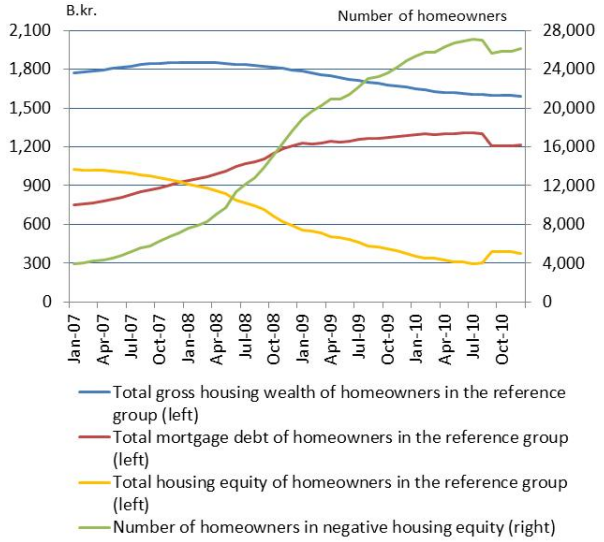
Negative housing equity is more widespread among high-income households. Many low-income families had a strong equity position in the run-up to the banking collapse and could withstand the rise in debt levels and house price declines without falling into negative housing equity. Why is this so? On the one hand, it can be expected that high-income households are more likely to be able to make larger down payments on their house purchases. On the other hand, our findings indicate that many high-income households have made use of their debt service capacity to take on large mortgage debt. This is especially true of young households that experienced rapid increases in income during the upswing. In many instances, high-income households purchased real estate with high loan-to-value ratios and combined foreign- and ISK-denominated mortgages, thereby exposing themselves to exchange rate and inflation risk. The stronger-than-expected housing equity position of low-income households could be due to more risk awareness on their behalf. Furthermore, it is likely that financial institutions were more reluctant to grant loans with high loan-to-value ratios to low-income families.

[38] Not all households in advanced economies are able to take advantage of the historical low interest rates; e.g., because of fixed-rate contracts or because they do not qualify for loan modifications (see, for instance, Santos, 2012).

Figure 5.2: Driving factors of housing equity

Figure 5.2a

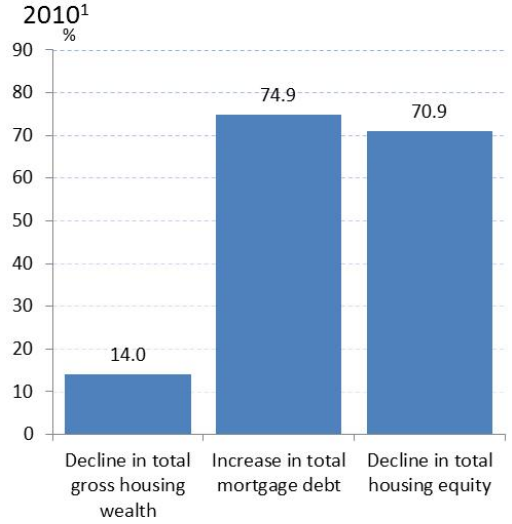
Developments of total housing wealth, mortgage debt and housing equity for indebted homeowners in the reference group



Source: Central Bank of Iceland Household Sector Database.

Figure 5.2b

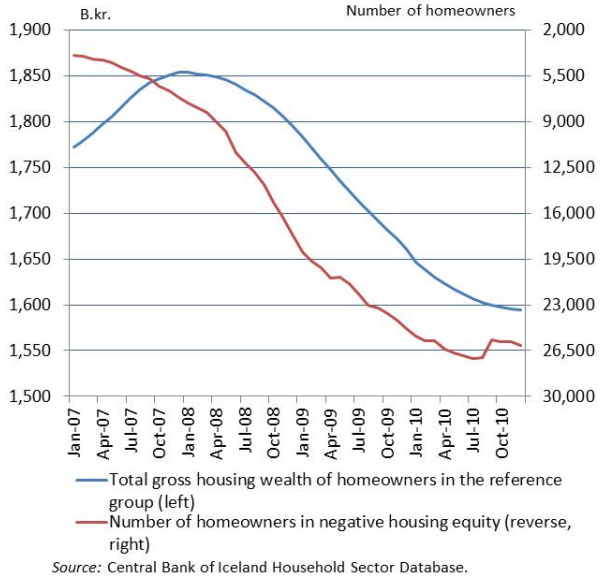
Changes to housing wealth, mortgage debt, and housing equity between peak and trough in January 2007-December 2010[1]



1. The figure shows the changes in total housing wealth, mortgage debt, and housing equity of all homeowners in the reference group between its maximum and minimum level over the four-year period.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.2c

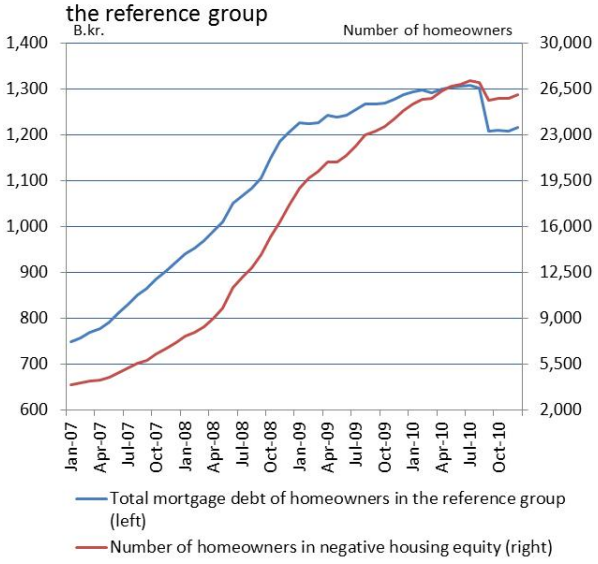
Total gross housing wealth and number of homeowners in negative housing equity in the reference group



Source: Central Bank of Iceland Household Sector Database.

Figure 5.2d

Total mortgage debt and number of homeowners in negative housing equity in the reference group



Source: Central Bank of Iceland Household Sector Database.

5.2 Characteristics of households in financial difficulties

> *"True, it has been quite usual in the old days for people to owe the merchant money and to be refused credit when the debt had grown too big. It had likewise been nothing uncommon for people thus denied sustenance to die of starvation, but such a fate, surely, was infinitely preferable to being ensnared by the banks, like people are nowadays, for at least they had lived like independent men, at least they had died of hunger like free people."*
>
> Laxness, H. (1934-35), *Independent People*, p. 504-505.

One of the main purposes of our analysis is to shed light on the characteristics of vulnerable households. Our results indicate that distress is inversely related to income[39] and age, that a larger share of families with children are in distress compared to childless households, and that the share of FX borrowers in distress is roughly twice as high as that among ISK borrowers. On the other hand, negative housing equity was more common among high-income households than low-income ones, but as in the case of distress, the share in negative housing equity was higher among families with children than among childless households.

If we examine the composition of households in distress at the end of the period, simultaneously across both income quintiles and different family types, we find that 37 per cent of distressed households at year-end 2010 were low-income singles, while roughly a third were middle-income families with children (see Figure 5.3a). It should be noted that 11 per cent of households in distress were singles in the 18-24 age group who, in many cases, could actually still be living at home with their parents. However, almost half of homeowners in negative housing equity are high-income nuclear families, while one in six are low-income singles (see Figure 5.3b). More interestingly, when we turn to the composition of vulnerable households being simultaneously in distress and in negative housing equity at year-end 2010, two groups stand out. On the one hand, just shy of 47 per cent of them were middle-income families with children, of which two-thirds were FX borrowers. On the other hand, roughly 22 per cent were low-income singles, that were split evenly between being FX and ISK borrowers (see Figures 5.3c-d).

An analysis of debt-at-risk - i.e., the share of total debt held by households in distress across different types of debt - reveals that distressed households hold an unusually large share of motor vehicle debt. Motor vehicle debt-at-risk peaked at almost 54 per cent in October 2009 and is assessed to have measured 37½ per cent at year-end 2010, or almost twice the relative size of the group of debtors concerned. Mortgage debt-at-risk aligns more closely with the size of the distressed group, as these 20 per cent of households held 25½ per cent of total mortgage debt at year-end 2010. Overall, debt-at-risk measured 26 per cent at that time, after having peaked at 37½ per cent. This implies that debt-financed motor vehicle purchases played an important role in bringing households into distress.[40] In December 2010, almost 3,500 distressed households had more than one such loan.

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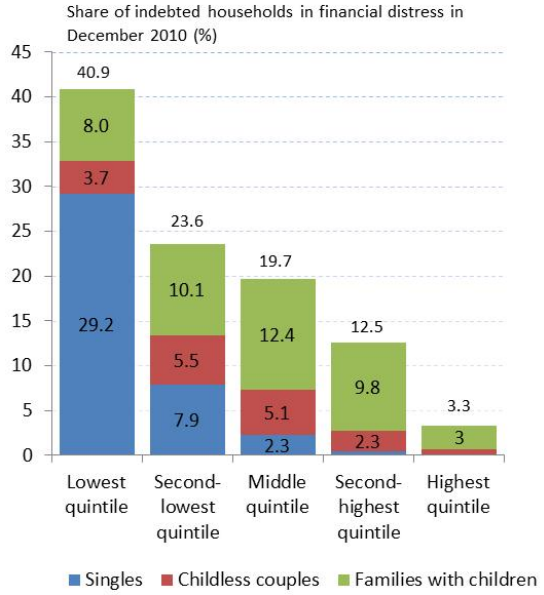
[39] A comparison of the composition of households in financial distress at different points in time over the four-year period indicates that, because of the large króna depreciation, high-income households temporarily represented a larger share of those in distress, but their relative weight in the distress group had fallen back to its original level (i.e., the January 2007 level) after the recalculation of foreign-denominated loans.

[40] This also implies that analyses of Icelandic households' financial position, that exclude motor vehicle loans are likely to underestimate the extent of financial distress (see, for example, Working Group of Experts, 2010).

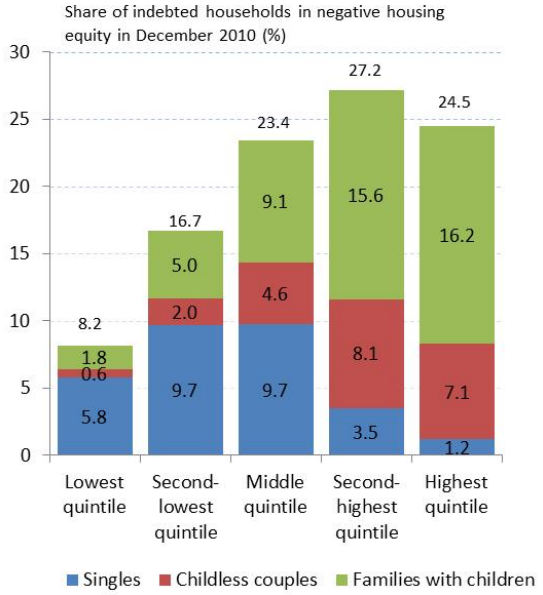
Figure 5.3: Characteristics of households in financial difficulties

Figure 5.3a
Composition of households in financial distress in December 2010 by income and family type[1]



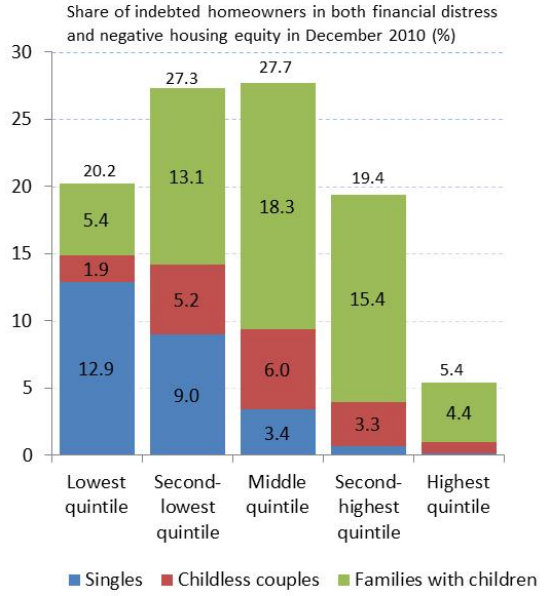
Source: Central Bank of Iceland Household Sector Database.

Figure 5.3b
Composition of homeowners in negative housing equity in December 2010 by income and family type[1]



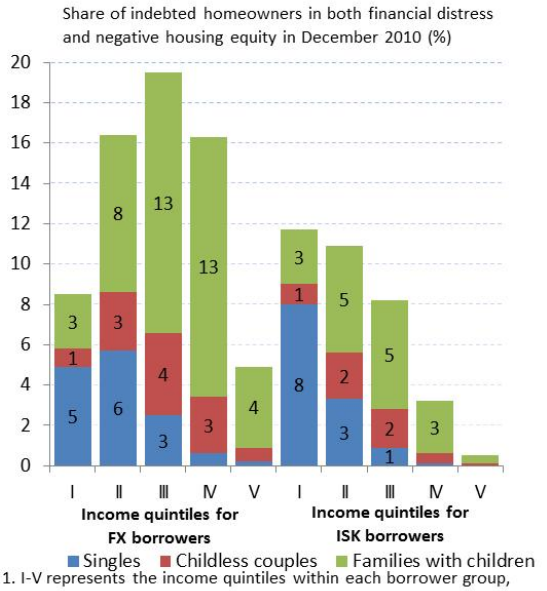
Source: Central Bank of Iceland Household Sector Database.

Figure 5.3c
Composition of homeowners in financial distress and negative housing equity by income and family type[1]



Source: Central Bank of Iceland Household Sector Database.

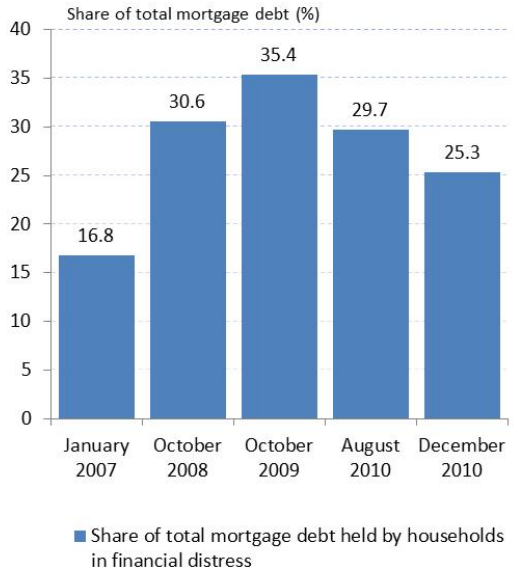
Figure 5.3d
Composition of homeowners in financial distress and negative housing equity by currency-denomination of debt, income and family type[1]



1. I-V represents the income quintiles within each borrower group, from the lowest (I) to the highest (V).
Source: Central Bank of Iceland Household Sector Database.

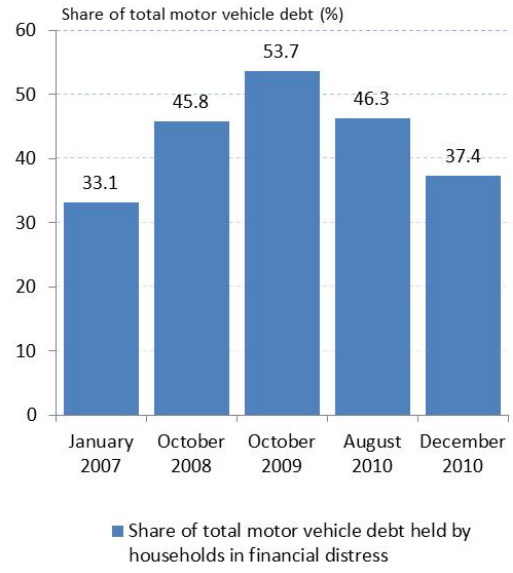
Figure 5.4: Debt at risk, in total and by type of debt

Figure 5.4a
Mortgage debt-at-risk [1]



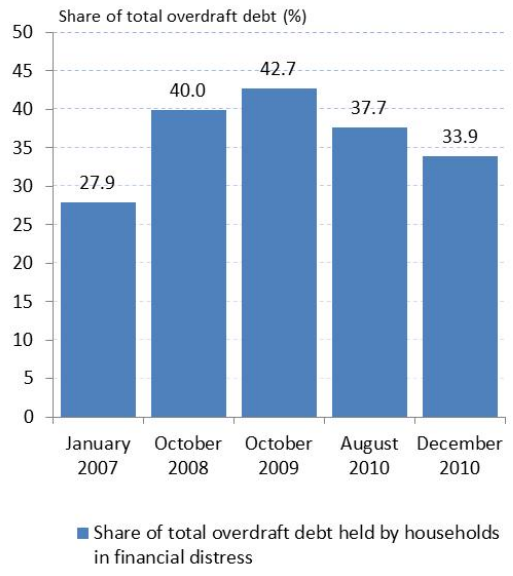
1. Debt-at-risk is defined as debt held by households in financial distress.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.4b
Motor vehicle debt-at-risk [1]



1. Debt-at-risk is defined as debt held by households in financial distress.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.4c
Overdraft debt-at-risk [1]



1. Debt-at-risk is defined as debt held by households in financial distress.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.4d
Debt-at-risk[1]

1. Debt-at-risk is defined as debt held by households in financial distress.
Source: Central Bank of Iceland Household Sector Database.

5.3 The build-up of households' vulnerability and the role of financial institutions' credit policies

> *"The mistake lies in assuming that the helping hand proffered by the banks is as reliable as it is seductive, when in actual fact the banks may be relied upon only by those few exceptionally great men who can afford to owe anything from one to five millions."*
>
> Laxness, H. (1934-35), *Independent People*, p. 505.

The results of our analysis imply that households' rapidly deteriorating financial position in the crisis was caused by the build-up of vulnerabilities in the prelude to the crisis, especially the second phase of the credit boom in the two-year period preceding the banking collapse, and the large shocks suffered by households, particularly the currency depreciation and the resulting surge in inflation. In Section 5.2, we showed that two groups stand out as the most vulnerable: middle-income families with children and low-income singles. Together, these groups represent 69 per cent of all households simultaneously in financial distress and negative housing equity at year-end 2010. In this section, we focus on the escalation of households' vulnerabilities from January 2007 to September 2008, particularly to include the role of financial institutions' credit policies in exacerbating those vulnerabilities by extending loans to households already in distress at the time of loan issuance. Is it the case that some of the households we find to be in the most vulnerable position at year-end 2010 were actually granted mortgage and motor vehicle loans in the run-up to the banking collapse despite already being in financial distress?

In our financial margin analysis, the results of which are presented in Section 4.1, we identified households in distress in each month over the four-year period. Our data also allow us to analyse loan issuance over time, as we have information on the date of issuance for each individual loan. Hence we can combine our results on financial distress with data on loan issuance to analyse to what extent financial institutions were granting loans in the prelude to the banking collapse to households that we have identified as being in distress in the three months immediately preceding loan issuance. It is well known that credit policies in most advanced economies were eased in the years preceding the financial crisis, and we have discussed the two phases of the five-year credit boom in Iceland. In this section, we focus on the second phase (from early 2007 to the banking collapse in October 2008), and we are interested in whether there is any evidence of especially imprudent lending activities at a time when the banks themselves were the object of increased scepticism in funding markets.

According to our database, domestic financial institutions granted 368 b.kr. in new mortgage and motor vehicle loans to roughly 78,600 households in the period from January 2007 to September 2008, 60 per cent ISK-denominated loans (mainly mortgages) and 40 per cent foreign-denominated (split roughly equally between mortgages and motor vehicle loans). Loan issuance in each quarter increased over the three first quarters of 2007, peaking at over 70 b.kr. in the third quarter and then falling to 33 b.kr. by the final quarter before the banking collapse (see Figure 5.5a).

We find that 59 b.kr., or 16 per cent of the sum of all loans issued in this period, were granted to over 12,800 households already in financial distress in the three-month period prior to loan issuance (this period is shorter for the first three months of 2007, as we only identify distressed households from January 2007). It should be noted that financial institutions may

have information regarding households' income sources that are not included in our database that would enable households to service the new loan. This amount is in itself relatively high, as prudent screening should, in most cases, have prompted the financial institutions to deny distressed households of credit. Even more interesting, though, is the evolution of granted loans to households already in financial distress as a share of total loan issuance, changes in the composition of these loans, and the characteristics of the distressed borrowers receiving new loans over time. We now turn to these issues.

Figure 5.5a portrays the development of total loan issuance over the seven-quarter period preceding the banking collapse and the share granted to households already in distress. A comparison of two periods before and after the outbreak of the global financial crisis (Q2-Q3/2007 and Q4/2007-Q1/2008) reveals that total issuance of new loans declined by 18½ per cent between the two periods. However, loan issuance to households already in distress rose by 19½ per cent. Hence, loans to distressed households as a share of total new loans increased by 46½ per cent between the two periods. This implies that loans granted to distressed households increased in line with the rising extent of financial distress over the period. This would not happen in an environment of prudent screening, as escalating financial distress should be reflected in a higher rate of loan rejection rather than increased lending to already distressed households. We are interested in possible changes that have taken place between the two periods in the type of already distressed borrowers who were granted loans and the type of loans they received.

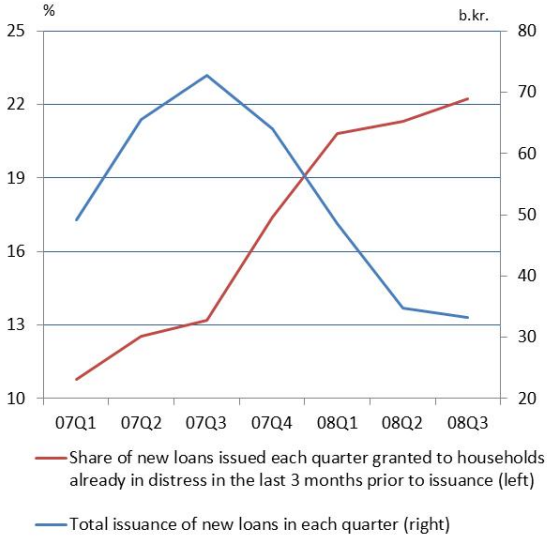
Figure 5.5b depicts the development of loan issuance to households already in distress by loan type. A comparison of the two periods (Q2-Q3/2007 and Q4/2007-Q1/2008) reveals that the increase in the loan amount granted to financially distressed households reflects primarily an increase in foreign-denominated loans. Hence the amount of foreign-denominated loans granted to distressed households rose by 39½ per cent between these two periods, while the amount of ISK-denominated loans contracted by 2 per cent.

Figure 5.5c shows the composition of distressed households that were granted new loans, both across income quintiles and over time. A comparison of the two periods (Q2-Q3/2007 and Q4/2007-Q1/2008) shows that 72 per cent of the increased amount of loans granted to financially distressed households between the two periods were received by middle-income households (i.e., households in the three middle income quintiles).

Figure 5.5d allows us simultaneously to capture changes in the income type of distressed borrowers granted loans and the type of loans they received between our two periods of interest. Roughly 59 per cent of the increase in the amount of loans granted to distressed households between the two periods is due to an increase in foreign-denominated loans to middle-income households, and 20 per cent is due to increased foreign-denominated lending to distressed households in the lowest income quintile; in other words, the increase in foreign-denominated lending to low-income households amounted to four times the increase in foreign-denominated lending to high-income households. On the other hand, increased ISK borrowing by distressed middle-income households explains only 13 per cent of the increase, ISK-denominated lending to low-income households contracted between the two periods, and increased ISK-denominated lending to high-income households accounts for only 7 per cent

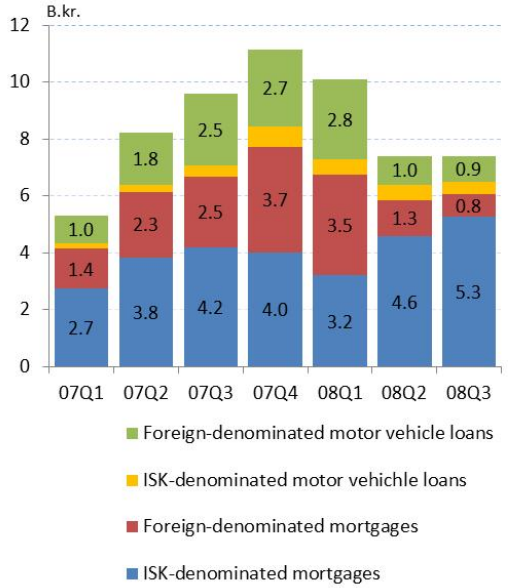
Figure 5.5: Escalation of households' vulnerability and the financial institutions' credit policies

Figure 5.5a
Share of the sum of new loans in the run-up to the banking collapse granted to households already in financial distress



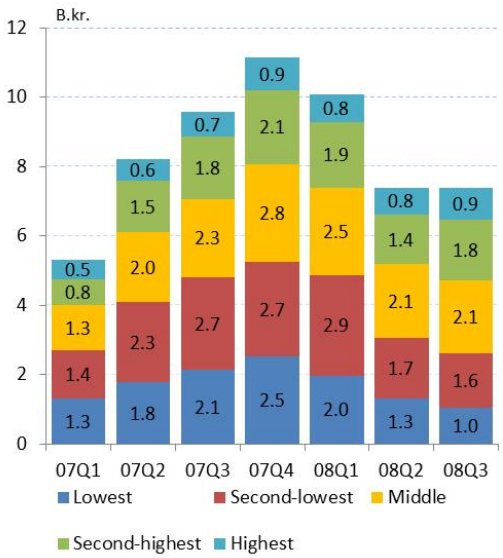
Source: Central Bank of Iceland Household Sector Database.

Figure 5.5b
Loans granted to households already in financial distress at the time of issuance[1]
By loan type



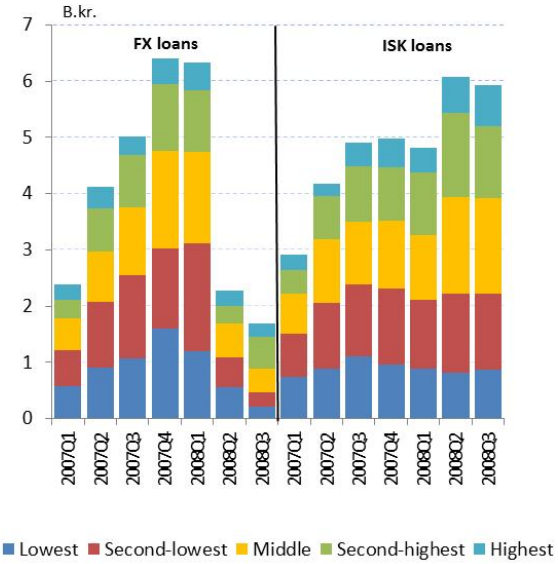
1. The sum of original loan amount in each quarter of loans to households already in distress in the last 3 months prior to issuance.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.5c
Loans granted to households already in financial distress at the time of issuance[1]
By income quintiles



1. The sum of original loan amount in each quarter of loans granted to households already in distress in the last 3 months prior to issuance.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.5d
Loans granted to households already in distress at the time of issuance[1]
By income and currency-denomination of debt



1. The sum of original loan amount in each quarter of loans granted to households already in distress in the last 3 months prior to issuance.
Source: Central Bank of Iceland Household Sector Database.

of the total increase in lending to distressed households. Hence the increase in foreign-denominated lending to distressed low- and middle-income households is by far the most important source of escalating household vulnerability between the two periods originating in financial institutions' imprudent credit policies.

If we also consider family type among distressed households receiving loans, we find that 40 per cent of the increase in loan issuance to already distressed households between the two periods is attributable to increased foreign-denominated lending to financially distressed middle-income families with children, while 25 per cent is due to increased foreign-denominated lending to distressed low-income singles and low-income families with children. There is evidence that the rise in foreign-denominated mortgages granted to distressed households between the two periods is inversely related to income, indicating that this type of risky loan was increasingly being granted to lower-income households, especially families with children, during the period before the substantial currency depreciation in the run-up to the banking collapse.

We analyse to what extent households in distress at year-end 2010 were granted new loans in the run-up to the banking collapse, given that they were also in distress in the three-month period leading up to loan issuance. We find that up to 34 per cent of households in distress at year-end 2010 were granted loans in the period from January 2007 to September 2008, when they were already in distress. While these loans were most often foreign-denominated motor vehicle loans, they also included ISK- and foreign-denominated mortgages. If we focus only on middle-income families with children that were in distress at year-end 2010, up to 56 per cent of them were granted loans during the prelude to the banking collapse, when they were already in distress.[41] In some cases, it is quite natural for financial institutions to grant loans to distressed households; for instance, to grant mortgage equity-withdrawal loans to pay down unfavourable short-term debt in order to reduce debt service over a short period or if income prospects are improving rapidly at the time of loan issuance. However, given that 53 per cent of households that were in distress at year-end 2010 and were granted loans in the run-up to the banking collapse, when they were already in distress, were taking on motor vehicle debt, it is clear that the bulk of this loan issuance cannot be explained by distressed households refinancing their debt.

Hence it is clear from the above that some of the seeds of households' financial difficulties were sown during the second phase of the credit boom. In far too many instances, households already in distress were granted new loans that exacerbated their over-indebtedness and sent them deeper into distress. Prudent lending standards and screening activities by publicly- and privately-owned financial institutions should have prevented such a rapid build-up of vulnerability. Of course, this debt accumulation by distressed households also represents reckless borrowing on their part. However, financial institutions' main role is to serve as an efficient intermediary between savers and borrowers by screening and monitoring borrowers in order to ensure, to the extent possible, that only creditworthy households and firms are granted loans. We discuss the policy lessons of this build-up of vulnerability in the next section.

[41] The analysis could include double-counting if already distressed households took on more than one loan over this period. Hence we report the findings as ranging up to 34 and 55 per cent, respectively.

5.4 Policy implications

> *"[Bjartur] went down to the Savings Bank to see if he could come to some arrangement about his debt, but the only person to be found on the premises was a limp, consumptive-looking wretch who languidly turned the leaves of a ledger and informed him that he had no powers to make any reductions. [...] Bjartur went home and thought the matter over. Perhaps he didn't even bother to think the matter over; it's all the same whether one thinks or doesn't think, they are thieves, every one of them."*
>
> Laxness, H. (1934-35), *Independent People*, p. 519.

We choose to emphasise three types of policy implications that, in our view, are most important in light of our analysis of households' financial position in the financial crisis in Iceland. First are the policy lessons from the build-up of households' financial vulnerability in the prelude to the banking and currency collapse and their implications regarding necessary policies to prevent the accumulation of similar balance sheet weaknesses in the future. Second are the policy lessons from household debt restructuring in the aftermath of the crisis, which has caught the attention of international institutions (see IMF, 2012b). Third is the question raised repeatedly in domestic and international debate: What type of policy should be implemented to assist the most vulnerable households?

5.4.1 Policy lessons from the build-up of households' financial vulnerability

We begin by looking at the policy lessons from the build-up of households' balance sheet weaknesses that can be traced to the behaviour of borrowers, then lenders, and finally the policy-making, supervisory and regulatory authorities. Some of these lessons apply to other advanced economies as well.

According to aggregate data from the IMF, the rise in household debt in the run-up to the crisis was not exceptional in Iceland (see Figure 3.1 in IMF, 2012b), but Icelandic households were nevertheless among the most indebted household sectors at the outbreak of the global crisis. Furthermore the composition of aggregate debt changed over time and vulnerabilities were exacerbated by the fact that the share held by low-income households is rather high in international comparison. During the first phase of the credit boom, many Icelandic households opted to refinance existing debt at lower interest rates and with extended maturities while taking on new loans, so that their debt service did not rise in tandem with increased indebtedness, especially not when measured against rapidly rising disposable income (see, for instance, Box 4 in Central Bank of Iceland, 2008). Our analysis nevertheless indicates that over-indebtedness and the effects of the currency depreciation and accompanying inflation episode that took place in the aftermath of the so-called mini crisis of 2006 had already driven some households into distress. This is reflected in our assessment that 12½ per cent of indebted households were in distress in January 2007 and that the share was higher among FX borrowers than ISK borrowers.[42] However, our analysis also shows

[42] The króna depreciated by 21 per cent between peak and trough in 2005 and 2006, according to our constructed household debt exchange rate index, and was still 16 per cent weaker at year-end 2006 than in November 2005. Annual inflation peaked at 8.6 per cent in August 2006 but the consumer price index rose by 11.3 per cent between January 2005 and year-end 2006. Hence, by these measures, the exchange rate and price level shocks households sustained in this mini crisis were roughly a third of the size of the same type of shocks in the

that the debt accumulation taking place in the second phase of the credit boom in 2007 and 2008 was especially unfortunate, as foreign-denominated loans became more popular and these risky loans were increasingly granted to low- and middle-income households, many of which were already in financial distress at the time of loan issuance.

It is clear that many households took on too much risk and overextended their debt service capacity in the run-up to the banking collapse. It is likely that many households, especially younger ones, overestimated their future income in light of the rapid increase in income during the upswing. In some cases, borrowers took large risk intentionally, but it is likely that many households neither understood the costs associated with borrowing nor were in a position to assess the risk associated with different forms of loans, especially not the wide variety of new types of financial instruments. Research has confirmed that financial literacy is severely lacking in Iceland, especially among low-income households and those in the youngest and oldest age groups (see Ministry of Business Affairs, 2009). Hence a clear policy implication from observed borrowers' behaviour in the escalation of households' financial vulnerability is the need to support education in financial literacy, particularly in schools, where this form of education has been more or less disregarded for years.[43]

In our view, the main reason for the build-up of households' financial weaknesses nevertheless lies in the changed behaviour of lenders. After all, financial institutions' main role is to be efficient intermediaries of funds between savers and borrowers. This involves screening and monitoring borrowers in order to make enlightened decisions on who should be granted loans, as well as providing guidance on what type of loan is best suited for each borrower. This role was neglected by Icelandic financial institutions in their race for balance sheet growth and profits. Increased balance sheet capacity made the banks more willing and temporarily able to take on exposures and increase their provision of credit both at home and abroad, especially in foreign currency. However, the financial institutions' infrastructure was simply incapable of sustaining strong credit quality given the pace of credit expansion. It seems clear that lack of experience in bank management played a role in the banks' excessive risk-taking and inadequate screening activities. Given their importance for the economy and the possible wreckage accompanying their collapse, it is important that financial institutions be governed by experienced management that can ensure strong credit quality and robust funding, even in relatively adverse situations.

In too many instances, the relationship between individual households and their financial institutions, and even with their personal advisor, was abused for short-term gains, resulting in long-term mistrust between households and financial institutions.[44] A clear policy lesson emerging from the build-up of households' balance sheet vulnerabilities is that financial intermediaries must shoulder their responsibilities as financial advisors to households, as they assist households in making some of their most important financial

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financial crisis. However, there were additional shocks - for instance, to real disposable income, employment, and asset prices - in the latter crisis, and household indebtedness had increased in the meantime, especially in foreign currency, making them more vulnerable to adverse shocks.

[43] Unfortunately, evidence has been found to suggest that financial literacy among Icelandic households has further deteriorated since the banking collapse. See the results of a recent survey carried out by the Institute for Financial Literacy in Iceland, available in Icelandic at http://www.fe.is/forsida/fjarmalalsi-islendinga-hrakar.html

[44] See also discussion on the "severely misleading advertisement" regarding money market funds in Section 14.8 in the report by the Parliamentary Special Investigation Commission (in Icelandic).

decisions. Furthermore, lending standards need to be revised and procedures surrounding loan issuance, including the incentive framework of bank employees, must be improved.

Despite the discussion above, our view is that the role of preventing the build-up of households' balance sheet weaknesses cannot rest solely on financial institutions, as their incentives and those of their borrowers and society as a whole will often diverge, at least in the short run. In the end, policy-makers must try to limit the escalation of financial imbalances.[45] This was not done in Iceland during the upswing. On the contrary: various measures were taken to fuel credit expansion and domestic demand, and monetary policy was overburdened with fighting the overheating, all of which led to high interest rates, which again made foreign-denominated borrowing seem an attractive option to many households. Simultaneously, municipalities competed fiercely in the development of new neighbourhoods, causing a gross over-supply of housing that accelerated house price declines in the aftermath of the crisis. Economic policy must aim for overall macroeconomic stability and should not overextend the economy with demand-supporting policies that make the economy highly-dependent on foreign funding and hence vulnerable to financial crises.

Rapid household credit expansion should be seen as an indicator of mounting vulnerability in the household sector, even when income and asset prices are rising in tandem as those increases can turn out to be unsustainable under more adverse circumstances as in the case of Iceland. Furthermore, policy makers must look at the composition of household debt and assets, not just their aggregate level. This involves analysing how sensitive households' debt service burden is to adverse shocks, what possibilities are available to restructure the debt in the case of shocks, and to what extent could households deleverage through liquidating assets if needed. This type of analysis calls for access to micro data on households' financial position. What looks sustainable on an aggregate level can prove to be highly unsustainable once a more detailed overview emerges.

Measures to support financial stability should also be considered, such as reduced loan-to-value ratios or increased scrutiny of the credit quality of new loans, especially if loan issuance is increasing. Furthermore, measures should be put into place to limit foreign-denominated lending to households without the natural hedge provided by foreign-denominated income.

5.4.2 Policy lessons from household debt restructuring and deleveraging in the aftermath of the crisis

We now turn to the lessons from policy measures introduced in the aftermath of the banking collapse. Iceland has been praised for a bold policy response to households' financial difficulties in the aftermath of the crisis (see, for instance, IMF 2012a,b). Iceland's results have probably surprised many analysts because of the challenging circumstances for debt restructuring, reflected in the size and share of the banking system collapse, the high level of

[45] We do not discuss the general macroprudential and regulative policy lessons from the build-up of banks' balance sheet vulnerability and how policy must minimise the extent to which the banks' losses are passed over to the state and household balance sheets. We focus mainly on factors that led to the build-up of households' financial vulnerability. It is clear that the overall lessons could suggest policies such as restricting the pace of banks' balance sheet expansion, setting limits on maximum leverage ratios, and adopting stricter rules on the banks' foreign exchange imbalances, where closer attention should be given to maturity transformation in individual currencies.

private sector indebtedness, the size of the needed fiscal adjustment, and limits on an export-led recovery due to a weak global economy.

Iceland's struggle with household debt restructuring confirms the results of numerous studies on private sector restructuring in general: that this is a daunting yet critical task and that household deleveraging is long and painful. The aims of private sector debt restructuring are to restructure the debt of viable firms, liquidate non-viable firms as soon as possible, and enable as many households as possible to escape from financial distress. Debt restructuring is also intended to support the restoration of a viable banking system and create the conditions for as rapid an economic recovery as possible, at minimum cost (see Stone, 2000a, Hagan *et al.*, 2003, and Foote *et al.,* 2009). From the outset, Icelandic policy-makers were aware of the fact that without measures aimed at restructuring private sector debt, there would be a significant risk that a vicious cycle of bankruptcy, financial distress, and unemployment would undermine the reconstruction of the financial system, delay economic recovery, and thereby increase the cost of the crisis, as well as jeopardising social cohesion (see Stone, 2000a,b, Claessens *et al.*, 2001, Haggard, 2001, IMF, 2003, Calomiris *et al.,* 2005). The timing, formulation, and execution of debt restructuring measures has nevertheless, in line with experience from other countries, proven to be a complex process that takes a number of years to implement. This is partly due to the fact that debt restructuring involves deciding how to distribute the burden accompanying a systemic financial crisis. It can be difficult to come to a conclusion and the tendency is to wait and hope that the situation will improve. Furthermore, Iceland's experience confirms that the government plays an important role in initiating debt restructuring measures, as banks and private entities face enormous co-ordination problems, the courts are ill-prepared for the system-wide scope of bankruptcy, and social unrest and uncertainty about optimum criteria prevent the adoption of the necessary measures (see Claessens *et al.*, 2001).

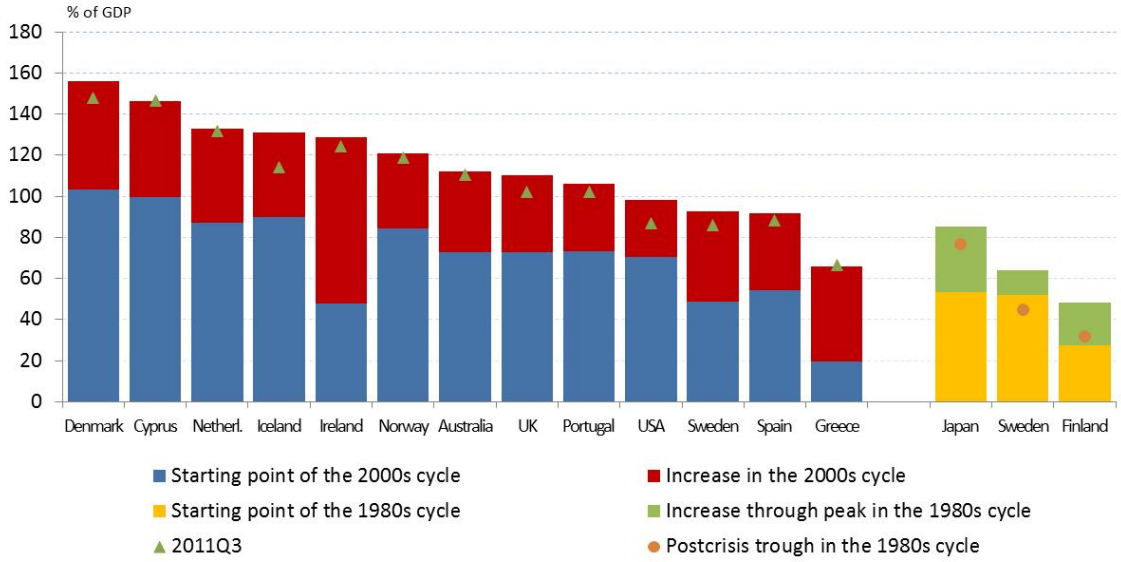
Iceland's experience also confirms that of other countries, that private sector debt restructuring can hardly begin before the following conditions are met: (i) reasonable macroeconomic stability has been regained; for instance, reflected in significant stabilisation of price levels and exchange rate; (ii) banking system recapitalisation is complete, so that banks know how much margin they have for further write-offs; (iii) a preliminary assessment of the scope of debt problems has been carried out; and (iv) improvements in regulatory environment and banks' accounting have been considered, so as to promote a more efficient framework (see Stone, 2000a). Before these conditions are met, forbearance efforts and changes to various benefit schemes were used to assist struggling households, as has been the case in other countries. The restoration of macroeconomic stability took some time, but a fair level of exchange rate and price level stability was attained in the latter half of 2009, and economic growth resumed a year later. The reconstruction of the banking system, however, was delayed considerably, with accompanying delays in household debt restructuring, as is discussed below. A preliminary assessment of the scope of distress was first provided in June 2009, followed by more thorough and detailed results in 2010 (see Vignisdóttir and Ólafsson, 2009, 2010). The debt restructuring framework underwent frequent changes and the accompanying effects on households' expectations about further (and more beneficial) measures in the future made them reluctant to participate in existing schemes (see Figure 3.6).

Furthermore, in line with experience from Sweden and Finland in the 1990s, deleveraging has progressed in two distinct phases in Iceland. In the former phase, households, firms, and financial institutions reduce their debt while the economy contracts or is stagnant and government debt rises. In the latter phase, growth rebounds and government debt is reduced. The size of aggregate deleveraging by Icelandic households is a bit smaller than in the Swedish case, as household debt relative to disposable income has declined by roughly 26 percentage points compared to 40 percentage points after the Swedish banking crisis (see Roxburgh *et al.*, 2012). The difference, however, is that this reduction took seven years in Sweden, while the reduction to date has been accomplished in two years in Iceland. Icelandic households nevertheless remain substantially more indebted on this scale than the Swedish household sector was, even before the deleveraging took place (see Figure 5.6a). Another difference is that, to a large extent, this reduction has involved outright declines in nominal household debt in Iceland. The nominal decline seems a bit larger in Iceland than in the US since the outbreak of the global crisis, but while the majority of debt reduction in the US reflects household defaults, in Iceland it reflects primarily the effects of recalculation of foreign-denominated loans and debt restructuring measures such as the 110 per cent option. Additionally, while the US ratio of household debt to disposable income is expected to return to its long-term trend in 2013 (see Roxburgh *et al.*, 2012), this ratio has already reached its trend over the period from 1990-2003 in Iceland although this should not be interpreted to mean that deleveraging has been accomplished (see Figure 5.6b). In both countries, this ratio peaked at roughly 30 percentage points above trend level.

Hence many of the lessons from historical debt restructuring and deleveraging episodes apply to Iceland's experience as well. However, Iceland's bank reconstruction method was unusual, and it proved crucial for enabling private sector debt restructuring and deleveraging in the challenging circumstances prevailing after the banking collapse. This is due to the fact that balance sheet problems in the aftermath of systemic crises are solved by shunting them over to stronger economic sectors. No domestic sector had the capacity to take on the balance sheet problems of the financial and non-financial private sector in Iceland. Hence, the government opted to split each of the three large cross-border banks into two parts, with the former representing roughly the domestic operations of the "old" bank, which were transferred to a "new" bank, while foreign operations were left in the collapsed bank. Therefore, foreign creditors of the collapsed banks shouldered the largest part of the losses. The new banks acquired the loan portfolios of the old banks at fair value, taking into account the need for write-downs and received capital injections from the government. Hence the banks had the capacity to restructure debt. It is questionable to what extent other countries could replicate Iceland's bank restructuring method. This is also far from being a problem-free option. Bank restructuring was exceptionally time-consuming in Iceland's case, reflecting to a certain extent the scope of the collapse, but also the lengthy evaluation process involved in determining fair values for the transferred assets and liabilities. This delayed private sector debt restructuring, and the legal disputes regarding exchange rate-linked loans caused further delays. Nevertheless, deleveraging progressed rapidly once it took off, and substantial progress has been made.

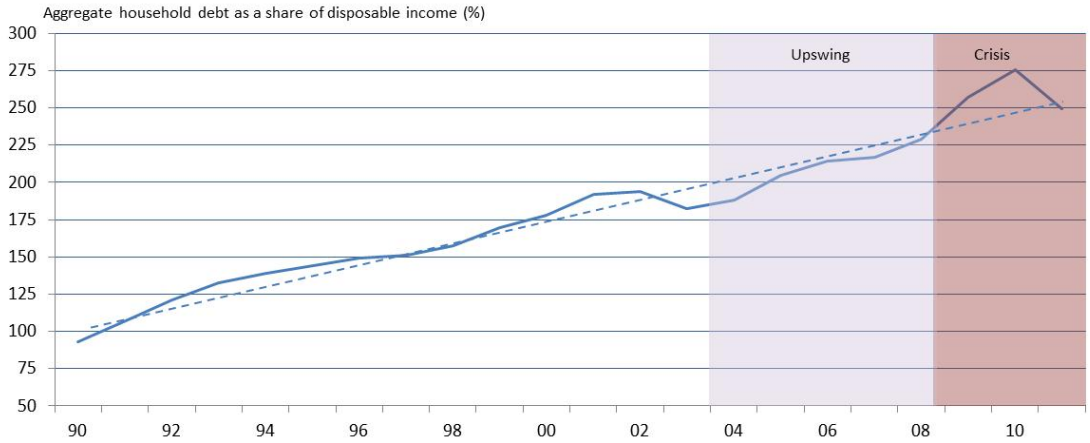
Figure 5.6: Household deleveraging

Figure 5.6a
Two household credit cycles: 1980s and 2000s[1]



1. Start of 1980s cycle is the value in 1980. Starting value for 2000s cycle is the value in 2000. Latest value in the 2000s cycle is as of end September 2011 except for Cyprus (end-December 2010) and Ireland (end-March 2011).
Sources: IMF, Central Bank of Iceland.

Figure 5.6b
Household debt ratio and its trend given the evolution from 1990-2003



1. The solid line is aggregate household debt as a share of disposable income according to historical data, while the dotted line reflects the trend line of the same debt ratio based on 1990-2003 data. Disposable income in 2011 is based on the Central Bank forecast of growth in disposable income between 2010 and 2011. This aggreagate ratio has to be interpreted with care , for instance, as aggregate disposable income rose to an unsustainable level during the upswing and includes the income of debt-free households.
Sources: Statistics Iceland, Central Bank of Iceland, authors' calculations.

The foregoing discussion of the size and pace of household deleveraging is based on aggregate measures of debt and disposable income. Our detailed database allows us to analyse the effects of these measures at the household level. As is previously discussed, our analysis takes into account the main debt restructuring measures, mostly excluding only decentralised measures where restructuring is tailored to each case. Our results show that forbearance efforts provided temporary relief to a number of households in the immediate aftermath of the banking collapse, and debt rescheduling in the form of payment smoothing lifted almost 3,000 households from distress in the autumn of 2009. Court decisions on foreign-denominated loans were influential as well, but we disregard them in this discussion because our focus is on the policy lessons from Iceland's experience of debt restructuring.

We remain critical of the measures introduced at year-end 2010, in the wake of intense social pressure for further interventions; i.e., the so-called 110 per cent option and the special interest rebate. These measures are at odds with a number of suggested basic features that should be taken into account in the design of such restructuring programs (see Laeven and Laryea, 2009). The 110 per cent option aimed primarily to solve the debt overhang, not ease financial distress. Our results in Section 4.5 show that a large majority of the write-offs were granted to households able to service their debt without them. Hence this measure had very limited impact on the scope of financial distress and non-performing loans. Furthermore, the option raises questions regarding moral hazard, as it grants the largest write-offs to the households that took the greatest risk by borrowing with high loan-to-value ratios and without regard to whether they had any problems in servicing their debt. Decreasing households' debt overhang is positive, of course, but this measure used up some of the banks' capacity for write-downs in relation to debt restructuring, and that capacity cannot be used again to assist distressed households. In our view, it would have been preferable to give greater priority to solving financial distress than to resolving the debt overhang problem. The same applies to the special interest rebate. In our view, distributing interest subsidies in this manner does not represent an efficient use of limited tax revenues. It would have been preferable to target these funds more directly at distressed households by taking income into account (see also Figures 5.7a and 5.7b).

The special interest rebate and write-offs due to the 110 per cent option may nevertheless have supported the economic recovery and thereby decreased financial distress indirectly. Third-pillar pension fund payouts were an especially effective measure in this regard, as they supported private consumption growth and generated valuable tax revenue without increasing private or public sector indebtedness. In our view, Iceland's policy initiatives to support private consumption growth amidst household deleveraging provide more valuable policy lessons for other countries than the country's experience with debt restructuring measures.

5.4.3 Possible policy measures to assist households still in financial distress

A discussion of possible policy measures to assist financially distressed households must be based on reasonable expectations regarding possible effects. Our findings imply that almost 21 thousand households were in financial distress at year-end 2010, after the policy and legal interventions included in our baseline scenario had enabled roughly five thousand households

to escape from distress. At that time, roughly 38 per cent of distressed households, or roughly 8,000 households, were in acute distress; that is, their negative financial margin exceeded 100,000 kr. a month. Furthermore, a quarter of distressed households, or roughly 5,220 households, had a negative margin between 50,000 and 100,000 kr., while 37 per cent (7,750 households) had a negative margin less than 50,000 kr.

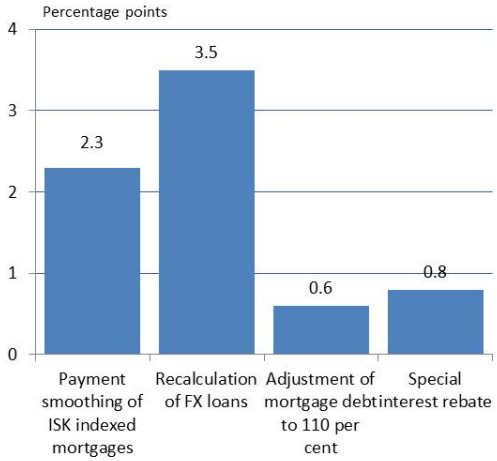
Clearly, no single realistic measure can address these varying degrees of financial distress. We expect that the majority of acutely distressed households need tailor-made solutions to escape from distress. Such cases are best handled in a decentralised manner, in some cases with the Debtors' Ombudsman as an intermediary. General debt restructuring measures will not be sufficient to enable these households to escape from financial distress and will exhaust valuable capacity for debt restructuring, obstructing further efforts. Hence in order for general across-the-board write-offs to allow acutely distressed households to escape from distress, their scope would have to be so extensive that they would seriously endanger public debt sustainability and financial stability. We analyse the effects of one hypothetical measure, i.e. a 20 per cent across-the-board principal reduction of indexed mortgages. Approximately 57 per cent of total write-offs would be granted to the two highest income quintiles, while the two lowest ones would receive 22 per cent. Roughly a quarter of the total write-offs would be granted to households in financial distress while a larger share, or almost 30 per cent, would go to households with a large positive financial margin (exceeding 200,000 kr. a month). Almost two-thirds of distressed households would still be in distress despite these costly write-offs. The capacity of financial institutions and the government to assist those households would, however, be exhausted, making it harder to solve their problems.

Tailor-made solutions involving individually appropriate combinations of principal and interest rate reductions, maturity extensions, and temporary forbearance efforts seem to represent the best way to support acutely distressed households. The government plays an important role in setting up the framework for the efficient implementation of such decentralised debt restructuring. Many steps have been taken in this direction, but it is important that the legal uncertainty surrounding the recalculation of foreign-denominated loans be eliminated and general write-offs ruled out in view of their cost and inefficiency in reducing distress. Furthermore, it should be acknowledged that, for those in the worst financial situation, default is an unavoidable option, followed by support through the welfare system.

Any further government-initiated debt relief measures should target households that are not acutely distressed in order to help them escape from distress, incorporating changes to existing benefit schemes and possibly the tax system. The child benefit system could be adjusted to give increased support to middle-income families with children, as our results show that 47 per cent of households in simultaneous payment and debt overhang problems belong to this group. Furthermore, changes to general mortgage interest subsidies could provide further support both to middle-income families with children and to low-income homeowners, even if the only change involved channelling the funds currently used for the special interest rebate towards general mortgage interest subsidies instead, as the latter are better targeted at distressed households. It is difficult to assess how many households could be

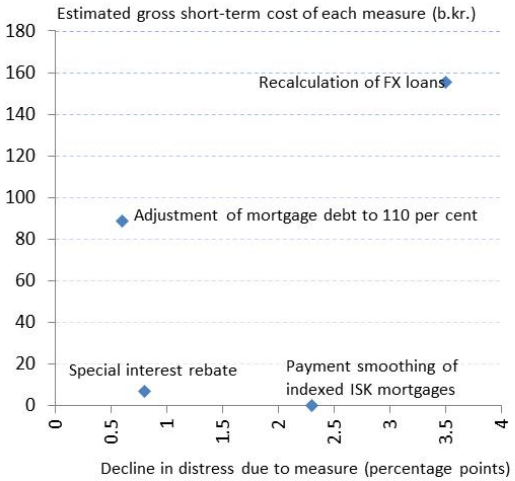
Figure 5.7: Effectiveness of policy and legal interventions

Figure 5.7a
Comparison of the decline in financial distress due to policy and legal interventions[1]



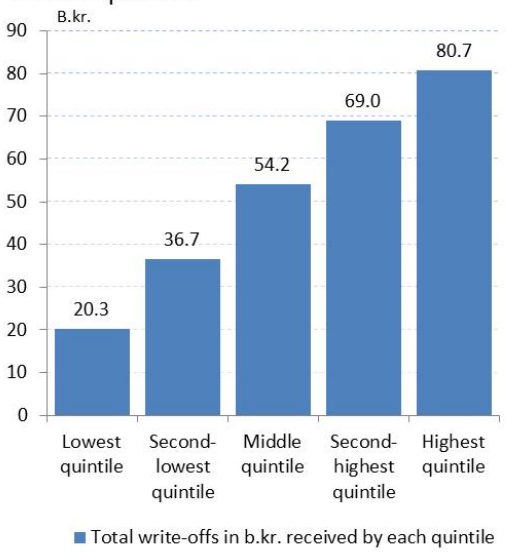
1. The figure shows the decline in the share of households in financial distress immediately after each measure is introduced.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.7b
Comparison of the cost of measures and their effectiveness against distress[1]



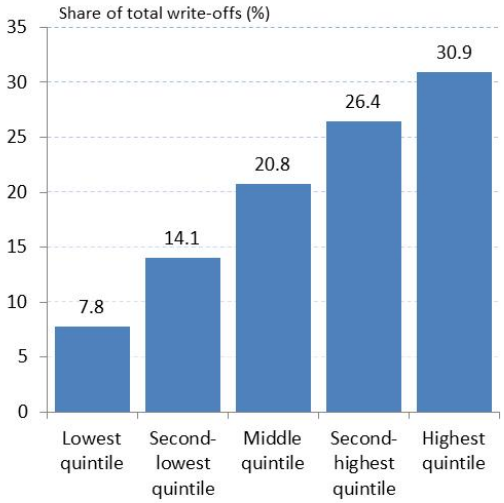
1. There is no immediate cost associated with payment smoothing on indexed ISK mortgages but some write-offs could take place as the maturity of each loan undergoing payment smoothing is only extended by three years at most. The extent of those write-offs will depend on wage, price and unemployment developments over the remaining maturity of each loan. The cost associated with the special interest rebate is for each year over the two-year period it should be in place.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.7c
Distribution of a hypothetical 20% write-off on indexed ISK mortgages across income quintiles[1]



1. We perform a hypothetical 20 per cent write-off on indexed ISK mortgages in December 2010, leading to a total of 260,8 b.kr. being written off. We do not account for how such a write-off would be financed in reality.
Source: Central Bank of Iceland Household Sector Database.

Figure 5.7d
Distribution of a hypothetical 20% write-off on indexed ISK mortgages across income quintiles[1]



1. We perform a hypothetical 20 per cent write-off on indexed ISK mortgages in December 2010, leading to a total of 260,8 b.kr. being written off. We do not account for how such a write-off would be financed in reality.
Source: Central Bank of Iceland Household Sector Database.

helped out of distress through such measures. If we consider families with children, it seems clear that raising child benefits could assist those roughly 2,700 households with a negative margin of less than 50,000 kr. a month. Combining such a measure with changes to general mortgage interest subsidies could possibly reach the nearly 2,000 families with children that have a negative margin between 50,000 and 100,000 kr. a month. The increase in mortgage interest subsidies would also allow some low-income singles to escape from distress. This leaves 4,000 acutely distressed families with children, whose situation calls for tailor-made solutions as is discussed above.[46] Finally, it should be noted that continued progress in reducing distress depends not only upon the success of debt restructuring, as developments in employment and disposable income are also important determinants of financial distress.

6. Conclusions

The goal of this paper is to portray how households' financial position evolved in the run-up to and aftermath of the financial crisis in Iceland, and how it was affected by policy and legal interventions. We do this by designing and collecting an extraordinary detailed micro database with information covering nearly all individual loans and households within the country and then utilising the information to build profiles for debt service, outstanding balance, disposable income, living expenses, and housing wealth enabling us to capture the key dynamics of the crisis. To the best of our knowledge, no similar study of households' financial position has been carried out to date. A major benefit of our analysis is that it allows us to uncover a more complete account of both the build-up of households' balance sheet weaknesses, the devastating consequences of adverse shocks, and the mitigating effects of debt relief measures.

The picture that emerges from our analysis is of a household sector that became increasingly vulnerable to adverse shocks in tandem with strong credit expansion and unfortunate changes to the composition of both type of household debt and income distribution of borrowers. We emphasise the costs of the second wave of the credit boom, which started in early 2007, after scepticism towards the Icelandic economy and its banks had temporarily eased. The share of households with foreign-denominated loans rose rapidly during this period, and these loans were increasingly granted to low- and middle-income households, many of which were already in financial distress at the time of loan issuance. Hence we find clear evidence of imprudent lending practises during that period.

We reveal evidence of quite extensive financial distress already in early 2007, when 12½ per cent of indebted households are found to have insufficient disposable income to cover both debt service and minimum living expenses. This reflects the effects of the currency depreciation and associated rise in inflation taking place during the so-called mini crisis in 2006. At the time of the banks' collapse in October 2008, when most of the adverse shocks to households' debt service had already occurred, this share had nearly doubled and the number of acutely distressed households almost quadrupled. Debt relief measures in the form of

[46] Given that 73 per cent of those 4,000 households are FX borrowers, they will likely receive further write-offs when recalculation of foreign-denominated loans based on recent and upcoming Supreme Court judgements is complete.

forbearance efforts, debt rescheduling, and court decisions, as well as rising income, managed to reduce the extent of financial distress to roughly 20 per cent by year-end 2010. Financial distress is found to be inversely related to income and age, as well as being higher among families with children and those with foreign-denominated debt than among childless couples and those with ISK-denominated loans only. Roughly a third of distressed households are found to be in the highly vulnerable position of being simultaneously in negative housing equity and financial distress. Middle-income families with children, most of which have foreign-denominated loans, and low-income singles are found to be especially vulnerable.

Iceland's response to households' financial difficulties has attracted positive attention internationally. More progress has been made than many expected, and indeed, household deleveraging has been more rapid here than in other crisis episodes. Aggregate household debt as a share of disposable income has decreased by roughly 26 percentage points in the last two years, which is a more rapid pace of deleveraging than after the Swedish banking crisis. In part, this reflects the fact that, to a greater extent than in Sweden, household deleveraging has been accomplished by a reduction in nominal debt. Furthermore, aggregate household debt as a ratio of disposable income has already reached its pre-crisis trend in Iceland while it is expected to do so in 2013 in the US. The decline in nominal household debt is similar in the two countries, but in the US it mainly reflects household default, whereas it reflects policy and legal interventions in Iceland.

We find that debt relief measures - for instance, write-offs due to court decisions declaring exchange rate-linked loans illegal and debt rescheduling in the form of payment smoothing - have enabled thousands of households to escape from financial distress. In two years, Iceland has achieved a decline in financial distress similar to that achieved in seven years in Norway following the banking crisis there. Despite this impressive progress, we remain critical of measures such as the 110 per cent option, which prioritises reducing the debt overhang instead of financial distress that is more likely, in our view, to lead to payment difficulties and personal bankruptcy. We are also highly critical of across-the-board write-offs. Distressed households have only received a small share of the write-offs due to the 110 per cent option and of the special interest rebates financed by a special bank tax. The distribution of across-the-board write-offs would be even more skewed and still leave a large majority of distressed households still in distress, while exhausting the capacity to assist those households further. The emergency bank restructuring measure applied in Iceland during the crisis provided domestic financial institutions with valuable capacity for debt restructuring, and it is important that it be used efficiently to reduce financial distress, thereby reducing costly defaults.

Looking forward, we find that it is important to adjust the current framework for debt restructuring and manage expectations more efficiently with regard to what government-initiated measures can hope to achieve. We emphasise the need for tailor-made solutions for acutely distressed households, as no realistic across-the-board measure is going to enable them to escape from distress.[47] This involves individually appropriate combinations of principal and interest rate reductions, maturity extensions, and temporary forbearance efforts.

[47] It should be noted, however, that further write-offs due to a likely second round of foreign-denominated loan recalculation in light of recent and upcoming Supreme Court judgements is expected to provide some FX borrowers with further debt relief. The extent of these write-offs is, however, uncertain at the time of writing.

Both creditors and borrowers must have a strong incentive to find such a solution where possible. Families with children are the majority of the acutely distressed group, and both lenders and the households themselves should prioritise efforts to seek a solution where possible. Financial institutions should not be reluctant to make use of reasonable principal reductions for individual distressed households where needed. They should continue to speed up decentralised debt restructuring. It is also important to avoid providing acutely distressed households with disincentives to participate in debt restructuring by continuously discussing unrealistic across-the-board measures.

We also suggest that the government should make adjustments to various benefit schemes in order to target households that can escape financial distress through such measures. This could include combined changes to child benefits and general mortgage interest subsidies, so as to channel them more effectively towards middle-income families with children. Such measures could allow thousands of not-too-acutely distressed households to escape from distress. In the end, future developments will also be highly dependent on the pace of economic recovery. Fortunately, economic growth has gained momentum, employment has increased, and disposable income has risen.

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Appendix 1: The data and constructed profiles for payments, income, living expenses and housing wealth for different scenarios

Overview of Appendix 1

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Table A1. Suppliers of data

Financial institutions

Commercial banks

New Kaupthing bank (Arion Bank), New Glitnir Bank (Íslandsbanki), NBI (Landsbanki),

Saving banks

Byr Sparisjódur, SPRON, Sparisjódurinn í Keflavík, Sparisjódur Mýrarsýslu, Afl sparisjódur, Sparisjódur Nordfjardar, Sparisjódur S. Thingeyinga, Sparisjódur Skagafjardar, Sparisjódur Ólafsfjardar, Sparisjódur Vestfirdinga, Sparisjódur Thórshafnar og nágrennis, Sparisjódur Vestmannaeyja, Sparisjódur Bolungarvíkur, Sparisjódur Strandamanna, Sparisjódur Svarfdaela, Sparisjódur Höfdhverfinga

Leasing companies

Frjálsi fjárfestingarbankinn, SP-Fjármögnun, Lýsing, Avant

Pension funds

The Pension Fund for State Employees, The Pension Fund of Commerce, The Pension Fund for Bank Employees, The Pension Fund for Engineers, Gildi Pension Fund, The United Pension Fund, Stafir Pension Fund

Other

The Housing Financing Fund (HFF)

Government agencies

Tax authorities

The Director of Internal Revenue

Labour market institutions

The Directorate of Labour

Table A2. Data definitions and sources

Variable	Description	Source
	Identification variables	
Loan number	Scrambled and encrypted loan identification number for each individual loan	Commercial banks, leasing companies, saving banks, HFF, pension funds, the Director for Internal Revenue, the Directorate for Labour
Social security number	Encrypted social security number for each individual	Commercial banks, leasing companies, saving banks, HFF, pension funds, the Director for Internal Revenue, the Directorate for Labour
Family number	Encrypted family number for each individual which is equal to the encrypted social security number for each household´s oldest family member	Commercial banks, leasing companies, saving banks, HFF, pension funds, the Director for Internal Revenue, the Directorate for Labour
	Terms and conditions on loans	
Date of issuance	Date of issuance for each individual loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
First payment date	Date of first payment date for each individual loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Loan type	Indicator variable for type of each individual loan: (i) indexed ISK-denominated loan, (ii) non-indexed ISK-denominated loan, (iii) foreign-denominated loan, (iv) mixed ISK- and foreign-denominated loans, (v) mixed indexed and non-indexed ISK-denominated loan.	Commercial banks, leasing companies, saving banks, HFF, pension funds
Maturity	Maturity of each individual loan at time of data gathering given as number of years with one decimal	Commercial banks, leasing companies, saving banks, HFF, pension funds
Payment dates	Number of payment dates each year for each individual loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Days with non-payment	Number of days since last scheduled payment date if no payment has taken place for each individual loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Debt service method	Indicator variable for type of debt service method for each individual loan: (i) annuity, (ii) fully amortizing payment, (iii) bullet	Commercial banks, leasing companies, saving banks, HFF, pension funds
Type of index	Indicator variable for type of index used for indexation for each individual indexed loan: (i) CPI for financial indexation, (ii) , the old credit terms index (iii) building cost index	Commercial banks, leasing companies, saving banks, HFF, pension funds

Table A2. Data definitions and sources (cont.)

Variable	Description	Source
	Terms and conditions on loans (cont.)	
Base value of index	Basic value of index used for each individual indexed loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Currency composition of foreign-denominated loans	Currency composition of foreign-denominated loans at the time of data gathering	Commercial banks, leasing companies, saving banks, HFF, pension funds
Currency composition of mixed loans	Currency composition of mixed ISK- and foreign-denominated loans at the time of data gathering	Commercial banks, leasing companies, saving banks, HFF, pension funds
Type of interest rate on ISK loans	Indicator variable for type of interest rate for each individual ISK-denominated loan: (i) fixed, (ii) floating	Commercial banks, leasing companies, saving banks, HFF, pension funds
Type of interest rate on foreign-denominated loans	Indicator variable for type of interest rate for each individual currency part of each foreign-denominated loan: (i) libor plus premium, (ii) libor	Commercial banks, leasing companies, saving banks, HFF, pension funds
Interest rate	Interest rate level for each ISK-denominated loan and individual currency part of each foreign-denominated loan at the time of data gathering	Commercial banks, leasing companies, saving banks, HFF, pension funds
Interest premium on foreign-denominated loans	Interest premium for each individual currency part of each foreign-denominated loan at the time of data gathering	Commercial banks, leasing companies, saving banks, HFF, pension funds
Premium revisions	Number of months between revision of interest premiums for each individual foreign currency-denominated loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Date of next premium revision	Date of next scheduled revision of interest premium for each individual foreign-denominated loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Last payment date	Date of last scheduled payment for each individual loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Revision of indexed mortgage loans	Indicator variable for each individual indexed ISK-denominated mortgage loan for whether the interest rate is up for revision. If yes, then when.	Commercial banks, leasing companies, saving banks, HFF, pension funds

Table A2. Data definitions and sources (cont.)

Variable	Description	Source
	Terms and conditions on loans (cont.)	
Original loan amount	Original amount in thousands of ISK for each individual loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Outstanding amount 31.12. 2008	Outstanding balance for each individual loan December 31, 2008	Commercial banks, leasing companies, saving banks, HFF, pension funds
	Debt service	
Average payment	Average total monthly payment in thousands of ISK from issuance of each individual loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Last paid instalment	Last paid instalment in thousands of ISK for each individual loan or currency part	Commercial banks, leasing companies, saving banks, HFF, pension funds
Last paid interest rate payment	Last paid interest rate payment in thousands of ISK for each individual loan or currency part	Commercial banks, leasing companies, saving banks, HFF, pension funds
Last paid payment due to indexation	Last paid payment due to indexation in thousands of ISK for each individual indexed loan in ISK	Commercial banks, leasing companies, saving banks, HFF, pension funds
	Debt restructuring	
Payment smoothing	Indicator variable for each individual indexed ISK-denominated mortgage loan regarding whether the debtor has applied for debt restructuring according to payment smoothing	Commercial banks, leasing companies, saving banks, HFF, pension funds
Freezing of payments	Indicator variable for each individual indexed ISK- or foreign-denominated loan regarding whether the debtor has applied for freezing of payments	Commercial banks, leasing companies, saving banks, HFF, pension funds
End of grace period	Date for normal payments to start again for each individual loan which payments have been frozen	Commercial banks, leasing companies, saving banks, HFF, pension funds

Table A2. Data definitions and sources (cont.)

Variable	Description	Source
	Assets and collaterals	
Deposits	Deposits in thousands of ISK categorised into the following types: (i) time deposits, (ii) foreign currency-denominated deposits, (iii) Other deposits	Commercial banks, saving banks
Third pillar pension savings	Accumulated third pillar pension savings in thousands of ISK	Pension funds
Type of collateral	Indicator variable for type of collateral for each individual collateral related to a specific loan: (i) house / apartment, (ii) motor vehicle, (iii) securities, (iv) other	Commercial banks, leasing companies, saving banks, HFF, pension funds
Priority of collateral	Indicator variable for priority of collateral for each individual collateral related to a specific loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Location of collateral	Indicator variable for location of collateral for each individual collateral related to a specific loan: (i) Central, Greater Reykjavik, (ii) Outskirts of Greater Reykjavík, (iii) Reykjanes peninsula, (iv) South Iceland, (v) East Iceland, (vi) North Iceland, (vii) West Fjords, (viii) West Iceland	Commercial banks, leasing companies, saving banks, HFF, pension funds
Collateral value at debt issuance	Estimated value of collateral at issuance of debt in thousands of ISK for each individual collateral related to a specific loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
New estimate of collateral value	If available, new estimate of collateral value in thousands of ISK for each individual collateral related to a specific loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Land registry value of house / apartment	Value of house or apartment collateral according to official Land Registry value in December 2008 (based on market value in February 2008) in thousands of ISK for each individual collateral related to a specific mortgage loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
Fire insurance value of house / apartment	Value of house or apartment collateral according to official fire insurance value in December 2008 in thousands of ISK for each individual collateral related to a specific mortgage loan	Commercial banks, leasing companies, saving banks, HFF, pension funds

Table A2. Data definitions and sources (cont.)

Variable	Description	Source
	Unemployment status and benefits	
Unemployment status	Coded security number of each individual registered unemployed in April as well as those who had applied for unemployment benefits in May 2009	Directorate of Labour
Share of unemployment benefits	Share of received unemployment benefits for each recipient of unemployment benefits in April 2009	Directorate of Labour
Share of part time work	Share of part time work for each recipient of unemployment benefits in April 2009	Directorate of Labour
Date of application	Date of first application of unemployment benefits during the current spell of unemployment for each recipient of unemployment benefits	Directorate of Labour
Unemployment benefits	Amount paid out in unemployment benefits in April 2009 for each recipient of unemployment benefits	Directorate of Labour
	Income	
Wage income in February 2009	Total wage income in thousands of ISK for each person in February 2009 according to tax withholding data	The Director for Internal Revenue
Wage income in February 2008	Total wage income in thousands of ISK for each person in February 2008 according to tax withholding data	The Director for Internal Revenue
Wage income in 2007	Total wage income in the year 2007 in thousands of ISK for each person according to tax returns	The Director for Internal Revenue
Financial income in 2007	Total financial income in the year 2007 in thousands of ISK for each person according to tax returns	The Director for Internal Revenue
	Demographics	
Age	Indicator variable for each individual's age interval: (i) 17 years or younger, (ii) 18-24 year old, (iii) 25-29 year old, (iv) 30-34 year old, (v) 35-39 year old, (vi) 40-44 year old, (vii) 45-49 year old, (viii) 50-54 year old, (ix) 55-59 year old, (x) 60-64 year old, (xi) 65-69 year old, (xii) 70 years or more	Commercial banks, leasing companies, saving banks, HFF, pension funds
Place of residence	Indicator variable for place of residence for each individual: (i) Central, Greater Reykjavik, (ii) Outskirts of Greater Reykjavík, (iii) Reykjanes peninsula, (iv) South Iceland, (v) East Iceland, (vi) North Iceland, (vii) West Fjords, (viii) West Iceland	Commercial banks, leasing companies, saving banks, HFF, pension funds

Table A3. Assumptions used in the construction of payment profiles without freezing or other debt restructuring measures

Variable	Description	Source
	Foreign-denominated mortgages	
Base interest rate level	Average monthly three month interbank rate is used for each individual currency part of each foreign-denominated mortgage	Ecowin, Bloomberg
Interest rate premium	The interest rate premium level effective at the time of the data hand-over for each individual foreign-denominated mortgage is assumed to have been effective throughout the maturity of mortgage	Commercial banks, leasing companies, saving banks
Currency composition	The currency composition effective at the time of the data hand-over for each individual foreign-denominated mortgage is assumed to have been effective throughout the maturity of the mortgage	Commercial banks, leasing companies, saving banks
Payment dates	Number of payment dates is assumed to be twelve per year	Own estimate
	Indexed ISK-denominated mortgages	
Interest rate level	Information on fixed interest rate level for each individual indexed ISK-denominated mortgage is used for those 80 per cent of loans with fixed interest rates. For the remaining 20 per cent of loans with variable interest rates, the general interest on indexed ISK-denominated loans published by the Central Bank of Iceland is used (available from July 2001, lowest interest on indexed loans from January 1997 to July 2001 but long-term indexed interest rates from the database of the Central Bank of Iceland QMM macroeconomic model from 1979 to 1996).	Commercial banks, leasing companies, saving banks, HFF, pension funds, Central Bank of Iceland
Consumer price index	Published CPI figures are used until June 2011. Central Bank of Iceland forecast is used from July 2011 with minor adjustments being made by the authors	Statistics Iceland, Central Bank of Iceland, own estimate
Payment dates	Assumed to be twelve payments per year	Own estimate
	Non-indexed ISK-denominated mortgages and motor vehicle loans	
Interest rate level	General interest on non-indexed ISK-denominated loans (available from July 2001), lowest interest on non-indexed loans (before July 2001)	Central Bank of Iceland
Payment dates	Assumed to be twelve payments per year	Own estimate

Table A3. Assumptions used in the construction of payment profiles without freezing or other debt restructuring measures (cont.)

Variable	Description	Source
	Foreign-denominated motor vehicle loans	
Base interest rate level	Average monthly three month interbank rate is used for each individual currency part of each foreign-denominated motor vehicle loan	Ecowin, Bloomberg
Interest rate premium	The interest rate premium level effective at the time of the data hand-over for each individual foreign-denominated motor vehicle loan is assumed to have been effective throughout the maturity of loan	Commercial banks, leasing companies, saving banks
Currency composition	The currency composition effective at the time of the data hand-over for each individual foreign-denominated motor vehicle loan is assumed to have been effective throughout the maturity of the loan	Commercial banks, leasing companies, saving banks
Payment dates	Number of payment dates is assumed to be twelve per year	Own estimate
	Indexed ISK-denominated motor vehicle loan	
Base interest rate level	General interest on indexed ISK-denominated loans (available from July 2001), lowest interest on indexed loans (before July 2001).	Central Bank of Iceland, commercial banks, leasing companies, saving banks
Interest rate premium	A fixed 3.5 percentage point interest rate premium is used throughout which reflects roughly the average premium according to a comparison of the base interest rate level and the interest level effective for each individual loan at the time of the data hand-over	Commercial banks, leasing companies, saving banks, Central Bank of Iceland, own estimate
Consumer price index	Published CPI figures are used until June 2011. Central Bank of Iceland forecast is used from July 2011	Statistics Iceland, Central Bank of Iceland, own estimate
Payment dates	Number of payment dates is assumed to be twelve per year	Own estimate
	Overdraft loans	
Interest rate level	Average of monthly overdraft interest rates at the commercial banks as reported to the Central Bank of Iceland	Central Bank of Iceland
Outstanding balance	Outstanding balance for each individual loan is assumed to stay the same throughout the reference period	Commercial banks, saving banks
Payments	Interest payments are assumed to be paid each month but no instalments	Commercial banks, saving banks, own estimate

Table A4. Assumptions used in construction of profiles for income and living expenses

Variable	Description	Source
	Income	
Wage income	Total income according to each individual's tax returns is used for the year 2007, distributed between months such that they develop in line with Statistics Iceland wage index. Total wage income for each individual according to tax withholding data is used for the period from 2008 to 2010 and extrapolated using the developments in the Statistics Iceland wage index. Data for February 2008 is used to extrapolate wage income from January to December 2008. Data for February 2009 is used to extrapolate wage income from January 2009 to December 2010	The Director for Internal Revenue, Statistics Iceland
Mortgage interest subsidies	Annual mortgage interest subsidies are calculated for each household according to rules applicable each year using information on income, assets, outstanding balances on mortgages and paid interest for different types of families	Commercial banks, leasing companies, saving banks, HFF, pension funds, the Director for Internal Revenue, the Directorate for Labour
Child benefits	Annual child benefits are calculated for each household according to rules applicable each year using information on income and family size	Commercial banks, leasing companies, saving banks, HFF, pension funds, the Director for Internal Revenue
	Living expenses	
Consumer guidelines for minimum living expenses	Amount necessary for minimum living expenses for different family types, updated in January and August each year. We use a linear approach to ensure that living expenses rise month-by-month instead of increasing in stages each January and August. The increase from January 2007 to December 2010 is roughly 37 per cent	The Debtors' Ombudsman (the Domestic Debt Advisory Service)
Buffer	As the consumer guidelines do not include various fixed expense items, such as telephone, subscriptions, property taxes, insurance and day-care we add a 60 per cent buffer on top of the guidelines in our analysis.	Own estimate
Cost of motor vehicles	Cost of motor vehicles according to the Debtors' Ombudsman guidelines is added for households that have motor vehicle loans. The increase from January 2007 to December 2010 is roughly 67 per cent	The Debtors' Ombudsman (the Domestic Debt Advisory Service), commercial banks, leasing companies, saving banks

Table A5. Assumptions used in the construction of payment profiles with freezing and other debt restructuring measures

Variable	Description	Source
Freezing of payments	For all loans, where the debtor had applied for freezing of payments at the time of the data hand-over, payments are assumed to be frozen from November 2008 until mid-2009. This is the period were this measure was widely used by borrowers	Commercial banks, leasing companies, saving banks, own estimate
Payment smoothing of indexed ISK-denominated mortgages	Payment smoothing is a means of temporarily lightening the burden of regular loan instalments by linking them to the modified mortgage payment index instead of the consumer price index. The modified mortgage payment index weights together developments in wages and employment levels. In the analysis of the effects of this measure, it is assumed that all indexed ISK-denominated mortgages were subject to payment smoothing from November 2009 when it became an opt-out option	Commercial banks, leasing companies, saving banks, HFF, pension funds, Statistics Iceland, own estimate
Payment smoothing for foreign-denominated mortgage loans	Payment smoothing for foreign-denominated mortgage loans involves setting the original payment at the level (in ISK) that applied in May 2008, or at the level of the first instalment if the loan was taken after that date. Subsequent payments change in accordance with the modified mortgage payment index for each month, as calculated by Statistics Iceland. In the analysis of the effects of this measure, it is assumed that all foreign-denominated mortgages were subject to payment smoothing from mid-2009 until recalculation of foreign-denominated mortgages is assumed to take place	Commercial banks, leasing companies, saving banks, HFF, pension funds, own estimate

Table A6. Assumptions used in recalculation of foreign-denominated and mixed loans

Variable	Description	Source
Interest rate level	General interest on non-indexed ISK-denominated loans	Central Bank of Iceland
Date of revaluation	The date of 31 August 2010 is used as a reference point in all revaluations of foreign-denominated and mixed loans	Own estimate
Recalculated original principal	The original principal is recalculated from date of issuance to 31 August 2010 with interest being added once a year using a 360 day interest rate period with the exception of the last period which is shorter	Commercial banks, leasing companies, saving banks, Central Bank of Iceland, own estimate
Recalculated payments	Each payment in the constructed payment profile for each individual loan is recalculated from payment date to 31 August 2010 with interest being added once a year using a 360 day interest rate period with the exception of the last period which is shorter	Commercial banks, leasing companies, saving banks, Central Bank of Iceland, own estimate
Reference principal at August 31, 2010	The recalculated original principal minus the sum of all recalculated payments for each individual loan constitute the new reference principal at August 31, 2010 which is then compared to the outstanding balance according to the constructed payment profile for each loan to get the change in outstanding balance for each loan	Commercial banks, leasing companies, saving banks, Central Bank of Iceland, own estimate

Table A7. Assumptions used in the construction of new payment profiles for reference principals for recalculated loans starting 31 August 2010

Variable	Description	Source
	Motor vehicle loans	
Loan type and debt service method	All new motor vehicle loans issued based on recalculated principals (where it is positive) are assumed to be floating non-indexed ISK annuity loans with starting date 31 August 2010	Own estimate
Interest rate level	General interest on non-indexed ISK-denominated loans	Central Bank of Iceland.
Maturity	New motor vehicle loans are assumed to have the same maturity as the remaining maturity of the original loan.	Commercial banks, leasing companies, saving banks
Payment dates	Number of payment dates is assumed to be twelve per year	Own estimate
	Mortgages	
Loan type and debt service method	All new mortgages issued based on recalculated principals (where it is positive) are assumed to be floating indexed ISK-denominated loans with fully amortizing payments with starting date 31 August 2010	Own estimate
Interest rate level	General interest on indexed ISK-denominated loans	Central Bank of Iceland
Maturity	New mortgages are generally assumed to have the same maturity as the remaining maturity of the original loan, but if less than one year is remaining of the original maturity, the loan is extended to December 31, 2013.	Commercial banks, leasing companies, saving banks, own estimate
Payment dates	Number of payment dates is assumed to be twelve per year	Own estimate

Table A8. Assumptions used in the construction of housing wealth profiles

Variable	Description	Source
Reference housing wealth in February 2008 for each individual homeowner	Based on the value of house or apartment collateral according to official Land Registry value in December 2008 (which is based on market value in February 2008) in thousands of ISK for each individual collateral related to a specific mortgage loan	Commercial banks, leasing companies, saving banks, HFF, pension funds
House price index for the country's eight districts from January 2007 to December 2010	Based on the development of annual average purchasing price per m^2 for each district from Registers Iceland. That data does not allow for distinguishing between Central Greater Reykjavik and the Outskirts of Greater Reykjavik. The values for Central Greater Reykjavik and the Outskirts of Greater Reykjavik are therefore based on the development of annual average purchasing price per m^2 for individual districts in Greater Reykjavik, but normalised such that the average of the indices for Central Greater Reykjavik and the Outskirts of Greater Reykjavik is the same as the value for the whole Greater Reykjavik area in the data for the other six districts used. All annual indices are split into monthly indices using the software Ecotrim.	Registers Iceland, own estimate
Housing wealth for each individual homeowner from January 2007 to December 2010	The Reference housing wealth in February 2008 for each individual homeowner (see above) is extrapolated from January 2007 to December 2010 using the constructed house price index for the eight different districts of place of residence (see above)	Commercial banks, leasing companies, saving banks, pension funds, Registers Iceland, own estimate

Appendix 2: Survey of related literature

A number of studies address the issues of household debt, payment problems, and household insolvency. Various approaches have been applied; e.g., traditional insolvency frameworks to construct household default predictions, stress test frameworks to assess the potential effects of adverse macroeconomic shocks, legal frameworks to evaluate how to deal with individual or system-wide insolvencies, and macroeconomic frameworks with emphasis on the relationship between issues such as credit cycles, consumption, housing wealth, defaults, financial stability, and economic policy. Studies within this area can also be grouped by whether they use aggregate data to focus on macroeconomic shocks, household-level data to focus on individual driving factors, or a combination of both. Our study focuses on payment problems, negative housing equity, and the effects of debt restructuring. Therefore, we provide a survey of some related studies.[48]

May et al. (2004) analyse the distribution of debt and its affordability using British survey data. They find that the majority of debt is held by mortgagors who appear to have few difficulties in servicing it. Nevertheless, 15 per cent of all households (23 per cent of debtors) spend 25 per cent or more of their gross income servicing their debt; these households hold 42 per cent of total debt. May and Tudela (2005) study the determinants of mortgage payment problems using British survey data. They find that adverse changes in employment and the mortgage debt service ratio are the most important household-level factors associated with payment problems. Difficulties seem to be permanent, as past problems are found to be a reliable predictor of future problems. Bowie-Cairns and Pryce (2005) found, also using British data, that household debt servicing capacity was an increasing function in the level of education, age and marital status. Del-Rio and Young (2005) conclude that high levels of debt and factors related to marital status and ethnicity were relevant to the occurrence of problems among British households with unsecured debt.

Johansson and Persson (2006) use Swedish survey data to study households' assets, liabilities, and ability to pay. They find that a majority of debt, as well as the largest share of real and financial assets, is held by high-income households and that the banking sector faces limited risk from losses on household loans. The top 20 per cent of earners in Sweden hold 57 per cent of total debt and 44 per cent of assets. Households with negative financial margins, representing roughly 6 per cent of households, are largely debt-free. They find that the household sector is more sensitive to increases in interest rates than changes in unemployment.

Riiser and Vatne (2006) analyses the debt burden of Norwegian households using survey data and information from tax statistics for the period from 1986 to 2003. She defines a debt burden as heavy if households have debt exceeding 500 per cent of their annual disposable income. She finds that 7 per cent of households had a high debt burden in 2003. The share of total debt held by households with a heavy debt burden peaked at roughly a third during the banking crisis in 1988-92 but was 25 per cent in 2003. Norges Bank reports that 12

[48] BIS (2009) contains an analysis of household debt in many Asian countries where household debt ranges from 7 to 82 per cent of gross domestic product. Tiongson *et al*. (2010) analyse the effects of the global crisis on households in emerging markets within the Europe and Central Asia (ECA) region. We do not discuss these studies in the survey.

per cent of Norwegian households had a debt burden of more than 500 per cent of disposable income in 2010, with the largest share in the youngest age group (Norges Bank, 2011).

Vatne (2006) calculates financial margins for Norwegian households using survey data for the period 1987-2004. The dataset consists of approximately 3,000 households in the data for 1987 and an increasing number of households in subsequent years to roughly 10,000 observations. Living expenses are estimated using standard budgets for households, and principal payments, which are not included in the dataset, are assessed assuming linear loan repayment over 20 years. He finds that 19 per cent of households had a negative financial margin and that those households held one-sixth of total debt. Income is the most significant difference between households with a negative and a positive margin. The two lowest income quintiles hold 14 per cent of total debt but roughly half of debt at risk. Debt at risk was highest during the banking crisis in 1988-92, when over 40 per cent of total debt was held by households with negative margins. He finds that a larger share of total debt is held by low income groups in Norway than in Sweden.

Herrala and Kauko (2007) use survey data to construct a micro simulation model to forecast distress in the household sector in Finland. The average share of households referring to some distress in the surveys varied between 13 and 19 per cent in the period from 2000 to 2004. They use logit analysis to estimate the extent to which households' risk of being financially distressed depends on net income after tax and loan servicing costs. They find that households' financial margin has significant effects on the probability of distress.

Zajączkowski and Żochowski (2007) use Polish survey data to assess the financial stability risk from rapid household credit growth, particularly foreign-denominated debt. They find that households' debt servicing capacity has not deteriorated despite rising debt levels and that households should be able to withstand financial and labour market shocks. The share of households with a negative financial margin decreased from close to 20 per cent in 1999 to approximately 12 per cent in 2006. Their results indicate modest effects of adverse exchange rate shocks, large effects from an increase in interest rates, and severe effects from labour market shocks, especially given the limited unemployment benefit system in place.

Kida (2009) uses survey data to assess financial vulnerabilities among mortgagors in New Zealand. She defines high leverage as a loan-to-value ratio above 80 per cent and heavy debt burden as mortgage payments exceeding 50 per cent of disposable income. She finds that highly leveraged households tend to have high incomes, whereas households with a heavy debt service burden tend to have low incomes. Only 0.1 per cent of mortgagors are both highly leveraged and have a heavy debt service burden.

Faruqui (2008) uses survey data to analyse the distribution of debt service ratios among Canadian households during 1999-2007. He focuses on the share of households whose debt payments exceed 23 and 40 per cent of gross income.[49] He finds that roughly 26 and 4 per cent, respectively, of indebted households fall within these groups in 2007. He provides a comparison with the US and shows that 36.5 and 6.3 per cent of indebted American households have a debt service ratio above these two thresholds. The Bank of Canada reports

[49] These threshold levels for household debt vulnerability correspond to 30 and 53 per cent when the ratios are calculated using disposable income instead of gross income, as disposable income in Canada averages about 75 per cent of gross income (Faruqui, 2008).

that 6.4 per cent of indebted households had a debt service ratio exceeding 40 per cent in 2010.

Gómez-Salvador et al. (2011) use survey data from the EU-SILC (Statistics on Income and Living Conditions) to analyse the incidence of household indebtedness and debt service burden in euro area countries. They find that 22 per cent of households had a mortgage outstanding and 17 per cent had only consumer loans in 2007. Only 4.4 per cent of households in the lowest income group were mortgagors, compared to 41.5 per cent in the highest income group. The share of households with a mortgage outstanding ranged from roughly 10 to 48 per cent across individual countries. Interestingly, some Southern European countries have very low outstanding mortgage rates despite high home-ownership rates. The average mortgage debt service ratio is found to be 17 per cent in the euro area, with some heterogeneity among countries ranging from 7.6 to 25.1 per cent. Low-income households were found to devote an average of 32.5 per cent of their income to service mortgage debt, while this ratio was below 20 per cent for households at the top of the income distribution. The authors focus on the share of mortgagors devoting more than 40 per cent of their disposable income to total housing costs and find that 6.8 per cent of households in the euro area had such a high debt service ratio in 2007, with individual country shares ranging from 0.9 to 15.8 per cent. The share of households above this threshold level is 61 per cent in the lowest income group but decreases rapidly by increasing income. The proportion of households in the euro area reporting late payments on mortgage debt in 2007 was 3.9 per cent, with individual country levels ranging from 0.8 to 18.3 per cent. Finally, they compare survey evidence from the euro area and the US. They find a much higher participation rate in the mortgage market for all age and income groups in the US, debt service burden seems to be heavier for low-income groups in the US, and the proportion of mortgagors in arrears is much higher in the US than in the euro area, or 27 per cent compared to 8 per cent. Arrears were especially common in the two lowest-income quintiles in the US.

Mian and Sufi (2009) focus on the accumulation of household debt and the increase in defaults in the US in the prelude to the global crisis. They use a random sample of nearly 70,000 homeowners from a dataset consisting of anonymous individual credit files from a national consumer credit bureau agency to show that home equity-based borrowing was responsible for a significant fraction of the sharp rise in household leverage from 2002 to 2006 and the increase in defaults from 2006 to 2008. In a subsequent paper, they provide evidence suggesting that the timing and severity of the recession across US counties was related to the increase in household leverage (Mian and Sufi, 2010).

Brown et al. (2010) focus on the reversal in household behaviour in the aftermath of the crisis and analyse the decline in household indebtedness and the sharp rise in delinquencies using the Federal Reserve Bank of New York Consumer Credit panel, created from a sample of consumer credit reports in the US. Chakrabarti et al. (2011) use credit report records and data collected from several household surveys to show that the global crisis affected large shares of households across all age, income, and education groups and that households' response to the crisis has been to cut back on spending and increase savings, in particular by paying down mortgage debt. Bricker et al. (2011) also analyse the effects of the recent recession on various types of households using data from the Federal Reserve Board's Survey of Consumer Finances for the years 2007-2009. Interestingly, they find that changes

in families' equity position over the period appear to reflect changes in asset values rather than debt. Hence American households have been hit primarily by shocks to the asset side of their balance sheet. This is different from Icelandic households, which, in addition to having suffered substantial losses in gross wealth, have experienced sharp rises in their debt levels due to the large exchange rate depreciation and accompanying rise in inflation.

Hellebrandt and Kawar (2009) analyse the extent of negative housing equity in the United Kingdom following the approximately 20 per cent decline in nominal house prices. They point out that only 40 per cent of British households are mortgagors and that many of these have only small mortgages relative to the value of their homes. They use three different approaches to estimate the incidence of negative housing equity and assess that roughly 7 to 11 per cent of homeowners were in negative housing equity at the end of the first quarter of 2009. This is a share similar to that in the housing downturn of the 1990s.

There are no official estimates of the extent of negative housing equity in the US, although various private sector estimates have been published. The Seattle-based company, Zillner, Inc., has estimated, for instance, that more than 28 per cent of American homeowners – or 16.2 million households – were in negative housing equity in early 2011. The share was highest in Las Vegas, where 85 per cent of homeowners were in negative equity (Gittelsohn 2011). CoreLogic (2011) estimate that 22.5 per cent of homeowners were in negative housing equity at the end of the second quarter of 2011 and that a majority of those households were also paying above-market interest rates on their mortgage.

Haughwout and Okah (2009) estimate the extent of negative equity in the non-prime mortgage market in the US. They analyse a 1 per cent random sample of the First American CoreLogic's Loan Performance dataset containing monthly loan-level information on approximately 4.8 million active, securitised sub-prime and alt-A loans. Importantly, their dataset excludes all loans held in bank portfolios; thus its interpretation is limited to securitised loans. They combine the sample of loan-level data with aggregate house price data and estimate the share of homeowners in negative housing equity. Depending on whether they use the Official of Federal Housing Enterprise Oversight's national price index or Standard and Poor's/Case-Shiller home price index, they estimate that 29 per cent or 47 per cent, respectively, of non-prime mortgagors were in negative equity at year-end 2008. They find that homeowners in negative equity are primarily households that took out mortgages near the peak of the housing market and with high original loan-to-value ratios.

Kennedy and Calder (2011) use loan-level data for 689,250 individual loans and 475,000 individual mortgaged properties from the residential mortgage books of four Irish financial institutions as of year-end 2010 (with some information from loan origin) to provide an overview of the structure and conditions of these loan books. Approximately 12 per cent of loans were in some form of arrears, with 4 per cent over 90 days past due (90DPD), and they expect serious delinquencies to rise. Roughly 31 per cent of mortgaged properties, or 47 per cent of the value of outstanding mortgages, were found to be in negative housing equity at year-end 2010, after a 38 per cent decline of house prices from the peak in Q4/2006. They found that 2.4 per cent of borrowers were simultaneously 90DPD and in negative housing equity, while the share increased to 7.8 per cent for some form of arrears. Kelly (2011) uses the same data to estimate default probabilities of individual mortgages and finds that loans originating between 2004 and 2006 are most likely to default. Lydon and McCarthy (2011)

also use the same loan-level database to identify the main characteristics of accounts in arrears, with special interest in examining the role of ability-to-pay and housing equity factors. They find that borrowers who took out their mortgages for buy-to-let purposes, those with high loan-to-value ratios, and those with high repayment burdens are all more likely to be in arrears. They find as well that affordability issues and general macroeconomic developments have had an important and sizeable effect on arrears trends over time.[50]

[50] There are important differences between the Irish loan-level database and the one used in our analysis. First, the Irish database only incorporates information on household income at the time of loan origination, whereas we have income for the year 2007, February 2008, and February 2009. Second, the Irish database only contains data on mortgage debt, whereas our database also includes data on other type of debt. Third, we build profiles to transform our cross-sectional data to a panel. Fourth, the important advantage of the Irish data compared to our dataset is the ability to identify the purpose or borrower type for each loan and thereby be able to distinguish between first-time buyers, movers, buy-to-let investors, and mortgage equity withdrawals. The Irish dataset furthermore includes more up-to-date information on arrears.

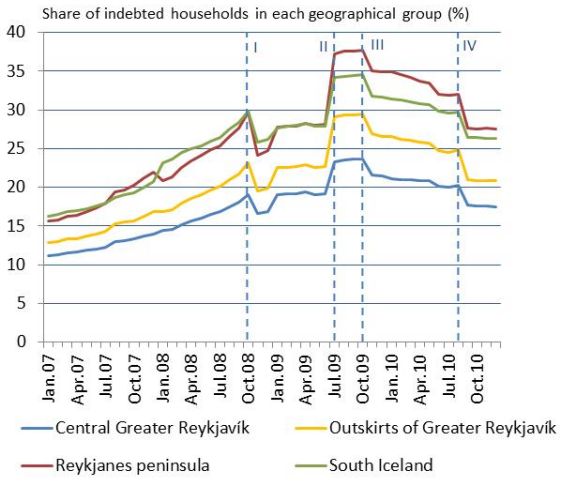
Appendix 3: Households' financial position, by region

Households' financial and housing equity position varies considerably by place of residence, as the extent of both indebtedness and foreign-denomination of debt differs from region to region, as do house prices. Households located in relatively new neighbourhoods that were built primarily during the upswing, for example, seem to have been more indebted than others and had a higher share of foreign-denominated debt.

Financial distress

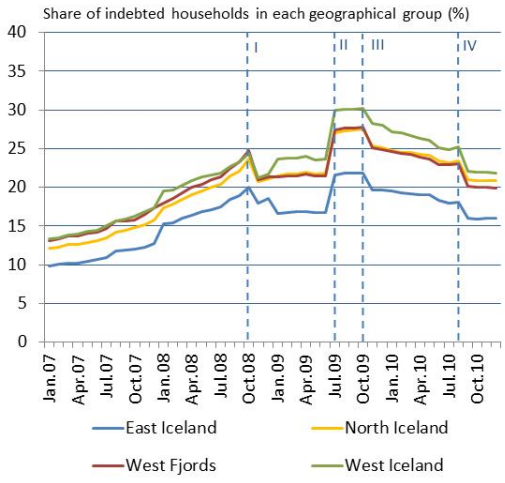
Financial distress was particularly widespread among households located on the Reykjanes peninsula, in the outskirts of Reykjavík, and in South Iceland. These regions all have many new neighbourhoods that were built during the housing boom. The most vulnerable group is located on the Reykjanes peninsula, where almost 28 per cent of households were estimated to be in distress at the end of 2010. The share of Reykjanes peninsula residents in distress peaked at 38 per cent in October 2009 after rising from 16 per cent at the beginning of 2007. Residential investment in Reykjanes skyrocketed during the upswing, and indebtedness was particularly high, which led to a massive shock after the housing bust and banking system collapse. As a result, the financial crisis hit the area extremely hard, and unemployment there has been higher than elsewhere. In the outskirts of Reykjavík, the share of households likely to be in distress measured 13 per cent in January 2007, peaked at 29 per cent in autumn 2009, and had fallen to a fifth by the end of 2010. In comparison, financial difficulties were less profound among households living in the central part of greater Reykjavík, where the share in distress peaked at 24 per cent in 2009 and had fallen back to 17½ per cent by the end of 2010.

Figure A3.1
Share of indebted households in distress by geographical groups[1]



1. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

Figure A3.2
Share of indebted households in distress by geographical groups[1]



1. I: Freezing of many foreign-denominated loans begins, II. freezing ends and payment smoothing of foreign-denominated mortgages begins, III. payment smoothing of indexed ISK mortgages begins, IV: recalculation of foreign-denominated loans takes place.
Source: Central Bank of Iceland Household Sector Database.

In December 2010, the share of households in financial distress was 26 per cent in South Iceland, 21 per cent in North Iceland, 16 per cent in East Iceland, 20 per cent in the West Fjords, and 22 per cent in West Iceland (see Figures A3.1 and A3.2).

Analysed by place of residence, households located in the Reykjavík outskirts were the largest group of distressed households, more than twice the size of the group of distressed households in the central part of greater Reykjavík. As is mentioned above, many neighbourhoods around the periphery of the capital area were built during the upswing, when residential investment and access to credit were at a peak, leading to higher indebtedness and greater vulnerability to financial difficulties, as the findings indicate. As a share of all households in financial distress at the end of the reference period, those located in the outskirts of Reykjavík accounted for an estimated 42 per cent, while households located in central Reykjavik were a fifth of those in distress.

Households in the outskirts of Reykjavík and on the Reykjanes peninsula seem to have received the lion's share of FX loan recalculation. Following recalculation, the share of households in distress declined by almost 4 percentage points in the Reykjavík outskirts and by 4½ percentage points on the Reykjanes peninsula, while the decline measured 2½ percentage points in central Reykjavík and North Iceland. These results go hand-in-hand with the aforementioned results indicating relatively more severe financial difficulties among households in the outskirts of Reykjavík and in Reykjanes, which show that many of them were not only more indebted but also likelier to have foreign-denominated debt.

Housing equity

Now we assess the development of housing equity across residence groups. Here it is influential that the decline in average housing wealth from peak to trough varied from region to region. The greatest decline was in South Iceland, where average housing wealth fell by approximately 24 per cent in nominal terms, as opposed to 20-22 per cent in greater Reykjavik, on the Reykjanes peninsula, and in West and East Iceland. The decline was less pronounced in North Iceland and the West Fjords.

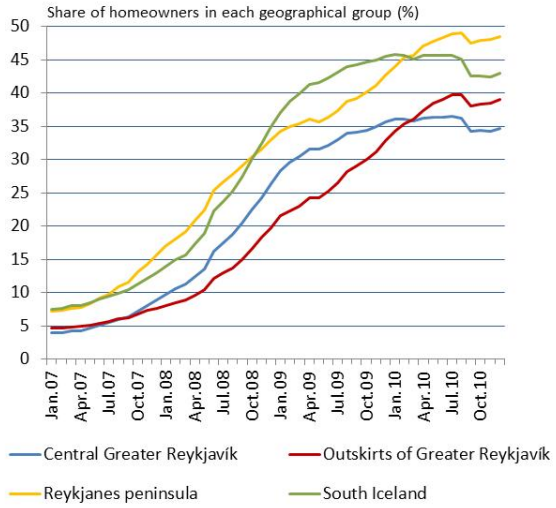
The share of homeowners in negative housing equity varies greatly by region (see Figures A3.3 and A3.4). It is highest among homeowners in West Iceland, where more than half were likely to be in negative equity at the end of 2010, as opposed to 15 per cent at the beginning of 2007. The increase over the four-year period is even more drastic among homeowners in Reykjanes, where just under half were assessed to be in negative housing equity in December 2010, up from only 7 per cent at the beginning of the period. The share of homeowners in negative equity at the end of 2010 was 43 per cent in South Iceland, 39 per cent in the outskirts of Reykjavík, and 35 per cent in central Reykjavík. It is lowest in North Iceland and the West Fjords, where it was estimated at just below 30 per cent. However, as expected, most households in negative equity come from Reykjavík and its outskirts. In December 2010, almost 11,800 homeowners in the outskirts of Reykjavík were estimated to be in negative equity, as compared with 5,300 in central Reykjavík and 2,300 on the

Reykjanes peninsula. Again, these results suggest that homeowners in Reykjanes and the outskirts of Reykjavík were more indebted than those elsewhere.

The recalculation of foreign-denominated mortgages had the greatest effect on households in Reykjavík and South Iceland as regards reducing instances of negative housing equity. The relative decline in the share of homeowners in negative equity is 2.5 percentage points in South Iceland, almost 2 percentage points in both the central part of greater Reykjavík and its outskirts, and 1.5 percentage points on the Reykjanes peninsula. The number of indebted homeowners in negative housing equity fell by 290 in central Reykjavík, 570 households in the outskirts of Reykjavík, and 130 in South Iceland, but only 70 in Reykjanes.

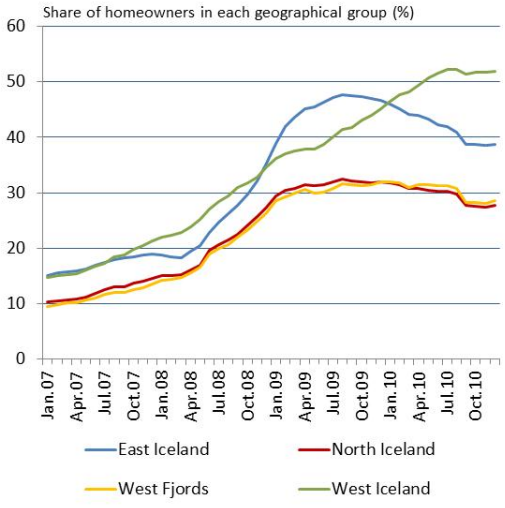
Given the extremely large proportion of Reykjanes homeowners in negative housing equity in autumn 2010, a larger share could have been expected to emerge from negative equity when FX loans were recalculated. However, if a large share of homeowners has severely negative housing equity, recalculation might not be enough to move these households into positive equity. If we consider the distribution of housing equity for different residence groups at different points in time, it is evident that the change in the distribution differs somewhat across groups. In January 2007, two out of three homeowners in the outskirts of greater Reykjavík had positive equity by more than 10 m.kr. At the end of the reference period, only around one in three still had that much housing equity. On the Reykjanes peninsula, however, the same share declines from 53 per cent to 18 per cent. Furthermore, households in negative equity have fallen deeper into negative equity during the reference period. The share of homeowners in central greater Reykjavík with negative equity

Figure A3.3
Share of homeowners in negative housing equity by geographical groups[1]



1. Share of indebted homeowners in each geographical group in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

Figure A3.4
Share of homeowners in negative housing equity by geographical groups[1]



1. Share of indebted homeowners in each geographical group in negative housing equity, i.e. with outstanding balance on their mortgages according to constructed payment profiles for the baseline scenario exceeding the value of their dwellings according to constructed housing wealth.
Source: Central Bank of Iceland Household Sector Database.

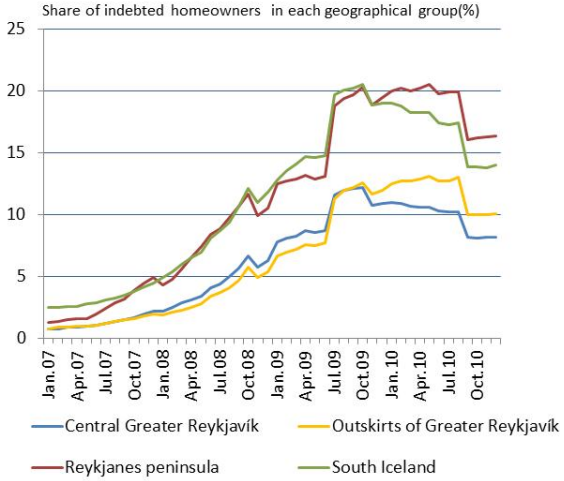
exceeding 5 m.kr. rose from around 1 per cent to 16 per cent over the four-year period, whereas the share of homeowners in Reykjanes with negative housing equity exceeding 5 m.kr. rose from around 1 per cent to 22 per cent.

Homeowners in both financial distress and negative housing equity

Homeowners located on the Reykjanes peninsula are relatively the most vulnerable to simultaneous financial distress and negative equity, which supports the above-mentioned results concerning the severity of their financial situation. Over 16 per cent of these households were both in distress and negative equity by December 2010, compared to only 1.3 per cent in January 2007. In West and South Iceland and the outskirts of greater Reykjavík, between 10 and 14 per cent of homeowners were estimated to be in severe financial difficulties. The share was lower in other areas (see Figures A3.5 and A3.6).

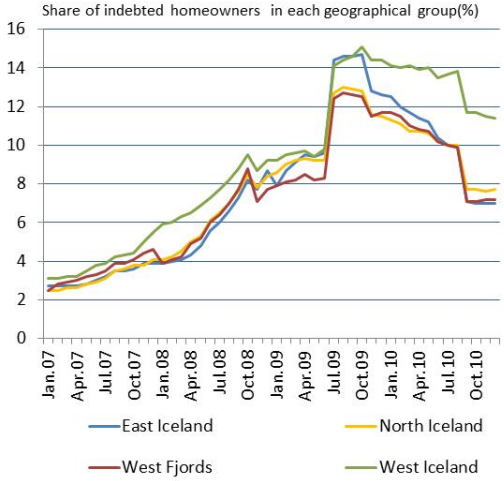
Homeowners who are likely to be both in financial distress and negative housing equity are most numerous by far in the outskirts of greater Reykjavík (3,050 in December 2010), as opposed to 1,260 in central Reykjavík. Just under 44 per cent of homeowners in this group lived in the outskirts of greater Reykjavík, while 18 per cent lived in central Reykjavík and 11 per cent in Reykjanes.

Figure A3.5
Share of indebted homeowners in both financial distress and negative housing equity by geographical groups[1]



1. Share of homeowners in each geographical group with both a negative financial margin and in negative housing equity in the baseline . The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Figure A3.6
Share of indebted homeowners in both financial distress and negative housing equity by geographical groups[1]



1. Share of homeowners in each geographical group with both a negative financial margin and in negative housing equity in the baseline . The baseline scenario allows for explicit debt restructuring measures and recalculation of foreign-currency denominated mortgages.
Source: Central Bank of Iceland Household Sector Database.

Appendix 4: Further information on the total number of households and the income and housing wealth data

The total number of Icelandic households is uncertain to some extent. There were roughly 174,052 household units at the time of data gathering, according to Statistics Iceland's population figures, including 77,047 nuclear families and 96,995 singles. We have information from tax returns on the income levels of 177,160 households for the year 2007, including 75,344 nuclear families and 101,772 singles. Hence the total number of households by this measure is very similar to the total number of households according to Statistics Iceland's population figures. Both measures apply roughly the same definition using the family number and are therefore subjected to the same risk of overestimation of the number of singles and underestimation of the number of nuclear families due to the classification of individuals as independent households although they still live with their parent(s).

Statistics Iceland also publishes another measure of the total number of Icelandic households, which is based on the Statistics on Income and Living Conditions (SILC) survey. The survey uses a "dependent children" measure that counts children as all those under age 18, in accordance with our definition, but also includes individuals aged 18-24 years who are without employment and live with at least one of their parents. Consequently, this measure is not subjected to the same type of estimation risk but is, of course, fraught with sample uncertainty. Hence the results are presented with an uncertainty interval. In 2009, there were between 121,300 and 130,900 households in Iceland, according to this survey measure (Statistics Iceland, 2010). Using the same degree of uncertainty, there were approximately 84,300-91,000 nuclear families and 36,400-39,300 singles. This implies that our measure of the total number of nuclear families is indeed an underestimation and our measure of the total number of singles an overestimation. However, the total number of households does not play an important role in our analysis since we focus on indebted households. Thus it is more important to assess the likely extent of over- and underestimation of the group of indebted nuclear families and singles, respectively.

We have information on the debt position of 120,745 households in our database, of which 66,704 (55 per cent) are nuclear families and 54,041 (45 per cent) are singles. Comparison with a breakdown of data from Statistics Iceland's SILC survey indicates that our number of indebted nuclear families could be a bit underestimated and that our number of indebted singles is overestimated to some extent, but the difference is much smaller than could be expected from the comparison of the total number of nuclear families and singles. Hence our focus on indebted households is preferable to the total number of households. The number of indebted households implies that the share of indebted households in Iceland is approximately 68 per cent. However, it is primarily singles that are debt-free. Nearly 90 per cent of nuclear families seem to be indebted.

Precautionary notes on the income and housing wealth data

It should be noted that there are advantages and disadvantages to our income measure. The use of tax withholding records allowed us to obtain up-to-date information on income at the time of data compilation, which reflected the income environment soon after the banking collapse. Importantly, the bulk of the contraction in hours worked and number of workers had

already occurred by February 2009, the period covered by our information on household income. On the other hand, some income is missing from the tax withholding records; e.g., financial income, some tax-exempt benefits, etc. In addition, given that we only have data for February, our income measure could misrepresent the average monthly income for some households, such as students, who receive a large share of their wages during the summer. Nevertheless, February should be preferable to many other months in this sense. We calculate mortgage interest subsidies and child benefits for each household and give consideration to changes in taxes and personal tax deductions. This allows us to calculate each household's disposable income.

A comparison of the distribution of disposable income for average monthly wage income in 2007 according to tax return data and for February 2008 and 2009 according to tax withholding records reveals that the main difference lies in the exclusion of individuals with very low incomes from the tax withholding records. This is not surprising, as many individuals who are only employed for a short period of the year (for instance, during the summer) are not included in the tax withholding records if the working period does not include February. This is reflected in the number of individuals included at the three points in time. We have income information for approximately 233,000 individuals for the year 2007 and roughly 214,000 and 207,000 individuals for February 2008 and February 2009, respectively.

We do not take financial income into account in our measure of disposable income, as our data on financial income is limited to the year 2007. It is clear that financial income changed dramatically after 2007, as the stock market was virtually wiped out when the three largest banks collapsed. Analysis of data on financial income in 2007 reveals that approximately 91,500 households had roughly 246 b.kr. in financial income in that year, when the asset price bubble reached its climax. Roughly 70,000 of those households were indebted and had 181.5 b.kr. in financial income. As a consequence, disregarding financial income can lead to overestimation of the share of households in financial distress. However, it is important to note that financial income is far more unevenly distributed than wage income. This is reflected in the fact that approximately 2,200 households had over 10 m.kr. in financial income in 2007 and held 78 per cent of all financial income received by indebted households in 2007. Around 37,000 indebted households, which had positive financial income in 2007, had below 100,000 kr. in financial income. In addition, 49,200 indebted households had no financial income in 2007.

Our housing wealth data is based on the official Land Registry value in December 2008, which broadly reflects the market value in February 2008. In 2010, Registers Iceland introduced a new official Land Registry value that incorporates new, refined methods to make the Land Registry value reflect market values more accurately. We do not capture these changes. According to information from Registers Iceland, the new methods implied that 55 per cent of residential property rose in value, with larger and more valuable dwellings increasing the most, while 45 per cent of dwellings decreased in value. The change in value was within 5 per cent for roughly 40 per cent of properties, but exceeded 15 per cent in approximately 16 per cent of cases (Registers Iceland, 2009). This has to be taken into account when interpreting our results on housing equity.

We do not consider households' total equity position in light of incomplete data on assets other than housing. We do have information on deposits in December 2008, but we have only limited data for pension fund assets and the value of securities and motor vehicles used as collateral at the loan issuance date. Calculations based on such incomplete data would be subjected to greater uncertainty than when we focus more narrowly on housing equity; in addition, it is not clear what assumptions we should use for the evolution of deposits over our reference period.

Appendix 5: Comparison with aggregate evidence

In this appendix we want to provide a comparison of aggregate household debt according to our constructed payment profiles with other data sources, as well as evidence on total and average housing wealth and mortgage debt. Finally, we compare total outstanding balances according to the constructed payment profiles with total reported outstanding balances at 31 December 2008. These comparisons should serve as quality checks on our constructed profiles, although it is quite natural that there are, for instance, differences between actual debt positions and the constructed profiles where payments are assumed to be made each month according to the loan agreement except when special debt restructuring measures are considered.

The main source of aggregate household debt prior to the collapse of the banking system in October 2008 was data on the credit system published by the Central Bank of Iceland. However, the Central Bank did not publish the series for over three years after the collapse as large uncertainty prevailed about the banks' balance sheets and data gathering proved problematic. According to credit system data, total household debt amounted to 1,890 b.kr. in September 2008 and had increased by roughly 1,158 b.kr. over a five-year period. The Central Bank published data on aggregate household debt for the whole period from 2007 to 2010 on 20 December 2011 in the new financial accounts.[51] However, households' loans at the three largest banks are evaluated at book value in these figures, which should reflect the amount expected to be collected, not the borrowers' actual debt levels. This makes a comparison with the results of our analysis problematic. Hence, we are also interested in using data on aggregate household debt according to tax returns from the Director of Internal Revenue for comparison. This measure tends to underestimate household debt compared to the credit system data, although it is likely that this underestimation is less severe now when information for most loans is automatically registered into the tax returns.

We compare the year-end aggregate household debt position in 2007-2010 according to data from the financial accounts and tax returns with the sum of the total outstanding balance for each of our roughly 424,000 constructed payment profiles (while at the same time assessing the development of debt excluded from the data gathering).[52] Aggregate household debt according to our assessment and tax return data is very similar from 2007-2009 (see Figure A5.1). According to both measures, aggregate debt increased by roughly 40 per cent over this two year period from a level of approximately 1,348-1,362 b.kr. to approximately 1,892-1,923 b.kr. at year-end 2009. The two measures diverge in 2010 when aggregate debt declined by roughly 7 per cent according to our measure but only 0.8 per cent in the tax return data. This probably reflects that the recalculation of foreign currency-denominated and mixed

[51] The financial account data and the older series from the credit system data are available at the Central Bank's website at http://sedlabanki.is/?pageid=552&itemid=198dfc1c-a027-4abf-b95f-c51fda8bc5f5

[52] Our data on individual loans does not cover all household debt. Student loans and loans from some small pension funds make up the largest share of debt excluded from our database. Data on student loans is available and we assume that the pension fund loans not included in our database evolve in the same manner as total pension fund loans to households. Hence, we add roughly 121 b.kr. to the sum of all outstanding balances according to the constructed payment profiles in 2007, ca. 141 b.kr. in 2008, ca. 178 b.kr. in 2009 and approximately 190 b.kr. in 2010. We also add the incomplete data we have on loans backed by securities, which amounted to 46.7 b.kr. at 31 December 2008.

loans takes place in August 2010 in our analysis while its effects will first be felt in the 2011 figures in the tax returns.

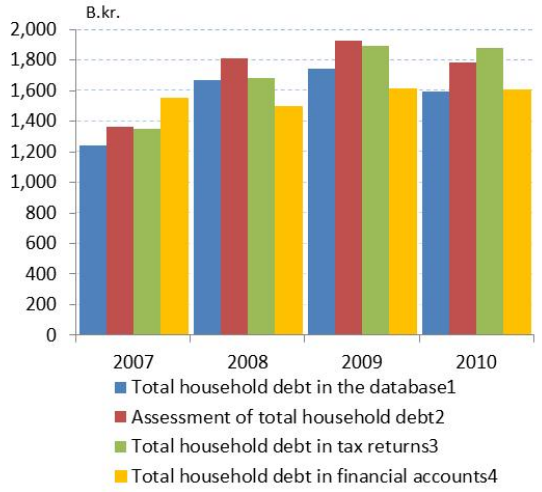
The fact that our assessment of aggregate household debt, which is based on the constructed payment profiles and adding debt excluded from the data gathering, fits closely with the tax return data is reassuring and indicates that the constructed profiles for the baseline scenario provide a fairly realistic representation of the evolution of aggregate debt. Financial account data are harder to compare due to the difference between book and claim value after the resurrection of the banking system.

Data from tax returns also provide an opportunity to compare data on total and average mortgage debt, as well as total and average housing wealth (see Figure A5.2). Our database includes data on mortgage debt for 84,568 households and data on housing wealth for 75,349 homeowners. Tax return data provide information on a greater number of homeowners and fewer mortgagors. This reflects that most debt-free homeowners are excluded from our housing wealth measure and that all loans backed by residential property are defined as mortgages in our database, while only loans for purchasing of property for own use is categorised as mortgage debt in tax returns. For the same reasons, aggregate and average housing wealth is lower and total and average mortgage debt higher in our database than in tax return data (see Figures A5.2 and A5.3).

Another method to test the quality of our constructed payment profiles is to compare the sum of total outstanding balances of payment profiles for different currency-denominated types of debt with the sum of all reported outstanding balances for the same groups of loans. Given that the reported outstanding balances reflect the debt positions at 31 December 2008 it is natural to compare it with the outstanding balances for the constructed profiles at December 2008 (see Figure A5.4). They are indeed similar as the total outstanding balance of foreign currency-denominated loans is 346 b.kr. for the constructed profiles for the baseline scenario and 335 b.kr. according to the reported balances. The outstanding balance on ISK-denominated loans are only 1 b.kr. apart, making the sum of the total outstanding balance on all the constructed payment profiles in the database only 9 b.kr. higher than according to the reported balances.

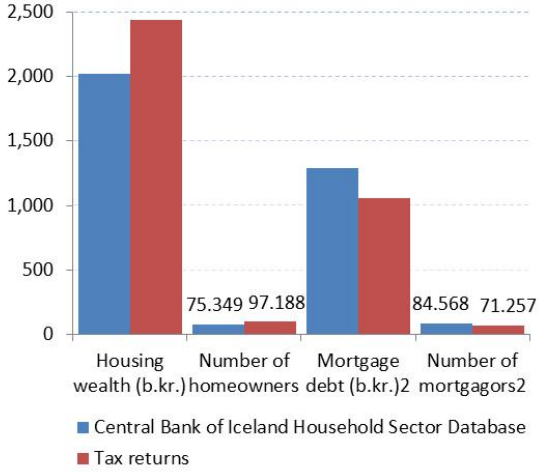
Figure A5: Comparison with aggregate data on the household sector

Figure A5.1
Evidence of aggregate household debt 2007-2010[1]



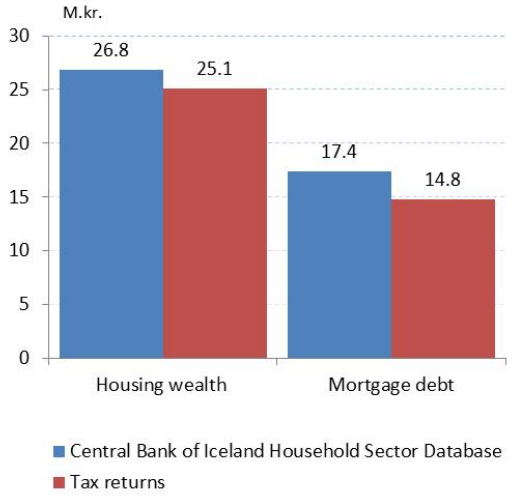
1. Based on total outstanding balances of all loans at year-end according to the contructed payment profiles. 2. Loans from the Student Loan Fund and some smaller pension funds not included in the data gathering added to total debt in the database. 3. Recalculation of foreign-denominated and mixed debt is generally not taken into account in the tax returns for the year 2010. 4. Loans at the three largest banks are evaluated at book value in the financial accounts in the data for 2008-2010.
Sources: The Director of Internal Revenue, Central Bank of Iceland, Central Bank of Iceland Household Sector Database, authors' calculations.

Figure A5.2
Aggregate data on housing wealth and mortgage debt of homeowners[1]



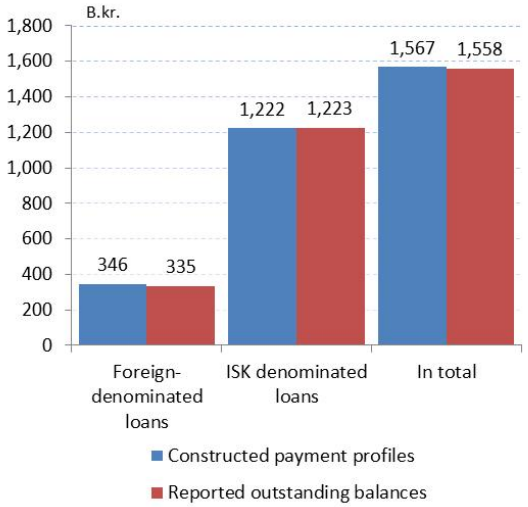
1. According to reported outstanding balance on mortgage loans and Land Registry value of housing at 31 December 2008 and tax returns for the year 2008. 2. Mortgage debt is not defined in the same way in the two databases. The figure shows all debt of homeowners backed by collateral in residential property for the Central Bank of Iceland Household Sector Database and all debt related to purchasing of property for their own personal use in tax returns.
Sources: The Director of Internal Revenue, Central Bank of Iceland Household Sector Database.

Figure A5.3
Average housing wealth and mortgage debt of homeowners[1]



1. According to reported outstanding balance on mortgage loans and Land Registry value of housing at 31 December 2008 and tax returns for the year 2008. Mortgage debt is not defined in the same way in the two databases. The figure shows average debt of homeowners backed by collateral in residential property for the Central Bank of Iceland Household Sector Database and average debt related to purchasing of property for their own personal use in tax returns.
Sources: The Director of Internal Revenue, Central Bank of Iceland Household Sector Database.

Figure A5.4
Comparison of combined outstanding balances of mortgage and motor vehicle debt at 31 December 2008[1]



1. Combined outstanding balances on mortgage and motor vehicle loans at 31 December 2008 according to reported data on each loan and according to constructed payment profiles for the baseline scenario. Foreign-denominated loans are 336,6 b.kr. in the absence of freezing of payments.
Source: Central Bank of Iceland Household Sector Database.