

Price Measurement Problems in Price Indices in times of Financial Crises¹

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Abstract

In October 2008 the Icelandic bank system collapsed followed by severe economic turmoil. This paper describes the theoretical and practical treatment of problems encountered in the Icelandic CPI and downturn of housing markets where prices are falling and lower volume of sales are facts, This paper describes the effect of this crises on the calculation of the Icelandic CPI. Among the problems rising are reduced sample of outlets due to closing down, reduced availability of goods in the stores, collapsing of the market for new cars. The economic downturn also leads to a sudden change in consumptions patterns causing difficult measurement problems. This paper describes the theoretical and practical treatment of those problems in the Icelandic CPI. This paper also describes the Icelandic house price index, the development of housing sales and prices 2000-2009 and falling prices and lower sales volumes. The measurement problems are fall in sales and fewer contracts available for price measurement. The share of trade in houses were part of the payment is non monetary increased as is shown in the paper.

JEL abstract

In October 2008 the Icelandic bank system collapsed followed by severe economic turmoil. This paper describes the theoretical and practical treatment of problems encountered in the Icelandic CPI and downturn of housing markets falling prices and lower volume of sales. This paper describes the effect of this crises on the calculation of the Icelandic CPI. Among the problems rising are reduced sample of outlets due to closing down, reduced availability of goods in the stores, collapsing of the market for new cars. The economic downturn also leads to a sudden change in consumptions patterns causing difficult measurement problems.

Key words: Consumer price index, financial crises, house price index, household expenditure surveys, shopping substitution bias, outlet substitution bias.

JEL: C43, C81, D11, E31.

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1. Introduction

Following the bank crash in Iceland in October 2008 there was a sudden downturn in consumption influencing the CPI measurement in many ways. Detailed economic information is not yet available showing all sides of this situation but many price measurement problems rose. In his paper will try to give overview of the impact of these practical measurement problems that affected the CPI.

The downturn influenced house prices and sales of houses leading to measurement problems because of fewer properties were sold and barter like trade that increased considerably. The measurement problems arising from these facts are also described in the paper.

The problems arising have been dealt with within the Icelandic statistical office. Eurostat has assisted Statistics Iceland by sending a mission to Iceland in the beginning of 2009 for bilateral discussions. Eurostat also convened a Task Force of price statistics experts from several European countries to compile compilation guidelines for the HICP, Eurostat (2009).

2. CPI price measurement problems following the economic turmoil

After the bank crash the first things assumed to be a problem was that goods would disappear leading to missing prices (holes) in the price measurement. This did not turn out to be the case but as the same amounts of varieties in goods are not available it influences the CPI price collection.

The import of new cars stopped completely in October 2008 but sales had already declined considerably from March-April 2008 when the exchange rate of the Icelandic Krona fell significantly. One immediate effect of the crises was that some of the outlets in the sample closed down.

Share of discount stores in the food market increased leading to a shopping substitution bias that had to be corrected. Changes in consumption influenced the different expenditures shares of the CPI.

2.1 Missing prices.

If an item of good or service is not available but is expected to become so soon again or it can not be replaced immediately in the basket, the price is kept unchanged from the previous month. This method is accepted and applied internationally.

There has not been any significant rise in goods that have disappeared from the shops as there has not been any goods shortage and real effort is made to maintain the sample size in the CPI up to date.

So far there have been no specific problems in Iceland regarding the availability of goods and service but it influences the CPI price collection especially as there are fewer varieties of goods available. This became clear under the PPP price collection for food in the first half of

2009 as many varieties of goods were not available as was the case in the survey three years ago.

The number of prices has been monitored since October and there is not a significant increase in missing prices. For the groceries missing prices are not taken into the calculation, only available prices. The price collectors are asked to propose new items to be added to the sample in case of permanent dropout (change in package size, new brand, etc). For other items the prices are left unchanged from last month if the item is expected to be available again and in cases when they have permanently dropped out the price collectors are instructed to find a replacement item (often done centrally).

The replacement items are taken into the sample using direct comparison, bridged overlap (class mean often used as a bridge). In the sample there are more than one outlet in the same chain to meet the fact that the items are not available at every occasion of price collection.

In a situation like this there is a possibility of downward drift in the index at the time of linking that should be avoided as is pointed out in Eurostat (2009).

2.2 Treatment of the fall in the sales of cars

Household purchases of private cars had a weight of 7% in the CPI when car sales came to stop as this is the component in the index which is most easily affected by changes in economic conditions. There is very detailed public weekly information available about the sales of car that is utilised by Statistics Iceland.

In October 2008, list prices of new cars rose by 4.1%. As car sales came largely to a stop, this rise in list prices was considered to be unrealistic and was therefore not included in the CPI (effect on the change in the CPI: -0.3%). Statistics Iceland has from November 2008 only included price changes of car sales where transaction has taken place. Information about the transaction prices is collected directly from the car sellers.

The effect of the change in the methods for price collection from October 2008 to March 2009 can be seen in table 1. The table show clearly that if the price collection method had not been changed the price change had been measured 1.1% higher than otherwise would have been. If the weight for cars had been taken out of the CPI the inflation would have been measured 0.13% higher than the published price change mainly because the share of other expenditures would have increased.

Table 1. Cars in the CPI October 2008–March 2009

<i>Percent</i>	<i>CPI</i>	<i>CPI less cars</i>	<i>Measured effect of car index</i>	<i>Effect of list prices</i>
Total in the period	6,00	6,13	0,31	1,41
October 2008	2,13	2,3	0	0,3
November 2008	1,73	1,78	0,08	0,06
December 2008	1,55	1,67	-0,01	0,48
Janary 2009	0,55	0,46	0,12	0,4
February 2009	0,51	0,48	0,07	0,22
March 2009	-0,59	-0,68	0,05	-0,05

One way to approach such kind of problem would be to use superlative method in the index calculation that would bring the changes in the weights gradually into the CPI. The information about car sales is available timely through detailed statistics about new registrations making it possible to adopt superlative method. The question arises of the time length for each quantity vector, that could be last 12 months for the Paasche vector. Even if superlative method would be used the lack of prices would have similar effects on the index as now and constitute a considerable problem.

Net weight is used now for cars in the CPI. The expenditures for automobile purchases is figured as the difference in value between a bought automobile and a sold one, which conforms to methods adopted by the harmonized consumer price index and in national accounts.

This means that when import of cars falls there is a downturn in the index weights even if consumers still use their cars. This leads to the question if a user cost method would be better suited for the CPI, especially if it is a COLI index, in a turmoil situation.

There are studies available of user cost for cars, see Schultz (1999, 20001). The use of cars will not lead to changes in the weights in the same way as is the case now. A user cost method was used in the Icelandic CPI prior to 1997.

2.3 Reduced sample of outlets

If a shop closes down the price change taken into account is the same as in the stores still in the sample. In the case of clothing (inclusive some home textiles) 10% of the outlet in the sample dropped out in October 2008 (5 of 50 outlets) and since then few shops selling home electronics closed down. Furthermore two providers of home electronics changed their variety of goods causing missing prices. There is difficult to add to the sample of goods in the current situation because of the uncertainty of whether the firms still operating will survive and new outlets are not entering the market under current economic situation.

Statistics Iceland strives at keeping the sample stable both by adding outlets if available and increasing sample of goods in stores already in the sample. In December 2008 one of the three prevailing conglomerate, (each split in three chains of outlets; a discount chain, a supermarket chain (big variety, good service) and a „around the clock“ chain (long opening

hours, poor variety of goods)) changed some stores in their supermarket chain to stores in their discount chain. Their own explanation was that it aimed at meeting new preferences from costumers that were becoming more economic in their shopping habits following the crises.

One store in the supermarket chain that was transformed into a discount store is in the CPI sample and it was decided to keep it there. The price change was evaluated by comparing the prices of goods common to both store types. The effect on the CPI of this was 0.1% lowering of the index.

There had been increasing competition in the clothing market in the recent years and even before the banking crash there were reports about difficulties in the clothing branch due to the general recession. The banking- and the following currency crash was so to say the last straw for many in the business. Resampling done resulted in the replacement of 14 out of 35 items. Statice decided to wait and see if more outlets would close down and fortunately that hasn't happened in the period October 2009-May 2009.

The prices from the outlets that shut down were dropped out of the sample. The exception was in the case of home electronics. In that case there were possibilities of resampling as some rather new outlets could be added to the sample that sold items similar to the disappearing ones. The new items were taken in using direct comparison where judged appropriate, if not then the class mean change from the base period was used. In the case of sales prices they were moved back to presales level before they dropped out.

If an outlet is closing down and final sales prices are included in the compilation of the index in the final month of the outlets activity, the price reductions will have a downward impact on index development which will not be followed by an upward index development in the next month. That is because in that month there is no direct price comparison between the final sales price and any after sales price. This may lead to a downward drift of the index, Eurotat (2009).

Statistics Iceland therefore excludes price observations from outlets that will close down. In one case a clothing outlet reduced prices and that price change was taken into account in September and included in the CPI. The shop had closed down in October and it was decided to impute the October prices to the level observed in August and the outlet removed from the index the following month to avoid downward drift.

2.4 Shopping substitution bias

In the Icelandic CPI, each type of substitution bias is accounted for separately. The geometric mean is used to calculate elementary indices. Outlet substitution is allowed for when an item is not available at a particular store. Substitution bias in household shopping has been called outlet substitution bias, though it in fact has more to do with household shopping behaviour than outlet prices. See Guðnason (2003, pp. 304-308 and 2004, pp. 13-17) and Reinsdorf (1993). On the construction of the elementary indices and the theory behind these,

see Balk (1997), Diewert (1998, 1999, 2001, 2004, 2009), von der Lippe (2009) and Silver (1993, 2009).

Consumers constantly face the fact that store prices for identical or similar goods often vary widely. If consumer price indices are to be correct, they should measure the prices of the goods that households obtain and on that basis measure the price changes in household purchases. Normally, not enough information on shopping behaviour is available to make that possible. The price collection for an index takes place in stores, and the average change in price is most often reckoned from sales information.

When households modify their purchasing patterns, the average price of their purchases may change without anything happening in the store; in fact, prices there might even remain unaltered. In order for consumer indices to reflect such developments, store weights must be adjusted and these price changes must be allowed for in the price measurements. If a price change was being measured by household weights, they would be changed for individual stores as household purchasing patterns evolved. The main issue is that the store sample should provide an accurate picture of transactions.

Retail practices are constantly evolving; accordingly, consumers modify their behaviour in consumption. When a store closes down, they are forced to adapt, although if another store opens at the same place as the old one they can keep shopping there. Otherwise, they must search for a new store, whether it has existed before or is brand new. Consumers will respond, and if they buy the same goods elsewhere, at a lower price, this must be accounted for in index calculations, or else shopping substitution bias will enter the index.

Until recently, it was impossible to monitor such changes, because information was lacking, and such a bias is most often called outlet substitution bias. This type of bias has not received much discussion on an international plane, and index adjustments for it have been out of the ordinary.

When consumer indices show no consideration for the household shopping substitution that is actually happening, the assumption will be that any price difference between stores stems from differences in the quality of their service, and in this instance, no change will be marked by indices when consumers evolve new shopping behaviour. "When pure price differences exist, a change in market conditions may make it possible for some households to switch from purchasing at higher prices to purchasing at lower prices, for example if new outlets open that offer lower prices. The resulting fall in the average price paid by households counts as a price fall for CPI purposes, even though the price charged by each individual outlet may not change." (Hill, 2004, p. 4).

Underestimating quality change in goods or services leads to overestimating inflation. This risk is most pronounced when inflation increases abruptly and household purchases deviate sharply. The service level in stores deeply influences consumer choice, besides prices on goods. Service level includes every factor affecting the consumer's idea of quality when selecting a place to shop, as well as most elements that characterize the type of store. Such aspects are entailed as the selection of goods, the number of stores in the chain, their location,

the number of cash registers, the opening hours and the payment arrangements. Every one of these aspects needs to be accurately reflected in price measurements. Since quality is both subjective and dependent on the individual, evaluating the service level presents a considerable problem, except for the selection of goods.

There has been a reduction in the contrast between low price stores and stores of other kinds in Iceland in regard to the factors indicated above. It is possible to assess a difference in the quality of varying service levels by comparing the assortment of goods, which represents the only factor in service that is measurable. An example would be if one store closed down and another opened at the same location. Various goods that had been available in the previous store would not be offered in the new one, and there would be different packaging and other brands. The consumer would be shopping at the same location as before but in a new type of store. The price difference between the stores for the goods they had in common would be used to measure the price changes.

The store weights and grocery headings were corrected in December 2001 which yielded a 1.3% decrease in the food component of the index or a 0.27% decrease in the overall index. On the basis of more precise data from receipts in the Icelandic household expenditure survey, the effects were evaluated once more in April 2002, resulting in a 0.10% lowering of the index, see Guðnason (2009).

This kind of bias was monitored from December 2001 to May 2003, the total change due to adjustments in household shopping substitution for groceries and petrol amounted to an almost 0.52% drop in the consumer price index. This revision has been conducted each year having the effect of 0.03% lowering in 2005, 0.03% lowering in 2006, no measured effect in the years 2007 and 2008 but 0.12% drop in 2009.

2.5 Changes in consumption patterns

In the domestic debate following the bank crash it was often argued that there would be an upward bias in the CPI measurement because the changes in consumption patterns that were supposed to have happened suddenly were not taken into consideration in the index compilation.

Changes in buying patterns have an impact on household expenditure (cost-of-living) but not necessarily on consumer prices. The consumer price index does not measure volume changes of the index basket but rather the price changes of the goods and services which the basket contains. A fall or an increase in household consumption does therefore not have an impact on the results of the calculation of the CPI.

It is well known that when purchasing power rises households have a tendency to buy more expensive goods than before and that many households will meet a fall in purchasing power by switching their purchases from expensive to inexpensive items. For example, if a household substitute expensive steaks with inexpensive processed meat it does not constitute a price reduction in the CPI as these are not comparable goods.

The same applies if purchasing power rises, leading households to switch to more expensive items (buying steaks more frequently than before), that it will not be measured as a price rise in the CPI.

A switch in the purchases of households away from relatively high price supermarkets towards low-price stores may have an impact on the CPI. Although the economic situation changes households will continue to buy many of the most common consumer goods, but their prices may differ substantially between shops. Many households will adapt to reduced purchasing power by becoming more price sensitive and actively seek out the lowest available prices. This does not constitute a change in consumption but rather a change in buying patterns.

Statistics Iceland monitors changes in the weight of different outlets in the household expenditure survey and renews the weights of outlets every time the index is rebased. The outlet weights are used in the calculation of price changes of everyday items in the CPI every month. The weights system of Icelandic CPI and HICP is based on HES. The HES covers 1,200 households each year.

A moving average of 3 years HES results is used for the CPI/HICP weights. At the time of the base revision one year is added and one dropped out. For example in June 2009 the national CPI is based on the average results of HES for the years 2005-2007, measured in 2007 prices. Then the average was price-updated to March 2009 and these weights are in use in June 2009.

The car component was revised in March 2009 with respect to new registration data and new data was obtained for airfares between Iceland and other countries and for package tours abroad. All items were reviewed on the basis of available data, such as on VAT turnover, as has been done on every occasion of rebasing the index during the last decade. Furthermore, a special attention was paid to changes in buying pattern.

The main changes in the expenditure composition were in transport where the weight decreased from 16.5% to 12.6%, mainly owing to the drop in sales of new cars in 2008. The weight of food and beverages increased from 12.0% to 14.3% and the weight of recreation and culture decreased from 11.8% to 10.8%. The share of housing water and electricity decreased from 28.2% to 25.4%. Thereof the weight of the imputed rent for owner occupied housing decreased from 17.9% to 14.1%.

The shopping habits of households were revised but the share of shops had been unchanged since 2006. The new shopping weights are based on the results from the household expenditure survey for the year 2007. The results were revised in accordance with turnover figures for the year 2008 to monitor the changes. This change in shopping habits is not consumption because the goods bought are the same as before but come from different types of shops and that is the reason why revision of this kind affects the index results.

The results show that consumers have moved their shopping to stores where prices are lower. This change in shopping substitution led to a 0.12% lowering of the index in April 2009.

The base revision can be divided into three parts. First there is the price updating of the expenditure weights. Second is the change in the shopping weights of grossery stores and the third is correction for shopping substitution bias.

When the expenditure weights had been price updated between March and April 2009 the index was 0.13% lower then would be if the price change was calculated on the older 2008 base.

When the shopping weights had been revised the price change was measured 0.08% lower than would have been on the older base. The reason is that there was a bigger price increase from March to April in the outlets with increased weights shares in the revision of the shopping weights.

When the shopping bias had been corrected (effect on the CPI -0.12%) the CPI was 0.20% lower on the new base compared to the old base.

3. Economic downturn and price measurement problems in the housing index

This chapter describes the Icelandic house price index, the sales activity in the housing market and the price development in the last years. It also treats price measurement problems that arise in a market downturn situation.

There are mainly two problems connected to the recession in the housing market. Firstly the falling prices and secondly there is an increase in sales contract where a part of the payment is non monetary, barter trade.

Following the downturn of the housing market the price observations (number of contracts) used in the calculation of the house price index are fewer. Compared to the period 2000-2004 the obserations have decreased by 65-85% influencing the calculation strongly. Still the stratification (by type, location and size) in the index is kept fixed in the calculation using a superlative approach.

In housing trade, real estate or liquid assets may constitute a part of the payment for the purchase of a dwelling. Such non monetary payment are found in approximately one third of the contracts and the present value of the contract is then calculated by a rate of return reflecting the risk of such trade. These contracts are a part of the market prices and have to be taken into account in the calculation.

3.1 The Icelandic house price index.

The house price index used in the Icelandic CPI is based on market prices for houses obtained from standardized sales contracts that the Property Registry collects. Every sales

contract contains information on the property number, its owners and the sales price, along with precise details on payment terms. These detailed data form a basis for the aggregate real estate value and form the grounds for measuring the market price of real estate used in the consumer price index.

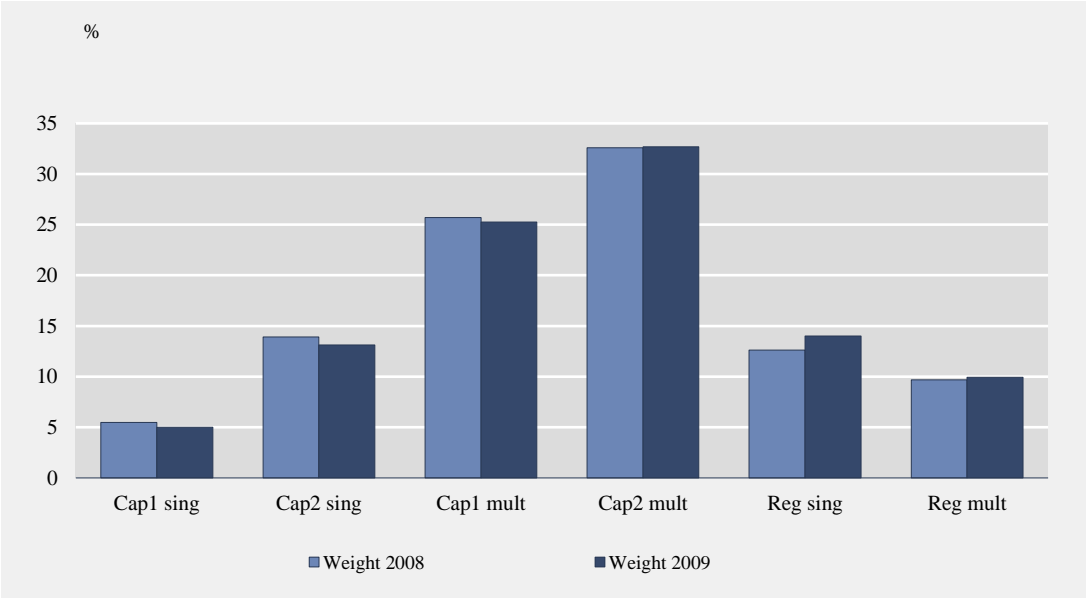
In the period until 2007 roughly 8–10 thousand real estate sales contracts were made annually, which means that around 8–10% of all the housing in the country was bought and sold. The sales fell to 4000 in 2008 and estimated to be only 2000 properties in 2009. The price concept is the same as for other price measurements in the CPI as the price used for computation is the one the consumer actually pays for goods and services, the price of the goods in cash. A sales contract details how payments are arranged; in fact, that information enters into figuring its present value. The basic reason for applying the present value is the fact that the value of money paid today is different from the value of money paid in the future.

The price changes for real estates are calculated as a three-months moving averages, with a one-month delay. April includes contracts from the period January to March, May contracts from the period February to April.

A stratification method is used in the Icelandic house price index. The index is transaction based, weighted superlatively (the Fisher index in this case) and subindices are produced by this method.

The value weights used in the house price are covering three years period and are changed monthly by adding one month and leaving out one month. The quantity vectors are now for the Laspeyres index (2008) covering the years 2005-2008 and for the the values of the Paasche index (2009) for 2006-2009.

Figure 1 Value weights in the house price index in March 2009



Note: Weight 2009 refers to March 2006-2009, weight 2008 to March 2005-2008. Cap1 is the inner part of the capital city area, Cap2 is the outer part, Reg is housing outside the capital area. Sing are single-flat houses, mult are multi-flat houses.

The biggest share of the weights is for multi-flat houses in the capital area. Single-flat houses in the capital area have similar share as housing outside the capital area. Since 2006 when this index was adopted there have been changes in the weight shares. Housing outside the capital area has now bigger share of the total, but the share of single-flat houses in the capital area is lower.

The geometric mean is used when averaging house prices within each stratum at the elementary level. This is in line with the calculation method used at the elementary aggregate level in the Icelandic CPI. The geometric mean is also used in hedonic calculations and the geometric mean is a typical matched model estimator, Diewert (2003b) p. 32 and (2003c) p. 334), Haan (2004) p. 431.

In the compilation of the index fixity is kept on following details placing emphasis on price developments within housing categories, not on types of properties or across the different regions of Iceland:

- Three regions by location in the country; capital are by age of the houses; older/inner and younger/outer and outside the capital area.
- Two types of properties; multi-family housing, single-family housing.
- 4-5 category sizes.

The capital area is split into two strata, an inner/older and an outer/newer where nearly 30% of the single-family houses sold belong to the inner/older area. There are 8 categories for the different types of properties by size, resulting in altogether 18 subindices for housing in the capital city area and 8 indices for properties outside the capital city area.

From both sets, 4 overall indices are calculated for multi-family housing and single-family houses, inside and outside the capital city area. Hence 30 subindices are used when calculating the aggregate index for real estate prices.

3.2 Housing market activity 2000-2009

One of the main methodological difficulties in the measurement of house prices is the fact that properties vary in quality. In the case of increase in sales many of the properties traded could be of lesser quality than before. In the case of sales decrease there are similar worries that better properties are sold and therefore there could be bias in the trade. There could also be changes in the sizes and geographical spread that have to be closely monitored for the house price index.

In the years 2000-2004 the sales contracts in Iceland compiled were on the average approximately 8,600 per year. The sales contracts used on the average in the index calculation in this period amounted to 25,000 yearly. In the period 2005-2007 the number of sales went up in the boom following the entrance of the private banks into the housing loan market in 2004.

The average number of sold properties sold in this period was 10.400 a year Dropping from a sales peak of nearly 12.000 properties in the year 2005, to only 8000 in the year 2006 and recuperating to 11.000 properties sold in 2007.

Table 2. Number of sales contracts used in the house price index 2000-2009

Year	Cap 1 mult	Cap 2 mult	Cap 1 sing	Cap 2 sing	Reg mult	Reg sing	Total
2000	2.518	1.950	263	603	1.070	1.150	7.554
2001	2.400	2.015	267	632	895	1.039	7.247
2002	2.714	2.326	300	657	932	1.050	7.979
2003	3.005	2.746	336	830	985	1.273	9.175
2004	3.211	3.706	377	867	1.214	1.504	10.879
2005	3.217	3.451	316	804	2.224	1.837	11.849
2006	2.271	2.460	226	603	1.276	1.212	8.048
2007	3.073	3.814	339	442	1.582	1.570	10.820
2008	1.141	1.023	99	278	734	718	3.993
2009	438	512	80	148	360	440	1.978

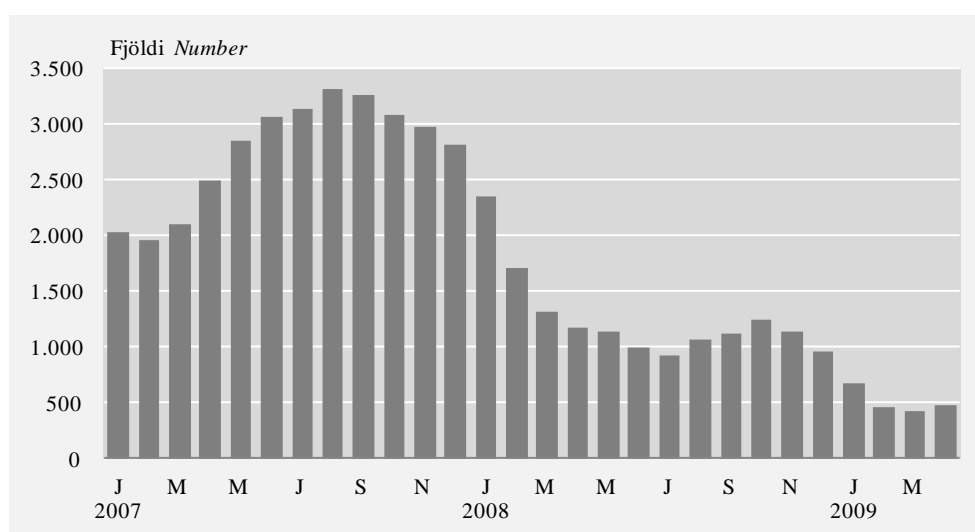
Note: Cap1 is the inner part of the capital city area, Cap2 is the outer part, Reg is housing outside the capital area. Sing are single-flat houses, mult are multi-flat houses.

Compared to the average for the year 2000-2004 the sales in the year 2005 were 38.3% higher and in the year 2007 26.3% higher. The number of sales contracts fell rapidly in the beginning of the year 2008 as the crises in housing market started and went further down after the bank crash in October 2008. The total number of houses sold in 2008 was around 4.000. The drop in housing sales in 2009 continued and in the first four months nearly 500 properties were traded, yearly equivalent to a sale of 2.000 houses.

This contraction from the average volume in the years 2000-2004 for multi flat housing in the capital area went down by 80-84%, the lowest value for this category 89% and the highest 65%. For single flat houses in the capital area the change is in the interval 74-79%, lowest value within a stratum being 70% and the highest 82%. For housing outside the capital area the values are similar (63-65%) and the spread is in the interval of 60-69%.

The decline in sales started in the beginning of 2008 and is still progressing.

Figure 2. Number of sales contracts used in the house price index 2007-2009



As the index results are calculated as a three-month moving average nearly 2800 sales contracts were used in the compilation of the house price index in each three month interval for the year 2007. In 2008 the numbers had fallen down to 1300 on the average. In the period December 2008 to April 2009 the amount had declined to near 500.

3.3 Housing prices 2000-2009

House prices started rising in the years 2003-2004 culminating in a 28.5% rise in the year 2005 and for single flat houses the price rise was nearly 43%. Price change was lower in next years and to April 2009 there was a price fall of 11.1% and in real terms by -21% (deflated by the CPI less housing cost).

Table 3. House prices development 2000-2009

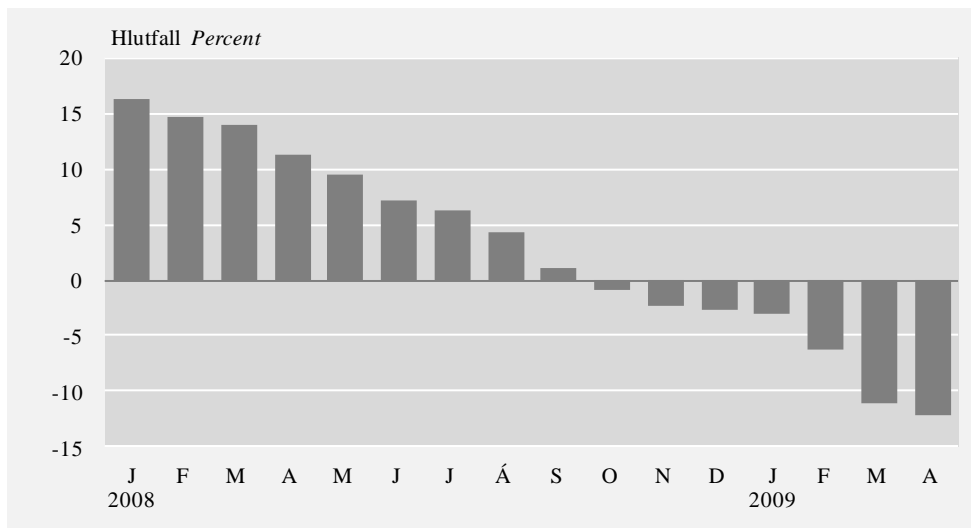
Year	Cap		Reg	Total	Cap		Reg	Total
	mult	sing	total	%	Real mult	Real sing	Real total	Real %
	%	%	%	%	%	%	%	%
2001	7.9	9.6	2.2	6.7	1.1	2.7	-4.3	0.0
2002	3.3	3.2	9.7	4.8	-1.3	-1.4	4.9	0.2
2003	12.1	9.5	11.7	11.7	11.3	8.7	10.9	10.9
2004	11.2	13.7	7.0	10.5	8.9	11.4	4.8	8.2
2005	30.5	42.9	15.0	28.5	29.3	41.6	13.9	27.3
2006	15.4	19.8	18.8	16.8	10.1	14.3	13.3	11.4
2007	8.6	8.5	12.8	9.4	6.1	5.9	10.1	6.7
2008	6.3	7.2	5.3	6.2	-5.3	-4.5	-6.2	-5.3
2009	-10.1	-11.1	-12.0	-11.0	-20.5	-21.0	-21.8	-21.0

Note: Real is real price change and prices are deflated by CPI less housing cost. Cap1 is the inner part of the capital city area, Cap2 is the outer part, Reg is housing outside the capital area. Sing are single-flat houses, mult are multi-flat houses.

The turning point in the price development occurred in the middle of the year 2008. Then prices started to fall and in October 2008 and there was a decline in the twelve month rate of change for the first time since March 2000.

The decline has continued in the year 2009. In April 2009 the twelve month rate of change was -12.2%, the prices were 11.8% lower for multi flat houses and 10.8% lower for single flat houses in the capital area. Outside the capital area the prices fell by 14.3%.

Figure 3. Housing prices, annual rate of change January 2008-April 2009



There has been considerable house price inflation in Iceland in recent years. In real terms, house prices (deflated by the CPI less housing cost) in the period 2000 to April 2009 have increased by 38% for multi-flat houses and 59% for single-flat houses in the capital area. For houses outside the capital area, the average price change in the same period was 22%. The average price change for the whole country was about 36%.

For houses in the capital area, the average price change, 1993 to April 2009, in real terms was 76%, for multi-flat houses in the capital area 72% and single-flat houses in the capital area 97%.

In the period 1993–1998 house prices were stagnant or fell slightly. In the period 1998 to 2000 there was a 24% increase in house prices in the capital area in real terms and 17% outside the capital area in the same period. In the period 2000–2004 the average prices in the whole country rose by 20%. The average house prices rose in the period 2004-2006 by 42% and fell by 20% in the period 2006-April 2009.

3.4 The housing measurement problem in the times of recession

There are mainly two problems connected to the recession in the housing market. Firstly the falling prices and secondly there is an increase in contracts where a part of the payment is non monetary.

Following the downturn of the housing market the price observations (number of contracts) used in the calculation of the house price index are fewer. Compared to the period 2000-2004 the observations have decreased by 65-85% influencing the calculation strongly. The stratification (by type, location and size) in the index is kept fixed in the calculation using a superlative approach.

In housing trade, real estate or liquid assets may constitute a part of the payment for the purchase of a dwelling. Such non monetary payments are found in approximately one third of the contracts and the present value of the contract is then calculated by a rate of return reflecting the risk of such trade. These contracts are a part of the price development in the market and need to be taken into account.

3.4.1 Effect of fall in sales and missing prices

There are three strata used in the calculation of the house price index, by location, by the type of housing; multiple or single flats and by and size classes. When there is a large drop in the sales of housing the composition of properties in each strata can vary between months causing volatility in the results. That raises questions about quality issues that can be difficult to treat within the model used and current situation might challenge the suitability of the geometric mean as an estimator.

There are two main ways used to treat this problem. When no sale occurs in a stratum the price is kept unchanged at least for three months. This is similar to methods used in other parts of the CPI calculation when goods or services are not available. It is also well in line with the concept for the user cost model used in the compilation of owner occupied housing.

If few contracts are available in a cell the rule used is that there should be at least five contracts available for the calculation. If there are fewer than five contracts available older prices are added to new ones to reach the minimal number of prices required in each month. In this way all available price material is utilised in the compilation. The rule of five contracts is not based on variance calculations but on ad hoc tests on the variability of the price material.

Table 4. Sales shares and missing prices

Period	No Sales %	<5 Sales %	Total Sales %
2008	1	4	5
2009	4	15	19
Single flats/ capital area	27	43	70

In 4% of the cases in 2008 there were less than five prices available and similar figure to April 2009 were 15%. Missing prices were nearly 1% in 2008 and 4% in 2009. The total of this is 5% in 2008 and 19% 2009. It means that nearly one price in five is effected by the economic situation.

The results differs between strata in 2009 as in the case for single flat in the capital area this figure reaches 70%, compared to only 9% for multiple flats in the capital area and 16% for housing outside the capital area.

3.4.2. The effect of non monetary payments

Non monetary trade in housing occurs when real estate or liquid assets may constitute a part of the payments for the purchase of a dwelling. A sales contract includes payment arrangement details used for computing the present value of the sales contract. Property traded in this way is equal to monetary payment and a need to make a montary evaluation of the transaction.

Around mid-year 2008, these types of housing transactions became increasingly common. From May 2008 the share of housing purchase contracts involving non-monetary payments constituted 17% of all housing purchase contracts, for the capital area the share was 22% and outside the capital area 14%. In the first four months of 2009 this trend has strengthened and the total number of non monetary transactions rose to 28%, for the capital area to 40% and outside the capital area to 18%.

The biggest share of these transactions is for single flat houses in the capital area where the share of this type of transactions was 38% in 2008 rising to 54% in the period January to April 2009².

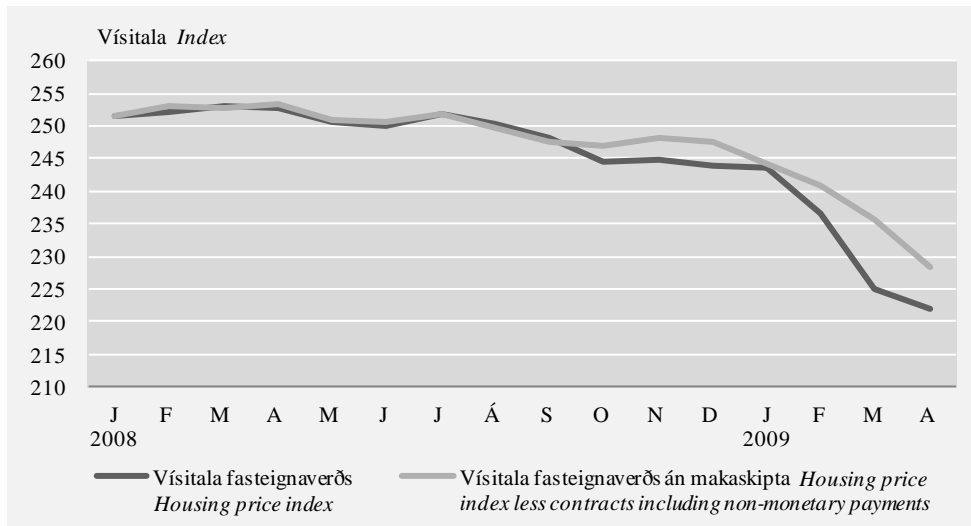
The reason for the increase of this form of payment is probably the difficulty in rasing credit at the times of crises. By letting your property go into the transaction as part of the payment means the the buyer does not have to raise as much capital as otherwise needed.

This facilitates the transactions and are therefore market transaction or the trade would ot take place. There is probably a tendency to value the properties as high as possible for mortgage purposes.

² Such forms of non mentary payments were also common in the years 1995-1999.

As the business would not otherwise take place these market transactions need to be taken into account as they also reflect market situation.

Figure 4. Effect of non-monetary payments on housing price index January 2008–2009



As the non monetary transactions became more common the required rate of return for such transactions was revised each month by using the highest long term real interest rates available in the banking system and with inflation also taken into account. In March 2009 the real interest rates were 8%, the inflation rate 15.2%, and thus the total rate of return used was around 23%, which entails that the nominal value of the real estate used for payment in housing purchases was reduced by nearly one quarter when calculating the present value of the sales price.

The method used lowers the value of the contract when calculating the present value. The main uncertainty connected to using the method is the question when the property, taken as a payment, can be sold and at what price. It is still considered necessary to include these contracts as they reflect market situation and in times of deep recession they can be considered as a precondition for sales to take place³.

If the non monetary transactions had not been taken into account in the calculation the house price index would have been 2.9% higher in April 2009 than the published index including those transactions. The difference is highest in the case of multi flat housing in the capital area 4.8%. This difference is lowest in the case of single flat houses outside the capital area -7.9%.

There is a difficulty regarding the effect of non monetary transactions on the market price of housing. This is a complex measurement issue regarding how to include these transactions

³ The Icelandic Land Registry calculates its own house price index for the capital area leaving these transactions out of their calculations. They have tested non monetary transactions in their hedonic evaluation model indicating that the rate of return is in the interval of 15-20%.

in the calculation of the present value of the contract when there are no standardised methods available.

4. FAQ about the CPI

One of the results of the bank crash in October was a considerable increase in the domestic discussion especially about the effect of higher inflation on private consumption. In most cases there has been a profound misunderstanding or misconception about the issues.

Statistics Iceland had not developed special strategy to meet this situation. The common information strategy in the price unit is easy accessibility for the users directly to the experts, and the staff is very service minded and tries to be transparent in their communication.

The unit tries to meet the demand for information which has been quite massive the last months. Examples of such recent communication: Participating in news magazines on Radio, giving interviews on TV and newspapers, presentation to the staff of Statice, presentation and discussion in meetings with representatives of trade unions, lecture at the university for graduate students in economy.

In addition the unit is under big pressure from the public calling in or writing e-mails with queries. The wide use of the CPI for indexation has put the CPI in focus. To meet the demand for exact communication Statistics Iceland gathered information as answers to the most frequently asked questions about the CPI and put out on the website. Both in an Icelandic and english version.

This has been very successful and in the three month period from March to June 2009 there were nearly 2.100 different visitors that accessed the FAQ on the website and thereof one third of those in the first day after publishing the answers. The visitors accessing the english part of the website were nearly 500 and the domestic users nearly 1.600. As a share of the users of CPI data nearly 15% of them looked at this page. In the domestic part the share was approximately 7%.

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