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Evaluation of core inflation and its application in the formulation of monetary policy

In accordance with the joint declaration by the Government of Iceland and Central Bank of Iceland from March 27 2001 on inflation target and a change in exchange rate policy, the Central Bank, in consultation with Statistics Iceland, has devised two measurements of underlying inflation which the Bank plans to use in addition to the Consumer Price Index, on which the inflation target is based, when formulating monetary policy. This article discusses the arguments for using such criteria in formulating monetary policy, and the methods for selecting them. The first core index excludes prices of vegetables, fruit, agricultural produce and petrol, and the other also excludes prices of public services.

1. Introduction

In formulating monetary policy the Central Bank of Iceland needs to assess how much of measured price changes can be attributed to factors that reflect persistent or general inflation developments, and how much to factors that only have a short-lived effect on inflation developments. Since such price changes usually reflect changes in relative prices, indirect tax changes or very short-lived supply shocks which change the level of prices without having a lasting impact on inflation, it is usually appropriate to ignore them in the formulation of monetary policy. To simplify the distinction between these two separate causes of price changes, many central banks have resorted to defining ways of measuring underlying inflation. These criteria ought to facilitate the formulation of monetary policy and in explaining their policy decisions to the government and general public. This should increase the probability that the inflation expectations will reflect the underlying inflation outlook rather than temporary price fluctuations which will be corrected soon afterwards.[2] This ought to reduce the fluctuations in output and the policy rate, which usually follow when the Central Bank aims to hit the inflation target.

The approach that is generally taken in devising measurements of the underlying rate of inflation is to attempt to exclude from the headline Consumer Price Index (CPI) items that reflect temporary effects. These are subcomponents on which monetary policy has little effect, are very volatile or have other properties which make monetary policy formulation more difficult than otherwise. The main idea is that price changes deriving from such subcomponents can give misleading signals about the tightness of the monetary stance and can therefore cause wrong policy responses. It can therefore be useful to have some

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2. It is quite conceivable that the public has learnt to ignore such fluctuations in the headline Consumer Price Index and thereby actually bases its decisions on some criterion for underlying inflation. Judging from the experience of recent years, however, the public's knowledge is probably some way from being adequate. Hence it is an important function of the Central Bank to teach the public to ignore such temporary fluctuations and to look farther ahead, at the underlying inflation trend. Part of such an educational role involves targeting monetary policy at core inflation to some degree.

measures of underlying inflation for the formulation of monetary policy. Such an index is normally termed a core price index which measures the underlying rate of inflation, or core inflation.

On the other hand, the CPI is the best available measurement of the development of the cost of living. Using the core index might impair this quality, thereby diminishing the transparency of monetary policy and likewise its credibility. Criteria for measuring underlying inflation thus need to be selected carefully to ensure that the core index reflects the same long-run trend as the CPI. The core index needs to be sufficiently broad in scope to provide a reasonable reflection of the general cost of living yet at the same time highlight as clearly as possible the underlying inflation trend (see e.g. Cufer et al. 2000 and Pétursson, 2000).

However, these conditions need not go hand in hand. An extensive, general index can be a good measure of cost-of-living developments while also containing subcomponents that are very prone to fluctuations, which makes it more difficult than otherwise to evaluate the appropriate tightness of the monetary stance and necessary policy responses when new information on price developments and outlook becomes available. Similarly, there is a risk that a too narrowly defined index will not reflect the general long-term development of the cost of living, with the result that monetary policy will not adequately reflect the general price developments faced by the public. In such a case there is a risk that the credibility of price measurements and monetary policy will be impaired. Indeed, one advantage of the CPI is that enjoys general confidence, since it has a long history, is measured timely, and is never revised. It must be ensured that the public also has confidence in the measured underlying price level. In order to do so, the public preferably needs to understand how the core index is measured and the reasons for using it.[3]

In light of this, the Central Bank, in consultation with Statistics Iceland, has devised two measurements of core inflation.[4] This is consistent with the joint declaration by the Government of Iceland and Central Bank of Iceland from March 27 2001 on inflation target and a change in the exchange rate policy (Central Bank of Iceland, 2001). The present article discusses the general arguments for using such measurements of the underlying inflation rate as a reference for formulating monetary policy, and the reasons for deciding to use these two measures of core inflation. However, it should be emphasized that these indices will only be used as a reference, since the Central Bank's inflation target will be based as before on the CPI as calculated by Statistics Iceland.

2. Methods of evaluating core inflation

2.1. Points to consider in the selection of a core index

In deciding whether monetary policy should target underlying inflation rather than inflation measured by the CPI, and which criteria to use for core inflation, a number of points need to be borne in mind (see e.g. Roger, 1998, and Cufer et al., 2000).

Correlation between the CPI and core index

By removing various expenditure items from the CPI, the quality of the index as a measure of cost of living is reduced. The core index and CPI can therefore develop along different paths in the long run. The larger the weight of components excluded from the CPI, the wider this divergence can become.

Short-term deviations between the core index and the CPI are unavoidable and in fact desirable, since the aim is to eliminate fluctuations which do not reflect underlying inflation developments. In the long run, however, it is highly desirable for the core index to reflect overall cost-of-living developments. Hence, measured core inflation and overall inflation should show the same kind of long-term behaviour.

Interpretation of price changes in monetary policy formulation

The price index focused on when formulating monetary policy should reflect the monetary policy stance as accurate as possible. In this context it should be borne in mind that the headline CPI contains a num-

3. One factor that could contribute to such confidence is if the measurement of the core index is made outside the central bank, e.g. at the statistics bureau which also measures the CPI.

4. The Central Bank and Statistics Iceland are also examining the possibility of adding an index which excludes the impact of indirect taxes and government subsidies. However, this requires considerable preparation and a study of methodological problems which are currently not clear how best to solve.

ber of subcomponents which are fairly volatile and others which lie beyond the influence of monetary policy. This can sometime make the interpretation and formulation of monetary policy on the basis of changes in the CPI more difficult. Excluding relatively volatile components can therefore reduce fluctuations in measured inflation and thereby facilitate the formulation of monetary policy.

Similarly, the responses of some subcomponents of the headline CPI to monetary policy actions can complicate the Central Bank's interpretation of their temporary impact. Excluding these subcomponents from the CPI can therefore be appropriate. An example of such a component is mortgage interest cost, which in some countries is measured as household cost-of-living item, although this is not the case in Iceland. In this case a rise in the central bank policy rate would lead to a rise in the headline index and to a temporary rise in measured inflation. This can make monetary policy formulation more difficult than otherwise and even lead to incorrect policy responses, i.e. if the monetary stance is tightened again and effectively starts following its tail. Countries which base their policies on formal inflation targeting, where mortgage interest cost is included in the headline index, have therefore removed it from their measurements of core inflation. Some countries have even redefined their CPI by removing this component from the headline index.

Another type of underlying price change which can be difficult to interpret, thus complicating monetary policy formulation, derives from changes in indirect taxation and government subsidies. A rise in indirect taxes, for example, leads to a temporary rise in inflation as measured by the headline CPI, which it is not appropriate for monetary policy to respond to, at least not in the first round.[5]

Impact of monetary policy on excluded components

It is inappropriate for monetary policy to respond to the initial impact of CPI subcomponents on which monetary policy really has no effect. One example is petrol prices. It can therefore be appropriate to exclude petrol prices from the core price index, enabling easier interpretation of short-term changes and monetary policy formulation.

Another argument for excluding subcomponents such as petrol prices is that changes in them are examples of changes in relative prices that a well formulated monetary policy should in general not respond to. On the contrary, it is natural to allow such a terms of trade shock to affect prices. A rise in petrol prices (a negative terms of trade shock) is generally accompanied by a slowdown in economic activity. If monetary policy responds by tightening the stance, there is a risk that it will dampen economic activity even further. Thus a good monetary policy will pass on such supply shocks to prices in part or in full. Monetary policy implementation can be facilitated by excluding subcomponents such as petrol prices, which are strongly impacted by supply shocks, from core prices. The main task of monetary policy is to constrain inflation and respond to shocks on the demand rather than the supply side.

A further example of subcomponents on which monetary policy has virtually no impact is administered prices. These show little responsiveness to underlying market conditions and are generally governed by other forces than pricing decisions by private businesses.[6]

The leading indicator properties of excluded subcomponents

Inflation 1-2 years ahead is the main task of monetary policy with inflation targeting. Current inflation, on the other hand, has an effect on future inflation and thereby acts as an important leading indicator for monetary policy formulation. It should be borne in mind that components should not be excluded from core prices if they are leading indicators for the future development of the general price level, i.e. if doing so would impair the power to forecast future inflation developments and thereby the leading indicator properties of measured core inflation for the monetary stance. However, it should be safe to exclude subcomponents which have little impact on general price developments in the present and the future.

5. For example, economic policy could become excessively tight if the tax increase reflects a tighter fiscal stance and monetary policy responded to that temporary rise of inflation by raising interest rates.

6. Similarly, it would be incorrect to respond to, for example, the abolition of subsidies and official price controls, which would entail short-lived price rises, by tightening the monetary stance.

2.2. Different methods for measuring core inflation

A variety of methods are used for measuring core inflation. Broadly speaking they can be divided into statistical methods and methods which exclude specific subcategories from the headline CPI (see e.g. Roger, 1998 and Hogan, 2000).

In the former case, statistical methods are used to dampen, partially or wholly, the impact of components that fluctuate more at any given time than a predefined level, regardless of the subcategory involved. One common approach is to reweight the index subcomponents on the basis of historical standard deviations. The weight of volatile subcomponents is then reduced in proportion to their standard deviation. Another method is to use the trimmed mean whereby a specific proportion of the subcategories that fluctuate the most at any given time are removed from the index, i.e. a specific proportion of the top and bottom of the distribution are trimmed. In both these cases the composition of the index alters with each measurement as the fluctuations in the subcomponents change. A third way is to use a multivariate time series approach to attempt to separate the price changes that can be traced to supply shocks from those that can be traced to demand shocks (see, e.g. Quah and Vahey, 1995).

In the exclusion approach, specific subcategories are permanently removed from the headline index. These could consist of, for example, volatile items or items that are beyond the impact of monetary policy. Commonly excluded subcategories are agricultural products, whose prices are quite volatile, petrol prices, which are both volatile and unaffected by monetary policy, and other volatile subcomponents. It is also common to remove administered prices and to attempt to make adjustments for the impact of indirect taxes and subsidies which only have temporary effects on inflation. The advantage of the exclusion method is that it is easier to interpret measurements of underlying inflation based on it than by using statistical methods that tend to obscure which information is being excluded and which is taken into account. The drawback, however, is that the exclusion method omits all information contained in these subcomponents, even when it may reflect real changes in underlying market conditions. Furthermore, the short-lived impact of subcomponents which remain in the index is not excluded from the measurement of core inflation. It can therefore be desirable to have more than one measure of core inflation and interpret their development in the context of how the headline index develops.

2.3. Measurements of core inflation in different countries

Whether or not measurements of underlying inflation are used for monetary policy decisions differs from one country to the next. If such criteria are used, they are also measured and applied in rather different ways.

As Table 1 shows, most inflation targeting countries base their inflation target on the headline CPI. Of those that base their inflation target on core inflation, the Bank of England and the South African Reserve Bank use the index of retail prices excluding mortgage interest cost. The Bank of Korea bases its target on the headline CPI excluding agricultural products and oil, and the Bank of Thailand's reference is the headline CPI excluding energy prices and unprocessed food. In all these countries, however,

Table 1 Different price indices used in inflation targeting countries

Formal price reference	*Country*
Consumer price index	Australia[1], Brazil, Canada, Chile, Colombia, Czech Republic[2], Hungary, Iceland, Israel, Mexico, New Zealand[1], Norway, Peru, Philippines, Poland, Sweden, Switzerland
Core inflation index	Korea[4], South Africa[3], Thailand[5], United Kingdom[3]

1. The Reserve Bank of Australia and Reserve Bank of New Zealand ceased basing their inflation targets on core inflation in 1998 and 1999 respectively when their CPIs were revised and mortgage interest cost excluded.
2. The Czech National Bank based its inflation target on core inflation (CPI excluding administered prices and the direct impact of indirect taxes and subsidies) until April 2001 when it began basing its target on the headline CPI.
3. The inflation target of the Bank of England and the South African Reserve Bank is based on the retail price index excluding mortgage interest cost.
4. The Bank of Korea bases its inflation target on the CPI excluding agricultural products and oil.
5. The Bank of Thailand bases its inflation target on the CPI excluding prices of energy and unprocessed food.

the headline CPI also has a role in monetary policy formulation.

In countries where the policy target is based on the headline CPI, different measures of core inflation often play a role in monetary policy formulation. For example, although the Bank of Canada's inflation target is based on the headline CPI, core inflation is used as an operational target insofar as the bank takes it into account in its monetary decisions as long as the core index and CPI display the same kind of long-term trend (Hogan, 2000). The bank's main measurement of core inflation is the headline CPI less eight volatile subcomponents (including vegetables, fruit and oil) and the direct impact of indirect taxes. The Central Bank of Sweden's policy has also been moving in this direction in recent years (Berg, 1999). Its measure of core inflation is the headline CPI excluding the direct impact of indirect taxes and subsidies, and mortgage interest cost. In New Zealand and Australia the monetary policy reference was for a long time underlying inflation which excluded mortgage interest cost from the CPI. This was changed in Australia in 1998 and a year later in New Zealand, when the CPI was revised and this subcomponent removed from it. Since then, the policy has been based on the revised headline CPI. The Reserve Bank of Australia, however, looks at a number of criteria for core inflation, including the trimmed mean and the CPI excluding volatile items. Instead of defining any particular measure of core inflation, the Reserve Bank of New Zealand defines escape clauses, i.e. permissible, predefined deviations from the inflation target which could be caused, for example, by serious terms-of-trade shocks or natural catastrophes. The same has happened in the Czech Republic, where the Czech National Bank bases its policy on the CPI with predefined escape clauses. Until April 2001 it based its policy on the headline CPI excluding administered prices, as well as the direct impact of indirect taxes and subsidies.

Other central banks which apply inflation targeting use various measures of core inflation as a reference for their monetary policy formulation, and commonly use various measures at the same time. For example, food is commonly excluded, such as vegetables and fruit (e.g. in Brazil, Chile, Mexico and Poland), oil prices (e.g. Chile, the Philippines, Norway and Poland), administered prices (e.g. Brazil, Israel, Mexico and Poland), the impact of indirect taxes (e.g. Norway) and volatile subcategories (e.g. the Philippines, Peru and Poland), in addition to which some use statistical measures of core inflation, such as the trimmed mean (e.g. Brazil, the Philippines and Poland).

3. Evaluation of core inflation in Iceland

3.1. Weight of subcomponents and their contribution to headline inflation

In light of the discussion outlined above, it was decided to examine more closely the properties of Icelandic price indices excluding food (i.e. vegetables, fruit and agricultural products) and petrol, since these components are fairly volatile, reflect relative price changes, lie beyond the Central Bank's sphere of influence or are administered to a lesser or greater extent. The subcategory public services, which is by definition administered, was also examined. Finally, an attempt was also made to evaluate whether the housing component should be excluded from the index in line with the Ministry of Finance's measure of core inflation (and with the European Harmonised Index of Consumer Prices).[7] Statistics Iceland's price indices for the period November 1992 to October 2002 are used in the study.

Table 2 shows the weight of different items in the headline index and their contribution to inflation for the entire period and for the period from January 1998 to October 2002 (roughly half the total period).

The weight of individual subcomponents changed little over the entire period. Subcomponents weigh approximately ¼ of the index excluding housing, and just under 40% if it is included. Over the entire period, just under half of the almost 39% rise in the headline CPI was due to these four subcomponents (¼ excluding housing), while from 1998 just under one-third of the 23% rise in the CPI can be attributed to them (just under 20% excluding the housing component).

7. The Ministry of Finance's index excludes agricultural products, vegetables, petrol and housing.

Table 2 Weights of components of the CPI and their contribution to inflation

	Weight in the CPI (%)	*Contribution to inflation*		*Price increase in %*
		Percentage points	*Percent*	
Component	*The period November 1992 to October 2002*			
Vegetables, fruit and agricultural products	9	2.2	6	24.6
Petrol	4	2.7	7	64.0
Public services	11	4.8	12	44.4
Housing	13	7.7	20	58.8
Total	37	17.4	45	.
Consumer price index	100	38.8	100	38.8
	The period January 1998 to October 2002			
Vegetables, fruit and other agricultural products	8	1.1	5	13.0
Petrol	4	1.2	5	27.9
Public services	11	2.1	9	18.8
Housing	13	6.5	28	48.7
Total	36	10.9	47	.
Consumer price index	100	23.1	100	23.1

3.2. Average inflation and volatility

Table 3 shows average inflation and volatility in inflation for the entire period, based on one-month and twelve-month changes in the CPI. As a measure of volatility, the table shows the unconditional and conditional standard deviation of price changes, the latter measuring the volatility of unforeseen price changes based on a simple time series model.[8] Finally, the table shows the conditional kurtosis of price changes, which gives an indication of the frequency of unforeseen large changes (increases and decreases), i.e. price changes exceeding what is compatible with the assumption of a normal distribution.

When comparing the volatility of different price indices in order to evaluate a suitable measure of core inflation, it is more important to compare conditional rather than unconditional standard deviations, since the former gives a measure of price surprises, namely the part of price changes that complicate monetary policy formulation, instead of fluctuations in predictable price changes. Likewise, interpretation of price changes ought to be more difficult, other things being equal, if large, unforeseen price changes are frequent. Thus the conditional kurtosis is shown rather than the unconditional one.

Considerable price fluctuations can be seen in the subcomponents, excluding public services which change relatively seldom but typically in large jumps when they do so, cf. their high kurtosis. Changes in CPI prices excluding the different subcomponents, however, are very similar. Based on the unconditional standard deviation, it is difficult to find a core index criterion which is less volatile than the headline index. Only the index excluding food and petrol has a lower standard deviation for one-month changes. For twelve-month changes, no index has a lower standard deviation than the headline CPI. However, in terms of the conditional standard deviation of price changes, a somewhat lower figure is found for twelve-month changes in the CPI excluding food and petrol, i.e. core index 1. A slightly lower standard deviation is also found when public services are also excluded, i.e. core index 2. No systematic difference can be identified between the kurtosis of price changes depending upon which subcomponents are excluded, and the headline CPI generally has the lowest kurtosis of all the overall price indices.[9]

8. The model includes a constant, the one-month lag of the relevant price index (and seasonal dummies in the case of one-month changes).

9. By definition the kurtosis of core inflation based on the trimmed mean would be lower, however.

Table 3 Average inflation and fluctuations in inflation

Price index	Average inflation	Standard deviation	Conditional standard deviation	Conditional kurtosis
			1-month change (%)	
(1) Vegetables, fruit and agricultural products	0.20	1.85	1.54	5.31†
(2) Petrol	0.44	2.19	1.99	3.77†
(3) Public services	0.31	0.66	0.51	9.84†
(4) Housing	0.39	0.69	0.66	4.87†
CPI excluding (1)	0.29	0.38	0.31	3.89†
CPI excluding (2)	0.27	0.38	0.33	2.88
CPI excluding (3)	0.27	0.43	0.38	2.72
CPI excluding (4)	0.26	0.43	0.38	3.29
CPI excluding (1)-(2)	0.28	0.35	0.29	3.53
CPI excluding (1)-(3)	0.28	0.39	0.32	3.57
CPI excluding (1)-(4)	0.26	0.43	0.36	4.51†
CPI	0.28	0.38	0.33	2.74
			12-month change (%)	
(1) Vegetables, fruit and agricultural products	2.74	3.69	2.17	3.99†
(2) Petrol	4.13	8.53	3.15	3.72
(3) Public services	3.42	1.48	0.69	5.49†
(4) Housing	4.94	4.85	0.96	3.70
CPI excluding (1)	3.34	2.28	0.50	3.76
CPI excluding (2)	3.26	2.25	0.50	3.12
CPI excluding (3)	3.28	2.39	0.58	3.43
CPI excluding (4)	3.01	2.35	0.59	3.63
CPI excluding (1)-(2)	3.32	2.32	0.45	3.87†
CPI excluding (1)-(3)	3.32	2.53	0.50	4.38†
CPI excluding (1)-(4)	3.04	2.79	0.56	5.20†
CPI	3.27	2.22	0.53	3.20

The conditional standard deviation is calculated as the residual standard deviation from regressing price changes from different indices on its one-month lag (and a seasonal dummy in the case of one-month changes). The conditional kurtosis is the kurtosis for the respective residual. † indicates a statistically significant correlation based on the 95% confidence level. The CPI excluding (1)-(2) corresponds to core index 1. The CPI excluding (1)-(3) corresponds to core index 2.

On the basis of this comparison, it seems reasonable to assume that unforeseen fluctuations in measured inflation can be reduced somewhat to make it easier to interpret price changes and thereby formulate monetary policy by using the CPI excluding food and petrol as a reference. This improvement is less marked if public services are also excluded from the index when measuring core inflation. Similarly, it does not seem particularly suitable to remove the housing component of the index, which shows more volatility than the headline CPI. However, a common feature of all these indices is that the standard deviation of price changes is similar, so there is not much difference in their respective volatility.

3.3. Leading indicator properties of different price indices

To assess whether information about future inflation developments is lost by excluding various subcomponents from the CPI, the correlation of twelve-

month changes in different indices with the twelve-month change in the headline CPI is calculated for different time horizons. Table 4 shows the results for the contemporaneous correlation of different measures of inflation and their correlations 1-2½ years into the future, which are frequent reference periods in connection with the transmission lags of monetary policy.

As the table shows, the leading indicator value of petrol and housing prices appears to be fairly good, especially the latter, since it has a significant correlation with headline inflation for more than two years into the future, while the significance of petrol prices lasts a shorter time. However, prices of food and public services appear to have little leading indicator value for future inflation.

An examination of price indices excluding different subcomponents reveals that their indicative value is quite similar. However, this deteriorates noticeably in cases where the housing component is excluded.

Generally speaking, price indices have excellent indicative value for most of the period but this deteriorates the further the projection is made, partly reflecting the Central Bank's policy response as it seeks to attain its inflation target (formal now but informal before) within the coming 1½-2 years, which as a rule is considered to be the time it takes monetary policy to impact inflation. If the policy succeeds, there should be no correlation between the leading indicators and inflation beyond that time. The statistically significant correlation between housing prices and the headline index for more than two years into the future could therefore suggest that they contain unused information about future inflation.

Thus it appears that little information about future inflation developments is lost by excluding food and public services from an evaluation of core inflation. Important information, however, is lost by removing the housing component. It is not as clear whether important information is lost by excluding petrol prices. The development of petrol prices appears to be a leading indicator for future inflation in its own right, but little information is apparently lost by excluding it, since the leading indicator value of the CPI excluding petrol prices is no poorer than that of other price indices.

Table 4 Correlation of different price indices with future inflation

Price index	*Simultaneous correlation*	*Correlation 12 months hence*	*Correlation 18 months hence*	*Correlation 24 months hence*	*Correlation 30 months hence*
(1) Vegetables, fruit and agricultural products	0.49†	0.08	0.16	0.20†	0.14
(2) Petrol	0.31†	0.22†	0.34†	0.31†	-0.01
(3) Public services	0.67†	0.00	0.15	0.09	-0.03
(4) Housing	0.51†	0.68†	0.80†	0.67†	0.38†
CPI excluding (1)	0.99†	0.27†	0.29†	0.23†	-0.02
CPI excluding (2)	0.99†	0.24†	0.25†	0.21†	0.00
CPI excluding (3)	0.99†	0.28†	0.30†	0.25†	0.00
CPI excluding (4)	0.96†	0.08	0.07	0.08	-0.11
CPI excluding (1)-(2)	0.97†	0.24†	0.24†	0.19†	-0.02
CPI excluding (1)-(3)	0.97†	0.25†	0.24†	0.19†	-0.02
CPI excluding (1)-(4)	0.89†	0.03	-0.01	-0.02	-0.15
CPI	1.00	0.27†	0.29†	0.24†	0.00

The table shows the correlation of twelve-month changes in individual indices with those in the headline CPI over different time horizons. † indicates a statistically significant correlation based on the 95% confidence level. The CPI excluding (1)-(2) corresponds to core index 1. The CPI excluding (1)-(3) corresponds to core index 2.

3.4. Selection of core inflation indices: General conclusions

As stated earlier, it can be appropriate for evaluation of core inflation to exclude volatile items, items that lie beyond the influence of monetary policy or reflect relative price changes to which monetary policy should not respond. However, it is desirable for a given measure of core inflation to show similar long-term behaviour as the general measure of the cost of living, i.e. average inflation ought to be more or less the same when measured on the basis of the core index as the headline price level. Similarly, it is important not to reduce the leading indicator value of current inflation for future inflation by excluding items which have a considerable predicative value for future inflation.

The above analysis gives the conclusion that the main items that contribute to dampening unforeseen fluctuations in inflation are food and petrol. By the same token, these are all subcomponents which are more or less beyond the influence of monetary policy, because they involve prices that are either administered or are determined in global markets, like petrol prices which furthermore reflect relative price changes that it is not considered suitable for monetary policy to respond to. Although public service prices are not particularly volatile, so that excluding them is not likely to limit unforeseen fluctuations in inflation, it can also be appropriate to exclude this subcomponent since it is by definition administered and also broadly determined by other factors than market pricing, and therefore by and large lies beyond the influence of monetary policy. An additional argument is that public price decisions have a tendency to concentrate on specific dates.

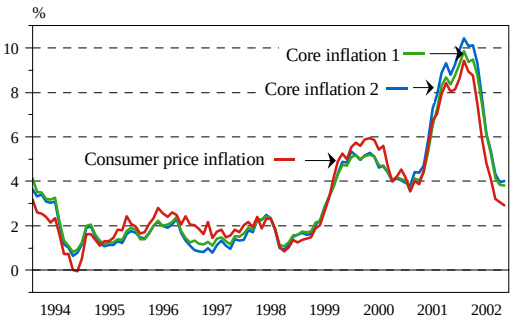
In light of all this, it was decided that the first measure of core inflation, core index 1, should be the headline CPI excluding food (i.e. vegetables, fruit and agricultural products) and petrol. Based on the weights this October, this index includes 89% of the expenditure items contained in the CPI. The second criterion, termed core index 2, also excludes the prices of public services. On the basis of the weights this October, this index includes 82% of the expenditure items contained in the CPI.[10]

10. The weight increased from 75% to 82% this April when all telephone services were defined as competitive business and not as a public service.

The above analysis suggests that important information about future inflation developments is not lost by excluding these subcomponents from the CPI. However, it was not deemed appropriate to remove housing prices from the evaluation of core inflation, since this produces no benefits in smaller fluctuations and also appears to lose important information about future inflation.[11]

Chart 1

Core inflation and consumer price inflation
January 1994 - October 2002



Source: Statistics Iceland.

Chart 1 shows the development of inflation since 1994, measured with these two core indices, and also with the headline CPI on which the Central Bank's inflation target is based. As the chart shows, the inflation trend is very similar over the whole period. The core indices fulfil the requirement of reflecting similar average inflation in the long run, although short-term deviations are natural. They show inflation rising higher at the beginning of this year and falling more slowly than the CPI does. Measured inflation is now 4% according to the core indices, but only 3% according to the headline CPI.

These two criteria for the underlying rate of inflation should therefore prove useful to the Central Bank in its monetary policy formulation, even though the Bank's inflation target is based on the headline CPI. Thus they will only be used as a reference in monetary policy formulation.

11. Moreover, there are various economic arguments for looking at housing price developments in evaluating the underlying inflation trend, since a rise in housing prices may reflect demand expansion which appear relatively quickly in housing prices which is reflected with a lag in headline inflation.

References

Berg, C., (1999), "Inflation forecast targeting: The Swedish experience", Sveriges Riksbank *Quarterly Review*, 3/1999, 44-70.

Central Bank of Iceland (2001), "Declaration on inflation target and a change in the exchange rate policy", *Monetary Bulletin*, 2001/2, 46-47.

Cufer, U., L. Mahadeva and G. Sterne (2000), "Specifying an inflation target: The case of administered prices and other candidates for exclusion", in L. Mahadeva and G. Sterne (eds.), *Monetary Policy Frameworks in a Global Context.* Routledge, Centre for Central Banking Studies: Bank of England.

Hogan, S., (2000), "Core inflation as an indicator in monetary policy rules", in L. Mahadeva and G. Sterne (eds.), *op. cit*.

Pétursson, T. G. (2000), "Exchange rate or inflation targeting in monetary policy?", *Monetary Bulletin,* 2000/1, 36-45.

Quah, D., and S. Vahey (1995), "Measuring core inflation", *Economic Journal,* 105, 1130-1144.

Roger, S., (1998), "Core inflation: Concepts, uses and measurement", Reserve Bank of New Zealand *Discussion Paper,* nr. G98/9.