Measures of underlying inflation in the euro area

The primary objective of the ECB is to maintain price stability in the euro area. The Governing Council of the ECB has defined price stability as "a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%". It has also made clear that price stability is to be maintained over the medium term.

The HICP – a weighted average of prices of a large number of individual goods and services consumed in the euro area – was chosen to quantify the ECB's primary objective because this is the homogeneous statistic that most closely approximates the price of the basket of consumption goods and services purchased by private households in the euro area.

The rate of HICP inflation, or "headline" inflation, is subject, in the short term, to a number of sector-specific disturbances. The latter, if large, may temporarily mask longer-term trends in consumer prices, thereby complicating the interpretation of headline HICP figures. This fact, common to consumer price indices in all countries, has motivated the development of suitably modified indices, characterised by the attempt to exclude the erratic or sector-specific influences, and aimed at capturing the "underlying" component related to general trends. While the objective of the ECB is unambiguously defined in terms of the headline HICP, measures of underlying inflation may be useful to identify and illustrate longer-term price trends and the nature and sources of the forces driving headline price dynamics.

Whilst intuitively appealing, underlying inflation has proven to be an elusive concept in practical applications. Many alternative methodologies have been proposed to operationalise it. This article summarises the properties of various approaches and presents some of the measures that can be computed for the euro area.

1   Introduction

The Treaty stipulates that the maintenance of price stability is the primary objective of the ECB. In this context, the Governing Council of the ECB decided to publish a quantitative definition of price stability in early October 1998. The following definition was adopted: "price stability shall be defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%". The Governing Council also indicated that price stability was to be maintained over the medium term.

The headline HICP is the measure chosen to quantify the ECB's primary objective, because this is the homogeneous statistic that most closely approximates the price of the basket of consumption goods and services purchased by private households in the euro area. The focus on the headline HICP guarantees effective protection against the loss of purchasing power for the public. The focus

on the medium term reflects the fact – confirmed by a substantial body of economic research – that price developments can be determined by monetary policy over this horizon. It also acknowledges that the prices of goods and services are, over shorter horizons, subject to other factors, related, for example, to seasonal effects or other sources of volatility. These short-run influences are typically sector-specific ("idiosyncratic" or "relative price" effects). In the HICP, which is a weighted average of prices of many individual goods and services, idiosyncratic developments normally cancel one another out over time and do not significantly affect developments over the time horizon over which price stability is to be maintained. With regard to seasonal effects, the ECB also publishes seasonally adjusted HICP series (see the document entitled "Seasonal adjustment of monetary aggregates and Consumer Price Indices (HICP) for the

euro area" (August 2000), available on the ECB's website, and Table 4.1 in the "Euro area statistics" section).

However, when temporary or idiosyncratic developments are large, they may have a significant short-run impact on the "headline" aggregate price index and temporarily mask underlying developments in the general level of prices. In order to identify the common and lasting trends in the general level of prices, a number of measures of "underlying", or "core", inflation have been proposed in the economic literature. All these measures aim at purging the "headline" measure of inflation from specific idiosyncratic and/or one-off influences.

Whilst intuitively appealing, the concept of underlying inflation has proven to be fraught with ambiguities in practical applications. Most frequently, the various measures lack theoretical foundations, with adjustments to the headline series often motivated by judgemental or statistical criteria. Moreover, there is no consensus on the criteria to be used for the empirical evaluation of the different proposals. As a result, a number of methodologies have been put forward to determine when a price change can be

considered "erratic", or "persistent", paving the way for the construction of many measures of underlying inflation.

This article reviews the foundations and properties of available measures, in the more general context of a comprehensive analysis of short-term price developments. Various measures of underlying inflation could help to identify the nature and sources of the shocks affecting headline prices. However, none of them can be trusted to provide consistently useful indications over time. Hence, such measures cannot be used as key indicators for policy analysis.

The ECB systematically monitors various narrow measures of consumer price inflation, such as the HICP excluding unprocessed food and energy. These are studied in the context of the analysis of price developments, and discussed extensively in the ECB Monthly Bulletin. Such narrow measures of inflation help, inter alia, to identify the driving forces behind developments in headline HICP inflation (see Box 3 on "An analysis of price developments: the breakdown of the overall HICP into its main components" in the December 2000 issue of the ECB Monthly Bulletin).

2   Underlying inflation: approaches and purposes

There are two broad approaches to the problem of measuring underlying inflation.

The first approach refers explicitly to the time dimension and views underlying inflation as persistent, or lasting, inflation. Measures of underlying inflation that reflect this view try to eliminate "temporary" price changes from the headline index. Such price changes are deemed to produce an impact on headline inflation which dies away automatically over the medium term. Examples of temporary price changes are those generated by events that occur on an occasional basis, or by events that, although perhaps recurrent, generate short-term fluctuations in prices which cannot be eliminated by monetary

policy given the lags with which changes in policy affect prices. These measures are normally based on the time series analysis of the aggregate price index, rather than on its various components at each point in time. However, measures that exploit additionally the information contained in individual price components have also been proposed.

The second approach interprets underlying inflation as generalised inflation, i.e. the component of price changes which is common to all individual goods and services. In this case, the relevant distinction is between changes in the general level of prices, on the one hand, and relative price changes, owing to sector-specific demand or supply shocks

affecting individual goods and services, on the other hand. While the first component may signal a risk of widespread inflation, it is argued that the second component captures either erratic movements ("noise") around the relevant common developments, or simply reflects the normal and desirable flexibility in relative prices. According to this view, measures of underlying inflation are obtained after excluding erratic price changes from the headline index. These measures are typically based on the analysis, at each point in time, of the cross-section of price changes of all individual goods and services included in the overall index.

The two approaches are interrelated. For example, measures of underlying inflation that capture the common component of individual price changes may also capture their persistent component as the effects of erratic, and thus probably temporary, price changes have been excluded.

In the light of its multifaceted nature, the empirical measures of underlying inflation can serve a number of different purposes.

Their most straightforward application is to help in the *analysis of the characteristics of the factors affecting headline inflation.* The source, nature and duration of the shocks influencing prices are uncertain at the time they arise. Hence, this sort of analysis is routinely conducted by most central banks, including the ECB (see an earlier article entitled "Price

and cost indicators for the euro area: an overview", which was published in the August 2000 issue of the Monthly Bulletin). Knowing that certain developments in the HICP are attributable to movements of a specific group of prices, for example, makes it easier to gauge whether those developments should be attributed to a shock affecting only relative prices, or to more broadly based inflationary or deflationary pressures.

Measures of underlying inflation have also been proposed as *coincident indicators,* which might help in assessing the current trend, or tendency, of headline inflation. Changes in underlying inflation occur when the effect on prices of any given shock is generalised and persistent, thus entrenched in headline inflation. An increase – or decrease – in underlying inflation could therefore provide evidence that headline inflation has drifted towards a higher – or lower – mean.

Conceivably, measures of underlying inflation might also serve as *leading indicators* of future headline inflation. As they are meant to capture the persistent component of inflation, they should in principle better foreshadow changes in the observed headline index. In this respect, the usefulness of underlying inflation measures depends crucially on the future horizon over which they may show leading indicator properties, a feature which must be analysed empirically on a case-by-case basis.

3 Empirical approaches to measuring underlying inflation

The two concepts of underlying inflation – as a way of discriminating between transitory and persistent developments in inflation, or as a way of distinguishing between common and idiosyncratic (i.e. sector-specific) components in the price changes of individual goods and services – have been given operational content in different ways. Existing empirical approaches to measuring underlying inflation differ along several dimensions.

The most clear-cut distinction relates to whether time series or cross-section information is used to estimate underlying inflation. By and large, these two paths are followed by the approaches emphasising the persistent and the generalised nature of price changes respectively.

Empirical approaches, however, could also be grouped along other dimensions. One of these pertains to the type of data used. Some

Table I

Empirical approaches to the measurement of underlying inflation

		Methodology [1]			
		Time series		Cross-section	
		Economic basis	Statistical basis	Economic basis	Statistical basis
Data	Individual price changes	.	Dynamic Factor Index	.	Exclusion-based measures, trimmed means, variability-adjusted measures
	Headline inflation rate (possibly together with other variables)	VARs	Moving averages, Filtered series	-	-

1) See Wynne, M. (1999), "Core inflation: a review of some conceptual issues," ECB Working Paper No. 5.

approaches use the information contained in individual price series, while other approaches focus on aggregate price changes, sometimes extending the information to consider the interplay with economic variables other than prices themselves (such as developments in economic activity or monetary aggregates). A third dimension relates to the choice of using purely statistical techniques to distinguish between "temporary" and "persistent" inflationary developments, rather than economic theories to derive a definition of underlying inflation and its corresponding measure. No consensus has yet emerged on how to choose among the empirical measures.

Table I presents the most frequently used approaches to measuring underlying inflation along the three aforementioned dimensions. In the remainder of this section, these approaches, grouped according to whether the cross-section or the time series dimension is used, are described in some detail.

Measures based on time series information

Measures within this class attempt to discriminate between "temporary" and "persistent" components of developments in the headline index, in order to identify underlying inflation with the second component. Sufficiently long data series are necessary for this purpose. In most cases, the lack of solid theoretical foundations for the definition of underlying inflation is taken for granted, so that the trend component of headline inflation is identified by using purely statistical techniques. A few attempts, however, have also been made to derive a concept and a corresponding measure of underlying inflation from economic theory, leading to applications based on vector autoregressions (VARs). Some selected measures of underlying inflation, based on time series information, are described in Box 1.

Box 1

Selected time series-based measures

Smoothing techniques

A frequently used approach for distinguishing between temporary and persistent, or trend, inflationary developments is to define the trend as the average of current and past headline inflation rates over a certain number of time periods. These "moving averages" have a backward-looking nature since, by construction, they do not take into account expected future developments. This approach has the advantage of simplicity, but it has the drawbacks of being rather mechanistic and slow to capture new trends in the data.

The Dynamic Factor Index model

In order to address the problem related to the backward-looking nature of moving averages, it is necessary to make further assumptions on the time series characteristics of trend inflation. When such assumptions are coupled with the use of information on individual price changes, in addition to aggregate ones, the so-called Dynamic Factor Index model is obtained. This model can account for persistence in both the idiosyncratic and the common components of price changes. The measure based on the Dynamic Factor Index model makes use of two technical assumptions: first, the idiosyncratic and common components of price changes follow mean reverting dynamic time series models; second, underlying inflation is unaffected by past, present or future idiosyncratic disturbances.

Vector autoregressions

The assumption that trend inflation follows a certain dynamic time series model has the disadvantage of being based on purely statistical considerations, possibly difficult to justify on economic grounds. Other proposals to measure underlying inflation have therefore focused on assumptions derived from economic theory, notably that monetary policy has no effects on real economic variables in the long run. Practical implementations are typically based on time series statistical models ("vector autoregressions", or VARs) including inflation and other economic variables. Underlying inflation is identified with the part of headline inflation whose movements have no cumulated effect on real variables in the long run.

The computation of time series measures of underlying inflation for the euro area faces a major difficulty, namely the fact that HICP data are only available from 1995. Given this constraint, applications to the euro area need to exploit mainly the cross-section dimension of the data.

Measures based on cross-section information

Measures within this class attempt to distinguish the common component of individual price changes, which reflects monetary developments in the economy, from the relative price component, which reflects events that affect only particular markets. The existing approaches differ in the way they use the cross-section information in order to select the price changes to be excluded from the headline index. Some commonly used measures based on cross-section information are described in Box 2.

Box 2

Selected cross-section-based measures

Exclusion-based measures

The so-called exclusion-based measures are calculated by excluding from the index certain prices of individual goods and services deemed to be particularly volatile. The selection of such goods and services is based on historical experience. Once chosen, these prices are excluded from the headline index irrespective of their volatility in subsequent periods. An example is the price of energy products, which, based on several historical episodes, has been found to be particularly volatile. Often excluded are also the prices of certain consumption goods, such as unprocessed food, alcoholic beverages or tobacco, which can be heavily influenced by factors such as seasonality or tax changes.

The exclusion-based measures are probably the most commonly used measures of underlying inflation. Based on the experience of the oil shocks in the 1970s, fuels used in the production of energy are often selected as one component to be removed, leading to the "excluding energy" measure. In order to remove erratic fluctuations associated with the weather (i.e. harvest failures, bumper crops), food prices, especially of goods directly produced as a result of agricultural and farming activities, are also often excluded from the headline index. This gives rise to the so-called "excluding unprocessed food" or "excluding seasonal food" indices. Finally, in combination with the previously mentioned one, the "excluding energy and unprocessed food" measure is also frequently used.

Exclusion-based measures do not require any complex estimation and statistical offices typically compute them directly together with the headline measure. For example, each month Eurostat reports three such measures ("excluding energy", "excluding energy, food, alcohol and tobacco", and "excluding tobacco") as part of the monthly HICP statistical release. Nevertheless, they do not always effectively exclude the most volatile components from the headline index, simply because the excluded items do not turn out to be the most volatile components in every period.

Table 2 shows the components of the HICP that proved to be the most and least volatile in the euro area over the four years from 1997 to 2000. The components shown in bold are those excluded by the "excluding energy and unprocessed food" measure of underlying inflation. The table clearly shows that such components were indeed among the most volatile, in terms of standard deviation, of the 94 components included in the HICP. Given the large fluctuations in oil prices in 1999 and 2000, it is not surprising to find "liquid fuels" at the highest position in the table. However, the price of fruit, which

Table 2

The ten most volatile components of the HICP …

Description	HICP weight [1]	Mean	Standard deviation
Liquid fuels	**0.8**	**11.7**	**23.5**
Heat energy	**0.5**	**4.4**	**9.2**
Fuels and lubricants for personal transport equipment	**4.0**	**5.5**	**8.6**
Gas	**1.3**	**3.9**	**6.2**
Coffee, tea and cocoa	0.6	0.6	6.2
Vegetables	**1.8**	**1.5**	**4.3**
Oils and fats	0.6	-1.7	3.8
Passenger transport by sea and inland waterway	0.1	3.9	3.8
Insurance connected with transport	0.7	2.4	3.5
Fruit	**1.2**	**1.2**	**3.0**

… and the ten least volatile

Description	HICP weight [1]	Mean	Standard deviation
Hairdressing salons and personal grooming establishments	1.2	2.2	0.3
Major household appliances, electric or not, small elect. hous. appl.	1.1	-0.7	0.3
Newspapers and periodicals	1.0	2.0	0.3
Glassware, tableware and household utensils	0.6	1.4	0.2
Bread and cereals	2.7	1.1	0.2
Maintenance and repair of personal transport equipment	2.5	2.2	0.2
Restaurants, cafés and the like	6.2	2.1	0.2
Major tools and equipment and small tools and misc. accessories	0.5	0.5	0.2
Other personal effects	0.5	0.9	0.2
Furniture and furnishings	2.9	1.2	0.2

Sources: Eurostat and ECB calculations.
1) *In 2000, as percentages. Based on 12-month changes and four-digit disaggregation over the 1997-2000 period. Items excluded by the "excluding energy and unprocessed food" measure are shown in bold.*

is relatively stable with respect to that of liquid fuels, is still 15 times more volatile than the price of components included in the bottom half of the table. On the other hand, Table 2 shows that other prices characterised by a high degree of volatility over the sample period are not kept out of the "excluding energy and unprocessed food" measure.

Variability-adjusted measures should be capable of addressing this limitation of exclusion-based measures, since they play down, by construction, the effects of all historically volatile items. The Edgeworth index, for example, weighs each individual price change by the inverse of its variance over a certain period. At each point in time, the weights are updated together with the estimates of the individual variances. Table 3 reports the Edgeworth weights assigned, on average over the 1997-2000 period, to the most and least volatile HICP components already presented in Table 2. The HICP

expenditure weights are also displayed for comparison.

On average, the Edgeworth index tends to reduce the weights of highly volatile components. "Liquid fuels", for example, weigh approximately 0.01% in the Edgeworth index, as compared with a value of 0.8% in the HICP. The opposite normally applies to the least volatile components, receiving a weight of up to 1.8% each. By and large, HICP components that have a very low weight in the Edgeworth index tend to coincide with those excluded by the "excluding energy and unprocessed food" measure of underlying inflation. Table 3 also highlights the main drawback of the Edgeworth index, i.e. the fact that it is defined independently from the HICP weights. As a result, it is not necessarily the case that highly volatile goods will receive a lower weight than in the headline HICP. The "passenger transport by sea and inland waterway" item,

for example, receives an Edgeworth weight higher, by over 70%, than the corresponding HICP weight, even if the influence of this item should be played down because of its high volatility. The opposite can happen for low volatility items, as is most evident in the case of "restaurants, cafés and the like".

It has been documented for many countries that the distribution of price changes fails to conform to the normality hypothesis. This result can be shown to hold also for the euro area. It suggests that trimmed means – which are robust to deviations of the data from normality – could represent useful additional measures of underlying inflation. Unlike the exclusion-based measures, the list of items included in/excluded from the computation of trimmed means does not remain constant over time. Table 4 presents the HICP items

that are most often excluded from a 15% symmetric trimmed mean. The table reports the number of months, as a percentage of the total, in which each item is excluded from the computation of the mean, because its price change is either among the smallest ("from bottom of distribution"), or among the largest ("from top of distribution"). The table shows that while various items in the table correspond to those excluded by the "excluding energy and unprocessed food" measure, there are also exceptions. Such exceptions coincide with goods and services whose price changes, although not highly volatile, are not representative of general inflationary trends (for example tobacco). Trimmed means, however, base the exclusion of individual items on purely statistical considerations, which could sometimes be judged inappropriate on economic grounds.

Table 3

Edgeworth weights for the ten most volatile components of the HICP …

Description	Edgeworth weight [1] (a)	HICP weight [2] (b)	Difference in % 100·((a-b)/b)
Liquid fuels	**0.01**	**0.8**	**-98.8**
Heat energy	**0.06**	**0.5**	**-88.0**
Fuels and lubricants for personal transport equipment	**0.05**	**4.0**	**-98.8**
Gas	**0.10**	**1.3**	**-92.3**
Coffee, tea and cocoa	0.04	0.6	-93.3
Vegetables	**0.10**	**1.8**	**-94.4**
Oils and fats	0.25	0.6	-58.3
Passenger transport by sea and inland waterway	0.17	0.1	70.0
Insurance connected with transport	0.15	0.7	-78.6
Fruit	**0.17**	**1.2**	**-85.8**

… and for the ten least volatile

Hairdressing salons and personal grooming establishments	1.49	1.2	24.2
Major household appliances, electric or not, small elect. hous. appl.	0.47	1.1	-57.3
Newspapers and periodicals	1.79	1.0	79.0
Glassware, tableware and household utensils	1.79	0.6	198.3
Bread and cereals	1.79	2.7	-33.7
Maintenance and repair of personal transport equipment	1.76	2.5	-29.6
Restaurants, cafés and the like	1.79	6.2	-71.1
Major tools and equipment and small tools and misc. accessories	1.72	0.5	244.0
Other personal effects	1.79	0.5	258.0
Furniture and furnishings	1.79	2.9	-38.3

Sources: Eurostat and ECB calculations.[3]
1) *Average weights over the sample period, as percentages.*
2) *In 2000, as percentages. Based on 12-month changes and four-digit disaggregation over the 1997-2000 period. Items excluded by the "excluding energy and unprocessed food" measure are shown in bold.*
3) *For a more detailed description of the methodology, see J. L. Vega and M. Wynne (2001), "An evaluation of some measures of core inflation for the euro area," ECB Working Paper No. 53.*

Table 4

The ten HICP items that are most often excluded from the 15% symmetric trimmed mean

Description	Frequency of exclusion [1]		
	From bottom of distribution (a)	From top of distribution (b)	Total (a+b)
Telephone and telefax equipment	100.0	0.0	100.0
Telephone and telefax services	100.0	0.0	100.0
Equip. for reception, recording and reprod. of sound and pictures	100.0	0.0	100.0
Photographic and cinematographic equipment and optical instruments	100.0	0.0	100.0
Information processing equipment	100.0	0.0	100.0
Liquid fuels	41.7	56.2	97.9
Heat energy	35.4	52.1	87.5
Tobacco	0.0	87.5	87.5
Gas	31.2	54.2	85.4
Major household appliances, electric or not, small elect. hous. appl.	83.3	0.0	83.3

Sources: Eurostat and ECB calculations.
1) Number of months, as a percentage of the total, in which each item is excluded from the computation of the mean. Based on 12-month changes and four-digit disaggregation over the 1997-2000 period.

For example, trimmed means disregard the prices of telecommunications, computers and other electronic equipment, which are typically among those displaying extremely small, and possibly negative, changes. Economic reasoning, however, suggests that, although abnormal with respect to those of other goods and services, the current dynamics of the prices of electronic equipment might be a long-lasting phenomenon. If this turned out to be the case, they could usefully be included in a measure of underlying inflation.

Other features of the alternative measures of underlying inflation

In order to play a useful role in the analysis of current price developments, measures of underlying inflation should satisfy standard statistical criteria, such as efficiency and unbiasedness. These features need to be analysed empirically on a case-by-case basis. Other characteristics of different measures of underlying inflation, however, tend to be valid on a general basis, and independently from the selected case study.

All measures based on cross-section information are typically available on a timely basis, in the sense that they can be computed as soon as new headline inflation figures are released. Measures based on VARs, on the contrary, may only be available with a delay with respect to headline inflation, if they include variables, such as output, which are published with some lag.

Statistical measures are typically not robust to changes in auxiliary assumptions. This is an important limitation, because different assumptions are often equally justifiable, in the sense that they may be characterised by advantages and drawbacks in similar proportions. Such assumptions are related, for example, to the horizon over which price changes are computed – often chosen to be equal to one month or 12 months – or to the level of disaggregation of the analysis, which can exploit both the geographical and the sectoral dimensions. Choosing between these alternative assumptions is often difficult. With regard to the horizon over which price changes are computed, for example, analyses based on one-month changes have the advantage of exploiting each month only new information, while focusing on 12-month

changes allows the analyst to remove seasonal components that may characterise individual price changes. Even if exclusion-based measures do not rely on explicit auxiliary assumptions, they are also not robust in the sense that many measures can be devised depending on which specific price components are judged to be highly volatile.

Developments in some measures of underlying inflation are easier to interpret in terms of their economic determinants. More precisely, measures which exploit the cross-section information of individual prices make it easier to determine which price components are

responsible for any divergence occurring between underlying and headline inflation at any point in time. From this viewpoint, VAR-based measures may prove more difficult to interpret.

Finally, all measures that are obtained as a result of econometric estimation along the time series dimension have the drawback that past underlying inflation may change significantly when new data are released. The whole history of a proposed measure of underlying inflation may therefore change when new information becomes available and a new estimation is run.
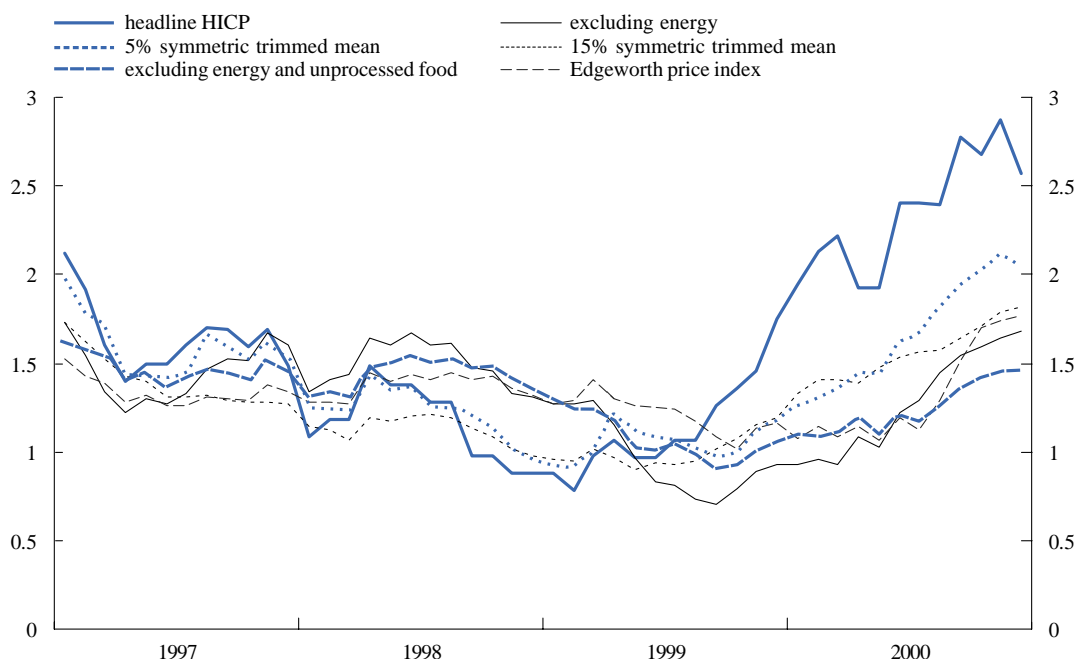
4   An illustration for the euro area

Chart I shows the evolution of the HICP and of selected measures of underlying inflation for the euro area over the period from 1997 to 2000. The chart plots the "excluding energy and unprocessed food" and the "excluding

energy" measures, two trimmed means with frequently used levels of trim (see Box 2) and different horizons for the calculation of price changes and, finally, the Edgeworth price index. For illustrative purposes, one of the two

Chart

Headline inflation and measures of underlying inflation in the euro area: 1997 to 2000

(monthly data)

- —— headline HICP
- ········ 5% symmetric trimmed mean
- – – – excluding energy and unprocessed food
- —— excluding energy
- ·········· 15% symmetric trimmed mean
- – – – Edgeworth price index

Sources: Eurostat and ECB calculations. Trimmed means and the Edgeworth index are based on euro area data at the maximum level of disaggregation. The 5% symmetric trimmed mean and the Edgeworth index are based on 12-month changes; the 15% symmetric trimmed mean is based on one-month changes.

trimmed means is computed on the basis of one-month, rather than 12-month, changes.

Broadly speaking, all measures provide mutually consistent indications. They all tend to attribute to temporary components a significant fraction of the increase in the rate of HICP inflation that occurred in the second half of 1999 and in 2000. In addition, they all tend to be lagging indicators of the reversal in the rate of HICP inflation occurred at the beginning of 1999, when the latter started increasing, but all measures of underlying inflation continued to decrease as in previous months.

Significant divergences between different measures can be observed over selected sub-periods. For instance, the "excluding energy and unprocessed food" and the "excluding energy" measures have tended to increase less than the two trimmed means since the second half of 1999. The reason is that the trimmed means reflect the exclusion of abnormally low price increases, or price reductions (e.g. in telecommunications and computers). The Edgeworth index, which displays remarkable similarities to the "excluding energy and unprocessed food" measure over most of the sample, becomes closer to the 15% symmetric trimmed mean at the very end of 2000. Finally, the 15% symmetric trimmed mean reacted less slowly, relative to the other measures, to the reversal in the rate of HICP inflation in 1999.

5   Conclusions

This article has provided a review of concepts and empirical methodologies that are behind the construction of measures of underlying inflation. It has also provided an illustration of some of these measures for the euro area, based on data for the Harmonised Index of Consumer Prices.

Underlying inflation is an elusive concept: various measures can be calculated, depending on a number of assumptions, and their interpretation is often ambiguous. Alternative measures of underlying inflation should therefore always be interpreted with caution and analysed jointly with other information, including headline inflation. In no way can a single measure be trusted to capture, by itself, the deep sources of inflationary or deflationary pressures prevailing in the economy, and so replace a broadly based assessment of price developments. The analysis of price developments conducted and periodically published by the ECB covers the main components of the HICP, thereby facilitating the early detection of the nature of inflationary and deflationary shocks and the identification of their causes.

The ECB has a clear mandate, which is to maintain price stability in the euro area. The Governing Council has unambiguously defined the primary objective of price stability in terms of the year-on-year rate of increase in the HICP for the euro area. The HICP is the homogeneous statistic that most closely approximates the price of the basket of consumption goods and services purchased by households in the euro area. HICP figures, published by Eurostat, are available to the public in a regular and timely fashion. Hence, the focus on headline HICP enhances the transparency of the ECB's monetary policy.

While the ECB's objective is defined in terms of the headline HICP, different measures of underlying inflation can occasionally be useful in summarising information on the nature and size of the shocks affecting headline inflation. By highlighting the transitory nature of certain inflationary shocks, they may contribute to focusing the public's attention on medium-term price developments.