Measurement and changes of core inflation in times before the introduction of the euro in Poland

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1. Monetary Policy and Inflationary Targets in Poland

The reforms in the Polish banking system began in year 1989. The objective was to adjust the financial system to the market economy. At the beginning the functions of the National Bank of Poland (NBP) were redefined. Ten commercial banks were derived from the NBP structures and the NBP itself became the central bank of Poland. Three basic functions of the NBP were formulated in the act in 1989:

• central bank of the State (formulation and realization of monetary policy, performance of exchange rate policy, provision of banking services to the State budget)
• issuing bank (issuing currency, supervising monetary circulation)
• banks’ bank (banking system supervision, credit-deposit operations, participation in the inter-bank monetary market).

In the Act of the National Bank of Poland (1997) essential changes were introduced. The goal is to maintain price stability in cooperation with economic policy performed by the government. The Monetary Policy Council consisting of ten members was created: the President of the NBP, three members appointed by the President, three members appointed by the Sejm (lower chamber of the Parliament), three members appointed by the Senate (upper chamber of the Parliament). This Council is responsible for the determination of the objectives of the monetary policy and its instruments. This information is introduced to the Parliament together with the draft Budget prepared by the Council of Ministers. The first Monetary Policy Council created Medium-Term Strategy of Monetary Policy 1999–2003. This period of time is crucial because Poland is preparing for integration with the European Union what is to occur in May 2004. It is important for the Council performance because fulfillment of some convergence criteria described in the Maastricht Treaty is strongly connected with the monetary policy. The Council defined the ultimate goal as reduction of inflation and consequently accomplishment of price stability.

The price stability can be achieved by applying direct or indirect strategy. The indirect strategy could be conducted by some indirect targets like controlling the monetary supply or maintaining a stable rate of exchange between domestic currency and currency from country with low inflation rate. For achievement of such goals in Poland would be very difficult, the direct inflation targeting was chosen. Indirect targets are abandoned and reaction occurs if there is a factor which could have negative impact on reaching the goal. The procedure involves using some bank’s instruments like:
• open market operations,
• reserve requirements,
• credit-deposit operations,
• short-term deposit accounts.

The medium-term strategy assumes reduction of inflation to below 4% by the year 2003. The inflationary target is defined as a range for each year (Table 1).

<table>
<thead>
<tr>
<th>Year</th>
<th>Inflation target (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>6.6 - 7.8</td>
</tr>
<tr>
<td>2000</td>
<td>5.4 - 6.8</td>
</tr>
<tr>
<td>2001</td>
<td>6.0 - 8.0</td>
</tr>
<tr>
<td>2002</td>
<td>4.0 - 6.0</td>
</tr>
<tr>
<td>2003</td>
<td>2.0 - 4.0</td>
</tr>
</tbody>
</table>

Source: The National Bank of Poland

The target definition and the assessment of its implementation is conducted on the basis of the Consumer Price Index (CPI). The core inflation indices are calculated additionally but the most important for performing the monetary policy is CPI determined and published by the Polish Central Statistical Office. There are different reasons for using CPI by the Monetary Policy Council for setting and monitoring inflationary goals:

- CPI has been used as a measure of inflation since the beginning of the economic transformation,
- CPI is calculated independently by the Central Statistical Office,
- composition of this index is consistent with the real structure of households expenditures,
- prices with seasonal fluctuations and prices administered by the State have big influence on price increases in the Polish economy (and are perceived in that way by the public).

The analysis of CPI is valuable in long-term horizon and ex post because of the “noise” generated by supply shocks. It is necessary for monetary policy to receive quick and up-to-date information about changes of prices. This need was the reason of introduction of so called core inflation indices in 1970. Core inflation has a general, fundamental and persistent character. Core inflation indices are not complementary to CPI but create (theoretically) some optimal inflation indicators. In practice the data concerning consumer prices are used for calculations of core inflation indices. They can be reached easily and no additional costs are necessary.

2. The Idea of Core Inflation

There is no one commonly accepted definition of core inflation. Definitions suggested by some authors are given in Table 2.

Two different approaches are presented in the theory of measurement of core inflation:

I. Model approach
II. Statistical approach

The first approach derives the method of measuring from macroeconomics. An economic model (based on theoretical grounds) should be constructed and its parameters ought to be estimated.
Some Definitions of Core Inflation

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eckstein (1981)</td>
<td>Long-term inflation rate which would occur if neither supply shocks nor demand pressures were present</td>
</tr>
<tr>
<td>Bryan, Cecchetti</td>
<td>Core inflation relates to the growth rate of money supply</td>
</tr>
<tr>
<td>Quah, Vahey (1995)</td>
<td>That component of inflation that has no medium to long-run impact on real output</td>
</tr>
<tr>
<td>Blinder (1997)</td>
<td>Core inflation is the 'durable' part of inflation</td>
</tr>
</tbody>
</table>

Source: Mankikar, Paisley, 2002

The second one is a practical approach. The goal is to define the method of measurement without regarding the connections in the whole economy. The statistical approach is applied more frequently because the central banks need “good” measure of inflation to conduct the monetary policy. Because of great costs of collecting data, the same information that for CPI is usually used and some modifications are done. CPI can be used for purposes connected with protection against inflation results (for example recouping pensions etc.) but there is no rational reason for using CPI for monetary policy. The monetary authorities should be interested in information about durable tendency without effects of short-term and reversible supply shocks. Central banks try to modify CPI to provide information of fundamental changes in inflation. There are certain methods of evaluation of core inflation indices less sensitive to prices’ changes like:

I. Exclusion of some components from the index, a priori.

II. Limited-influence estimators – measures based on trimming; certain percentage of the components with the largest and the smallest price changes are excluded.

III. The Edgeworth Index (variance weighted index). The importance of the components is inversely related to the volatility of its price.

IV. Dynamic factor index – combines the time series and cross section information of individual price changes.

V. Moving average, exponential smoothing of CPI.

VI. Other methods.

3. Exclusion-based Measures of Core Inflation

The most popular ways of core inflation evaluation are exclusion-based methods but it does not mean comparability of core inflation measures in different countries. The range of exclusions differ from country to country and can include (Wozniak 2002, p. 114):

1. Fruit and vegetables
2. Other food
3. Alcoholic beverages and tobacco
4. Energy
### Table 3 Excluded elements of the basket in some countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Excluded goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Goods and services controlled by the government, energy, mortgage interest payments</td>
</tr>
<tr>
<td>Canada</td>
<td>8 elements with the biggest volatility: fruit, vegetables, petrol, fuels, gas, mortgage interest payments, local transport, tobacco</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Goods and services controlled by the government and local authorities, medicines, rents, postal services, other regulated charges</td>
</tr>
<tr>
<td>Japan</td>
<td>Non-processed food</td>
</tr>
<tr>
<td>Norway</td>
<td>Energy</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Food, controlled prices</td>
</tr>
<tr>
<td>USA</td>
<td>Food, energy</td>
</tr>
<tr>
<td>Poland</td>
<td>Food, fuels, controlled prices</td>
</tr>
</tbody>
</table>


### Table 4 The Most Popular Exclusion-based Measures of Core Inflation

<table>
<thead>
<tr>
<th>Measure</th>
<th>Price excluded</th>
<th>1999 weight in HCPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Excluding energy</td>
<td>electricity, gas, liquid fuels, solid fuels, hot water, steam&amp;ice, fuels&amp;lubricants</td>
<td>8.7%</td>
</tr>
<tr>
<td>2. Excluding seasonal</td>
<td>fish, fruit, vegetables including potatoes and other tubers</td>
<td>4.4%</td>
</tr>
<tr>
<td>3. Excluding energy and food</td>
<td>meat, fish, fruit, vegetables including potatoes and other tubers, electricity, gas, liquid fuels, solid fuels, hot water, steam&amp;ice, fuels&amp;lubricants</td>
<td>17.7%</td>
</tr>
<tr>
<td>4. Ex. energy and seasonal food</td>
<td>1 + 2</td>
<td>13.1%</td>
</tr>
<tr>
<td>5. Ex. energy and unprocessed food</td>
<td>meat + 1 + 2</td>
<td>17.7%</td>
</tr>
<tr>
<td>6. Ex. alcoholic beverages and tobacco</td>
<td>spirits, wine, bear, tobacco</td>
<td>4.2%</td>
</tr>
<tr>
<td>7. Ex. energy, food and alcoholic beverages and tobacco</td>
<td>3 + 6</td>
<td>21.9%</td>
</tr>
<tr>
<td>8. Ex. Housing, water, electricity, gas and other fuels</td>
<td>Actual rentals for housing, services and products for the regular maintenance and repair of the dwelling, other services relating to the dwelling + 1</td>
<td>19.9%</td>
</tr>
</tbody>
</table>

5. Hot water and central heating
6. Rent
7. Fuels
8. Railway and city transport
9. Communication services
10. Medicines and health resource fees
11. Insurance
12. TV and radio payments

Some of these factors have big volatility other are regulated administratively what has an impact on the changes in the prices level. If such factors are weighted as “zero” the index is more stable. The elimination of some categories from CPI creates a lot of problems like: Which categories should be abandoned? How detailed the exclusion should be? The extent to which the exclusion is done vary from country to country (e.g. Japan 8% of the basket, Australia 49% of the basket). The elements which are eliminated can be also different (Table 3):

The core inflation measures for the Euro-zone countries and EU15 countries belong also to this exclusion-based group. Ten indices of core inflation calculated after some exclusions are described in European Central Bank Working Paper No. 53 by Vega and Wynne 2001 (see Table 4).

Central banks from EU countries use measures ‘Excluding energy and food’ or ‘Excluding energy and seasonal food’ when counting core inflation indicators. Core inflation rates for Euro-zone and EU15 are published by EUROSTAT monthly in different ways:
• in comparison with previous month,
• in comparison with corresponding month of previous year,
• as cumulative value in last twelve months,
• as an index.

### Measures of core inflation used in Poland

<table>
<thead>
<tr>
<th>Measure</th>
<th>Price excluded</th>
<th>2002 weight in CPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. core inflation adjusted to exclude officially controlled prices</td>
<td>alcoholic beverages and tobacco, energy, fuel, transport, postal and telephone services, insurance</td>
<td>25.0%</td>
</tr>
<tr>
<td>2. core inflation adjusted to exclude most volatile prices</td>
<td>significant part of fruits and vegetables, actual rentals for housing, electricity, some of postal and telephone services</td>
<td>15.5%</td>
</tr>
<tr>
<td>3. core inflation adjusted to exclude most volatile prices and fuels prices</td>
<td>2 + fuels</td>
<td>18.0%</td>
</tr>
<tr>
<td>4. net inflation (since II quarter 2000r.)</td>
<td>food and fuels</td>
<td>33.0%</td>
</tr>
<tr>
<td>5. 15% trimmed mean</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Source: Methodology of Underlying Inflation Measurement (Metodologia liczenia inflacji bazowej), NBP 2002
4. Measurement of Core Inflation in Poland

The core inflation evaluation in Poland was started in 1998. The Polish central bank NBP applies only some measures from groups I and II (see Table 5).

The first measure is counted after exclusion of controlled prices to which belong: prices with big share of excise tax (fuels, alcoholic beverages), prices with upper limits of growth or regulated in another way (electric energy), prices established by local authorities (city transport).

The second measure is calculated after exclusion of prices which are characterized by the highest volatility. The threshold value is evaluated according to standard deviations of price indicators in groups of consumer goods and services. Indicators which exceed this critical value are regarded to be too volatile and abandoned.

Figure 1  CPI and Core Inflation Excluding Controlled Prices minus CPI

Figure 2  CPI and Net Inflation minus CPI
Next measure is quite similar to the previous one but eliminates prices of fuels additionally.

Net inflation is created by excluding the whole food, non-alcoholic beverages and fuels. This measure gives an opportunity to analyze changes in prices of consumer goods and services after elimination of supply shocks which affect the fundamental tendencies.

The NBP applies also the trimmed mean method which belongs to the group of limited-influence estimators.

5. Comparison of Core Inflation and CPI in Poland in recent years

5.1. CPI and Core Inflation Excluding Controlled Prices minus CPI

If the difference between core inflation and inflation is lower than zero the controlled prices have big influence on the whole prices' level. Changes in controlled prices (alcoholic beverages and tobacco, energy, fuel, transport, postal and telephone services, insurance) which occurred in years 1998-2003 were essential factors to inflation processes (see Figure 1).

In the first two quarters of 2001 the difference between core inflation and CPI was bigger than zero, so non-controlled prices were responsible for CPI increase. The largest price growth (when compared with corresponding month of previous year) was observed for bread, meat, rent, cold water, coal, newspapers and magazines, medicines.

5.2. CPI and Net Inflation minus CPI

Net inflation indicator point out that changes in excluded prices (food and fuels) do not usually influence CPI in investigated years (see Figure 2).

From June 1999 to June 2000 CPI increased in comparison with previous month. From the beginning of 2000 the prices of petrol grew rapidly in comparison with corresponding period of previous year. This situation can be observed on Figure 2. The difference between core inflation and CPI in 2000 is considerably below zero what indicates that excluded prices influenced CPI significantly.

5.3. CPI and Core Inflation Excluding Most Volatile Prices and Fuel Prices minus CPI

Figure 3 presents how changes in petrol price influence CPI. Petrol price in Poland increased rapidly at the end of 1999 and in the first half of 2000 in comparison with corresponding period of previous year.

It can be observed when changes in non-excluded prices had bigger influence on CPI than excluded ones:
- I quarter of 1999: sugar, bread, wheat, meat, coal, tobacco, household expenditures,
- I quarter of 2001: as above and alcoholic beverages, gas, newspapers and magazines,
- II quarter of 2002: clothing and footwear, durable household equipment,
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recreation and culture services, restaurants, hotels, housing, electricity, poultry, fruit, vegetables, telephone calls.

4.4. **CPI and 15% Trimmed Mean minus CPI**

The analysis of core inflation evaluated as the trimmed mean (Figure 4) indicates that prices with the biggest and the lowest volatility do not influence CPI substantially. This influence is essential only at the end of 1999 and in 2000 the same as for other measures. This situation is due to growth of petrol price.

**Figure 3** CPI and Core Inflation Excluding Most Volatile Prices and Fuel Prices minus CPI

**Figure 4** CPI and 15% Trimmed Mean minus CPI

Source: NBP data and own computations.
All described measures of core inflation showed the largest influence of excluded goods on CPI in Poland between July 1999 and September 2000. Very high values of both core inflation indices and CPI were observed in this period of time (in comparison with the corresponding period of previous year), so the prices which create the core inflation indices increased significantly.

Core inflation measurement in Poland is much different than in UE:
- the rules of calculation core inflation indicators in Poland are precisely defined, and core inflation measurement in UE countries is performed by excluding some goods and services which are chosen arbitrary,
- in Poland the 15% trimmed mean measure is already implemented and in UE it is still only a suggested method. According to the Polish experiences this measure differs substantially from CPI only when rapid changes in prices are observed.

References:


Metodologia liczenia inflacji bazowej (Methodology of Underlying Inflation Measurement), NBP, Warsaw 2002.


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