HAS THE INFLATION PROCESS CHANGED?

The factors that condition the rate of inflation include inflation expectations and cyclical movements in production and employment. In other words, inflation is affected both by confidence in monetary policy’s ability to safeguard the value of money and by changes in the level of activity.

A simple inflation equation can be written as:

$$\pi = \pi_e + b\cdot GAP + c\cdot \pi_u + e$$

where $\pi$ is registered domestic inflation, $\pi_e$ is expected inflation, GAP is the cyclical situation (output gap or unemployment), $\pi_u$ is external inflation (or other supply shocks) and $e$ stands for random shocks; $b$ and $c$ are parameters that set the extent to which domestic inflation is affected by changes in the cyclical situation or in external prices and supply shocks.

A lasting change in the inflation process can result from a variety of factors. For one thing, the process that generates inflation expectations may have altered; a different formation of expectations may be a result, all else equal, of increased inflation target credibility, for example. For another, a different trade-off may have developed between the situation as regards supply and demand and the rate of inflation (this amounts to changing the values of the parameters that relate demand and supply shocks to inflation).

A clear indication of increased inflation target credibility is that the inflation expectations of households have fallen steeply in the 1990s. In the 1980s household expectations of inflation in the coming twelve months averaged 6–7 per cent. Since the beginning of 1992 the corresponding average level is little more than 2 per cent.

The clear trend break in households’ inflation expectations from the beginning of this decade can be interpreted as an initial sign of a change in the inflation process. It is of even greater interest that expectations of inflation in the longer run (five years) among bond investors have been falling since 1991, though it was not until 1996 that they were under 3 per cent.

Demonstrating the occurrence of structural shifts with econometric methods is not easy, in this case partly because the interval since the adoption of the inflation target is fairly short. Results are presented below from two Riksbank studies. One study presents estimations of a simple relationship for inflation for the period 1972:Q2–1996:Q2.3 Inflation in a particular period is explained by a

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**Figure 4.**

Output gap calculated with a W-H filter ($\lambda=100,000$), the production function approach (PF) and seasonally-adjusted registered unemployment. Per cent

Source: The Riksbank.
combination of the preceding period’s inflation, demand and external price changes, together with an average of historical external consumer price movements.\(^4\)

Moreover, a number of dummy variables are used to catch changes in VAT rates during the period. The predictive properties of three demand indicators (the output gap measured with a Whittaker–Henderson filter (W–H) as well as with the production function approach (PF), and unemployment) were evaluated from 1994:Q3 onwards (Fig. 4).

The econometric results, presented in Table 1, show that when demand is represented by either of the two indicators of the output gap, the simple relationship for inflation tends to overestimate inflation after 1993. When a regime shift dummy is introduced from 1993:Q1, however, the relationship’s predictive power is increased, particularly in the case where demand is measured with a W–H filter. With this dummy variable, inflation begins to move down from the beginning of 1993 by about 0.6 percentage points per quarter, that is, by about 2.4 percentage points a year. The relationships between the output gap (as specified here) and inflation suggest that the path of inflation has shifted to a lower level.

When demand is represented instead by unemployment, the relationship no longer overestimates inflation in the period after 1993.

In the other study, the relationship between growth on the one hand and unemployment, inflation and the level of activity on the other is analysed in a broader way, using the UC model\(^5\) (see Box on p. 17).

The UC model confirms that when demand is derived from unemployment, the picture of the inflation process differs from that when production is used. In the UC model the equilibrium level of unemployment is allowed to vary over time. With demand represented by cyclical unemployment (the difference between the registered and the equilibrium rate of unemployment), an estimation without a regime-shift dummy gives a fit to inflation that is roughly as good as an estimation with this dummy.

The changes that have occurred in the structure of Sweden’s economy, in the form of deregulations, internationalisation and increased competition, have contributed to an improved price formation.\(^6\)

Since about 1980 markets have been deregulated...

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### Table 1.


<table>
<thead>
<tr>
<th>Annual percentage change</th>
<th>Registered inflation</th>
<th>Predicted, no regime dummy</th>
<th>Predicted with regime dummy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output gap, W–H filter ((\lambda=100,000))</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994:II</td>
<td>2.6</td>
<td>3.2</td>
<td>2.6</td>
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<tr>
<td>1995</td>
<td>2.9</td>
<td>5.0</td>
<td>3.1</td>
</tr>
<tr>
<td>1996:I</td>
<td>1.4</td>
<td>3.5</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Output gap, PF approach</strong></td>
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</tr>
<tr>
<td>1994:II</td>
<td>2.6</td>
<td>2.9</td>
<td>2.6</td>
</tr>
<tr>
<td>1995</td>
<td>2.9</td>
<td>4.2</td>
<td>3.2</td>
</tr>
<tr>
<td>1996:I</td>
<td>1.4</td>
<td>2.5</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Unemployment as demand variable</strong></td>
<td></td>
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</tr>
<tr>
<td>1994:II</td>
<td>2.6</td>
<td>2.4</td>
<td>2.5</td>
</tr>
<tr>
<td>1995</td>
<td>2.9</td>
<td>2.5</td>
<td>2.8</td>
</tr>
<tr>
<td>1996:I</td>
<td>1.4</td>
<td>1.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>

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\(^4\) As data are not available on inflation expectations prior to 1979, they are approximated on the right-hand side of the relationship by registered inflation in the preceding period.


lated to a greater or lesser extent in virtually all the industrialised countries. At the same time, public activities have been privatised and exposed to competition.

Pressure for change is also generated via advances in technology. In particular, developments in communication and information technology have had a major impact on the organisation of production and distribution. Expanding foreign trade and internationalisation also play an important part.

In Sweden a number of sectors have been deregulated in the past decade, for example transport and telecommunications. Other important events are the tax reform and the new competition laws. EU membership has also had positive effects on competition in Sweden. The market for food products has been deregulated in some respects. The 1990 food policy reform entailed a deregulation of agricultural policy, with less price support and an end to export subsidies. EU membership has involved some re-regulation but increased food imports have exerted downward pressure on prices.

Competition in everyday retailing has grown in that the wholesale-retail chain has been weakened in favour of direct deliveries from producers. The number of low-price shops has risen. Food prices have fallen in the 1990s. Even excluding the changes in VAT rates, the price of food products has moved up considerably less than the general price level. Increased competition from imports has been promoted by EU membership. In transport, increased competition has had positive price effects in air charter and the taxi market, for example.

Moreover, the telephone monopoly has been abolished. Prices have fallen sharply for products exposed to competition, such as international calls and mobile telephony, while they have risen in markets that are more protected. Rents, on the other hand, are rather immune to market forces and have risen more than the CPI.

Other CPI items that show above-average increases are highly-taxed goods (e.g. alcohol and petrol) and administrative prices (e.g. medical care and postal services). This is partly explained by the consolidation of government finance in that subsidies have been reduced and the degree of fee financing has risen.

The analysis of the lower inflation expectations points to an increase in inflation target credibility. There are many indications that the inflation process has shifted downwards. The magnitude of this shift is, however, difficult to specify. The reason for this is that actual inflation responds both to cyclical factors and to structural factors underlying the inflation propensity. Empirical results for these parameters are highly contingent on the specification of the demand situation.

Price formation has changed in a number of areas, with lower price increases and greater flexibility in consumer prices in the 1990s compared with the 1980s. For many categories of goods it seems that the rate of price increases has shifted downwards. Positive price effects are discernible above all in the food sector, import-dependent trade and some service sectors.