The Possible Unemployment Cost of Average Inflation below a Credible Target

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Issue

- Average inflation below target 1996-2011
- Average inflation expectations close to target 1996-2011
- If inflation expectations stuck at target when average inflation deviates from target, non-vertical long-run Phillips curve?
- Higher average unemployment from lower average inflation?
- Bias in estimates of sustainable unemployment rate based on historical averages?
- Conclusions for the future?
CPI inflation, CPI inflation expectations, and unemployment 1996-2011

5-year moving averages:
CPI inflation expectations close to 2 %, CPI inflation below 2 %
Before 1996: High CPI inflation expectations (Aragon)

![Graph showing CPI inflation, Inflation next 2 years, Inflation next 5 years, and Unemployment from 1991 to 2000.]

First few years: Inflation target not credible, tight monetary policy, and high unemployment.

\[ \pi - \pi^e = -\gamma(u - u^*) \]

\( \pi = \pi^* = 2 \)
Inflation target gradually becomes credible

\[ \pi^e = \pi = \pi^* = 2 \]

From 1996: Inflation expectations stuck at 2 %, but monetary policy still tight:
Inflation too low, and unemployment too high

\[ \pi^e = \pi^* = 2 \]
\[ \pi = 1.4 \]
**Estimate short-run Phillips curve, compute long-run Phillips curve**

\[ \pi_t - 2 = \beta_0 + \beta_1(\pi_{t-1} - 2) + \beta_2(\pi_{t-2} - 2) + \beta_3u_t + \epsilon_t \]

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_0 )</td>
<td>1.835275</td>
<td>0.528245</td>
<td>3.474290</td>
<td>0.0010</td>
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<tr>
<td>( \beta_1 )</td>
<td>1.127351</td>
<td>0.121112</td>
<td>9.308356</td>
<td>0.0000</td>
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<tr>
<td>( \beta_2 )</td>
<td>-0.500917</td>
<td>0.110455</td>
<td>-4.535029</td>
<td>0.0000</td>
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<tr>
<td>( \beta_3 )</td>
<td>-0.283695</td>
<td>0.080984</td>
<td>-3.503117</td>
<td>0.0010</td>
</tr>
</tbody>
</table>

Newey-West lag 4, \( R^2 \) 0.84, \( \text{adj } R^2 \) 0.83, S.E. 0.51, DW 2.12

\[ \pi - 2 = \gamma_0 - \gamma u \quad \gamma_0 = \beta_0 / (1 - \beta_1 - \beta_2) \quad \gamma = -\beta_3 / (1 - \beta_1 - \beta_2) \]

\[ \pi - 2 = 4.92 - 0.76 u \]

**The long-run Phillips curve, 1998Q1-2011Q4**

[Diagram showing the relationship between unemployment percent and CPI inflation - 2, percentage points.]

5 6 7 8 9 10

-4 -3 -2 -1 0 1 2 3

CPI inflation - 2, percentage points

Unemployment, percent
The unemployment cost of average inflation below a credible target

- "Near-rational" inflation expectations?
- Akerlof-Dickens-Perry (2000): For average inflation close to zero, a significant fraction of agents disregard inflation; behave as if inflation expectations are zero
- Here, for average inflation close to 2 %, a significant fraction of agents disregard deviation from 2 %; behave as if inflation expectations are 2 %
- Non-vertical Phillips curve applies for average inflation not too far from 2 % (± 1 %?)

The unemployment cost of average inflation below a credible target

- 1997-2011 average CPI inflation 1.4 %
- Average inflation expectations about 2 %
- Downward-sloping long-run Phillips curve

$$\pi_t - 2 = 4.92 - 0.76 \, u_t$$

- 0.6 p.p. lower inflation gives 0.6/0.76 = 0.8 p.p. higher unemployment on average during 1997-2011
- Robustness?
The unemployment cost of average inflation below a credible target

- Point estimate 0.79 p.p.
- 95 % conf. interval $0.79 \pm 0.29 = [0.50, 1.08]$ p.p.
- 99 % conf. interval $0.79 \pm 0.39 = [0.40, 1.18]$ p.p.

CPI inflation and unemployment, 1976-2011
Long-run Phillips curve, 1998-2011
**Earlier start, 1997Q1-2011Q4**
Flatter, higher unemployment cost

**Later start, 1999Q1-2011Q4**
Not much steeper, not much lower unemployment cost
Consider CPIXF inflation and gap to Riksbank long-term unemployment

With CPIXF inflation, 1998Q1-2011Q4
Flatter curve, similar unemployment cost
With Riksbank unemployment gap, higher cost, possibly overestimate of long-term unemployment

Revised Riksbank unemployment gap and long-run Phillips curve, 1998Q1-2011Q4
Revised Riksbank long-term unemployment gap,

With lagged unemployment
Flatter curve, higher unemployment cost
Other countries

- Average inflation in other countries?

<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA average CPI</td>
<td>1996-2011</td>
<td>2.02</td>
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<tr>
<td>UK average RPIX</td>
<td>1995-2003</td>
<td>2.48</td>
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<tr>
<td>UK average CPI</td>
<td>2004-2007</td>
<td>2.01</td>
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<tr>
<td>UK average CPI</td>
<td>2008-2011</td>
<td>3.39</td>
</tr>
<tr>
<td>US average core CPI</td>
<td>2000-2011</td>
<td>2.02</td>
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<tr>
<td>US average core PCE</td>
<td>2000-2011</td>
<td>1.86</td>
</tr>
</tbody>
</table>

Canada, 1997Q1-2011Q4
Average inflation on target 2 %
Conclusions for the future?

- Swedish (Prospera) inflation expectations not rational
- "Near rational"?
  Stuck at 2% for average inflation not too far from 2%?
- Stable inflation expectations of 2 per cent good:
  Easier to stabilize unemployment without too much variation in inflation
- Important to hold average inflation close to 2 per cent
- Too low average inflation can entail large real economic costs
- Better with price-level targeting, average inflation targeting over a longer period?
Government bill (1997/98:40, p. 1): “without prejudice to the objective of price stability, [the Riksbank] should support the objectives of general economic policy with the purpose to achieving sustainable growth and high employment.”