ÖNB

OESTERREICHISCHE NATIONALBANK

Stability and Security.

WORKSHOPS

Proceedings of OeNB Workshops

Price Setting and Inflation Persistence in Austria

December 15, 2005

EUROSYSTEM

No. 8

Comment on "Inflation Persistence in Austria:

First Results for Aggregate and Sectoral Price Series"[1]

Markus Knell

Oesterreichische Nationalbank

1. Introduction

The Inflation Persistence Network (IPN) has produced an impressive body of evidence concerning price-setting behavior and the stickiness and persistence of prices and inflation in euro area countries. In accordance with the fact that inflation persistence is a multi-facetted phenomenon the IPN researchers have used a wide variety of methods that range from micro-data analyses and survey studies to calibrated macroeconomic models. The present paper by Josef Baumgartner adds to this literature by using econometric time series techniques to document various relevant properties of Austrian price indices. There already exist some papers (cf. Lünnemann and Mathä, 2004; Cecchetti and Debelle, 2005) that have undertaken such an analysis of aggregated and disaggregated price indices. The aim of these papers, however, was an international comparison between different countries and thus I think it is a reasonable and valuable exercise that national experts look more deeply (and with the intricate knowledge of national insiders about index changes, tax increase and other typical peculiarities of such time series) at the behavior of particular variables.

My discussion of the paper by Josef Baumgartner is divided into two parts. In section 2, I will briefly summarize some of the crucial results of the paper. In section 3, I will comment on these results and I will offer some suggestions for possible extensions of the paper and possible topics for future research.

2. Short Summary

In this section I want to summarize the main results of the paper in brief bullet-point form:

- The paper uses univariate autoregressive models to analyze the inflation persistence of four aggregate price indices (GDP deflator [PGDP], private

---

consumption deflator [PCP], wholesales price index [WPI] and consumer price index [CPI]) and three groups of disaggregated price indices ("use" with 10 sectors; "main groups" with 5 sectors and the 181 individual goods from the CPI basket of goods).

- The longest time period (1966–2004) shows a high persistence (for the CPI series, e.g., one gets that $\rho=0.91$). Having account of structural breaks (i.e. of changes in the average inflation rate), however, reduces the extent of persistence considerably (for the CPI, e.g., to values of ρ between 0.29 and 0.72).
- For most time series one finds two to three of such structural breaks (in the mid-1970s, the mid-1980s and the mid-1990s).
- The benchmark estimation is based on (i) quarterly data, (ii) a long time sample (1966 - 2004), (iii) seasonal adjustment with the Tramo/Seats Method (for four subsamples) and (iv) while allowing for multiple structural breaks and testing for them with Bai-Perron tests (minimum regime length: 24 quarters, maximum number of structural breaks: 4). The validity of the results is, however, also analyzed under alternative assumptions. In particular with (i) monthly data, (ii) shorter time intervals, (iii) different methods for seasonal adjustment and (iv) under the assumption of only one structural break (Andrews-Ploberger test).
- The results of these robustness tests are rather ambiguous. The estimated dates for the structural breaks fluctuate to a lesser extend than the estimates for ρ (persistence) and α (intercept).

3. Comments on the Paper

3.1 Robustness of the Results and Interpretation

At the moment the paper contains a large number of inflation persistence estimations that refer to various indices, time periods, variables, estimation methods etc. This large number of estimations requires some efforts to structure, systematize and interpret the results. One crucial issue in this respect refers, e.g., to the robustness of the persistence estimations.

Table 1: Summary of Estimations Based on the CPI for the Last Regime (1995–2004)

Source	Description	α	ρ	π*=α/(1-ρ)
Table 4	Benchmark	0.19	0.54	1.65
Table 5	Short Period (1978-2004)	0.19	0.54	1.65
Table 6	Seasonal Dummies	0.20	0.26	1.08
Table 7	Fourth Seasonal Differences (D4)	0.47	0.72	1.68
Table 8	X12-Seasonal Adjustment	0.23	0.45	1.67
Table 9	Tramo/Seats II	0.25	0.48	1.92
Table 10	Monthly Data	0.07	0.49	1.65
Table 13	HICP, monthly	0.14	–0.10	1.53

Source: Various tables in Baumgartner (in this volume).

In table 1, I have collected the results of eight estimations that use the CPI and refer to the last regime (1995–2004). Given the public and political importance of the consumer price index and the crucial changes in monetary policy that took place over the last decade this subinterval seems to be of special interest. Table 1 reports the estimates of the intercept α, the persistence parameter ρ and the long-run inflation rate that is implied by this parameter values ($\pi^* = \dfrac{\alpha}{1-\rho}$). This last relation follows from the following equation:

$$\pi_t = \alpha + \rho\pi_{t-1} + \sum_{i=1}^{p-1}\beta_i\Delta\pi_{t-i} + \varepsilon_t, \tag{1}$$

with $\Delta\pi_{t-i} = 0$ and $\varepsilon_t = 0$. Looking at table 1 we can make the following observations:

- The estimated structural break lies always in the vicinity of the second quarter of 1995. The timing of the break is thus rather robust and cannot be the source of differences in the estimated parameter values.
- The estimations of the implied long-run inflation rate fluctuate between 1.08 and 1.92 (or between 1.53 and 1.92 if we disregard the estimation that is based on seasonal adjustment with dummies). These rather moderate fluctuations are to be expected since the estimation method will necessarily lead to a π^* that will be close to the period average in the rate of inflation (with was around 1.6%).
- The fluctuations in the implied long-run inflation rate are, however, also reflected in the estimations of the persistence parameter. For five estimations (using quarterly data) it lies around 0.5 while for seasonal adjustment

according to D4 it is considerable larger (0.72) and with seasonal dummies considerably smaller (0.26). Probably this can be explained by the adjustment methods but it would be interesting to have a discussion along these lines in the paper. On the total I have to say, however, that I like the careful treatment of the seasonal adjustment topic in this paper. This issue is often neglected (or treated with some nonchalance) while it can have an essential impact on the results (as one can learn from the paper by Josef Baumgartner).

- The estimation based on monthly CPI data also arrives at a persistence parameter around one half. At first sight this might be interpreted as a comforting sign of the robustness of the $\rho=0.5$ result. At closer inspection, however, I don't quite understand this result since it seems to imply that inflation is as sticky across months as it is across quarters.

- The results based on the HICP is somewhat strange and lies completely outside the range of the other estimations ($\rho=-0.1$). Given that the index is not all that different from the CPI it would be interesting to read about the author's explanation for this behavior.

3.2 Comparison of the Results

Furthermore, it could be interesting to compare the results of the disaggregated price indices with the similar papers of Lünnemann and Mathä (2004) and Cecchetti and Debelle (2005). Is it, e.g., also true for Austria that food prices show more persistence than the one for services/durables? Given that the existing literature was not able to find robust results about this differential stickiness across sectors, I do not expect to find very consistent results about Austria. Nevertheless, it would be nice to have at least some paragraphs on this issue.

It could also be a useful "value-added" of the paper to collect information (perhaps in an appendix) about details and particularities of the construction and calculation of the Austrian price indices. For example, information about changes in sales taxes or details concerning the treatment of sales or of educational expenses or of the costs for housing. For international researchers such information is often difficult to gain and the paper could also serve as a valuable source of reference in this respect.

3.3 Possible Limitations of the Univariate Approach

In this section I want to discuss briefly main elements and possible criticisms of the univariate time series approach to a measurement of inflation persistence. I want to start this discussion with the "mission statement" of the IPN: "The main goal of the IPN is to understand the speed and pattern of inflation adjustment in response to shocks of different nature. Inflation persistence then refers to the tendency of inflation to converge slowly (or sluggishly) towards its long-run value following

such shocks" (Angeloni et al., 2004, p. 4). As expressed in this quotation there are two necessary ingredients for an accurate estimation of inflation persistence: (i) knowledge about the long-run value of inflation and (ii) knowledge about the occurrence and persistence of the "shocks of different nature".

The univariate approach to the measurement of inflation persistence is based on the estimation of equation (1) that uses a single time series of one price index (around 150 observations for quarterly data) and a number of rather restrictive assumptions to meet these informational requirements. The long-run value of inflation is associated with the intercept α which is assumed to change over time (structural breaks) in order to allow for changes in monetary policy and different inflation targets. In order to deal with the presence of shocks it is assumed that the ε_t are i.i.d. and thus show no persistence. This assumption does not seem to be very realistic since the decades since 1966 have been characterized by various cost and demand shocks (e.g. oil price shocks, trade shocks, productivity and wage developments), sometimes of a rather sticky and persistent nature. A high estimation of ρ might thus simply reflect the stickiness of real shocks rather than the persistence of inflation itself. A remedy for these short-comings of the univariate approach would be to amend it with additional data source. One could use, e.g., data on inflation expectation in order to proxy for the long-run value of inflation or one could use other macroeconomic time series in order to allow for the various kind of economic shocks. This, however, would push this approach closer towards other more structural econometric techniques that are based on the estimation of Phillips curves or various VAR approaches.

On the total, I would say that the univariate approach is a reasonable and useful instrument to get a first impression about the main properties of inflation and price index data. The interpretation of these results (in particular of the persistence parameter ρ), however, is somewhat more difficult and one should probably also use information from other data sources or from other related studies.

3.4 Suggestions for Extensions and Further Research

In general it would be interesting to compare the main results of the paper to similar findings of the related micro-data analyses and firm surveys. E.g., can one observe similar patterns of persistence and price-setting across sectors? Furthermore it would be worthwhile to investigate whether the sectoral differences could be (at least partly) explained by structural differences between the sectors, e.g.: market concentration and market form, openness and international competition, characteristics of wage-setting etc. These extensions would, however, involve rather time consuming efforts to collect data and should be interpreted as suggestions for future research.

References

Angeloni, I., Aucremanne, L., Ehrmann, M., Gali, J., Levin, A. and F. Smets (2004). "Inflation Persistence in the Euro Area: Preliminary Summary of Findings", ECB, mimeo.

Cecchetti, S. and Debelle, G. (2005), "Has the Inflation Process Changed?", Bank for International Settlements, BIS Working Papers 185.

Lünnemann, P. and Mathä, T. Y. (2004), "How Persistent is Disaggregate Inflation? An Analysis across EU-15 Countries and HICP Sub-Indices", ECB Working Paper, 415.