Discussion to the paper by Jan Brůha

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Brůha's paper proposes a small model for joint modeling of the labor force, employment, wages, hours worked, output, and the GDP deflator. All the model variables are decomposed into a trend component for the long-run dynamics and a cyclical component for the short-run dynamics. These components are modeled jointly in a state-space model. Subsequently, the properties of the model, including multivariate filtering, second moments, and forecasting, are examined.

I very much appreciate the fact that the trend components and cyclical components are modeled jointly. Many dynamic models require data prefiltering prior to estimation. The arbitrary choice of detrending method can significantly change the behavior of these models and the results obtained can differ substantially. I consider this feature to be the major pitfall of such models. Moreover, many detrending methods are also applied to each time series individually, and these filtered trends can be inconsistent with each other. Joint modeling of trends and cycles is also in line with Andrle (2008), who argues for incorporating explicit (possibly structural) assumptions on trend behavior. Andrle argues that permanent shocks influence business cycle behavior and ad-hoc detrended models *must have hard times to explain the co-movement of the data* (Andrle, 2008, p. 1).

The long-run dynamics of the model employ log-linear specifications of the production function and the labor demand equation so that each variable is described in the long run by some combination of trends in the labor force, labor productivity, unemployment, hours per employee, and the GDP deflator. All these trends are modeled as a random walk with drift, and this drift (minus a constant) follows an AR1 process. These trends are therefore represented by ARIMA(1,1,0) processes. Such specification allows for fluctuations of the drift in the trend around certain values.

The suggested representation of trends seems reasonable. However, as the author argues, it has some difficulties explaining some comovements in the labor market data. The applied specification of the trend in unemployment can be viewed as a version of the neoclassical assumption about the long-run dynamics of unemployment. According to this assumption, unemployment in the long run is given by its natural rate, which is determined purely by institutional factors, while cyclical factors play no role. The model therefore suggests that unemployment cannot exhibit hysteresis in the long run. This is at odds with empirical evidence on the presence of such hysteresis (some of which is mentioned by the author).

One of the first empirical and theoretical studies to deal with hysteresis in unemployment is the influential paper of Blanchard and Summers (1986). They show evidence on the existence of hysteresis in unemployment in European countries and try to explain it within a model of insider wage bargaining where wages are set by insiders with a view to protecting their jobs and preventing the unemployed from getting a job. Ball (1996) finds that the increase in the NAIRU in OECD countries in

the 1980s was caused mainly by tight monetary policy, i.e., by cyclical factors.[1] Ball (1999) confirms the previous evidence on hysteresis and explains cross-country differences in NAIRU estimations by differences in monetary policies conducted in the face of recession. King (2005) argues that productivity shocks alone cannot explain the entire movement in the natural rate of unemployment over time. Ball (2009) reviews the previous evidence on hysteresis and provides some new evidence on this phenomenon. A very nice introduction to the theory of hysteresis is provided by Němec (2010), who also confirms the presence of hysteresis in unemployment in the Czech economy.

My suggestion for further research is to modify the trend component of unemployment in some way that incorporates hysteresis in unemployment. One possible way of doing this is to add some lagged cyclical components[2] to the specification of the trend in unemployment, for example

$$\theta_t^u = \theta_{t-1}^u + \gamma_{t-1}^u + \alpha_1 \tilde{u}_{t-1} + \alpha_2 \tilde{u}_{t-2} + \alpha_3 \tilde{u}_{t-3} + \sigma_\theta^u \varepsilon_{1t}^u$$

$$\gamma_t^u - \mu^u = \rho^u \left(\gamma_{t-1}^u - \mu^u \right) + \sigma_\gamma^u \varepsilon_{2t}^u$$

Interpretation of this unemployment trend is straightforward. If actual unemployment is higher (lower) than its trend, it creates a positive (negative) unemployment gap which pushes the unemployment trend upwards (downwards). How many lagged unemployment gaps are sufficient for plausible dynamics of the unemployment trend and how well identifiable are parameters α_i are research questions that may be discussed.

The model might also be enhanced by including capital in the production function and modeling the development of the capital stock in order to make the model more realistic. This extension is also related to the problem of hysteresis mentioned above. Some authors (e.g. Franz, 1987, and Bean, 1994) try to explain the hysteresis in unemployment as being a result of changes in the capital stock. They claim that the NAIRU also depends on the level and utilization of the capital stock.

I can conclude that I find this paper very interesting. I appreciate the fact that the model contains trends as well as cycles. I focused my attention in this comment on one particular problematic feature of this model – the neoclassical assumption about the trend in unemployment. Nevertheless, this paper covers many interesting topics which are not discussed in this comment. I think that the presented model provides a good basis for further research.

[1] For our purposes we can identify the NAIRU with the long-run unemployment trend.

[2] Because the cyclical component is modeled as VAR(3) there should be no more than three lags.

REFERENCES

Andrle M (2008): The Role of Trends and Detrending in DSGE Models. *Munich Personal RePEc Archive*, no. 13289; http://mpra.ub.unimuenchen.de/13289/.

Ball L (1996): Disinflation and the NAIRU. *NBER working paper*, no. 5520.

Ball L (1999): Aggregate Demand and Long-Run Unemployment. *Brookings Papers on Economic Activity*, 1999(2):189–251.

Ball L (2009): Hysteresis in Unemployment: Old and New Evidence. *NBER working paper,* no. 14818.

Bean CR (1994): European Unemployment: A Survey. *Journal of Economic Literature*, 32(2): 573–619.

Blanchard O, Summers LH (1986): Hysteresis and the European Unemployment Problem. In: Fisher S (ed): *NBER Macroeconomics Annual 1986*, Volume 1:15–90.

Franz W (1987): Hysteresis, Persistence and the NAIRU: An Empirical Analysis for the Federal Republic of Germany. In: Layard R, Calmfors L (eds.): The *Fight Against Unemployment*. MIT Press, pp. 91–138.

King TB (2005): Labor Productivity and Job-Market Flows: Trends, Cycles and Correlations. *Federal Reserve Bank of St. Louis Supervisory Policy Analysis Working Paper*, no. 2005-04.

Němec D (2010): *Hystereze nezaměstnanosti v České republice v makroekonomických souvislostech.* 1st ed., Masaryk University, Brno.