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Detecting unemployment hysteresis: A simultaneous unobserved components model with Markov switching☆

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HIGHLIGHTS

- Markov-switching unobserved components framework with asymmetric spillovers.
- Upward trend in German unemployment fully explained by hysteresis.
- Both hysteresis and structural unemployment reduced after institutional reforms.
- U.S. unemployment not driven by hysteresis effects.

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ABSTRACT

We construct a new Markov-switching unobserved components framework for analysing hysteresis effects, featuring trend-cycle decomposition, identification of spillovers between the components and asymmetry over the business cycle. The decades-long upward trend in German unemployment is fully explained by hysteresis. The Great Recession was well absorbed because both hysteresis and structural unemployment were substantially reduced after institutional reforms. In contrast, U.S. unemployment was not driven by hysteresis effects.

1. Introduction

Hysteresis denotes the effect of cyclical on structural unemployment. Even though unemployment may have been caused by a recessionary shock, skill loss, stigmatisation, demotivation or high re-entry barriers due to insider negotiations could render it persistent (Blanchard and Summers, 1986; Blanchard and Diamond, 1994). The relevance of hysteresis for the long-run development of unemployment has been discussed controversially over decades. Among others, Blanchard and Wolfers (2000) find supply-side factors rather than hysteresis relevant for the NAIRU. This view has been challenged several times (Reinhart and Rogoff, 2009; Ball, 2009). Recently, the Great Recession revived interest in hysteresis as output potential was destroyed and dismissed workers were detached from the labour market (Reinhart and Rogoff, 2014; Ball, 2014).

An empirical analysis of hysteresis requires three important ingredients: a breakdown of unemployment into a long-run and a transitory component (the trend and the cycle), spillovers between trend and cycle in order to disentangle causality in both directions, and asymmetric responses of trend unemployment

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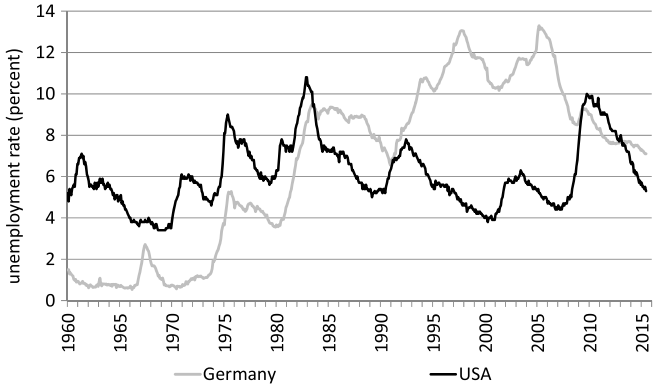

Fig. 1. Unemployment rates in Germany and the U.S.
Source: German Federal Employment Agency, BLS.

over the cycle. This paper provides an innovative specification to account for these requirements: a simultaneous Markov-switching unobserved components model. By means of that model, we study unemployment persistence in Germany and the U.S.: Did unemployment come up cyclically because of a drop in demand (hysteresis) or structurally from the very beginning? What changed with the Great Recession?

We build our contribution on several discrete pieces of work, on the NAIRU and unit roots (Canarella et al., 2013; Leon-Ledesma and McAdam, 2004), correlated UC models (Morley et al., 2003), identification of the causality structure between trend and cycle shocks (Weber, 2011), asymmetry of unemployment with respect to Okun´s law (e.g. Lucchetta and Paradiso, 2014; Owyang and Sekhposyan, 2012), and regime switching UC models (Morley and Piger, 2012; Sinclair, 2010).

2. Data

We use monthly seasonally adjusted unemployment rates from 1960:1 to 2015:6 (in line with German data availability). In German register data workers count as unemployed if they are temporarily not employed, search for a new job subject to social security, are available for job placement efforts and registered as unemployed. U.S. unemployment provided by the Bureau of Labor Statistics is based on the self-assessment of participants in the Current Population Survey. Due to these different concepts, the absolute levels of the two series should not be compared.

While the paths of unemployment in the U.S. and Germany diverge in 1967, 1970 and 1997, major recessions led to increasing unemployment in both countries (Fig. 1). The U.S. unemployment rate recovered more quickly and (almost) fully, but the German rate increased in stairs. Inflexible institutions and generous unemployment insurance have been named as major reasons (Blanchard and Wolfers, 2000; Nickell et al., 2005). However, from the pure look at the data one crucial distinction cannot be made: Did German unemployment rise because of hysteresis or did it simply follow an upward trend with cyclical deviations?

Starting in 2005, after severe labour market reforms (see Klinger and Rothe, 2012) the picture changes drastically. While German unemployment moved along a negative trend just mildly interrupted by the Great Recession, U.S. unemployment rose much more strongly and hardly reached the pre-crisis level by mid-2015.

3. The simultaneous correlated unobserved components model with regime switching

The structural form of our model reads as:

$$u_t = \tau_t + c_t \tag{1}$$

Table 1
Probabilities to stay in or switch the regime.

		S_{t-1}	
		0	1
S_t	0	λ_0	$1-\lambda_1$
	1	$1-\lambda_0$	λ_1

$$\tau_t = \tau_{t-1} + \mu^\tau + (k + \Delta k\, S_{t-1})\; c_{t-1} + \eta_t \tag{2}$$

$$c_t = \sum_{i=1}^{p} \phi_i c_{t-i} + \mu_1^c S_t + \mu_0^c (1 - S_t) + \varepsilon_t. \tag{3}$$

Unemployment u_t is disentangled into a permanent component τ_t and a transitory component c_t (1). The permanent component or trend is a random walk with drift μ^τ (2) while the transitory component or cycle is a stationary autoregression (3).[1] All roots of the lag polynomial $\Phi(L) = 1 - \phi_1 L - \cdots - \phi_p L^p$ in modulus lie outside the unit circle.

To analyse hysteresis, spillovers between trend and cycle must be implemented and assignable to the direction of hysteresis, i.e. from cycle onto trend. Following Weber (2011), the UC innovations are considered as composites of uncorrelated core trend and cycle shocks $\tilde{\eta}$ and $\tilde{\varepsilon}$ (with normalised variances). In the linear combinations (4), κ_{ij} $(i, j = 1, 2)$ denote the mutual contemporaneous spillovers. With impact κ_{12}, permanent effects may be induced by transitory reasons.

$$\begin{aligned} \eta_t &= \kappa_{11}\, \tilde{\eta}_t + (\kappa_{12} + \Delta\kappa_{12} S_t)\; \tilde{\varepsilon}_t \\ \varepsilon_t &= \kappa_{21}\, \tilde{\eta}_t + \kappa_{22}\, \tilde{\varepsilon}_t \end{aligned} \quad \text{with } \kappa_{ii} > 0\ (i = 1, 2). \tag{4}$$

Additionally, a lagged cycle impact, denoted by k, is implemented directly in (2).

The model contains regime switches to account for hysteresis as the long-lasting effect of a recessionary rather than an expansionary shock. We implement endogenous regime switching by a two-state first-order Markov process. The state variable S_t in (2)–(4) is 0 in the first and 1 in the second regime. S_t depends on S_{t-1} according to the transition probabilities in Table 1.

The regimes are distinguished by switches in cyclical unemployment and the spillovers of cycle onto trend. Formally, this is captured by temporary cycle intercepts μ_0^c and μ_1^c in (3) – with $\mu_0^c = -\mu_1^c \frac{1-\lambda_0}{1-\lambda_1}$ (guaranteeing an unconditional cycle mean of 0) and $\mu_1^c > 0$ – as well as breaks in the lagged and contemporaneous spillover coefficients, Δk and $\Delta\kappa_{12}$, in (2) and (4).[2] The state $S_t = 1$ refers to recessions when cyclical unemployment rises. $k + \Delta k$ and $\kappa_{12} + \Delta\kappa_{12}$ mirror the hysteresis effects of cyclical increases in unemployment.

For Germany, additional breaks in 2005:4 were considered in the drift μ^τ and hysteresis parameters Δk and $\Delta\kappa_{12}$ allowing for potential effects of the labour market reforms (cf. Klinger and Weber, 2016).

Specification analysis in the reduced form ARIMA models delivers optimal information criteria and residuals free of autocorrelation for lag lengths $p = 8$ in Germany and $p = 12$ in the U.S. Based on the state-space representation (see online appendix) and the Kalman filter, maximum likelihood is applied. Identification of the causal structure requires two distinct volatility regimes (see Weber, 2011 and online appendix, Appendix A). Indeed, introducing Markov switching leads to large likelihood increases for both countries.

[1] While we allow unemployment to have both a stochastic trend and cycle, the variances of both components are freely estimated from the data. Particularly, since the trend shock variance can become virtually zero, the model does not impose non-stationarity of unemployment.

[2] Additionally, the variance of the uncorrelated cycle shock $\sigma^2_{\tilde{\varepsilon}}$ is allowed to switch, see online appendix (Appendix A).