Hopeless Hysteresis: Investigating Unemployment Persistence in South Africa

Vincent Dadam Nicola Viegi

University of Pretoria and SAMNet

November 30th, 2021

<ロト < 部 ト < 注 ト < 注 ト 三 三 のへで</p>

Introduction

- Unemployment is the defining characteristic of the South African economy with distinctive dynamics:
 - Up from 29.1% in 2020Q1 before lockdown effects could be felt to 34.4% in 2021Q2 (44.4% including discouraged). 21.1% just before the financial crisis.
 - The youth are particularly affected with 64.4% without a job in 2021Q2
 - Unemployment follows closely GDP growth patterns:

Figure: South Africa Unemployment - GDP Growth 2000-2019



Introduction (Cont...)

- This paper:
 - Investigates the drivers of the double negative trend.
 - First, by providing evidence of hysteresis in the unemployment series for South Africa.
 - Second, by using a simple model of insider-outsider dynamics to identify the causes of hysteresis and discussing the implications this finding generates.

Part I: Hysteresis in Unemployment - Definition and Evidence

- Blanchard and Summers (1987) pioneered the idea of hysteresis in economics. The paper investigates increases in Europe unemployment that were persitent in 1980s.
- The concept became more prominent in the post 2008 global financial crisis era to explain the persistence of economic stagnation when monetary policy is at the zero lower bound.
- Gali (2020): long lasting deviation of unemployment from a "flexible wages" underlying natural rate of unemployment.
- Garga and Singh (2021): a permanent change in potential output, *i.e.* a unit root in the underlying equilibrium values.
- Evidence of a unit root therefore appears to be a significant indication of hysteresis.

Table: Unit Root Tests on South Africa Unemployment 2000q1-2019q4

Null Hypothesis: Unemployment has a unit root	Adj. t-Stat	Prob.*
Augmented Dickey-Fuller test statistic Phillips-Perron test statistic	$-1.384906 \\ -1.457863$	0.5856 0.5497

• Tests confirm unit root evidence in the South Africa unemployment series

<□▶ < □▶ < 三▶ < 三▶ = 三 のへぐ

- Cross *et al* (2009): systems that display not only *persistence* but also *remanence*
- Remanence implies that the application and the removal of a shock changes the equilibrium of the system as shown in Figure:

Figure: Shocks and Unemployment in Natural Rate vs Hysteresis models



< □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □ > < □

- Remanence but specifically selective memory.
- This paper follows Cross (1994) to apply the Preisach model to the South African unemployment series.
- The idea is to identify the dominant shocks in a series and calculating a non-linear transformation of the series where each shock is weighted for its degree of remanence.
- The Preisach model allows to build an index based on the unemployment series that can be tested for strong hysteresis using Priscitelli *et al* (2000).

*ロ * * @ * * ミ * ミ * ・ ミ * の < @

Figure: Unemployment rate and hysteresis transformation



The transformation emphasizes shocks that are locally not dominated, so that the series remember selectively shocks that were relevant in changing the "equilibrium" unemployment rate.

 The relevance of the hysteresis specification can be seen by comparing the forecasting performance of an autoregressive model of unemployment with or without the hysteresis index.

Figure: Out of sample forecasting of Unemployment Rate: 2018q1 - 2019q4



Part II: Hysteresis in Unemployment - Causes and Consequences

- The Model:
 - Formalism by Blanchard and Quah (1989) augmented with insider-outsider dynamics to account for hysteresis.
 - Imperfect competition in product and labour markets.
 - Firms produce same good, use same technology and the wages are uniform.

<ロト < 部 ト < 注 ト < 注 ト 三 三 のへで</p>

- The system is defined by the following set of equations in log:
 - Production function

$$y_t = n_t + a_t \tag{1}$$

• Demand for produced goods

$$y_t = \phi d_t \tag{2}$$

Prices set up as markup on the unit labour cost

$$p_t = w_t - a_t + \mu_t \tag{3}$$

• The labour market

$$l_t = u_t + n_t \tag{4}$$

$$I_t = \alpha(w_t - p_t) - bu_t + \tau_t \tag{5}$$

 a_t , d_t , μ_t and τ_t are all random walks, respectively shocks to productivity, demand, markup and labour. Their uncorrelated i.i.d. counterparts are $\Delta a_t = \epsilon_{st}$, $\Delta d_t = \epsilon_{dt}$, $\Delta \mu_t = \epsilon_{pt}$ and $\Delta \tau_t = \epsilon_{lt}$.

▲□▶ ▲□▶ ▲臣▶ ▲臣▶ 三臣 - のへで

- Insider-outsider dynamics and the hysteresis assumption
 - The targeted nominal wage w_t^* determines the actual nominal wage

$$w_t = w_t^* + \epsilon_{wt} + \gamma_1 \epsilon_{dt} + \gamma_2 \epsilon_{pt}$$
(6)

*ロ * * @ * * ミ * ミ * ・ ミ * の < @

$$w_t^* = \arg \{ n_t^e = (1 - \lambda) n_{t-1} + \lambda I_{t-1} \}$$
(7)

 n^e_t is the expected employment, $\lambda \in [0,1]$ denotes the hysteresis parameter, ϵ_{wt} is an i.i.d. shock to wages which also reflects the bargaining power of unions.

- If 0 < λ < 1, the bargained wage is consistent with n^e_t being larger than n_{t-1}, therefore increasing the size of the workforce.
- If λ = 0, full hysteresis prevails in the economy. The insiders decide the nominal wage that ensures their employability, with virtually no weight associated to the unemployed.

• The full hysteresis assumption allows for the setting up of the model in moving average:

$$\Delta y_t = \phi \epsilon_{dt} \tag{8}$$

$$\Delta n_t = \phi \epsilon_{dt} - \epsilon_{st} \tag{9}$$

$$\Delta w_t = \gamma_1 \epsilon_{dt} + \epsilon_{wt} + \gamma_2 \epsilon_{pt} \tag{10}$$

$$\Delta p_t = \gamma_1 \epsilon_{dt} - \epsilon_{st} + \epsilon_{wt} + (1 + \gamma_2) \epsilon_{pt}$$
(11)

$$\Delta u_t = \frac{1}{1-b} \left[\phi \epsilon_{dt} + (1+\alpha) \epsilon_{st} - \alpha \epsilon_{pt} + \epsilon_{lt} \right]$$
(12)

<ロト < 団 ト < 臣 ト < 臣 ト 三 の < で</p>

Empirical Results - Nominal Wage Shock







Empirical Results - Markup Shock

Figure: Markup shock





Empirical Results - FEVD

Figure: Forecast Error Variance Decomposition



▲□▶ ▲□▶ ▲ 三▶ ▲ 三▶ ● ○ ○ ○ ○

Conclusion

- This paper investigates hysteresis in the unemployment series as explanation for its structural nature.
- We use a model with insider-outsider dynamics to assess the causes and consequences of such findings.
- The results confirm the presence of hysteresis in the South African unemployment series based on definitions found in the literature.
- Nominal wage shock increases prices with long lasting effects while a mark up shock induces a permanent response in unemployment.
- The linkages between the three variables are confirmed by FEVD where nominal shocks explain for prices forecast errors while markup shocks contribution to forecast errors in unemployment increase in proportion as the forecast horizon increases.
- This has significant for the conduct of monetary policy amid inflation targeting.
- This suggests a reassessment of the specification of the Phillips curve because ignoring the strong network between nominal wages, inflation and unemployment could yield inflation targets and an output gap estimate that are flawed and bias.