

# Short Note on the Unemployment Rate of the “French overseas regions”

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## **Abstract:**

This article analyzes the hysteresis hypothesis in the unemployment rates of the four “French overseas regions” (Guadeloupe, Martinique, Guyana, Reunion) [FORs] over the period 1993-2008. We use standard univariate and panel unit root tests, among them Choi(2006) and Lopez (2009) that account for cross-sectional dependence and have improved performance when the number of countries and the time dimension of the data are limited. Our results cannot reject the null hypothesis of a unit root and so find evidence supporting hysteresis in the unemployment rates for the FORs.

**Keywords:** Hysteresis, Unemployment, Panel unit root test, cross-section dependence, convergence

**JEL classification:** C23; E24; R23

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## 1. Introduction

Unemployment still constitutes one of the major challenges for economists and policymakers for most countries around the world. This problem is crucial for France, and its overseas regions (Guadeloupe, Martinique, Guyana, and Reunion). Indeed, according to the European Union [EU]'s statistics agency, "Eurostat", these four French overseas regions [FORs] had the highest unemployment rates in the 27-nation EU in 2007. This finding clearly emphasizes the great failure of all the policy measures against unemployment implemented by the successive French governments during the last decades as these regions continue to have a relatively low economic development performance.

The determination of suitable policies for these non-continental regions relies on the understanding of the behavior of unemployment rates from a theoretical standing point. As mentioned by Camarero *et al.* (2006), there are two main hypotheses related to the explanation of unemployment. On one hand, the non-accelerating inflation rate of unemployment [NAIRU] characterizes unemployment dynamics as a stationary process (a mean-reverting process), *i.e.* the unemployment rate tends to revert to its equilibrium in the long-run after a shock<sup>4</sup>. On the other hand, the hysteresis hypothesis states that the unemployment rate is an integrated process of order one, *i.e.* shocks have permanent effects on unemployment.<sup>5</sup> The empirical validity of these hypotheses commonly relies on the use of unit root tests. Clearly, the hysteresis hypothesis is associated with the presence of a unit root in the unemployment rate process while the NAIRU or natural-rate hypothesis is associated with its rejection.

Since the pioneer work of Blanchard and Summers (1986), many authors have used unit root techniques to study the unemployment rate behavior for developed countries (Mitchell, 1993; Roed, 1996; Song and Wu, 1997, 1998; Arestis and Mariscal, 1999; Murray and Papell, 2000; Leon-Ledesma, 2002, Camarero *et al.*, 2006; Yilanci, 2008, among others).<sup>6</sup> Yet, the literature does not reach any clear consensus on the debate NAIRU versus hysteresis. Furthermore, only few studies, among them Chang *et al.* (2007), Gomes and Gomes da Silva (2008) and Gomes and Gomes da Silva (2009) focus on developed countries.

This article contributes to this latter line of research by determining whether hysteresis in unemployment is a characteristic of the FORs' labor market. More precisely, we test for the

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<sup>4</sup> A special case of the NAIRU concept is when the unemployment rate can be defined as a stationary process around a small number of permanent structural breaks (Phelps, 1994). Most shocks to unemployment are still temporary but with occasional and permanent changes in the natural rate.

<sup>5</sup> See Roed (1997) for the theoretical aspects on the hysteresis concept.

<sup>6</sup> See Camarero *et al.* and Chang *et al.* for a recent survey of this literature.

presence of a unit root in the unemployment rate of Guadeloupe, Martinique, Guyana, and Reunion for the 1993-2008 period. First, our analysis relies on univariate and standard panel unit root tests. Then, the limited amount of data available being a concern, we use the more powerful tests of Choi (2006) and Lopez (2009). To our knowledge, this is the first time that the hysteresis paradigm is tested for a set of Small Island Developing Economies [SIDE].

The remainder of this article is organized as follows. Section 2 describes the panel unit root test proposed by Choi (2006) and Lopez (2009). Section 3 presents the data and the empirical results. Finally, Section 4 gives some concluding remarks and the major policy implications of our findings.

## **2. Econometric methodology**

Standard univariate unit root test, such as the augmented Dickey Fuller [ADF] or Elliott, Rothenberg, and Stock [ERS] tests, are well-known for their inability to accurately reject the unit root null hypothesis when the span of the data is short. Hence, they often lead to evidence of non stationary data when the data may be stationary. One way of dealing with this issue is to extend the cross-section that is adding countries, moving from a univariate to a multivariate analysis. Combining the number of periods with the number of countries leads to significant improvements in the tests' ability to correctly reject the unit root null hypothesis. However another issue appears. Standard or first generation panel unit root tests, such as Levin *et al.* (2002) [LLC], Im *et al.* (2003) [IPS] and Maddala and Wu (1999) [MW], assume that there is no relation between the countries studied at any point of time. Yet, if the data does not observe such a restrictive assumption, then these tests have the tendency of over rejecting the null hypothesis, leading to evidence of stationarity when the data may be non stationary.

As an alternative, a second generation of panel unit root tests tries to address the latter issue.<sup>7</sup> We focus on two of these newer tests: Choi (2006) and Lopez (2009) which propose panel extension of the ERS(1996) univariate unit root tests, but differ in their treatment of the contemporaneous correlation as well as the hypotheses tested. Choi (2006) uses a unique common factor structure approach and cross-sectionally demeaned the data, while Lopez (2009) advocates the estimation of the residual covariance matrix. Furthermore, Choi (2006)'s alternative hypothesis considers the presence of some stationary processes while Lopez (2009) considers that all the series are stationary. Yet, as Breitung and Pesaran (2008) pointed

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<sup>7</sup> Breitung and Pesaran (2008) provide a survey of the literature.

out, in both cases the rejection of the null hypothesis means that “a significant fraction of the cross-section units are stationary”.

Each set of tests requires several steps in their estimation procedure. Both start with GLS-transform the data as follows

- Step 1, for both tests. For each series  $y_{jt}$  with deterministic component  $z_{jt}$ , the quasi-differences  $\tilde{y}_{jt} = \left( \tilde{y}_{j1}, (\tilde{y}_{j2} - a\tilde{y}_{j1}), \dots, (\tilde{y}_{jT} - a\tilde{y}_{jT-1}) \right)'$  and  $\tilde{z}_{jt} = \left( 1, (1 - a), \dots, (1 - a) \right)'$  are calculated using the local alternative  $a = 1 + \frac{-7}{T}$  for Choi (2006) and  $a = 1 + \frac{-7}{\sqrt{NT}}$  for Lopez (2009). The locally demeaned data is then constructed as  $y_{jt}^d = y_{jt} - \beta_j' z_{jt}$ , where  $\beta_j$  is the least-squares estimate of the regression of  $\tilde{z}_{jt}$  on  $\tilde{y}_{jt}$ .

The next steps, then, differs as Choi (2006) combines p-values from univariate unit root test while Lopez (2009) uses pooled data.

Choi (2006) ‘s testing procedure follows:

- Step 2: the data is cross-sectionally demeaned:

$$z_{jt} = y_{jt}^d - \frac{1}{N} \sum_{j=1}^N y_{jt}^d$$

- Step 3 : estimation of the DF-GLS<sup>u</sup> regressions for the series  $j=1, \dots, N$ ,

$$\Delta z_{jt} = \rho_j z_{jt} + \sum_{i=1}^{k_j} \phi_{ji} z_{j,t-i} + u_{jt} \text{ with } t = 1, \dots, T$$

With the number of lagged first difference terms allowing for serial correlation,  $k_j$  selected using the Modified Akaike Information Criterion [MAIC].

The estimated  $\rho_j$  and its corresponding standard deviation are obtained and the t-statistic is calculated for  $H_0: \rho = 1$ , and the corresponding p-values are generated and the following statistics are calculated for the combination unit root tests:

$$Pm = -\frac{1}{\sqrt{N}} \sum_{j=1}^N (\ln(p_j) + 1)$$

$$Z = \frac{1}{\sqrt{N}} \sum_{j=1}^N \Phi^{-1}(p_j)$$

$$L^* = \frac{1}{\sqrt{\pi^2 N/3}} \sum_{j=1}^N \ln\left(\frac{p_j}{1-p_j}\right)$$

The unit root null hypothesis rejected for each test when  $P_m > c_{p\alpha}$ ,  $Z < c_{z\alpha}$  and

$L^* < c_{1\alpha}$ , where  $c_{p\alpha}$  is from the upper tail of the standard normal distribution and  $c_{p\alpha}$ , and  $c_{z\alpha}$  from the lower tail.

Lopez (2009)'s testing procedure follows:

Step 2: For each series, the number of lagged first difference terms allowing for serial correlation,  $k_j$  is selected using the MAIC

Step 3: Estimation of the following system equations:

$$\Delta y_{jt}^d = \rho y_{jt}^d + \sum_{i=1}^{k_j} \phi_{ji} y_{j,t-i}^d + u_{jt} \quad \text{with } j = 1, \dots, N \text{ and } t = 1, \dots, T \quad (1)$$

The residual covariance matrix is estimated. It is, then, used in the estimation of (1) with the SUR/FGLS method, constraining the values of  $\rho$  to be equal across equations. The estimated  $\rho$  and its corresponding standard deviation are obtained and the t-statistic is calculated for  $H_0: \rho = 1$ . Finally, since the statistic depends on the estimated residual covariance matrix, the critical values are bootstrapped with 10000 iterations, to avoid size distortion.<sup>8,9</sup>

### 3. Data and empirical results

We study the annually rates of unemployment, based on the International Labor Organization [ILO] definition for 4 specific French regions (Guadeloupe, Martinique, Guyana, Reunion) covering the 1993 to 2008 period. All data are from the “demographic indicators and economic account” database of the French National Institute of Statistical and Economic Information [NISEI].

We first analyze the data via commonly used univariate unit root tests, namely the ADF test, the DF-GLS test of ERS and the M-GLS tests ( $MZ_t$  and  $MZ_a$ ) of Ng and Perron (2001) [NP]. The results are reported in Table 1, with the appropriate number of lags which was determined by using MAIC, as suggested by NP. If we use the asymptotic critical values of each test, the unit root hypothesis can be rejected for Guyana when using the DF-GLS,  $MZ_a$  and  $MZ_t$  tests, yet these results disappear when the critical values are simulated to account for the very small span of our data sets (16 years). Such a difference in the results can be expected due to the very short span of data and the potential size distortion due to the use of asymptotic critical values in such case.

<sup>8</sup> See Lopez (2009) for more details.

<sup>9</sup> The SUR estimation requires that  $T > N$ .

This overall lack of rejection is still not very informative as the univariate unit root tests are also well-known for their lack of power when applied to very short data.

**Table 1. Univariate unit root tests for the FORs, 1993-2008**

Regions	ADF	DF-GLS	MZ <sub>a</sub>	MZ <sub>t</sub>	k
Guadeloupe	-1.1695	-1.279	-4.1862	-1.1453	0
Guyana	-2.3614	-2.528** <sup>(a)</sup>	-6.5618* <sup>(a)</sup>	-1.7043* <sup>(a)</sup>	0
Martinique	-0.7717	-0.880	-1.7077	-0.8238	0
Reunion	0.3128	-0.016	-0.0295	-0.0140	0

Notes: \* and \*\* indicate significance at the 10% and the 5% levels, respectively. The numbers in parenthesis are the p-values. The 5% (10%) critical values for the ADF, DF-GLS, MZ<sub>a</sub> and MZ<sub>t</sub> tests are -3.08 (-2.68), -1.96 (-1.61), -8.10 (-5.10) and -1.98 (-1.62), respectively.

(a): These rejections disappears with bootstrapped critical values.

One way to add more information in presence of limited time dimension is to expand the cross-section and to use panel unit root tests. In our case, the four French regions presenting several similarities, the panel approach sounds a good candidate. Indeed, these territories reveal several common characteristics such as (i) a relative isolation resulting from the distance from the European continent, reinforced by insularity or enclave status; (ii) a limited extent of local domestic market, linked to the size of the population; (iii) geographical and climatic conditions limiting endogenous development of primary and secondary industries (lack of natural resources, active volcanic areas, ...); and (iv) an economic dependence on a small number of product. As a result, these regions have important structural and permanent handicaps relative to the rest of France or the EU. The EU has recognized this specific situation by grouping them into the “Ultra Peripheral Regions” [UPR] area<sup>10,11</sup>.

The top panel of Table 2 presents the results of several commonly used first-generation panel unit root tests, namely the Levin *et al.* (2002) [LLC], Im *et al.* (2003) [IPS] and Maddala and Wu (1999) [MW] tests. The MAIC procedure is used to determine the optimal number of lags. These findings corroborate the univariate’s ones as none of the tests are able to reject the unit root null, providing evidence of hysteresis in unemployment rates. Note that while these first generation tests are well-known for their tendency of over-rejecting the null hypothesis as they do not account for the potential cross-correlation, this seems to not be an issue here.

<sup>10</sup> The concept of UPR was officially recognized in 1997 by the Treaty of Amsterdam (Article 299§2).

<sup>11</sup> Actually, the UPR group also includes the Azores, the Canaries and Madeira.

**Table 2. Panel data unit root tests for the FORs, 1993-2008**

	Statistics	p-value
<b>First-generation tests</b>		
LLC	1.7081	0.9562
IPS	1.0752	0.8589
MW	4.9217	0.7659
<b>Second-generation tests</b>		
$P_m$	0.0201	0.4919
Z	0.1483	0.5590
$L^*$	0.1521	0.5608
DF-GLS-SUR (bootstrapped)	-2.1998	0.2120

Notes: \* and \*\* indicate significance at the 10% and the 5% levels, respectively.

However, these first generation tests may have rather low power for such a small panel (16 years for 4 countries), hence the final testing round use the more powerful alternative of Choi (2006) for IPS and MW and Lopez (2009) for LLC. As we show earlier, these tests account for contemporaneous correlation and benefit from the GLS transformation to enhance their finite sample properties.

These second generation tests' results are reported in the lower panel of Table 2. They all confirm the lack of rejection of the non-stationarity null providing evidence of hysteresis in the unemployment rates for the FORs during the period 1993-2008.<sup>12</sup> As a result, the unemployment rate will not revert to its long-run equilibrium level given by the NAIRU.

#### 4. Conclusion and policy implications

This article studies the behavior of the unemployment rates of four French regions, namely Guadeloupe, Martinique, Guyana and Reunion over the period 1993-2008. We analyze the behavior of these series using univariate and multivariate unit root tests, especially the more powerful Choi (2006) and Lopez (2009). The results are in favor of the hypothesis of unemployment hysteresis for the FORs' unemployment rates.

Moreover, this study has some major policy implications. On the one hand, the presence of hysteresis invalidates the well-stated view that Keynesian demand-driven policies are inefficient in the long-run. In so far as the long-run rate is dependent of the past behavior of unemployment (path-dependent), all measures reducing the current unemployment rate is likely to be effective. Besides, as mentioned by Roed (1997), "a macroeconomic policy that

<sup>12</sup> We also implemented the test for each combination of three regions, but the conclusions do not change.

prevents unemployment from rising in the first place may be worthwhile, even though it is viewed as too expensive in the short run” (Roed, 1997, p. 412-413). On the other hand, in the context of hysteresis, supply-driven policies tend to be inappropriate to fight against unemployment (L’Horty and Thibault (1995)).

Note that the effectiveness of economic policy in this area also depends on the hysteretic factors of interest. Roed (1997) isolated several sources of hysteresis. Among them, the theories of the “Insider-outsider” effects and the “human capital depreciation” seem to be the best explanations for the case of the FORs. For the former theory, demand-driven policies are effective if they are not anticipated by the employed workers. For the latter one, targeted structural measures may be needed, together with the conventional macroeconomic employment policies. All in all, it would be important to clearly identify the underlying reasons for unemployment. However, this is beyond the scope of this work, but should be investigated in a future study.



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