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Abstract

This paper examines the degree of persistence of youth unemployment (total, male and female) in twenty-four countries by using two alternative measures: the AR coefficient and the fractional differencing parameter, based on short- and long-memory processes respectively. The evidence suggests that persistence is particularly high in Japan and some EU countries such as Spain, Portugal, Ireland and Finland, where appropriate policy actions are of the essence. Specifically, active labour market policies are necessary to prevent short-term unemployment from becoming structural (long-term).

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Keywords: youth unemployment, persistence, fractional integration.

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1. Introduction

Youth unemployment has received considerable attention in recent years, especially in the European context, where it is particularly high relative to adult unemployment (see, e.g., Perugini and Signorelli, 2010); the current financial crisis has had a further negative impact, greater than that on adult unemployment (see Choudhry et al., 2012). It is not surprising, therefore, that the European Employment Guidelines should focus on appropriate strategies to reduce youth unemployment, such as increasing human capital. The relatively low human capital of young people has in fact been found to be the key factor compromising their employment prospects (see OECD, 2005), the "youth experience gap" playing a very important role (see Caroleo and Pastore, 2007). Various studies have analysed the "school-to-work" transition process, also stressing the mismatch between the skills acquired through education and those required by employers (see, e.g., Quintini et al., 2007). Suitable policies to address these issues have been suggested in studies such as those by Brunello et al. (2007) and the European Commission (2008).

Another important feature of youth unemployment has been shown to be its high degree of persistence (see, e.g., Heckman and Borjas, 1980 and Ryan, 2001). This is the focus of the present study that aims to provide some more evidence on this issue by analysing data for a large group of countries and estimating both short- and long-memory models. The layout of the paper is as follows. Section 2 outlines the statistical models. Section 3 presents the data and the empirical results. Section 4 offers some concluding remarks.

2. Statistical models

Two statistical models are employed in this study to test for persistence. The first one is an AutoRegressive AR(1) model of the form

$$y_t = \eta + \alpha y_{t-1} + \varepsilon_t, \qquad t = 1, 2, \ldots, \qquad (1)$$

where y_t is the observed time series, η is the intercept, α is the AR coefficient (the indicator of persistence) and ε_t is a white noise. This process is assumed to be stationary, therefore the parameter α is constrained to lie in the interval (-1, 1); the higher the absolute value of α, the higher is the degree of persistence. It belongs to a broader class of processes called short-memory ones and characterised by the fact that the infinite sum of the autocovariances is finite.[1]

The second process considered is a fractional differencing one, given by

$$y_t = \eta + x_t; \qquad (1 - L)^d x_t = \varepsilon_t, \qquad t = 1, 2, \ldots. \qquad (2)$$

where d can be any real value. If $d > 0$, x_t (and y_t) are said to be long-memory processes, so called because of the strong degree of association between observations far apart in time. Here, the sum of the autocovariances is infinite; the parameter d is now the indicator of the degree of persistence and is estimated using the Whittle function in the frequency domain (Dahlhaus, 1989).

3. Data and results

The dataset includes the total youth unemployment rate (as well as the male and female rates) in 24 countries, namely Austria, Australia, Belgium, Canada, Chile, Denmark, Finland, France, Greece, Hong Kong, Ireland, Israel, Italy, Japan, South Korea, Luxembourg, the Netherlands, Norway, the Philippines, Portugal, Spain, Sweden, the United Kingdom and the US (15 of these countries are EU members). This variable is

[1] Other studies define persistence as the sum of the AR coefficients in a more general AR(p) process (Nelson and Plosser, 1982; Fuhrer and Moore, 1995).

defined as the number of unemployed in the 15-24 years age group divided by the labour force for that group. The series are annual, span the period from 1980 to 2005, and have been obtained from the International Labor Organisation (ILO).

Table 1 displays the estimates of the AR coefficient of total, male and female youth unemployment for each country.

[Insert Table 1 about here]

Starting with the total youth unemployment series, the lowest degree of persistence is found in South Korea (0.568), followed by Australia (0.663) and Canada (0.696). The highest values is instead estimated for Japan (0.971), Ireland (0.936) and Finland (0.925). Focusing now on male youth unemployment, the lowest values for the AR coefficient are those for South Korea (0.489), Belgium (0.557), Denmark (0.569), Luxembourg (0.592) and Canada (0.664), and the highest for Japan (0.973), Ireland (0.932), Finland (0.910) and Austria (0.902). For female youth unemployment, the lowest values are estimated for Denmark (0.600), South Korea (0.616) and the Philippines (0.668) and the highest for Japan (0.950), Finland (0.933), Ireland (0.929), Portugal (0.913) and Spain (0.910).

In 16 out of the 24 countries examined higher degrees of persistence are observed in female youth unemployment. Only in Austria, Chile, Hong Kong, Ireland, Japan, Norway, the Philippines and Sweden does male youth unemployment exhibit a higher AR coefficient than the corresponding female rate.

Next, we consider an alternative measure of persistence, namely the fractional differencing parameter d. Table 2 displays its estimates and their corresponding 95% confidence intervals for the three series.

[Insert Table 2 about here]

Again, we focus first on the total youth unemployment rate. The estimates are relatively large in all cases. There is a single case where the null of d = 0 cannot be rejected at the 5% level, i.e. Denmark, for which the estimate of d is equal to 0.250 and the 95% confidence interval is large, including both the nulls of d = 0 and d= 1. Other small values of d are obtained for South Korea (d = 0.591) and the Philippines (d = 0.605). Values of d significantly above 1 are estimated in the cases of Ireland (1.408), Spain (1.634), Portugal (1.689), the Netherlands (1.692) and Finland (1.952). In the case of male youth unemployment, we obtain very similar results. The null of d = 0 cannot be rejected for Denmark (d = 0.255), and small values are also fond for South Korea (0.445), Luxembourg (0.524) and Belgium (0.551). The largest values are obtained for Spain (1.564), Portugal (1.601), the Netherlands (1.677) and Finland (1.777). For female youth unemployment, the null of d = 0 cannot be rejected for Denmark (0.271) and the Philippines (0.507), and in the latter case the null of d < 1 cannot be rejected. The highest values of d are obtained for Spain (1.707), Finland (1.691), the Netherlands (1.506), Ireland (1.369) and Italy (1.289). Female youth unemployment is higher than the corresponding male rate in 14 out of the 24 countries examined.

The two tables also display the top-5 and bottom-5 countries according to the degrees of persistence in the youth unemployment series. It is noteworthy that many countries have similar rankings in the two tables. For example, in the case of total youth unemployment, Finland, Ireland, Spain and Netherlands are in the top 5 according to both measures, while South Korea, Denmark, Australia and Canada are in the bottom 5 in both cases. As for male youth unemployment, only Finland and the Netherlands appear in the top 5 according to both AR and fractional models, but South Korea, Belgium, Denmark and Luxembourg are in the bottom 5 in both cases. Finally, in the

case of female youth unemployment, once more Finland, Ireland, Portugal and Spain appear in the top 5 in both cases, while South Korea, Australia, the Philippines and Denmark are in the bottom 5.

As far as the EU countries in particular are concerned, the short-memory model suggests very high persistence in all three series in the case of Finland and Ireland; male youth unemployment is found to be highly persistent in Austria, and the female one in Portugal and Spain. The evidence based on the long-memory model again indicates high persistence in the total rate in Finland and Ireland, but now the rates in Spain, Portugal and the Netherlands are also found to have this characteristic. In addition, the same group of countries has highly persistent male and female youth unemployment rates, and the latter is also rather persistent in Italy. Denmark is the EU country with the least persistent rates, according to both the short- and long-memory models; the Belgian rates also have relatively low persistence. Outside the EU Japan is the country characterised by the highest degree of persistence.

4. Conclusions

Youth unemployment is one of the main policy challenges facing both developing and developed countries, especially in Europe, where it tends to be even higher relative to adult unemployment, and even more so following the negative impact of the current financial crisis. One of its well-known features is its persistence. This paper has analysed it using annual data on total, male and female youth unemployment in 24 countries and estimating both autoregressive and fractionally integrated models. The evidence suggests that persistence is particularly high in Japan and some EU countries, where appropriate policy actions are of the essence. Specifically, active labour market policies are necessary to prevent short-term unemployment from becoming structural

(long-term). As pointed out by Choudhry et al. (2012), better “school-to-work transition” institutions as well as educational, placement and training schemes are particularly important in this respect.

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Table 1: Estimates of persistence: AR coefficient

Country	Total unemployment	Male unemployment	Female unemployment
Austria	0.848	0.902	0.737
Australia	0.663	0.649	0.690
Belgium	0.715	0.557	0.854
Canada	0.696	0.664	0.724
Chile	0.833	0.828	0.807
Denmark	0.605	0.569	0.600
Finland	0.925	0.910	0.933
France	0.763	0.760	0.787
Greece	0.866	0.827	0.877
Hong Kong	0.881	0.893	0.853
Ireland	0.936	0.932	0.929
Israel	0.767	0.726	0.797
Italy	0.872	0.806	0.893
Japan	0.971	0.973	0.950
South Korea	0.568	0.489	0.616
Luxembourg	0.794	0.592	0.779
Netherlands	0.896	0.899	0.891
Norway	0.887	0.889	0.861
Philippines	0.792	0.835	0.668
Portugal	0.839	0.767	0.913
Spain	0.890	0.872	0.910
Sweden	0.884	0.884	0.879
United Kingdom	0.837	0.804	0.877
United States	0.815	0.786	0.843
Highest persistence (Top 5)	Japan Ireland Finland Spain Netherlands	Japan Ireland Finland Austria Netherlands	Japan Finland Ireland Portugal Spain
Lowest persistence (Bottom 5)	South Korea Denmark Australia Canada Belgium	South Korea Belgium Denmark Luxembourg Australia	Denmark South Korea Philippines Australia Canada

Table 2: Estimates of persistence: Fractional differencing coefficient

Country	Total unemployment	Male unemployment	Female unemployment
Austria	1.086 (0.704, 1.503)	1.177 (0.726, 1.559)	0.884 (0.546, 1.335)
Australia	0.839 (0.417, 1.823)	0.884 (0.371, 1.933)	0.746 (0.392, 1.496)
Belgium	0.808 (0.306, 1.317)	0.551 (0.166, 1.104)	1.127 (0.673, 1.670)
Canada	1.172 (0.405, 2.052)	1.107 (0.266, 1.922)	1.105 (0.493, 1.924)
Chile	0.896 (0.667, 1.221)	0.847 (0.623, 1.181)	0.906 (0.655, 1.257)
Denmark	0.250 (-0.081, 1.124)	0.255 (-0.122, 1.453)	**0.271 (-0.033, 0.673)**
Finland	1.952 (1.336, 2.796)	1.777 (1.217, 2.540)	1.691 (1.232, 2.417)
France	1.089 (0.443, 1.695)	0.808 (0.230, 1.481)	1.174 (0.774, 1.640)
Greece	1.014 (0.421, 1.522)	0.856 (0.461, 1.364)	1.046 (0.349, 1.544)
Hong Kong	0.876 (0.673, 1.281)	0.886 (0.692, 1.303)	0.844 (0.637, 1.263)
Ireland	1.408 (1.088, 1.873)	1.279 (0.984, 1.714)	1.369 (1.076, 1.817)
Israel	1.049 (0.547, 1.712)	0.949 (0.412, 1.617)	1.041 (0.639, 1.592)
Italy	1.150 (0.971, 1.456)	0.961 (0.756, 1.222)	1.289 (1.057, 1.653)
Japan	1.245 (0.955, 1.682)	1.372 (0.877, 1.823)	0.934 (0.742, 1.293)
South Korea	0.591 (0.196, 1.322)	0.445 (0.057, 1.127)	0.654 (0.281, 1.485)
Luxembourg	1.158 (0.288, 1.717)	0.524 (0.116, 1.007)	1.094 (0.188, 1.940)
Netherlands	1.692 (1.311, 2.161)	1.677 (1.283, 2.133)	1.506 (1.131, 1.965)
Norway	1.406 (0.781, 2.176)	1.497 (0.923, 2.273)	1.079 (0.473, 1.769)
Philippines	**0.605 (0.360, 0.982)**	0.637 (0.437, 1.014)	**0.507 (0.222, 0.873)**
Portugal	1.689 (1.137, 2.324)	1.601 (1.004, 2.227)	1.499 (1.066, 2.093)
Spain	1.634 (1.192, 2.223)	1.564 (1.077, 2.182)	1.707 (1.322, 2.227)
Sweden	1.336 (0.914, 1.972)	1.371 (0.906, 2.127)	1.274 (0.903, 1.827)
United Kingdom	1.368 (0.304, 2.117)	1.336 (0.455, 2.150)	1.203 (0.297, 1.833)
United States	1.047 (0.535, 1.997)	0.983 (0.508, 1.837)	1.059 (0.557, 2.116)
Highest persistence (Top 5)	Finland Netherlands Portugal Spain Ireland	Finland Netherlands Portugal Spain Norway	Spain Finland Netherlands Portugal Ireland
Lowest persistence (Bottom 5)	Denmark South Korea Philippines Belgium Australia	Denmark South Korea Luxembourg Belgium Philippines	Denmark Philippines South Korea Australia Hong-Kong

In bold, statistical evidence of mean reversion ($d < 1$) at the 5% level.