

Department of Economics and Finance

**INFLATION PERSISTENCE IN EUROPE:  
THE EFFECTS OF THE COVID-19 PANDEMIC  
AND OF THE RUSSIA-UKRAINE WAR**

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August 2022. The data are not seasonally adjusted. Inflation is calculated as the monthly rate of change (M) of consumer prices in year  $t$  and month  $m$ :

To allow for the possible presence of long memory and/or seasonality as well as of deterministic components in the series we consider the following model:

$$x_t = \alpha + \beta t + z_t; \quad (1-L)^d z_t = u_t, \quad u_t = \rho u_{t-12} + \varepsilon_t, \quad (1)$$

where  $x_t$  stands for the series of interest;  $\alpha$  and  $\beta$  are unknown parameters, specifically the constant and the coefficient on a linear time trend;  $L$  is the lag operator,  $d$  is a real value, and thus  $z_t$  is integrated of order  $d$ ;  $u_t$  is a seasonal AR(1) process which is  $I(0)$ , and  $\rho$  is the seasonal AR coefficient. The estimation is carried out using a Whittle function in the frequency domain. Note that if  $d = 0$  the process exhibits short memory, while  $d > 0$  implies long memory; if  $d$  belongs to the range  $(0, 0.5)$  the series is covariance stationary and mean-reverting, while if  $d$  is in the interval  $[0.5, 1)$  the process is nonstationary though still mean-reverting. The series exhibits a unit root when  $d = 1$ ; in this case (and also if  $d > 1$ ) shocks have permanent effects.

Table 1 reports the estimated coefficients for each of the two series from a model with an intercept only as the time trend

Next we estimate the parameter  $d$  recursively from December 2019 by adding one observation at a time; the aim is to investigate the evolution over time of persistence and if/how it has been affected by the Covid-19 pandemic and the Russia-Ukraine war. Figure 1 displays both the recursive estimates and the 95% confidence intervals. In the case of the euro zone upward jumps in inflation persistence appear to have occurred in February and May 2020, namely in the early stages of the pandemic; persistence then only increases slightly and remains relatively stable till November 2021, before another upward jump in March 2022 (which is around the time of the Russian invasion) and a subsequent slight decrease. As for the behaviour of inflation in the EU27, it is noticeable that its persistence increases throughout the sample, first jumping up in June 2020 and then again in March 2022, at the start of the conflict.

### **3. Conclusions**

Exogenous shocks such as pandemics and wars can have a significant impact on economic variables such as inflation, as shown by various previous studies (e.g., Brunnermeier et al., 2020; Ruiz Estada, 2022). This note focuses on one particular issue, namely the possible effects of the Covid-19 pandemic and of the Russia-Ukraine war on the degree of inflation persistence in both the euro zone and the EU27. The adopted empirical framework, which is based on the concept of fractional integration, is very general and it encompasses a variety of stochastic processes; moreover, it is-9(is)ty



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