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The Impact of the Covid-19 Pandemic on Persistence in the European Stock Markets

Abstract

This paper analyses the impact of the Covid-19 pandemic on the degree of persistence of European stock markets. Specifically, it uses fractional integration methods to estimate persistence at the daily, weekly and monthly frequencies in the case of ten major European stock market indices; the effects of the pandemic are assessed by comparing the pre-pandemic estimates (over the period 2005-2019) to those from a sample extended until July 2021 which includes the pandemic period. The approach used is more general than the standard one based on the stationarity versus non-stationarity dichotomy and allows for a wider range of dynamic processes. Three different model specifications are considered, and these are estimated under two alternative assumptions for the disturbances (white noise and autocorrelation). The findings indicate that there has not been any significant impact of the Covid-19 pandemic on the degree of persistence of the European stock market indices, though their volatility persistence has decreased.

JEL-Codes: C220, G150.

Keywords: Covid-19 pandemic, European stock market indices, persistence, fractional integration.

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1. Introduction

The Covid-19 pandemic has been one of the greatest challenges faced by the world economy, including the European Union (Consilium, 2021). It has had significant effects both on the real economy and on financial markets. Shehzad (2020) provided evidence that the European and US stock markets have reacted more strongly than Asian ones – for example, the S&P 500 index has dropped by 30% since the start of the pandemic. Corbet (2020) reported an increase in the correlation between the volatility of the Chinese stock market and of Bitcoin at the peak of the pandemic. Ali (2020) found higher stock market volatility during the pandemic in the US, the UK, Germany, and South Korea, which reflects the higher uncertainty faced by investors; this is lower in high-trust compared to low-trust countries (Engelhardt, 2021).

This paper focuses on the impact of the Covid-19 pandemic on the degree of persistence of various European stock market indices (DAX, FTSE100, CAC40, FTSE MIB, IBEX35, AEX, SMI, BIST100, WIG20, OMXS30) as well as their volatility. For this purpose fractional integration methods are used to compare the period from January 2005 to December 2019, namely before the pandemic, to that until July 2021, the latter including the pandemic. The approach used is more general than the standard one based on the I(0) versus I(1) dichotomy and thus allows for a much wider range of possible stochastic behaviours.

The structure of paper is as follows: Section 2 outlines the methodology used; Section 3 describes the data and the empirical results; Section 4 concludes.

2. Methodology

The measure of persistence used in this paper is the estimated fractional integration parameter from an appropriately specified model. Alternative measures, such as the

AR(1) coefficient or the sum of the AR(p) coefficients of the process under examination, are questionable if their values are close to the unit circle as often in practice. Fractional integration is a more general case and does not produce an abrupt change in the behaviour of the series around the unit root.

More specifically, a stochastic process is said to be integrated of order d, denoted by I(d), if it can be represented as:

$$(1 - L)^d x_t = u_t, \qquad t = 1,2,..., \tag{1}$$

where L is the lag-operator ($Lx_t = x_{t-1}$): d can be any real value, and u_t is an *I(0)* process which is covariance stationary and has a spectral density function that is positive and finite at any frequency. The category of I(0) processes includes the white noise case but also a wide range of specifications such as the stationary autoregressive moving average (ARMA) class of models.

The polynomial appearing on the left-hand side in equation (1) can be defined in terms of its Binomial expansion, such that, for all real *d*,

$$(1 - L)^d = \sum_{j=0}^{\infty} \frac{\Gamma(j - d)}{\Gamma(j+1)\,\Gamma(-d)} L^j,$$

where $\Gamma(x)$ is the Gamma function.

When $d = 0$ in equation (1), $x_t = u_t$, and therefore x_t is *I(0)*, and possibly "*weakly autocorrelated*" (also known as "*weakly dependent*"), with the autocorrelations decaying exponentially if the underlying disturbances are autoregressive. If $0 < d < 0.5$, x_t is still covariance stationary, but its lag-u autocovariance γ_u decreases very slowly, in fact hyperbolically, according to equation (2), and therefore the γ_u are absolutely non-summable. In that case x_t is said to exhibit long memory given that its spectral density $f(\lambda)$ is unbounded at the origin (see equation (3)). Finally, it is important to note that as d in (1) increases beyond 0.5 and towards 1 (the unit root case), the variance of the partial

sums of x_t increases in magnitude. This is also true for $d > 1$, so a large class of nonstationary processes may be described by (1) with $d \geq 0.5$.[4]

The method employed in this paper to estimate the fractional differencing parameter *d* is based on the Whittle function (an approximation to the likelihood function) expressed in the frequency domain (Dahlhaus, 1989) and uses a testing approach developed in Robinson (1994) and widely applied (Gil-Alana and Robinson, 1997; Gil-Alana and Moreno, 2012; Abritti et al. 2016); etc.).

3. Data Description and Empirical Results

We examine the behaviour of ten European stock market indices, namely AEX (Amsterdam Exchange Index, the Netherlands), BIST100 (Borsa Istanbul stock exchange, Turkey), CAC40 (Cotation Assistée en Continu, France) DAX (Deutscher Aktienindex, Germany), FTSE100 (Financial Times Stock Exchange 100 Index, UK), FTSEMIB (Milano Indice di Borsa, Italy), IBEX35 (Índice Bursátil Español, Spain), OMXS30, Options Market Index Stockholm, Sweden), SMI (Swiss Market Index, Switzerland), WIG20 (Warszawski Indeks Giełdowy, Poland). Specifically, we consider the daily, weekly, and monthly closing prices over the period going from January 2005 to July 2021;[5] the data source is Thomson Reuters Eikon. In order to analyse the possible impact of the Covid-19 parameter on the fractional integration parameter d, which is a measure of persistence, first we estimate the models from January 2005 to December 2019, then we re-estimate them for the full sample up to July 2021. Figure 1 displays plots

[4] See Diebold and Rudebusch (1989), Sowell (1992a) and Gil-Alana and Robinson (1997) for applications involving *I(d)* processes in macroeconomic time series.
[5] More precisely, the sample period goes from 4 January2005 to 13 July 2021 for the daily and monthly series, and from 7 January 2005 to 9 July 2021 for the weekly ones.

of the daily series (the weekly and monthly ones look very similar), whilst Table 1a,b,c report some descriptive statistics for each frequency.

[Insert Figure 1 and Tables 1a, 1b and 1c about here]

The estimated model is the following:

$$y_t = \alpha + \beta t + x_t, \qquad (1 - L)^{d_o} x_t = u_t, \qquad t = 1, 2, ..., \qquad (3)$$

where y_t is the observed time series, α and β are the intercept and the time trend coefficient respectively, and d is the differencing parameter.

We start by presenting the results based on the sample ending on 31 December 2019, that is, just before the Covid-19 pandemic (Tables 2 -7). Tables 2, 4 and 6 display the estimated values of d (and the 95% confidence bands of the non-rejection values of d using Robinson's (1994) tests) for the daily, weekly and monthly series respectively and three model specifications: i) no deterministic terms, ii) an intercept, and iii) an intercept as well as a linear time trend. The full set of estimates for the three frequencies considered is reported in Tables 3, 5, and 7; those from the selected model in each case (on the basis of the statistical significance of the estimated coefficients) are shown in bold. The upper and lower half of the tables report the results for the case of white noise and autocorrelated errors in (3) respectively; in the latter case we use the exponential spectral model of Bloomfield (1973), which is an approximation of AR structures in the frequency domain.

For the daily series (Tables 2 and 3) a time trend is required in two cases with white noise errors (DAX and OMXS-30), and also for OMXS-30 and SMI with weak autocorrelation. In all cases the coefficients are significantly positive.

[Insert Tables 2 and 3 about here]

As for the differencing parameter, evidence of mean reversion (namely of $d < 1$) is found in a number of cases: CAC-40, FTSE-MIB, FTSE-100 and OMXS-30 with white noise errors, and in the last two along with SMI with autocorrelation. In the remaining

cases, under the assumption of white noise errors the unit root null hypothesis (i.e., d = 1) cannot be rejected, which is consistent with the Efficient Market Hypothesis (EMH), at least in its weak form.

[Insert Tables 4 and 7 about here]

Concerning the weekly series (Tables 4 and 5), a significant positive time trend is found only in the case of the DAX with white noise errors, and mean reversion takes place in half of the cases with white noise errors (CAC, FTSE-100, IBEX, OMXS and SMI) but not in a single case with autocorrelation. Finally, for the monthly series the time trend is only significant in the case of BIST-100 and DAX with autocorrelated errors, and mean reversion is not found in any single case.

Next we re-estimate the models over the full sample until July 2021 to assess the impact of the Covid-19 pandemic on persistence. Tables 8 – 13 report these results: Tables 8 and 9 concern the daily data, Tables 10 and 11 the weekly data, and Tables 12 and 13 the monthly ones.

[Insert Tables 8 and 13 about here]

In the case of the daily series a time trend is required for DAX and OMXS-30 without autocorrelation and OMXS-30 and SMI with autocorrelation (exactly the same as for the shorter sample), and mean reversion is found in the case of FTSE-100 and OMXS-30 with white noise errors and these two series along with SMI with autocorrelated disturbances. As for the weekly series, DAX, OMXS-30 and SMI require a time trend with white noise errors, and under the same assumption CAC-40, FTSE-100 and SMI display a small degree of mean reversion. Finally, of the monthly series BIST-100 and DAX are the only two with a significantly positive time trend with both white noise and autocorrelated errors, and the unit root null hypothesis cannot be rejected in any single case except for SMI with white noise errors, in this case in favour of $d > 1$.

[Insert Tables 14 and 15 about here]

Tables 14 and 15 display a summary of the results discussed above. In brief, under the assumption of white noise errors, there is a slight increase in the degree of integration at the daily and weekly frequency but a decrease at the monthly one. In the more realistic case of autocorrelated disturbances a different picture emerges: in general, the degree of persistence decreases, especially at the weekly and monthly frequencies. However, the differences are not statistically significant, which suggests that the Covid-19 pandemic has had very little effect on the degree of persistence of stock markets.

Finally we also analyse persistence in the squared returns of the series under examination, which is a proxy for volatility. More specifically, we estimate again the parameter d at all three frequencies for both the pre-Covid sample ending on 31 December 2019, and the full sample ending ending on 13 July 2021, and compare the respective estimates to assess the impact of the pandemic. These results are displayed in Table 16.

[Insert Tables 16 about here]

In general, the value of d is found to decrease for the full sample including the Covid-19 period, especially in the case of SMI at the daily frequency (from 0.31 to 0.27), WIG20 at the weekly frequency (from 0.27 to 0.18) and CAC40 at the monthly frequency (from 0.15 to 0.08). Evidence of long memory is found in all cases examined and similar results are obtained using absolute returns instead of the squared ones. These findings suggest that the increase in uncertainty caused by the pandemic is not having long-lasting effects on the volatility of stock prices and that this will relatively quickly revert to pre-Covid levels.

4. Conclusions

This paper analyses the impact of the Covid-19 pandemic on the degree of persistence of European stock markets. Specifically, it uses fractional integration methods to estimate persistence at the daily, weekly and monthly frequencies in the case of ten major European stock market indices; the effects of the pandemic are assessed by comparing the pre-pandemic estimates (over the period 2005-2019) to those from a sample extended until July 2021 which includes the pandemic period. The approach used is more general than the standard one based on the stationarity versus non-stationarity dichotomy and allows for a wider range of dynamic processes. Three different model specifications are considered, and these are estimated under two alternative assumptions for the disturbances (white noise and autocorrelation). The findings indicate that there has not been any significant impact of the Covid-19 pandemic on the degree of persistence of European stock market indices. However, their volatility process has become less persistent, which suggests that the higher uncertainty faced by investors during the pandemic is not going to have long-lasting effects.

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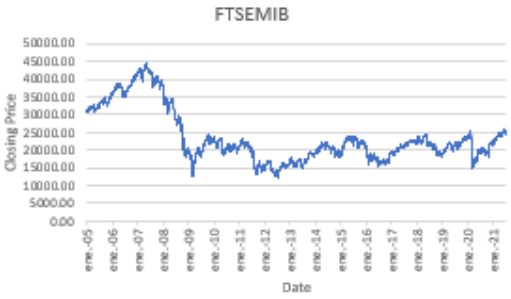
Figure 1: Time series plots of the daily series

AEX	BIST100
	
CAC40	DAX
	
FTSE-100	FTSE-MIB
	

IBEX35	OMXS30
	
SMI	WIG20
	

Note: AEX: Amsterdam Exchange Index, BIST100: Borsa Istanbul stock exchange, CAC40: Cotation Assistée en Continu, DAX: Deutscher Aktienindex, FTSE100: Financial Times Stock Exchange 100 Index, FTSEMIB: Milano Indice di Borsa, IBEX35: Índice Bursátil Español, OMXS30: Options Market Index Stockholm, SMI: Swiss Market Index, WIG20: Warszawski Indeks Giełdowy.

Table 1a: Descriptive statistics: Daily data

Series	Max. value	Min value	Mean	Std. Dev-	J-B stat.
AEX	740.69	199.25	438.57	105.11	55.51
BIST100	1570.42	212.2827	712.82	293.05	155.93
CAC40	6666.26	2519.29	4552.2	845.49	97.27
DAX	15790.51	3666.41	8761.19	2972.31	259.82
FTSE-100	7877.45	3512.09	6193.09	858.46	106.95
FTSE-MIB	44364	12362.51	23592.09	7503.82	860.26
IBEX35	15945.7	5956.3	10052.03	1927.14	550.6
OMXS30	2349.53	567.61	1274.02	345.95	113.14
SMI	12085.51	4307.67	7984.45	1515.04	68.88
WIG20	3910	1305.73	2375.31	469.4	725.71

Table 1b: Descriptive statistics: Weekly data

Series	Max. value	Min value	Mean	Std. Dev-	J-B stat.
AEX	740.7	199.5	438.80	105.67	12.45
BIST100	1560.34	219.6596	714.25	292.55	33.38
CAC40	6622.87	2534.45	4555.09	850.35	20.88
DAX	15785.23	3666.41	8778.97	2975.49	56.23
FTSE-100	7778.79	3530.73	6200.04	861.28	24.42
FTSE-MIB	44364	12739.98	23548.27	7488.01	199.85
IBEX35	15823.7	6065	10047.21	1931.7	127.98
OMXS30	2351.848	567.613	1275.62	346.70	26
SMI	12047.86	4311.61	7988.96	1517.09	14.54
WIG20	3899.59	1365.97	2373.63	469.21	165.61

Table 1c: Descriptive statistics: Monthly data

Series	Max. value	Min value	Mean	Std. Dev-	J-B stat.
AEX	15795.95	3843.74	439.93	2971.96	2.55
BIST100	1476.72	235.9164	716.99	291.28	7.05
CAC40	6550.52	2702.48	4567.52	848.38	4.72
DAX	15795.95	3843.74	8810.70	2971.96	12.5
FTSE-100	7748.76	3830.09	6198.92	848.49	5.21
FTSE-MIB	43755	12873.84	23544.06	7489.72	48.45
IBEX35	15890.5	6089.8	10047.59	1941.79	29.61
OMXS30	2351.73	617.376	1280.57	349.21	6.16
SMI	12056.86	4690.67	8008.49	1517.6	3.15
WIG20	3877.62	1372.47	2375.51	470.14	36.49

Table 2: Estimates of the differencing parameter. Daily data. Sample ending on 31/12/2019

Series (- 31/12/2019)	d (95% band)	Constant	A constant and a linear time trend
i) No autocorrelation			
AEX	1.00 (0.97, 1.03)	**0.99 (0.96, 1.01)**	0.99 (0.96, 1.01)
BIST100	1.00 (0.98, 1.03)	**1.01 (0.98, 1.04)**	1.01 (0.98, 1.04)
CAC40	1.00 (0.97, 1.03)	**0.95 (0.92, 0.97)**	0.95 (0.92, 0.97)
DAX	1.00 (0.97, 1.03)	0.98 (0.96, 1.01)	**0.98 (0.96, 1.01)**
FTSE-100	1.00 (0.97, 1.02)	**0.94 (0.92, 0.97)**	0.94 (0.92, 0.97)
FTSE-MIB	1.00 (0.97, 1.03)	**0.97 (0.94, 0.99)**	0.97 (0.94, 0.99)
IBEX35	1.00 (0.97, 1.03)	**0.97 (0.94, 1.00)**	0.97 (0.94, 1.00)
OMXS30	1.00 (0.97, 1.03)	0.94 (0.91, 0.97)	**0.94 (0.91, 0.97)**
SMI	1.00 (0.97, 1.03)	**0.98 (0.95, 1.01)**	0.98 (0.95, 1.01)
WIG20	1.00 (0.97, 1.02)	**1.00 (0.97, 1.02)**	1.00 (0.97, 1.02)
ii) With autocorrelation			
AEX	0.99 (0.95, 1.04)	**0.98 (0.94, 1.03)**	0.98 (0.94, 1.03)
BIST100	0.99 (0.95, 1.04)	**1.02 (0.98, 1.07)**	1.02 (0.98, 1.07)
CAC40	1.00 (0.96, 1.05)	**0.95 (0.92, 1.00)**	0.95 (0.92, 1.00)
DAX	1.00 (0.96, 1.04)	**0.98 (0.92, 1.03)**	0.98 (0.92, 1.03)
FTSE-100	0.99 (0.95, 1.03)	**0.94 (0.89, 0.98)**	0.94 (0.89, 0.98)
FTSE-MIB	1.00 (0.96, 1.05)	**1.00 (0.96, 1.05)**	1.00 (0.96, 1.05)
IBEX35	1.00 (0.95, 1.04)	**0.95 (0.91, 1.01)**	0.95 (0.91, 1.00)
OMXS30	1.00 (0.96, 1.04)	0.92 (0.88, 0.97)	**0.92 (0.88, 0.97)**
SMI	1.00 (0.96, 1.04)	0.89 (0.85, 0.93)	**0.89 (0.85, 0.93)**
WIG20	1.00 (0.96, 1.04)	**0.95 (0.91, 1.00)**	0.95 (0.91, 1.00)

Note: in parenthesis, the 95% confidence intervals of the non-rejection values of d. In bold the estimated values from the selected model specification.

Table 3: Estimated coefficients of the selected models. Daily data. Sample ending on 31/12/2019

Series (- 31/12/2019)	No terms	Constant (t-value)	Time trend (t-value)
i) No autocorrelation			
AEX	0.99 (0.96, 1.01)	5.865 (450.43)	---
BIST100	1.01 (0.98, 1.04)	5.523 (323.83)	---
CAC40	0.95 (0.92, 0.97)	8.259 (597.39)	---
DAX	0.98 (0.96, 1.01)	8.363 (618.66)	0.00036 (1.87)
FTSE-100	0.94 (0.92, 0.97)	8.406 (738.61)	---
FTSE-MIB	0.97 (0.94, 0.99)	10.344 (649.77)	---
IBEX35	0.97 (0.94, 1.00)	9.128 (611.29)	---
OMXS30	0.94 (0.91, 0.97)	6.624 (485.48)	0.00024 (1.70)
SMI	0.98 (0.95, 1.01)	8.661 (781.43)	---
WIG20	1.00 (0.97, 1.02)	7.578 (519.15)	---
ii) With autocorrelation			
AEX	0.98 (0.94, 1.03)	6.006 (429.48)	
BIST100	1.02 (0.98, 1.07)	5.980 (366.95)	---
CAC40	0.95 (0.92, 1.00)	8.383 (557.17)	---
DAX	0.98 (0.92, 1.03)	8.751 (591.81)	---
FTSE-100	0.94 (0.89, 0.98)	8.617 (692.25)	---
FTSE-MIB	1.00 (0.96, 1.05)	10.233 (577.55)	---
IBEX35	0.95 (0.91, 1.01)	9.348 (572.27)	---
OMXS30	0.92 (0.88, 0.97)	6.759 (478.56)	0.00033 (2.38)
SMI	0.89 (0.85, 0.93)	8.865 (772.16)	0.00018 (2.01)
WIG20	0.95 (0.91, 1.00)	7.829 (523.57)	---

Note: the values in column 2 refers are the estimates of d and their 95% confidence band. In parenthesis, in column 3 and 4, the t-values of the deterministic terms.

Table 4: Estimates of the differencing parameter. Weekly data. Sample ending on 31/12/2019

Series: (- 31/12/2019)	d (95% band)	Constant	A constant and a linear time trend
i) No autocorrelation			
AEX	1.00 (0.95, 1.05)	**0.99 (0.94, 1.04)**	0.99 (0.94, 1.04)
BIST100	1.01 (0.96, 1.06)	**1.00 (0.95, 1.05)**	1.00 (0.95, 1.05)
CAC40	1.00 (0.95, 1.05)	**0.93 (0.88, 0.98)**	0.93 (0.89, 0.98)
DAX	0.99 (0.95, 1.04)	0.94 (0.90, 1.00)	**0.95 (0.90, 1.00)**
FTSE-100	1.00 (0.95, 1.05)	**0.91 (0.86, 0.96)**	0.91 (0.86, 0.96)
FTSE-MIB	1.00 (0.95, 1.05)	**0.99 (0.94, 1.04)**	0.99 (0.94, 1.04)
IBEX35	1.00 (0.95, 1.05)	**0.93 (0.87, 0.98)**	0.93 (0.87, 0.98)
OMXS30	1.00 (0.95, 1.05)	**0.94 (0.89, 0.99)**	0.94 (0.89, 0.99)
SMI	1.00 (0.95, 1.05)	**0.90 (0.86, 0.94)**	0.90 (0.86, 0.94)
WIG20	1.00 (0.95, 1.05)	**1.01 (0.96, 1.07)**	1.01 (0.96, 1.07)
ii) With autocorrelation			
AEX	0.99 (0.92, 1.09)	**1.03 (0.95, 1.11)**	1.03 (0.95, 1.11)
BIST100	0.99 (0.92, 1.09)	**1.06 (0.97, 1.16)**	1.06 (0.97, 1.16)
CAC40	0.99 (0.92, 1.08)	**0.98 (0.91, 1.07)**	0.98 (0.91, 1.07)
DAX	0.98 (0.91, 1.08)	**0.99 (0.91, 1.09)**	0.99 (0.91, 1.09)
FTSE-100	0.99 (0.92, 1.09)	**0.93 (0.85, 1.03)**	0.93 (0.85, 1.03)
FTSE-MIB	0.99 (0.92, 1.09)	**1.02 (0.94, 1.13)**	1.02 (0.94, 1.13)
IBEX35	0.99 (0.92, 1.09)	**1.01 (0.93, 1.11)**	1.01 (0.93, 1.11)
OMXS30	0.99 (0.92, 1.09)	**1.00 (0.92, 1.08)**	1.00 (0.92, 1.08)
SMI	0.99 (0.92, 1.08)	**1.04 (0.97, 1.12)**	1.04 (0.97, 1.12)
WIG20	0.99 (0.92, 1.08)	**0.98 (0.91, 1.05)**	0.98 (0.91, 1.05)

Note: in parenthesis, the 95% confidence intervals of the non-rejection values of d. In bold the estimated values from the selected model specification.

Table 5: Estimated coefficients of the selected models. Weekly data. Sample ending on 31/12/2019

Series (- 31/12/2019)	No terms	Constant (t-value)	Time trend (t-value)
i) No autocorrelation			
AEX	0.99 (0.94, 1.04)	5.870 (211.11)	---
BIST100	1.00 (0.95, 1.05)	5.533 (154.69)	---
CAC40	0.93 (0.88, 0.98)	8.264 (293.54)	---
DAX	0.95 (0.90, 1.00)	8.368 (288.25)	0.0014 (1.87)
FTSE-100	0.91 (0.86, 0.96)	8.408 (364.35)	---
FTSE-MIB	0.99 (0.94, 1.04)	10.345 (320.98)	---
IBEX35	0.93 (0.87, 0.98)	9.121 (297.09)	---
OMXS30	0.94 (0.89, 0.99)	6.618 (242.73)	---
SMI	0.90 (0.86, 0.94)	8.657 (365.41)	---
WIG20	1.01 (0.96, 1.07)	7.551 (255.03)	---
ii) With autocorrelation			
AEX	1.03 (0.95, 1.11)	5.870 (211.31)	---
BIST100	1.06 (0.97, 1.16)	5.530 (155.24)	---
CAC40	0.98 (0.91, 1.07)	8.263 (297.25)	---
DAX	0.99 (0.91, 1.09)	8.370 (288.99)	---
FTSE-100	0.93 (0.85, 1.03)	8.488 (363.27)	---
FTSE-MIB	1.02 (0.94, 1.13)	10.345 (321.25)	---
IBEX35	1.01 (0.93, 1.11)	9.109 (297.57)	---
OMXS30	1.00 (0.92, 1.08)	6.617 (242.46)	---
SMI	1.04 (0.97, 1.12)	8.653 (365.91)	---
WIG20	0.98 (0.91, 1.05)	7.551 (255.31)	---

Note: the values in column 2 refers to the estimates of d and 95% confidence band. In parenthesis, in column 3 and 4, the t-values of the deterministic terms.

Table 6: Estimates of the differencing parameter. Monthly data. Sample ending on 31/12/2019

Series (- 31/12/2019)	d (95% band)	Constant	A constant and a linear time trend
i) No autocorrelation			
AEX	0.99 (0.91, 1.11)	**1.09 (0.99, 1.21)**	1.09 (0.99, 1.21)
BIST100	0.99 (0.89, 1.11)	**0.98 (0.87, 1.12)**	0.98 (0.87, 1.12)
CAC40	0.99 (0.90, 1.11)	**1.05 (0.95, 1.18)**	1.05 (0.95, 1.18)
DAX	0.98 (0.89, 1.11)	**1.04 (0.92, 1.18)**	1.04 (0.93, 1.18)
FTSE-100	0.98 (0.89, 1.11)	**0.97 (0.87, 1.09)**	0.97 (0.87, 1.09)
FTSE-MIB	0.99 (0.89, 1.11)	**1.05 (0.95, 1.17)**	1.05 (0.95, 1.17)
IBEX35	0.98 (0.89, 1.11)	**1.02 (0.92, 1.15)**	1.02 (0.92, 1.15)
OMXS30	0.99 (0.90, 1.11)	**1.05 (0.95, 1.17)**	1.05 (0.95, 1.17)
SMI	0.99 (0.89, 1.11)	**1.13 (1.04, 1.26)**	1.13 (1.04, 1.25)
WIG20	0.99 (0.90, 1.11)	**1.02 (0.93, 1.14)**	1.02 (0.93, 1.14)
ii) With autocorrelation			
AEX	0.97 (0.81, 1.16)	**1.04 (0.86, 1.29)**	1.04 (0.86, 1.29)
BIST100	0.94 (0.80, 1.16)	0.94 (0.70, 1.26)	**0.95 (0.73, 1.27)**
CAC40	0.96 (0.82, 1.18)	**0.94 (0.79, 1.15)**	0.94 (0.80, 1.15)
DAX	0.95 (0.81, 1.17)	0.83 (0.66, 1.06)	**0.85 (0.66, 1.06)**
FTSE-100	0.95 (0.81, 1.17)	**0.96 (0.79, 1.21)**	0.97 (0.78, 1.21)
FTSE-MIB	0.96 (0.82, 1.18)	**0.98 (0.81, 1.19)**	0.98 (0.82, 1.19)
IBEX35	0.95 (0.82, 1.17)	**0.93 (0.76, 1.17)**	0.93 (0.75, 1.17)
OMXS30	0.96 (0.80, 1.18)	**1.06 (0.84, 1.34)**	1.06 (0.86, 1.33)
SMI	0.96 (0.82, 1.18)	**1.09 (0.92, 1.32)**	1.09 (0.93, 1.32)
WIG20	0.94 (0.81, 1.15)	**1.04 (0.86, 1.28)**	1.05 (0.86, 1.30)

Note: in parenthesis, the 95% confidence intervals of the non-rejection values of d. In bold the estimated values from the selected model specification.

Table 7: Estimated coefficients of the selected models. Monthly data. Sample ending on 31/12/2019

Series (- 31/12/2019)	No terms	Constant (t-value)	Time trend (t-value)
i) No autocorrelation			
AEX	1.09 (0.99, 1.21)	5.883 (121.71)	---
BIST100	0.98 (0.87, 1.12)	5.611 (74.81)	---
CAC40	1.05 (0.95, 1.18)	8.269 (179.57)	---
DAX	1.04 (0.92, 1.18)	8.353 (165.09)	---
FTSE-100	0.97 (0.87, 1.09)	8.488 (229.90)	---
FTSE-MIB	1.05 (0.95, 1.17)	10.351 (176.77)	---
IBEX35	1.02 (0.92, 1.15)	9.128 (169.30)	---
OMXS30	1.05 (0.95, 1.17)	6.605 (143.74)	---
SMI	1.13 (1.04, 1.26)	8.654 (250.35)	---
WIG20	1.02 (0.93, 1.14)	7.540 (128.00)	---
ii) With autocorrelation			
AEX	1.04 (0.86, 1.29)	5.835 (121.27)	---
BIST100	0.95 (0.73, 1.27)	5.603 (74.60)	0.0078 (1.78)
CAC40	0.94 (0.79, 1.15)	8.276 (180.66)	---
DAX	0.85 (0.66, 1.06)	8.358 (169.56)	0.0061 (3.35)
FTSE-100	0.96 (0.79, 1.21)	8.488 (229.91)	---
FTSE-MIB	0.98 (0.81, 1.19)	10.352 (176.82)	---
IBEX35	0.93 (0.76, 1.17)	9.133 (170.41)	---
OMXS30	1.06 (0.84, 1.34)	6.604 (143.82)	---
SMI	1.09 (0.92, 1.32)	8.656 (248.58)	---
WIG20	1.04 (0.86, 1.28)	7.537 (128.19)	---

Note: the values in column 2 are the estimates of d and their 95% confidence bands. In parenthesis, in column 3 and 4, the t-values of the deterministic terms.

Table 8: Estimates of the differencing parameter. Daily data. Sample ending on 13 July 2021

Series (-13/07/2021)	d (95% band)	Constant	A constant and a linear time trend
i) No autocorrelation			
AEX	1.00 (0.97, 1.03)	**0.99 (0.97, 1.02)**	0.99 (0.97, 1.02)
BIST100	1.00 (0.97, 1.02)	**1.01 (0.99, 1.04)**	1.01 (0.99, 1.04)
CAC40	1.00 (0.97, 1.02)	**0.96 (0.94, 0.99)**	0.96 (0.93, 0.99)
DAX	1.00 (0.97, 1.03)	0.99 (0.97, 1.02)	**0.99 (0.97, 1.02)**
FTSE-100	1.00 (0.97, 1.02)	**0.95 (0.93, 0.98)**	0.95 (0.93, 0.98)
FTSE-MIB	1.00 (0.97, 1.03)	**0.97 (0.95, 1.00)**	0.97 (0.95, 1.00)
IBEX35	1.00 (0.97, 1.02)	**0.98 (0.95, 1.01)**	0.98 (0.95, 1.01)
OMXS30	1.00 (0.97, 1.02)	0.94 (0.92, 0.97)	**0.94 (0.92, 0.97)**
SMI	1.00 (0.97, 1.02)	**0.98 (0.95, 1.00)**	0.98 (0.95, 1.00)
WIG20	1.00 (0.97, 1.02)	**1.00 (0.98, 1.03)**	1.00 (0.98, 1.03)
ii) With autocorrelation			
AEX	0.99 (0.95, 1.04)	**0.98 (0.94, 1.03)**	0.98 (0.94, 1.03)
BIST100	0.99 (0.95, 1.04)	**1.02 (0.98, 1.07)**	1.02 (0.98, 1.07)
CAC40	1.00 (0.96, 1.05)	**0.95 (0.91, 1.00)**	0.95 (0.91, 1.00)
DAX	1.00 (0.96, 1.04)	**0.98 (0.94, 1.03)**	0.98 (0.94, 1.03)
FTSE-100	0.99 (0.95, 1.04)	**0.94 (0.89, 0.98)**	0.94 (0.89, 0.98)
FTSE-MIB	1.00 (0.96, 1.05)	**1.00 (0.96, 1.05)**	1.00 (0.96, 1.05)
IBEX35	1.00 (0.95, 1.05)	**0.95 (0.91, 1.00)**	0.95 (0.91, 1.00)
OMXS30	1.00 (0.96, 1.05)	0.92 (0.88, 0.97)	**0.92 (0.88, 0.97)**
SMI	1.00 (0.96, 1.05)	0.89 (0.85, 0.93)	**0.89 (0.85, 0.93)**
WIG20	1.00 (0.96, 1.05)	**0.95 (0.91, 1.00)**	0.95 (0.91, 1.00)

Note: in parenthesis, the 95% confidence intervals of the non-rejection values of d. In bold the estimated values from the selected model specification.

Table 9: Estimated coefficients of the selected models. Daily data. Sample ending on 13 July 2021

Series (-13/07/2021)	No terms	Constant (t-value)	Time trend (t-value)
i) No autocorrelation			
AEX	0.99 (0.97, 1.02)	5.865 (440.75)	---
BIST100	1.01 (0.99, 1.04)	5.523 (324.60)	---
CAC40	0.96 (0.94, 0.99)	8.259 (578.19)	---
DAX	0.99 (0.97, 1.02)	8.364 (595.96)	0.00037 (1.79)
FTSE-100	0.95 (0.93, 0.98)	8.486 (706.21)	---
FTSE-MIB	0.97 (0.95, 1.00)	10.344 (633.99)	---
IBEX35	0.98 (0.95, 1.01)	9.118 (593.12)	---
OMXS30	0.94 (0.92, 0.97)	6.624 (477.72)	0.00029 (2.09)
SMI	0.98 (0.95, 1.00)	8.661 (766.86)	---
WIG20	1.00 (0.98, 1.03)	7.578 (503.50)	---
ii) With autocorrelation			
AEX	0.98 (0.94, 1.03)	6.006 (429.48)	---
BIST100	1.02 (0.98, 1.07)	5.980 (366.95)	---
CAC40	0.95 (0.91, 1.00)	8.383 (557.17)	---
DAX	0.98 (0.94, 1.03)	8.751 (591.17)	---
FTSE-100	0.94 (0.89, 0.98)	8.617 (692.25)	---
FTSE-MIB	1.00 (0.96, 1.05)	10.238 (577.55)	---
IBEX35	0.95 (0.91, 1.00)	9.348 (572.27)	---
OMXS30	0.92 (0.88, 0.97)	6.759 (478.56)	0.00033 (2.38)
SMI	0.89 (0.85, 0.93)	8.865 (77.16)	0.00018 (2.01)
WIG20	0.95 (0.91, 1.00)	7.829 (523.37)	---

Note: the values in column 2 are the estimates of d and their 95% confidence bands. In parenthesis, in column 3 and 4, the t-values of the deterministic terms.

Table 10: Estimates of the differencing parameter. Weekly data. Sample ending on 13 July 2021

Series (-13/07/2021)	d (95% band)	Constant	A constant and a linear time trend
i) No autocorrelation			
AEX	1.00 (0.95, 1.05)	**0.99 (0.94, 1.04)**	0.99 (0.94, 1.04)
BIST100	1.00 (0.95, 1.05)	**1.00 (0.96, 1.05)**	1.00 (0.96, 1.05)
CAC40	1.00 (0.95, 1.05)	**0.94 (0.90, 0.99)**	0.94 (0.90, 0.99)
DAX	0.99 (0.95, 1.05)	0.95 (0.90, 1.00)	**0.95 (0.90, 1.00)**
FTSE-100	1.00 (0.95, 1.05)	**0.92 (0.88, 0.98)**	0.92 (0.88, 0.98)
FTSE-MIB	1.00 (0.95, 1.05)	**0.99 (0.95, 1.05)**	0.99 (0.95, 1.05)
IBEX35	0.99 (0.95, 1.05)	**0.95 (0.90, 1.00)**	0.95 (0.90, 1.00)
OMXS30	1.00 (0.95, 1.05)	0.94 (0.90, 1.00)	**0.95 (0.90, 1.00)**
SMI	1.00 (0.95, 1.05)	0.90 (0.86, 0.94)	**0.90 (0.86, 0.94)**
WIG20	1.00 (0.95, 1.05)	**1.00 (0.95, 1.05)**	1.00 (0.95, 1.05)
ii) With autocorrelation			
AEX	0.99 (0.93, 1.09)	**1.01 (0.94, 1.09)**	1.01 (0.94, 1.09)
BIST100	0.99 (0.93, 1.09)	**1.05 (0.96, 1.14)**	1.05 (0.96, 1.14)
CAC40	0.99 (0.92, 1.08)	**0.98 (0.90, 1.08)**	0.98 (0.90, 1.08)
DAX	0.98 (0.92, 1.07)	**0.98 (0.90, 1.09)**	0.98 (0.91, 1.09)
FTSE-100	0.99 (0.92, 1.08)	**0.95 (0.87, 1.05)**	0.96 (0.87, 1.05)
FTSE-MIB	0.99 (0.92, 1.08)	**1.01 (0.94, 1.11)**	1.01 (0.94, 1.11)
IBEX35	0.99 (0.92, 1.08)	**1.00 (0.92, 1.09)**	1.00 (0.92, 1.09)
OMXS30	0.99 (0.93, 1.08)	**0.99 (0.92, 1.07)**	0.99 (0.92, 1.07)
SMI	0.99 (0.92, 1.08)	**1.02 (0.95, 1.10)**	1.02 (0.95, 1.10)
WIG20	0.99 (0.93, 1.08)	**1.00 (0.93, 1.08)**	1.00 (0.93, 1.08)

Note: in parenthesis, the 95% confidence intervals of the non-rejection values of d. In bold the estimated values from the selected model specification.

Table 11: Estimated coefficients of the selected models. Weekly data. Sample ending on 13 July 2021

Series (-13/07/2021)	No terms	Constant (t-value)	Time trend (t-value)
i) No autocorrelation			
AEX	0.99 (0.94, 1.04)	5.870 (203.25)	---
BIST100	1.00 (0.96, 1.05)	5.533 (153.50)	---
CAC40	0.94 (0.90, 0.99)	8.264 (277.31)	---
DAX	0.95 (0.90, 1.00)	8.368 (272.56)	0.00148 (1.94)
FTSE-100	0.92 (0.88, 0.98)	8.488 (342.71)	---
FTSE-MIB	0.99 (0.95, 1.05)	10.345 (306.50)	---
IBEX35	0.95 (0.90, 1.00)	9.110 (281.41)	---
OMXS30	0.95 (0.90, 1.00)	6.616 (236.07)	0.00128 (1.84)
SMI	0.90 (0.86, 0.94)	8.655 (257.25)	0.00079 (1.78)
WIG20	1.00 (0.95, 1.05)	7.551 (239.92)	---
ii) With autocorrelation			
AEX	1.01 (0.94, 1.09)	5.869 (203.28)	---
BIST100	1.05 (0.96, 1.14)	5.530 (153.84)	---
CAC40	0.98 (0.90, 1.08)	8.263 (276.64)	---
DAX	0.98 (0.90, 1.09)	8.370 (272.42)	---
FTSE-100	0.95 (0.87, 1.05)	8.488 (341.19)	---
FTSE-MIB	1.01 (0.94, 1.11)	10.345 (306.52)	---
IBEX35	1.00 (0.92, 1.09)	9.109 (281.07)	---
OMXS30	0.99 (0.92, 1.07)	6.617 (235.94)	---
SMI	1.02 (0.95, 1.10)	8.654 (356.67)	---
WIG20	1.00 (0.93, 1.08)	7.551 (239.92)	---

Note: the values in column 2 are the estimates of d and their 95% confidence bands. In parenthesis, in column 3 and 4, the t-values of the deterministic terms.

Table 12: Estimates of the differencing parameter. Monthly data. Sample ending on 13 July 2021

Series (-13/07/2021)	d (95% band)	Constant	A constant and a linear time trend
i) No autocorrelation			
AEX	0.99 (0.91, 1.11)	**1.09 (1.00, 1.21)**	1.09 (1.00, 1.21)
BIST100	0.98 (0.89, 1.09)	0.97 (0.86, 1.11)	**0.97 (0.87, 1.11)**
CAC40	0.99 (0.90, 1.10)	**1.04 (0.95, 1.17)**	1.04 (0.95, 1.17)
DAX	0.99 (0.90, 1.10)	1.01 (0.90, 1.16)	**1.01 (0.91, 1.16)**
FTSE-100	0.99 (0.90, 1.10)	**0.99 (0.89, 1.11)**	0.99 (0.89, 1.11)
FTSE-MIB	0.99 (0.90, 1.10)	**1.02 (0.93, 1.14)**	1.02 (0.93, 1.14)
IBEX35	0.99 (0.90, 1.10)	**1.01 (0.91, 1.13)**	1.01 (0.91, 1.13)
OMXS30	0.99 (0.91, 1.11)	**1.04 (0.95, 1.15)**	1.04 (0.95, 1.15)
SMI	0.99 (0.90, 1.10)	**1.12 (1.02, 1.24)**	1.12 (1.02, 1.23)
WIG20	1.00 (0.91, 1.11)	**1.03 (0.94, 1.15)**	1.03 (0.94, 1.15)
ii) With autocorrelation			
AEX	0.98 (0.83, 1.15)	**1.01 (0.85, 1.23)**	1.01 (0.85, 1.23)
BIST100	0.94 (0.81, 1.12)	0.89 (0.65, 1.16)	**0.88 (0.67, 1.16)**
CAC40	0.97 (0.83, 1.17)	**0.91 (0.75, 1.12)**	0.92 (0.76, 1.12)
DAX	0.96 (0.83, 1.16)	0.80 (0.63, 1.02)	**0.80 (0.63, 1.02)**
FTSE-100	0.96 (0.82, 1.16)	**0.91 (0.73, 1.16)**	0.91 (0.73, 1.16)
FTSE-MIB	0.96 (0.83, 1.16)	**0.94 (0.79, 1.16)**	0.94 (0.79, 1.16)
IBEX35	0.94 (0.83, 1.15)	**0.89 (0.72, 1.12)**	0.89 (0.71, 1.12)
OMXS30	0.98 (0.83, 1.16)	**1.06 (0.89, 1.31)**	1.06 (0.87, 1.30)
SMI	0.97 (0.82, 1.17)	**1.06 (0.88, 1.30)**	1.06 (0.88, 1.29)
WIG20	0.97 (0.83, 1.17)	**1.00 (0.80, 1.22)**	1.00 (0.79, 1.22)

Note: in parenthesis, the 95% confidence intervals of the non-rejection values of d. In bold the estimated values from the selected model specification.

Table 13: Estimated coefficients of the selected models. Monthly data. Sample ending on 13 July 2021

Series (-13/07/2021)	No terms	Constant (t-value)	Time trend (t-value)
i) No autocorrelation			
AEX	1.09 (1.00, 1.21)	5.883 (120.86)	---
BIST100	0.97 (0.87, 1.11)	5.602 (74.06)	0.0080 (1.73)
CAC40	1.04 (0.95, 1.17)	8-270 (168.50)	---
DAX	1.01 (0.91, 1.16)	8.348 (157.08)	0.0066 (1.68)
FTSE-100	0.99 (0.89, 1.11)	8.587 (216.74)	---
FTSE-MIB	1.02 (0.93, 1.14)	10.352 (168.10)	---
IBEX35	1.01 (0.91, 1.13)	9.129 (158.50)	---
OMXS30	1.04 (0.95, 1.15)	6.605 (141.51)	---
SMI	1.12 (1.02, 1.24)	8.655 (246.68)	---
WIG20	1.03 (0.94, 1.15)	7.539 (122.31)	---
ii) With autocorrelation			
AEX	1.01 (0.85, 1.23)	5.886 (120.34)	---
BIST100	0.88 (0.67, 1.16)	5.604 (74.92)	0.889 (2.54)
CAC40	0.91 (0.75, 1.12)	8.277 (170.42)	---
DAX	0.80 (0.63, 1.02)	8.362 (165.24)	0.800 (4.39)
FTSE-100	0.91 (0.73, 1.16)	8.492 (218.81)	---
FTSE-MIB	0.94 (0.79, 1.16)	103.53 (168.98)	---
IBEX35	0.89 (0.72, 1.12)	9.135 (161.04)	---
OMXS30	1.06 (0.89, 1.31)	6.604 (141.69)	---
SMI	1.06 (0.88, 1.30)	8.657 (245.12)	---
WIG20	1.00 (0.80, 1.22)	7.542 (122.34)	---

Note: the values in column 2 are the estimates of d and their 95% confidence bands. In parenthesis, in column 3 and 4, the t-values of the deterministic terms.

Table 14: Summary of the Results. Comparison of the values of d in a model with white noise errors

Series	Daily		Weekly		Monthly	
	Pre-covid	Covid	Pre-covid	Covid	Pre-covid	Covid
AEX	0.99 (0.96, 1.01)	0.99 (0.97, 1.02)	0.99 (0.94, 1.04)	0.99 (0.94, 1.04)	1.09 (0.99, 1.21)	1.09 (1.00, 1.21)
BIST100	1.01 (0.98, 1.04)	1.01 (0.99, 1.04)	1.00 (0.95, 1.05)	1.00 (0.96, 1.05)	0.98 (0.87, 1.12)	0.97 (0.87, 1.11)
CAC40	**0.95 (0.92, 0.97)**	**0.96 (0.94, 0.99)**	**0.93 (0.88, 0.98)**	**0.94 (0.90, 0.99)**	1.05 (0.95, 1.18)	1.04 (0.95, 1.17)
DAX	0.98 (0.96, 1.01)	0.99 (0.97, 1.02)	0.95 (0.90, 1.00)	0.95 (0.90, 1.00)	1.04 (0.92, 1.18)	1.01 (0.91, 1.16)
FTSE-100	**0.94 (0.92, 0.97)**	**0.95 (0.93, 0.98)**	**0.91 (0.86, 0.96)**	**0.92 (0.88, 0.98)**	0.97 (0.87, 1.09)	0.99 (0.89, 1.11)
FTSE-MIB	**0.97 (0.94, 0.99)**	0.97 (0.95, 1.00)	0.99 (0.94, 1.04)	0.99 (0.95, 1.05)	1.05 (0.95, 1.17)	1.02 (0.93, 1.14)
IBEX35	0.97 (0.94, 1.00)	0.98 (0.95, 1.01)	**0.93 (0.87, 0.98)**	0.95 (0.90, 1.00)	1.02 (0.92, 1.15)	1.01 (0.91, 1.13)
OMXS30	**0.94 (0.91, 0.97)**	**0.94 (0.92, 0.97)**	**0.94 (0.89, 0.99)**	0.95 (0.90, 1.00)	1.05 (0.95, 1.17)	1.04 (0.95, 1.15)
SMI	0.98 (0.95, 1.01)	0.98 (0.95, 1.00)	**0.90 (0.86, 0.94)**	**0.90 (0.86, 0.94)**	1.13 (1.04, 1.26)	1.12 (1.02, 1.24)
WIG20	1.00 (0.97, 1.02)	1.00 (0.98, 1.03)	1.01 (0.96, 1.07)	1.00 (0.95, 1.05)	1.02 (0.93, 1.14)	1.03 (0.94, 1.15)

Note: in bold, cases of mean reversion. Red (blue) indicates an increase (decrease) in the estimated degree of persistence when using the full sample.

Table 15: Summary of the Results. Comparison of the values of d in a model with autocorrelated errors

Series	Daily		Weekly		Monthly	
	Pre-covid	Covid	Pre-covid	Covid	Pre-covid	Covid
AEX	0.98 (0.94, 1.03)	0.98 (0.94, 1.03)	1.03 (0.95, 1.11)	1.01 (0.94, 1.09)	1.04 (0.86, 1.29)	1.01 (0.85, 1.23)
BIST100	1.02 (0.98, 1.07)	1.02 (0.98, 1.07)	1.06 (0.97, 1.16)	1.05 (0.96, 1.14)	0.95 (0.73, 1.27)	0.88 (0.67, 1.16)
CAC40	0.95 (0.92, 1.00)	0.95 (0.91, 1.00)	0.98 (0.91, 1.07)	0.98 (0.90, 1.08)	0.94 (0.79, 1.15)	0.91 (0.75, 1.12)
DAX	0.98 (0.92, 1.03)	0.98 (0.94, 1.03)	0.99 (0.91, 1.09)	0.98 (0.90, 1.09)	0.85 (0.66, 1.06)	0.80 (0.63, 1.02)
FTSE-100	**0.94 (0.89, 0.98)**	**0.94 (0.89, 0.98)**	0.93 (0.85, 1.03)	0.95 (0.87, 1.05)	0.96 (0.79, 1.21)	0.91 (0.73, 1.16)
FTSE-MIB	1.00 (0.96, 1.05)	1.00 (0.96, 1.05)	1.02 (0.94, 1.13)	1.01 (0.94, 1.11)	0.98 (0.81, 1.19)	0.94 (0.79, 1.16)
IBEX35	0.95 (0.91, 1.01)	0.95 (0.91, 1.00)	1.01 (0.93, 1.11)	1.00 (0.92, 1.09)	0.93 (0.76, 1.17)	0.89 (0.72, 1.12)
OMXS30	**0.92 (0.88, 0.97)**	**0.92 (0.88, 0.97)**	1.00 (0.92, 1.08)	0.99 (0.92, 1.07)	1.06 (0.84, 1.34)	1.06 (0.89, 1.31)
SMI	**0.89 (0.85, 0.93)**	**0.89 (0.85, 0.93)**	1.04 (0.97, 1.12)	1.02 (0.95, 1.10)	1.09 (0.92, 1.32)	1.06 (0.88, 1.30)
WIG20	0.95 (0.91, 1.00)	0.95 (0.91, 1.00)	0.98 (0.91, 1.05)	1.00 (0.93, 1.08)	1.04 (0.86, 1.28)	1.00 (0.80, 1.22)

Note: in bold, cases of mean reversion. Red (blue) indicates an increase (decrease) in the estimated degree of persistence when using the full sample.

Table 16: Estimates of d on the squared returns series

Series	Daily		Weekly		Monthly	
	Pre-covid	Covid	Pre-covid	Covid	Pre-covid	Covid
AEX	0.22 (0.20, 0.23)	0.20 (0.18, 0.22)	0.11 (0.07, 0.15)	0.11 (0.07, 0.15)	0.25 (0.15, 0.38)	0.24 (0.14, 0.36)
BIST100	0.13 (0.11, 0.15)	0.12 (0.10, 0.14)	0.18 (0.14, 0.23)	0.18 (0.14, 0.23)	0.08 (0.02, 0.16)	0.06 (0.00, 0.15)
CAC40	0.18 (0.16, 0.20)	0.17 (0.16, 0.19)	0.14 (0.10, 0.18)	0.13 (0.09, 0.17)	0.15 (0.08, 0.25)	0.08 (0.00, 0.19)
DAX	0.17 (0.15, 0.18)	0.15 (0.13, 0.17)	0.18 (0.14, 0.22)	0.16 (0.12, 0.20)	0.09 (0.01, 0.18)	0.09 (0.01, 0.20)
FTSE-100	0.21 (0.19, 0.23)	0.20 (0.18, 0.22)	0.12 (0.09, 0.16)	0.12 (0.08, 0.16)	0.21 (0.13, 0.31)	0.20 (0.10, 0.33)
FTSE-MIB	0.14 (0.13, 0.17)	0.14 (0.12, 0.16)	0.16 (0.12, 0.20)	0.13 (0.09, 0.17)	0.11 (0.04, 0.21)	0.03 (-0.05, 0.13)
IBEX35	0.15 (0.13, 0.17)	0.15 (0.13, 0.18)	0.16 (0.12, 0.21)	0.14 (0.10, 0.18)	0.12 (0.04, 0.23)	0.02 (-0.06, 0.13)
OMXS30	0.17 (0.15, 0.19)	0.16 (0.15, 0.18)	0.14 (0.10, 0.18)	0.13 (0.10, 0.17)	0.09 (0.02, 0.19)	0.08 (0.01, 0.18)
SMI	0.31 (0.29, 0.33)	0.27 (0.25, 0.30)	0.20 (0.15, 0.25)	0.19 (0.14, 0.24)	0.14 (0.06, 0.25)	0.12 (0.04, 0.23)
WIG20	0.13 (0.11, 0.15)	0.12 (0.09, 0.16)	0.27 (0.22, 0.33)	0.18 (0.14, 0.23)	0.12 (0.05, 0.22)	0.12 (0.04, 0.23)

Note: in bold, cases of mean reversion. Red (blue) indicates an increase (decrease) in the estimated degree of persistence when using the full sample.