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Short-term exit from pandemic restrictions: did European countries' speed converge?

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Abstract

Concurrently with the end of the second wave of the coronavirus pandemic, European democracies have progressively relaxed the restrictions on social mobility following the decrease in disease indexes. Did the exit speed from pandemic restrictions substantially differ across governments? This paper intends to analyze this intriguing issue, by investigating whether any convergent response of EU countries did emerge. To this aim, a convergence log-t test is performed on a panel of 25 European countries. Five different clubs emerge which suggest spatially distributed trends for relaxing stringency measures, suggesting the absence of a common European strategy to escape from the first wave pandemic. Additionally, we provide evidence of the role that economic, political, and health variables exert on these different exit strategies.

JEL classification: C10, I18, F69

Keywords: Covid-19, Club convergence, Political fragmentation, Europe

1. Introduction

The Covid 19 pandemic challenged both health systems and governments to provide adequate policy responses addressing the supranational nature of the pandemic (Beaussier and Cabane, 2020; Schomaker et al. 2021). The leadership of public organizations, performance management, evidence-based policy-making, and institutions were some of the most important factors influencing governments' responses to the pandemic (Boin et al., 2020; George et al., 2020; Kettl, 2020; Van Dooren & Noordegraaf, 2020; Weible et al., 2020; Yang, 2020). Yet, although the response strategies adopted by countries around the world showed some interesting similarities (Griffin et al., 2021; Misra et al., 2022), they sensibly diverged in the speed of response. Chen et al. (2021) investigate institutional and cultural determinants of government responsiveness to the pandemic. They find that stronger collectivistic

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culture and trust in government are dominating factors influencing the timing of government actions.

There is also a growing literature on the moral limits and implications of Covid policies. More specifically, several papers explore the trade-offs between the limitation of individual freedom implied by fighting the pandemic and the effectiveness of policies. A special issue of the European Journal of Law and Economics prefaced by Marciano and Ramello in 2022 presents a few interesting papers where these trade-offs are analysed from different points of view. A normative profile, giving large weight to freedom is offered by Bjørnskov and Voigt (2022). They conclude that many governments have (mis-)used the pandemic as a pretext to curtail media freedom. Geloso et al. (2022) present a very interesting and comprehensive analysis, based also on historical cases of epidemics, of the multiple trade-offs that exist in the choice of health policies. The paper is framed in a utilitarian analytical context that necessitates a long-term exploration of the evolution of epidemics to have a full cost-benefit account of the alternatives. This is not the case with the present Covid-19 epidemic.

Another strand of the literature suggests that authoritarian regimes perform faster and more efficiently than democracies by neglecting time-demanding coordination (Alon et al. 2020; Stavasage, 2020; Tafuro Ambrosetti and De Maio, 2021). Using a simulation approach, Biondo et al. (2021) show that despite in the long-term all regimes collapsed to the same stringency measures, full democracies take longer. Policy responses in democracies are also analysed by Cepaluni et al. (2021). They demonstrate the cost of democratic decisions during a pandemic in terms of deaths, specifically, countries with more democratic political institutions experienced deaths on a larger per capita scale than less democratic countries.

The timing of responses was important in guaranteeing adequate control of the pandemic. Countries that lagged in introducing restriction measures registered a more dramatic increase in the contagions than those that were quicker to impose restrictions (Makki et al., 2020). Kahn (2020) suggests that the delay in the adoption of stringent measures was due to the economic trade-off between an immediate negative impact on GDP and a substantially larger one in the mid-term. This justification is discredited by those who argue that delaying measures to preserve the economy would result in a more persistent recession when infection jumps (Eichenbaum et al., 2020).

However, while most of the existing literature has focused on the speed of countries to adopt stringency measures, the urgency with which countries exit from restrictions rules has been partially neglected. By contrast, researchers have focused on the consequences of delaying the adoption of exit strategies (Griffin et al., 2020; EU, 2020), ignoring whether common patterns emerged across countries. This paper intends at contributing to this intriguing issue, by investigating whether any convergence emerges in the relaxation of restrictions to the Covid-19 pandemic across European countries. More specifically, the idea is to test whether any convergence pattern emerges and to detect potential clustering clubs across European countries. Spatial and cultural proximity between these countries supports the idea of some commonality of policy decision-making in the area of Covid-19 management that could be captured by the emergence of clubs.

To this end, we use a convergence log-t test on a panel of 25 European countries between the pandemic peak of the first wave (which necessarily differs across countries) and 90 days afterward to test whether the exit speed is not equal for all countries in the sample. Several papers have applied this technique. For instance, Xu et al. (2021) investigate club convergence of Covid-19 vaccination rates across the OECD countries, indicating a significant convergence in a sub-group of the 30 OECD countries that composed the sample. Analogously, Skare and Soriano (2021) use the convergence club analysis to investigate convergence across countries and different service industry sectors, i.e. accommodation and food services, information and communication, transportation, and storage services. The same club convergence methodology is used by Lau et al. (2022) to support evidence of overall economic globalization convergence in both high and low-developing countries.

Results do not support the existence of a common path, but rather the existence of five separate groups of countries converging to their steady-state path. Additionally, to shed some light on the potential drivers of these club memberships, we also test for the role that health, economic, and political factors, exert in determining the probability of belonging to a specific club.

The rest of the paper is organized as follows. Section 2 describes the club convergence method, while Section 3 displays the main results. In Section 4 the

probability of belonging to one of the five convergence clubs is investigated by performing an ordered probit regression. Section 5 concludes.

2. Methodology

To investigate the club convergence across European countries in relaxing restrictions to the Covid-19 pandemic, we apply the log t-test as developed by Phillips and Sul (2007). Such a methodology can detect club convergence clusters, each of which converges to different points of equilibria or steady states, without any particular assumptions concerning trend stationarity or stochastic non-stationarity (Okazaki and Sakai, 2020).

Let y_{it} denote the log of stringency index of country $i=1,\ldots,N$ at time $t=1,\ldots,T$. Strictly following Phillips and Sul (2007), y_{it} is assumed to follow a nonlinear time-varying common-factor model representation, such that:

$$y_{it} = \delta_{it}\mu_t$$

where μ_t is a single common component and δ_{it} is a time-varying idiosyncratic element, which captures the deviation of country i from the common path δ defined by μ_t.

Since the number of parameters is greater than the number of observations, Phillips and Sul eliminate the common component μ_t through rescaling by panel average:

$$h_{it} = \frac{y_{it}}{1/N\sum_{i=1}^{N} y_{it}} = \frac{\delta_{it}}{1/N\sum_{i=1}^{N} \delta_{it}}$$

where the panel average $N^{-1}\sum_{i=1}^{N}\delta_{it}$ and its limit as $N \to \infty$ both exist and differ from 0.

To test for convergence, Phillips and Sul assume that δ_{it} has the following transition form:

$$\delta_{it} = \delta_i + \sigma_i \xi_{it} L(t)^{-1} t^{-\alpha}$$

where δ_i is fixed, $\sigma_i > 0$ is an idiosyncratic scale parameter, ξ_{it} is iid (0, 1) with finite fourth moment over i, L(t) is a slowly varying function and α is the decay rate. Since all countries will converge to the same steady-state if $\delta_{i,t+k} = \delta \; for \; all \; i$, which holds if and only if $\delta_i = \delta$ for all i and $\alpha \geq 0$, the null hypothesis of convergence is as follows:

$$H_0: \delta_i = \delta \; for \; all \; i \; and \; \alpha \geq 0$$

And the alternative:

$$H_A: \delta_i = \delta \; for \; all \; i \; and \; \alpha < 0$$

These hypotheses can be tested using the following 'log t' regression model (Phillips and Sul, 2007):

$$log(H_1/H_t) - 2logL(y) = \hat{c} + \hat{b}logt + u_t$$

where $log(H_1/H_t)$ is the cross-sectional mean square transition differential and measures the distance of the panel from the common limit; and $t = [rT], [rT] + 1, \dots, T, with \; r > 0.$

3. European club convergence

In response to the pandemic, countries adopted different restrictive measures to reduce Covid-19 transmission. These strategies contributed to mitigating the transmission, but, at the same time, caused significant social and economic costs. The pandemic had deep adverse effects at the global level, affecting many economies and leading to a severe recession (Gunay and Can, 2022). Countries adopted different strategies for a safe exit from the lockdown (Misra et al., 2022), where the exit speed was likely to be a strategic issue to contrast the economic consequences of Covid-19. This paper expressly focuses on these short-term exit speed from Covid-19 restrictions after the pandemic's first wave.

The paper investigates whether any convergence emerges across European countries in relaxing Covid-19 restriction rules. We use a sample of 25 European countries, as illustrated in Figure 1.

FIGURE 1. Countries in the sample

The measure of individual restrictions we adopt is the stringency index, edited by the Blavatnik School of Government at the University of Oxford. It is based on nine response indicators including school closures, workplace closures, travel bans, etc., rescaled to a value from 0 to 100.[1] Following Alvarez et al. (2021), we limit the analysis to 90 days after the country stringency index joined its maximum value (T=0), which was expected to capture the overwhelming impact of the pandemic on governments' choices. As affirmed by Alvarez et al. (2021), "…*the optimal policy prescribes a severe lockdown beginning two weeks after the outbreak…(which) is gradually withdrawn after 3 months."* [2]

Table 1 displays results from the convergence log-t test applied to the stringency index smoothed through the Hodrick-Prescott filter to remove any cyclical or seasonal component in the series. The test applied to a sample of 25 European countries rejects the hypothesis of overall convergence at the 1 percent statistical significance.

[1] For more details see https://www.bsg.ox.ac.uk/coronavirus-information

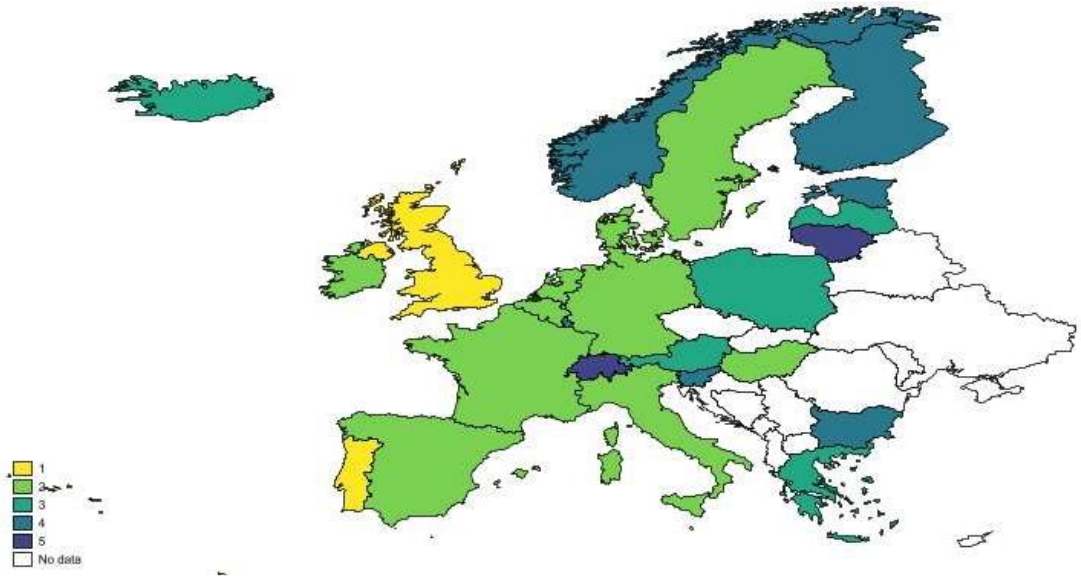
[2] Robustness checks have been performed for 80 and 100 days. Results substantially do not change, confirming the goodness of the selected period.

TABLE 1. Convergence club classification

Club	Coefficient	t-Stat	Club Members
1	1.616	10.263	Portugal, United Kingdom
2	-.101	-.822	Belgium, Denmark, France, Germany, Hungary, Ireland, Italy, Netherlands, Spain, Sweden
3	.644	5.953	Austria, Greece, Iceland, Latvia, Poland
4	-0117	1.322	Bulgaria, Estonia, Finland, Luxembourg, Norway, Slovenia
5	-1.453	-.762	Lithuania, Switzerland

Five clubs are identified: the first group contains 2 countries; 10 countries comprise the second group; the third includes 5 countries; the fourth is composed of 5 countries; finally, only 2 countries compose the fifth group. The exact composition of each group is displayed in Figure 2.

FIGURE 2. Convergence clubs



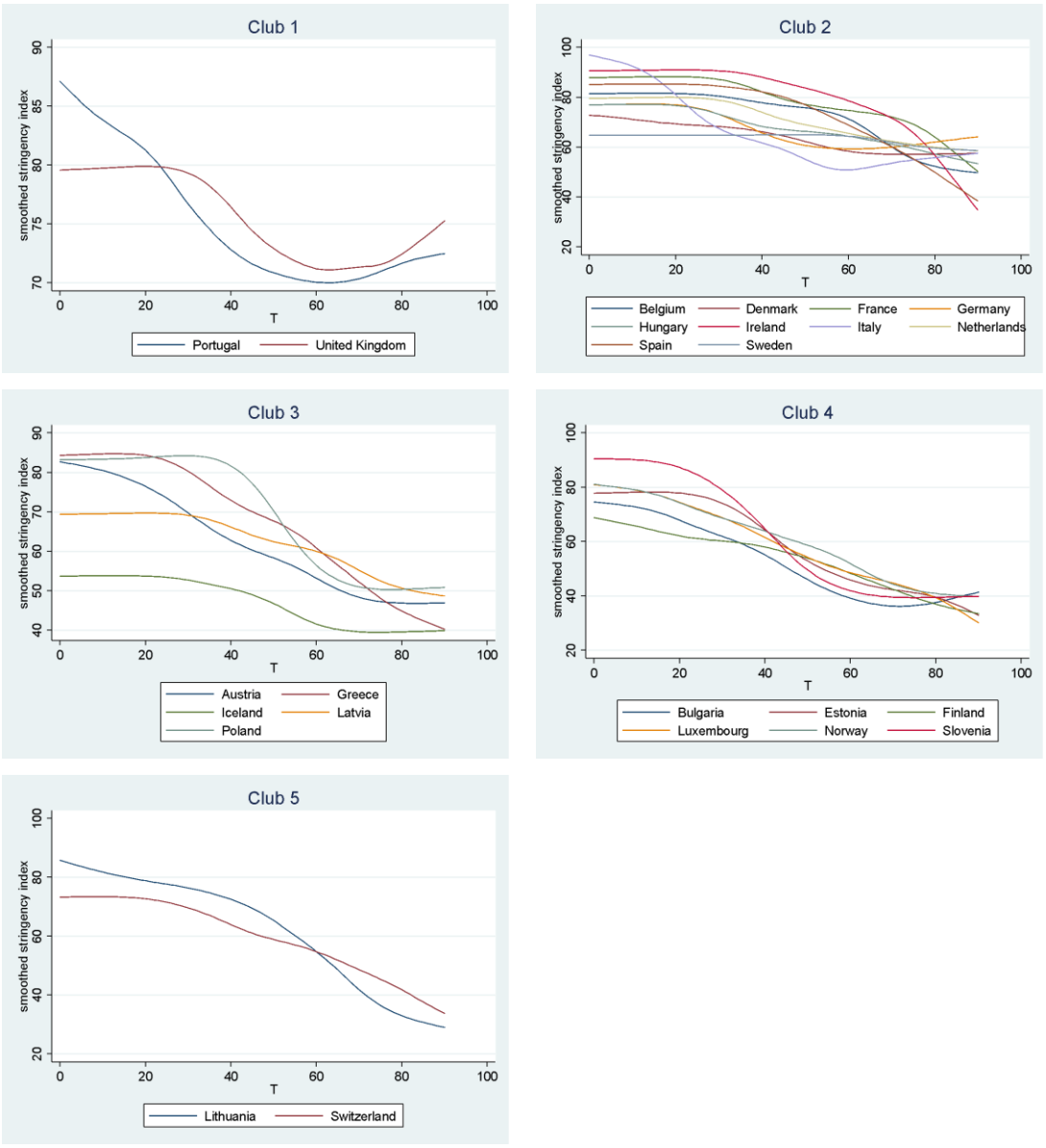
The result of the log t-test for club 1 is 1.616 with a statistical value t of 10.263 so that the null hypothesis of convergence is not rejected and Portugal and the United Kingdom converge according to the log t-test. Analogously, the log t-tests provide evidence of convergence of the other subgroups. Subgroup 2, whose t-test is -0.101 with a statistical value t of -0.822, is composed of Belgium, Denmark, France, Germany, Hungary, Ireland, Italy, Netherlands, Spain, and Sweden. A similar result emerges in the case of subgroup 3, whose value of the log t-test is 0.644 with a statistical value of t of 5.953. This is the reason why the null hypothesis of convergence of Austria, Greece, Iceland, Latvia, and Poland, is also not rejected. The club members of subgroup 4 are Bulgaria, Estonia, Finland, Luxembourg, Norway, and Slovenia, which result in a value of -0.012 for the log t-test and a statistical value t of 1.322. As of subgroup 5, the log t-test is equal to -1.453 and its statistical t equals -0.762, the reason why Lithuania and Switzerland converge.

As a whole, Club 1 contains countries with slower lockdown exit strategies than countries in Club 2 to Club 5. However, convergence among the members of Club 1 is proceeding faster than the convergence rates in the other clubs – as indicated by the higher estimate of the coefficient and illustrated in Figure 3 – suggesting a clear tendency of countries of Club 1 to be heartily disinclined to relax restrictions.

Figure 3 shows the convergence behaviours, which differ in terms of internal convergence and transition paths. Initial conditions also differ for countries within clubs, significantly affecting the transition paths.

From visual inspection, it is difficult to infer any general conclusion about the possible spatial distribution of clubs across Europe. Hence, although there is no definite reason to why countries differed in exit strategies, the choice to relax stringency measures could reflect the specific development (and consequences) of the pandemic within the countries. Although the time series started from the highest peak of the stringency index registered in each country in the first pandemic wave, differences in how countries reached their peak (in terms of death tolls or health systems' stress) may have influenced the adoption of different precautionary approaches. Additionally, how countries took account of the economic crisis could have suggested different speeds to relax the stringency measures.

FIGURE 3. Stringent index club convergence (Hodrick-Prescott filter)



4. Club membership

In this section, we attempt to shed some light on the potential drivers of club membership. We perform an ordered probit regression to explain club membership of the five convergence clubs, denoted by the ordinal variable *c* (McKelvey and Zavoina (1975)). Due to the small numbers of countries in club 1 and club 5, we summed them up respectively to club 2 and club 4, so that the ordinal variable assumes values from 2 to 4. Following Bartkowska and Riedl (2012), we can model the dependent variable as an ordinal variable since convergent clubs could be ranked according to the steady-state stringency index of countries in the respective club. However, since the differences between steady-state levels across clubs are unknown, we assume that the club membership is related to a continuous latent variable, y*, such that:

$$y_i^* = X_i\beta + \varepsilon_i$$

where X are the explanatory variables in the initial period, and ε are the errors with a mean of zero and a variance of $\pi^2/3$.

Due to the few observations, it is not possible to include a large set of variables. Hence, in what follows we adopt a parsimonious specification of the regression model to maintain enough degrees of freedom. To capture the importance of the economic stress on the decision to relax stringency measures, we use the 2020 first-quarter gdp deviation over the 2019 value, in percentage points, *gdp*. The deviation from the previous year's quarter is consistent with the hypothesis that governments were likely to worry more about the decrease in gdp than about its absolute value.

To check whether the political framework is impacting exit strategies (Ruisch et al., 2021; Turska-Kawa and Pilch, 2022), we enclose the degree of government fragmentation, *herfgov*, a continuous variable representing the Herfindahl index of the ruling government coalition. This variable is obtained by summing up the squared seat shares of all the parties in the coalition, thus it equals one in the case of single-party governments, and decreases towards zero as the number of parties in the coalition increases. Whether low or highly fragmented government coalitions are more likely to swiftly exit from the pandemic is not clear beforehand. The coordination costs of a coalition might be likely to increase with its heterogeneity, but at the same time we

cannot ex-ante exclude idiosyncratic effects. Finally, we need to take into account the pandemic seriousness and hospital capacity which are likely to affect exit strategies. We use the number of Covid-19 patients in hospitals per million inhabitants at time 0, *hosp*. [3] It is likely that the impact of Covid-19 on hospital-acquired pressure led to different lockdown exit timing.

Since y_i^* is not observable, we compute the probabilities of belonging to a specific club, c, given the set of covariates X by performing a maximum likelihood technique. Table 2 displays the marginal effects on the probabilities of each variable evaluated at its mean and the mean of all other explanatory variables.

TABLE 2. Marginal effects on probabilities

Variable	Club	dy/dx	Std. Err.
gdp	2	-.418***	.125
	3	-.153	.101
	4	.570***	.172
herfgov	2	.868***	.202
	3	.317**	.162
	4	-1.185***	.154
hosp	2	.001***	.0003
	3	.001	.0004
	4	-.002***	.0006

*Marginal effects are computed at the mean of all variables. The Brant Test ($\chi_3^2 = 0.69$) indicates that the parallel regression assumption in not violated.+,**,***. Significance at .10, .05, .01 respectively*

In Table 2 the coefficients show the change in the probability of belonging to a specific club given a small change in the covariates. The Brant Test ($\chi_3^2 = 0.69$) indicates that the parallel regression assumption is not violated so that the dataset satisfies the proportional odds assumption.

The change in gdp over the previous year plays a role in explaining the probability of club membership in clubs 2 and 4, while it is not statistically significant in the case of

[3] We are acknowledged that additional potential covariates could be used to capture the complexity of the 'heath care structure' and its effect on the exit strategies (demographic ageing; health care system; etc.), but we are forced to adopt a parsimonious specification due to the small dimension of the sample.

club 3. Specifically, an increase in it decreases the probability of belonging to the high-stringency club, the opposite occurs in the case of the other club. Given the existence of a trade-off between the negative short-term economic effects of lockdown and the detrimental effects on the economy of letting infections grow uncontrolled (IMF, 2020), our results seem to show the importance of economic effects on the decision to quickly exit from stringency measures. The influence of political fragmentation on the Covid-19 crisis and related policy responses seems to suggest the importance of external political costs of composite government coalitions. The higher the level of political fragmentation, the lower the probability of belonging to club 2 (slow exit from stringency measures). Hence, rather than supporting the coordination problem hypothesis (Alon et al. 2020; Stavasage, 2020; Tafuro Ambrosetti and De Maio, 2021), our findings seem to suggest the importance of the potential hostility of opposing parties' advocates on speeding up measures to restart 'normal life'. Finally, our results show that larger hospitalizations raise the probability of belonging to club 2, but the opposite holds in the case of club 4. The coefficient associated with club 3 is not statistically significant. This is consistent with the hypothesis that underreacting to the first signs of the pandemic turned out to spread the disease and required severe lockdowns afterward, forcing exit strategies to be delayed to deal with the severity of the pandemic.

5. Conclusions

This paper investigates whether any convergence occurred across European countries in the speed to exit from pandemic restrictions. To this end, a convergence log-t test has been performed on a panel of 25 European countries. The results show that five clubs emerge. However, the visual inspection does not allow us to infer any general conclusion about possible determinants of the spatial distribution of clubs across Europe. Hence, we perform an ordered regression model to capture potential drivers of club membership. The economy, political fragmentation, and the severity of the health crisis exert a role in determining the probability of belonging to a specific club.

By definition the emergence of clubs signals the absence of a common European strategy to exit from the first wave pandemic. Early management of the pandemic was

quite different across European countries (Forman and Mossialos, 2021), and these differences still persisted when countries started to relax stringency measures. Our results show the existence of clusters of countries adopting common exit strategies. The trade-off between the urgency to recover economy (*gdp* in our model) and the health emergency (*hosp* in our model) is someway 'balanced' by the political framework. Ceteris paribus, where political fragmentation is high it is likely that the potential hostility of opposite parties accelerates the exit strategies. In a world characterized by a growing political fragmentation (Snower and Boswort, 2021), club strategies to quick exit from outbreaks are likely to persist in the future.

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