THE IMPACT OF COVID – 19 ON THE STOCKS ' YIELD FROM THE PHARMACEUTICAL SECTOR

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Abstract

In a period marked by negative effects of the sanitary-economic crisis at the level of worldwide economy, analysis upon the impact on sectors that compose the system displays a special emphasis, the pharmaceutical one being of great importance, generating revenues of over 1,25B USD in 2019, field which was in a continuous ascension until the start of the COVID-19 pandemic. The article aims to show the impact of factors such as the economic-political uncertainty through the implemented policies (EPU), the new COVID-19 cases recorded, as well as the Dow Jones index (DIJIA) upon daily yield recorded by the pharmaceutical field, a key field for a healthy society in a continuous development.

Keywords: yield, stock exchange rate, COVID- 19, pharmaceutical sector.

JEL Classification: A10, C10, F30, F37.

Introduction

It is known that the triggering of the COVID-19 pandemic severely affected fields such as the auto industry and a part of the processing industry, wood processing industry and furniture fabrication, metallurgical industry, the manufacturing of rubber products and plastics (masses), car fabrication and equipments, the textile industry, the field of services such as air transportation, hotels and restaurants, real estate transactions, travel agencies, events and cultural activities. Since the pharmaceutical sector can play an essential role during the outbreak of diseases caused by COVID-19, I considered an analysis of this sector necessary. Thereby, research starts with a review of the main results on the researched theme, followed by the application of a balanced panel with daily observations, where the dependent variable includes daily yield of the top 10 firms in the pharmaceutical sector at a global level, judged on the criterion of stock market capitalization.

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1. Literature review

To try and understand the effect of COVID-19 upon the volatility of the market, researchers Seungho, B. and co.(2020) include a study realized by Baker and co.(2020) which identifies the actual pandemic as having the biggest impact on the stock market volatility in the history of pandemics. Also, Zaremba and co. (2020) examines if the government's answer to COVID-19 constricts the volatility of the international stock market. They observe a significant growth of the stock market volatility in countries where the governments adopt strict measures to reduce the spread of the virus, as well as informing campaigns and cancellation of public events. Furthermore, Onali (2020) identified a significant growth in the volatility in stock market from USA, as an answer to the reports of new cases and death reported to COVID-19 in more countries.

Recently, the coronavirus outbreak lead to an unparalleled volatility on the American financial markets. For example, the volatility index CBOE(VIX) grew by 80% on 16 March 2020, overcoming the previous record registered during the 2008 crisis. The S&P500 and Nasdaq indexes decreased by 12% on 16 March 2020. In the same day, Wall Street Journal reported that Dew Jones Industrial Average(DIJA) decreased by over 12% "marking the second worst day in its 124 years history". However, these arguments do not fully explain the marked volatility. Due to this, researchers (Seungho and others, 2020) examined if the impact of the dissemination of information regarding COVID-19 varies based on the industry.

The result obtained suggests that the industries most affected by the negative shocks of the aggregate demand, like petrol and gas, restaurants, hotels and accommodations, presented the biggest raise in risks, while industries like food production and alcoholic beverages are constant or the growth in demand presented smaller changes. Also, results show that changes in volatility are more sensitive to COVID-19 news compared to economic indexes. Furthermore, negative news referring to the number of COVID-19 deaths have a 2 times greater impact than the positive ones. The reaction of the market to COVID-19 news presents a positive-negative asymmetry.

Cepoi, C.-O. (2020) analyzed the reaction of the capital market to news about coronavirus in the top 6 most affected states by number of reported cases. Thereby, he came to the conclusion that fake news have a non-linear negative impact upon the lower quantile and the middle one within the distribution of their rentability.

Samadi and others (2020) studied, first of all, the state of market that interacted with each other in short, medium and long-term and, moreover, which market was the most important. Understanding the correlations between different market is important, but the examination of other factors is as important, such as the one of a sanction or of a pandemic outbreak, upon these correlations. As a consequence, upon calculating the correlation of each set of variables, the impact of imposing new sanctions in 2018 and the emergence of the COVID-19 outbreak upon the correlation of the variables on the financial markets from Iran were studied using segmented regression. Moreover, researchers (Samadi et al.) observed that financial markets have been influenced not only by external shocks (sanctions and COVID-19 outbreak), but also by the measures taken by the political decisions factor. Actually, results of the analysis show that these correlations of the financial markets from Iran have been directly influenced by political

and economic decisions. They also observed that with the outbreak the later intensification of the recession, the currency exchange, gold, stock markets recorded a slight decrease of the quotations, but after that they followed an ascendent tendency. Fluctuation of exchange markets and gold before February 2020 were not greatly different compared to those after February 2020; all these considered, the global stock market index reached its highest point since the establishment of the Teheran Stock Market and recorded a significant growth. In contrast to the exchange markets, the stock markets have fluctuated, in some cases, influenced the volatility of oil price, result which is in concordance with what Huang et al.. (2018) and Gourene and Mendy (2018) reported. This correlation between the capital market and the oil market could be supported by numerous companies listed at Teheran Stock Market which are oriented towards exports. Following the application of the Wavelet analysis, they obtained a positive correlation between the global price of gold and the exchange rate on long, medium and short term, during the sanctions and the COVID-19 outbreak. This result comes in line with the one conducted by Nademi and Khochiany (2017), who found, as well, a strong correlation between the exchange rate and gold price from 2012 to 2013 (during the sanctions period), the exchange rate being considered the principal variable.
Results of the study mention that the evolution of oil prices in the Iranian economy wouldn't be usable as a viable indicator to identify the most profitable market for investing. They also showed that the price of oil had a weaker correlation with the other 3 markets, to be more precise, exchange rate, currency market and gold price. Therefore, the oil market can be an alternative to investors adequate to risk. Meanwhile the petrol market can act as a financing source for the government during the sanctions period. This explains, probably, the recent decision of the Iranian government to use petrol in order to finance their fiscal deficit. Between the exchange rate and the price of gold they identified that the price of gold as a principle variable during a global pandemic and as a result it influenced the risk of portfolio investors. This result is important from the perspective of elaborating national/global policies.

Ashraf (2020) examined the reaction of stock markets to three types of governmental actions, including social distancing measure, entertainment and answer to health and support packages for revenues. On one side, for direct effects, social distancing measures could have a negative effect upon the stock markets yield by affecting negatively the economic activities. On the other hand, the intervention of the government, by granting support packages of the revenues or by announcing data, will lead, probably, to a positive reaction of the market, by increasing the confidence of investors and reducing the economic adverse effects caused by the COVID-19 pandemic. Governmental actions, like strict social distancing measure, quarantine, could reduce the rate of infection. According to emerging literature which reports that stock markets reacted to the COVID-19 pandemic in a strong negative way (Al-Awadhi et al, 2020; Ashraf, 2020; Baker et al., 2020; Ramelli and Wagner, 2020; Zhang et al., 2020), the researcher states that if strict governmental actions reduce the intensity of local outbreaks, they will lead to a negative reaction of the market to the growth of confirmed COVID-19 cases. Social distancing saves lives on one hand, while imposing high costs for the society due to reduced economic activity. Therefore, governmental actions, like blocking and restricting travelling, meant to ensure social distancing, are expected to

have direct effects, as well as indirect upon the actions yield. For the direct effort, such policies have a negative economic impact by closing workplaces, schools, desks and factories. For instance, Sauvagnat et al. (2020) estimate a decrease of 3% in employment and a 1,87% decrease in market value of companies only in April 2020, due to the 10% raise in work restrictions at a state level in USA, Greenstone and Nigam (2020) estimate the fact that moderate social distancing in USA, starting with March 2020, would save 1,7 million lives until 1 October 2020. Benefits of social distancing are channelled, mainly, in reducing the number of new COVID-19 cases.

A series of recent studies show that stock market reacted to the growth of confirmed COVID-19 cases with negative yield (Al-Awadhi et al.., 2020; Ashraf, 2020). So, isolation and health policies result into benefits, in regard to the lower number of infections and deaths. The lower mortality rate offers to the economy enormous benefits materialized in a higher number of saved lives (Greenstone and Nigam, 2020; Thunstrom et al., 2020). The conclusion of researchers is that social distancing has a positive economic impact by reducing the intensity of COVID-19 outbreaks.

According to World Health Organization (WHO,2020), the coronavirus outbreak which appeared at the end of December 2019 in China, spread in 216 countries, zones or territories and reached over 8,3 million cases with over 450.000 deaths in the whole world, on 19 June 2020. Taking into account the transmission on a large a scale and the continuity of the new coronavirus on a global level, WHO officially declared the pandemic on 11 March 2020.

Researchers Ramelli and Wagner (2020) observed three stages starting right from the start of January 2020 until the end of March 2020, which ended right before the announcement of Federal Reserve (FED) "whatever it takes". They studied the impact of COVID-19 on the stock markets emerging in the period 10 March- 30 April 2020. The obtained results show that the negative impact of the pandemic upon the emerging stock markets, gradually decreased and started to decrease until the half of April 2020. In terms of regional classification, the impact of the outbreak was the greatest in the big emerging states of Asia, while emerging markets in Europe recorded their lowest level.

Moreover, recent studies suggest that the fact that the risk level of all the countries increased in March 2020, when COVID-19 spread in over 200 destinations (Gormsen and Koijen, 2020; Zhang et al.., 2020).

Researcher Topcu (2020) used the IPS test proposed by Im et al. (2003) for investigating the unit root. He observed that the most affected emerging markets by COVID-19 are the Asian markets, followed by the South American ones and the Middle East. This observation is at least surprising, taking into account that the lowest performance of the stock market is the one registered in South America due to its strict dependency on the global economic activity. On the other hand, Central and East Europe, where the first measures were taken quickly, are considered to be the least affected regions. He came to the conclusion that the impact is proven to be insignificant. Overall, the results show that the negative impact of the outbreak on emerging stock markets has declined gradually and started to decline by mid-April 2020. When regions

are considered, Asian emerging markets are most severely affected over time while the impact is modest in Europe.

Researcher Chang (2020) used, in his analysis, the daily closing prices of the energy sectors in the US, Asia and the Eurozone for the observation period March 24, 2000 - May 29, 2020. The data set covers 104 companies in the renewable energy sector and 112 fossil fuel energy companies It found significant evidence of herd behaviour in the negative days of the oil market in all energy sectors except the fossil fuel energy sector in the Asian market. Empirical results suggest that investors are more likely to exhibit herd behaviour during extremely low oil price returns, especially in the fossil fuel energy sectors. As the economic costs of developing renewable energy are still considerable, the renewable energy market appears to be vulnerable to any shocks to the fossil fuel energy market.

Christie and Huang (1995) observe the behavior of herds in capital markets, which they use to explain stock volatility. However, there has been a lack of research into growth behavior in renewable energy markets. Muth (1961) proposed rational expectations and assumed that investors are rational and do not make systematic mistakes. Fama (1970) proposed the efficient market hypothesis and assumed that prices will fully reflect all information available in financial markets when they work efficiently. Both economists and practitioners are interested in the herd effect on stock prices as investors in the financial field, knowing that markets are influenced by others in decision-making.

As developed by Gamba-Santamaria et al. (2017) and Antonakakis et al. (2019), Corbet et al. (2020) based on the framework of Diebold and Yilmaz (2012) and build volatility dispersion indexes, using a DCC-GARCH t-Copula framework to model multivariate volatility relationships between stocks, commodities (agriculture, energy and precious metals), foreign exchange and the cryptocurrency market. It is important to understand whether the coronavirus index acted as a true financial barometer on the intensity of cases in these outbreaks. Financial crises have also been found to show a number of notable similarities during their development and expansion into traditional financial assets (Reinhart and Rogoff (2008); Diebold and Yilmaz (2012)), especially in the presence of substantial and certain significant volatilities.

Furthermore, the coronavirus is also a transmitter of volatility to Bitcoin. The use of digital currency as a means of short-term value storage will be supported by opportunistic governments cause substantial alarm among many regulators and policy makers who are aware of the wide range and frequency of complex and relatively simplistic frauds.

Kumar et al. (2020) focused on the impact of COVID-19 in relation to the Indian stock market and stock performance. They analyze the correlation between stock performance and capital market growth, using pre- and post-COVID-19 stock market data, by comparing data from 20 January 2020 to 20 June 2020. The analysis concludes that integrated policies should be developed in line with the financial impact generated by the COVID-19 epidemic.

Brodzicki (2020) points out that global volatility has increased significantly due to COVID-19 and may negatively affect the prospects for a global recovery. Mao and Zhang (2020) emphasize that the immediate impact of the COVID-19 outbreak on

the global economy is inevitable. However, this COVID-19 outbreak does not adversely affect all business opportunities. The life insurance sector is a new business opportunity, as people's awareness of life and health has been increased, stimulating the demand for life and health insurance. The outbreak of COVID-19 is now the most significant black swan of 2020 (Brodzicki, 2020). The capital of a life insurer and its board of directors is valued at the level of the guaranteed optimal rate in order to maximize equity. From a technical point of view, the volatility of the underlying assets of the insurer reveals information about equity risk in assessing the call option, which Li et al. (2020) focused on using a geometric Brownian motion. Thus, they noted that the severity of COVID-19 has a significant impact on the investment risk, the insurer must now provide a return to a higher risk base. One way in which the insurer can try to increase its overall profitability is to increase the value of life insurance policies at an increased optimal guarantee rate, in order to manage the active-passive balance. However, the protection of policyholders increases the cost of the optimal interest margin of the insurer, due to an increase in the guarantee rate. Hence, strict capital regulation helps to protect policyholders, but harms the insurer's interest margin, contributing to the stability of insurance during the COVID-19 outbreak.

Consequently, the result obtained by researchers is - largely - compatible with the argument of Mao and Zhang (2020): the life insurance sector is one of the new opportunities in the COVID-19 period, and the usefulness of the board is increased. The result thus contributes to the stability of insurance, because the insurer's capital serves directly for the protection of policyholders (Insurance Europe, 2014). As reported by Daniels Trading (2020), the COVID-19 outbreak has been a major factor in recent market volatility.

Goodell and Huynh (2020) evaluated 46 industries, including US financial services, for abnormal returns. However, unlike their study, which uses industry-level data, the evaluation of researchers Mirza and Naqvi (2020) is based on firm-level data. Therefore, the consolidation of the sample was in six broader sectors, similar to those in the research of De Vito and Gómez (2020). Through their analysis, Goodell and Huynh (2020) aimed to investigate the impact of COVID-19 on the solvency profile of firms in EU Member States, introducing multiple stress scenarios for rated non-financial firms and reporting a gradual increase in the probability of default, an increase in debt repayment and a decrease in coverage. With constrained supply chains, uncertain production and limited demand, the revenues and cash flows of EU firms are under immense pressure. Their study has multiple contributions, being the first to assess the impact of COVID-19 on the solvency of European companies. In this paper, solvency stress testing was performed at the level of non-financial firms in 15 EU Member States that reported over 10,000 cases of coronavirus. The results obtained suggest a reduction in the stock market and an increase in the probability of default. At the same time, the results obtained by them suggest that, if the decrease in income is up to 25%, a tax deferral is optimal. However, if revenues decrease by 50% –75%, hybrid debt and equity support will be needed to support the solvency profile at pre-COVID-19.

There are also researchers who apply the neutral risk assessment methodology to assess the capital of a life insurer. Their purpose is to develop a payment option model to assess the insurer's equity. The characteristics of the model include the credit

risk capped by the credit institution, the premature risk structure captured by the barrier call, the imperfect competition reflected by the optimal determination of the guaranteed rate and the COVID-19 outbreak expressed by the structural rupture of volatility.

According to the report of the International Association of Insurance Supervisors (2018), US life insurance and risk coverage have increased substantially. Thus, the down payment and outgoing call option model can be used to largely explain the impact of COVID-19. Additionally, it is observed that financial authorities tend to adapt normally in order to prevent a financial crisis by regulating capital. Their results show that the insurer's activity is negatively related to the severe effect of the COVID-19 epidemic on its loan company, but positively related to the strict regulation of capital. The protection of policyholders is adversely correlated with the severe impact of the COVID-19 outbreak on the credit institution and the insurer's coverage.

2. Databases and research methodology

To study the impact of new daily cases of COVID-19 on stock yields, we used a balanced panel with daily data over a period of 198 working days, from January 3, 2020 to September 30, 2020. The dependent variable includes daily yields of the first 10 companies, according to the stock market capitalization criterion in the pharmaceutical sector, a significant part of them being listed on the NYSE. A more detailed description is presented in Table no. 1.

Tabel no. 1. Variable description

Variable	Description	Source
Stock Yield	Daily yields are defined by: , $R_{i,t} = \frac{P_{i,t}}{P_{i,t-1}} - 1$ where $P_{i,t}$ represents the stock price in day t	Thomson Reuters
DJIA Index	Dow Jones Index	Thomson Reuters
EPU Index	Measures the political-economic uncertainty	https://www.policyuncertainty.com/index.html
Number of new cases	Number of new reported cases of COVID-19. In the base of the regression analisys I used daily percentage change.	World Health Organization https://www.who.int/

Source: author contribution, based on existant data in the mentioned sources

In order to have a comprehensive vision regarding the evolution of the course of the selected companies, considering the economic uncertainty related to the implemented policies, we capture in Figure no. 1 the evolution of the EPU index versus

the closing rate. It can be seen that all companies had a drastic decline in March 2020 and April 2020, which was followed by a strong recovery compared to the DJIA Index (see Figure no. 2). Specifically, for most of them, current rates are higher compared to the previous COVID-19 pandemic period. This indicates that investors have been confident about the potential of these companies to develop new technologies to combat COVID-19 and the effects to follow.

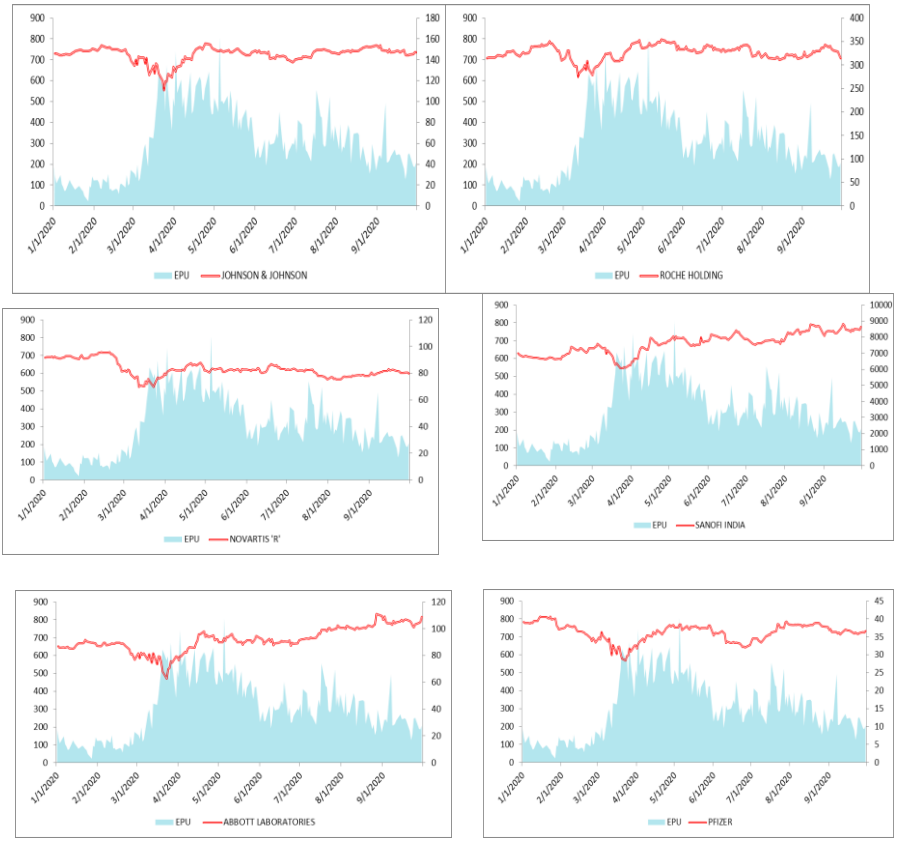

Figure nr. 1. Pharmaceutical Companies – the evolution of stock prices versus the evolution of EPU during 2 January 2020 – 30 September 2020
Source: author's contribution

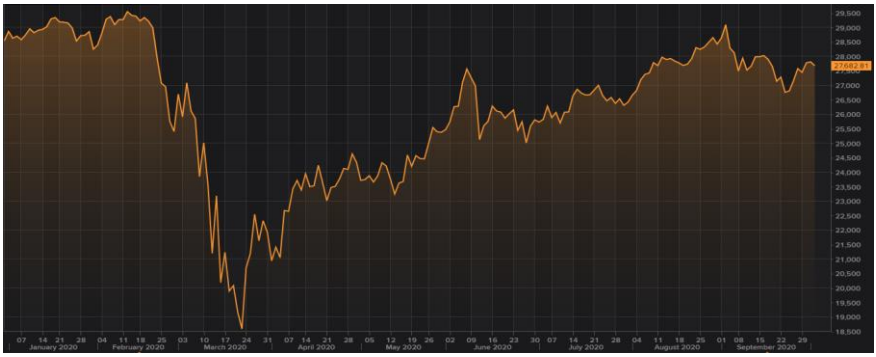

Figure no. 2. DJIA evolution
Source: Thomson Reuters Refinitiv

3. Results and discussions

Given the financial disturbances generated by COVID-19, the most appropriate method for estimating the impact of political and economic uncertainty and the number of cases on the profitability of pharmaceutical companies is the quantum regression developed by Koenker (2004). Compared to OLS, quantile regression is a more relevant

tool for the situation of more pronounced extreme values, as was the case of the turmoil caused by COVID-19.

Tabel no. 2. Regression results based on quantile

Quantile	the 10th	the 25th	the 50th	the 75th	the 90th
Intercept	-0.0200***	-0.0097***	-0.0003	0.0089***	0.0211***
Yields with lag	0.0913***	-0.0008	-0.0101	-0.0340	-0.0569
Dow Jones Index	0.4688***	0.4331***	0.4238***	0.4440***	0.4593***
EPU Index	-0.0083***	-0.0028*	-0.0017	-0.0012	0.0028
No. of new cases	-0.0076*	-0.0047***	-0.0045*	-0.0034***	-0.0057***
Pseudo R-squared (Pseudo R^2)	21.56%	16.28%	13.14%	13.58%	15.67%
Observations	1880	1880	1880	1880	1880

Statistical signification at trust levels is 1, 5 and 10 indicated using ***, ** and *.

Souce: author's calculations.

It can be seen that the yields of pharmaceutical companies have a strong autoregressive behavior when the market is declining (10th quantile). The dynamics of pharmaceutical companies follow to a large extent the dynamics of the DJIA index, regardless of whether the market is declining, stagnating or rising. The increase in economic uncertainty (EPU) amplifies the deterioration of stock quotes (the coefficients are significant only in areas where returns are negative (the 10th and 25th quantiles). The increase in the number of reported cases of COVID-19 leads to a deterioration of the stock quotes of companies in the pharmaceutical industry, regardless of whether the market is declining, stagnating or growing. It can be seen that the model is more efficient when it is desired to explain the lower areas of the profitability distribution (10th quantile). It can be observed that the model is more efficient when it comes to explaining the lower areas of the distribution of profitability (10th quantile).

The results estimated and presented above have very important political implications for people trading on the capital market, for regulators, as well as for government policy makers. Also, government officials need to be very careful about how they communicate news regarding the economic future, as increasing uncertainty will spread directly to declining stock prices. People who trade on the stock exchange on pharmaceutical companies should not be alarmed due to the fact that in times of health crisis, the price trend of these companies will be upward after absorbing the shock.

Conclusions

The results of the study indicate two very important aspects. Firstly, the stock price of pharmaceutical companies has seen a much earlier and more pronounced return compared to other sectors. This illustrates that investors have been confident about the potential of these companies to develop new technologies to combat COVID-19 and its potential effects. Secondly, the increase in economic uncertainty (EPU)) amplifies the deterioration of stock prices, while the increase in the reported number of cases of COVID-19 leads to the degradation of pharmaceutical companies stock prices, regardless of whether the market is declining, stagnant or rising. By the same token, it should be borne in mind that the integration and support of research and development activities would play an important role in the long-term support of companies in the pharmaceutical sector. The role of the state in the period immediately following the COVID-19 pandemic will be a decisive one, both for the pharmaceutical sector and for the other sectors, rendering vital the implementation of a package of measures meant to support the industries. These measures must have immediate effects on both the EPU index and the returns on shares. Moreover, the state can invest in these pharmaceutical companies, because in times of health crisis the growth trend is visible compared to other sectors.

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