

INFLATION VS INFLATION EXPECTATIONS IN 2020–2021 – THE IMPACT OF THE COVID-19 PANDEMIC

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ABSTRACT

Aim: During the COVID-19 pandemic in 2020–2021, there was a significant increase in inflation and inflation expectations due to the government policies of the United States (US) and the European Union (EU), including the Euro Area (EA). With that being said, the evolving situation within these three political-economic areas highlights the importance of understanding the relationship between inflation and inflation expectations, as perceived by both consumers and professional forecasters. The purpose of this article is to analyze the changes in these phenomena, using descriptive survey data analysis and a hybrid model of inflation expectations. **Methods:** The research methods refer to the descriptive survey data analysis that provides evidence on the long-term courses of inflation in the US, the EU, and the EA, as well as the consumers' and professional forecasters' inflation expectations within the period 1999–2019. A hybrid model of inflation expectations has been used to estimate this data during the period of 2021. The study correlates and compares the findings of both types of research. **Results:** The results demonstrate that during the pandemic, the evidence supports the occurrence of periodic medium-high inflation in the studied economic areas. Inflation expectations in the US and the EU were periodically weakly anchored, although they were stabilized in the EA. **Conclusions:** The research, conducted by analyzing price trends and their expected trajectories over various timeframes, revealed consistent patterns. These patterns highlighted similarities in anticipated price changes before and during the pandemic.

Key words: inflation, inflation expectations, pandemic, long-term, short-term

JEL codes: B30, C00, E31

INTRODUCTION

At the end of the second decade of the 21st century, economists characterized it as an era of global stability, marked by an average inflation rate of approximately 3.36% [IMF 2021] from 1970 to 2020. The outbreak of the coronavirus pandemic destroyed this stability. The evolving state of play in the United States (US), the European Union (EU), and the Euro

Area (EA) during the pandemic highlights the prominence of understanding the interrelation between inflation and inflation expectations observed by both consumers and professional forecasters. Accordingly, three basic research questions should be answered: 1) how quickly inflation will proceed, taking into account the governments' decisions in 2020–2021 to stimulate the observed economies; 2) how these pro-inflationary measures condition inflation expectations formulated

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by consumers' and professional forecasters; 3) what are the impacts of these appearances considered in maintaining the anchored inflation expectations? The main contribution of this analysis is to adopt an approach that aims to verify the thesis that governmental justifications for stimulating the economy to fight against the disease have impacted changes in the pace of inflation and inflation expectations.

The paper is organized into four sections. The first section examines inflation theories in relation to the studies of inflation expectations. The second part delves into the relationship between inflation speed and inflation expectations, covering the long-term period from 1999 to 2019 in the US, the EU, and the EA, along with the COVID-19 pandemic period from 2020 to 2021. The third chapter presents a hybrid model of inflation expectations while demonstrating the outcomes of the distinctive situations in selected political areas. The fourth section outlines modeled inflation expectations in the US, the EU, and the EA. The article concludes with findings.

RELATED LITERATURE

One of the first debates on macroeconomic inflation theories in the context of inflation expectations' formation brought agreement that "future behavior is dominant in the analysis of expected inflation dynamics", since it has an impact on decisions that determine the current inflation [Muth 1961, Gertler et al. 2001, D'Acunto et al. 2020, Rogoff 2021]. This is how John M. Keynes [1936] defined this phenomenon, also indicating that expectations – divided into short- and long-term – impact the amount of output, employment, and savings [Łyziak 2011]. Nevertheless, research notes many approaches, including the monetarist [Phelps 1967, Friedman 1968], which suggested that inflation expectations could be modeled adaptively (Adaptive Expectations – AE). Indeed, the concept of rational expectations (RE) was proposed by the Nobel Prize recipient Robert B. Lucas [1972], who was followed by the New Keynesians [Evans and Honkapohja 2002], demonstrating that expectations should be perceived as based on optimality (BO). In turn, Charles F. Man-

ski [2004] found out that forecasters are forced to form probabilistic expectations (PE), while – according to Christopher A. Sims [2008] – expectations should be perceived as a research view with limited rationality (LR). Built at the end of the second decade of the 21st century, the diagnostic expectations concept (DE) says that each forecaster reacts only according to their own assessments [Bordalo et al. 2019]. Recent years have brought the idea of Richard Curtin of tailored expectations (TE). It has been proved that consumers should be treated equally with businesses and the government as having an independent and visible impact on the macro-economy, while observing a close correspondence between aggregate trends in consumer expectations and such trends in national statistics [Curtin 2019, Curtin 2022]. Still, contemporary economists are inclined to the thesis that none of the proposed options fully meet the criterion of expecting the rate of future inflation. One might note (a little jokingly) that the options developed inform us about expectations from the past and not about the expectations to come. At the same time, it has been proven that economic and financial decisions of households and firms – such as consumption, investment, price, and wage setting – formed as inflation expectations' surveys can have an impact on actual inflation [Łyziak et al. 2018, Rogoff 2021, Schnabel 2021, Schafer 2022]. So, it can be said that these expectations shaped in the aftermath of the pandemic are both rational (LR) but also adaptive to some extent (AE). In short, fiscal policy is not responsible for inflation, though it occurs if the government increases their debts [Friedman 1968, Cochrane 2021], contrary to people's expectations. Furthermore, it can also be said that assessments of inflation sources – and consequently, its definition – can be modified as a result of COVID-19 [Banaszyk et al. 2021, Rudd 2021].

INFLATION AND ITS EXPECTATIONS. A LONG-TERM PERSPECTIVE

This section provides evidence on the long-term courses of inflation in the US, the EU, and the EA, as well as the inflation expectations of consumers' and professional forecasters' within the period 1999–2019.

Government decisions to stimulate fiscal policy were applied in the examined areas respectively in the years 1999–2001 (dot-com bubble [Galbraith and Hale 2004]), in 2005–2012 (consisting of important stages such as the pre-crisis 2005–2007, crisis 2008, post-crisis 2009–2012), and in 2016–2018 (doubts about governments); (Fig. 1).

As a result, an increase in the inflation rate has been observed both in the US, the EU, and in the EA. Indeed, the status quo does not change even if we assume that the Eurostat data for 2022 taken for the study pertain to the level of inflation in the EU and the EA [ECB 2022 and Eurostat 2022a]. If we simultaneously consider the results of consumer surveys on inflation expectations in the mentioned areas (Fig. 2–4) and combine them with inflation levels from 1999 to

2019, one can notice that lower inflation levels were associated with lower indicators of these expectations, and vice versa. Higher inflation was accompanied by increased indicators of expectations in the analyzed areas. To sum up, public expectations became unstable as governments intensified their fiscal involvement [MICH 2021 and Yellen 2016].

As we can see in Fig. 3, surveys collected by the European Commission since May 2003 on consumers' aggregated inflation perceptions (CES) show that inflation expectations in the EU exhibited instability during and after macroeconomic shocks, specifically during the 2008 financial crisis and throughout the period from 2010 to 2012 [ECB 2013]. The course of expectations in the Euro Area (Fig. 4) looked different than in the EU during the comparable re-

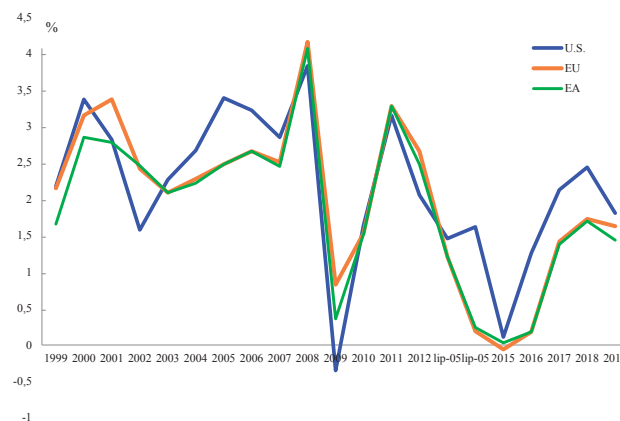


Fig. 1. Inflation in the US, the EU, and the EA in 1999–2019 [%]

Source: own elaboration based on OECD, Eurostat, and FRED data.

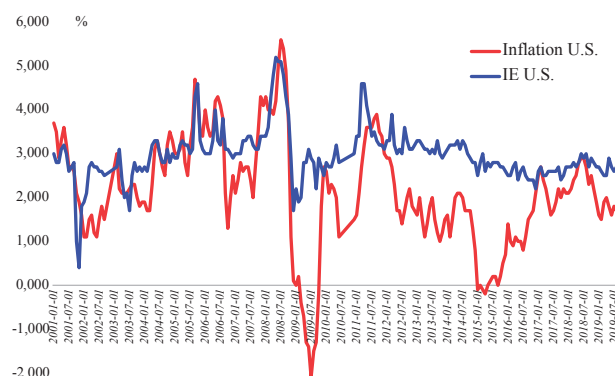


Fig. 2. Inflation and inflation expectations in the US (monthly) in 2001–2019 [%]

Source: own elaboration based on MICH and BLS.

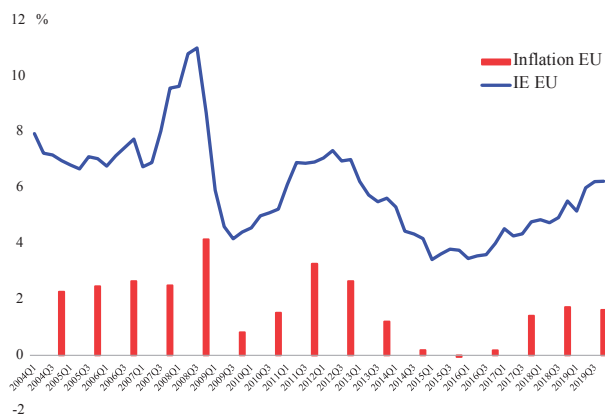


Fig 3. Inflation (p.a.) and inflation expectations (quarterly) in the EU in 2004–2019 [%]
Source: own elaboration based on European Commission and Eurostat.

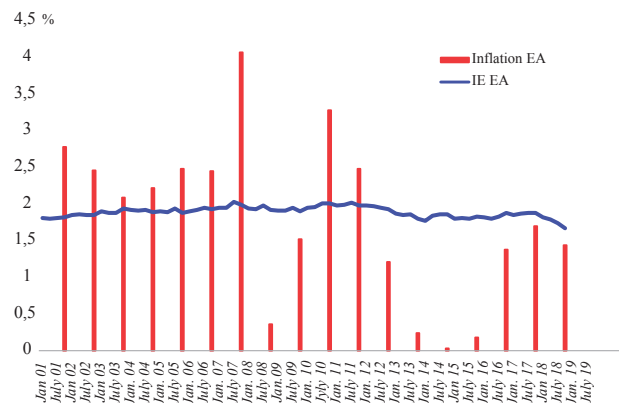


Fig 4. Inflation (p.a.) and inflation expectations (quarterly) in the EA in 2001–2019 [%]
Source: own elaboration based on EBC data.

search period (2001–2019). Above all, appropriate research began to be carried out soon after the creation of EA, i.e., in this case, from 2001. Moreover, it was found that the expectations have been anchored since its start around the ECB’s inflation target [ECB 2011].

INSTITUTIONAL INFLATION, ITS EXPECTATIONS, AND THE PANDEMIC

Given the above insights, I will therefore expand on the long-term inflationary phenomena referred to as episodes that occurred during the pandemic. Accordingly, one should ask: what factors conditioned the price dynamics in the US, the EU, and the EA,

and what was the course of both inflation and inflation expectations in the analyzed period?

I’ll first delineate the influence of the respective governments, which undertook their policies in two stages in response to the pandemic, also in accordance with the suggestions of international institutions [OECD/European Union 2020, IMF 2022]. The early stage essentially started in mid-March 2020. It was at this time that governments introduced lockdowns in response to the course and consequences of the medical crisis. However, these decisions soon resulted in a halt in production, subsequently leading to a growth in unemployment, a drop in consumption, an increase in consumers’ savings (as a percentage of their income), and a decline in businesses’ investment

commitments, while generating a rapid increase in prices starting from April 2020. The restrictions on the functioning of economies during the second period of the pandemic, throughout 2021, caused a number of shortages in specific sectors, leading to price pressure, particularly on food and energy. The observed turmoil had a severely adverse impact on the economy. Even though the US inflation rate in 2020 was 1.4%, which was lower than in the preceding year (by 0.9 percentage points), by the end of 2021 it had already reached a level of 7.036%, not seen since June 1982 when it was 7.064% [IMF 1986]. At the same time, the rate of inflation in the EU, which was approximately at an average level of 0.49% in 2020, reached 5% a year later. Inflation in the EA in December 2021 was 5%, while at the end of 2019 it was 0.29% (Fig. 5).

Such indicated macroeconomic factors, understood as a derived consequence of the government's decision to implement fiscal stimulus, were the primary reason for the rapid increase in inflation in both the US and the EU, including in the EA. Therefore, it can be referred to as institutional, or even government-induced inflation. Furthermore, when supplementing the data from 1999–2019 (Fig. 1) with the changes observed from 2020 to 2021 (Fig. 3), we can observe that the rate of growth in this institutional inflation and its magnitude during the latter period are significantly higher – twice on average – than the rate and magnitude of inflation in the twenty years prior to the pandemic [Eurostat 2022a].

I will now delve into the topic of institutional inflationary factors and inflation expectations in the US. In response to the pandemic, which afflicted over 79 million people and claimed the lives of over 967,600 individuals, both the Donald Trump and Joe Biden administrations allocated approximately USD 5.12 trillion in special funds to combat the disease [CAA 2020, CRS 2020]. However, despite this substantial spending on pandemic-related measures, inflation in the economy did not experience a significant increase in 2020 [CARES 2020, CPRSA 2020]. Experts attributed this phenomenon to the well-entrenched practice of households actively working to minimize their expenditures. Ultimately, the continuous price fluctuations observed in early 2021 were mirrored by a decline in public sentiment, as evident in surveys measuring inflation expectations [Labonte et al. 2021]; (Fig. 6).

As a consequence, the graph shows that inflation expectations of professional forecasters were broadly anchored around the 1.6% average level, though there was a short period of radical destabilization reaching the deflation level of –0.8% in May' 2020. These expectations dropped drastically from 2.2% in March to –2.3% in June, before returning to the average level of approximately 2% in September of that year [US Bureau of Labor Statistics 2020–2021]. The severity of the pandemic in the EU, including the EA perspective, was even greater than in the US. The

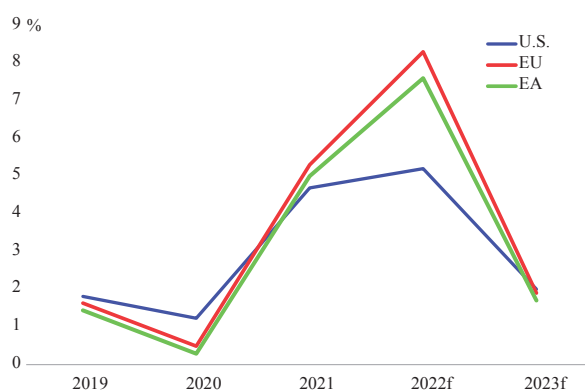
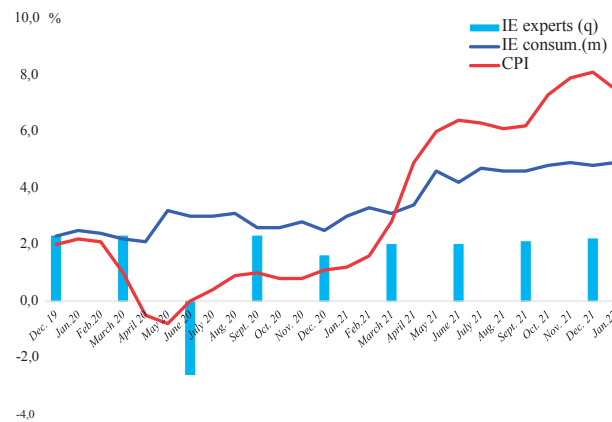


Fig. 5. Inflation in the US, the EU, and the EA in 2019–2023 [%]

Source: own elaboration based on OECD, IMF, and FRED data.



ie experts (q) – quarterly; ie consumers (m) – monthly

Fig. 6. Inflation and inflation expectations (consumers & experts) in the US, 2020–2021 [%]

Source: own elaboration based on BLS, FED, and MICH data.

course of the pandemic in the EU, where approximately 100 million cases of COVID-19 were recorded from January 2020 until the end of 2021 [WHO 2022], displayed similar characteristics to the developments in the US. Rapid decisions on the implementation of fiscal stimulus were taken by both the EU governments and the EU institutions, injecting 1,824.3 billion euros into the European economy. As expected, EC data (HICP) quickly revealed the problems caused by rapid price rises. Countries that were under the influence of the USSR prior to 1990, such as Poland, Hungary, or Estonia, experienced the most significant impact from this phenomenon [GUS 2022, Eurostat 2022a, Eurostat 2022b]. Nevertheless, the issues stemming from the pandemic were responsible for inflation across the EU during that period. This is why the European Commission, responsible for conducting consumer surveys on inflation expectations, determined that there would be a rapid and substantial increase in inflation in 2020–2021 based on this data. The EU’s inflation expectations, which stood at a relatively high level of 6.59% in 2020 despite a relatively low inflation rate of 1.23%, made for a noteworthy forecast [ECB 2022]. However, this forecast was not confirmed by subsequent changes in the expectations index one year later, which dropped to 4.57% after a period from January to September 2021 characterized by low inflation expectations at 2.8%, despite an average inflation rate of approximately 2.9% (Fig. 7).

Conversely, it can be inferred that the unsettled consumer inflation expectations (CE) within the EU during 2020–2021 may have signaled an expected rise in inflation. This anticipation could have arisen from survey respondents adjusting their medium-term inflation expectations based on their personal perception of inflation [Stanisławska and Paloviita 2021]. Such a process had also been observed within the EA, where the average inflation expectations index was approximately 1.69% in 2020, with a slight uptick to 1.82–1.9% during the latter half of 2021. Furthermore, the rise in inflation within the EA to a level of 5% in December 2021 could serve as confirmation of the validity of the post-pandemic inflation hypothesis.

THE MODEL OF INFLATION EXPECTATIONS

This section relies on data from the previously mentioned quantitative questions to explore how consumers in the US, EU, and EA shape their inflation expectations. To do this, a hybrid model of inflation expectations has been used for data estimation, as described below:

$$\pi t^e = c + \alpha_1 \pi_{t-1} + \alpha_2 \pi_{t+12} + \varepsilon_t \quad (1)$$

where:

πt^e – expected inflation in period t after 12 months,

π_{t+12} – inflation CPI (y/y) in period t + 12,

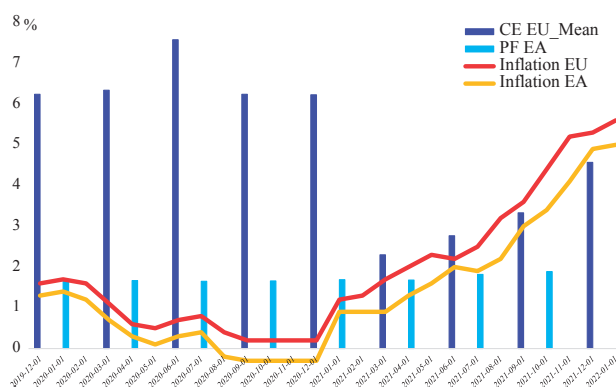


Fig. 7. Inflation (monthly) and consumers' inflation expectations in the EU experts' surveys quarterly in EA, 2020–2021 [%]
Source: own elaboration based on EC, Eurostat, and ECB data.

π_{t-1} – inflation CPI (y/y) in a one month preceding the month of carrying out of survey,

$\varepsilon_t = 0\%$.

The model presented above is estimated on aggregated data – received from consumers' surveys carried out in each area respectively – to assess its impact on the average of the set of individual answers to Questions 2 and 3. The model consists of elements of adaptative expectations (AE) and elements of rational expectations (RE). When $c = \alpha_1 = 0$ and $\alpha_2 = 1$, the model meets the condition of forming rational expectations. Moreover, with sum of parameters α_1 and α_2 equals 1, the results of estimation of expected inflation are allowed to be treated twofold:

- in reference to a1 as the effect of examination of consumers' surveys formulating their expectation adaptively;
- in reference to a2 as the outcome of examination of consumers' surveys formulating anticipation-oriented expectation.

At the same time, the average expected inflation should be compared with the rate of inflation in line with the expectations' horizon in 12 months. In order to carry out the analysis under the above assumptions, I have made a decile breakdown of the distributions of expected inflation by month and then assessed the dynamics of these statistics within the accepted time [US Bureau of Labor Statistics 2020–2021]. It is noted that the answer is considered inconsistent if the consumer answering the qualitative question (1) states that

prices will rise faster than at present, while declaring lower expected inflation than perceived inflation in response to quantitative questions (2–3). This inconsistency can be ruled out by introducing a sensitivity interval of 2ε . If the difference between perceived and expected inflation is less than $\pm\varepsilon$, such inconsistency is considered of no research significance [EC 2020]. Since consumers used to treat as insignificant some slight deviation of the inflation level from its actual level, the expected inflation was estimated on the assumption of five sensitivity ranges: mean, 0 p.p. and ranges ± 1 p.p., ± 3 p.p., and ± 5 p.p.

MODELLED INFLATION EXPECTATIONS VS QUANTITATIVE QUESTIONS

The analysis of the distribution of modeled individual responses in the US, obtained on the basis of equation (2), with regard to the level of expected inflation in the years 2020–2021, allows for the following conclusions. Firstly, simulation results indicate that the inflation expectations of respondents in the US were in the range of 2.2–8.1% (Fig. 8).

However, in the short term, they fell to around -0.8% , well below the inflation target, but in line with the current inflation level. Concurrently, in some periods, modeled expectations have largely stabilized at levels close to the inflation rate. Thus, during the period of December 2019–March 2020, inflation expectations were stable, remaining at around 2.2%, 2.1%, and 2.3%, on average exceeding the then Fed's

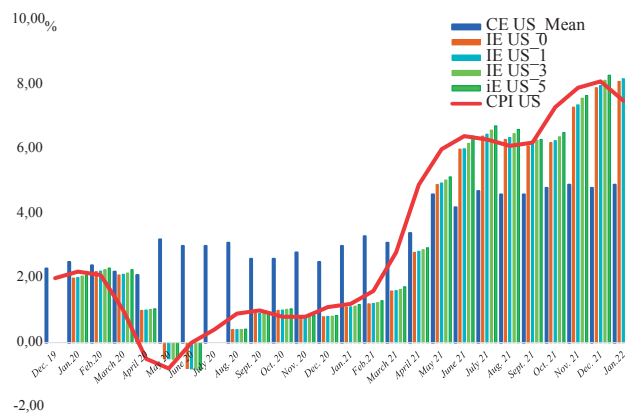


Fig. 8. Modeled inflation consumer expectations in the US in 2020–2021 [%]

Source: own elaboration based on FRED data.

1.29% inflation target by 1 p.p. As mentioned earlier, inflation in the US remained stable throughout 2020, with a temporary dip below zero occurring from April to June 2020. It was only at the beginning of 2021 that a noticeable shift in consumer attitudes became apparent. Following the adjustment period in the fall of 2020, where consumers' inflation expectations aligned with the actual level, there was a subsequent period from December 2020 to May 2021 where an underestimation of the inflation level ranging from 0.24 to 0.8 percentage points was observed. It was not until June 2021 that inflation expectations started to increase, aligning with the actual inflation rate of around 8.1% by December 2021 [BLS 2021 and IMF 2021]. In summary, inflation expectations in the US can be characterized as adaptive (AE).

The disparity in modeled inflation expectations within the EU, as opposed to the more synchronized distribution of consumer expectations in the US over the examined period, can be attributed to the emergence of inflationary conditions in an environment that had maintained a low inflation rate, usually not exceeding approximately 1.89%, for the past two decades [Eurostat 2022b]. Therefore, the change in the attitude of the EU institutions to fiscal policy, although justified by the pandemic, has resulted in high inflation expectations that periodically exceed the level of real inflation by ten times. Expectations modeled in June 2020 were 0.5–0.53%, while average consumer expectations in the same month, according to Eurostat

data, reached 7.58%. In 2020, the level of inflation in the EU remained at an average annual level of 0.68%, while a year later it increased to 2.43%, exceeding the annual forecasted value of 1.5% by more than 0.9 p.p. Inflation expectations were, therefore, destabilized – although the expectations index was already high in December 2019 at 6.24% under the rate of inflation at 1.6%, while in March 2020 it reached 6.34%. The highest level of expectations occurred in June 2020, reaching the rate of 7.58% with the rate of inflation of 0.7%. In November, the level of expectations was reduced to 6.23% when the current level of inflation stood at 0.2% (Fig. 9).

Certainly, the notable drop in inflation expectations in 2021 to an average of 3.24% during the first three quarters was mainly a result of the EU institutions scaling down their financing efforts related to COVID-19. Subsequently, these modeled inflation expectations underwent a swift ascent, reaching levels of 5.3 to 5.6% by December 2021. Generally, the modeled inflation expectations of consumers in the EU in the years 2020–2021 exhibited fluctuations that hovered around the quarterly average value derived from EC research. The maximum divergence index was approximately 0.1 pp in the period August–December 2021, when the average level of inflation expectations recorded by the EC was 3.95%, while the average rate of modeled consumer inflation expectations had been estimated at 3.85% (with the average inflation level of 4.03%). The distributions of the

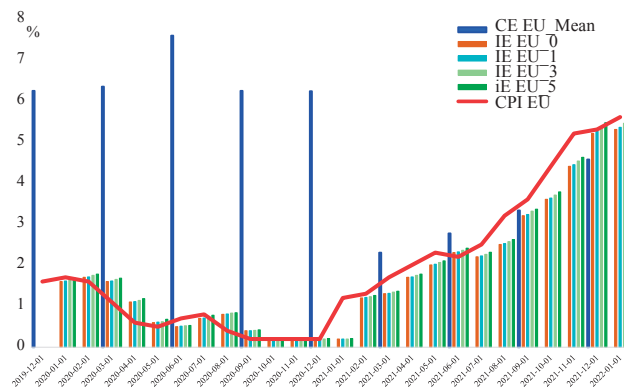


Fig. 9. Modeled inflation consumer expectations in the EU in 2020–2021

Source: own elaboration based on EC and Eurostat data.

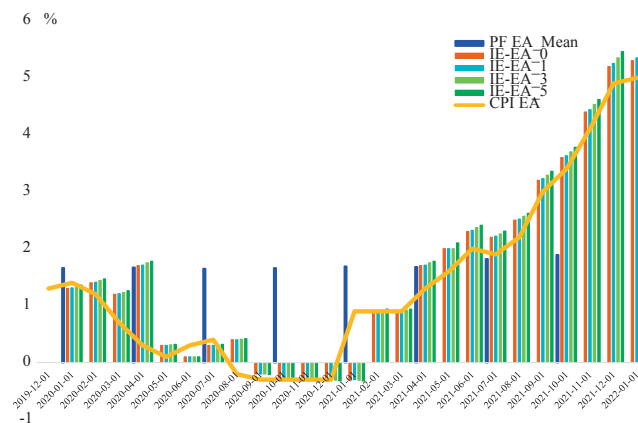


Fig. 10. Modeled inflation expectations in EA in 2020–2021[%]

Source: elaboration based on [EBC 2022].

modeled expected inflation were left-skewed, except for the months of September-October 2020, when the observed distribution was horizontally aligned. The average value of the inflation expectations index was approximately 1.69% in the EA in 2021–2022, while it remained at a mean yearly level of 0.3% in 2020, and at 2.25% in 2021 [ECB 2021]. The course of expectations therefore indicated their relative destabilization. The results of the inflation expectations estimation validate its occurrence during the period from February 2020 to October 2021, wherein the average discrepancy between the quarterly average expected inflation and the average modeled expected inflation was approximately 0.982 percentage points (Fig. 10). Inflation expectations remained relatively stable in January 2020, as well as from September to Decem-

ber 2020 and during the months of February to March 2021. In summary, inflation expectations in both the EU and the EA can be categorized, similarly to the US, as adaptive (AE).

CONCLUSIONS

The empirical evidence presented in this study points to the following conclusions. As observed, pandemic inflation occurred in the US and in the EU, including the EA, after a long period of low prices. The substantial government involvement in financing the economy during various lockdowns has notably and significantly disrupted inflation expectations in the economic areas mentioned, serving as an indicator of inflation, which has already gained high dynamics

in 2021. The rapid increase in these indicators demonstrates that institutions responsible for monitoring inflation have not sufficiently studied them, thereby constituting a significant limitation for observers. In the meantime, through the analysis of price trends and their expectations over various timeframes, the research uncovered consistent patterns, highlighting similarities between anticipated price changes before and during the pandemic. Firstly, the tension between inflation expectations and inflation dynamics during the pandemic period shall be seen as a kind of warning against classifying inflation as a process independent of institutional conditions, such as anti-COVID decisions taken both by the US, the EU, including the EA. On the contrary, such a form of inflation can be linked to government fiscal stimulus, although it exhibits a lag of approximately 12 months. Essentially, this type of inflation caused by government institutions can be referred to as institutional inflation or even government-induced inflation. Secondly, such inflation is expected to increase, underscoring the importance of maintaining both stability and alignment with inflation targets. The suggestion is significant because the principle of stability excludes the use of fiscal stimulation, which, however, sometimes has to be implemented. Indeed, fiscal stimulation is correctly perceived in the economy as a source of problems, rather than a tool to strengthen it. And yet, the need to support fiscal stimulus to combat the pandemic highlights the necessity to broaden the scope of assessing the impact of this factor on inflation growth and inflation expectations in such periods of threat to the health of entire communities. Thirdly, the observance of inflation expectations plays a role in shaping trust in both government and central bank objectives. This means that there is a need to evaluate its effects also beyond economic concerns, while prioritizing ethical considerations, with the primary direction being the protection of society from disease, rather than following strict economic norms, especially those related to pandemic fiscal restraint.

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INFLACJA A OCZEKIWANIA INFLACYJNE W LATACH 2020–2021 – WPŁYW PANDEMII COVID-19

STRESZCZENIE

Cel: Podczas pandemii COVID-19 w okresie lat 2020–2021 nastąpił wysoki wzrost inflacji oraz odpowiednio oczekiwań inflacyjnych w Stanach Zjednoczonych (USA), Unii Europejskiej (UE), a także w strefie euro (EA). Przebieg zmian wskaźników makroekonomicznych we wskazanych trzech obszarach polityczno-gospodarczych USA, UE i EA zwraca uwagę na obecność zależności między dynamiką inflacji a taką dynamiką oczekiwań inflacyjnych. Oba typy zmian charakteryzują zarówno zachowania konsumentów, jak i zachowania grup profesjonalnych prognostów. Celem artykułu jest zbadanie sekwencji zmian obu wskazanych zjawisk zarówno z wykorzystaniem opisowej metody analizy danych ankietowych, jak i w wyniku zastosowania hybrydowego modelu szacowania oczekiwań inflacyjnych. **Metody:** Metodyka badań polega na zastosowaniu techniki opisowej analizy danych w odniesieniu do długoterminowego rozkładu zjawisk inflacji i oczekiwań inflacyjnych obserwowanych wśród konsumentów i profesjonalnych prognostów w USA, UE i EA w latach 1999–2019. Z kolei do oszacowania danych dotyczących zjawiska inflacji oraz oczekiwań inflacyjnych w krótkim okresie 2021 roku wykorzystano hybrydowy model oczekiwań inflacyjnych. W opracowaniu zestawiono i porównano wyniki obu typów badań. **Wyniki:** Analizy wskazują, że w czasie pandemii obserwuje się występowanie okresowo średnio-wysokiej inflacji w trzech analizowanych obszarach gospodarczych, podczas gdy jednocześnie oczekiwania inflacyjne w USA i UE były okresowo słabo zakotwiczone, choć jednocześnie odnotowano ich ustabilizowanie w EA. **Wnioski:** Z badań polegających na analizie trendów zmian cenowych oraz zmian oczekiwań inflacyjnych w różnych okresach czasowych – długo- i krótkoterminowych – wynika istnienie zaobserwowanych spójnych wzorców zależności między dynamiką inflacji, a taką dynamiką oczekiwań inflacyjnych również ze względu na występowanie podobieństw w przebiegu obu typów zjawisk przed pandemią oraz w jej trakcie.

Słowa kluczowe: inflacja, oczekiwania inflacyjne, pandemia, długoterminowy, krótkoterminowy