Changes in the explanation of inflation[1]

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SUMMARY: Most discussion of inflation in 2021-2022 have focused on product market shocks rather than unemployment indicators. The Phillips curve approach, which provides the traditional theoretical framework, was questioned. In addition to the surge in food and energy prices, many new inflationary factors have come to the fore, such as the disruption in supply chains, as well as fiscal spending and loose monetary policy in the context of the pandemic. These factors do not fit into the traditional approach. In this paper, we review the main literature on the US and European economies to see how the analytical framework represented by the Phillips curve can be adapted to analyse the current situation. Since its inception, the Phillips curve approach has undergone significant changes reflecting changes in the nature of inflation. For example, the unemployment gap was later replaced by the output gap. In the current situation, the output gap has been replaced by arguments in favour of the inclusion of enterprise pricing, marginal cost and the profit rate.
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Introduction

The inflation that developed in 2021 and 2022 has led to significant price rises in almost every country in the world at a surprisingly fast pace. Many people have recalled the inflation that followed the oil price shock of the 1970s, because, as then, the rise in energy prices has contributed significantly to the price increase. However, the comparison is flawed in several respects and it would be premature to jump to conclusions about the economic policy response at that time. Indeed, the situation today is different from any previous inflationary episodes. The correlations in traditional theoretical approaches do not provide a convincing explanation for today's phenomena. Nor do traditional approaches provide any guidance on how to deal with the problem effectively. In this paper, the focus is on change, although the papers on which we draw here have tended to focus on the potential of traditional approaches. These applications have featured prominently in the modelling work that underpins the Central Bank of Hungary's Inflation Report (MNB 2022) and in the IMF's recent country studies of inflation (see IMF, 2021, 2022a, 2022b). This also indicates that the theoretical framework of the Phillips curve, which is the traditional approach, can, with some modification, provide a useful framework for analysing today's issues, yet in this paper we summarise the problems and highlight the directions for change. In today's context, the traditional approach is extended with new elements. In this paper, we first overview some of these considerations from the ongoing debates, and then we outline the path of the Phillips curve in a brief theoretical-historical context of the new developments in monetary policy. In doing so, we also illustrate that theoretical approaches of inflation have been in a state of constant alteration. The glory of theories that put themselves ahead of all previous approaches, such as Friedman's quantitative money theory (Friedman 1968, Friedman – Schwartz 1963), have not been dominant in practice for a long time, although they undoubtedly still dominate much of the textbook literature on mainstream macroeconomics. This paper calls for change in this respect as well.

Views and debates on inflation in the United States[6]

Inflation in the US by now has fallen significantly, but the Fed leadership is not in a triumphant mood and there is no sign of rate cuts in the communication at the time of this writing[7]. But even if one were to believe that the inflation problem in the US has been solved, it is still worth examining how the events appear in the context of other countries' assessments of the situation.

6 This issue is discussed in detail in Ábel – Nagy (2022). In this article, we review recent papers published since then.

7 We completed the draft of the paper in November 2023.

Regarding the rapid rise in oil prices, Galbraith (2023) points out that the oil prices were particularly low in the period leading up to 2021, largely due to the impact of the Covid-19 pandemic, which triggered a fall in demand. Adapting to the fall in demand, production and exploration was reduced. Rising demand following the recovery from the pandemic led to a rapid increase in prices after 2021. The price of oil per barrel on international markets fluctuated between $65 and $80 before the outbreak of the pandemic, falling to $20 in early 2020 as the crisis unfolded. Prices rose rapidly once the crisis was over, with the inflation-adjusted price per barrel reaching $116 in early 2022, before falling back to around $80 by the end of the year. While this price increase was below 2014 levels (inflation-adjusted), it was very rapid, and the fuel component of the US CPI rose by 154% between March 2022 and June 2022. The rise in fuel prices were quickly incorporated in the prices of food products and other transport-intensive goods (Galbraith, 2023, p. 4).

Of the cost shocks associated with the pandemic, the rise in fuel prices was only one factor contributing to today's inflation. Galbraith (2023) highlighted the shortage of semiconductors, chips that play an important role in the automotive industry, as an important factor in inflation, which occurred because manufacturers expected telecommuting to reduce demand for cars used for commuting and thought that demand for household appliances would increase. This did not happen, but the decline in new car supply caused used car prices in the US to rise by 55 % by February 2022. Galbraith (2023) notes that the purchase of a used car is a replacement of an existing product and although this transaction was driven by an increase in demand, but it is not related to output. This fact raises questions about what output and cost-focused economic policy considerations could be put in place to counteract the inflationary effect.

In the United States and other developed countries, the response to the Covid-19 pandemic had been a massive increase in fiscal spending and an extremely loose monetary policy, both to help people who have lost income and to counter the threat of recession among businesses. There is a strong view that it was this spending that led to today's rapid inflation, as the public started to spend, and deferred demand suddenly appeared on the market and firms used the rapid increase in demand to raise prices.

Galbraith (2023) notes that the increase in unemployment benefits, which represented a very significant increase in budgetary expenditures to help the population, reaching up to $600 per person per week, did not necessarily translate into savings, as households in distress still had to spend on rent, food, fuel and everyday living expenses, and only the more affluent had to make additional savings. They were likely to spend it on investments, property purchases and the like.

Reviewing the current debate on inflation in the United States, Ferguson and Storm (2023) strongly refute the idea that the increase in government budget spending related to the Covid pandemic can explain the inflation that has occurred. They argue that the current inflationary episode can be attributed to a number of global factors but cannot be adequately explained by the US economic policy response to the pandemic itself, which has provided substantial support to the household

incomes of workers and the unemployed, simply because there has been a significant change in subsidies, while this has not been reflected in the inflationary trend. They also point out that a number of supply-side changes, such as increases in import prices, energy prices and corporate profit margins, have contributed significantly to the rise in inflation, but even those together do not convincingly explain the significant change in inflation. Although they deny that economic policy responses to the pandemic are behind it, they themselves accept that the global effects of the Covid have contributed to inflation through the supply shocks (Ferguson and Storm 2023, p. 36).

All this is extremely important for the choice of the appropriate economic policy intervention to contain inflation because the usual monetary policy interventions, a drastic increase in interest rates, can only mitigate the price increase effects of external and hectic supply shocks at a very high cost. The resulting recession is often more damaging than the inflation itself.

Modelling the impact of inflation factors (Phillips curve)

The equation describing the impact of various economic variables (inflationary factors) on inflation is usually called a Phillips curve, as Szentmihályi and Világi (2015) have stated in their thorough review of the theoretical and statistical characteristics of the equations describing inflation (Szentmihályi and Világi (2015, p. 25)

The Phillips curve was originally derived from the work of Alban W. Phillips (1958) and Richard Lipsey (1960), who showed a statistical relationship between the rate of change in wages and the unemployment rate. In general, the change in nominal wages in the economy is generally closely related to inflation, and the change in unemployment is a proxy for the capacity utilisation in the economy, an important feature of supply and demand conditions. The statistical relationship identified by Phillips and Lipsey[8] has thus provided a good basis and furthermore a theoretical framework for theoretical and practical approaches to inflation. The first, but very convincing, step in this direction was provided by the influential work of Samuelson and Solow (1960). The theoretical roots of the relationship itself go back much earlier, as Humphrey (1985) has shown in detail. More recent periods of macroeconomic theory (the impact of expectations and the New Keynesian consensus) have also led to an extension and transformation of the Phillips curve.

8 The overview outlined here is provided for didactic purposes, to indicate the practical connections of the theory and to introduce approaches that seem promising for today's inflationary processes. We note here that a number of very useful papers on the applications of the Phillips curve have been published, among which we highlight Balatoni (2009) and Balatoni (2021), as well as Szentmihályi and Világi (2015). The connections described by the Phillips curve have already been discussed by early classical economists. Humphrey (1985) mentions the emergence of these ideas in the works of John Law (1671-1729), David Hume (1711-1776), Henry Thornton (1760-1816), Irving Fisher (1867-1947) and others.

King (2000) offered a substantial review of its implications for central banking practice. Drawing on the classic paper by Frisch (1983) and Aykut's (2002) summary for Turkey, we begin to review this approach to describing and managing inflation[9]. Phillips (1958) and Lipsey (1960) revealed a negative relationship between the rate of nominal wage change and the unemployment rate. We start from the following elementary relationship between the rate of inflation and the unemployment rate[10] :

$$(1)\ \pi = \alpha\, u$$

Where

π is the inflation rate

u is the unemployment rate.

It is important to note that the parameter α is negative ($\alpha < 0$).

The most obvious first step in extending the basic equation (1) towards practical applications is to use inflation expectations (π^e), which is the first step towards a Phillips curve extended with expectations. In the equation below, we show one more extension, the effect of external inflation shocks, which is given by μ variable:

$$(2)\ \pi = \alpha\, u + \mu + \beta\, \pi^e$$

The inclusion of unemployment in the description of inflation can be justified for a variety of reasons, representing a variety of behavioural mechanisms. In Phillips' original approach, it is a representation of the price-wage spiral mechanism through the effect of unemployment on wages. In measuring unemployment in relation to inflation, much emphasis had been placed on the interpretation that achieving zero unemployment is not a realistic objective because unemployment has a natural rate. Reaching this natural rate implies full employment, and higher employment (or lower unemployment) than this already causes severe labour market tensions, which accelerate inflation through wage increases. For this reason, the indicator u in equation (2), which represents the unemployment rate, is more correctly interpreted as the difference between the actual unemployment rate and the natural rate ($u = u_{actual} - u_{natural}$), i.e. u represents the *unemployment gap* in the equation.

However, developments since the 1970s have raised many doubts about the enforcement of workers' wage claims and, through them, their inflationary impact, as trade unions have been marginalised and labour's share of national income has stagnated or even declined.

9 In this article, we will try out several different approaches to review the context. Such an approach to the literature review is intended to capture the diversity of applications and the flexibility of filling out the theoretical framework. Our aim is not to expose the true and emphatically proposed approach, but to outline a framework that encourages openness, the search for new perspectives and the possibility of exploring them.

10 Equations (1) and (2) are identical to equations (6a) and (6b) in Aykut (Aykut 2002, p. 50).

Although the inclusion of the unemployment gap in approaches based on equation (2) is still used but attributing to it a representation of a different behavioural mechanism. The change in employment reflects the business cycle, so the unemployment gap indicator shows a similar relationship to the output gap. The relationships described by equation (2) are therefore often written in the following form:

$$(3)\ \pi = \alpha\, y + \mu + \beta\, \pi^{e}$$

Where y is the deviation of the output from the potential output, it is the output gap. The inclusion of the output gap in equation (3) instead of the unemployment gap is an important change for other reasons. Whereas the unemployment gap traditionally represents the inflationary impact of changes on the demand side in the specification in equation (2), the output gap in the specification in (3) has a broader interpretation. The output gap, like the unemployment gap, can be sensitive to changes on the demand side, but this indicator can also reflect the impact of supply shocks and is more sensitive to these than would be the case for changes in the unemployment gap. It is for this reason that interpreting the Phillips curve in the form as (3) is considered more promising in applications.

The commonly used approach to monetary policy modelling to assess the dynamic impact of inflation factors is to estimate the traditional Phillips curve with the addition of various inflation-intermediating factors. One such model calculation is described in the IMF's Country Analysis of Hungary (IMF, 2023), which was applied to quarterly data for 21 advanced and 5 emerging European countries, including Hungary, for the period from Q1 2000 to Q2 2022.[11]

In the model, both headline and core inflation are analysed by estimating an equation with the explanatory variables lagged inflation, inflation expectations (three-year-ahead consensus inflation expectations), the unemployment gap (the difference between the actual and trend unemployment rate), and external price shocks. The impact of external prices is measured by commodity prices, food, energy, foreign producer prices and the exchange rate, based on IMF (2022) data (IMF, 2022, online annex to Ch.2 of the October 2022 regional econ outlook: Europe Regional Economic Outlook for Europe, October 2022 (imf.org))

The Phillips curve estimation for Hungarian data has also been carried out and analysed separately by the IMF and is evaluated in detail in the IMF Special Issue Paper Cohn-Bech – Foda – Roitman (2023). The Hungarian case is particularly interesting because among the EU countries, Hungary had a particularly high inflation rate at the end of 2022. For the estimation, an extended Phillips curve was estimated in the form shown below:

11 The five emerging countries included in the study were Bulgaria, Croatia, Hungary, Poland and Romania. The 21 advanced countries were England, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, the Netherlands, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the Netherlands (IMF, 2023, p. 10).

$$(4)\ \pi_t = \alpha_1\pi_{t-1} + \alpha_2\pi_t^e + \alpha_3\, y_t + \alpha_4 Energy_t + \alpha_5 \sum_{j=0}^{4} Food_{t-j} + \alpha_6 extP_{t-1} + \epsilon_t$$

where

π_t: refers to the annualised inflation from one quarter to the next,

π_t^e: indicates inflation expectations three years ahead,

y_t: an indicator of unused capacity, which measures the actual unemployment rate in the economy as the deviation of the trend unemployment rate from the unemployment rate calculated using the Hodrick-Prescott filter.

$Energy_t$: represents the quarterly increase in the price of energy, weighted by the weight of energy in the price index,

$\sum_{j=0}^{4} Food_{t-j}$: represents the quarterly increase in food prices according to the weighting in the price index for the current and the three preceding quarters,

$extP_{t-1}$: the lagged value of the external price pressure.

The value of the external price variable is calculated on the basis of the structure of imports, weighted by the weight of the producer price index of the country in the country's imports. To the price pressure from the producer price index of the import source country the effect of relative exchange rate changes is added, i.e. the difference between the change in the exchange rate of the import source country's currency against the dollar and the change in the exchange rate of the importing country's currency against the dollar. From the resulting effect, the percentage change in the country's GDP deflator is subtracted. This means that if the external price increase via imported goods is equal to the percentage change in the GDP deflator, there is no external inflationary effect. If, on the other hand, the percentage increase in the GDP deflator exceeds this, then there is an inflation-reducing effect via imports.

Energy and food price rises have the same periodic impact on inflation, except that food price rises in previous quarters are also reflected in food price rises, reflecting the assumption that the impact of food price rises on household inflation is more lagged than the impact of energy price rises. For food, a lag of 4 quarters was found to be statistically significant in the estimation.

All variables in domestic currency.

Results of the estimation (Cohn-Bech – Foda – Roitman 2023, p. 17 Appendix I. Model Results))

$$\pi_t = \alpha_1 \pi_{t-1} + \alpha_2 \pi_t^e + \alpha_3 y_t + \alpha_4 Energy_t + \alpha_5 \sum_{j=0}^{4} Food_{t-j} + \alpha_6 extP_{t-1} + \epsilon_t$$

α_1 = 0.723*** (0.128)
α_2 = 0.277** (0.128)
α_3 = -0.361 (0.415)
α_4 = 0.053* (0.028)
α_5 = -0.042 (0.046)
$\alpha_{5,t-1}$ = 0.132*** (0.045)
$\alpha_{5,t-2}$ = 0.049 (0.032)
$\alpha_{5,t-3}$ = 0.003 (0.032)
$\alpha_{5,t-4}$ = 0.056 (0.038)
α_6 = 0.061*** (0.020)

(Source: Cohn-Bech – Foda – Roitman 2023, p. 17. Appendix I. Model Results
***p<0.01, **p<0.05, *p<0.1)

The estimation results of Cohn-Bech – Foda – Roitman (2023) indicate that the variables used in the traditional Phillips curve approach are significant among the factors explaining inflation in Hungary, but that in addition to these, specific factors have had a significant impact on inflation. Thus, foreign price shocks also emerged here as an accelerating factor for inflation. At the same time, several internal effects that traditionally appear as inflation-enhancing factors, such as inflation expectations or demand-side factors, are not considered to have significant explanatory power in the analysis of current inflation. Of the 23.14 per cent inflation in November 2022, food price increases accounted for 9.49 per cent, consumer durables price increases for 2.33 per cent, gas and electricity price increases for 2.64 per cent, other energy price increases for 0.40 per cent and other factors such as import prices for 8.27 per cent contributed to the high inflation (Cohn-Bech – Foda – Roitman 2023, p. 6)

Ben Bernanke and Olivier Blanchard review of models explaining inflation

In a general theoretical framework, Bernanke and Blanchard (2023) used a similar method to Phillips' curve-like approach in their highly influential paper, which assessed the various approaches and views on US inflation in a broad overview. They also empirically compared these with reality through detailed model analysis and presented a model framework that summarises the analyses. They found that the slow and often misguided response of central banks and economic policy

to the onset of inflation can be explained by the erroneous assumptions made in exploring the causes of inflation. To support and justify this finding, they presented a new modelling framework, in some elements, that can better describe the processes. The paper argues that even those analyses that have correctly pointed to the possibility of abnormally high inflation and its protracted nature have mostly done so by using wrong assumptions about the real causes. These analyses have often cited demand factors linked to fiscal spending slippages, as well as wage related inflationary effects of excessive employment stimulus and changes in the labour market as a result of the stimulus efforts of economic policy. Bernanke and Blanchard (2023), while not disputing the impact of these factors on demand and hence on inflation, stress that these factors alone do not explain what has happened and, moreover, these explanations would lead to proposals for economic policy adjustments that would not improve the situation. They acknowledge that demand-increasing factors have indeed caused a general upward trend in prices, but they emphasized that this trend has been altered in different ways by sector and product specific changes, which may have accelerated the pace of price increases in some sectors. The Bernanke and Blanchard (2023) approach highlights unexpected and persistent changes and distortions in product markets (Bernanke – Blanchard, 2023, p. 3). These include unexpected and significant inflationary effects caused by the size and persistence of the energy price increases, and by protracted supply disruptions in supply chains. The importance of supply shocks in product markets was also highlighted, alongside with the importance of the effects of changes in labour markets. These factors had a more pronounced impact than considerations related to wage increases or wage-price spirals, which are prominent in traditional approaches. Bernanke and Blanchard (2023) point out that the problems on the demand side cannot be explained by the general fiscal stimulus alone. At the same time, they acknowledge that a permanent change in the structure of demand in the wake of the Covid pandemic is an important explanatory factor for inflation. While in the past the change in the structure of demand has led to an increase in relative prices in some sectors, this effect has been offset by a decrease in relative prices in other sectors. Now, however, this moderating effect was absent, and changes in the relative price formation of individual sectors have also fuelled inflation. Relative price changes in individual sectors became one of the explanatory factors for inflation in this period because of specific supply problems, tensions that were more difficult to manage and protracted adjustment problems (Guerreri et al., 2022; di Giovanni et al., 2023, cited in Bernanke and Blanchard, 2023, p. 3).

Several approaches to the US inflation episode in the period of 2020-2023 emphasise the shortcomings of the approaches that would fit into the traditional Phillips curve framework. They introduce new aspects to explain inflationary processes that are so new that they imply the rejection of the Phillips curve framework. Bernanke and Blanchard (2023), in presenting the shortcomings of the models and the economic policy proposals, nevertheless argue in favour of the traditional approach and propose to incorporate new aspects that can improve the applicability of the models.

In the previous sections, we have reviewed approaches to the Phillips curve and its reinterpretations and complementary applications. What these applications had in common was that they started from the Phillips curve framework and argued for using this framework, although noting all the problems of these applications. A different approach is presented by Storm (2023), who argues for major changes in the interpretation and modelling of the current inflation episode by highlighting new problems with the key variables used in the traditional approaches.

The problem of explaining inflation by output gap developments

According to the generally accepted traditional approaches to inflation, represented for example by the Phillips curve, if the output gap in the economy is positive, i.e. actual output exceeds potential output, and furthermore it is increasing, this leads to an acceleration of inflation. In this case we can talk about the economy becoming overheated. However, the output gap has very rarely been positive in the past. It has typically been negative (Gagnon – Sarsenbayev, 2022, p. 9).

In the years following the pandemic (after 2020), the output gap was negative in most countries, including the United States. In the United States, the output gap was positive for only a short period in the fourth quarter of 2021, but this is not a convincing reason to explain the acceleration in inflation, i.e. it does not support the hypothesis that an excess increase in aggregate demand had caused the acceleration in inflation (Storm 2023, p. 8). Although aggregate demand would not, but supply disruptions, i.e. supply-side shutdowns in supply chains in the wake of the pandemic and transport problems due to the Russian-Ukrainian war, could explain the acceleration in inflation (Ferguson – Storm 2023). Thus, the surge in energy prices and food prices in 2021 undoubtedly had an impact on the rapid rise in consumer prices. Similarly, the rise in import prices in general has also translated into inflation (Storm 2022) in the United States, although there has not been a significant depreciation of the exchange rate to amplify this channel.

On the impact of unemployment gap on inflation

The trends in the output gap did not suggest that rising inflationary pressures were the result of an overheating economy, as there was no sustained positive and rising output gap. As the previously generally negative output gap has not closed, there might instead be signs of inflationary tensions indicated by observing the unemployment gap. Although the unemployment gap has fluctuated in both positive and negative territory, it has been too low to indicate a threat of inflation. Jorda et al. (2022) calculated that the contribution of unemployment gap to inflation in the United States was statistically insignificant in the period 2020-2022 (cited in Storm 2023, p. 11). The rather narrow definition of the unemployment rate may also play a role in the fact that this indicator has not proved informative about the emergence of the

current inflation tensions. The problem is compounded by the fact that there may also be many doubts about the estimation of the unobservable NAIRU (non-accelerating unemployment rate) needed to calculate the unemployment gap. This makes the unemployment gap indicator highly uncertain (Domash and Summers 2022a, p. 3) and even suspected to be an unreliable indicator (Storm and Naastepad 2012).

Inflation expectations

It is often assumed that inflation expectations are a major determinant of inflation (Fair 2021, Rudd 2022a). Indeed, Bernanke (2022) argues that the role of inflation expectations is particularly important because they are crucially determined by the actions and communication of the central bank. For this reason, the inflation-reducing effect of relatively small interest rate increases can be significant, because the central bank also acts to reduce inflation expectations through them (Rudd (2022b), Lansing and Nucera (2023)).

These arguments are convincing, but in case of the current inflation there are many doubts about them. On the one hand, most central banks did not expect inflation to accelerate in 2021-2022, and Fed officials also thought that the inflation shock was only temporary and that no drastic rate hikes were needed to contain it. Nor did other experts expect an inflation shock as large as the one that occurred. The views of the general public, which have always been very different from those of the experts, were also very diverse. A broad overview of these opinions is offered in Ábel and Nagy (2022). The first question to ask about the impact of inflation expectations on the acceleration of inflation would therefore be whose expectations we are talking about. Expectations can be so diverse that to attribute explanatory power to them is an exaggeration, as long as these expectations are not organised into some kind of unified action to exert their inflation-accelerating influence in one direction.

The other question about the assumed impact of inflation expectations is that these expectations mostly reflect the current and past actual inflation rates (Fair 2021, 2022, Rudd 2022a). Thus, the inflation expectations of households and firms mostly reflect their perceptions of the recent and current rate of inflation. These beliefs are often unsubstantiated (Weber et al. 2022, Candia, Coibion and Gorodnichenko 2022). Surveys suggest that there is little basis for assuming that firms have even a rough idea of monetary policy's inflation considerations, the inflation target or the steps taken to achieve it. The public's views are often even less connected to the steps that monetary policy has taken or is likely to take. In fact, the questionnaire research by Candia et al. (2021, p. 4) indicates that the majority of business managers cannot even estimate the inflation target variable of monetary policy and do not care about it at all. On this basis, Rudd (2022a) noted that the mechanism of action for inflation expectations is not simply weak, but very weak (cited in Storm 2023 p. 16).

Consequently, although many experts claim that inflation expectations play a major role in the acceleration of inflation, but no one knows whose inflation expectations they are referring to. For example, one could say that they mean that

inflation expectations of firms are making their way into price formation and that this could contribute to accelerating inflation. Surveys show very large differences in inflation expectations between experts and the general public, but the largest differences are in the inflation expectations of firms and, in addition, firms differ widely in their perceptions of inflation expectations (Candia et al 2022). Rudd (2022a) argues that these questions make it likely that the impact of expectations on inflation is very difficult to interpret or measure.

Storm (2023, p.22) points out that right from the start of the acceleration of inflation in 2020-21, it was clear that the main drivers were the significant global and domestic increases in energy and food prices, disruptions in supply chains and the high mark-up in corporate pricing, rather than wage growth or inflation expectations.

Marginal cost and pricing

András Balatoni (2009) and Gagliardone et al. (2023) use a different approach to the output gap-based Phillips curve, in which they do not represent inflationary tensions with output gap becoming positive, but instead they use marginal cost in the traditional Phillips curve rather than the output gap[12] . Thus, the form of the Phillips curve described by equation (3) yields the following form:

$$(5)\ \pi_t = \vartheta\, mc_t + \mu_t + \beta\, E_t\, \pi_{t+1}$$

Where the coefficient expressing the slope of the Phillips curve is ϑ. According to the estimation results of Gagliardone et al. (2023) and Gagliardone and Gertler (2023), the estimated value of the parameter ϑ is of order of magnitude larger for marginal cost than for the output gap (Gagliardone et al. 2023, p. 25). A higher parameter value indicates a Phillips curve with a larger slope, i.e. a larger inflationary response[13]. But the reinterpretation that leads to the change and the inclusion of marginal cost instead of output gap implies, in principle, a different inflationary mechanism. In this interpretation, a rise in oil prices could cause an increase in marginal costs. In other words, inflation in the recent period has been predominantly triggered by a shock increase in energy costs.

The interpretation of equation (3) also includes the effect of external factors in the output gap explanation. In this form, it is also possible to interpret the case in which the acceleration in inflation was not triggered by demand growth or real wage growth, but by supply-side shocks. In this specification, an exogenous external inflation shock

12 Following the approach of Gali and Geltler (1999), this procedure has proved to be very useful for practical applications.

13 An essentially identical equation to (5) is also the starting point for the extended Phillips curve study of András Balatoni (2009).

is represented by the variable μ in the equation. Its increase represents an upward shift of the Phillips curve, while the Phillips curve remains flat and ϑ variable in equation (5) continues to take a low value in the estimation, indicating that the output gap (y) has not turned positive, which would cause inflation-generating tensions.

The flattening and disappearance of the Phillips curve from the monetary policy toolkit

In connection with the fading or outright disappearance of the explanatory power of the Phillips curve to inflation, the flattening of the Phillips curve, i.e. the fact that the inflationary impact of labour market tensions has remained small, is often mentioned since the 1980s. The Phillips curve was flat for nearly 20 years prior to the Covid pandemic. The flat Phillips curve correlation expressed that a very large increase in the recession and unemployment gap would have been needed to achieve price stability (Rudd 2022b).

There are similar doubts about the current inflation episode. There is good reason why the Phillips curve flattened earlier and remains flat even now. Storm (2023, p. 46) argues that wage demands have not been met as a result of the liberalisation of the labour market and the sidelining of trade unions. The share of labour in national income has declined and the share of corporate profits has increased. Stansbury and Summers (2020) estimate that the wage advantage of unionised occupations fell by about a third from 1982 to 2019 (cited in Storm 2023, p. 46)

Since the organised emergence of workers' demands is less and less possible to explain inflation by higher wages, the emergence of a wage-price spiral is also of limited relevance. A higher growth rate, a closing output gap or a narrowing of the unemployment gap may not at all be expected to lead to structurally higher wage growth and thereby explain higher inflation. Ratner and Sim (2022, pp. 3-4) have shown that a change in the bargaining power of workers after the 1980s can explain the flattening of the Philips curve on its own, without any change in the monetary policy framework. There is an even more important and surprising interpretation of this development. That is, the persistent disinflation of the 1970s was not so much caused by Fed President Paul Volcker's drastic interest rate hike, but by the disappearance of workers' bargaining power because of the structural transformation of the labour market (Storm 2023, p. 49)

A non-linear Phillips curve can be suitable to describe today's inflation

A plausible explanation for the high inflation in 2020-21 (in many places today) is that the previously flat and linear Phillips curve has now become non-linear, and thus relatively mild tensions in the labour market could lead to a disproportionate increase in inflation. In another respect, this approach would suggest that relatively

mild monetary tightening may be sufficient to achieve the desired disinflationary effect. This approach is taken by Benigno and Eggertsson (2023), Hobijn et al. (2023) and Crust et al. (2023), who use the unemployment rate as an indicator of the number of job vacancies instead of the unemployment rate. This indicator indicates a larger increase in the years under study than is reflected in the decrease in the unemployment rate, so that the Phillips curve approach may also indicate a larger labour market stress and labour shortages. This indicator is used by Benigno and Eggertsson (2023 and Domash and Summers (2022a, 2022b) and they argue that the number of job vacancies is a more useful indicator of the expected path of nominal wages and inflation. Storm (2023, p. 25), however, pointed out that the surprisingly large increase in job vacancies between the fourth quarter of 2021 and the second quarter of 2023 is a consequence of the structural transformation in the employment structure in the wake of the Covid-19 crisis. Closures during the pandemic, the decline of services requiring face-to-face contact, and the emergence of new jobs associated with the rapid take-up of on-line services have caused a very significant change in the employment structure (Ferguson and Storm 2023). In the United States, following the pandemic, quitting jobs in occupations previously considered risky or dangerous and the opening of new opportunities led to a rapid increase in the number of vacancies (Birinci and Amburgey 2022). However, this process is not related to changes in demand and thus does not imply that labour shortages due to demand growth have triggered accelerating inflation through nominal wage increases. Even if job changers were able to find better-paying jobs, real wages for the majority of workers fell and the share of labour in national income continued to decline in the US, again suggesting that wage tensions resulting from labour shortages, i.e. the assumed increase in the unemployment gap, which may have been reduced due to measurement error, may not have been the cause of inflation.

Inflation caused by profit growth, not wage growth

Inflation, which accelerated in 2021, quickly broke 40-year records in both the United States and the European Union. In exploring the root causes of this phenomenon, we find views that emphasise demand factors, such as the restrictions imposed by the pandemic and, once they have subsided, the upsurge in consumer demand that had been postponed until then, as well as the rapid price increases induced by nominal wage growth. However, the data do not suggest that aggregate demand has increased excessively. While the European Commission's report on labour market and wage developments (European Commission, 2022) notes that nominal earnings growth of 4 percent in 2021 was 1.9 percentage points above the average for the years 2013-2019 before the pandemic, overall wage developments showed subdued growth, with real wages falling significantly in both 2022 and 2023. According to the ILO (2022), real wages globally fell by 0.9 percent in the first half of 2022, excluding China by 1.4 percent, and such a significant decline in real wages has not occurred since 2008. In the European Union, real wages had been growing at 1-2 percent before the

pandemic, but this stopped in 2021, and falling by 2.4 percent in the first half of 2022. In Eastern Europe, the relatively high increase in real wages of 3.3 per cent in 2021 was followed by a similar negative change. After millions of low-wage workers in the US and Canada lost their jobs in the wake of the pandemic, real wage increased by 4.3 percent in 2020, then fell to zero the following year, and even here it shrank by 3.2 per cent in the first half of 2022. Fears of a wage-price spiral are therefore unfounded, with nominal wage growth in the US slowing from 6 percent to 4.4 percent by May 2022 (annualised on three-month averages).

Others argue that disruptions and bottlenecks in global supply chains (e.g. chip shortages), which emerged in the wake of the restrictive measures introduced to combat the pandemic, have fuelled inflation, causing significant problems in some affected sectors and dampening supply-side adjustment. Stiglitz – Regmi (2022) identified five main factors in this context. World energy and food price rises, accelerated by the Russia-Ukraine war, together contributed 2.9 percentage points to the 7.7 percent inflation in the United States in October 2022, while energy price developments prior to the epidemic were more deflationary. Price increases for other basic goods were also significant (particularly for cars and parts and freight). Supply problems in some sectors are causing demand for substitutes to rise faster than the rate at which oversupplied goods would moderate, as nominal prices are inelastic downwards, which also has a price increasing effect. Increased house rents (depending on regional variations and property type) took 0.6 percentage points off the October 2022 inflation figure. The fifth factor is due to the market power of companies, namely the fact that they increased their prices more than their costs.

According to Stiglitz and Regmi (2022, p. 40), corporate profit margins in the United States exceeded marginal costs by an average of 26 percent between 1960 and 1980, and have been rising steadily, albeit at a slow pace, since then. In 2021, average profit margins were 72 percent higher than marginal costs. Again, Lapavitsas et al. (2022) argue that it is not the wage-price spiral that explains the increase in inflation, but the excessively rapid increase in profits. In the UK, 60 percent of the price increase since October 2021 was attributable to increases in corporate profits, while wage growth contributed only 8 percent to inflation. Nersisyan – Wray (2022) cite a study by Matt Stoller (2021) which also finds that rising corporate profits account for 60 percent of inflation in the United States. They estimate that this costs the average American $2,126 a year. Another study, the most recent by Glover et al. (2023, p. 33), finds that profit margin growth in the United States contributed more than 50 percent to inflation (greedflation) in 2021, a considerably higher rate than in the previous decade.

The inflationary consequences of US corporate profit growth are discussed in Bivens (2022a,b) and Konczal and Lusiani. (2022). Here we present the calculations of Konczal and Lusani (2022), who studied market markups in the United States over the period of 1955-2021. In their study, they adopted and developed the methodology of De Loecker et al. (2020), which interpreted market markups as the ratio of sales revenue to the value of cost of goods sold, with some adjustment factors. The authors examined three aspects, the evolution of firm size and mark-ups, the movement of

mark-ups in the sectoral dimension, and the explanatory factors affecting the 2021 mark-ups.

The US example showed that premiums calculated using the methodology of De Locker et al. (2020) increased significantly despite the pandemic. In particular, spreads of firms with the highest spreads in the previous period increased sharply, and from a sectoral perspective, prices in the financial sector, oil, and real estate increased.

Changes in the components of corporate income – a break-down of EBIT

Smolyansky (2023), analysing the change in the weight of the pre-tax corporate income factors of large US corporations from the 1960s to the present, reveals striking trends. He assumed that after-tax profits can be written in this way (Smolyansky 2023, p. 9):

(6) Profit after tax= (EBIT-interest expense)(1-τ)

Where EBIT (earnings before interest and tax) is the gross profit before interest and tax, i.e. it is essentially the profit realised on sales. This category of earnings provides information on the evolution of the mark-up used in corporate pricing.

Rearranging equation (6) gives the formula used to decompose the income factors:

(7) Profit after tax = EBIT (1 – interest expense/EBIT) (1 – τ).

In this decomposition, the increase in taxable profit is presented as a function of three factors. These three factors are the increase in gross profit (EBIT), the decrease in the share of interest expense in gross profit and the effective income tax rate (τ) decrease. The results of the calculation are summarised in Tables 1 and 2.

Table 1. Average annual real growth rate of US S&P 500 non-financial companies per share over the candidate period

	1962–1989	1989–2019	2019–2022
Profit after tax (net)	2.0	3.8	7.2
EBIT	2.4	2.2	6.3
EBITDA	2.5	2.3	3.4
Turnover	2.6	1.9	1.9
GDP	3.6	2.5	1.7

Source: Smolyansky (2023) Table 1 (p.10) and Appendix Table A (p.24)

In addition to the average annual growth rate of corporate earnings per share, Table 1 also includes the average growth rate of GDP, so the relative differences help to understand corporate earnings dynamics. It is striking that the growth rate of GDP in the period 2019-2022 reached only 1.7 percent, the lowest among the three periods, but EBIT grew by 6.3 percent on average over this period, the highest among the three periods. Even more interesting, however, is the exceptionally rapid growth in after-tax profit, which is indicated by the 7.2 percent figure in Table 1. Moreover, this high growth in profits was achieved against a background of slower or broadly stable growth in turnover than in previous periods.

Smolyansky (2023) used the following logarithmic derivative of equation (7) to calculate the weight of the contribution of each factor to the growth of corporate profits.

$$\Delta\ln(\text{after tax profit}) = \Delta\ln(\text{EBIT}) + \Delta\ln(1 - \text{interest expense/EBIT}) + \Delta\ln(1 - \tau).$$

Dividing each side of equation (8) by *Δln(after-tax profit)* gives the relative weight of the impact of the factors, normalised to 1, which gives the impact as a percentage. The change in the gross profit indicator (EBIT) can be decomposed into two factors in a different way. Firstly, the increase in turnover and, secondly, the change in the mark-up used for pricing:

(9) (EBIT= (EBIT/Revenue) × Turnover

The resolution (9) is obtained by substituting equation (8):

$$(10)\ \Delta\ln(\text{after tax profit}) = \Delta\ln(\text{Revenue}) + \Delta\ln(\text{EBIT/Revenue}) + \Delta\ln(1 - \text{interest expense/EBIT}) + \Delta\ln(1 - \tau).$$

The results, the evolution of the contribution of the factors under consideration to the growth of profit after tax over the three periods under consideration are summarised in Table 2.

Table 2. Trends in the average real net profit ratio of US S&P 500 non-financial companies, adjusted for the effects of the gross profit (EBIT) ratio, interest rates and effective income tax (total effect 1)

	1962–1989	1989–2019	2019–2022
1. Gross profit (EBIT)	1.20	0.58	0.88
1.a. EBIT/Revenue	-0.08	0.09	0.60
1.b. Turnover	1.28	0.50	0.27
2. 1-interest expense/EBIT	-0.53	0.19	0.23
3. 1 effective tax rate	0.33	0.22	-0.11

Source: Smolyansky (2023) Table 1 (p.10) and Appendix B Table (p.24)

The data in Table 2 show that companies' gross profits grew faster in 2019-2020 than in the previous period. In the 2019-2020 period, the contribution of the growth rate of turnover was lower than ever before, but the profit rate used for pricing increased. The contribution of the growth rate of the profit rate to the growth of gross profit was 60 percent, while the same indicator increased profit by only 9 percent in the 1989-2019 period and decreased it by 8 percent in the previous period. The contribution of sales growth to net profit growth was 27 percent. The decrease in the share of interest expense also increased net profit, with a weight of 23 percent. However, the increase in the effective tax rate reduced it with a weight of 11 percent.

Summary and conclusion

The period of low inflation over many years was followed by a sharp and unexpected acceleration in inflation in very many countries around the world in 2020-2021. A wide range of economic policy responses have been used to deal with this situation, but they have been subject to a number of criticisms. Many analysts have criticised the timing and decisiveness of the measures, which have been described as late and weak. Others argued that central banks failed to recognise the risks, that the approaches used in their analyses were outdated and inadequate to identify and anticipate the new context underlying inflation. In this paper, we do not seek to take a position on these pressing issues, nor do we address the one-sidedness of often emotive findings. We are looking at a more modest, but perhaps more important issue in the longer term. We are assessing the potential for using the Phillips curve approach, which provides a theoretical framework for examining the relationship between inflation and the economy, at a time when the professional community is tending to believe that this approach is outdated and ripe for complete abandonment.

To this end, we discuss in detail the characteristics of today's inflation shocks, analyses that reflect traditional understandings of the causes but often challenge erroneous findings. The general theoretical context, which can be formulated in several countries, is mentioned, drawing mainly on analyses of the countries of the United States and the European Union. These are discussed because there is a great deal of high-quality technical material available, which can also provide useful guidance for evaluating theoretical frameworks. These provide a picture of how much the context of the current inflation shock has brought new phenomena to the surface and how much it poses a different problem for dealing with them.

The second element in our approach is to review how the application of the Phillips curve theoretical framework has changed broadly over the past 60 years and how this has been adapted to the context of the main factor that has fundamentally changed in the inflation periods in the meantime. We have seen four distinctly different phases in this evolution. In the applications published in the late 1950s (Phillips 1958, Lipsey 1960), the Phillips curve appeared in the description of inflation through the relationship between nominal wages and unemployment. Samuelson and Solow (1960) and Phelps (1967) opened a new era by incorporating inflation

expectations and the equilibrium or natural rate of unemployment. For the analysis of the phenomena that followed the 1970s, with supply shocks coming to the fore in the wake of the oil price rise, the inclusion of the output gap instead of the unemployment gap was a fruitful development and can be seen as the third stage in the development of the Phillips curve applications. This is still the way in which the Phillips curve approach is used by the majority of the profession in our country. It would be more accurate to say that this is how the Phillips curve approach was conceived, since the Phillips curve as it is used today has become obsolete and inappropriate for monetary policy. The inflation shock of 2020-2021, however, has brought the theoretical framework for describing inflation factors in terms of the Phillips curve to a new stage. This fourth stage can be briefly characterised by a shift from the inclusion of the output gap to the representation of marginal costs and profit rates in the corporate price setting. A further change in this fourth stage is that, although the framework for analysing the effects of inflation is still characterised by the Phillips curve approach as reinterpreted, a large number of new elements have been introduced to describe the different shocks. The emergence of this approach can be traced back to a very large number of publications, but here we highlight only the paper by Bernanke and Blanchard (2023). Thus, our paper reviews the elementary context of a theoretical framework that is constantly changing as the inflationary context changes. There are also many examples in the Hungarian literature showing the benefits of the elasticity of Phillips curve approach to applications, and among these, András Balatoni (2009) is particularly noteworthy, mentioning the inclusion of marginal cost instead of the inclusion of the output gap.

Our conclusion is that the inflation shock of 2020-2021 has challenged analysts and policy makers in many countries globally. The change also significantly reshapes the theoretical framework of analysis. In its wake, it may usher in a new era of the Phillips curve approach, in which the approach includes corporate pricing factors instead of or in addition to the output gap and additional explanatory variables to account for the different shocks separately. ■

References

1. Ábel, I., Nagy, Gy. (2022). Views on inflation. Unfounded assumptions and unfalsifiable theories Foreign Economy, Vol. 66, September-October, 2022, (pp. 44-75) Foreign Economy (kulgazdasag.eu)
2. https://doi.org/10.47630/KULG.2022.66.9-10.44
3. Balatoni, A. (2009). The Phillips curve and stop-go cycles in Hungary. Statistical Review, vol. 87, no. 9, pp. 898-920.
4. Balogh, A. (2021). What causes inflation? – The relationship between central bank policies and inflation. Credit Research Review, Vol. 20, No. 4, December, pp. 146-158.
5. Benigno, P., Eggertsson, G. B. (2023). ‚It's Baaack: The surge in inflation in the 2020s and the return of the non-linear Phillips curve.' NBER Working Paper 31197. Cambridge, Mass.: National Bureau of Economic Research. https://doi.org/10.3386/w31197
6. Bernanke, B. S. (2010) Monetary Policy Objectives and Tools in a Low-Inflation Environment. Speech presented at the Revisiting Monetary Policy in a Low-Inflation Environment Conference, Federal Reserve Bank of Boston, October 15, 2010.
7. Bernanke, B., O. Blanchard (2023). What Caused the U.S. Pandemic-Era Inflation? paper prepared for a conference-"The Fed: Lessons learned from the past three years"-at the Hutchins Center on Fiscal & Monetary Policy at the Brookings Institution. Bernanke-Blanchard-conference-draft_5.23.23.pdf (brookings.edu)
8. https://brookings.edu/wp-content/uploads/2023/04/Bernanke-Blanchard-conference-draft_5.23.23.pdf.
9. Bivens, J. (2022a). corporate profits have contributed disproportionately to inflation. how should policymakers respond?" *Economic Policy Institute Working Economics Blog,* April 21. https://www.epi.org/blog/corporate-profits-have-contributed-disproportionately-to-inflation-how-should-policymakers-respond/ Accessed December 29, 2022.
10. Bivens, J. (2022b). Wage growth has been dampening inflation all along-and has slowed even more recently', Economic Policy Institute, available at: https://www.epi.org/blog/wagegrowth-has-been-dampening-inflation-all-along-and-has-slowed-even-more-recently/.
11. Candia, B., Coibion, O., Gorodnichenko. Y. (2021) The inflation expectations of U.S. firms: evidence from a new survey. NBER Working Paper No. 28836. Cambridge, Mass.: National Bureau of Economic Research. https://doi.org/10.3386/w28836
12. Candia, B., Coibion, O., Gorodnichenko, Y., (2022). The Macroeconomic Expectations of Firms Bernardo Candia, Olivier Coibion, and Yuriy Gorodnichenko NBER Working Paper No. 30042 May 2022. https://doi.org/10.3386/w30042, Microsoft Word – CCG – 2021-12-26 – NBER WP
13. Coibon, O., Gorodnichenko, Y., Weber, M. (2021). ‚Monetary policy communications and their effects on household inflation expectations.' NBER Working Paper 25482. Cambridge, Mass.: National Bureau of Economic Research. https://doi.org/10.3386/w25482

14. Cohn-Bech, E, Foda, K., Roitman, A. (2023) Drivers of Inflation, Hungary. IMF Selected Issues Paper (SIP/2023/004). Washington, D.C.: International Monetary Fund. Selected Issues Papers Volume 2023 Issue 004: Drivers of Inflation: Hungary (2023) (imf.org)
15. Comin, D., Callum J., Johnson, R. (2023) Supply chain constraints and inflation, NBER working paper 31179, April.
16. Crust, E. E., Lansing, K. J., Petrosky-Nadeau, N. (2023) Reducing Inflation along a Nonlinear Phillips Curve. Federal Reserve Bank of San Francisco Economic Letter 2023-17 | July 10, 2023. Reducing Inflation along a Nonlinear Phillips Curve | San Francisco Fed (frbsf.org)
17. De Loecker, J., Eeckhout, J., Unger, G. (2020) The Rise of Market Power and the Macroeconomic Implications, Quarterly Journal of Economics, vol. 135, no. 2, pp. 561-644. Available at https://doi.org/10.1093/qje/ qjz041
18. di Giovanni, J., Kalemli, S., Silva, A., Yildirim, M. (2023). quantifying the inflationary impact of fiscal stimulus under supply constraints, American Economic Review Papers and Proceedings, forthcoming.
19. Domash, A. and L. H. Summers. (2022a). How tight are U.S. labor markets? NBER Working Paper 29739. Cambridge, Mass.: National Bureau of Economic Research. https://doi.org/10.3386/w29739
20. Domash, A., Summers, L. H. (2022b) A labor market view on the risks of a U.S. hard landing. NBER Working Paper 29910. Cambridge, Mass.: National Bureau of Economic Research. https://doi.org/10.3386/w29910
21. Domash, A., Summers L. H. (2022c). The relation between nominal and real wage growth. Medium.com, April 11. Link: https://medium.com/@alex.domash/the-relation-between-nominal-and-real-wage-growth-2bfd2e1b27b8
22. ECB, (2010) The „great Inflation" Lessons for monetary policy ECB Monthly Bulletin May 2010, pp. 99-110. The „Great Inflation": lessons for monetary policy, Monthly bulletin, May 2010 (europa.eu)
23. Fair, R.C. (2021). What do price equations say about future inflation? Business Economics 56 (1): 118-128. https://doi.org/10.1057/s11369-021-00227-2
24. Fair, R.C. 2022.'A note on the Fed's power to lower inflation.' Business Economics 57 (1): 56-63. https://doi.org/10.1057/s11369-022-00254-7
25. Ferguson, T., Storm, S. (2023). Myth and Reality in the Great Inflation Debate: Supply Shocks and Wealth Effects in a Multipolar World Economy. International Journal of Political Economy 52 (1): 1-44. Link: https://doi.org/10.1080/08911916.2023.2191421
26. Friedman, M. (1968) The Role of Monetary Policy, American Economic Review Volume LVIII MARCH 1968 Number 1, pp. 1-17.
27. Friedman, M., Schwartz A. J. (1963) A Monetary History of the United States: 1863-1960. Princeton: Princeton University Press.
28. Gagliardone, L., Gertler, M. (2023) Oil prices, monetary policy and inflation surges. NBER Working Paper 31263. Cambridge, Mass.: National Bureau of Economic Research. https://doi.org/10.3386/w31263

29. Gagliardone, L., Gertler, M., Lenzu, S., Tielens. J. (2023). Anatomy of the Phillips Curve: Micro Evidence and Macro Implications. NBER Working Paper 31382. Cambridge, Mass.: National Bureau of Economic Research. https://doi.org/10.3386/w31382
30. Gagnon, J., Sarsenbayev, M. (2022). 25 Years of Excess Unemployment in Advanced Economies: Lessons for Monetary Policy (October 18, 2022) Peterson Institute for International Economics Working Paper No. 22-17, Available at SSRN: https://ssrn.com/abstract=4255161 or http://dx.doi.org/10.2139/ssrn.4255161
31. Galbraith, J. K. (2023) The Quasi-Inflation of 2021-2022: A Case of Bad Analysis and Worse Response FEB 2, 2023 | MMacroeconomics, The Quasi-Inflation of 2021-2022: A Case of Bad Analysis and Worse Response | Institute for New Economic Thinking (ineteconomics.org)
32. Galí, J., Gertler , M. (1999) Inflation dynamics: A structural econometric analysis, Journal of Monetary Economics, 44, 195-222
33. Glover, A., Mustre-del-Río, J, von Ende-Becker, A. (2023). How Much Have Record Corporate Profits Contributed to Recent Inflation? Federal Reserve Bank of Kansas City Economic Review – First Quarter 2023 pp. 23-35. https://www.kansascityfed.org/Economic%20Review/documents/9329/EconomicReviewV108N1GloverMustredelRiovonEndeBecker.pdf
34. Hobijn, B., Miles, R. A., Royal, J., Zhang, J. (2023) The recent steepening of Phillips curves. Chicago Fed Letter No. 475, January. https://doi.org/10.21033/cfl-2023-475
35. Humphrey, T. M. (1985) The Early History of the Phillips Curve (1985) Economic Review, vol. 71, no. 5, September/October 1985, pp. 17-24, Available at SSRN: https://ssrn.com/abstract=2118883
36. IMF (2022). World Economic Outlook (October 2022). Technical Report, International Monetary Fund, URL https://www.imf.org/en/Publications/WEO/Issues/2022/10/11/world-economic-outlook-october-2022.
37. Jordà, Ò., Liu, C., Nechio, F., Rivera-Reyes.F. (2022). wage growth when inflation is high. FRBSF Economic Letter 2022-25, September 6. https://www.frbsf.org/economic-research/publications/economic-letter/2022/september/wage-growth-when-inflation-is-high/
38. Konczal, M., Lusiani, N. (2022). Prices, Profits, and Power: An Analysis of 2021 Firm-Level Markups. New York: Roosevelt Institute. https://rooseveltinstitute.org/wp-content/uploads/2022/06/RI_PricesProfitsPower_202206.pdf.
39. Lapavitsas, C., Meadway, J., Nicholls, D. (2022). The True Causes of Inflation: Weak Production and High Profits September 2022 https://www.nautilusint.org/globalassets/public-resources/pdfs/the_real_causes_of_inflation_gftu.pdf
40. Nersisyan, Y., Randall, W. L. (2022). What's Causing Accelerating Inflation: Pandemic or Policy Response? (March 4, 2022) Levy Economics Institute, Working Papers Series 1003 (2022), Available at SSRN: https://ssrn.com/abstract=4049894 or http://dx.doi.org/10.2139/ssrn.4049894
41. Phelps, E. Phillips Curves, Expectations of Inflation and Optimal Unemployment over Time, *Economica* 34 (135): 254-281 DOI : 10.2307/2552025

42. Romer, C. D., Romer , D. H. (2023). Presidential Address: Does Monetary Policy Matter? The Narrative Approach after 35 Years, American Economic Review 2023, 113(6): 1395-1423 https://doi.org/10.1257/aer.113.6.1395 1395
43. Rudd, J.B. (2022a). Why do we think that inflation expectations matter for inflation? (And should we?) Review of Keynesian Economics 10 (1): 25-45. https://doi.org/10.4337/roke.2022.01.02
44. Rudd, J. B. (2022b). The anatomy of single-digit inflation in the 1960s. Finance and Economics Discussion Series 2022-029. Washington: Board of Governors of the Federal Reserve. https://doi.org/10.17016/FEDS.2022.029
45. Samuelson, P. A., Solow R. M. (1960) Analytical Aspects of Anti-inflation Policy, *American Economic Review*, 50(2): 177-194.
46. Smolyansky, M. (2023). End of an era: the coming long-run slowdown in corporate profit growth and stock returns, Finance and Economics Discussion Series 2023-041. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/FEDS.2023.041.
47. Stiglitz, J. E., Regmi, I. (2022). The Causes of and Responses to Today's Inflation. Roosevelt Institute, https://rooseveltinstitute.org/wp-content/uploads/2022/12/RI_CausesofandResponsestoTodaysInflation_Report_202212.pdf
48. Stoller M. (2021) Corporate Profits Drive 60% of Inflation Increases
49. MATT STOLLER blog 2021. DEC. 29. Corporate Profits Drive 60% of Inflation Increases (thebignewsletter.com)
50. Storm, S. (2022) Inflation in the Time of Corona and War. Institute for New Economic Thinking Working Paper No. 185. New York: Institute for New Economic Thinking. Link: https://www.ineteconomics.org/research/research-papers/inflation-in-the-time-of-corona-and-war
51. Storm, S. (2023).The Art of Paradigm Maintenance: How the ‚Science of Monetary Policy' tries to deal with the inflation of 2021-2023.Institute for New Economic Thinking, Working Paper No. 2014. October 4th, 2023. WP_214-Storm-The-art-of-paradigm-maintenance.pdf (ineteconomics.org) https://www.ineteconomics.org/uploads/papers/WP_214-Storm-The-art-of-paradigm-maintenance.pdf
52. Szentmihályi Sz., Világi B. (2015). The Phillips curve – theoretical history and empirical implications. Hreditinstituteti Szemle, vol. 14, no. 4, December, pp. 5-28.
53. Weber, I.M., Wasner, E. (2023) Sellers' inflation, profits and conflict: why can large firms hike prices in an emergency?. In Review of Keynesian Economics, Vol. 11.
54. Weber, I. M., D'Acunto,F., Gorodnichenko, Y., Coibion, O. (2022). The Subjective Inflation Expectations of Households and Firms: Measurement, Determinants, and Implications NBER Working Paper No. 30046 May 2022 https://doi.org/10.3386/w30046