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Fighting recent inflation: An empirical literature review of monetary and governmental policies

1. Introduction

Inflation affects people in their everyday lives as it shows rising prices for a wide range of goods and services. One can often observe a mismatch between increases in wages and increases in prices within the same time interval since there is no automatic adaptation of wages and pensions to inflation in many countries, as Blanchard (2021) states. This is especially the case when inflation rates are higher than the average of the past few years, and leads on the one hand to the problem of how income is distributed in an economy. On the other hand, if prices are changing in an erratic way for the population they may be insecure about how to decide on their future spending and investments. Inflation leads money to have less and less worth, so the higher the price increases in goods and services, the lower the propensity of people to make long-term decisions in general. A bond with a long maturity and a fixed coupon rate yields the same amount of money every year in nominal terms, but the real value (nominal value less inflation) shrinks more and more when high inflation rates are prevalent. Therefore, investors charge more for lending their money to bond issuers, as well as banks for lending money to companies and private households. Both lead to lower economic activity, further reducing economic growth and also potentially leading to recessions and higher unemployment rates. This in turn can force governments to spend more money on social benefits to support people in need while earning lower government revenue due to decreased economic activity, burdening the budget and leading to a higher debt-to-GDP ratio and may decrease trust in the financial viability of a country.

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This short and simplified representation summarizes some of the probable consequences of high inflation rates. As inflation has an impact on companies, private households, and economies as a whole, it is helpful to understand which forces drive inflation rates, how they can be dampened, and to what extent short-term measures have an impact on long-term economic development. Two main institutions are in charge of observing and trying to influence price increases in economic areas: the central banks – for the euro area the European Central Bank (ECB) – and the (national) governments. The ECB can change their base rates and conduct asset purchases (quantitative easing) whereas governments can adjust their spending and debt levels to cope with inflation. This literature review focuses on how certain monetary policy and governmental policy measures can be conducted to keep inflation around predefined levels and to fight too-high inflation rates. For the causes of inflation and a detailed explanation of policy instruments, see for instance Mishkin (2021). Ideally, both pull together, as some measures of one institution can cancel out those of the other in certain economic situations or lead to even higher inflation rates. This interdependence and the manifold implications for economic development and social impacts make inflation an academic topic of high interest to investigate properly and thoroughly.

Therefore, this empirical literature review answers the following research question:

How can central banks and governments use their respective tools and how do they interact to effectively combat recent high inflation?

The literature review aims to offer a deeper understanding of the impact of certain mechanisms of central banks and governmental policies on the evolution of inflation, particularly within the euro area. It evaluates the existing literature to determine if fiscal measures can account for price increases and, if so, to what degree. It also examines central bank policies, including the unconventional measures implemented in response to the COVID-19 pandemic, and offers insight into how they might shape future inflation. This research contributes to the academic literature by investigating prior findings and establishing relationships between government decisions on national budgets and debt levels aimed at stabilizing the economy in the post-COVID-19 era and the subsequent increase in inflation rates. Table 1 summarizes the main findings for a quick overview.

To answer the research question systematically, the following literature review is based on searches on Google Scholar and EBSCOhost. Using the search term “monetary AND policy AND inflation” yields 2,410,000 results in Google Scholar without publication date restrictions and 27,300 results when starting in 2000. The same search term, but restricted to publication titles and academic journals only, yields 470 results on EBSCOhost (1946 to 2023) and 416 results starting in 2000. The search term “fiscal AND policy AND inflation” yields 1,820,000 results on

Google Scholar without publication time restrictions and 566,000 results when starting in 2000. Again, the same search term, but restricted to publication titles and academic journals only, yields 54 results on EBSCOhost (1946 to 2023) and 42 when starting in 2000. The search term “economic AND policy AND inflation” yields 2,830,000 results on Google Scholar without publication time restrictions and 591,000 results when starting in 2000. Again, the same search term, but restricted to publication titles and academic journals only, yields 38 results on EBSCOhost (1967 to 2023) and 26 when starting in 2000. I chose the time restriction to focus on more recent papers to account for sophisticated methods to deal with a large amount of data and to account for structural changes that have happened just before for even some developed countries, such as inflation targeting and central bank independence. These two search terms are the basis for the further exploration of the topic. After identifying key drivers of monetary and fiscal policy, such as inflation expectations as a proxy for subsequent actual realized inflation rates, I focus on relevant papers that deal with these issues, pointing out possible limitations and pointing to papers with results that contradict those prevailing in the literature.

Table 1
Concise summary of the empirical literature research results

Supporting economies is not new, but has been amplified since the 20th century	Personal views of monetary policymakers influence post-crisis trends inflation	Too little supply and/or too much demand fuel inflation rates
What people think about future inflation affects their decisions and actions, and in turn shapes future inflation rates	Monetary policy tends to be faster and more effective against persistent inflation but can lead to higher debt ratios of countries	Fiscal policy without lower spending leads to higher debt ratios and, as a consequence, higher inflation expectations
The academic literature is divided on whether fiscal policy measures are inflationary or have little effect on inflation	The duration of economic crisis measures must be carefully considered to prevent sudden economic slumps or high inflation	Firms in certain industries with pricing power can accelerate overall inflation
Analyzing data for price stickiness, interconnectedness, and market imperfections is the basis for effective monetary policy decisions	Slow wage growth and low energy prices by law have been two success factors in keeping inflation under control after recent crises	Monetary policy and fiscal policy must work together to ensure effective action against excessive inflation

The rest of the paper is structured as follows: Section 2 contains the empirical literature review that is based on 13 subsections about different influencing variables on inflation. These subsections deal with how central banks supported economies in economic downturns over time (2.1), how beliefs of central bank executives can affect future inflation rates (2.2), the role of supply and demand for strongly rising inflation rates (2.3), how relief programs and expectations of economic actors can shape inflation (2.4), the role of the interplay between monetary and governmental policies in inflation fighting (2.5), how interest rate changes by the central bank can harm national finances (2.6), the consequences of different policies in charge (2.7), the role of heavy fiscal support (2.8), how important a clear and determined stance of a central bank is for fighting persistent inflation (2.9), the impact of companies with high price power (2.10), how theoretically solving a Ramsey problem could be a guideline for central banks (2.11), the importance of a broad data basis for taking decisions (2.12), and a comparison of countries with high and low inflation rates after the COVID-19 crisis (2.13).

2. Empirical literature review

To begin with, the support of the economy in the aftermath of the COVID-19 pandemic is described as a fairly recent policy action. As a consequence of the beginning COVID-19 pandemic, the ECB (European Central Bank) in conjunction with the national central banks started to purchase government bonds and corporate bonds under the Pandemic Emergency Purchase Programme (PEPP) in March 2020, as explained in European Central Bank (2023c). The main objectives were to stabilize the transmission of monetary policy and to ensure price stability in the euro area as well as to maintain favourable financing conditions. In the beginning, the programme was set to a maximum amount of EUR 750bn of government bonds and corporate bonds to be purchased by the ECB, including Greek government bonds as every country was negatively affected by COVID-19. In June 2020 and in December 2020, PEPP was ultimately extended to a total amount of EUR 1,850bn. Moreover, the minimum maturity of corporate bonds that could be purchased under the existing Corporate Sector Purchase Programme (CSPP) was lowered from 180 days to 28 days, also being eligible for PEPP. By March 2022, two years after starting PEPP, the programme was stopped, but the maturing principal payments will be reinvested until the end of 2024, maybe even longer, if the ECB concludes that doing the monetary policy effectively would be negatively affected by stopping it.

2.1. On the support of economies through time

From 50% to 100% expansion. A look into the past shows that central banks supported economies as early as in the 17th century, so this is not a new phenomenon, but their aim moved and their sensitivity rose to fight the adverse impacts of financial crises after the Great Depression of the 1930s. Depending on the kind of economic environment that requires support (financial crisis, war or similar military interventions, pandemics, and other natural disasters, or commercial drivers), central banks expanded their balance sheets by around 50% on average, according to Ferguson et al. (2023). The supporting activity of the central banks during the COVID-19 pandemic, however, exceeded this average a lot, as the Fed more than doubled its balance sheet total between March 2020 and April 2022 from roughly USD 4.2trn to USD 8.9trn. To support the financial markets during the Global Financial Crisis (GFC), it also more than doubled its balance sheet total, but on a much lower absolute level (from 0.9trn to 2.2trn between September 2008 and December 2008), see Board of Governors of The Federal Reserve System (2023). The balance sheet of the ECB developed similarly, as shown in European Central Bank (2023a).

2.2. On the effects of central bankers' positions on inflation

After crises, hawks facilitate deflation, doves inflation. The core of the contemporary scientific literature that has been established around financial crises is dealing with liquidity issues, according to Caballero and Krishnamurthy (2008), Brunnermeier (2009), Negro et al. (2017), or Guerrieri and Shimer (2014), as investors seeking refuge in liquid assets when returns are uncertain to build a cushion against decreasing returns or lower cash flows, as Ferguson et al. (2023) states. But as information asymmetries can cause adverse selection and disincentives can lead to moral hazard, history has shown that banks may take too much risk that they cannot bear themselves, leading to further financial crises and liquidity issues. Central banks being forced to take action against these scenarios by providing liquidity via quantitative easing (QE), i.e. asset purchases, makes the financial markets more susceptible to future liquidity shock scenarios, according to Acharya et al. (2023). Eleftheriou and Kouretas (2023) studied the relationship between monetary policy and inflation starting with 1979 using a Vector Error Correction (VEC) model. A VEC model tries to capture long-term relationships and short-term dynamics between time series variables. In general, the term "error correction" refers to a short-term deviation from the long-run equilibrium that is captured to learn how quickly a dependent variable adjusts to changes in other variables. The goal is to understand how long-term connected variables are

related over time, see Martin et al. (2012). The authors show that unconventional measures like quantitative easing do not have the desired effect on inflation if the central bank interest rate is at zero. In such an environment, inflation dynamics deviate from the usual pattern that can be observed when interest rates are not at the lower end. A central bank institution as such is run by people who are roughly classified in the literature as “hawks” or “doves”. For that, Doulamis and Colman (2023) show current classifications of central banks’ members. In general, hawks are decision-makers who address moral hazard concerns when thinking about decisions made in banks and are particularly interested in price stability whereas doves look more to economic growth goals and employment goals, according to Ferguson et al. (2023). Therefore, the probability of providing liquidity support by expanding the balance sheet of the central bank is 36% higher among doves than among hawks, as Ferguson et al. (2023) show. Ferguson et al. (2023) as well as Borio and Zabai (2018) found out that when a central bank offers economic support by expanding its balance sheet in the first two years of a financial crisis by conducting private asset purchases, the real GDP growth can be increased without facing strongly increasing inflation rates, while avoiding such support leads to long-lasting deflation. Specifically, for 89 financial crises since 1870 in 17 advanced economies that were examined by Ferguson et al. (2023), the leadership of hawks tendentially led to a more volatile money aggregate (M2) growth, the worse development of real GDP per capita, and a deflation of about 1.3% p.a. within four years since the beginning of the according financial crises. In contrast, when doves were governors, the M2 growth tended to be more stable, real GDP per capita developed positively, and the inflation was about 4.6% p.a. In contrast, although the leadership of doves – or, generally spoken, a more supporting orientation of central banks – seems to have a beneficial impact on an economy, this does not go without a downside. As participants in financial markets know that dovish central bank management focuses more on growth and employment and less on price stability and moral hazard, they tend to take more risk in calm times as they expect that the central bank will take appropriate actions in case of a financial crisis anyway, as shown in Ferguson et al. (2023). This is not only due to psychological reasons, but also because expansions of balance sheets are made through asset purchases on the markets, like for instance the mentioned PEPP programme by ECB, as this leads to fewer safe assets being available on the markets and lower yields, so market participants are even forced to take more risk to fulfill their expected returns, as Kelleher and Basil (2023) state. Grimm et al. (2023) study how a dovish central bank policy can increase the probability of financial crises and come to a similar conclusion. They declare a loose monetary policy as times when a central bank sets its policy rate lower than the neutral interest rate, the estimated real interest rate at which economic activities are in balance where they are not

driven to increase or decrease by the policy rate. Looking at five-year periods, they state that a difference between these two rates that is one percentage point lower results in both strong credit growth and strong asset price growth (according to Greenwood et al. 2022) to be more likely by 3.2 percentage points (household sector) and 1.8 percentage points (business sector) within five years. When both are rising together, they can predict financial crises very reliably. Actually, a financial crisis to happen in this scenario is 5.5 percentage points more likely within the following 5 to 7 years as well as 15.5 percentage points more likely to happen within the following 7 to 9 years. In short, it can therefore be shown that the personal beliefs of central banks' decision-makers can have a strong influence on future inflation rates after external shocks. A predominantly dovish attitude on the part of the central banks in recent years may have had a certain impact on why inflation rose strongly in the aftermath of COVID-19. Reis (2022a) hypothesized that one of the reasons may be the fact that central banks wanted to boost real economic activity, in which they indeed succeeded. However, they did not react properly to the supply shocks as they expected them to be just a short-term phenomenon. Monetary policy remained loose instead of tightening it for too a long time, they argue.

2.3. On how supply and demand affect inflation

Supply shortage and demand excess drive inflation. Bankowski et al. (2023), European Central Bank (2022) as well as Gonçalves and Koester (2022) argue that the strongly growing inflation rates in the euro area starting in August 2021 can be ascribed mainly to the supply side, but partly to the demand side of the economy, too. The supply-side shock was amplified by significantly rising energy prices after the start of the Russian-Ukrainian war at the end of February 2022.¹ As a consequence, governments started to counteract the negative effects on the financial situation of companies and private households. In Austria, for example, the government adopted a total of three relief packages. The first one and the second one amount to 3.7bn euros in total and involve a wide range of different measures to dampen the negative impact of rising energy prices, like e.g. the *Stromkostenbremse* (electricity cost brake) for private households, where prices over 10ct per kilowatt hour (kWh) will be compensated by the budget, up to a maximum of 40ct per kWh for 19 months. This corresponds to a maximum grant of 30ct per kWh for an amount of up to 2,900 kWh of annual power consumption,

¹ This is what the cost-push theory explains as the main cause of inflation. Higher prices for raw materials or higher interest rates. Firms with high pricing power can pass on their higher costs to their customers, see e.g. Totonchi (2011).

as shown in Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK) (2022). The third package amounts to more than 28bn euros, covers the years until 2026 and implements measures like an increased monthly family allowance and higher tax deduction possibilities for families and employees, see Bundesministerium für Finanzen (2022b). In addition, by the beginning of 2023, the marginal amount in the different tax brackets will be adjusted automatically to inflation rates on an annual basis. Therefore, the bracket creep, as described for instance in Parliament of Australia (2021), has been abolished, which previously led to a higher tax burden for employees every year, because increasing wages due to inflation could get them into higher tax brackets. This measure alone sums up to more than 20bn euros of lower Austrian government revenues until 2026, according to Bundesministerium für Finanzen (2022a).

Ferguson and Storm (2023) agree that the strongly rising inflation rates following COVID-19 are due to supply and demand factors. From the supply side, they identify four factors: imports, energy prices, higher corporate profit margins, and COVID-19 but emphasize that the supply shortages alone cannot account for the strongly rising prices. Instead, the demand side plays an important role.² But they refuse to hold the fiscal stimulus, in this case, the US measures, responsible for the amplified demand in this period. In fact, they state that the unequal increase in private households' wealth, especially of the richest ones, caused by ultra-loose monetary policy, see also El-Gamal (2022), during the years of 2020 and 2021 fuelled demand and, in turn, inflation. To cope with the supply-side constraints, on the one hand, the authors suggest establishing or further developing anti-trust policy and regulatory rules as well as investing in public health and renewable energies. On the other hand, they recommend fiscal policy to support monetary policy to fight supply-side shocks to be more effective. To address the demand side, the authors suggest fiscal policy to dampen inflation surges that arise from supply-side shocks by establishing progressive consumption taxes and higher taxes on wealth and capital gains. El-Gamal (2022) uses wavelet coherency to identify the degree of correlation between oil prices, overall price inflation, and changes in real money supply at different frequencies and times. The results show that short-term inflation can be indeed strongly affected by exogenous shocks, the soaring inflation rate in 2022 is mainly the result of the ultra-loose monetary policy. Pasimeni (2022) adds to this perspective the share of the inflation rise that came from the supply side in the United States compared to the euro area. Whereas this share lies about 50% for the United States, it is more than 80% for the euro area,

² This is consistent with the demand-pull theory, which explains the cause of inflation by increased consumer spending and high demand for goods and services, see e.g. Barth and Bennett (1975). For this case, Keynes (1936) recommends central banks to intervene in the money circulation and/or governments to raise taxes to get inflation under control.

mainly due to the energy crisis following the war in Ukraine. The study points out that shocks affecting one economic sector at first, resulting in lower potential output, can cause falling demand in other sectors and in turn a reduction in overall economic activity. This can particularly come true when it is difficult to shift resources from one sector to another, when consumers are concerned about the future economic prospects and be able to shift their spending, and in markets with restrictions as in this case, some goods and services may be unavailable or difficult to obtain. In contrast to Ferguson and Storm (2023), the author does not suggest including measures on the demand side. Instead, fixing or resolving issues that have caused disruptions in the supply chain and addressing the energy price shock seems essential for ensuring the uninterrupted movement of goods and services, which is critical for a well-functioning economy.

2.4. On the effects of relief programs and expectations on inflation

Relief programs and expectations shape future inflation. If such relief measures are implemented over a longer period, a higher household income they generate may lead to higher demand and, in turn, to higher inflation, according to Committee for a Responsible Federal Budget (2022) and de Soyres et al. (2022). Economic shocks like the one brought out by the COVID-19 pandemic or the soaring energy prices due to the war in Ukraine pressure governments to fight against the adverse consequences of higher budget spending. This leads to higher nominal money growth and thus to higher inflation rates, often letting governments force companies that are under their control to keep their prices to fight against inflation. Frequently, this is hardly effective, as the deficits of such companies have to be financed again by the government, as stated in Blanchard (2021). Soaring inflation rates can have long-lasting negative effects when escalating via wage-price spirals. As employees demand higher wages due to higher living costs, demand is increased and can in turn lead to even higher inflation rates, see Committee for a Responsible Federal Budget (2022).

Besides the national governments, the European Union established its NextGenerationEU, a recovery plan to support the economies of its member countries after the COVID-19 pandemic. Contrary to the past, the volume of 750 billion euros (this and all further data regarding NextGenerationEU are in 2018 prices) is raised by common EUR borrowing on the financial markets, see European Union (2021). According to European Commission (2023), it is made up of grants and loans, where the largest component is the Recovery and Resilience Facility (RRF) with funding of 672.5 billion euros to support reforms and investments undertaken by the EU member states to make them more sustainable and resilient. About 358.1 billion euros of the funds are provided as repayable loans and

about 314.4 billion euros in grants. To be eligible for accessing money, member states have to submit national recovery plans with their agendas that have to include at least 37% of the expenditure to climate objectives and 20% to digital transitions. Besides RRF, another large component is the Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU) with a funding of 47.5 billion euros. REACT-EU focuses on support to maintain jobs, including self-employed people, and aims at helping to create jobs and to establish youth employment measures and healthcare measures, see European Commission (2021).

Much is about expectations. When consumers expect rising prices, they tend to spend more money earlier (which is called “intertemporal substitution”), demand higher wages, or are content to consume at higher prices, whereas companies increase prices for their goods and services when anticipating higher prices for doing business, according to Committee for a Responsible Federal Budget (2022), Bachmann et al. (2015), Coibion et al. (2018, 2019), or Vellekoop and Wiederholt (2019). This is especially true for durable goods as Andrade et al. (2023) found out. They looked at differences in consumers’ buying decisions using the French survey results from 2004 to 2018. It turned out that for this period a large fraction of about 33% of the private households tended to expect prices to remain stable instead of rising prices, whereas only 1% of them expected declining prices. The authors show that dividing households into the two factions of those who expect prices to stay the same and those who expect prices to rise impacts their decisions of whether to buy durable goods or not much more than which actual numeric inflation rate differences they expect. Households that are expecting higher inflation rates indeed tend to spend money on durable goods earlier than later. Central banks can learn from this when they provide information about how they want to conduct their policies in the future to shape the inflation expectations of the market (forward guidance) or by balancing target inflation rates over time instead of using a hard limit (inflation targeting) this can have a low impact on guiding aggregate demand, at least in low-inflation periods. The fraction of private households that expect stable inflation evolution cannot be lower than 0 and if nearly all of them expect higher prices, then communicating even higher inflation expectations does not lead to even greater spending on durable goods.

Private households also decide how much to spend on durable goods depending on their wealth situation and the real interest rate. Lieb and Schuffels (2022) use household-level data on balance sheets, inflation expectations, and durable consumer spending from the Dutch Central Bank’s Household Survey in their study. They find that households with a lower net worth tend to antedate their spending more likely than those with a higher average net worth when they expect rising prices in the future. This is particularly pronounced for households with fixed-interest rate mortgages. The reason for this lies in the net nominal

position of a household's balance sheet, so the difference between nominal values of assets and liabilities and in different types of assets and liabilities private households hold. When it comes to the real interest rate, when people expect higher inflation, they may demand higher nominal interest rates to compensate for the expected loss of purchasing power. But if they do not adjust immediately, their real interest rate decreases, based upon nominal interest rate minus their expected inflation, so saving money becomes less attractive and spending will increase. Furthermore, as Burke and Ozdagli (2021) point out, households of higher education (college degree) that are highly indebted in mortgages tend to consume more when they expect higher inflation rates in the future as this lowers their real debt which in turn leads to a higher real wealth. They also found that a higher household income leads to a lower spending reaction when inflation expectations change. Lieb and Schuffels (2022) find that financial investments, such as stocks or real estate, can moderate this effect by providing a hedge against inflation. Households with financial investments may be less sensitive to changes in expected inflation because their investments can protect them against the loss of purchasing power.

Firms' decisions on their financing are also driven by the inflation they expect in the future. But there is no strong common sense of how inflation rates are emerging in the future: the general observation is that households that look similar in a demographic way often nevertheless expect future inflation significantly different, as they encounter different kinds of goods and services in their everyday lives, according to Weber et al. (2022). Moreover, firms and private households of even different countries, data sets, and periods tend to have higher expectations of future inflation rates than professional forecasters and higher than the actual realized inflation rates in the future. This bias towards higher inflation expectations is different between certain groups of people. Women and people from lower socioeconomic groups tend to expect future inflation rates higher than others. The latter result is accompanied by a study by Rumler and Valderrama (2020) who examine the influence of information literacy, monetary policy literacy, and financial literacy on inflation expectations. Using data from a survey of 30 questions conducted in the spring of 2013 among 2,000 Austrian households, they found that consumers are not quite literate regarding inflation. The ones that are indeed more familiar with how inflation works expect future inflation rates more realistic with smaller absolute errors, therefore lower than people with lower inflation literacy. But the latter are more convinced about their estimations due to the overconfidence bias which states that especially lower-educated people are more sure than others. The authors also show that the more people trust the central bank and the higher its standing, the more precise are people's expectations.

Inflation expectations can also be connected to job situations. The lower the hierarchical position within a firm, the higher the employees expect future inflation rates, as Gorodnichenko and Candia (2021) state. If firms are split over inflation expectations, this can have unwanted effects on central banks when conducting their monetary policy, as Falck et al. (2021) state. A central bank that unexpectedly tightens its monetary policy by, for instance, increasing interest rates should have a look at the dispersion of inflation expectations when doing this. This is because in an environment of high disagreement on how future inflation will be firms are not able to explain why the central bank lowered the interest rates, like fighting inflation or due to an overheating economy (positive output gap). Instead, they may mistakenly think of less supply due to less productivity because of disruptions in supply chains, adverse technological changes, or reduced efficiency in production processes as a possible reason to dampen the upward pressure on prices. Or, more importantly, firms may interpret rising interest rates as a reaction to an increased willingness of consumers to spend more money due to changes in consumer confidence, expectations of future income growth, or shifts in consumer tastes and preferences. As firms believe that consumers are willing to spend more money, they may increase the prices of the goods or services they provide to increase their sales and profits. Therefore, the initial goal of a central bank of fighting inflation can be counteracted by higher inflation pressure in such an environment. Falck et al. (2021) found that in this case, a 100 basis point increase in interest rates leads to a 0.7 percentage points higher inflation and higher inflation expectation over a period of up to three years. Compared to this, when firms are more or less agreed about inflation expectations, a higher interest rate set by a central bank leads to the intended and expected reaction of an inflation rate of about 0.8 percentage points lower over the upcoming three years.

According to Mankiw et al. (2004), private households and firms not only expect higher inflation rates than professional forecasters, but their expectations are also more widespread than the professionals' ones. This may be due to two potential factors: information sources and interpretation. First, various groups of people have different information sources about what is going on in the economy. Private households experience inflation in buying groceries and other products they need frequently. Professional forecasters have access to more in-depth information through information portals and can comprehensively analyse data. Second, different groups of people interpret shock events differently. Rising oil prices, for instance, may make private households think that the general price level is strongly increasing, but professional forecasters may interpret them just as a temporal phenomenon. Private households and firms are also more uncertain about the actual inflation outlook than professional forecasters. Moreover, people tend to have "sticky inflation expectations" as surveys have shown that

when an economic shock event happens, they not only expect inflation rates to be higher for the upcoming short time but also for longer time horizons, neglecting the fact that central banks take action to fight strongly rising inflation rates, as underpinned in Weber et al. (2022).

Strong drivers for personal inflation expectations are what people believe about how inflation emerged in the recent past and which cognitive abilities they have. Malmendier and Nagel (2015) examined inflation expectations from Reuters and the Michigan Survey of Consumers for 57 years between 1953 and 2009. They figured out that inflation expectations are driven by inflation experiences that people had in the past. Moreover, perceptions vary between different age groups: Younger people tend to revise their inflation expectations more strongly than older people, as for the former their whole life so far has been shorter and therefore, their immediate past has a larger share. Contributing to the former finding, Stokman (2023) finds that there are four main drivers of soaring inflation expectations in the aftermath of the COVID-19 pandemic: prices for energy, food, transportation, and houses. To examine, the study uses information from the Joint Harmonized EU Consumer Survey from 1995 onwards. This survey asks households how they expect the consumer prices within the next 12 months compared to the last 12 months, giving them six possible answers, including “don’t know” and averages them to infer expectations. Cognitive abilities play also a role in different inflation expectations among otherwise similar groups of people. D’Acunto et al. (2019) use 120 questions from a cognitive abilities test of the Finnish Armed Forces (FAF) that targets quantitative, verbal, and visuospatial abilities. The quantitative part involves arithmetic calculations and other tasks using numbers. The verbal part consists of questions about comparing words and word pairs as well as synonyms and antonyms. The visuospatial part tests respondents on pattern recognition. The authors ascertain that all three types of abilities influence a person’s inflation forecast error. For all three types, higher levels of cognitive abilities are associated with lower inflation forecast errors. Burke and Ozdagli (2021) use a survey panel dataset of households in the US from a period where the Fed held their target rate at the lower limit of 0%, namely mid-2009 to late 2012. They ascertain that only households of higher educated people, at least college education, tend to spend relatively more on durable goods when they await a higher inflation one year, especially when they have a mortgage loan. In contrast, people who are not as educated, in some cases spend more on durable goods when expecting higher prices in the future, but less than college-educated people, but sometimes actually even less than before expecting rising inflation rates. Regardless of the educational type of private households’ members’ spending on non-durable goods and services (like in their sample food, clothing, utilities, and some other items) is almost not affected by how people estimate

future inflation. This can be challenging for central banks as they try to influence consumer spending in general, not only looking at those of durable goods as they account for only 10% of all consumer spending in the dataset and are similarly low for consumer spending in general.

According to Reis (2020), even as some market participants are better informed, sometimes private households and firms forecast inflation better. This is especially the case when central banks try to balance the expectations of both professional forecasters and private households and firms to stabilize the expected inflation rate as it becomes less uncertain and less volatile. The core reason for this can be found in responsiveness. The more responsive private households are to news, the more they adapt their inflation expectations to new information, and therefore, the more accurately they can predict future inflation rates. The other way around is valid for market participants and financial noise. The stronger market participants react to random price fluctuations that cannot be explained by actual economic factors, the less accurate are their expectations. Speaking of differences in inflation expectations among professional forecasters themselves, Dovern et al. (2012) found that they are built upon actual price levels and the (in)dependence of central banks. The higher the price level, the higher the disagreement between forecasters about future inflation rates tends to be. In countries like Japan or Italy, where central banks became independent much later than in other countries, the differences between forecasters' expectations are more pronounced.

2.5. On steering the economy: monetary vs. governmental policies in combating inflation

Monetary policy should take charge. Monetary policy and governmental policy act via different channels: via setting interest rates to affect how much credit banks lend and customers borrow (interest rate channel and credit channel), how exchange rates are shaped (exchange rate channel), how attractive investment in bonds is (wealth channel), and how much worth assets are as collateral for loans (balance sheet channel). Additionally, monetary policy affects how much demand there is for bonds when conducting unconventional measures (quantitative easing channel). Governmental policy can influence how much money companies and private households have on hand to spend on goods and services by altering taxes or spending.³ But too high inflation rates are contrary to the main objective

³ This is known as fiscal policy where governments can change their spending and/or taxation in order to influence demand and, as a consequence, inflation – see e.g. Horton and El-Ganainy (2019). But they can also intervene through government guarantees, price limits or price bands, and excess profits taxes. Government guarantees are common in international trade to support economic activity, where a government pays for an exporting company of the home country when it is no

of the ECB, i.e. to keep prices in the euro area stable, see European Union (2016). Therefore, the central bank will increase the interest rate on the main refinancing operations to make borrowing money more expensive for commercial banks and hence for private households and companies, too.⁴ This dampens credit demand and demand in the real economy, which should in turn be followed by lower inflation. But it is also about the methods of monetary policy. Decreasing interest rates may fuel inflation more than quantitative easing or fiscal policy that is financed by taxes, as Wu and Xie (2023) state. According to them, there can be several reasons behind this rationale, with the first being transmission channels. On the one hand, conducting quantitative easing by purchasing financial assets to provide liquidity to the economy increases the money supply, lowers long-term interest rates, and therefore should increase lending and investment. On the other hand, conventional monetary policy, mainly decreasing interest rates, leads to borrowing cheaper money more directly, and therefore to higher inflationary pressures. Second, limited control over asset allocation. Conventional monetary policy typically involves taking control over short-term interest rates, but the impact might differ between different economic sectors, putting inflationary pressures on some of them. Third, the velocity of money. Lowering interest rates may imply a greater impact on the velocity of money than conducting QE programs, and therefore can fuel inflation more strongly. Hence, the more indirect nature of QE on financing conditions and economic activity may exert lower inflationary pressure compared to lowering interest rates. The existing literature broadly argues that central banks should take the lead in fighting inflation,⁵ supported by fiscal policy measures (or more generally, governmental policy measures), see for instance Committee for a Responsible Federal Budget (2022), because due to

longer able to do so, as e.g. Peterdy (2022) states. According to Rockoff (2008), price ceilings or price bands may be imposed to prevent people and businesses from paying too high prices for essential goods or services. Several countries imposed excess profits taxes on certain industries whose profits were above historical averages due to rising energy prices following the start of the war in Ukraine, as European Commission (2022a) and European Commission (2022b) allowed. Whether such taxes reduce or increase inflationary pressures depends on how the government uses the increased public revenues and for how long they are imposed.

⁴ The ECB influences the interest rate by buying or selling securities on the financial markets which refers to the term open market operations (OMO), providing or withdrawing liquidity on the market. Depending on how long the maturities of the securities are, there can be main refinancing operations (MROs) for providing liquidity to banks for one week against collateral or longer-term refinancing operations with a maturity of usually three months. Furthermore, the ECB can conduct fine-tuning operations when there is a sudden need of liquidity or structural operations to smooth the liquidity of the banking sector over a certain time. For detailed explanations, see European Central Bank (2018), European Central Bank (2016), and Deutsche Bundesbank (2023).

⁵ But the quantity theory of money and monetarists like Milton Friedman argue that a too-high money supply is the most important factor for high short-term inflation, as Totonchi (2011) state.

Elmendorf and Furman (2008), there are presumably three factors that may be in favour of monetary policy over governmental policy. One is the faster process of applying monetary policy measures, as governmental policy measures are based on bills to be negotiated and passed that need some time to implement them. Another factor that Elmendorf and Furman (2008) propose is potentially controversial, namely that research people working for a central bank are more sophisticated in analysing market conditions and risks than those in governmental organizations. Moreover, fiscal support through lower taxes – as will be the case with the mentioned measures in Austria, see Bundesministerium für Finanzen (2022a) – has to be accompanied by less government spending. Otherwise, they can hinder further economic development for a long time, as Ball and Mankiw (1995) and Sinai et al. (2004) argue, too. Contrary to this widely used monetary policy-centred approach, Kocherlakota (2022) states that when using a heterogeneous agent New Keynesian (HANK) model there are some applications during a crisis where instead fiscal policy seems more reasonable. In a HANK model, households differ in terms of their income, wealth, and borrowing constraints (“heterogeneous agents”) which implies different responses to measures of monetary policy or fiscal policy. It assumes prices and wages to be fixed for some time even when supply or demand changes which causes short-run economic fluctuations (“New Keynesian”). If the real interest rate is only slightly lower than the growth rate, the debt burden of an economy is large, it might be difficult to extensively use monetary policy to fight inflation, as higher interest rates mean an even higher debt burden in the future. Instead, governments can use fiscal policy to redistribute transfers to sectors that are more likely to spend and stimulate economic activity without having to change their approach to spending in the future.

Interestingly, according to Glenn and Samad (2012), a lower interest rate set by a central bank leads to lower inflation in the long run. They want to test the hypothesis of Sargent and Wallace (1981) which is the following. If a government persistently produces budget deficits, the debt level increases over time, which may drive the government to allow more money to be printed, leading in turn to higher inflation. As the central bank aims to get higher inflation under control, it can raise interest rates, but this leads to higher costs for the government to finance its debt. Therefore, the government may want to print even more money increasing inflation even more. In contrast, if the central bank keeps the interest rates low, the financing costs for government debt stay low, and even inflation. Indeed, when using data from the US between 1973 and 2011 and a monetary model of inflation, lower inflation as a result of lower interest rates can be observed. A monetary model of inflation focuses on monetary factors like money supply (i.e., how much money circulates in the economy), money demand

(i.e., how much money market participants want to hold), monetary policy, velocity of money (i.e., how quickly money circulates through the economy), and inflation expectations. They use a quite simple model where only the money supply is chosen as a key factor, and they assume money supply growth and inflation to be stable. The study also finds that a sound fiscal policy like lower government spending to produce lower budget deficits and to decrease debt-to-GDP ratio can also contribute to lower inflation rates in the long run.

2.6. On the consequences of contractionary monetary policy on public finances

Higher interest rates are followed by a higher debt burden. According to the Committee for a Responsible Federal Budget (2022), a higher interest rate on the main refinancing operations, like it was imposed by the ECB beginning in July 2022 after more than six years being at zero, may also lead to higher debt-to-GDP ratios of countries. First, refinancing is more expensive, so the government has to finance higher amounts of interest payments. Second, at the same time, tax revenues may decrease due to potentially lower demand and slower economic growth. In the end, investors' confidence in servicing debt may be decreased so they demand even higher interest rates for being willing to invest in government bonds, and/or the money demand decreases too. The latter would impact the currency value adversely and make imported goods more expensive, fuelling inflation again. It has to be mentioned that investors may demand higher interest rates, but do not lose their trust in the financial stability of a country. In this case, the higher interest rates would attract more investors, leading to higher money demand, and a stronger currency value, making imports cheaper and subduing inflation rates. Nevertheless, reversing governmental policy support measures abruptly can in turn lead to slow economic growth in the aftermath, as some authors argue, like Banerjee et al. (2022). Therefore, it is highly important and of interest, how and within what period the governments in the euro area are slowing down their economic support and what the long-term implications on growth, employment, and economic development will be. However, there are some limitations of the paper. The study relies solely on the monetary base, so currency in circulation and bank reserves, but does not include broader money supply measures that have a more direct effect on economic activity, and it also does not include asset purchases or forward guidance. It also does not include structural changes in the US economy over the sample period like, for instance, financial innovation, globalization, inflation targeting, or changes in the length and characteristics of business cycles.

2.7. On How “fiscal policy first” impacts inflation

Fiscal policy in charge means higher inflation rates. Banerjee et al. (2022) examined how different policy regimes impact future inflation rates. They classified them into monetary policy regimes and fiscal policy regimes, according to the strength of their respective effect on inflation, each with two measures, one de facto measure and one de jure measure. A fiscal policy regime is classified as “prudent” or “profligate” by the authors using a de facto measure adapted to Bohn (1998), meaning that a government should aim to spend less money on public goods and services than it receives by taxes in the long run, creating a primary surplus, as shown in OECD (2022). The de jure measure is derived from whether an economy has established binding rules for the design of the budget balance. A monetary policy regime is categorized by whether central banks look out for stable prices and the de facto measure of whether the central bank increases interest rates more than the prevailing inflation. Taylor (1999) and others concluded that if this is not the case, this could lead to inflation rates getting out of hand like it was the case in the 1970s. The example of Turkey shows that this is not just a theoretical framework, but can be observed in reality. According to Gürkaynak et al. (2022), due to political considerations and lacking independence of the Central Bank of the Republic of Turkey, they had to impose an upper limit on interest rates, the so-called effective upper bound (EUB). This resulted in nearly unmanageable, escalating inflation rates for the country. The de jure measure that the authors use leans on to what extent a central bank can act independently from governments by laws that constrain lending to public sectors. The more independent a central bank can make its decisions, the lower the inflation tends to be, at least for advanced economies, as Cukierman et al. (1992) state. The authors found that when fiscal policy dominates, governments are more “profligate”, not looking out strongly for bearable debt-to-GDP ratios, and when monetary policy does not pay much attention to price stability, future inflation rates tend to be higher and more volatile on average than under a monetary policy regime. Shifts from a monetary policy regime to a fiscal policy regime and changes in how inflation targets are measured (like for instance average inflation rates instead of a fixed percentage goal) also contribute to higher future inflation rates, as shown in Banerjee et al. (2022).

These results about fiscal dominance and the importance of central bank independence are confirmed by Kliem et al. (2016). Fiscal dominance prevails when a government sets its fiscal policy without coordination with the central bank and their monetary policy, the latter has to finance fiscal deficits by printing money, and therefore, the central bank loses control over inflation, as only governments are in charge. Fiscal deficits that are financed by printing money and a central bank

that cannot effectively fight inflation as it depends on the government's actions lead to a close long-run relationship between growing deficits and inflation. The study investigates such periods for Germany, Italy, and the United States from the 1960s to the 1990s. For Germany, the relationship between the budget deficit as a percentage of GDP and inflation was close to zero for the entire sample period, indicating that the country had governments that maintained fiscal discipline and that the central bank was independent. For Italy, one can observe a highly positive relationship between budget deficit to GDP and inflation from the 1960s to the late 1980s, indicating fiscal dominance during this period. From the early 1990s onward, this relationship dropped sharply and can be attributed to the 1981 decision of the government to make the central bank independent, as Epstein and Schor (1986) state. In the United States, the relationship was high in the 1960s and 1970s but dropped sharply from 1979 onwards, when Paul Volcker became the chairman of the Fed. His focus was on fighting the high inflation of the 1970s by pushing for more independence of the Fed from the government, as shown in Goodfriend (2007). He conducted a hawkish policy, raising interest rates dramatically and helping to sharply reduce inflation for a long period.

Kwon et al. (2009) use a dataset of 71 advanced, emerging markets, and developing countries over 42 years from 1963 to 2004 to examine the relationship between public debt, monetary policy, and inflation. Their results support the previously stated insights. Countries that borrow more and more risk that market participants expect higher inflation rates and that inflation goes up. Higher inflation can result in higher interest rates, making it more difficult for the country to fulfil its obligations and may force it to incur an even higher debt burden. A higher debt burden will, in turn, increase inflation expectations even more, ending in a vicious cycle of a debt-inflation trap. In this scenario, monetary policy is constrained as it has to take into account the impact of higher interest rates on the ability to pay off the debt. Instead, fiscal policy has to set measures of consolidation to generate a primary surplus to support monetary policy to cope with rising inflation rates. This is where credibility comes into play. A country with a high debt burden has to make clear that it establishes a policy that aims at fighting high inflation rates and, even more important, that it is willing to conduct it. Otherwise, bondholders may nonetheless demand higher nominal interest rates as they still expect higher inflation in the future. If they believe that the inflation rate is still going up, the country benefits in the short run as borrowing costs are lower, but this can then lead to measures not to be trusted and higher borrowing costs in the longer term. However, even when the policy measures are successful and the inflation rate decreases, the real value of interest payments on debt goes up as the nominal interest rate on debt is fixed which stresses a country's budget. These results underpin how essential it is for countries to not let their debt go out

of hand as it gets more and more challenging to maintain credibility and minimize surprises in this case. Aktas et al. (2010) investigate how monetary policy and fiscal policy interact for a certain country, Turkey, between 1999 and 2006. This paper analyzes the impact of the exchange rate-based stabilization program introduced in 1999 to address high inflation and debt sustainability concerns due to a high debt burden. Moreover, Turkey started inflation targeting in 2002. The study comes to similar conclusions as Kwon et al. (2009). If a central bank raises the interest rate in such a high-indebted country, inflation could go up instead of going down as servicing debts become more expensive, default risk increases, capital flows out of the country and the currency depreciates. As the currency depreciates, imports become more expensive, and therefore, inflation increases.

This interplay between monetary policy and fiscal policy is also covered by Mello and Ponce (2023) with another concrete example. They examine the case of Uruguay between October 2009 and March 2020 with the results of the monthly Inflation Expectations Survey (IES) among firms in the country. The main focus of the study is to examine how the budget deficit to GDP influences inflation expectations of firms as central banks want to anchor the latter to reach their inflation target, see also Visco (2023). The study finds that the budget deficit and the gross debt to GDP are positively correlated with inflation expectations. Therefore, monetary policy and fiscal policy influence each other. As a consequence, if the fiscal outlook of a country gets worse, inflation expectations of firms go up, and this counteracts efforts of the monetary policy to stabilize them. In the specific case of Uruguay for the considered period, the authors state that these efforts worked properly through both the interest rate channel itself and the communication channel of the central bank's goals, leading to a negative correlation with firms' inflation expectations. The positive correlation between a worsened budget deficit and firms' inflation expectations could be balanced by that, resulting in relatively stable inflation expectations. The paper further points out that exchange rate volatility and budget deficit seem to be summarizing factors of other macroeconomic variables that are important reference points for institutions to form their inflation expectations.

The credibility of a fiscal policy is possibly influenced when conducting discretionary fiscal measures. That means that a government changes spending or taxes deliberately, like for instance when decreasing taxes to increase consumer spending. The Brazilian government made use of a discretionary fiscal policy and creative accounting, which was analyzed from January 2005 to June 2018 by Montes and de Hollanda Lima (2022). They wanted to study the impact of fiscal policy on the inflation risk premium. The inflation risk premium is the difference between the break-even inflation rate (BEIR) and the expected inflation rate. The break-even inflation rate results from the difference between yields of bonds of the same maturity, the yield of a traditional bond with a fixed interest rate

(nominal bond), and the yield of a bond whose coupon payments are adapted to rising inflation rates (inflation-linked bond). It is the inflation rate level at which an investor would be indifferent between buying the nominal bond or the inflation-linked bond, as the yield of both bonds is the same. The expected inflation rates in the study are coming from a survey among about 120 forecasters of financial institutions in Brazil. Therefore, the inflation risk premium can express how much investors require to be compensated for unexpected inflation. The study finds that if a government adopts discretionary fiscal policy measures, the more pronounced they are the higher the increase in the inflation risk premium, as such measures increase the uncertainty of investors about the evolution of future inflation rates and therefore lead to higher inflation expectations. It also finds that if the government enhances its fiscal credibility, so credibly signaling that it will meet fiscal targets and maintain fiscal discipline, the adverse impact on inflation risk premium can be moderated.

However, not only the type of fiscal measures can influence future inflation rates but also the alignment towards a pro-cyclical or counter-cyclical direction, again accounting for the interplay with monetary policy. Kurnia et al. (2021) investigated these relationships for the period of 2003 to 2017 on a dataset of 25 countries where central banks have established frameworks to keep inflation rates within a given target, as is the case for many countries in the world. They apply the generalized method of moment (GMM) method, a statistical technique to estimate parameters in econometric models, in this case about the role of monetary policy's credibility and the alignment of fiscal policy. The study ascertains if fiscal policy is counter-cyclical, future inflation rates tend to be low as a credible monetary policy can secure this and also financial stability. The reason is that there is no need for monetary policy to interfere with fiscal policy as counter-cyclical fiscal policy can help to moderate the fluctuations in economic activity. It can stimulate economic activity during downturns by increasing government spending, leading to more aggregate demand and higher economic growth. Or it can curb economic activity during upturns by decreasing government spending, leading to less aggregate demand and lower economic growth. As a result, inflation rates tend to be stable, and financial stability can be secured, too. If, on the other hand, a government acts pro-cyclically, the actual inflation rate will differ from the one that was expected and the one monetary policy aims at. This counteracts monetary policy's credibility and therefore, a central bank will strive to regain it by using tools like increasing interest rates to fight rising inflation. Due to this, borrowing will be more expensive, leverage will be reduced and as a consequence, asset prices fall and economic activity will shrink, leading to greater financial instability. Again, this study explains how important the interplay between monetary policy and fiscal policy is for inflation evolution.

It can also be postulated that if a government unexpectedly changes its fiscal policy stance, this could have a substantial impact on future inflation rates by hampering the inflation targets of monetary policy. Cevik and Miryugin (2023) study a panel dataset of 139 countries for the period between 1970 and 2021 to investigate how such a fiscal policy shock affects inflation. According to them, a negative fiscal policy shock happens when the budget balance to GDP worsens by one standard deviation. They use the local projections (LP) method, which requires weaker assumptions about the long-term behaviour of the underlying data, is more flexible when dealing with nonlinearities and time-varying relationships, may provide more robust estimates, and is easier to apply to non-stationary time series data than the classical vector autoregression (VAR) model, that is also trying to find relationships between several variables from their past values, as Barnichon and Brownlees (2019) and Jordà (2005) state. The LP method is applied to impulse response functions (IRFs) that measure the reaction of a variable or several variables (in this case, mainly the primary budget balance) to a one-time, temporary shock (in this case, an unexpected worsening of budget discipline) to another variable (in this case, the inflation rate), according to Jordà (2005). The primary budget balance is the difference between the governmental revenue and its spending on goods and services, without considering net interest payments for public debt, see OECD (2022). The study accounts for the public indebtedness of a country, for the state of the economy when such a fiscal policy shock occurs (recession or expansion), as well as for which monetary policy frameworks are established, how a country deals with exchange rates, and whether there are fiscal rules that are implemented. The authors conclude that in countries with a high debt burden, a negative fiscal policy shock (as measured by overall budget balance) lets the inflation rate that includes all relevant items (headline inflation) rise by 0.88 percentage points in the first year (0.72 percentage points cumulatively after four years) of the shock. In countries with a low debt burden, the impact is lower and not statistically significant. Similarly, when the primary budget balance is used as a measure, the impact is only about half as large for low-indebtedness countries as for high-indebtedness countries. Looking at the results for core inflation, i.e. total inflation except highly price-volatile items like energy and food, there is an even stronger impact of a fiscal policy shock in countries with a high debt burden, of about 1 percentage point in the first year after the shock. Regarding the state of the economy, results show that a fiscal policy shock lets the inflation rate rise by 1.2 percentage points in times of a recession, but does not affect it in times of expansion. The reasoning for this may be that during a recession, fewer goods and services are demanded and if a government lowers taxes or increases spending, this can stimulate demand and lead to higher prices. Government

decisions can have a greater impact on inflation during a recession, as monetary policy is constrained by the economic situation and cannot raise interest rates to fight inflation. Regarding monetary policy frameworks, the authors state that when central banks pursue certain inflation targets, headline inflation goes up in these countries as well, but core inflation drops noticeably. In countries without inflation targets, both headline inflation and core inflation go up, stronger than in the other countries, too. Regarding how a country deals with exchange rates, the study states that those who do not intervene in exchange rates benefit from a lower inflation rate increase when a fiscal policy shock hits. The reasoning for this is that higher government spending stimulates demand, which can be partly demand for foreign goods and services, which puts pressure on the exchange rate, making the domestic currency weaker. As the exchange rate depreciates, exports become cheaper for foreign buyers, thus increasing, while imports become more expensive for domestic consumers, leading to a decrease. This depreciation helps to balance the impact of the initial fiscal shock by boosting exports and reducing imports. Regarding the implementation of fiscal rules, the authors state that the inflation rate in countries with established fiscal rules only rises about 0.29 percentage points in the first year after the fiscal policy shock, whereas in countries without such rules, it rises by 1.17 percentage points. The reasoning for this effect is that governments are more restricted to use discretionary fiscal policy, which helps to stabilize inflation expectations. This can help to dampen the impact of fiscal policy shocks on future inflation rates.

Assadi (2017) points in the same direction. Their study examines how fiscal policy can affect monetary policy efforts, using quarterly US macroeconomic data from 1959 to 2013, including 195 series about real output, consumption, employment, exchange rates, interest rates, prices, wages, fiscal variables, money aggregates, orders, and housing. They use Principal Component Analysis (PCA) to extract the most influential factors. PCA is a data-driven technique to identify the main components that are responsible for most of the variance in a dataset to reduce the dimension, so the complexity of the model, to avoid overfitting (i.e. to avoid having too many parameters relative to the number of observations that would result in failing to apply the model properly on new data), according to Zezula (2021). This results in three factors as unobserved forces driving the co-movement in many of the economic variables: inflation, industrial production growth, and federal funds rate, and complement them with a fiscal variable, the debt-to-GDP ratio, feeding a Factor-Augmented Vector Autoregression (FAVAR) model and a Time-Varying Parameter Factor-Augmented Vector Autoregression (TVPFAVAR) model. FAVAR means that the model is extended by the few important factors that are chosen from the large dataset (“factor-augmented”),

using a collection of variables (“vector”) where the variables are based on lagged values of their own past values (“autoregression”), as Bernanke et al. (2005) state. TVP-FAVAR allows parameters to change over time (“time-varying parameter”) to include effects due to a policy change, so due to different regimes. The results show that when the fiscal variable (debt-to-GDP ratio) is included in the model, inflation generally rises when central banks try to dampen inflation by using a sudden change in their policy (referring to as a monetary policy shock), irrespective of a FAVAR or a TVP-FAVAR model is used. According to the author, this may be due to a wealth effect, as when a central bank imposes higher interest rates, bondholders benefit by achieving higher returns which allows them to consume more. But the strength of the effect is different. In periods when monetary policy is passive and fiscal policy is active, like it was, for instance, in the Burns era in the 1970s, inflation rises more strongly (0.4 percentage points) to a 1% monetary policy shock than in times with passive fiscal policies (0.2 percentage points), as Bordo and Levy (2020) also confirm. The study also confirms that fiscal shocks lead to increasing inflation rates, even when they are relatively low as a fiscal shock of a 1% government spending increase results in a 0.1 percentage point increase in inflation. Ferrara et al. (2021) come to similar conclusions, using a one standard deviation increase in government spending, like Cevik and Miryugin (2023) do. Inflation increases by 0.2 to 0.3 percentage points, peaking around 0.4 percentage points 2 to 3 quarters after the shock.

However, in contrast to the above studies, other studies find no effect of fiscal policy shocks on inflation, or even an opposite effect, i.e. lower inflation rates. For instance, Jørgensen and Ravn (2022) argue that for the quarterly US data from 1960 to 2008, they examined inflation rate shrinks by 0.4 percent six quarters after a fiscal shock. The authors mainly use data on government consumption expenditure, gross investment, real GDP, real personal consumption, tax revenues, a personal consumption price index, the 3-month Treasury bill rate, and the total factor productivity as well as defense spending news shocks and government spending forecast errors. They use different approaches to define fiscal shocks which are forecast errors of government spending growth, a Cholesky decomposition, defence news shocks, and sign restrictions. Forecast errors of government spending shocks are differences that occur when released data about government spending growth are not in line with forecasts of professional forecasters. In a Cholesky decomposition, government spending is ordered first, as the study assumes that before implementing it, a series of decision steps and other preparing steps have to be made, which need time. Government spending can then affect other macroeconomic variables relatively quickly, whereas the opposite is not true, like, for instance, rising prices cannot affect government

spending within one quarter, as this information can only be implemented in the decision process of government spending for the following quarters. Defence news shocks are unexpected changes in defence spending, captured by narrative accounts in news sources, and seem to be suitable to use as they are likely to be exogenous, as they are carried out when geopolitical factors change. Sign restrictions mean that when a shock hits, government spending and, in this case, the output must increase and stay above the steady state for more than three quarters. As a rationale for why inflation shrinks or at least remains stable after a fiscal policy shock, the study uses the available technology level as a supply-side mechanism when demand gets higher due to higher government spending. Hence, firms can utilize available technology more intensively when needed, which can be compared to a higher productivity level. A higher productivity level enables firms to produce more with the same input and to meet higher demand. When governments spend more, the labour demand goes up, and also people tend to demand higher wages. The model assumes that firms can use a higher technology level at relatively low costs, lower ones as if they would employ more people. This leads to lower marginal costs, and, in turn, firms can sell their goods and services at lower prices, resulting in a lower inflation rate. Klein and Linnemann (2020) state somewhat differentiated results. Their study argues that inflation reacted to fiscal policy shocks in various ways over time when using a time-varying VAR model. The dataset consists of quarterly US macroeconomic data over a period of nearly a hundred years from 1920 to 2019 and involves the growth rate of real government spending per capita, unemployment, budget deficit to GDP, inflation rate, and the nominal interest rate based on Federal Funds rate (since 1954) or Treasury bill rate (before). Looking at the eight-quarter averages, inflation was nearly unaffected by government spending shocks in the 1920s and 1930s. From the 1940s to the 1970s, inflation decreased due to such shocks for most of the observations, particularly strongly around 1980. Afterward, inflation turned to a positive reaction to government spending shocks, particularly from the 2000s on. From the 1970s to the 1990s the results are insignificant, suggesting that fiscal policy had a lower or nearly no impact on inflation in that decades. Therefore, the impact of fiscal policy on inflation can be roughly divided into a pre-1980 era and a post-1980 era. All of the results reflect the application of a time-varying model that allows parameters like coefficients, variance/covariance terms, and others to change every quarter. The authors use such a model because they argue that using a constant parameter VAR would not capture the structural changes in the impact of fiscal policy on inflation that have occurred over the decades. The results could be attributed to lower and more stable inflation since the 1980s, in which case fiscal policy measures are more likely to have a greater impact on inflation.

This is because at low and anchored inflation levels there are not many capacity reserves in an economy, so if a government spends more, it is more likely to cause supply constraints. Moreover, inflation targeting and more credible central bank commitments may lead to lower sensitivity of inflation to fiscal policy measures. This is because, in such an environment, fiscal policy measures are not perceived as a threat to price stability. After all, market participants believe that central banks have price developments under control.

2.8. On the impact of fiscal help measures on inflation

Strong fiscal support during crises fuels inflation – de Soyres et al. (2022) point in a similar direction and mention reasons for the soaring inflation rates in the aftermath of COVID-19. They examined the impact of the strong fiscal support by governments on supply and demand as well as on inflation for 52 countries. Core inflation was used instead of headline inflation, as core inflation captures all items except those whose prices fluctuate widely without having much relation to a certain economy or economic area. This is mainly due to seasonal fluctuations or for energy products, as shown in European Central Bank (2023b), so only items that are supposed to be affected strongly by fiscal policy. The effect was split into a domestic effect, representing the impact of a country's fiscal policy on its after-COVID-19 inflation rate, and a foreign effect, representing how the fiscal measurements of other countries affect the domestic inflation rate of a country. The results show that Chile is on top of the countries with the highest impact of its fiscal policy on its inflation rates. A fiscal stimulus of 1% led to a 3.29% increase in inflation there, followed by Greece (2.86%) and Lithuania (2.77%). Chile was, together with Great Britain, the United States, Canada, and Japan, one of the countries with extraordinarily strong fiscal support to fight the impact of COVID-19 on their economies, compared to their fiscal trend before the pandemic. For Austria, a value of 1.61% was calculated, putting the country in 14th place among the 52 countries, therefore ranking relatively high, too. This can possibly be attributed to the extensive support by the Austrian government mentioned before. Looking at the impact of foreign countries' measurements on the inflation rates of an economy shows that Luxembourg (7%) and Ireland (6.61%) are on top of the countries with the highest foreign effect on domestic inflation, clearly ahead of the other countries. This is due to the strong economic ties to foreign partners of these two countries. Half of Luxembourg's workforce consists of people who live in neighbouring countries, according to The Government of the Grand Duchy of Luxembourg (2020). Ireland is the European home to many international corporations, like Apple or Microsoft. Austria is ranked in 13th position with a foreign effect of 3.92%.

2.9. On a determined Central Bank's contribution to lower inflation rates

Proactive central banks successfully fight inflation persistence. An important consideration for policies is inflation persistence, the degree of how past inflation, coming from shock events, influences future inflation. In other words, how flexible or inflexible inflation rates react to changing economic conditions and for how long the effects of a shock event last until inflation rates get back again to their long-run means, according to Marques (2004). The higher the inflation persistence, the more aggressively should monetary policy act to get soaring inflation rates under control. But, according to Michau (2019), when inflation is persistent, monetary policy should also be aggressive in an opposite environment, i.e. when interest rates are near zero and inflation is low. In such a case, being aggressive means that central banks should keep interest rates very low for a long time, even when the economy recovers, as this increases inflation expectations, avoiding deflation. They argue that, again, monetary policy measures should be combined with monetary policy measures, i.e. governments should increase spending to support the economy, to overcome economic weakness. Walsh (2022) criticizes central banks for being too slow and too sluggish in fighting inflation in the aftermath of COVID-19. Instead, according to the author, it seems to be more effective to rather estimate a more persistent inflation and a less robust job market than pure numbers would suggest. The central banks' actions could, on the one hand, be partially explained by their estimations that the equilibrium interest rate, r -star, has fallen. R -star is the directly unobservable estimated real interest rate at which economic activities are neither hindered nor fueled by, therefore often referred to as a neutral interest rate. As a consequence, in such an environment inflation rates stay constant, which is the main goal of the ECB and other central banks. If the policy rate of the ECB is set above r -star plus inflation target, the monetary policy is said to be tightening. If the policy rate is set below this measure, the monetary policy is said to be loosening, possibly increasing future inflation rates, see Reis (2022a). Central banks estimate r -star by focusing on the returns of government bonds solely. These returns reflect changes in quasi-risk-free interest rates, as government bonds are backed by the financial capabilities of whole countries. However, they cannot show how profitable and attractive it is to invest capital in private investment opportunities. Reis (2022b) and Reis (2022a) show that since the middle of the 1980s government bond returns have actually fallen constantly over time. But for the same time interval, private capital returns have risen. The estimates show that starting with a gap of about zero between both in 1985, it has widened to nearly eight percentage points in 2019 (0% return on government bonds and 8% return on private capital, both starting from about 6%). This

widening gap displays that investing in private opportunities became yet less attractive over the decades and that looking solely on government bond returns falsely suggests policymakers accept higher inflation rates than before, leading them to a policy that is not aggressive enough in fighting rising inflation and therefore probably contributing to the soaring inflation rates from 2021 on, as Reis (2022a) underpins.

On the other hand, Borio et al. (2023) point out another reason why central banks acted too hesitantly at the beginning of the soaring inflation in 2021: relying on core inflation measures. They develop a model of two inflation regimes, a low-inflation regime, and a high-inflation regime, and suggest central banks to conduct monetary policy in different ways, depending on which of the regimes is prevailing. This is because they argue that transition phases from a low-inflation regime to a high-inflation regime reinforce themselves due to three reasons. First, while inflation is not paid much attention to when it is low, people start to notice it more when it is rising in their personal perception of prices when buying goods or using services and via media coverage. Second, when prices start to rise, they tend to rise similarly for many sectors, increasing people's attention as well. Third, as rising prices mean lower firm profits and lower purchase power of households, both groups try to counteract inflation which can make wage-price spirals more likely to happen. As it is adverse to keep prices constant, they are changed more frequently. Central banks try to predict future inflation rates by often using core inflation, i.e. excluding prices of goods and services that tend to fluctuate much, as they want to gain knowledge of factors for long-term inflation evolution. However, the authors argue that when the environment changes from a low-inflation regime to a high-inflation regime the prices that are most noticeable to consumers (salient prices) tend to increase first and have a greater impact on overall inflation than the prices that are typically used to measure underlying inflation (core prices), which is contrary to the normal inflation pattern. This happened after the beginning of the Russian war against Ukraine and the rebound in global demand: the prices of energy and food have increased significantly. Energy and food prices are salient prices for households, but as they are excluded from core inflation measures, central banks might have a wrong impression of how future inflation evolves.

Chin (2022) shows the utmost importance of decisive monetary policy on future inflation using a Bayesian Vector Autoregression (VAR) model informed by a DSGE prior based on a small-scale New Keynesian Dynamic Stochastic General Equilibrium (DSGE) model, as described in An and Schorfheide (2007). The latter uses only a few variables ("small-scale"), assumes prices and wages do not react instantly to changes in demand and supply, leading to short-run economic fluctuations ("New Keynesian"), allows economic variables to change over time due to decisions of market participants and due to external shocks ("dynamic"),

incorporates stochastic shocks like the establishment of disruptive technologies, government policies, or natural disasters (“stochastic”), and refers to adjusting prices until demand and supply quantities for all goods are simultaneously equal, based on interactions between governments, households, and firms (“general equilibrium”) to analyze macroeconomic fluctuations and policy issues in a closed economy, see Clarida et al. (1999) or Ireland (2004). This model informs the prior distribution and, therefore represents the ex-ante beliefs about likely values before observing the data, which go into the Bayesian model. Then the coefficients of the VAR model are estimated by the observed data and used to update the beliefs about the likely values, getting to a posterior distribution. Bayesian models can have two benefits. First, applying prior knowledge may increase accuracy and precision. Second, as the updated beliefs (the posterior distribution) are based on both prior beliefs (in this case a small-scale New Keynesian DSGE model) and available data, they can provide a more complete picture of the uncertainty and lead to more informed decisions. Their results suggest that using the DSGE-VAR approach is reasonable for studying where persistent inflation comes from and that inflation persistence declined in the 1980s. This can be significantly attributed to aggressive monetary policy, as the study found that when removing this factor, the decline of inflation persistence did not appear in the results. Critically reflecting on the study, one limitation may be the small scale of the model where there are maybe more variables that can influence the results. Lanne (2015) comes to the same conclusion that since the 1980s inflation persistence has been lower than before. They use non-causal autoregressions in their study. Autoregressions are a statistical model that is based on the assumption that the current values of a variable can be predicted by past ones. As the autoregressions are non-causal in this study, current variable values need not be caused by their past values but may be caused by other factors, as Lanne and Saikkonen (2013) state. They add that large, unexpected decreases in inflation are felt for a longer time (i.e. higher persistence) than small unexpected increases (i.e. lower persistence) in inflation only for the period after 1982. Before, high persistence meant high inflation rates, afterwards it meant low inflation rates, which points back to the monetary policy being more aggressive than before.

Bergholt et al. (2023) add that a more aggressive monetary policy led to a flattening of the demand curve, i.e. that inflation reacts less sensitively to changes in demand than before the 1980s. They applied a Structural Vector Autoregression (SVAR) model. Both the above-mentioned classical Vector Autoregression (VAR) model and the SVAR model try to analyse the relationship between multiple variables (“vector”) using time series and linear combinations of the past values of each variable (“autoregression”) and the past values of all other chosen variables. As requirements, these models assume that all variables are endogenous

(i.e., having an impact on each other and their own past values influence them) and that linear equations are a proper form of representing the relationship among the variables. In contrast to VAR, which focuses on the statistical relationships among the variables only, the SVAR model tries to find out the reasons for the observed relationships (“structural”) by identifying shocks using additional knowledge, based on economic theory for instance. The benefit of using SVAR instead of VAR is that it can help to overcome the issue of potential misspecifications of the model or the need for many parameters that, when left out, can cause error terms and distorted results as a consequence, see Kotzé (2019). Bergholt et al. (2023) explain that if private households and companies expect the central bank to take an active and decisive role in fighting inflation, they may change their own consumption and investment decisions in advance, maybe because of simply being more cautious because of fearing interest rates to be set higher by the central banks. There can also be indirect effects on the demand curve by import prices or export competitiveness caused by an aggressive monetary policy if the central bank wants to counter inflation pressures coming from imported goods.

2.10. On the role of companies with high market power on inflation

Companies that can exert price power are pushing inflation. Carlstrom et al. (2009) spot, among the more aggressive monetary policy, another possible explanation for lower inflation persistence since the 1980s, is a lower variability in technology shocks. Technology shocks are changes in technology that were not expected and emerge suddenly. Such changes can be positive or negative for economic development and macroeconomic variables. Positive shocks can lead to higher productivity, and efficiency, or push innovation activities, whereas negative shocks may lead to lower economic growth. When the impact of technology changes on economic development becomes less fluctuating than in the past, mark-up shocks become relatively more important, as the authors state. Mark-up shocks are sudden, unexpected changes in the pricing power of companies. If they gain more pricing power because of a markup shock, they can raise prices which leads to higher inflation rates.⁶ Such a mark-up shock that benefits the pricing power of companies can be observed for the years after the COVID-19 pandemic as the supply side suffered from different restrictions, for example, the long and strict lockdown phase in China, negatively affecting the global supply chain channels, making it difficult for companies to get raw materials or intermediate goods for their production, as Arce et al. (2023) state. However, they observe that

⁶ Again, the cost-push theory comes into play, as mentioned in the remarks on how supply and demand affect inflation rates.

also the high prices for input, like for instance energy, benefit companies to raise prices as they blur the perception of which factor is dominant for higher prices, the higher input costs, or the higher margins companies are charging. Moreover, companies always strive to make up for the past real income losses they incurred during the pandemic.

Santacreu, A.M. and LaBelle, J. (2022) examined the situation in the United States for the year 2021 (January to November) by calculating a measure that shows how much U.S. exports from 26 different industries are affected by foreign supply bottlenecks. They show that, in general, manufacturing industries are (way) more affected than services industries, especially motor vehicles, coke and petroleum products, basic metals, and machinery and equipment. This can be ascribed to their strong dependence on intermediate inputs and the severe supply bottlenecks they faced. Inflation (PPI, producer price index) in these industries was partly among the highest, especially for coke and petroleum products and basic metals, leading the authors to the conclusion that foreign supply bottlenecks and the inflation producers face are positively correlated. But Arce et al. (2023) show that compared to the pre-2022 levels and pre-pandemic levels, company profits increased much stronger than wages, especially in certain sectors, like agriculture (due to higher food prices), energy and utilities, manufacturing (due to higher input costs, less supply, and high demand), construction (due to higher housing demand), and contact-intensive service sectors (due to strong demand). The authors also look back into the past and observe that whereas, in the 24 years between 1999 and 2022, the gross operating surplus per unit of real GDP contributed about a third to the price pressure, in 2022, this share was about two-thirds. If employees' wage demands dampen due to lower rising energy and food prices and companies are less able to exercise pricing power due to easing of tension between the supply and demand side, the price pressure would become lower. This can be supported by an aggressive monetary policy, as higher interest rates lower credit demand and, as a consequence, lower demand. If a central bank does not act decisively enough, both wages and profits may rise strongly, sparking up a wage-price spiral that can lead to long-lasting high inflation rates.

2.11. On the optimal orientation measure for central banks

In theory, solving a Ramsey problem would be best. A key question that arises is which kind of price development should central banks orientate. The ECB focuses on the mentioned HICP when targeting their aim of price stability, but other indices are also conceivable, like the mentioned PPI for instance. Matsumura (2022) studies New Keynesian small economies that are open to international trade and capital flows and are exposed to international price shocks

by solving a Ramsey problem. The Ramsey problem can be traced to the British mathematician, Frank P. Ramsey, who asked about the optimal savings rate of a nation, taking into account individual behaviour, factor prices, and utility and its discounting to identify how resources should be allocated over time to maximize social welfare, see Ramsey (1928). The author examined 35 sectors according to the World Input-Output Database (WIOD) for 40 countries, taking into account the respective price stickiness for each sector. In addition, it is considered that a higher inflation makes exports more expensive relative to foreign goods and therefore less competitive while goods needed for the production of the later export goods get more expensive, leading to a lower trade surplus. Both effects, price stickiness and how inflation impacts trade surplus, are neither considered by HICP nor by PPI. This leads to worse results given welfare. For each of the 40 countries, the least welfare loss would occur if central banks would switch to orientate to Ramsey model index proposed in the paper. Also to be emphasized is that the ranking of how well orientation to the alternatives (core consumer price index, producer price index, headline inflation) works differs from country to country. For Austria, for instance, the second-best alternative to Ramsey would be the PPI, followed by core CPI, least headline inflation. For the United States, using Core CPI would be the second-best alternative, followed by headline inflation, least PPI. Over the whole dataset, Core CPI would be second best for 18 countries, PPI for 16 countries, and headline inflation only for 6 countries, the latter are mainly northern and eastern Europe countries. In reality, it is not that easy to optimize the ECB's strategy by using the proposed model. It assumes that all countries are small open economies, which is not the case for some of them, like for instance the United States or Germany. Furthermore, it does not consider other sources of shocks (e.g. fiscal shocks) and assumes perfect information from a central bank about the economy. The model also assumes that the economies are in a steady state, meaning that all markets are cleared and there is neither economic growth nor economic contraction.

2.12. On the importance of data for monetary policy decisions

Optimal monetary policy needs a lot of different data to be taken into account. Besides these limitations, Corsetti et al. (2010) discuss factors that should be accounted for when deciding about optimal monetary policy in an open economy. They use a DSGE model to study different policy rules conducted in the US economy. When countries interact and trade with each other internationally, the model proposes to only look at output gaps, so the difference between the output level an economy can provide without being in danger of inflation pressures (potential output) and the actual output, as shown in Jahan and Mahmud (2013).

Conducting this alone is challenging, as the data used for calculating output gaps are based on information about past outputs and combined continuously with new arriving information, making them volatile and biased to past experience. It also seems that the perception in which business cycle an economy is at a certain point in time changes significantly over time, making it hard to just rely on output gaps as indicators for the optimal monetary policy, as Gudmundsson et al. (2020) show in their study of 197 countries between 1995 and 2018. However, three influence factors need to be considered, too. First, taxes, subsidies, and regulations can cause sticky prices of imported goods in terms of local currency when they do not change according to exchange rates, leading to different prices on the domestic market compared to the international markets, according to Nicita (2013). Second, as open economies are connected via trade, the monetary policy of one country or region has an impact on other countries welfare, forcing the domestic central bank to balance output gaps of the own economy with export-to-import price ratios (terms of trade), see Kopp (2022). Third, transaction costs, information asymmetries, and limited access to credit interfere with perfect financial markets and can lead to exchange rates that do not reflect the true economic values of two currencies and can cause excess demand or excess supply in certain countries, as described in Greenwald and Stiglitz (1993). According to Corsetti et al. (2010), a central bank of an open economy needs to take into account these factors to conduct a monetary policy that achieves stabilizing while minimizing the costs of economic fluctuations as well as coordinating monetary policies between different central banks.

Greenwood-Nimmo (2014) simulates different policy regimes and includes such an interplay between different central banks. The study models a stock-flow consistent (SFC) model of two countries to analyse the effectiveness of different approaches of monetary and fiscal policy to stabilize real GDP, inflation, and exchange rates. An SFC model tries to depict an economy as a monetary system with consequent, accounting-based relations ("consistent") between balances of financial assets and liabilities ("stocks") and transactions and cash flows over time ("flows") to give an integrated picture of an economy, according to Godley and Lavoie (2012). The model simulation uses persistent inflation and economic cycles to give an incentive for stabilizing the mentioned macroeconomic variables. It involves three different simulations. One is that the central banks of the two countries try to influence inflation to get it within the set target independently of each other; another one is a leader-follower approach where one central bank sets the interest rate first and the other central bank reacts to that; another one is to combine one of the aforementioned approaches with a countercyclical fiscal policy that reacts when inflation is changing. They are tested under the assumption that either exports decrease, wage pressure increases, or income tax is decreased. The

study concludes that neither monetary policy nor fiscal policy alone is sufficiently capable of stabilizing real GDP, inflation, and exchange rates. If no measures are taken, the result is that those variables fluctuate enormously and cannot be stabilized effectively. The result is similar for uncoordinated decisions on interest rates between the two central banks. If both central banks work together in a leader-follower approach the result is better as exchange rates fluctuate less than in the independent decision approach. Combining monetary policy measures with a countercyclical fiscal policy yields the best results. Inflation can be effectively stabilized even when monetary policy is done independently by the central banks, but even better when using a leader-follower approach that minimizes volatility, too. The author uses a relatively simple model that does not incorporate investment behaviour or a financial sector. Typically, changing interest rates cause investment spending reactions by firms. Without a commercial banking sector, the model is restricted to loans from the central bank to the government to finance budget deficits through purchases of government bills as the only source of money creation. Both restrictions implicate that some real-world cyclical dynamics and how monetary policy affects key macroeconomic variables cannot be covered. However, the model can act as a starting point for further analysis.

2.13. Exemplary high and low inflation countries after COVID-19

In the aftermath of the COVID-19 pandemic, the governments of the euro area countries set different measures to fight the adverse effects, like, for example, strongly rising energy prices. Austria witnessed a comparatively high inflation during this period. While the country's inflation rate was constantly lower than the average of the euro area countries as a whole during the past ten years, this changed in the summer of 2022, see Trading Economics (2023). Austria's inflation rate increased more strongly than the euro area as a whole. As Fritzer et al. (2023) state, three main factors contributed to this development: higher company profits, higher unit labour costs, and government support measures. Higher company profits were mainly due to energy companies which benefitted from increasing wholesale energy prices. Wage negotiations resulted in higher wage increases in Austria, compared to other euro area countries. Wages contributed more than two-thirds to inflation in the second quarter of 2023, making them the main driver. The authors expect that wages will also determine inflation development in the near future, as trade unions negotiated significantly higher wages in 2023 than in 2022. Moreover, the workforce is in demand and wanted. Therefore, companies tend to keep their employees even when the economy weakens, causing higher unit labour costs, too. In addition, the Austrian government lowered taxes for some leisure and cultural sectors and put upward pressure on inflation, too.

Other than Austria, France is a country that experienced higher inflation rates than the euro area average in the past, but had lower rates after COVID-19, at least temporarily. This can be attributed to the country's different energy mix, lower stimulus spending, lower wage growth, and different government policies. France relies heavily on nuclear power which was the reason why it was hit less hard by strongly increasing prices for natural gas and oil, according to the World Nuclear Association (2023). The government spent less fiscal stimulus to fight the adverse economic effects of COVID-19 compared to other euro area countries and therefore generated less upward pressure on inflation, as stated in International Monetary Fund (2021). Wages grew only 3.6% in France in 2022, whereas in Austria they increased by 5.5%, according to Eurostat (2023). Slower growing wages mean subdued increasing income and therefore less upward pressure on prices. Moreover, France conducted different government policies as its government decided to regulate energy prices by lowering taxes on energy, measures to incentivize non-nuclear power suppliers to provide more alternative energy, subsidies for gas and electricity suppliers, and regulations to bind the two largest suppliers Engie (natural gas) and EDF (electricity) on tariffs at the then levels, as shown in Rüdinger (2023).

3. Conclusion

Inflation is a complex economic phenomenon that is well-captured in the academic literature, but the factors that influence it are rather diverse and partly in discussion even nowadays.

This literature review highlights what the monetary policy of the central banks and governmental policy by the governments can do to limit inflation to a certain target. The success of these policies depends on several factors, like, for instance, how decisive the institutions are, what the stance of the deciding people is towards economic growth, price stability, and employment, and how well the measures of monetary policy and governmental policy fit together and support each other. Supporting the economy by monetary policy measures was even common in past centuries, but the amount rose in the 20th century. Decision makers that focus more on stable prices and proper behaviour of market participants may risk deflation after a crisis, whereas decision makers who focus on employment and economic growth risk further financial crises due to excessive support measures. For instance, long-lasting relief programs during and after economic crises may lead to higher inflation rates. Whatever direction these decisions take, they influence supply and demand in an economy and therefore drive future inflation rates. The academic literature suggests preferring monetary policy measures over governmental policy

measures, mainly because the former can be conducted faster and the latter has to be accompanied by lower government spending to avoid a too-high future debt burden of a country or region. Studies suggest that monetary policy measures are also effective in fighting persistent inflation. On the other hand, higher interest rates because of a tighter monetary policy can also lead to higher debt, as governments have to pay more on interest and may face lower tax revenues as economic growth slows down due to lower credit demand. If fiscal policy takes the lead, the literature is split over the consequences of it for inflation. Some of the studies indicate that fiscal policy shocks can lead to higher inflation rates, others suggest that inflation may remain stable or even decrease, depending on the prevailing inflation level, available technology, and the credibility of policy measures. In any case, central banks and governments should cooperate when it comes to fighting inflation to secure an effective and trustful policy.

One limitation of this literature review is that it relies on studies that may not fully capture the dynamic and evolving nature of the global economy. Changing economic conditions, advanced technological developments, and changing geopolitical situations may lead to restricted applicability of the findings of past research literature on future scenarios. Another limitation is the general focus on the euro area, i.e. highly-developed countries. Therefore, the findings in the literature may not be applicable to developing countries as these often have substantially different economic structures.

For these reasons, future research could investigate more in-depth how effective inflation management strategies across different economic systems and development stages are to establish monetary policy and governmental policy measures that fit better to certain economic contexts. Moreover, it could draw on the unconventional policy measures in the aftermath of COVID-19 and other crises to explore their long-term effects on future inflation rates.

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Summary

Inflation is a crucial issue for businesses and households, central banks and governments, in fact for all economic actors, as it has a strong impact on economic growth and welfare. This literature review captures how monetary policy and governmental policy can control inflation, how their measures work, and which are the key points to consider when conducting these policies, especially in times of crises. It uses academic papers from the past eight decades, supplemented by publications from financial and economic institutions, but focuses on literature beginning with the 2000s to capture the latest methods and techniques to find out what drives inflation and how. Monetary policy and governmental policy should act together to effectively fight inflation. Monetary policy can have adverse effects on governments' future tax revenues and debt-to-GDP ratios. Fiscal policy measures should be associated with altered government spending to avoid high inflation rates and/or high debt burdens in the future. Especially during and right after crises, measures have to be evaluated as too long support can fuel inflation in the future. Both parties should also take into account people's inflation expectations, as these shape their economic behaviour.

JEL codes: E52, E62, E63

Keywords: *inflation, monetary policy, fiscal policy, governmental policy, policy instruments, policy effects, inflation expectations*