IN-DEPTH ANALYSIS

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Monetary Dialogue Papers, November 2020

European Parliament

# Monetary Policy in the Time of COVID-19, or How Uncertainty is Here to Stay


Policy Department for Economic, Scientific and Quality of Life Policies
Directorate-General for Internal Policies
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# Monetary Policy in the Time of COVID-19, or How Uncertainty is Here to Stay

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**Abstract**

The COVID-19 crisis has compounded the uncertainty that has come to characterise the European economy. We explore how this uncertainty manifests itself in terms of ECB decision-making and the long-run challenges the ECB faces. Confidence in ECB actions will come from the contingency scenarios it considers and communicates on, and from the adoption of potential policies for a wide range of such scenarios. Greater clarity around the ECB's inflation target and surrounding tolerance bands would also be beneficial.

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# CONTENTS

# LIST OF ABBREVIATIONS

| | |
|---|---|
| **ABSPP** | Asset-backed securities purchase programme |
| **APP** | Asset purchase programme |
| **CBPP** | Covered bond purchase programme |
| **CSPP** | Corporate sector purchase programme |
| **ECB** | European Central Bank |
| **EP** | European Parliament |
| **EPU** | Economic Policy Uncertainty |
| **EU** | European Union |
| **GDP** | Gross domestic product |
| **HICP** | Harmonised Index of Consumer Prices |
| **MRO** | Main refinancing operations |
| **NPL** | Non-performing loans |
| **PEPP** | Pandemic emergency purchase programme |
| **PSPP** | Public sector purchase programme |
| **SMP** | Securities markets programme |
| **QE** | Quantitative easing |
| **TLTRO** | Targeted longer-term refinancing operations |
| **VIX** | (Chicago Board Options Exchange) Volatility Index |
| **VSTOXX** | Euro Stoxx 50 Volatility Index |

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# EXECUTIVE SUMMARY


- **Even before the COVID-19 pandemic the European macro-economic environment was approaching a poorly understood 'new normal' that the European Central Bank (ECB) sought to navigate with unconventional tools**. The pandemic has accelerated some of these trends, pushing real interest rates further into negative territory and moving economies further from equilibrium.
- **The unprecedented resulting increase in uncertainty is evident in the different proxies used to measure it**: newspaper and Twitter analyses, stock market implied volatility and cross-sectional disagreements in forecaster estimates.
- **Moreover, traditional notions of uncertainty depend on the idea that we can measure risks reliably, which is no longer entirely the case**. Current circumstances approach fundamental uncertainty: our understanding of both the COVID-19 shock and the new economic equilibriumare incomplete.
- **In the shorter term, this uncertainty manifests itself in the effects of immediate ECB policy**.
- **The pandemic affects inflation through both supply and demand mechanisms**. While overall it appears deflationary, inflation risks remain and compound uncertainty, exacerbated by a growing supply of money and soaring debt, and the small possibility of fiscal dominance.
- **Unconventional measures, while perhaps necessary to stabilise an exceptional situation, lead to rapid expansion of an already large balance sheet, with uncertain consequences**. The subsequent compression of sovereign spreads raises concerns about medium-term debt sustainability and whether the ECB could conceivably come under pressure to continue support beyond the appropriate horizon.
- **These aspects combine with more fundamental challenges for monetary policy from the increasing uncertainty about the state of the world**.
- **Market and econometric estimates both place the equilibrium real interest rate in negative territory**, which is fundamentally 'not normal' and a source of concern about clearing capital markets and central bank ability to manage demand.
- **The design of monetary policy relies on estimates of oft-unobserved variables**, yet forecasting has become increasingly inaccurate in the presence of fundamental uncertainty, and thus less useful in informing policy.
- **In these circumstances, traditional confidence intervals should be discarded**; confidence is provided instead by the range of contingency scenarios considered. The ECB should provide a certain set of predictions based on a range of assumption outcomes.
- **Effective communication of these assumptions is key and should focus on what the response will be to a wide range of scenarios if they materialise** (as opposed to focusing on what the ECB expects to happen).
- **Policy options should then be ranked based on their ability to keep inflation within an acceptable (pre-determined) range for a wide set of assumptions** (i.e. in the most extreme scenarios).
- **Additionally, redefining the price stability objective to a simple target of 2% would help best manage inflation under uncertainty**. Under the theory of focal points, greater clarity improves

communication and provides a good signal to the markets that should facilitate the achievement of the target.

- **Finally, the establishment of a tolerance band around this target would explicitly set the levels of inflation that are tolerable.** Remaining within this range establishes credibility, while the cost of failing to do so is also heightened. The bands should be moderately wide: in times of uncertainty, it is more important for the ECB to be predictable than precise.

# 1. INTRODUCTION

The euro area is forecast to contract by 8.7% in 2020 and grow by 6.1% in 2021 (European Commission, 2020). The drop in GDP in 2009, the worst year of the financial crisis, was just over 5%. There is no doubt that the drop we face today is much more significant, although it is expected to be short-lived and with a sharp bounce back. However, all EU countries are currently going through a COVID-19 second wave which is worse than the first wave in terms of number of infections, albeit with fewer deaths at time of writing. Countries, one after the other, apply partial shut-downs to contain the spread of the virus. Who knows what the real hit to the economy will be, and indeed how long it will be before we can resume normality?

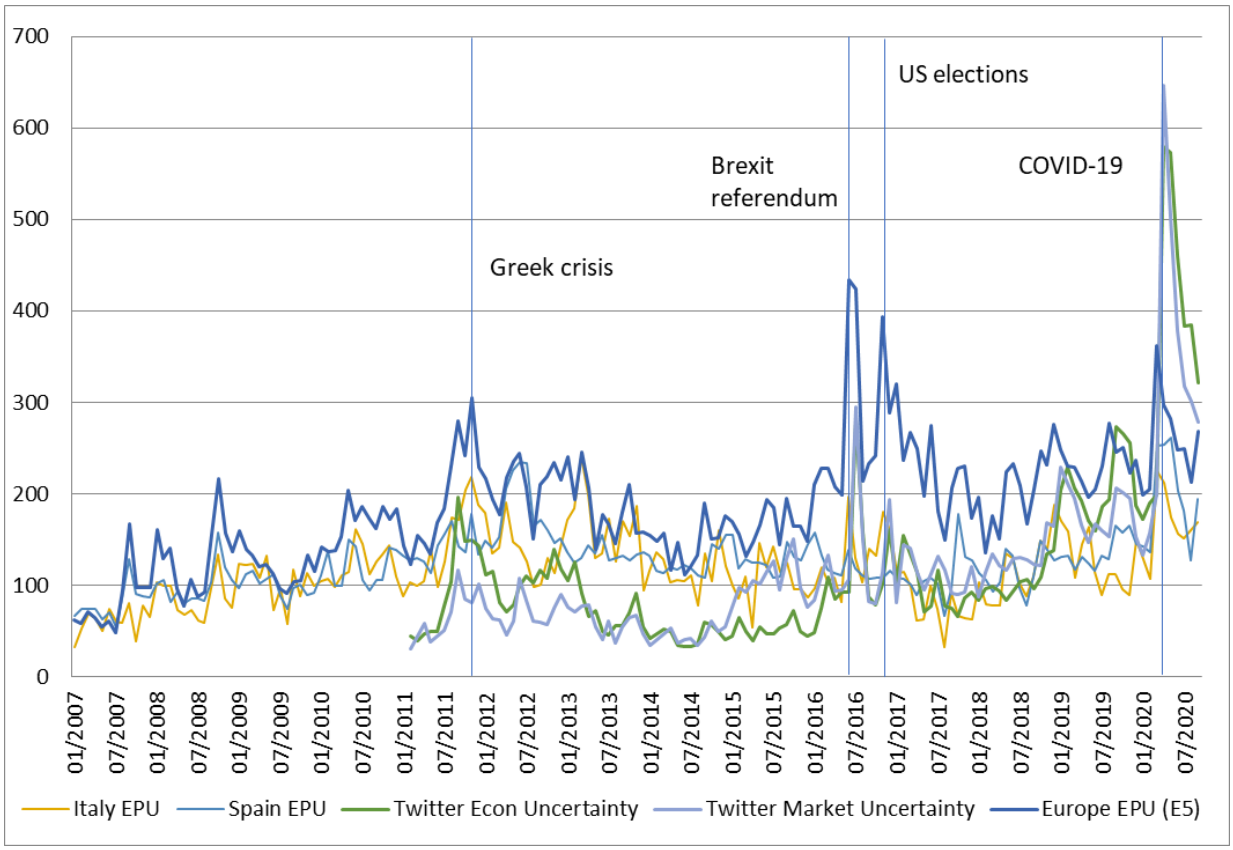
Furthermore, the notion of a "return to normality" masks the fact that major shifts were taking place in the global economy before the outbreak of the COVID-19 health crisis. Digitisation, globalisation and its possible reversal, and shifting powers across the globe all point to a transition underway and to a poorly understood "new normal" that the European Central Bank (ECB) has been navigating for some years now with unconventional monetary tools. Policy design in such circumstances becomes particularly difficult: how can you steer a boat when the destination remains unknown (Claeys et al., 2019)?

The global pandemic has accelerated some of these trends, such as digitisation, but has interrupted and possibly reversed others, such as long integrated value chains. COVID-19 appears to have pushed real interest rates further into negative territory and moved our economies further from equilibrium, undermining our ability to forecast. If one thing is clear, it is that the pandemic is adding to an already high level of uncertainty. And while policy intervention, including by the ECB, will need to be present and big, it will be guided by changing and imprecise information.

Before we delve further into these mechanisms, it is worth trying to get a sense of how uncertainty has evolved in recent years. Figures 1 to 3 present different measures that can be used as proxies for uncertainty: the expression of economic uncertainty in newspapers and on Twitter, implied volatility of options in the market, and the cross-sectional disagreement between forecasters' growth estimates. All three show an evident peak at the outset of the pandemic.

First, Figure 1 plots the frequency of the word "uncertainty" in the popular press and in tweets. A small peak is evident during the Greek crisis, followed by a slightly larger double peak in 2016 around the Brexit referendum and then the election of Trump, and a final and more significant peak in the past few months related to the COVID-19 uncertainty. Both the medium-term build-up and the compounding effects of COVID-19 are evident. This is particularly clear in the two Twitter indices, although all measures exhibited are comfortably above 100.

Figure 1: Newspaper and Twitter text uncertainty measures hit all-time highs during the pandemic




Source: Bruegel. For Economic Policy Uncertainty (EPUs): Baker et al. (2016) for Italy and Ghirelli et al. (2019) for Spain. St Louis Fed for Europe EPU Index (constructed from newspaper uncertainty in the five largest economies: France, Germany, Italy, Spain and UK).

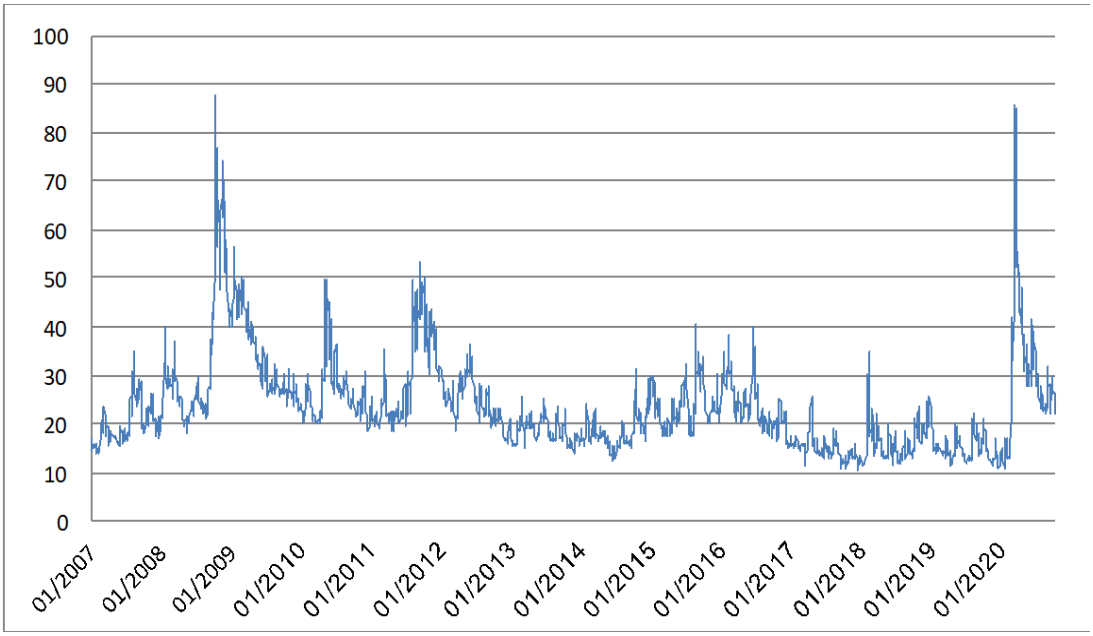
Notes: See Baker et al. (2016) for details of EPU index construction. Monthly values available at http://www.policyuncertainty.com/. The daily version of this index reflects the frequency of newspaper articles with one or more terms about "economics," "policy" and "uncertainty" in roughly 1,000 daily US newspapers. It is normalised such that its mean value over the period from 1985 to 2010 is 100, so values above 100 reflect higher-than-average uncertainty. For Twitter-based Economic Uncertainty (TEU) and Twitter-based Market Uncertainty (TMU), see Renault et al. (2000). The index is constructed by extracting all tweets related to uncertainty, economics and equity markets, then rescaling each series to a mean of 100 from 2010 to 2015. Values exhibited represent rolling monthly averages to avoid the excessive prevalence of isolated one-day events. Daily values available at http://www.policyuncertainty.com/. Twitter-based measures constructed from tweets only in English, thus best reflecting the situation in the English-speaking world.

Other measures of uncertainty tell a similar story. Figure 2 plots the VSTOXX index, which is the euro area volatility index (similar to the VIXX in the US). It tracks the implied volatility of EURO STOXX 50 options, those of the primary European equities index. The evident peak that followed the outset of the COVID-19 crisis is only comparable to the financial crash of 2008. Implied volatility captures market expectations of the move in a security's price, thus indicating market expectations of large fluctuations, given economic uncertainty.

Finally, Figure 3 looks at a third alternative proxy of uncertainty – disagreements between professional forecasters over the economic outlook. We constructed this measure for the euro area by looking at GDP growth expectations from the ECB's survey of professional forecasters. To measure the degree of disagreement, we plotted the standard deviation between the estimates of different forecasters at each point in time. This was calculated for the expected year-on-year change in real GDP two and six

quarters after the forecasting date. The results are striking. The COVID pandemic has resulted in an unprecedented spike in forecaster disagreement almost triple that seen during the Great Financial Crisis. Professional forecasters thus expect very different states of the world in just six and 18-months' time. This measure was first constructed by Altig et al. (2020) for the US and UK, for both of which the results were similar.

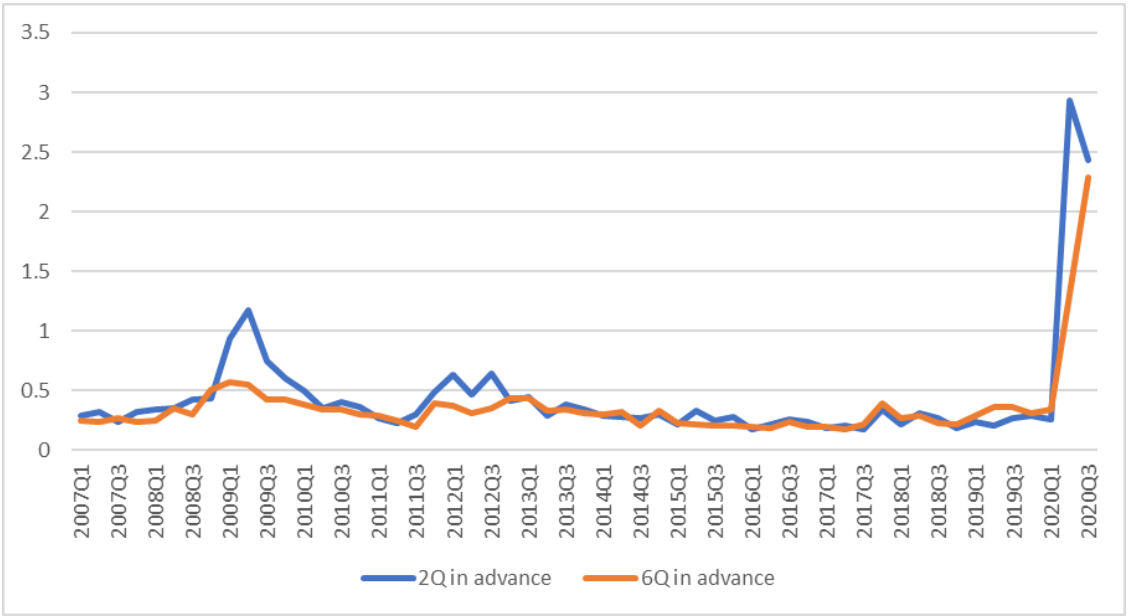
Figure 2: VSTOXX index




Source: Bloomberg.

Notes: The VSTOXX Index, similarly to the VIXX Index in the US, measures euro area stock market volatility through the implied volatility of EURO STOXX 50 Index options with rolling 30-day expiry. While implied volatility structurally trends above realised volatility, its evolution through time is the variable of interest.

Figure 3: Cross-sectional dispersion, GDP growth forecasts




Source: Bruegel based on ECB Survey of Professional Forecasters, standard deviation between forecasts. See https://www.ecb.europa.eu/stats/ecb_surveys/survey_of_professional_forecasters/html/index.en.html.

But while measures of uncertainty provide an informative signal of volatility, they are also based on the assumption that risk can be measured. And if it can be measured, then policy can rely on such measurements to "optimise" and achieve precise and well-defined outcomes. But both the nature of the current health shock and the significant structural changes in the global economy, in our view, imply that uncertainty cannot be measured reliably. Our understanding therefore of how the challenges we face will work themselves out in the economy is incomplete.

With this in mind, we describe COVID-19's effects on inflation and discuss possible risks arising from ECB decisions. We then look at how uncertainty poses challenges for monetary policy in the long run, given the inoperability of an uncertain and negative equilibrium real interest rate and under increasingly imprecise forecasts that are unable to capture our present deviations from equilibrium.

The first issue is to understand whether COVID-19 is deflationary or inflationary, and over what term. The ECB's latest forecast[1] is that annual inflation will drop to 0.4% in 2020 but will gradually recover in 2021 (1.0%) and 2022 (1.3%). While most scholars tend to see deflationary effects as more pronounced, others, such as Goodhart and Pradhan (2020), maintain that given the massive policy measures on the fiscal and monetary sides, the risk of high inflation beyond the policy horizon are not negligible. As we will show, markets do not seem to agree with this.

Second, beyond the inflationary impact, ECB non-conventional measures imply a big increase in its balance sheet. Two risks are associated with this: first, what does a large balance sheet mean for bank profitability and financial stability? Second, the immediate impact of ECB policy has been to suppress the cost of borrowing for all Member States[2], thus allowing them to finance expenditure associated with containing the pandemic. Will these suppressed costs continue without the ECB's help, and is it conceivable that the ECB will come under pressure, threatening its independence, to continue quantitative easing (QE)? And what about the sustainability without ECB support of national fiscal debts, which will have increased as a result of COVID-19?

Third, the current shock has aggravated longer-term challenges from increasing uncertainty about the state of the world, which were already present. Markets believe that the nominal rate will hover around zero for the next 10 years and possibly longer. This means that policy space will be seriously constrained. At the same time, given very low inflation, markets expect that real interest rates will remain negative for a long time. What do sustained negative real interest rates mean for the clearing of capital and how does this affect a central bank's ability to manage demand?

Lastly, the existence of fundamental uncertainty poses a serious challenge for central banks when measuring and designing policy. We will show that forecasting in general has been very inaccurate during big structural shifts and also continued to underperform persistently afterwards.

[1] HICP forecast in 2020 Q3. See https://www.ecb.europa.eu/stats/ecb_surveys/survey_of_professional_forecasters/html/table_hist_hicp.en.html.

[2] Including Greece, whose debt is still not rated as investment grade.

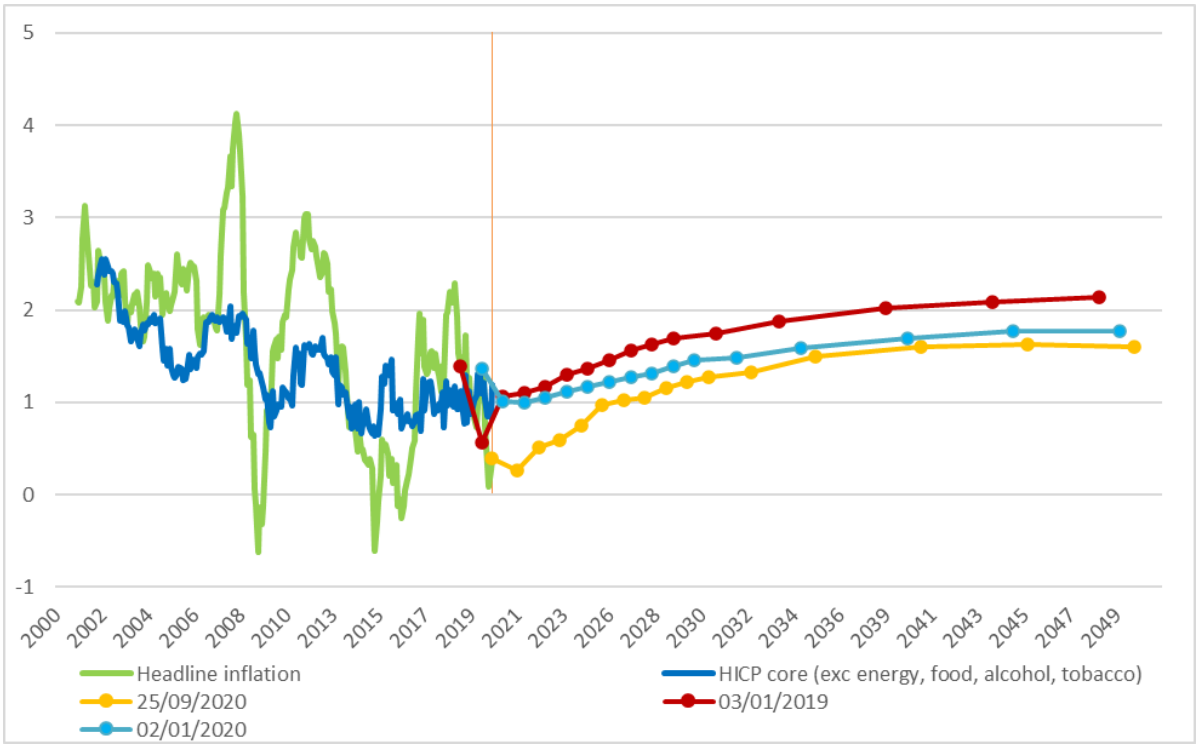
# 2. UNDERSTANDING THE EFFECTS OF ECB POLICY DECISIONS

The COVID-19 pandemic will have far-reaching economic consequences that are not yet well understood. When it comes to inflation, the mechanisms at play are often contradictory. Thus, while most scholars believe COVID-19 will be deflationary, the possibility of high inflation remains. Meanwhile, ECB actions to combat the downturn have been largely necessary, but they still compound certain sources of uncertainty: the effects of the ballooning balance sheet and the medium-term outlook for sovereign debt sustainability, and whether ECB support for spreads will damage ECB independence.

## 2.1. Inflation and COVID-19

The first issue is how the pandemic and the ECB's response to it will affect inflation. Is there any inflation risk from the pandemic, arising from the combination of supply chain disruption and very aggressive fiscal and monetary stimulus (and quasi monetisation of debt)? While, so far, COVID-19 appears to have had a deflationary effect on the euro area, and most scholars[3] concur these effects will continue, others have warned of the risks of inflation.

Figure 4: Headline and core inflation, including expectations in the euro area




Source: Bruegel based on Bloomberg.

Figure 4 shows the initial effect of the pandemic has been evidently deflationary. Headline inflation between January and July dropped by almost one full percentage point, and inflation expectations remain under 1% for the next five years. This is a relatively big change from what markets were expecting back in January 2020 (especially up to 2026). The longer-term expectations curve also shows

[3] See Guerrieri et al. (2020), Blanchard (2020), Landau (2020), Balleer et al. (2020) and Miles and Scott (2020).

a small downward shift of around 15 basis points (bps). The market for inflation swaps becomes less liquid over the 15 to 20-year horizon and is therefore less informative.

The mechanisms at play require some disentangling. Historically, pandemics have been found to have an inflationary effect because the disruption of supply, resulting from a reduction in labour from mortality and morbidity, is larger than the disruption in aggregate demand[4].

However, in the current pandemic, the bulk of the economic effect has been driven by containment measures and not disruptions of the supply of labour. Initially, COVID-19 resulted in a large supply shock, given the disruption to global value chains and production, but a seemingly larger aggregate demand shock followed. Household consumption fell because of precautionary saving, social distancing measures, income cuts and eventually also loss of employment. Uncertainty and mounting debt have subdued corporate investment. This was compounded by the collapse in the price of oil (among other commodities). Guerrieri et al. (2020) presented an interesting model of what they term Keynesian supply shocks to explain the theoretical mechanism through which some of the effects, such as those of the current pandemic (such as shutdowns, layoffs and exiting firms), may cause larger aggregate demand shocks. The data and general consensus appear to agree with them: overall, the effects of the pandemic appear to be deflationary.

Two main arguments against this have been made. First, there is a mainstream group of scholars that agrees that, while the effects will most likely be deflationary, there is a small risk of a surge in inflation. This could happen if debt-to-GDP saw a very large surge (above 30%) through several years of widespread government support, causing an increase in the natural rate of interest (above growth) culminating in fiscal dominance of monetary policy (Blanchard, 2020). However, as we will show, there are many factors that have put and continue to put downward pressure to the natural rate of interest. This scenario is therefore unlikely to happen. While the quasi-monetisation of government debt presents some inflation risks, inflation expectations remain low (Landau, 2020).

Goodhart (2020) however sees a different outlook for inflation. It is true, he argues, that despite the large increase in the supply of money, inflation has not increased yet, but this he explains by the fact that the velocity of broad money has been falling at a similar rate (because of the temporary decrease in activity and incomes and rise in precautionary savings). However, once velocity recovers, the inflation risk could be high. Miles and Scott (2020) on the other hand argued that while the stock of money has risen substantially, the fall in the value of private-sector assets should more than compensate for these effects. Either way, underlying forces will cause greater inflation volatility in the near future, thus contributing to overall uncertainty (Brunnermeier, 2020).

## 2.2. More QE to suppress the spreads?

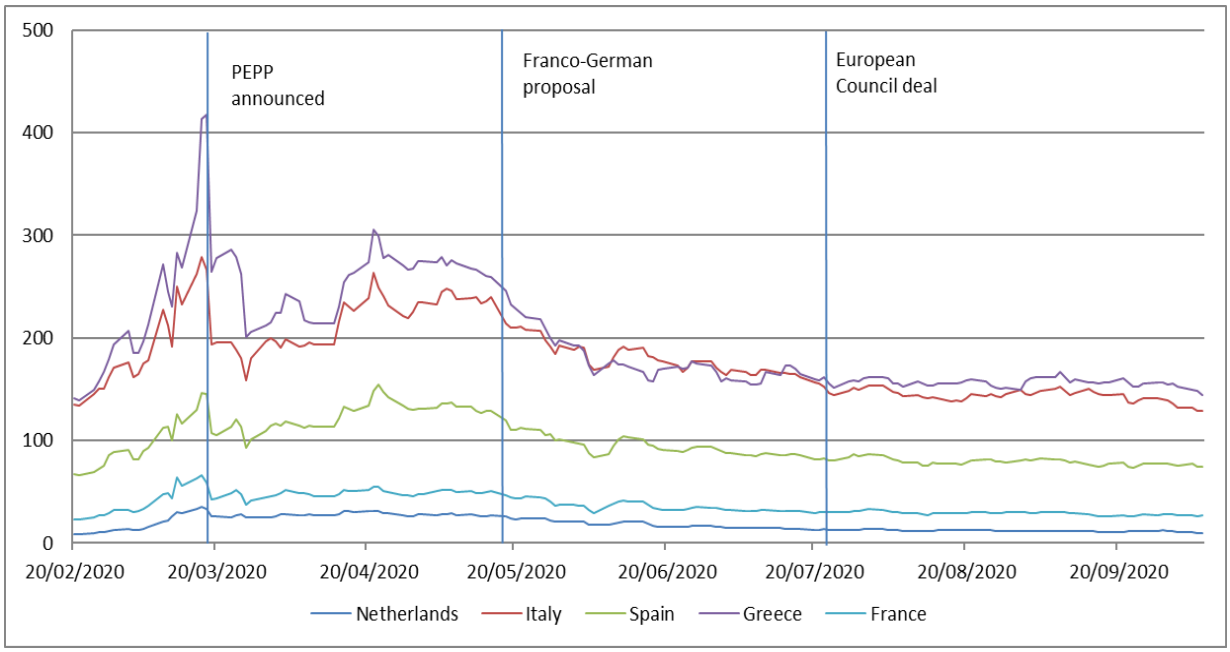
Then, there is the question of the ECB balance sheet and the recent performance of sovereign spreads. With the nominal rate at zero, the central bank lacks conventional tools. At the start of the pandemic the ECB's initial response came in two steps. First, they reduced the targeted longer-term refinancing operations (TLTRO) refinancing rate to -75 bps, establishing an indirect "subsidy" to banks that borrowed under the TLTRO (derived from borrowing at -75 bps and depositing at -50 bps). In parallel, the ECB loosened regulatory requirements and reactivated QE with an initial EUR 120 billion. Second, and most significantly, on 18 March, the ECB introduced the pandemic emergency purchase programme (PEPP). Under this new asset purchase programme, self-imposed issuer limits no longer

[4] For example, Barro et al. (2020), when looking at the Spanish flu, found 1% mortality to have an effect of around 10 percentage points on inflation. Similarly, Keogh-Brown et al. (2010) simulated the contemporary effects of an influenza pandemic in the UK, finding, in the most severe scenario, yearly inflation rising by 1.64%.

apply, Greek debt became eligible for purchase and there was greater flexibility to deviate from the capital key.

Figure 5 shows that the effects of this were immediate. Almost exactly at the time of the announcement, sovereign spreads for all euro area countries fell substantially against the German bund. For Italy and Greece, this provided much-needed relief and ensured they could continue to obtain market financing at sustainable rates. ECB support on sovereign markets assuaged any fears of a possible new sovereign debt crisis and allowed member states to react to the pandemic (Consiglio and Zenios, 2020).

Figure 5: Sovereign spreads, 10Y, to DE (February-September 2020)

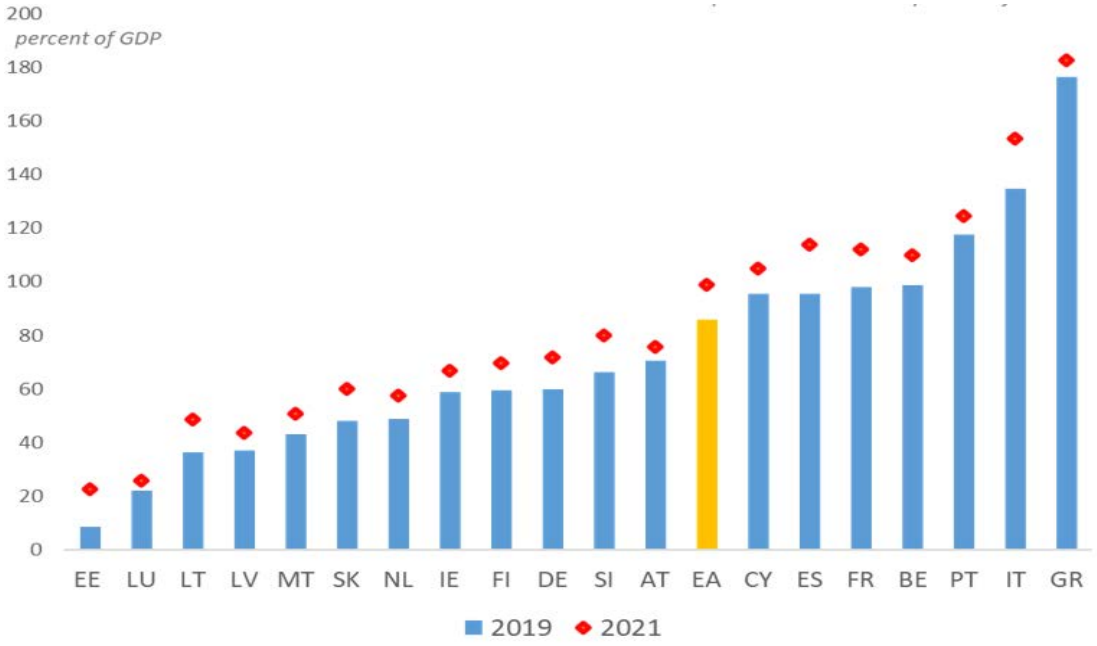



Source: Bloomberg.

Note: the Franco-German proposal was the plan published by France and Germany in May 2020 for a recovery fund based on EU borrowing. It was succeeded by the European Commission's proposal for what became Next Generation EU.

Necessary though these measures are, they do not come without risks. First, the combination of the PEPP and funds under the EU recovery plan, Next Generation EU, has ensured that spreads are kept low and that countries can access the market at low rates in order to deal with the pandemic. The compression of spreads may have been a positive short-term development given the lessons of the past crisis and the need for Member States to have the policy space to combat the unprecedented circumstances. However, these very small spreads might not necessarily reflect the real cost of debt. Lest we forget, spreads for different euro area countries almost entirely disappeared with the introduction of the euro, because of a false market understanding of *de facto* risk-sharing (if it became necessary), which was ultimately damaging. While the circumstances are different this time and spreads have not disappeared, they are around their pre-COVID-19 levels and Member State debt continues to increase (Figure 6).

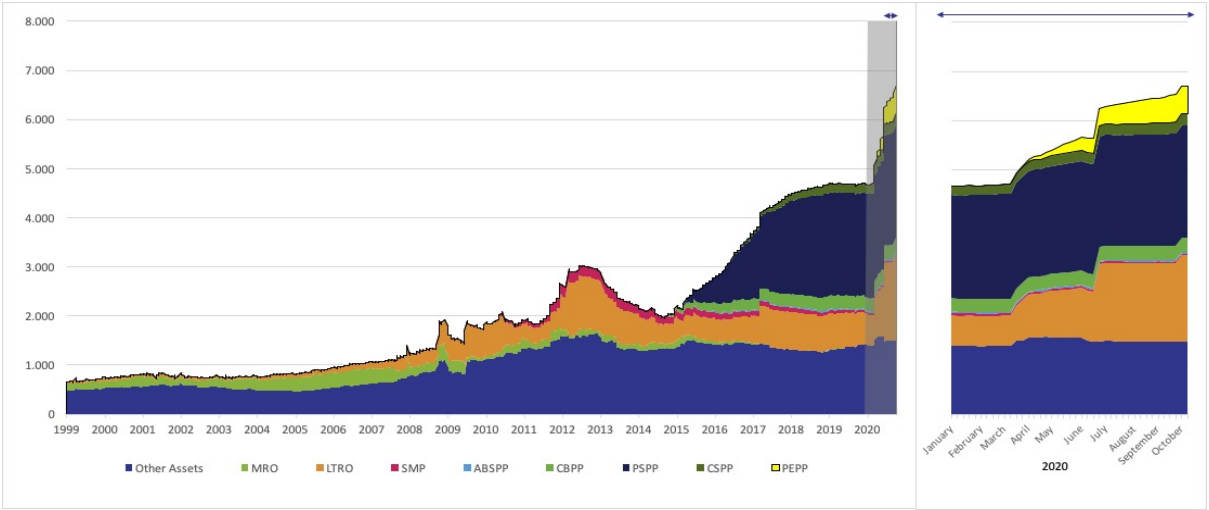
Figure 6: Public debt in the euro area in 2019 vs. projections 2021




Source: European Commission, April 2020 forecast.

Uncertainty also stems from the evolution of the ECB balance sheet. Figure 7 shows that this grew from about EUR 4.8 trillion to just below EUR 7 trillion in a few months. Not all of the growth in the balance sheet is due to the PEPP. As graph 7 shows much of the growth in the balance sheet is due to the increase in the liquidity provision LTRO (orange part).

Figure 7: ECB balance sheet expands during the pandemic




Source: Bloomberg.

The effects of an increased central bank balance sheet are not yet entirely known, though there is no evidence of impact on bank profitability (see Altavilla et al., 2017). The macroeconomic effects of QE are also unclear. When the ECB ended its net purchases in 2018, self-imposed issuer limits of 33%, which had been in place from the outset, had been reached in some jurisdictions (Claeys et al., 2018). The

rationale for this limit was that the ECB did not wish to be in the position of having the power to block the restructuring of a euro area country's ECB-held debt, on the basis that not blocking such a restructuring might be interpreted as monetary financing. Combined with the rule that requires purchases to be proportionate to the shares of different national central banks in the ECB's capital (exhibited in the capital key), this limit reduces drastically the scope of asset purchases. This first condition (issuer limits) will not apply for the PEPP, and there will be greater flexibility to diverge from the capital key. For the ECB to be able to implement the PEPP it has had to break these self-imposed limits on how much it purchases, meaning it is going against its previous rationale.

From this, two key challenges are evident: 1) what does this ballooning balance sheet mean for central bank health and what will be the side effects on aspects such as bank profitability? (Altavilla et al., 2017). And 2) what will be the medium-term outlook with compressed spreads? Will the ECB need to support the spreads and at what cost for its independence (in particular if there arises a need to restructure debts)?

# 3. MONETARY POLICY AND DEALING WITH LONG-TERM CHALLENGES

Beyond the uncertain policy circumstances brought about by the pandemic and the ECB's actions under uncertainty, wider structural issues have been posing a challenge for monetary policy in the longer term. First, there is the uncertainty regarding an apparently negative equilibrium real interest rate. As the traditional benchmark for monetary policy, lack of understanding of this new normal has left the ECB operating without direction. Second, the forecasting models that produce estimates used as inputs to determine monetary policy have become increasingly inaccurate in the past decade. Designed to mean-revert, they have remained continuously off the mark following larger deviations from equilibrium.

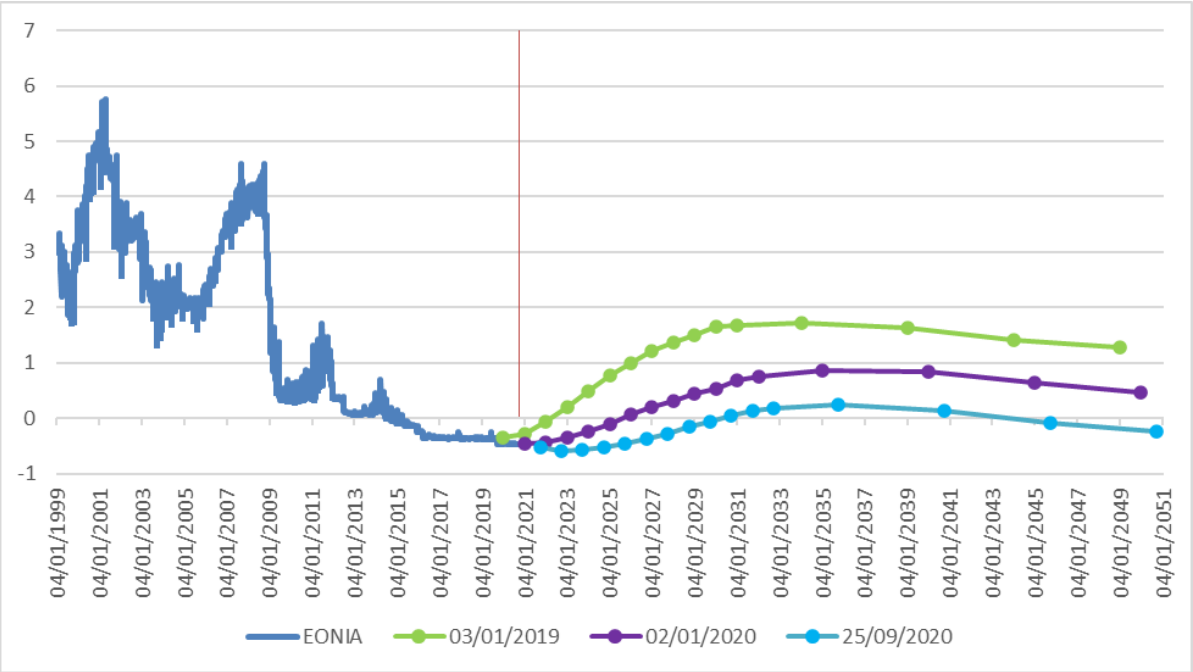
## 3.1. Interest rates: negative for ever?

A more longstanding challenge, compounded by COVID-19, arises from the recent levels of nominal and real interest rates, with the latter now negative even in equilibrium (according to markets and more econometric estimates).

The scope for applying traditional monetary policy tools has been substantially reduced. While there is evidently no constraint on tightening, there is very limited room to ease monetary policy further, given that nominal interest rates are at their lowest level. There is very little scope for the ECB to support demand at the zero lower-bound, with the continuation of QE being the obvious first alternative despite the risks we have described. And while low rates are the result of many evolving factors, they further suppress productivity and growth, in a self-reinforcing circle.

Figure 8 shows that the COVID-19 pandemic has had a substantial effect on this, in that it has caused a further downward shift in the yield curve. Markets now expect interest rates to remain negative for over a decade and hover around zero after that.

Figure 8: Nominal interest rate in the euro area (policy rate) up to 2050



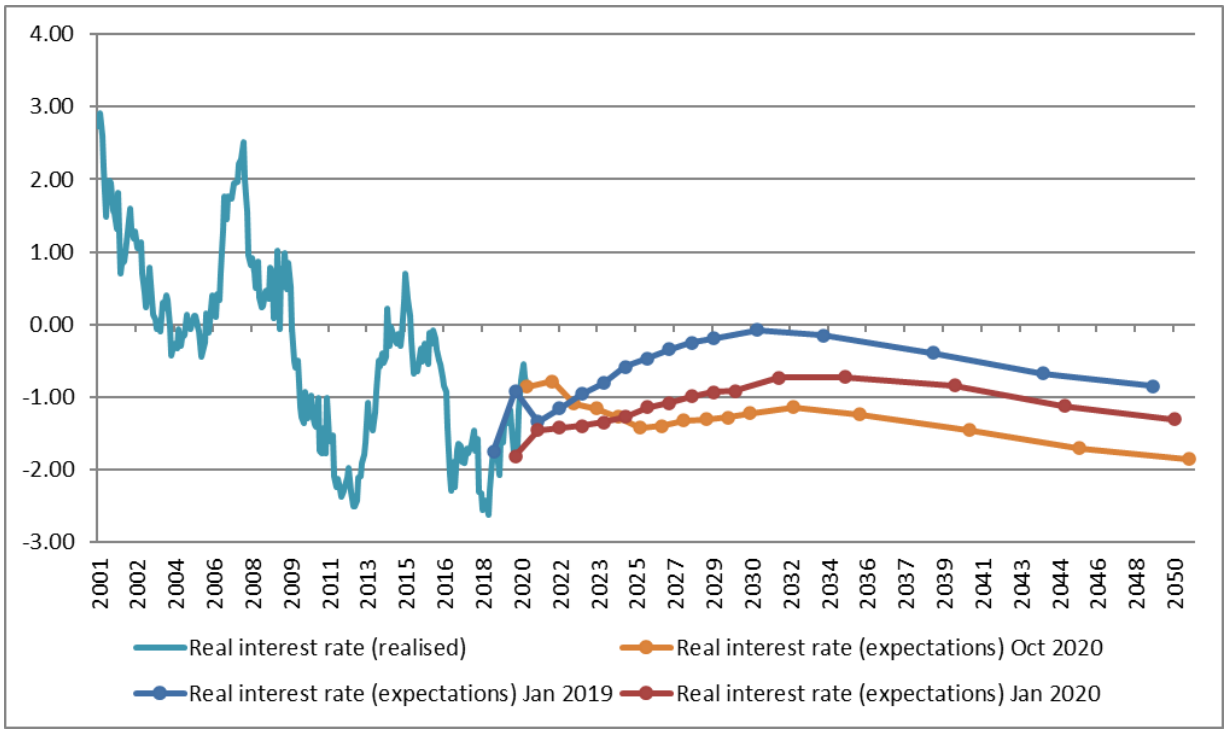

Source: Bruegel based on Bloomberg.

Note: Inflation expectations are derived from inflation zero-coupon swaps of different terms (1 year, 2 years, up to 10 years), which provide information on market expectations of average yearly inflation over the contract term. Expectations for 2020 inflation, for instance, are derived through expected inflation over the next year (2019), given by the 1-year swap, and expected inflation over the next two years (2019 and 2020), given by the 2-year swap. Expectations related to the Eurostat HICP exc. tobacco.

Protracted periods of low rates raise significant concerns, in particular for financial stability. Financial institutions (including non-bank institutions) may pursue yield enhancement through excessively risky means, including with complex structured products (Dell'Ariccia et al., 2017). Though non-performing loans (NPL) that built up in the financial crisis had reduced substantially before the pandemic, households and firms in many euro area countries were already highly indebted. The debt overhang can be a source of financial instability. With the pandemic, the situation has become more precarious. Through well-capitalised banks, it has been possible to avoid a genuine financial dimension to the crisis so far, but it is not clear whether this can be sustained.

The combination of zero nominal rates but positive inflation (Figure 4) implies that real interest rates are also expected to remain negative for the market's entire horizon (Figure 9). This has been exacerbated by the pandemic for most of this horizon, though interestingly not for the first few years (explained by the collapse in inflation). However, the real rate's entire curve was already negative (though only just) even at the start of 2019, when the outlook for the euro area economy was bright, pointing to a more structural explanation. Arguably, the notion of negative long-term interest rates (for the entire curve) could be identified with equilibrium. In effect, a negative, 30-year interest rate begs the question of where this places the equilibrium real interest rate, which functions as the benchmark for monetary policy. But what does a negative real cost of capital (in equilibrium) mean for the efficient allocation of resources? Can demand management, including by the ECB, be counted upon to manage prices and clear supply and demand?

Figure 9: Real interest rate (realised and expectations)

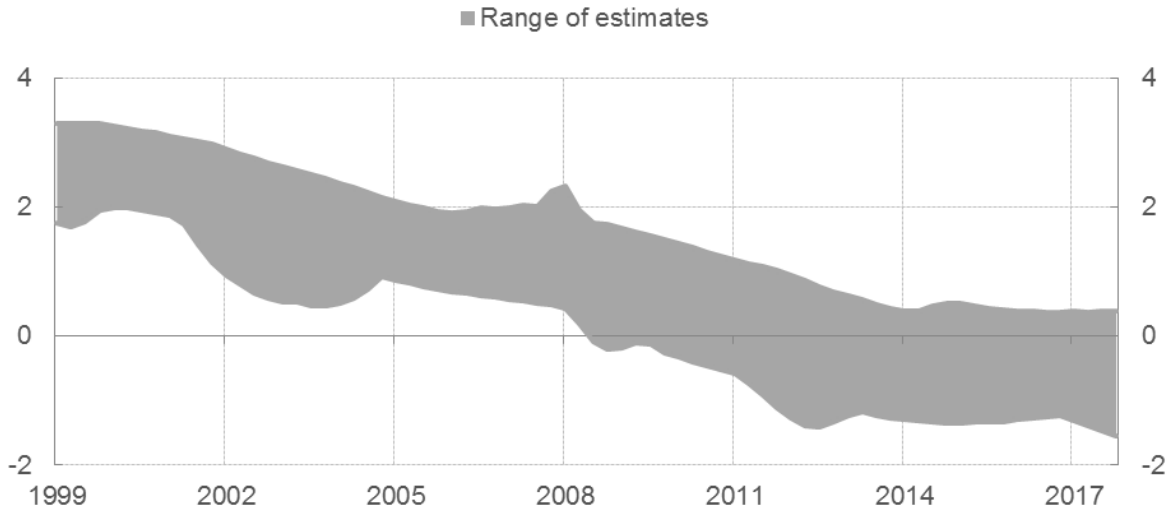



Source: Bloomberg.

Notes: Compounded as the difference between the nominal interest rate and inflation.

Granted, beyond market expectations, estimates of the natural equilibrium real interest rate are very poor as they rely on largely unobserved variables (see Beyer and Wieland, 2019). However, this is consistent with attempts to estimate the interest rate in equilibrium. Figure 10 maps the range of such estimates taken from the literature (including Fiorentini et al., 2018; Hledik et al., 2018; Holston et al., 2017; and Jarocinsk et al., 2017) and shows that the equilibrium interest rate has been declining now for some decades and was already in negative territory around 2018.

Figure 10: Range of point estimates of the natural rate of interest in the euro area obtained from econometric models (percentages)




Source: Philip Lane, Remarks, Dublin, 28 November 2019.

Notes: The grey-shaded area reports ranges of point estimates of r* for the euro area, as estimated in Brand and Mazelis (2019). Corresponding individual point estimates are reported in Brand et al., (2019). Sample period: 1999 Q1 to 2017 Q4 (Lane, 2019).

Three reasons for this decline have been identified. First, there seems to have been stagnation in trend growth for some decades. Holston et al. (2017) showed trend potential output growth to have fallen by about one percentage point across developed economies between 2007 and 2016. Falling trend growth is shown to be more consistent in the euro area, with a more modest fall during the financial crisis but a continued downward trajectory since. This has a knock-on effect on growth expectations. Lane (2019) broadly estimated that a fall in potential output of one percent would cause a similar-sized decline in the real equilibrium rate. This decline in productivity can be explained by many factors beyond the scope of this paper, and includes a decline in technological innovation and technological diffusion, and the structural shift in employment towards less productive sectors (such as services)[5]. As we have discussed briefly, this results in a vicious cycle of sorts as low rates themselves subvert productivity and trend growth.

Second, demographic trends in the past decades have further contributed to a reduction in the equilibrium rate. The growing share of retirees in the population (and their ratio to workers) causes a reduction in aggregate productivity, reinforcing the mechanisms we have discussed and thus causing

[5] For a good overview see Lane (2019). Academic analyses of these trends and their effects on rates include: Summers and Rachel (2019), Gordon (2015), Summers (2016), Roberts (2001), Edge et al. (2007) and Kahn and Rich (2007).

a more rapid decline in the equilibrium rate. An older population further implies a reduction in the demand for capital. A working population that expects to live in retirement for many decades will also likely have a higher propensity to save, and a lower propensity to engage in riskier investments. This shifting ratio between the demand for and supply of capital causes a downward shift in the equilibrium rate. The effect of these demographic trends is expected to cause a reduction of the equilibrium rate of between 1 and 2 percentage points (between around 1980-2050)[6], as pointed out by Lane (2019).

Third, global factors appear to have played a role, with the decline identified in the euro area following a similar trend in other developed economies. The two decades have seen a substantial increase in the global supply of savings, resulting in a large increase in the demand for safe assets. The developing world has partly led this drive, as booming global capital flows and currency crises in the 1980s and 1990s led developing countries to stock up on reserve currencies (Bernanke, 2005). The financial crisis also resulted in a fall in investor risk appetite, further concentrating savings in safe assets. At the same time, the crisis and ensuing expansion of sovereign debt-to-GDP ratios led to many euro area countries being downgraded, substantially reducing the supply of euro-denominated safe assets. This shift in both supply and demand has inevitably reduced the equilibrium rate[7].

The COVID-19 pandemic adds an additional layer of uncertainty to these mechanisms. The possible effects on productivity have received significant attention but include conflicting mechanisms. Within firms, the effects on productivity will be seemingly negative, given suboptimal allocation of labour (precautionary measures) and capital (postponed investments), transaction costs due to barriers to mobility, and the additional cost of safety measures (di Mauro and Syverson, 2020). Meanwhile, the exit of less-productive firms may result in creative destruction, increasing overall productivity. However, exit will also be determined by market power and access to credit (disadvantaging SMEs) and government support, none of which necessarily reflect inherent productivity (Cespedes et al., 2020; Restuccia and Robertson, 2020). Finally, at a sectoral level, there may be a shift from the less-productive hospitality sector to the more-productive IT sector (Di Mauro and Syverson, 2020b). The overall effect on the real equilibrium rate is thus ambiguous, creating more uncertainty, although most studies agree that productivity is more likely to decline, which could drive the rate further into negative territory. The market seems to agree with this assessment given the real rate has fallen is expected to fall over 5-30-year horizon (when compared to the beginning of the year), even as shorter-term real rates are higher (Figure 9).

To make matters worse, this is happening at a time when the relationship between employment and wages appears to have weakened, and the Phillips curve might have flattened (at least in some countries; see Bonam et al., 2018). The relationship between wages and prices is seeing a greater degree of uncertainty because variables such as the non-accelerating inflation rate of unemployment are harder to gauge. Not only is the space for monetary policy limited, its effect appears to be smaller.

## 3.2. Forecasting is difficult, particularly about the future

Finally, the effects of uncertainty are further heightened by the limitations of current forecasting models, even though the outputs of these models are fundamental in the determination of monetary decisions. Monetary policy depends on estimations of both observable and unobservable variables. Under conditions of deep uncertainty, these estimations become less informative and therefore less reliable.

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6 Rachel and Smith (2015), Rachel and Summers (2019), Papetti (2019) and Lopez-Salido (2016).

7 For more detail see Del Negro et al. (2017), Del Negro et al. (2018), Bauer and Rudebusch (2019), Hutchinson and Saint-Guilhem (2019) and Laubach (2009).

The ECB and most advanced economy central banks base their monetary policy decision-making on an estimate of a simple Taylor rule:

$$i_t = \pi^* + r^* + \alpha_\pi(\pi_t - \pi^*) + \alpha_y(y_t - y^*)$$

- $\pi^*$ is the inflation target
- $r^*$ is the equilibrium interest rate.
- $y_t - y^*$ is the output gap.

The policy rate will be chosen to close the inflation and output gap. One can rewrite the Taylor rule in deviations:

$$i_t - r^* = \pi^* + \alpha_\pi(\pi_t - \pi^*) + \alpha_y(y_t - y^*)$$

Monetary policy tools have two characteristics that function less well in times of uncertainty.

First, these models rely on estimates or proxies of unobservable variables (such as the equilibrium real rate or the output gap). In order to compute reliable proxies, we need a mechanism that can understand the "new (economic) normal". Wider global developments have further rendered the shape and form of this *status quo* unknown.

As we have seen, in the current circumstances, estimates of the equilibrium real interest rate point in a direction that is at best unusual, in the sense that a negative real cost of capital cannot be sustained for long and certainly not in equilibrium. It follows that the underlying models – our interpretation of how the economy operates – are also poor. While this was an issue before the COVID-19 pandemic, the current situation has introduced an additional layer of uncertainty and, as we have discussed, has put additional downward pressure on the real equilibrium interest rate.

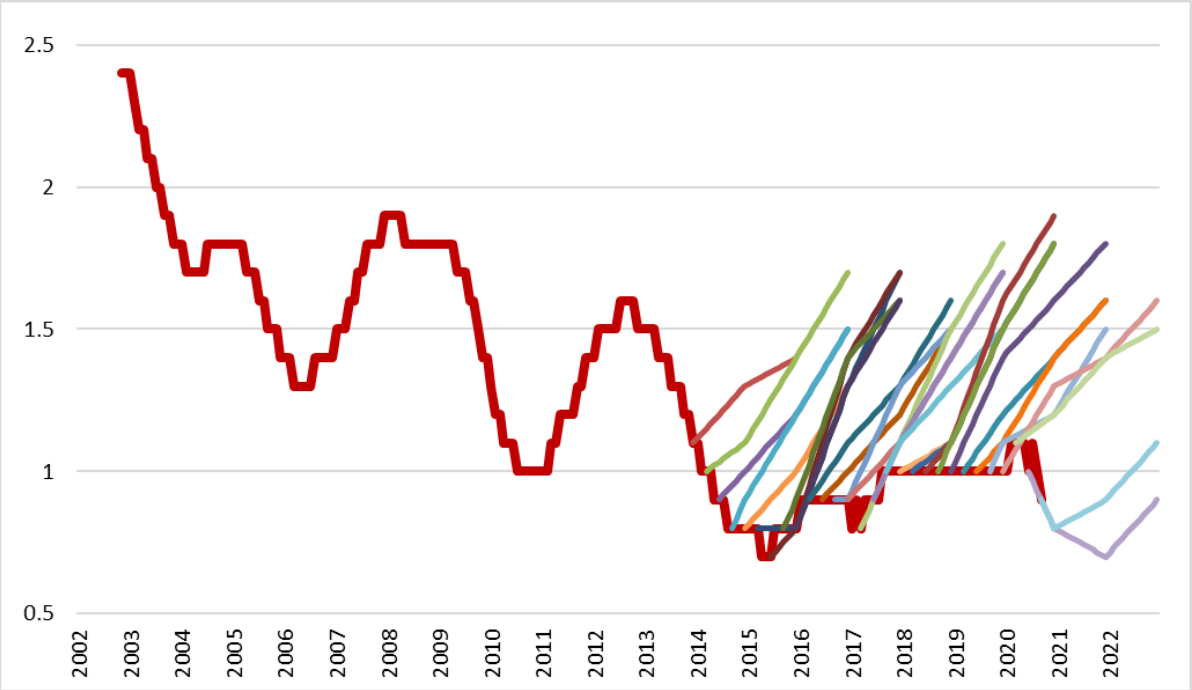
The second problem is that the models used to help predict and form policy are designed to "mean revert", in other words, to return to equilibrium. This means that these models focus on describing a well-defined economic equilibrium that is known and understood. As shocks push the economy away from equilibrium, the role of policy is to simply bring the economy back to equilibrium (i.e. mean revert). Furthermore, for these tools to be tractable they need to be linear (or linearised), which in itself means that shocks really need to be small for model predictions to be sensible.

But, as we have argued so far, the shocks we face today are not small, nor is the equilibrium that we seek known to us. The result is that policy forecasts are prone to two mistakes.

First, models predict that when moved away from equilibrium, policy will intervene so that the relevant variables revert (at a speed captured by estimated lags). Figure 11 represents the ECB staff's macroeconomic projections for core inflation (moving 12-month average rate of change) every month over the next two years. These quarterly projections are shown from December 2013 to September 2020. As inflation during this period was uncharacteristically low and below 2%, the forecasting model predicted persistently throughout the seven-year period a reversion to the mean. As this has not materialised, projections in recent years have been systematically wrong (Darvas, 2018). This would imply that our understanding of the mechanisms that determine inflation and of the monetary-policy transmission channel has been poor, which could jeopardise monetary policy effectiveness and even affect the ECB's credibility. Figure 11 shows that the ECB's last two predictions were better at capturing the short-term movements, but again core inflation is expected to revert in order to meet its target.

The message here is that if the economy is transiting to a new normal, as we have argued, then mean-reverting models will fail to allow for that and will always predict a return to the old equilibrium. A new generation of models will need to allow for transition between steady states.

Figure 11: Core Inflation, ECB staff macroeconomic projections for the euro area, average annual values




Source: Darvas (2018), based on ECB, whom we also thank for updating the series to include latest numbers.

Note: The thick red line represents actual core inflation and each coloured line represents inflation forecasts for the subsequent two years at each point in time.

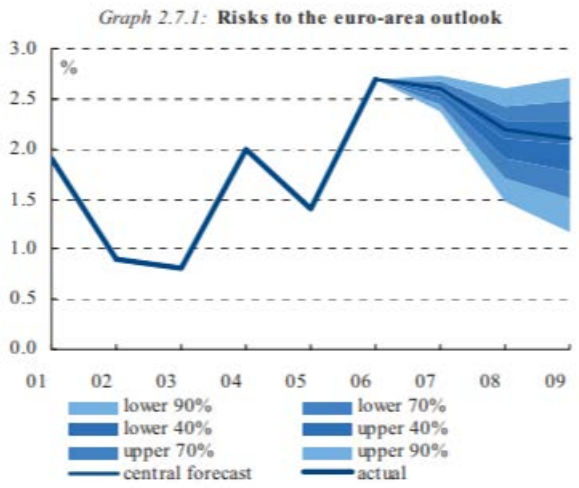
The second policy forecasting mistake is that forecasts typically are communicated around confidence intervals (fan charts), which provide statistical confidence. But this may no longer be appropriate because confidence bands are based on econometric estimates using past data. But if the world is governed by fundamental uncertainty, then the past is not a good predictor of the future, and therefore, all these bands provide is a false sense of certainty.

A rather telling example is the way the European Commission was forecasting the output gap back in 2009. It is important to note that the European Commission is not exceptional in this respect. Many others in the business of predicting were making similar mistakes (graphs available upon demand).

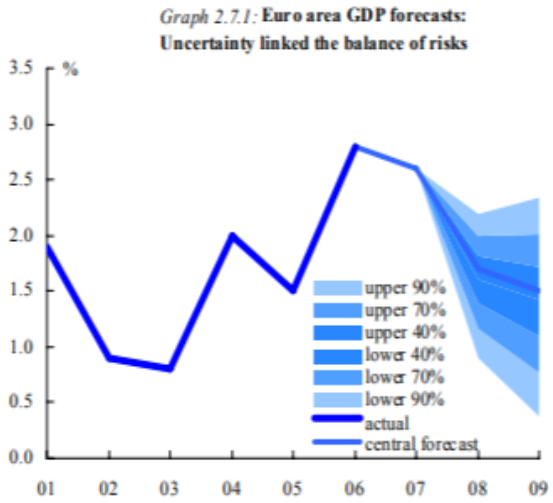
Figure 12 show the Commission's GDP forecasts and its confidence bands, (up to 90%), known also as fan charts, as estimated between 2007 and spring 2009. In autumn 2007, the GDP growth forecast for 2009 was 2% and the lowest estimate at the 90% confidence interval was 1.2%. While the first whiffs of turmoil were apparent in the US financial markets, it was still early. However, even in the autumn forecast for 2008 (published on 3 November 2008, almost two months after Lehman Brothers had filed for bankruptcy), the growth forecast for the euro area in 2009 was still zero, and the lowest output estimate in the 90% confidence band was about -2%. Just six months later, the central projection for 2009 was -4% or an even greater contraction. However, not only was the baseline projection in autumn 2008 very wrong, the estimated 90% confidence bands did not include the baseline forecast in the spring of 2009, as Figure 12 shows. The 90% confidence bands also did not include the eventual contraction for 2009 that turned out to be around -4.5%. Indeed, the lowest band in autumn 2008 was at around the same place as the highest band only six months later – there was no overlap in the 90% confidence intervals for 2009.

Figure 12: European Commission, Economic Forecasts report, euro area GDP predictions for 2009

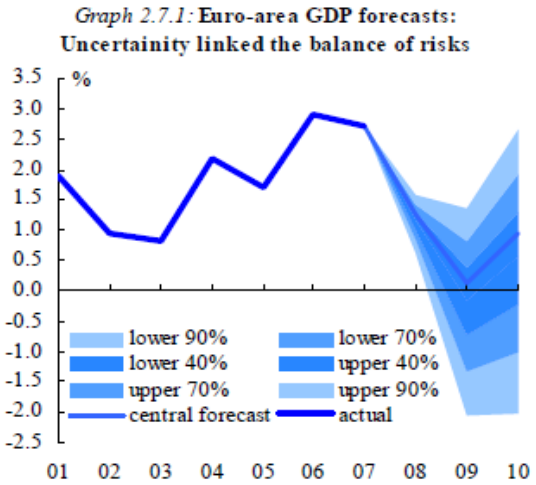
Autumn 2007



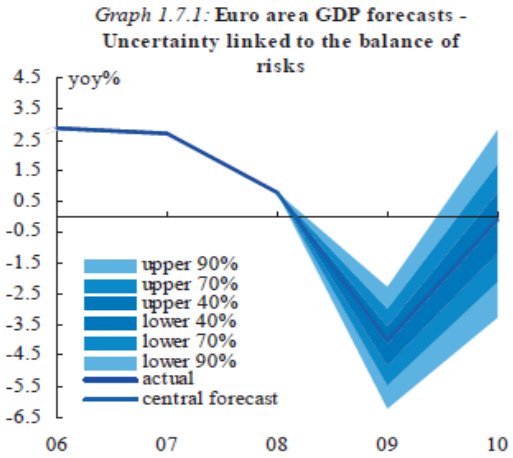

Spring 2008




Autumn 2008




Spring 2009



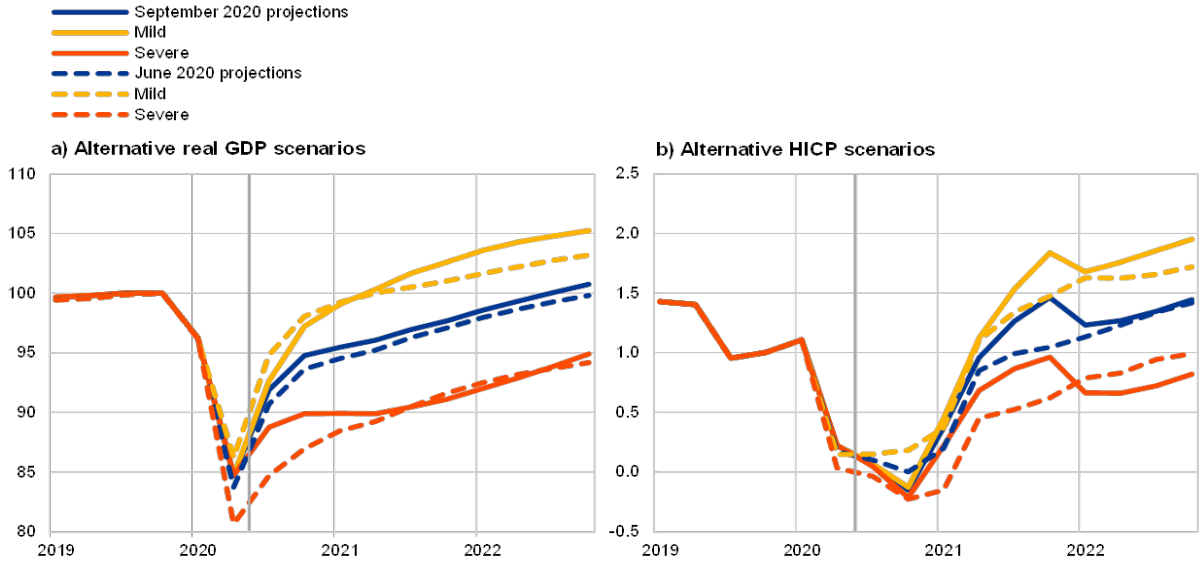

Source: European Commission, Economic Forecast, Autumn 2007 and 2008 and Spring 2008 and 2009.

The European Commission no longer presents confidence bands, but instead discusses alternative scenarios in the *Economic Forecast* report. The ECB also used to provide confidence bands surrounding their forecasts, or rather upper and lower ranges that were consistent with a 57.5% confidence interval[8]. However, this was not done for the last two quarters (June and September 2020). The reason given for this is that the computation of the ranges was based on historical projection errors, unreliable in a situation of such unprecedented uncertainty as that caused by the pandemic.

The ECB has instead included alternative scenarios, just like the European Commission, based on different assumptions of the evolution of the pandemic, shown in Figure 13.

[8] See ECB (2009) https://www.ecb.europa.eu/pub/pdf/other/newprocedureforprojections200912en.pdf.

Figure 13: ECB Staff macroeconomic projections and alternative scenarios for real GDP and HICP inflation in the euro area (September and June projections 2020)




Source: ECB staff macroeconomic projections for the euro area, September 2020, Box 3.

Notes: The vertical line indicates the start of the projection horizon, index: Q4 2019 = 100 (left-hand chart) and year-on-year rate (right-hand chart).

The message here is that discussing scenarios instead of presenting fan charts is a very welcome development and we hope the ECB and the Commission will continue this practice once the pandemic has passed. The backward-looking nature of confidence intervals may not be informative and may even create false confidence as we transit to a new normal.

# 4. IMPLICATIONS FOR POLICYMAKING

The real problem that policymakers face in the presence of fundamental uncertainty is that they cannot use traditional tools to acquire confidence in their decisions or indeed in the outcomes of their decisions. A 90% percent confidence interval around a baseline projection provides "90% confidence" that inflation or growth, for example, will be within a certain interval. At the heart of this exercise lies a fundamental trade-off: that between precision in outcomes and confidence in achieving them. The greater the degree of confidence and predictability, the wider the range of possible outcomes, as all the panels in Figure 12 show. But if we cannot rely on defining confidence probabilistically, then how do we define confidence at all?

We used the September 2020 ECB forecast for HICP inflation shown in Figure 13b, to describe how to capture confidence in the absence of probabilities. The ECB forecasts as a baseline scenario that HICP inflation in 2021 will be 1% (blue line in Figure 13b). Alongside that, the ECB also provides forecasts for a mild scenario (around 1.5% in 2021, yellow line in Figure 13b) and a severe scenario (0.7% in 2021, orange line). These scenarios are constructed based on critical assumptions around the evolution of the pandemic and our success or failure in containing the number of infections in the euro area, which will translate into very different costs in terms of economic activity. The assumptions for each scenario are carefully laid out and explained. Confidence comes from the breadth of the contingency scenarios considered. If the number of infections turns out to be between what is assumed in the mild and severe scenarios, then the ECB can be confident (not sure) that inflation will be between 0.7% and 1.5%. If the ECB wanted to present a more precise inflation forecast, it would have had to calibrate the two scenarios to be more similar. On the other hand, if the ECB wanted to be prepared for very extreme pandemic scenarios, it would have had to present a much greater, and thus less precise, range of inflation outcomes.

This framework provides two useful ways of forming decisions.

- The ECB is in a good position to reveal which inflation range it would be prepared to communicate (for example, in this case between 0.7% and 1.5%). Once this is decided, it can say for which range of outcomes in terms of COVID-19 infections this inflation range will materialise. If infections go beyond what is assumed in the severe scenario then inflation will not be in this range. Naturally, the ECB could reason the other way around: what are the consequences for inflation for any given range of infections. However, we feel that the former reasoning is more appropriate, as the ECB is in a better position to judge acceptable levels of inflation rather than the course of the pandemic.
- The second benefit it offers is an ability to rank different policies. If the ECB were to consider alternative policies, it should pick the policy that would achieve any given inflation range, for the most extreme pandemic scenarios (Ben-Haim and Demertzis, 2008, 2016).

This approach will allow the ECB to continue to provide inflation forecasts based on its best guess of what conditions (say, pandemic conditions) will be, but also to inform the public about the consequences of not making the correct assumptions about the pandemic. We hope the ECB continues to present results in this format, but also explains the choice of policies pursued as a way to achieve acceptable inflation outcomes for the greatest set of possible pandemic (and indeed other) scenarios.

In the meantime, while the ECB considers how to adapt its strategy, there are two quick wins it can apply to manage uncertainty better.

The first is to redefine its price stability objective as a target of 2% rather than *"below or close to 2%"*. The benefit of a clear objective is that it is easy to communicate. The theory of focal points then helps

us establish that clarity in the objective provides a very good signal that can help the central bank achieve it (Demertzis and Viegi, 2008).

The second quick win is establishing a tolerance band around the target. Demertzis and Viegi (2010) showed that explicit bands are a tool for communicating what levels of inflation are tolerable. Given the explicit nature of these bands, achieving those outcomes then establishes credibility, which in turn helps the central bank to achieve its objective more easily. And the other way around: if inflation lands outside those bands, the central bank will lose some credibility, which will make it more difficult for it to achieve its objectives.

But Demertzis and Viegi (2010) also showed that for high degrees of uncertainty, policymakers can afford wider bands. When volatility is high, it is better to have wider tolerance bands without fearing the imprecision that this necessarily implies. **In times of uncertainty it is more useful to be predictable than precise.** Given that the euro area economy needs to manage the digital and green transition, we recommend that such bands remain wide (say between 0.5% and 3.5%).

Last, it is important to acknowledge that the nature of central bank communication also needs to change when uncertainty is high. Uncertainly means less knowledge about the future. **Communication then is less about what will happen, which by definition is less known, and more about what the reaction should be if alternative scenarios would happen.** This is exactly what Figure 13 shows without having to explain how likely any of the scenarios are, not even the baseline scenario.

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The COVID-19 crisis has compounded the uncertainty that has come to characterise the European economy. We explore how this uncertainty manifests itself in terms of ECB decision-making and the long-run challenges the ECB faces. Confidence in ECB actions will come from the contingency scenarios it considers and communicates on, and from the adoption of potential policies for a wide range of such scenarios. Greater clarity around the ECB's inflation target and surrounding tolerance bands would also be beneficial.

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