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MEASURING MACROECONO UNCERTAINTY DURING THE EURO'S LIFETIME

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It is a cliché in o cial economic institutions' publications and their leaders' speeches to lament exceptional uncertainty. e complaint does, however, ring true currently. A solid empirical basis should be given to this view by properly measuring macroeconomic uncertainty.

To measure macroeconomic uncertainty, we start from observable forecasts of macroeconomic variables, which are transformations of underlying economic conditions. By observing how forecasts change over time, we measure the ow of macroeconomic surprises. e more intense the ow of surprises, the greater uncertainty can be said to be. Greater di erences among forecasts are also evidence of uncertainty.

We draw out four indicators of macroeconomic uncertainty, measured over the lifetime of the euro:

1. How the macroeconomic forecasts of a given institution for the same time period change over time;
2. How the macroeconomic forecasts of a given institution deviate from realised outcomes;
3. How the macroeconomic forecasts of di erent institutions deviate from one other;
4. How dispersed the forecasts of di erent professionals are.

We also measure whether the 'stag-' or the '- ationary' component is stronger in the overall stag ationary shock caused by the Russian invasion of Ukraine.

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1 Introduction

It has become a cliché in the publications of official economic institutions and the speeches of their leaders to lament exceptional uncertainty. This complaint is made so often that the adjective 'exceptional' cannot always be true. The complaint does, however, ring true currently, with the economic situation considered more uncertain than in the last 20 years or so. A solid empirical basis should be given to this view by properly measuring macroeconomic uncertainty. This is the purpose of this paper.

Research already shows the adverse effects of uncertainty on financial markets, household spending and overall economic activity (Gieseck and Rujin, 2020). Coibion et al (2021) showed that greater uncertainty makes households spend less. Bloom (2009) suggested that greater uncertainty causes firms to temporarily pause investment and hiring. Also, elevated risk premia lead to increased borrowing costs, together with the likely reduction in loan provision, which dampens even more (Gilchrist et al, 2014). The relationship between uncertainty and inequality is, however, ambiguous. While some research shows that uncertainty reduces inequality, this is due to lower investment and a higher risk premium that leads to the reduction of asset prices and therefore the of financial wealth of investors holdilchrisrwrw

We translate our basic idea into four concrete indicators of macroeconomic uncertainty, measured over the lifetime of the euro:

1. How the macroeconomic forecasts of a given institution for the same time period change over time;
2. How the macroeconomic forecasts of a given institution deviate from realisations (other words, forecasting errors);
3. How the macroeconomic forecasts of different institutions deviate from one another for a given time period;
4. How dispersed the forecasts of different professionals are.

We also try to measure whether the "stag" or the "-flationary" component is stronger in the overall stagflationary shock caused by the Russian invasion of Ukraine.

Finally, we check whether the return to the pattern before the COVID-19 pandemic, documented by Grzegorczyk et al (2021), remains the prevailing view of forecasters.

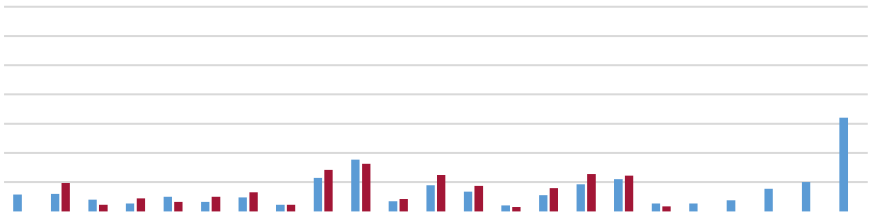
Data sources and limitations

We

2 Changes over time for forecasts from the same institution

In this section, we use changes in ECB, IMF and SPF forecasts over time to measure the level of uncertainty. We check how different the predictions for a given year are from those made one year previously. For instance, we take an average of quarterly forecasts made in 2021 about 2021, and we compare them with those done in 2019 and 2020. To illustrate our procedure, we start with changes in the ECB projections.

Figure 1: Changes in ECB projections over time, inflation and GDP growth (percentage points difference)



Source: Bruegel based on ECB. The bars represent the changes over time of the yearly average (Inflation is HICP, annual averages of quarterly forecasts) and (GDP growth is real GDP, annual averages of quarterly forecasts) expressed in absolute value. The dates correspond to the time at which the forecast is made, i.e. t in equation 1 in the Appendix.

Figure 1 shows the extraordinary uncertainty created first by COVID-19 in 2020 on growth, and then by the war in Ukraine in 2022 on inflation: the corresponding changes in the forecasts of inflation and GDP growth are a large multiple of the average change since the introduction of the euro, and higher than in any period since 2000. The Great Financial Crisis (GFC) is visible in the high uncertainty about inflation in 2008-2009.

the Great Financial Crisis look very relative to what has happened since. The observation in Rostagno et al (2021) that the first eight years of the life of the euro were less affected by shocks than subsequent years is confirmed by our measure.

3 Forecasting errors by the three institutions

This section focuses on differences between forecasts and actual values, so-called forecasting errors. We calculated the forecasting error for the prediction for the current year, one year and two years ahead and took the average of these values.

pa51001 Figure 3.5: Yearly averaged [illegible]

We also observe that the ECB is the most reluctant of the three institutions to change its forecast GDP growth (Figure 2), and thus its forecast errors were greatest on average (Figure 3). That observation led us to investigate differences in institutions' forecasts.

4 Inter-institutional forecast differences

We assume that the difference between institutions' predictions for the same period increases when uncertainty is greater. Therefore, we constructed a time series showing the average difference between ECB forecasts and those of the IMF and SPF.

Figure 4: Yearly average of forecast differences between the ECB and the IMF/SPF (inflation and GDP growth, in percentage points difference)

Source: Bruegel based on ECB Statistical Data Warehouse and World Economic Outlook (WEO). Note: The IMF's WEO presents
b t9 (i)asw -3(i)Tj [(b)sw -3(i)ta>BDC3h d.002 TcGD0.00(s)-2a (g 0.3F ( )]T (ooTd [(b)w)]T41ct)Tc hBDC3h (n)2.1 (g)5

According to each of the three institutions, the inflationary component of the shock coinciding with t
Ukraine war has been much worse (as the inflation forecast was revised by 3 percent or
more) than at the time of the GFC (less than 2 percent). However, according to the IMF and the SPF, the
growth component of the shock during the GFC

Table 1: Medium term scenarios, gross domestic product growth and inflation for the euro area

	GDP growth		Inflation (HICP)	
	Past observation: Q3 2021	Current observation: Q1 2022	Past observation: Q3 2021	Current observation: Q1 2022
IMF	2021: 5.0% 2022: 4.4% 2023: 2.0%	2022: 2.8% 2023: 2.3% 2024: 1.8%		

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Appendix: A measure of macroeconomic uncertainty

ie the forecasting error between the forecast made at time t and the time for which it is the forecast that is the same as the realisation of the relevant variable

The formula for indicator 3 is

$$@= \quad (_{5\,ç\,ç>} \quad F \,(_{6\,ç\,ç>}$$

where dt is the forecast deviation between institution 1 and institution 2 made at time t for time t+ì

The precise time indexing of indicators 1 and 2 in the main text is explained in the following table:

ì	0	1	2	3
1	t,t+1	t+1,t+1	-	-
2	t,t+2	t+1,t+2	t+2,t+2	-
3	t,t+3	t+1,t+3	t+2,t+3	t+3,t+3
Average	(t,t+1+ t,t+2)/2	(t+1,t+1+t+1,t+2)/2	(t+2,t+2)	t+3,t+3

Uncertainty indicators 1 and 2 in the main text are given by the difference between a cell and the adjacent cell on the right. The bottom row defines the averages used in indicators 3 and 4.

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