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Luis Gutiérrez de Rozas

THE EURIBOR SURGE AND BANK DEPOSIT COSTS: AN INVESTIGATION OF INTEREST RATE PASS-THROUGH AND DEPOSIT PORTFOLIO REBALANCING

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THE EURIBOR SURGE AND BANK DEPOSIT COSTS: AN INVESTIGATION OF INTEREST RATE PASS-THROUGH AND DEPOSIT PORTFOLIO REBALANCING

Abstract

Against the backdrop of sharp monetary policy tightening, this article studies the links between bank deposit costs and the EURIBOR. In doing so the authors employ an SVAR multivariate model that jointly includes deposit rates and volumes, fitted on monthly data covering the period 2003-2019. Increases in the EURIBOR are found to pass through to bank deposit rates in Spain, pushing up interest rates on term deposits in particular. In turn, increases in the EURIBOR triggered shifts from sight to term deposits. Through both mechanisms, bank deposit costs increased. The article documents that in 2022 the pass-through from the EURIBOR to deposit rates is falling short, relative to what would be expected according to the historical pattern captured by model results; as a result, the increase in bank deposit costs has been weaker than expected. To draw insights into the reasons behind this pattern, the authors analyse several euro area economies. Correlation analyses suggest that the impact of the EURIBOR on deposit rates and costs was weaker in banking sectors with greater excess liquidity and higher market concentration.

Keywords: deposit rates, deposit volumes, pass-through, VAR model, conditional forecasts.

1 Introduction

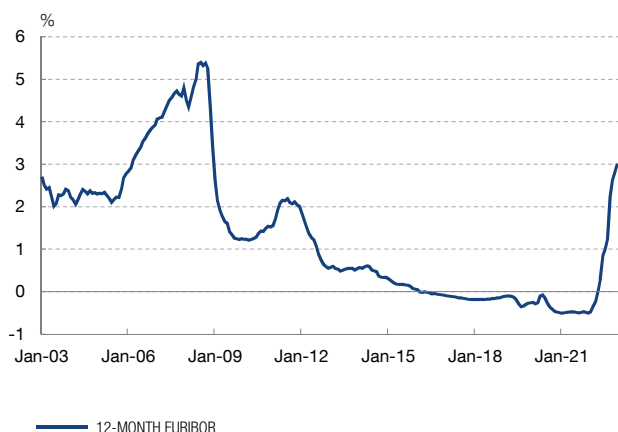
The EURIBOR, the reference interbank interest rate in the euro area, rocketed in 2022 as monetary policy tightened sharply to address the persistent increase in prices in the monetary area. The EURIBOR has so far not reached the levels recorded before the Great Financial Crisis (see Chart 1.1). Yet the speed and the size of its current increase certainly overshadow previous episodes. Indeed, by December 2022 the twelve-month cumulative increase in the EURIBOR amounted to 350 basis points (bp), relative to just 70 bp and 130 bp in the same period after June 2005 and March 2010. Furthermore, even the total increase in the EURIBOR in the period 2005-2008 was smaller, amounting to just 310 bp.

In the past, increases in the EURIBOR pushed up bank funding costs. Descriptive analyses of patterns reveal that changes in the EURIBOR passed through to bank deposit rates in Spain. In particular, in this period increases in the EURIBOR passed through to the interest rates on term deposits. By doing so, they triggered a shift from sight to term deposits. Through both mechanisms, rises in the EURIBOR resulted in an increase in bank deposit costs.

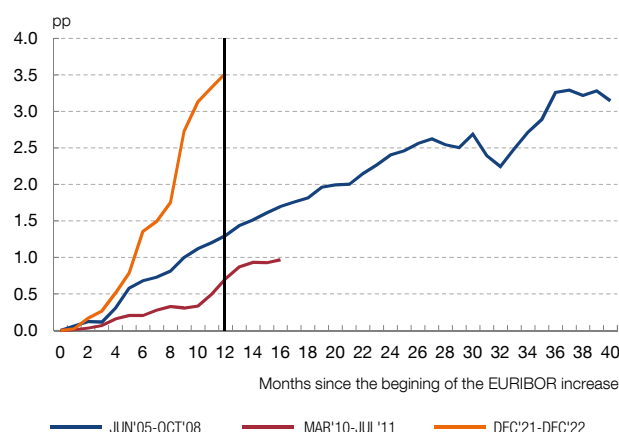
Chart 1

THE HISTORICAL EVOLUTION OF THE 12-MONTH EURIBOR

1 12-MONTH EURIBOR



2 CUMULATIVE INCREASE IN EURIBOR IN HISTORICAL EPISODES OF INTEREST RATE GROWTH



SOURCE: Banco de España.

We formally assess these linkages by developing a Structural Vector Autoregressive (SVAR) model, estimated over the period 2003-2019, and building on Bernanke and Blinder (1992). A key ingredient of our analysis is the joint modelling of deposit rates and volumes. Specifically, in the baseline specification, we include the growth rate of the industrial production index (IPI), harmonised index of consumer prices (HICP) inflation, the 12-month EURIBOR, four deposit rates (household: sight; non-financial corporation: sight; household: term; and non-financial corporation: term) and, lastly, the growth rate of volumes of the same deposit categories. This specification allows us to assess the potential portfolio rebalancing across types of deposits triggered by increases in the EURIBOR, as it: i) distinguishes between sight and term deposits; ii) breaks down deposits of households and non-financial corporations (NFCs); and iii) jointly models deposit rates and volumes. The multivariate nature of the model allows us to take into account interactions between several variables, distinguishing this approach from simpler, univariate or bivariate models. To estimate the model, we set contemporaneous zero restrictions based on economic reasoning to trace out the impact of an increase in the 12-month EURIBOR.¹

In our analysis we focus on retail deposits and select the 12-month EURIBOR (12M EURIBOR) as the reference rate to assess pass-through. The 12M EURIBOR is the most relevant measure for our purposes, as commercial banks usually define the interest rate on their deposits as a mark-down on the interbank rate of a similar

¹ The aim of this article is not to identify the impact of monetary shocks on retail deposit rates and volumes, but rather to study the pass-through of a tightening of the monetary conditions regardless of its nature (expected or unexpected), focusing on medium and long-term effects.

maturity.² The 12M EURIBOR is a single variable widely used as a reference rate in euro area member countries, which facilitates the comparability of results across countries. Moreover, the other most common maturities, e.g. 1, 3 or 6 months, are very strongly correlated (close to 100%) with the 12M EURIBOR, which makes the choice of maturity less critical from a statistical point of view.

The results confirm that the 12M EURIBOR has historically had a significant impact on deposit rates, and particularly on term deposit rates, which is to be expected. Indeed, term deposits have close substitutes among other financial products. Therefore, banks have a higher need to raise term deposit rates, although due to frictions these typically fall short of other instrument rates. In Spain the negative aggregate impact on deposit volumes was relatively muted.³ Overall, the impact of the EURIBOR on bank deposit costs operated through two mechanisms. First, the interest rates charged on outstanding term deposits increased. Second, this increase triggered a portfolio deposit rebalancing from sight to term deposits.

Using these results, we produce conditional forecasts of the expected monthly path of deposit rates, volumes and costs for the period January 2021-December 2022, and we benchmark the observed paths of these variables. The results show that the actual increase in deposit rates was significantly lower than that expected given the level of the 12M EURIBOR. The weak pass-through of the 12M EURIBOR to deposit rates is apparent for all types of deposits, including term accounts, which typically exhibit a stronger response. Aggregate deposit volumes did not decrease, in contrast to the model results. Overall, bank deposit costs failed to increase, which relates to the weak pass-through of the 12M EURIBOR to deposit rates.

To draw insights into the reasons behind the weakened pass-through in 2022, we analyse several euro area countries, namely Germany, France, Italy, and the Netherlands. Despite quantitative differences, we also find that: the 12M EURIBOR had a significant impact on deposit rates, which was stronger for term accounts; deposit volumes remained unaffected; and it pushed up bank deposit costs. In addition, comparing model predictions with current developments, we observe that the pass-through is falling short this time across all countries. Yet we find differences in the strength of the observed pass-through, which is particularly weak in Spain and Italy.

Lastly, we assess the potential reasons behind the differences in the strength of the pass-through of the 12M EURIBOR to deposit rates and costs. We examine as

2 For previous research using the 12M EURIBOR to assess the response of deposit volumes and rates to changes in interest rates, see Pérez Montes and Ferrer (2018) in the context of bank profitability. The choice of a single EURIBOR rate allows us to better capture statistically meaningful relationships, isolate the behavior of banks towards their retail customers as regards the remuneration of funds and the translation of the underlying interest rate changes, and interpret results in terms of a widely used variable in economic policy analysis. Furthermore, the 12-month maturity is frequently used as a reference rate in Spain, particularly for mortgages.

3 Previous research has shown that some banks may face a significant reduction in loanable funds (Kishan and Opiela, 2000).

potential drivers the banking sector's excess liquidity, measured by the deposits from the ECB that banks had on their balance sheets, and market concentration, gauged by the market share of the five largest banks. We gauge excess liquidity by looking at the liability side (deposits obtained from the ECB), and not the asset side (deposits at the ECB), due to data issues. Indeed, the ECB statistics are compiled on a residency basis and, due to intra-group funding flows, using asset-side measures would overstate the excess liquidity of certain banking systems.⁴ In this exercise we expand the sample by adding Belgium, Ireland, Greece, Austria, Portugal and Finland. We find that deposit rates grew far less, relative to what was expected based on previous historical experience, in countries showing greater excess liquidity. We also observe that the pass-through was weaker than expected in countries with higher market concentration. These results suggest that the reduction in the liquidity obtained from the Eurosystem could strengthen the pass-through of the 12M EURIBOR to deposit rates, therefore increasing bank deposit costs.

The results obtained need to be analysed with caution and are an initial step towards understanding which factors may be driving the slow response of deposit rates to the increase in the 12M EURIBOR. Indeed, we think that the methodology put forward, which consists in benchmarking current developments against model predictions, can be useful to assess the strength of the observed impact of the 12M EURIBOR. Yet looking ahead, a more careful analysis of the reasons behind the weakness of the current pass-through is certainly warranted. Exploiting bank-level data may help in this regard, in particular as the pass-through accelerates and differences across banks emerge.

2 Deposit rates, deposit volumes and the EURIBOR: stylised facts in Spain

2.1 Historical patterns

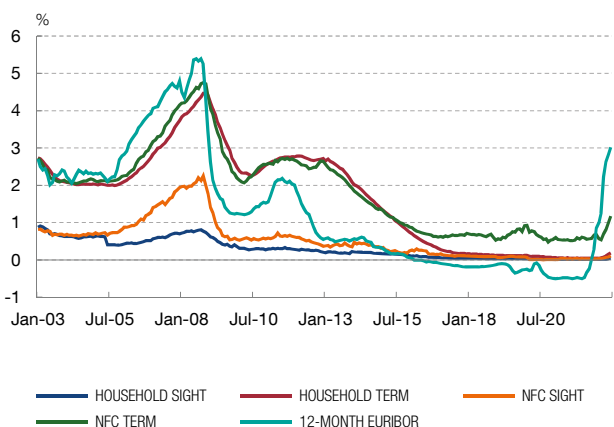
We provide stylised facts regarding the evolution of retail deposit rates and volumes over the last twenty years and discuss links to the EURIBOR. This analysis is based on data drawn from the regulatory information on interest rates and balance sheet composition that Spain's main banks must report to the ECB every month. Only information from banks reporting information on interest rates has been considered. Several patterns emerge.

4 As the ECB statistics are compiled on a residency basis, using asset-side measures would overstate the excess liquidity of certain banking systems. Problems arise as the bulk of the asset purchase programme (APP) portfolio was bought from counterparties whose head institution is domiciled outside the euro area, which kept their liquidity in accounts in certain euro area countries, such as Germany and Luxembourg. For further details, see Baldo et al. (2017).

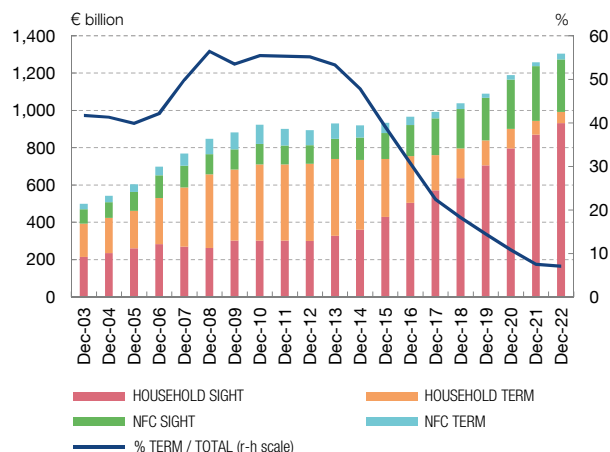
Chart 2

HISTORICAL EVOLUTION OF RETAIL DEPOSIT RATES, VOLUMES AND COSTS IN SPAIN

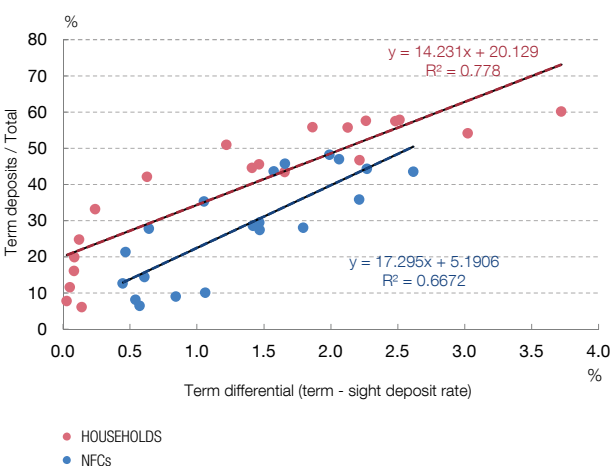
1 SIGHT AND TERM DEPOSIT RATES FOR NFCs AND HOUSEHOLDS



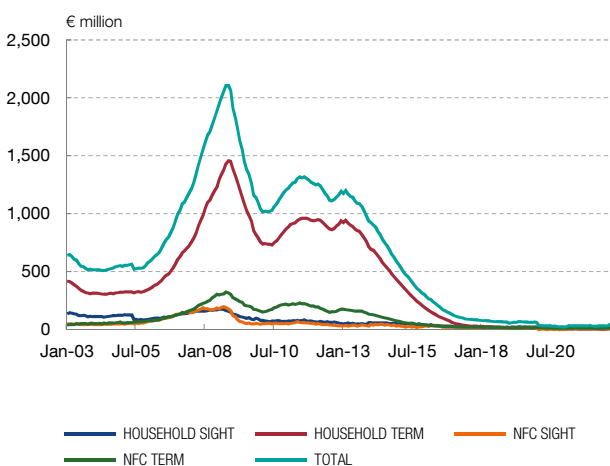
2 DEPOSIT VOLUMES FROM NFCs AND HOUSEHOLDS



3 SIGHT VS. TERM DECISION BASED ON PRICE DIFFERENTIALS



4 MONTHLY COST OF SIGHT AND TERM DEPOSITS FOR NFCs AND HOUSEHOLDS



SOURCE: Banco de España.

First, interest rates on retail deposits at Spanish banks, which have in general decreased over the last twenty years, doing so steadily since 2013, strongly correlate with the 12M EURIBOR. Sight and term interest rates on household and NFC deposits have decreased steadily since 2013 (see Chart 2.1). Interest rates on sight accounts have historically shown less sensitivity to the 12M EURIBOR than term deposit rates, although with some differences depending on the holder. In particular, the return on household sight deposits moved within a narrow range of values, with an average rate that did not reach 1% at any time throughout the sample. However, since 2016 the gap between rates on term and sight deposits has narrowed, a development likely related to the constraint imposed by the zero lower bound on sight deposit rates.

Second, deposits from Spanish households and NFCs have remained a major source of funding for deposit-taking institutions in Spain. Over the last twenty years, the total volume of these deposits has grown practically uninterruptedly to exceed €1,300 billion in December 2022 (see Chart 2.2). Household deposits, with an amount exceeding €991 billion in December 2022, account for 76.1% of the total.⁵

Third, term accounts of households and NFCs decreased after 2013, while sight accounts grew strongly. The proportion of retail term deposits shrunk to an all-time low of 7.1% in December 2022. Currently, nearly all deposits are held in sight accounts, with this modality representing 93.9% of the total in the case of households and 89.9% in the case of NFCs. Back in 2013, term deposits accounted for 53.3% of total deposits.

Fourth, shifts from term to sight deposits registered over the last two decades correlate with changes in the interest rates on term deposits. The spread of interest rates on term deposits over sight accounts exhibits a positive correlation with term deposits as a percentage of the total, as depicted in Chart 2.3. The relationship is economically significant, as each percentage point (pp) increase in this differential (spread) typically increases the percentage of term deposits in the total volume by 14.2 pp and 17.3 pp in the case of households and NFCs, respectively.

Overall, decreases in deposit rates, particularly steep in term accounts, have entailed a shift away from them, and a major reduction in the cost of deposits (see Chart 2.4). These shifts have historically exhibited close ties with 12M EURIBOR dynamics.

2.2 Current developments

According to the historical evidence, the rapid surge in the 12M EURIBOR could have pushed up deposit interest rates. We examine if this is the case, benchmarking current developments against two other episodes of 12M EURIBOR increases, starting in June 2005 and March 2010. In doing so, we compare the pass-through of the 12M EURIBOR to retail deposit rates, defined as the ratio of the cumulative change (in pp) in the commercial interest rate to the change in the 12M EURIBOR during the period considered. In this exercise, we limit the period of analysis to the first twelve months of the EURIBOR rise, which is the maximum length of the current episode for which data are available.

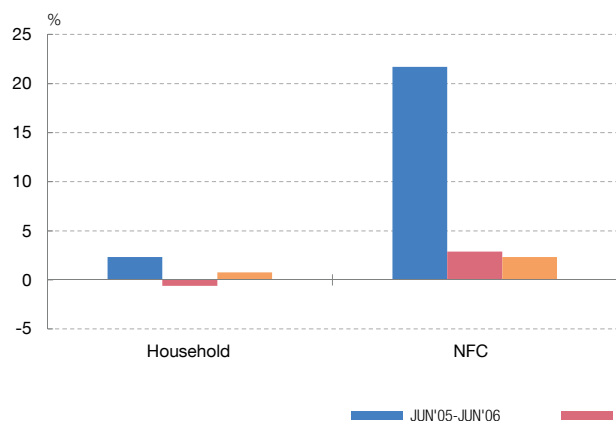
The results show that the pass-through from the 12M EURIBOR to deposit rates is much weaker than in previous periods, particularly for certain types of deposits.

⁵ As a reference, as of September 2022 deposits accounted for 38.5% of total household financial assets.

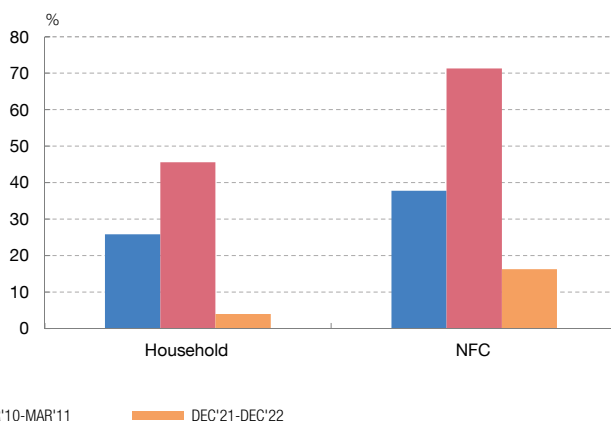
Chart 3

PASS-THROUGH OF THE 12M EURIBOR TO DEPOSIT RATES

1 PASS-THROUGH OF EURIBOR INCREASES TO SIGHT DEPOSIT RATES. FIRST 12 MONTHS OF INCREASE



2 PASS-THROUGH OF EURIBOR INCREASES TO TERM DEPOSIT RATES. FIRST 12 MONTHS OF INCREASE



SOURCE: Banco de España.

This is apparent in the pass-through to sight deposits, which has historically been more moderate. The pass-through to sight deposits in the first episode (June 2005 to June 2006), reached 20% for NFC sight accounts. The pass-through to sight deposits is currently negligible (see Chart 3.1). Specifically, of the 352 bp increase in the 12M EURIBOR accumulated over the course of 2022, only 0.7% and 2.3% has been passed through to interest rates on sight accounts held by households and NFCs, respectively.

Differences in pass-through strength are even starker for term deposits (see Chart 3.2). Currently, the pass-through to term deposits from households only amounts to 4%, relative to 25% and 40% in the first and second episodes considered. Pass-through for NFC term deposits is also falling short; it amounts to 16.2%, well below the percentages observed for this same portfolio in the two previous episodes (around 40% and 70%, respectively).⁶

3 Empirical analysis

Our next step is to formally analyse the impact of changes in the 12M EURIBOR on deposit rates, volumes and costs in Spain, using an SVAR model. Building on the non-structural representation of the VAR model, we then assess how the recent increases in the 12M EURIBOR should have affected key deposit indicators.

⁶ The pass-through gained traction over time. By the end of the first episode of rising rates, which lasted for more than three years, the pass-through to term deposit rates exceeded 80%.

The latter exercise helps us to document that the impact of the current monetary policy cycle on these variables has been unusually weak, relative to historical evidence.

3.1 Model description

Our baseline model harnesses the SVAR of Bernanke and Blinder (1992) who documented using US data the negative impact of a surprise increase in the federal funds rate on the volume of bank deposits. We depart from them in distinguishing between sight and term deposits, which is a critical distinction to uncover portfolio rebalancing across types of deposits. Furthermore, we distinguish deposits by their respective holders (i.e. households and NFCs), which provides a more accurate assessment of portfolio rebalancing across types of deposits.

More recently, Gerlach, Mora and Uysal (2018) investigated the pass-through of an increase in the federal funds rate to bank deposit rates (the so-called “deposit betas”), finding imperfect pass-through (that is, less than one-to-one changes between the federal funds rate and various deposit rates).⁷ Furthermore, by estimating both the expected increases in the deposit rates and the corresponding changes in volumes, they quantified the overall deposit funding costs expected during the normalisation of US monetary policy after a decade of near-zero interest rates. In our empirical analysis, we take advantage of having observed the beginning of the tightening cycle in the euro area, and hence we can see what our VAR model would have predicted for key deposit rates and volumes in Spain. This enables us to analyse how unusual the current period is in terms of bank deposit rates and volumes.

The VAR model is a system of equations, which explains a set of variables y_t by their own past values, a constant and random innovations hitting the system. This class of model allows us to jointly model the evolution of the variables in the system, capturing potential interactions between them. To summarise the dynamics embedded in the model, we produced impulse-response functions to answer the question “What happens to the variables in the system if the 12-month EURIBOR unexpectedly increases by a certain amount?”. This involved turning the VAR model into an SVAR model, appropriately restricting the contemporaneous response of certain variables. Furthermore, we generated conditional forecasts using the VAR model, which describe the path of a certain set of variables as predicted by the

⁷ While investigating the structural sources of imperfect pass-through is beyond the scope of this article, we briefly refer to early studies, such as Berger and Hannan (1989), who explain it by banks’ market power, and Kishan and Opiela (2000), who provide an analysis focusing on bank size. For a comprehensive overview of the literature, see Section 2.1 in Gerlach, Mora and Uysal (2018). We will provide insights into market concentration and pass-through in a European context in Section 4. Furthermore, while we are not investigating asymmetric pass-through, we refer to Driscoll and Judson (2013) on this issue. Our VAR model does not explicitly take into account the effective lower bound, which can be modelled as in Johansson and Mertens (2021).

model, while keeping the path of others fixed at appropriately chosen values. For technical details, please see the annex.

In the baseline specification, the variables in y_t are as follows: growth rate of the IPI; HICP inflation; the 12M EURIBOR; four deposit rates (household: sight; NFC: sight; household: term; and NFC: term); and, lastly, the growth rate of outstanding amounts of the same deposit categories, for a total of eleven variables.^{8,9} We estimated the VAR model using monthly data between January 2003 and December 2019, which is the longest sample available before the COVID-19 pandemic. For further details on possible sample periods, please see the annex.

Based on economic reasoning, in the coefficient matrices we restrict the direct impact of the deposit rates and volumes on the first three variables (industrial production growth, inflation and the 12M EURIBOR) to zero. This reflects our view that the former variables do not have a direct impact on the latter set of variables. To balance the number of observations and the number of estimated parameters, we specified the VAR model with $p = 2$ lags.

3.2 Impulse-response function analysis

After estimating the VAR model, we generated structural impulse-response functions, which trace out the reaction of the variables in the system following a surprise increase in the 12M EURIBOR. To do so, we used the following identifying assumptions: industrial production growth and inflation do not respond contemporaneously to an increase in the 12M EURIBOR, while the 12M EURIBOR and the deposit rates and volumes are allowed to respond within the month when the shock hits the system. These assumptions reflect our belief that industrial production growth and inflation are “slow-moving” variables, while interest rates and volumes are “fast-moving”. These assumptions are in line with those used by Bernanke and Blinder (1992) and Gerlach, Mora and Uysal (2018), for example.

Chart 4 shows the responses of the deposit rates following a positive 12M EURIBOR shock of one standard deviation (approximately 9 bp). As Chart 4.1 demonstrates, the response of the household sight deposit rate is very minor: the median response is 2.7 bp at the peak, which is reached 12 months after the shock, followed by a sluggish return. In Chart 4.2, we see that the NFC sight deposit rate reacts stronger

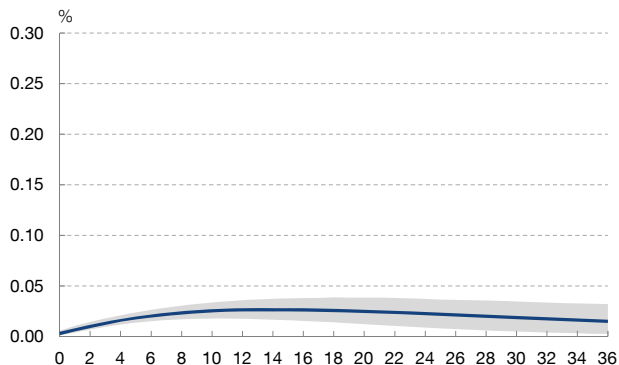
8 Both the IPI and the HICP series were seasonally adjusted.

9 This parsimonious list of macro variables (IPI and HICP) and the 12M EURIBOR, albeit reduced, facilitates the interpretation of results and it also provides some control for the general macroeconomic conditions (activity and inflation). However, there could be other more sector-specific factors affecting the dynamics of deposit rates and outstanding amounts, like the level of liquidity, competition or risk appetite, as well as regulatory issues or the availability of other sources of operating profit, like net fees and commissions.

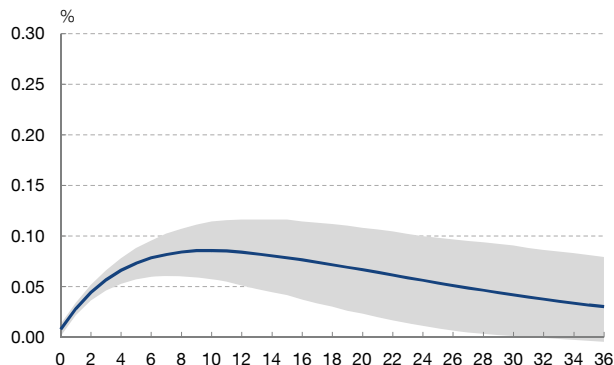
Chart 4

IMPULSE-RESPONSE FUNCTIONS OF RETAIL DEPOSIT RATES TO A 1 SD SHOCK TO THE EURIBOR

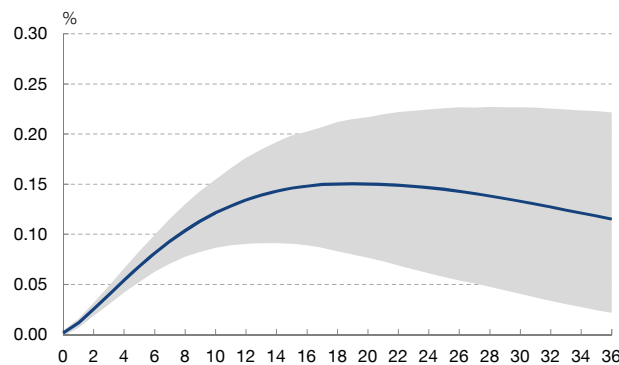
1 HOUSEHOLD SIGHT DEPOSIT RATE. IMPULSE-RESPONSE FUNCTION TO A 1 SD SHOCK TO THE EURIBOR



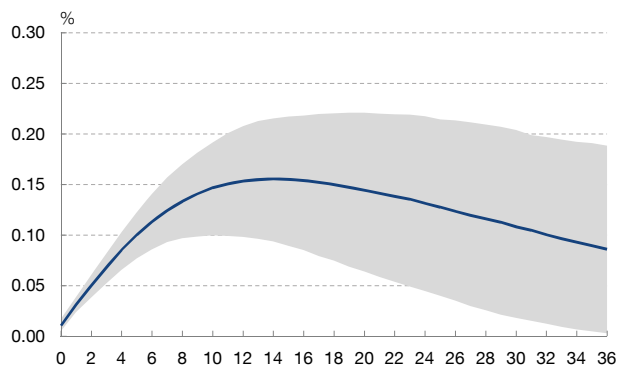
2 NFC SIGHT DEPOSIT RATE. IMPULSE-RESPONSE FUNCTION TO A 1 SD SHOCK TO THE EURIBOR



3 HOUSEHOLD TERM DEPOSIT RATE. IMPULSE-RESPONSE FUNCTION TO A 1 SD SHOCK TO THE EURIBOR



4 NFC TERM DEPOSIT RATE. IMPULSE-RESPONSE FUNCTION TO A 1 SD SHOCK TO THE EURIBOR



90% CI

MEDIAN IRF

SOURCE: Banco de España.

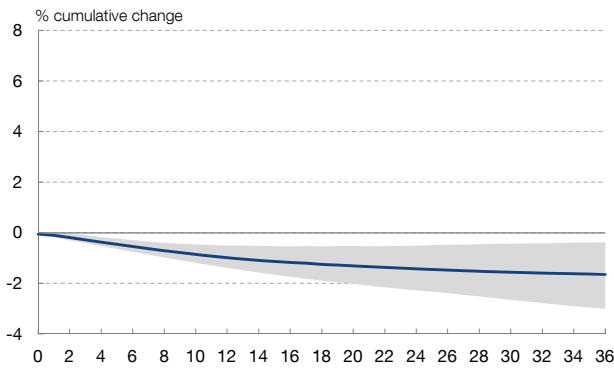
and faster: the peak impact of 8.6 bp is reached in 9 months. Charts 4.3 and 4.4 show that both household and NFC term deposit rates show a sizeable response after a 12M EURIBOR shock, with median peaks of 14.4 bp (after 1.5 years) and 15 bp (after 14 months), respectively, and a markedly more persistent response. This latter feature is in line with the longer maturity of term deposit portfolios. To sum up, we see that sight deposit rates (particularly those of households) are less sensitive to changes in the 12M EURIBOR than term deposit rates.

Turning to deposit volumes, Chart 5 shows the cumulative responses of the various deposit volumes to the same 12M EURIBOR shock as before. First, as Charts 5.1 and 5.2 show, sight deposits held by both households and NFCs tend to decrease in response to an increase in the EURIBOR, although the decline in the latter is somewhat more muted in the months immediately following the shock. This latter feature can be explained by companies' liquidity needs, which limit how much they can reduce their sight deposits. In contrast, the volumes of both types of term

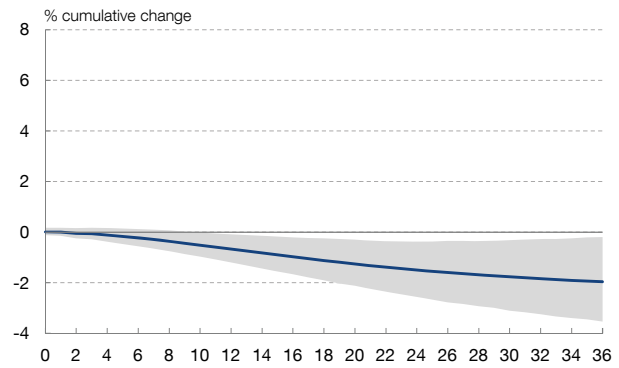
Chart 5

IMPULSE-RESPONSE FUNCTIONS OF RETAIL DEPOSIT VOLUMES TO A 1 SD SHOCK TO THE EURIBOR

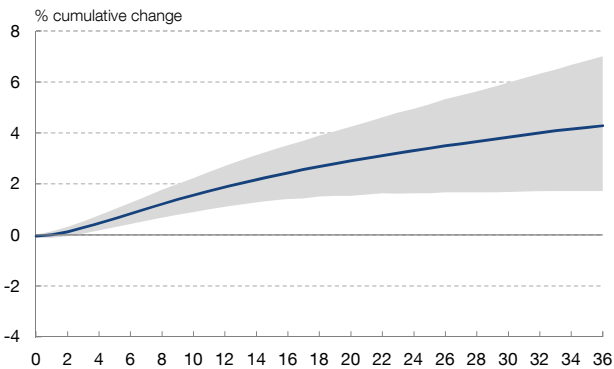
1 HOUSEHOLD SIGHT DEPOSIT VOLUMES. IMPULSE-RESPONSE FUNCTION TO A 1 SD SHOCK TO THE EURIBOR



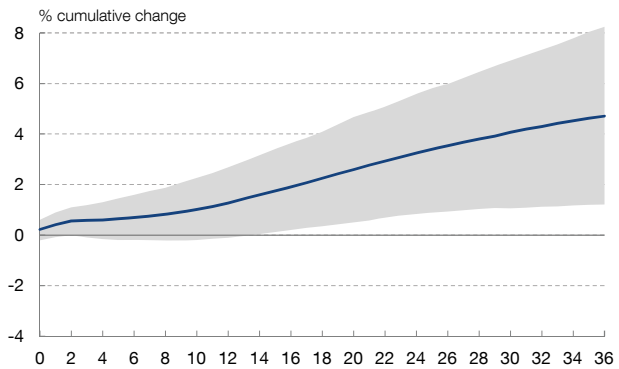
2 NFC SIGHT DEPOSIT VOLUMES. IMPULSE-RESPONSE FUNCTION TO A 1 SD SHOCK TO THE EURIBOR



3 HOUSEHOLD TERM DEPOSIT VOLUMES. IMPULSE-RESPONSE FUNCTION TO A 1 SD SHOCK TO THE EURIBOR



4 NFC TERM DEPOSIT VOLUMES. IMPULSE-RESPONSE FUNCTION TO A 1 SD SHOCK TO THE EURIBOR



90% CI MEDIAN IRF

SOURCE: Banco de España.

deposits dynamically increase, as Charts 5.3 and 5.4 demonstrate. Taken together, these responses suggest that households act in line with a portfolio rebalancing motive, taking advantage of the higher yield offered by term deposits.

Note that the net impact of a positive 12M EURIBOR shock to the volume of total deposits depends not only on these four impulse-response functions, but also on their relative starting composition. In particular, since the overwhelming majority of deposits are currently held in sight accounts, as discussed in Section 3.1 above, a positive 12M EURIBOR shock would entail a drain effect, that is, a decline in total deposits, even if term deposit volumes present a positive response that is higher in percentage terms than the negative reaction observed in the sight deposit volume. This drain effect is consistent with the findings of Bernanke and Blinder (1992) and Gerlach, Mora and Uysal (2018). This is despite the fact that total household savings typically increase, as households tend to direct resources from bank deposits to instruments issued by other financial institutions.

3.3 Conditional forecasts

Our VAR model allows us to generate an alternative or counterfactual path for deposit rates and volumes in the past, and quantitatively answer whether or not current developments differ from historical patterns. Importantly, note that no information related to the current policy cycle was used to estimate the model (as the estimation sample ended in December 2019), hence the model's predictions reflect historical relationships between the variables, spanning several monetary policy and macroeconomic cycles. In particular, we produced conditional forecasts of the four deposit rates and volumes jointly for the period between January 2021 and December 2022, based on the actual paths of the remaining variables (industrial production growth, HICP inflation and 12M EURIBOR).

We compute the corresponding forecasts of the average deposit rate (weighted by volumes), total deposit volumes (calculated as the sum of the four deposit types) and total deposit costs (computed as the sum of the products of each rate and volume). This exercise is particularly relevant due to the important role played by deposits in the funding structure of Spanish banks, as we highlighted at the beginning of this section.

Chart 6.1 shows that the counterfactual average rate gradually diverged from the observed rate. Considering the total volume of deposits, we see in Chart 6.2 that the model's forecasts are in line with the actual data, thanks to its ability to capture the developments of sight deposit volumes. Finally, as Chart 6.3 shows, the divergence between the predicted deposit costs – suggested by historical patterns and summarised by the VAR model – and their observed counterparts closely mirrors that of the (average) deposit rate, amounting to close to €525 million a month by the end of the period analysed. According to this estimation, the total deposit cost divergence in 2022 amounts to €3.25 billion that otherwise would have reduced the aggregate net interest income (of around €24 billion for all deposit institutions' business in Spain), according to the underlying estimation.

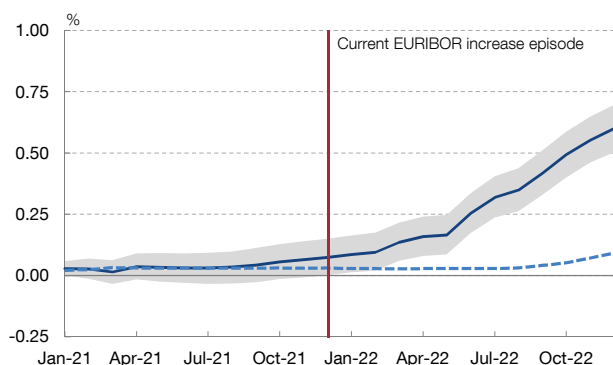
Seen through the lens of the model, the actual pass-through in each deposit category is substantially lower than what historical patterns would suggest, as Chart 6.4 clearly demonstrates. In absolute terms, the discrepancy is the most striking in the case of term deposits, where we see a 43 pp gap.

In Chart 7 we document that the model would predict a much steeper path for all deposit rates, in line with historical patterns. Considering deposit volumes (see Chart 8), the picture is somewhat different. For household sight deposits (see Chart 8.1), the model's predictions closely track the observed series until about the end of 2021. Starting at around the beginning of 2022, the model suggests a slight decline (although with considerable uncertainty, as the predictive bands show), while

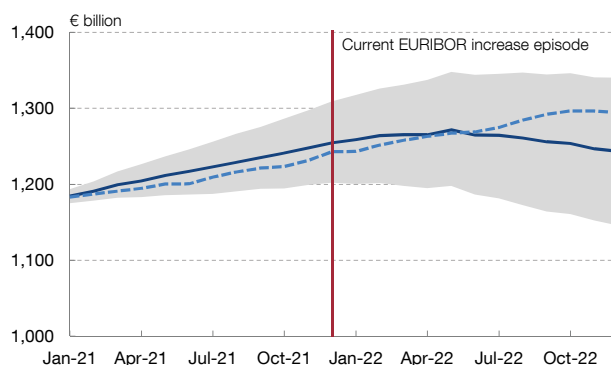
Chart 6

ACTUAL PATTERNS VS. MODEL PREDICTIONS IN THE CURRENT 12M EURIBOR SURGE EPISODE (a)

1 WEIGHTED AVERAGE INTEREST RATE. JANUARY 2021 TO DECEMBER 2022 PREDICTION VS. ACTUAL VALUES

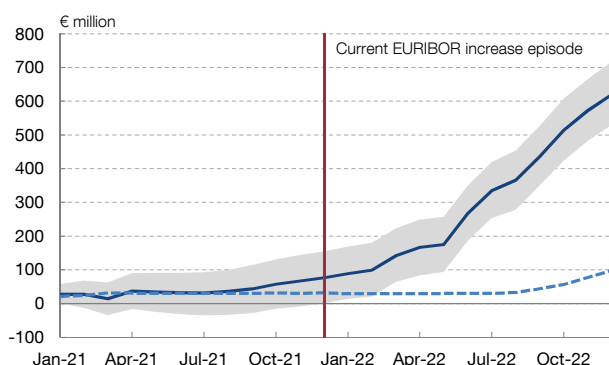


2 TOTAL DEPOSIT VOLUMES. JANUARY 2021 TO DECEMBER 2022 PREDICTION VS. ACTUAL VALUES



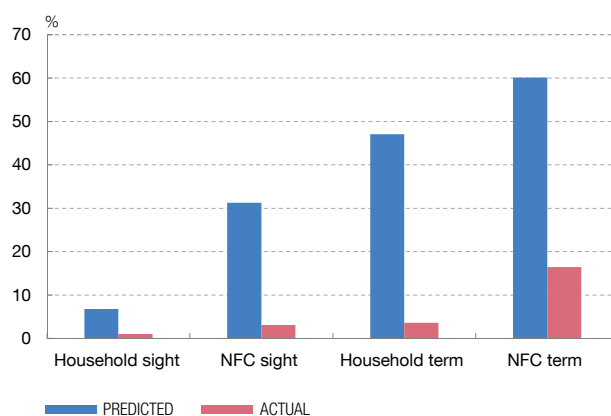
90% CI PREDICTION ACTUAL

3 TOTAL DEPOSIT COSTS. JANUARY 2021 TO DECEMBER 2022 PREDICTION VS. ACTUAL VALUES



90% CI PREDICTION ACTUAL

4 PASS-THROUGH OF EURIBOR INCREASES TO DEPOSIT RATES. JANUARY 2021 TO DECEMBER 2022



PREDICTED ACTUAL

SOURCE: Banco de España.

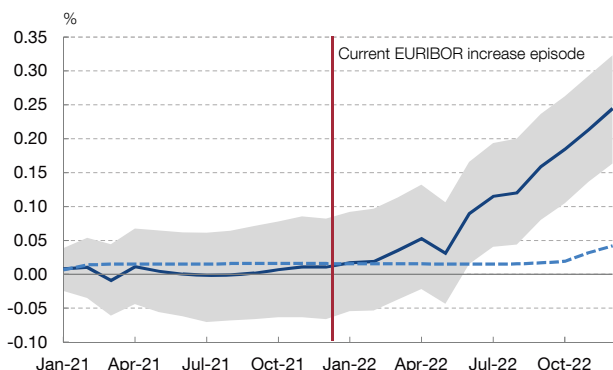
a The weighted average interest rate is computed as the average of the predicted deposit rates (see Chart 7), weighted by the corresponding predicted relative volumes (see Chart 8). Total volume is calculated as the sum of the four deposit volumes, while total deposit costs are obtained as the sum of the products of each predicted deposit rate and the corresponding volume. Predictive bands are based on 1,000 forward simulations of the VAR model, taking the conditioning paths of industrial production growth, HICP inflation and the 12M EURIBOR as given. The dark red lines indicate the beginning of the current EURIBOR increase episode.

in reality deposits kept increasing. For NFC sight deposits, the model's predictions in Chart 8.2 are fairly in line with the actual values, although the latter tend to fall in the lower end of the predictive uncertainty bands. Turning to household term deposits (see Chart 8.3), the model would have suggested a U-shaped path, while the actual series steadily declined until the beginning of the second half of 2022. Finally, we can see in Chart 8.4 that while up to the second half of 2022 the VAR model's forecasts are largely in line with the actual changes in the deposits held by NFCs, the model would not predict the dynamic increase in deposit volumes observed in the second half of the year. This upswing is presumably due to the similarly rapid increase in the deposit rate seen in Chart 7.4.

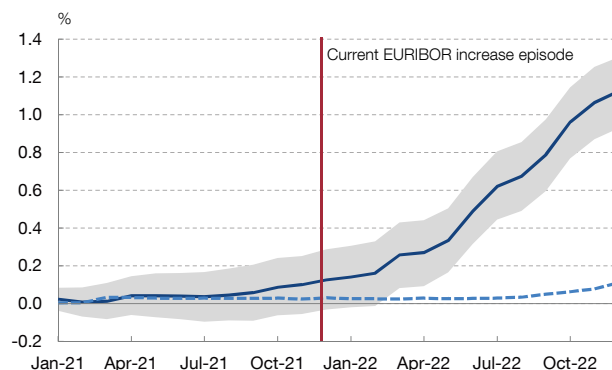
Chart 7

INTEREST RATE FORECASTS IN THE CURRENT 12M EURIBOR SURGE EPISODE (a)

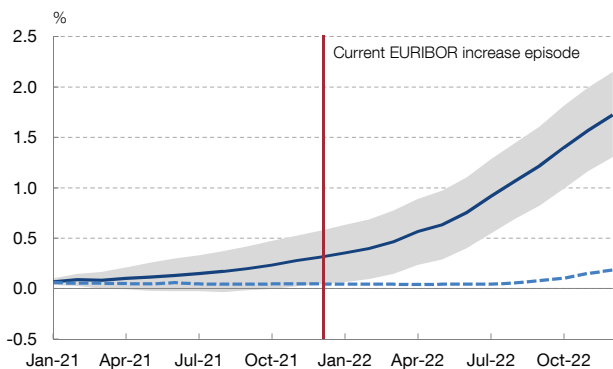
1 HOUSEHOLD SIGHT DEPOSIT RATE. JANUARY 2021 TO DECEMBER 2022 PREDICTION VS. ACTUAL VALUES



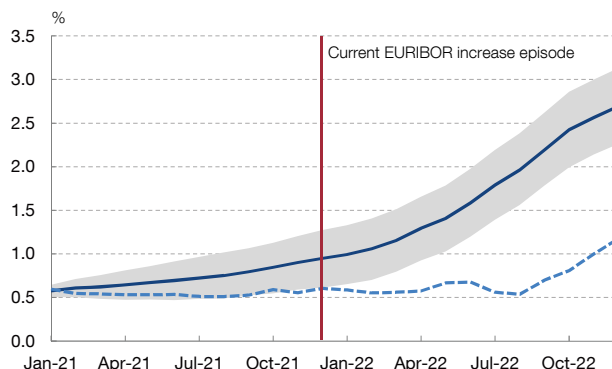
2 NFC SIGHT DEPOSIT RATE. JANUARY 2021 TO DECEMBER 2022 PREDICTION VS. ACTUAL VALUES



3 HOUSEHOLD TERM DEPOSIT RATE. JANUARY 2021 TO DECEMBER 2022 PREDICTION VS. ACTUAL VALUES



4 NFC TERM DEPOSIT RATE. JANUARY 2021 TO DECEMBER 2022 PREDICTION VS. ACTUAL VALUES



90% CI PREDICTION ACTUAL

SOURCE: Banco de España.

a The dark red lines indicate the beginning of the current EURIBOR increase episode.

In sum, our results indeed suggest that deposit rates do not follow the current increase in the 12M EURIBOR as much as our model would predict, in line with a remarkably muted pass-through mechanism. In contrast, the behaviour of deposit volumes shows a pattern which is not extreme from a historical perspective.

4 Comparative analysis of deposit rates and volumes with main euro area countries

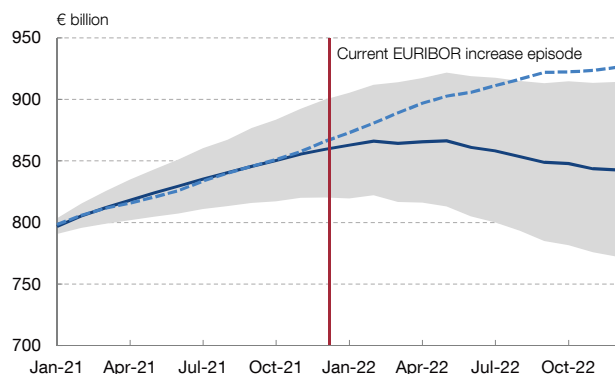
4.1 Stylised facts

Having documented that the pass-through of the 12M EURIBOR in Spain is weaker than in the past, we turn to examine the potential reasons. In order to do so, we expand our analysis to a number of euro area countries. Specifically, we compare historical patterns

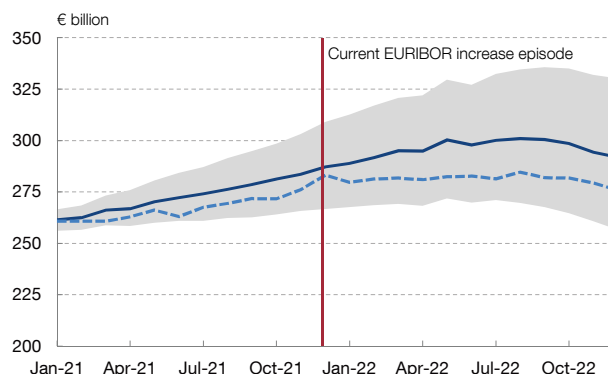
Chart 8

DEPOSIT VOLUME FORECASTS IN THE CURRENT 12M EURIBOR SURGE EPISODE (a)

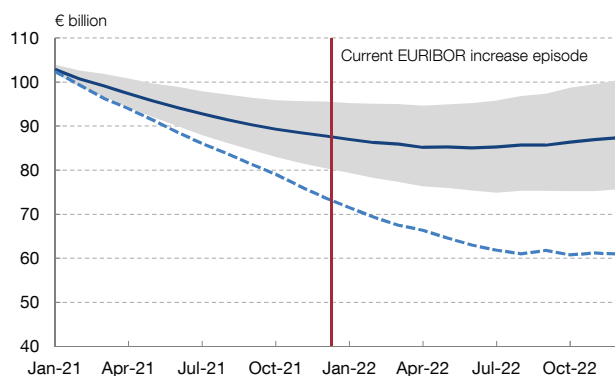
1 HOUSEHOLD SIGHT DEPOSIT VOLUMES. JANUARY 2021 TO DECEMBER 2022
PREDICTION VS. ACTUAL VALUES



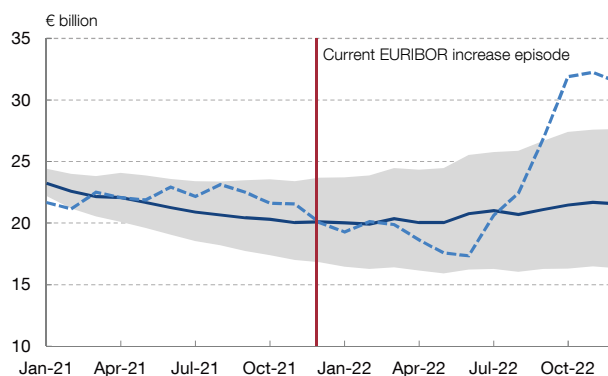
2 NFC SIGHT DEPOSIT VOLUMES. JANUARY 2021 TO DECEMBER 2022
PREDICTION VS. ACTUAL VALUES



3 HOUSEHOLD TERM DEPOSIT VOLUMES. JANUARY 2021 TO DECEMBER 2022
PREDICTION VS. ACTUAL VALUES



4 NFC TERM DEPOSIT VOLUMES. JANUARY 2021 TO DECEMBER 2022
PREDICTION VS. ACTUAL VALUES



90% CI PREDICTION ACTUAL

SOURCE: Banco de España.

a The dark red lines indicate the beginning of the current EURIBOR increase episode.

of deposit rates, volumes and costs in the main euro area countries (Germany (DE), France (FR), Italy (IT) and the Netherlands (NL)), both from a historical perspective and in the current scenario. For this purpose, we use the data on interest rates and deposit volumes published by the European Central Bank in its Statistical Data Warehouse.¹⁰

The comparison suggests that Spain shares historical patterns with other euro area countries.

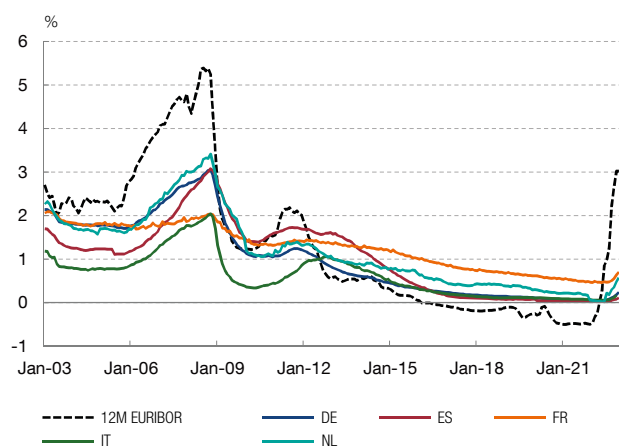
First, over the last twenty years the average interest rate on retail deposits declined in all the euro area countries examined, largely following the 12M EURIBOR (see

¹⁰ Information on interest rates is obtained from the ECB's MFI Interest Rate Statistics, and information on volumes is available from the ECB's Balance Sheet Items database.

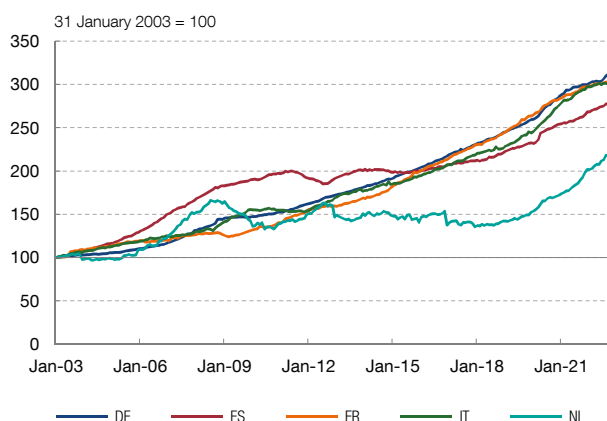
Chart 9

HISTORICAL EVOLUTION OF RETAIL DEPOSIT RATES, VOLUMES AND COSTS IN MAIN EURO AREA COUNTRIES

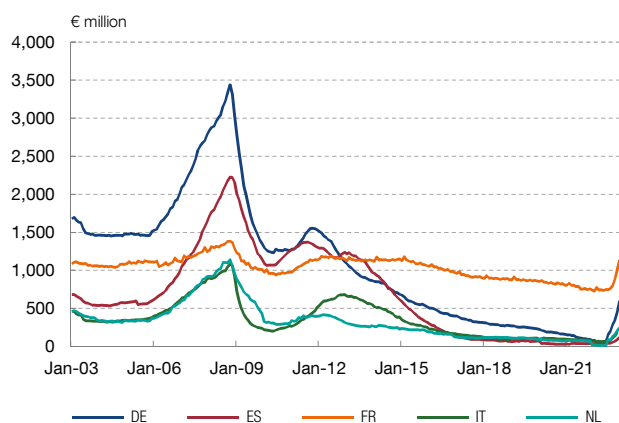
1 WEIGHTED AVERAGE INTEREST RATE FOR SIGHT AND TERM DEPOSITS. NFCs AND HOUSEHOLDS



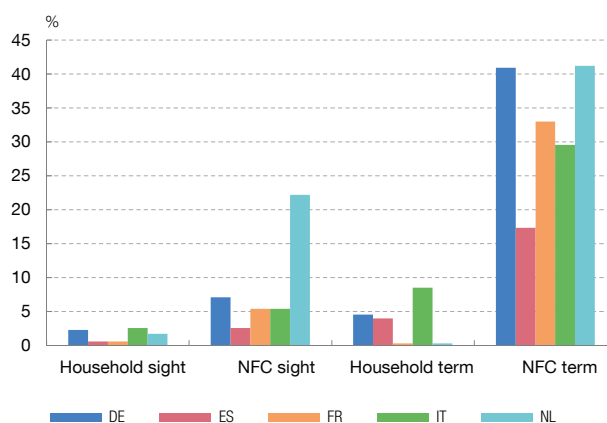
2 TOTAL SIGHT AND TERM DEPOSITS. NFCs AND HOUSEHOLDS



3 MONTHLY COST OF DEPOSITS. NFCs AND HOUSEHOLDS



4 PASS-THROUGH OF EURIBOR TO DEPOSIT RATES. DECEMBER 2021-DECEMBER 2022



SOURCE: ECB.

Chart 9.1). There are, however, some cross-country differences. For one, the average rate on deposits in France shows greater stability over time and since 2014 placed it at the top in terms of deposit rates.¹¹ On the other hand, deposit rates were historically lower in Italy, although these differences moderated and completely disappeared throughout the years of expansionary monetary policy.

Second, the volume of deposits in the countries analysed grew over the last two decades (see Chart 9.2). According to these data, the volume of deposits tripled in

11 The greater stability shown by the average interest rate on deposits in France is probably due to the inclusion of household deposits under the *Livret A*, a savings product whose characteristics (interest rate, maximum balance payable, etc.) are set by the French Government.

Germany, France and Italy. Deposit growth in Spain is close to these figures, although somewhat lower (+178%). Only in the Netherlands was deposit growth significantly below the average growth rate (+113%). The upward trend in deposit volumes was not interrupted in the low interest rate environment.

Finally, the total cost of deposits for credit institutions declined in all the countries analysed. In fact, the monthly cost of deposits reached the lowest values in the series at the end of 2021, despite the aforementioned increase in the total volume of deposits, standing below €70 million in Germany, Spain, Italy and the Netherlands (see Chart 9.3). By contrast, these costs remained above €700 million in France.

There are currently some cross-country differences in the strength of the pass-through of the 12M EURIBOR to deposit rates (see Chart 9.4). The pass-through of the 12M EURIBOR to interest rates on household deposits has been very limited (below 5%) in all countries, and practically zero in the case of sight deposits. Pass-through to NFC deposit rates has been larger and notably heterogeneous across jurisdictions, proving stronger in Germany and the Netherlands and weaker in Spain. Term deposits show the highest pass-through, with values ranging from 41% in Germany and the Netherlands to 17% in Spain.

The cost of bank deposits has reversed its trend in the second half of 2022, reaching a monthly cost of €600 million in Germany, €116 million in Spain, €250 million in Italy and the Netherlands and €1.14 billion in France.

4.2 Empirical analysis

To investigate whether the current period is substantially different from what historical evidence in each country tells us, we have estimated the VAR model in Section 3.1 for our sample of euro area countries. In each case, we used the country-specific IPI and HICP price level (both from Eurostat), and deposit rates and volumes, while the 12M EURIBOR is naturally common to all countries and models.¹²

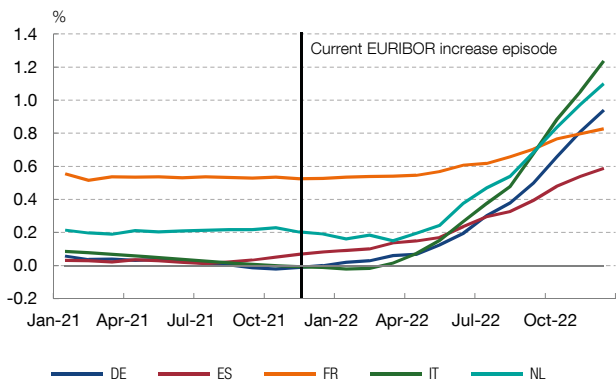
For the sake of brevity, we focus only on the counterfactual predictions produced similarly to those in Section 3.3, specifically those of the average deposit rate, total deposit volume and total deposit costs. The left-hand side panels of Chart 10 show the predictions of these variables, while the right-hand side panels display the relative gap between the out-of-sample forecast and the actual value of each variable in each country in December 2022, divided by this latest observation (hence, positive

¹² We downloaded seasonally adjusted IPIs, while we performed the seasonal adjustment of the HICP series using the TRAMO-SEATS procedure (see, for example, Gómez and Maravall (1996)), implemented in the JDemetra+ software available at https://ec.europa.eu/eurostat/cros/content/software-jdemetra_en. Deposit volumes showing seasonal patterns were also adjusted prior to analysis.

Chart 10

MODEL FORECASTS AND FORECASTING ERRORS FOR MAIN EURO AREA COUNTRIES IN THE CURRENT 12M EURIBOR SURGE EPISODE

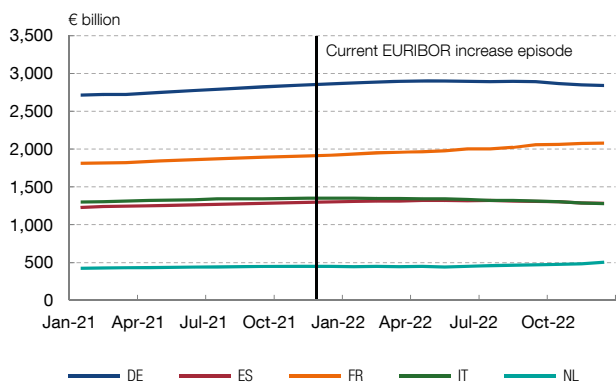
1 AVERAGE DEPOSIT RATE FORECAST (JAN-21 TO DEC-22)



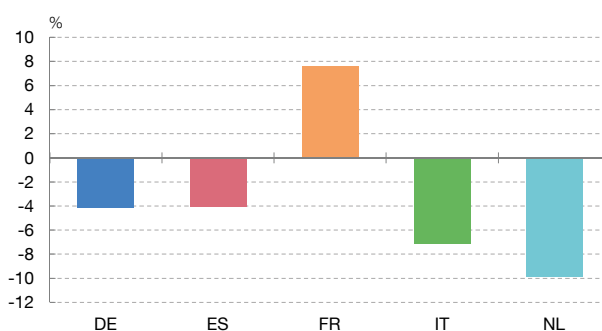
2 DEC-22 AVERAGE DEPOSIT RATE FORECASTING ERROR AS A % OF ACTUAL VALUE



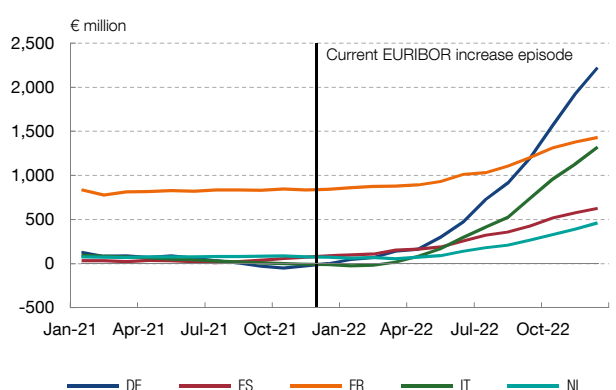
3 TOTAL DEPOSIT VOLUME FORECAST (JAN-21 TO DEC-22)



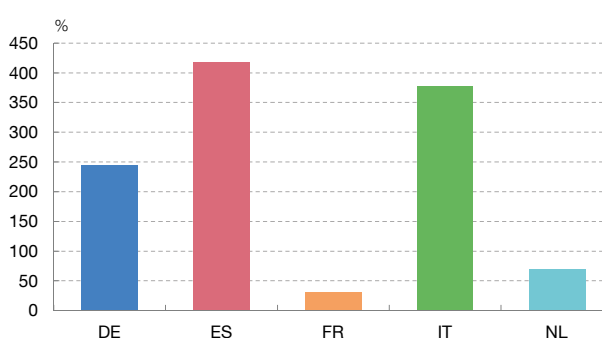
4 DEC-22 TOTAL DEPOSIT VOLUME FORECASTING ERROR AS A % OF ACTUAL VALUE



5 TOTAL DEPOSIT COST FORECAST (JAN-21 TO DEC-22)



6 DEC-22 TOTAL DEPOSIT COST FORECASTING ERROR AS A % OF ACTUAL VALUE



SOURCE: ECB.

values correspond to overpredictions). These gaps are qualitatively similar to those in Spain. First, deposit rates behave in a historically unusual way (except for France, see footnote 11), as the model appears to suggest a considerably higher average deposit rate. Second, deposit volumes increased substantially in the last two years¹³ (see Chart 9.2), while the model predicted a more stable path, once again supporting that the period analysed does not fit the historical pattern well. Finally, deposit costs are growing less than predicted by the model, similar to the pattern observed in Spain.

Yet there are quantitative differences in the gaps across countries. Specifically, the expected increase in deposit rates in Spain is taking place even slower than the one observed in peer countries, such as Germany and the Netherlands.

Next, we further explore whether there are changes in the sign of the co-movement between deposit rates and the 12M EURIBOR. First, we assess potential changes in correlations, which measure the sign of the changes in the variables. Chart 11.1 documents that the historical correlation of deposit rates with the 12M EURIBOR has generally been strong across countries.¹⁴ In the last year, the correlation between deposit rates and the 12M EURIBOR has remained, in general, strong, leaving to one side some unusual patterns in household term deposits, which account for a small fraction of the total.¹⁵ In NFC term deposits, correlations have remained strong across all countries.

We conclude that linkages of the 12M EURIBOR are moving in the same direction, despite the fact that the strength of their linkages has decreased, as shown in previous sections.

In addition we conduct a principal component analysis to further study the co-movement of interest rates among different deposit portfolios within the same country, as well as among countries within each of the portfolios considered.¹⁶ In the period 2003-2021, the proportion of the total variance of the series explained by the first principal component amounts to almost 90% in all countries (see left-hand side of Chart 11.2). In the last year, the intensity of the co-movement has remained broadly similar – it has decreased somewhat in France and the Netherlands, and increased in Spain and Italy. Similarly, the deposit rates considered moved in tandem across

13 In addition, although not shown in the chart, in 2022 Q4 a modest rebalancing of volumes from sight to term deposits began to be observed in some of the countries in the sample. This trend is expected to intensify in the coming months.

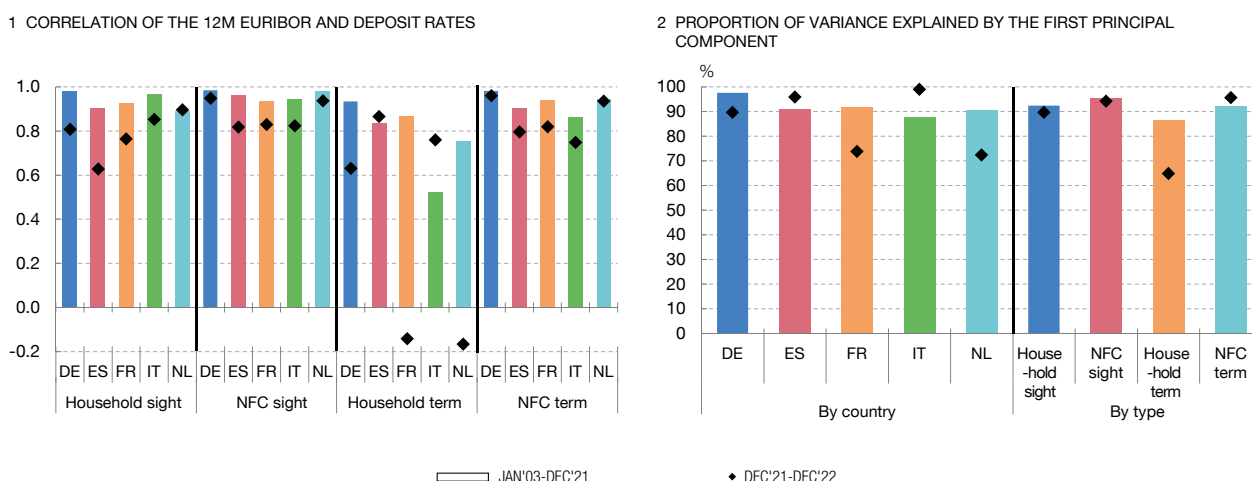
14 Correlations were around 0.9 in most portfolios and countries; interest rates on household term deposits exhibit the lowest correlation (values range from 0.52 in Italy to 0.93 in Germany).

15 In the case of household sight deposits, the correlation observed in Spain (0.63) is particularly low. In NFC sight and term deposit rates, Germany and the Netherlands have maintained correlation levels similar to those of their time series, while those in Spain, France and Italy have been somewhat lower.

16 We use the weight of the first principal component, which can be interpreted as the first common trend, in the total variance of the considered set of variables as an intuitive measure of the degree of co-movement present in that set.

Chart 11

CO-MOVEMENT BETWEEN RETAIL DEPOSIT RATES AND THE 12M EURIBOR IN MAIN EURO AREA COUNTRIES



SOURCE: ECB.

countries for a given portfolio in the period 2003-2021, as the first principal component explains around 85-90% of the joint variance (see right-hand side of Chart 11.2). In 2022, there are no major changes in co-movement patterns, leaving aside household term deposits.

4.3 Potential drivers of cross-country differences: liquidity and market concentration

The previous analysis underscores the cross-country differences in the quantitative impact of the current 12M EURIBOR surge on retail deposit rates, and not a complete decoupling. Many factors may certainly be behind the divergences relative to historical patterns, and a fully fledged analysis remains beyond the scope of this article. However, we explore the role played by factors often deemed to be drivers of pass-through speed. We first look at the impact of excess liquidity, which could reduce banks' incentive to raise deposit rates in order to obtain funds through retail deposits. In addition, we analyse market concentration, which could signal more power for banks to moderate or postpone deposit rate increases.

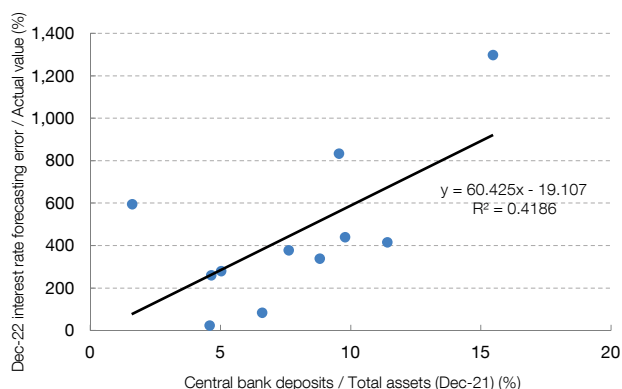
To this end, Chart 12.1 presents, for an extended sample of countries,¹⁷ the relationship between the weight of deposits from the ECB that banks had on their

17 The expanded sample of EU countries considered for this analysis includes 11 euro area founding countries: Belgium (BE), Germany (DE), Ireland (IE), Spain (ES), France (FR), Italy (IT), the Netherlands (NL), Austria (AT), Portugal (PT) and Finland (FI). Greece (GR), having joined the euro area only two years after its foundation, is also included in the sample.

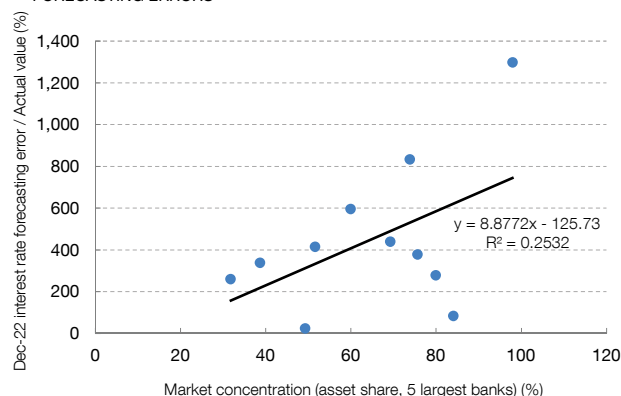
Chart 12

LIQUIDITY AND MARKET CONCENTRATION AS POTENTIAL DRIVERS OF CROSS-COUNTRY DIFFERENCES IN 12M EURIBOR PASS-THROUGH

1 EFFECT OF EXCESS LIQUIDITY ON DEPOSIT RATE FORECASTING ERRORS



2 EFFECT OF MARKET CONCENTRATION ON DEPOSIT RATE FORECASTING ERRORS



SOURCE: ECB.

balance sheets¹⁸ as of December 2021 – as a percentage of their total assets – and the forecasting error of the average interest rate on retail deposits modelled for December 2022 – normalised by the value actually observed in that same period. As discussed above, the excess liquidity of certain banking systems would be overstated had we gauged it using deposits held at the ECB, due to operational issues related to liquidity management by foreign banks operating in Germany and Luxembourg. In the other European banking systems there is a closer connection between deposits from and at the ECB. As can be seen in the chart, the countries with greater excess liquidity are those that in turn show a greater deposit rate forecasting error, i.e. they are the countries that increased their rates the least with respect to what was expected based on previous historical experience.

Next we check the role of market concentration, measured via the asset market share of the five largest banks (C5).¹⁹ We also observe a positive relationship, although it is weaker than in the previous case, with the model forecasting errors for average interest rates (see Chart 12.2).

According to this analysis, a decrease in the funding obtained by Spanish banks from the Eurosystem would have a material impact on the strength of the pass-through from the 12M EURIBOR to deposit rates. Moving from the 9.8% excess

18 The weight of deposits from the ECB relative to total assets constitutes a good proxy of the excess liquidity held by banks with relevant retail deposit activity, but excluding that held by institutions domiciled outside the euro area and kept in the ECB through subsidiaries located in certain countries, such as Germany or the Netherlands.

19 Information on market shares is obtained from the ECB’s SSI Banking Structural Financial Indicators Statistics database.

liquidity ratio recorded in December 2021 to zero would narrow the estimated gap in the pass-through by 85%.

5 Conclusions

The EURIBOR surged in 2022, as monetary policy tightened to dampen inflation. According to historical experience, such a strong rise in the EURIBOR should have pushed up deposit rates, triggering shifts from sight to term deposits, which are costlier, and ultimately driving up deposit costs. Our conclusion is warranted by both descriptive analyses and a formal estimation employing an SVAR model fitted on the period 2003-2019.

We document that, in 2022, the pass-through of the EURIBOR to bank deposit rates in Spain was weaker than expected according to model results. Specifically, deposit rates failed to increase; the discrepancy was more striking in the case of term deposits, which have historically responded more strongly. Overall, and up to December 2022, bank deposit costs remained broadly stable.

In 2022 the pass-through of the EURIBOR was also weak in other euro area countries, yet there were quantitative cross-country differences. Simple correlation analyses suggest that the EURIBOR pass-through is particularly weak in banking systems with a high volume of deposits from the ECB as of December 2021 and high market concentration.

Going forward, jointly modelling deposit rates and volumes will remain useful to assess the impact of the EURIBOR on bank deposit costs. In addition, once the EURIBOR pass-through gains momentum, differences across banks will likely appear and bank-level analyses will help to understand which factors determine bank responses.

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This annex summarises the econometric techniques we used to estimate the (S)VAR models in the article.

The reduced-form VAR model assumes a linear relationship between an $(N \times 1)$ vector of variables y_t and its p lags as

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + \epsilon_t,$$

where c is an $(N \times 1)$ vector of intercepts, A_i s denote $(N \times N)$ coefficient matrices, while ϵ_t is an $(N \times 1)$ vector of independent and identically distributed innovations following a normal distribution with mean zero and covariance matrix Σ .

We estimated the VAR model with maximum likelihood. Visual inspection of the autocorrelations of the estimated error terms (that is, the difference between the fitted values and the realisations) suggested using at least two lags. The Akaike Information Criterion (AIC), a commonly used model selection criterion, suggested two lags when considering potential lag lengths between $p=1$ and $p=6$. The Bayesian Information Criterion (BIC), a more parsimonious alternative to the AIC, suggested $p=1$ lag only, but due to the presence of strong serial correlation in the residuals, we discarded this suggestion. However, when considering potential lag lengths between $p=2$ and $p=6$ only, the BIC also suggested $p=2$.

As described in Section 3.1 of the main text, our estimation sample spans the period between January 2003 and December 2019. The sample starting date is determined by data availability. By ending the estimation sample before the COVID-19 pandemic, our results are not contaminated by the extreme macroeconomic volatility observed during that period. Furthermore, we avoid potential biases due to the possibly unusual behaviour of deposits due to administrative restrictions affecting mobility and business hours. Considering the rather short period between 2003 and the Global Financial Crisis (GFC) of 2007-2008 could potentially alleviate issues related to negative interest rates and macroeconomic and financial turbulence, leading to a more appropriate benchmark pass-through. However, time-varying parameter regression analysis reveals that the relationship between deposit rates and the 12M EURIBOR was markedly different during that early period relative to the full-sample constant-parameter estimates. Furthermore, for outstanding rather than new deposits, estimates based on a longer sample potentially capture composition effects better.

To construct the impulse-response functions and turn the reduced-form VAR into an SVAR model, we relied on contemporaneous restrictions: variables ordered before

the 12M EURIBOR (i.e. industrial production growth and HICP inflation) are not allowed to respond contemporaneously to an unexpected change in the 12M EURIBOR. Technically, after estimating the VAR model, the impulse-response functions are identified via the lower triangular Cholesky decomposition of the covariance matrix of the error terms (the estimate of Σ). The 90% confidence intervals reflect estimation uncertainty, and we generated them via a resampling method known as the bootstrap.

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EU ENERGY DERIVATIVES MARKETS: STRUCTURE AND RISKS

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The views expressed in this article are those of the authors and do not necessarily reflect the views of ESMA.

Abstract

Energy derivatives markets were thrown into turmoil following Russia's invasion of Ukraine, as the prices of natural gas and power soared amid high volatility and a significant deterioration in market liquidity. Prices surged in March 2022, before declining in Spring and then rebounding to reach historical peaks at end-August 2022. The sharp price increases triggered large margin calls on derivatives positions, resulting in liquidity stress for some firms using derivatives as hedges against price declines, energy utilities in particular. The liquidity demands were so high that some EU countries introduced public support mechanisms in the form of loans and public guarantees, and a few energy firms were bailed out. Therefore, it is crucial to understand the structure and functioning of energy derivatives markets. This article provides an overview of EU energy derivatives markets and assesses the risks for financial stability. Unlike other financial markets, non-financial corporates play a key role in energy markets by trading on exchanges and over the counter. The market is characterised by a high degree of concentration in clearing and trading activities, as evidenced by network analysis, and some energy firms hold relatively large positions in the market. In this context, liquidity and concentration risks are among the main vulnerabilities identified, along with data fragmentation and data gaps. The recent migration of some of this activity from exchange-traded to over-the-counter derivatives markets raises concerns over limited transparency and more bespoke margin and collateral requirements.

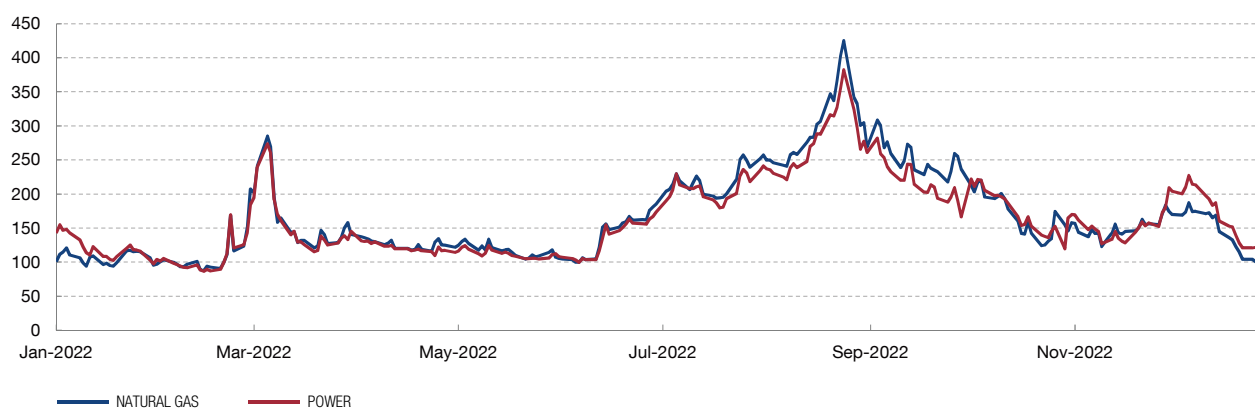
Keywords: Financial stability, energy derivatives, collateral, margins.

1 Introduction

Russia's invasion of Ukraine at the end of February 2022 triggered a sharp rise in the price and volatility of commodities, energy in particular. The price of natural gas and power futures rose by 200% between the end of February and early March, before declining and settling at pre-war levels in Spring. Prices again increased in July, hitting historical heights in late August 2022, at close to four times their pre-war levels (Chart 1). Since then, energy prices have been trending downwards and had returned to their pre-war levels by end-2022.

Beyond certain fundamental factors, such as the fall in the supply of natural gas from Russia, the rise in the demand for gas owing to the build-up of inventories ahead of the winter, and issues surrounding electricity production by nuclear plants in some EU countries, the extreme volatility observed on derivatives markets was also attributable to the structure and functioning of these markets.

Chart 1

ENERGY DERIVATIVE PRICES

SOURCES: Refinitiv Datastream and ESMA.

NOTE: Future prices of natural gas (Dutch TTF front-month contract) and power (Phelix front-month) in EUR, rebased at 22 Feb. 2022 = 100.

Across all commodities, derivatives markets play a key role in price discovery (Shrestha, 2014; ECA, 2015). Market participants can take directional positions on the future prices of the underlying energy products for speculative or hedging purposes.

Energy derivatives markets, which encompass natural gas and power (electricity),¹ display certain characteristics common to all financial markets: trading activity is concentrated in exchanges where market members can send buy and sell orders to a central limit order book, and trades are mainly cleared through central counterparties (CCPs), where clearing members have to post initial and variation margins to reduce market and counterparty risk. In addition to on-venue trading, derivatives trades can be also executed over-the-counter (OTC) and cleared bilaterally between counterparties.

At the same time, energy derivatives markets also display certain features that set them apart from traditional financial markets: much of the activity is carried out by non-financial corporates (mainly energy firms), while the role of financial intermediaries (such as banks) is less prominent than is the case on traditional financial markets. In addition, constraints on the physical delivery and storage of the underlying commodity can have an impact on how the market functions.²

1 From a regulatory perspective, under MiFID II only natural gas and power derivatives are considered energy derivatives. As per the regulatory definition, in the remainder of the article energy derivatives refer to natural gas and power derivatives.

2 For example, in electricity markets, Cartea and González-Pedraz (2012) show that date and location are crucial determinants of market clearing prices and use real options to model the valuation of an interconnector (an asset that gives the owner the option to transmit electricity between two locations).

This article provides an overview of the structure and functioning of EU energy derivatives markets by expanding the analysis of natural gas markets performed by ESMA (2023b) to include power markets.³ The analysis shows that EU energy derivatives markets are characterised by a high degree of concentration in terms of clearing activity, and that a few energy firms have a large market footprint. Following the rise in margins on exchange-traded derivatives (ETDs), a migration to OTC derivatives has taken place, leading to the further fragmentation of the energy derivatives network. This development may make energy markets less resilient, since OTC markets are less transparent and counterparty risk is managed on a bilateral basis, instead of centrally through CCPs.

The following section describes the structure and size of the energy derivatives markets, along with the main types of market participant. The third section looks at risks in energy markets in light of recent developments observed since the start of the Russian invasion of Ukraine. The fourth section focuses on changes in the network structure of EU energy derivatives markets and on concentration risk. The final section sets out some closing observations and conclusions.

2 The structure of energy derivatives markets in the EU

The energy derivatives ecosystem

Across all commodities, derivatives markets play a key role in price discovery (Shrestha, 2014; ECA, 2015). Market participants can take directional positions on the future prices of the underlying energy products for speculative or hedging purposes. By using derivatives, market participants can hedge their positions (e.g. a natural gas producer can take a short position in derivatives to hedge against future price declines, while a firm needing natural gas or power in the future can take a long position to hedge against a price rise), take directional views on future prices and contribute to price discovery. The trading of ETDs also boosts liquidity through standardisation and reduces counterparty risk through the use of CCPs. Indeed, CCPs act as systemic risk managers that cover counterparty risk on a centralised basis thanks to a sophisticated set of models and the financial resources needed to foster transparent and liquid markets.

Aside from the benefits derivatives have to offer, they can also entail risks, including liquidity and counterparty risks. The use of derivatives can pose two types of liquidity risk: market liquidity risk and funding liquidity risk (Brunnermeier and Pedersen, 2009). Market liquidity refers to the ability of the market to absorb large trades quickly

³ This article does not cover in detail the monitoring and regular reporting of natural gas markets, including in the context of the market correction mechanism introduced at end-2022. See ACER (2023) and ESMA (2023a) for further details on this mechanism.

without moving the price too much. Funding liquidity is the ability to borrow money quickly to finance positions. Counterparty risks refers to the risk of one counterparty failing to deliver on its derivatives obligations, leaving the other exposed to potential losses.

The use of derivatives usually requires that the counterparties post initial margins at the inception of the derivative contract (this is mandatory for ETDs and optional for OTC derivatives) to protect against counterparty default, followed by daily variation margins (generally in the form of cash) to reflect the current market value of the trade for the counterparty exposed to mark-to-market loss. In the event of a steep price increase, the counterparty with a short position has to post variation margins (since its position has incurred mark-to-market losses) and, in some cases, both counterparties have to post additional initial margins (since the margin models used by CCPs require higher levels of collateral to compensate for the heightened volatility of energy derivatives).⁴ While eligible collateral and margin requirements may differ across clients and clearing members, all clearing members are subject to similar requirements regarding the initial and variation margins posted with the CCP.

In the OTC space, counterparties enter into derivatives transactions that may have bespoke, more customised characteristics. Margin rules for non-cleared derivatives include the mandatory posting of initial and variation margins when firms' derivatives exposures (average aggregate notional amounts) exceed certain thresholds.⁵ Otherwise, counterparties can structure their margin arrangements at their discretion. Eligible collateral is defined bilaterally by the counterparties, although, in practice, cash and sovereign bonds are the norm (ISDA, 2021).

Before looking at such risks in more detail in the context of Russia's February 2022 invasion of Ukraine, it is worth reflecting on the structure of EU energy derivatives markets. This structure can be broken down into different components (Figure 1).

First, the ultimate investors can be EU or non-EU entities. Investors can be financial institutions such as banks or investment funds, or non-financial corporates such as energy producers (utilities), entities specialised in commodity trading (independent commodity trading firms) or corporates that use energy as an input for their production processes (e.g. manufacturing firms).

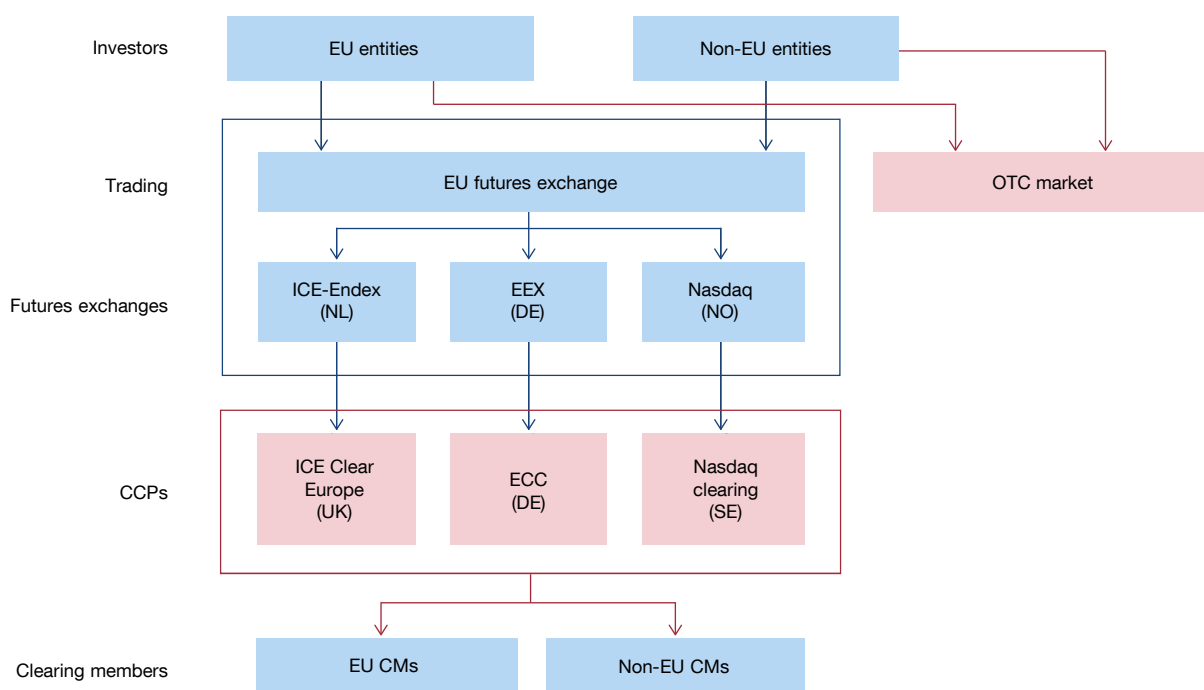
Investors can trade on futures exchanges or bilaterally on the OTC market. There are three main regulated markets for the trading of natural gas and power derivatives in

4 CCPs use internal models for determining initial and variation margins. High volatility triggers variation margins for counterparties with mark-to-market losses and can also result in higher initial margins for both counterparties.

5 For commodity derivative contracts, the clearing threshold is EUR 4 billion in gross notional value. If a NFC's positions exceed this clearing threshold, it becomes subject to bilateral margin requirements (initial and variation margins). For further details, see ESMA (2022b).

Figure 1

TRADING AND CLEARING ECOSYSTEM



SOURCE: ESMA (2023b).

the EU: ICE Endex in the Netherlands (the main exchange for natural gas, Chart 9), European Energy Exchange (EEX) in Germany (the main exchange for power and a significant exchange for natural gas, Charts 9 and 10) and Nasdaq Oslo in Norway (a significant exchange for power, with a more limited role in natural gas).

Trades on these exchanges are cleared centrally through three CCPs: ICE Clear Europe in the UK for ICE Endex, European Commodity Clearing (ECC) in Germany for EEX and Nasdaq Clearing in Sweden for Nasdaq Oslo.

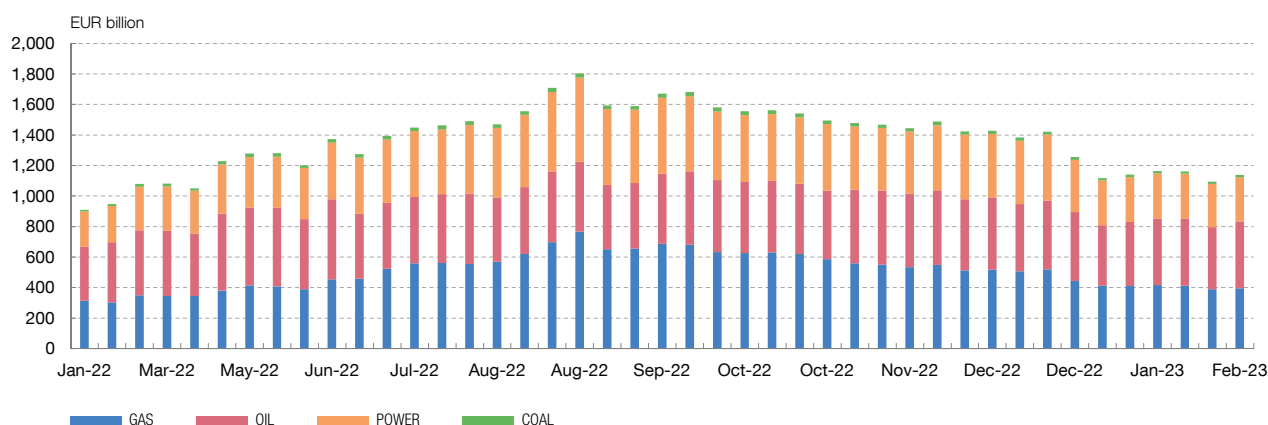
CCPs have clearing members (CMs), which can be EU or non-EU firms. EU CMs for energy derivatives are mainly large banks and, to a lesser extent, NFCs.

Finally, clearing members have clients, which can be financial or non-financial entities. Such clients clear their ETD trades with CMs by posting collateral. In turn, CMs post collateral to the CCP on behalf of their clients.

In the ETD space, market participants trade standardised futures and options on regulated markets as market members or through direct market access (whereby a market participant trades using the trading code of a market member).

Chart 2

OUTSTANDING NOTIONAL AMOUNTS BY ENERGY DERIVATIVE AND DATE



SOURCES: EMIR and ESMA.

NOTE: All sectors included, intragroup trades excluded.

Size of EU energy derivatives markets

Overall, exposures of EU entities to energy derivatives markets totalled around EUR 1.1 trillion⁶ at February 2023, with natural gas and power derivatives representing 60% of the gross notional amounts (Chart 2).⁷ In February 2023 natural gas and power-related derivative exposures amounted to EUR 400bn and EUR 290bn, respectively, as compared with EUR 440bn for oil and less than EUR 15bn for coal. The size of such exposures shows that energy derivatives markets (for natural gas and power in particular) are essential for the functioning of energy markets in the EU.

Non-financial corporations (NFCs) play a significant role in energy derivatives markets. On average, 35% of the outstanding notional amounts in gas derivatives over the period analysed were reported by NFCs (Chart 3), not including intragroup trades. This share has decreased slightly, from 38% in January 2022 to 35% in February 2023. Conversely, it has risen steadily in the case of power, from 35% to 50% (Chart 4).

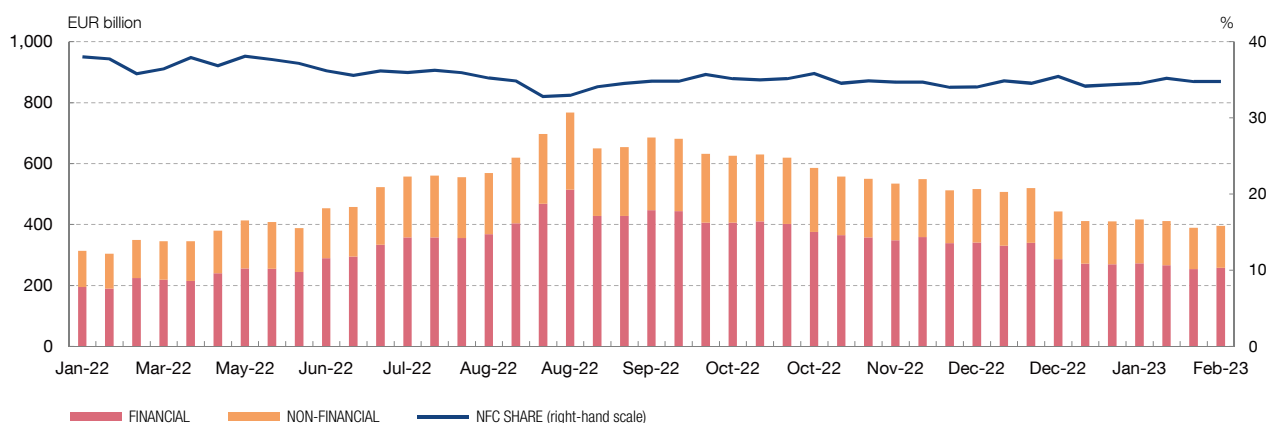
Energy derivatives can be traded on regulated markets, using ETDs such as futures and options, or OTC, mainly in the form of swaps and forwards. Overall, the gross notional exposures of EU counterparties to gas derivatives consists mainly of ETDs,

6 This number includes all outstanding derivatives, including positions between CCPs and clearing members.

7 Under the European Market Infrastructure Regulation (EMIR), counterparties domiciled in the European Economic Area are subject to detailed reporting requirements on derivatives trades and positions. The data used in the article come from European Economic Area (EEA) entities, covering counterparties domiciled in the 27 EU countries and Iceland, Liechtenstein and Norway. For presentational purposes, the term EU is used throughout the document to cover the EEA.

Chart 3

GAS NOTIONAL AMOUNTS BY SECTOR

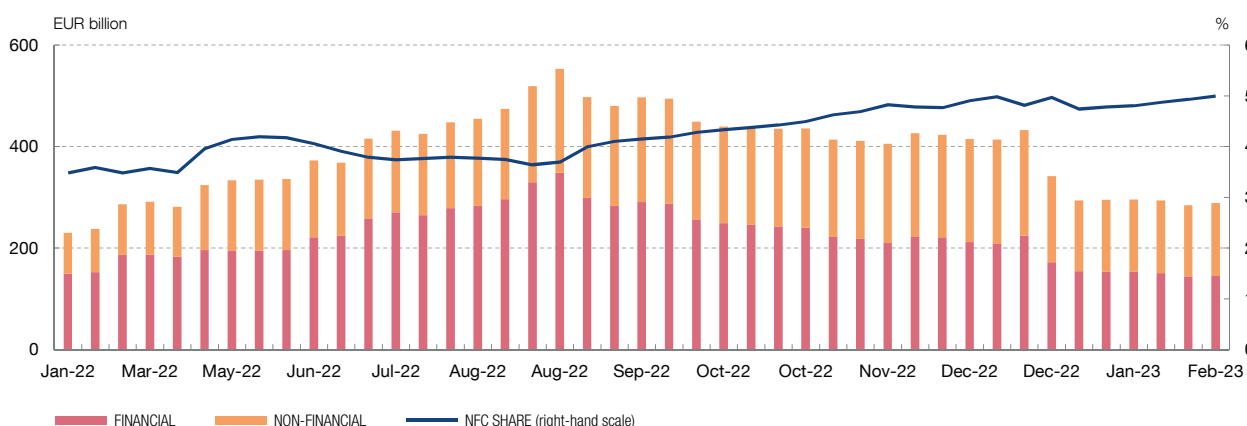


SOURCES: EMIR and ESMA.

NOTE: Sector of the reporting counterparty, intragroup trades excluded.

Chart 4

POWER NOTIONAL AMOUNTS BY SECTOR



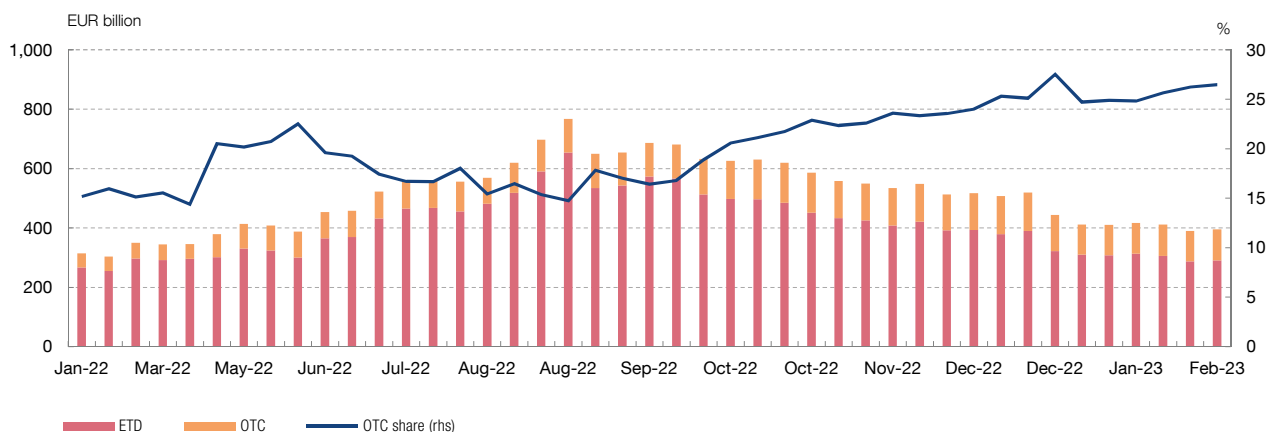
SOURCES: EMIR and ESMA.

NOTE: Sector of the reporting counterparty, intragroup trades excluded.

accounting for 75% of the total. However, since summer 2022 the OTC share of outstanding positions has increased from 15% to 25% (Chart 5). Similar patterns can be observed for power derivatives: around 2/3 of gross exposures are through ETDs and 1/3 via OTC derivatives. The share of OTC derivatives has also increased markedly, from less than 10% in early 2022 to more than 30% (Chart 6). While the outstanding notional amounts of both types of commodities have decreased since late summer 2022, the number of open transactions has remained relatively stable, pointing to the influence price changes have on notional amounts.

Chart 5

GAS NOTIONAL AMOUNTS BY ETD/OTC SPLIT

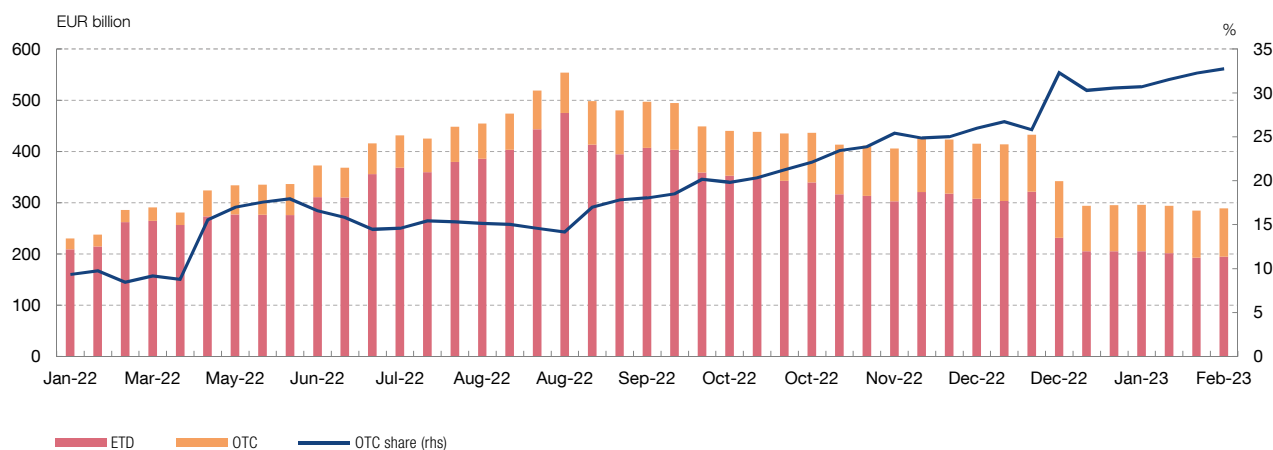


SOURCES: EMIR and ESMA.

NOTE: All sectors included, intragroup trades excluded.

Chart 6

POWER NOTIONAL AMOUNTS BY ETD/OTC SPLIT



SOURCES: EMIR and ESMA.

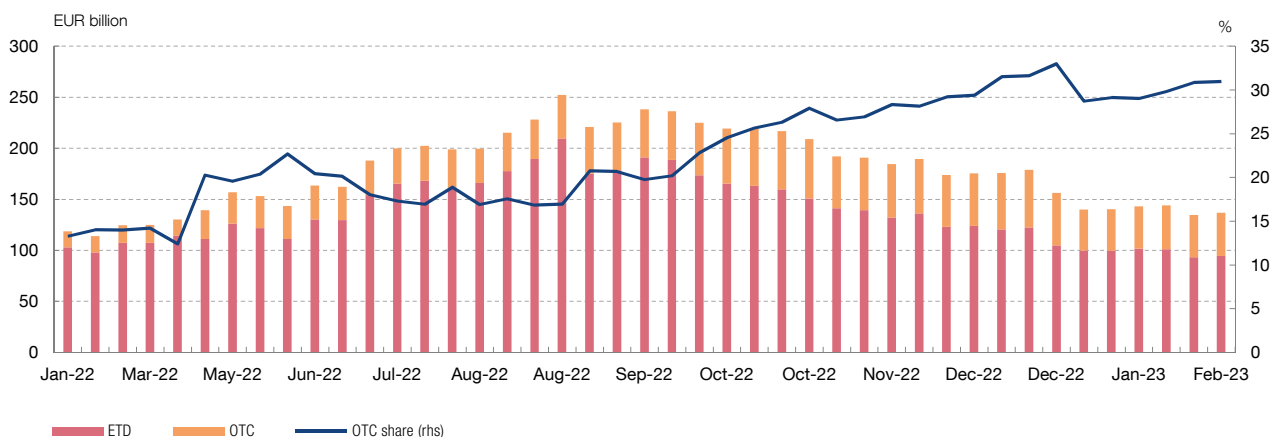
NOTE: All sectors included, intragroup trades excluded.

Within ETDs, futures represent around 80% of the gross notional amounts of gas and power derivatives. In the OTC space, excluding intragroup trades, swaps account for 74% of these markets, followed by forwards (13%) and options (6%).

Most exposures to natural gas and power derivatives still take the form of ETDs. However, there has been a significant shift towards the OTC market since the summer, in particular for NFCs and, above all, energy firms (FSB, 2023). Charts 7 and 8 show that the overall share of OTC during 2022 and early 2023 has increased from less than 15% to more than 30% for natural gas and from 20% to over 50% for

Chart 7

GAS NOTIONAL AMOUNTS REPORTED BY NFCs, BY ETD/OTC SPLIT

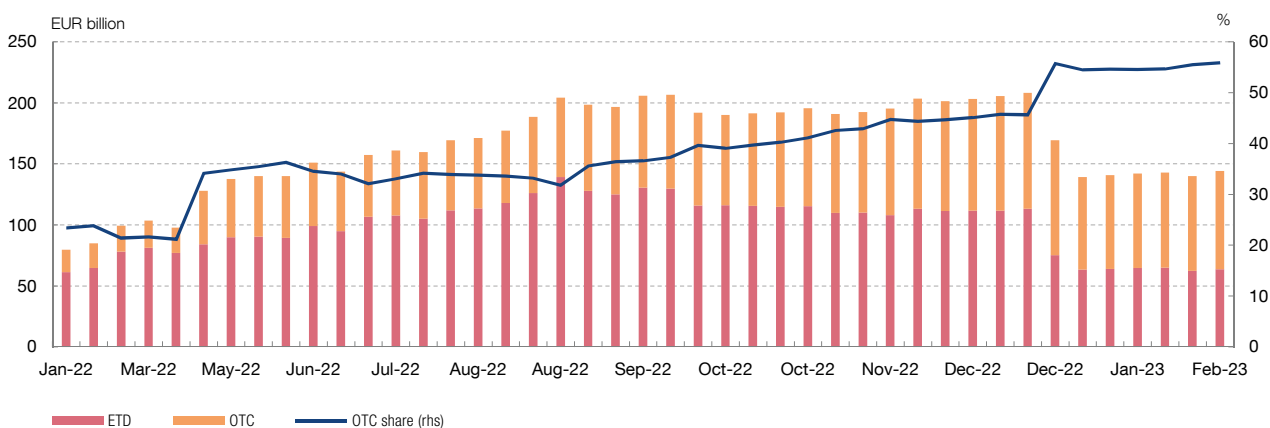


SOURCES: EMIR and ESMA.

NOTE: Only trades reported by NFCs, intragroup trades excluded.

Chart 8

POWER NOTIONAL AMOUNTS REPORTED BY NFCs, BY ETD/OTC SPLIT



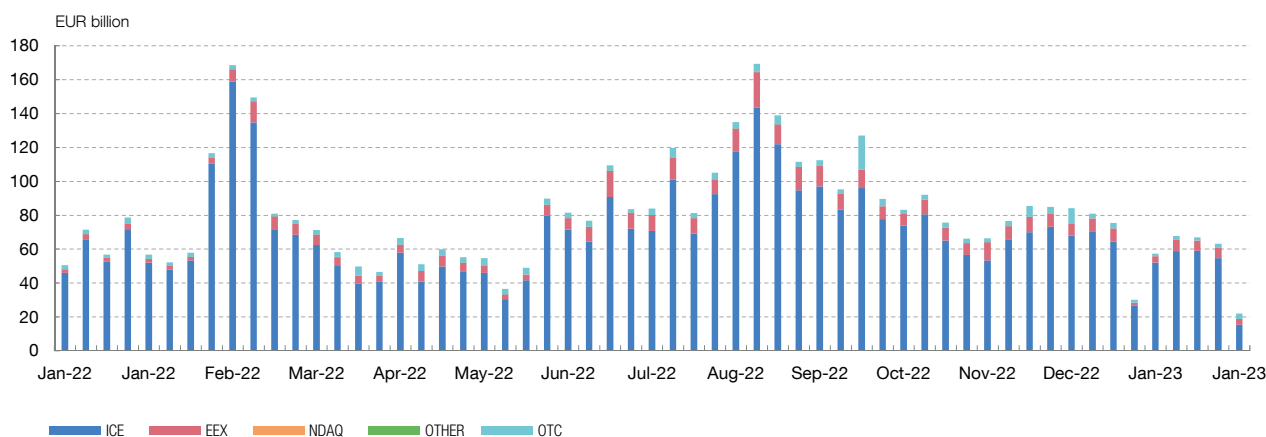
SOURCES: EMIR and ESMA.

NOTE: Only trades reported by NFCs, intragroup trades excluded. Eur billion.

power. Firms may have migrated to OTC to reduce margin requirements, as bilateral contracts can provide counterparties with greater flexibility, even doing away with initial margins in some cases (FSB, 2023). By doing so, firms can trade off liquidity risk for counterparty risk and reduce the liquidity available on trading venues. This shift to OTC is influenced by the different distribution of maturities between ETD and OTC derivatives, as ETD trades tend to have shorter tenors. While prices have come down since the summer of 2022, and notional amounts have decreased accordingly, ETD trades have expired and been renewed comparatively more frequently than OTC trades.

Chart 9

GAS TRADED NOTIONALS BY VENUE AND OTC



SOURCES: FITRS, EMIR, ESMA.

NOTE: Trades reported by CCPs, intragroup trades excluded.

Main trading participants on EU energy derivatives markets

Trading patterns can be analysed by comparing ETD and OTC positions and by comparing trading volumes across both execution methods. Trading volume data show that trading tends to be concentrated on one exchange.⁸ ICE is the dominant futures exchange for ETD trades of natural gas derivatives (Chart 9), accounting for 91% of all ETDs in the period between January 2022 and January 2023. This share has decreased slightly, from 96% on average in January 2022 to 89% in January 2023, but trading volumes on other futures exchanges remain small when compared to ICE.

The amount traded OTC is small compared to the volume of ETDs. On average, OTC trades account for only 5% of total trading volumes, and this share has remained stable.

For power derivatives, trading activity is also concentrated on one exchange. EEX accounts for 92% of ETD volumes (Chart 10), with a slight decrease between January 2022 and January 2023, from 95% to 91%.

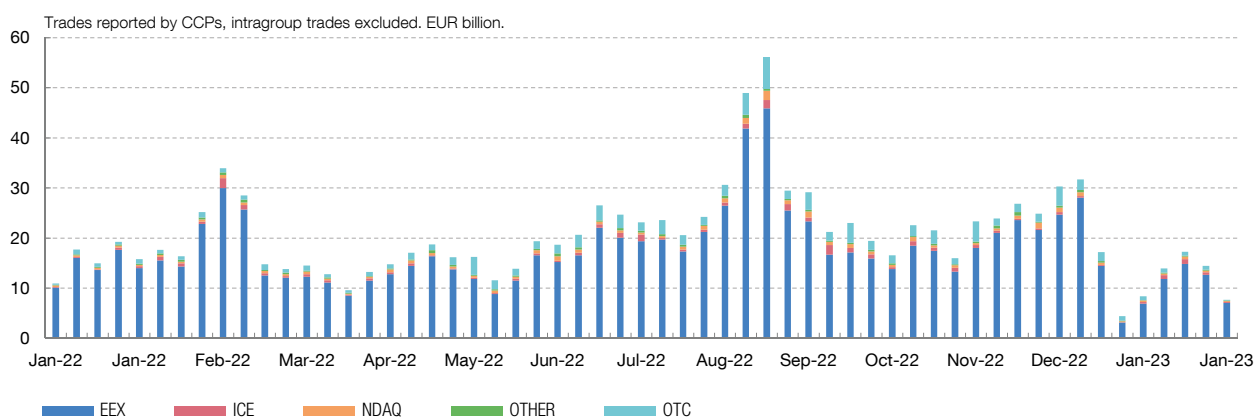
The share of OTC trading is also small, although higher than in the case of natural gas, accounting for 8% of total trading volumes.

On futures exchanges, the main types of market participant can be analysed using ETD trading data, as well as position reporting at exchange level, since exchanges have to report position information on market participants to the National Competent

⁸ These figures do not include trades reported by CCPs to EMIR, to avoid overestimating amounts where the counterparty is in the EEA30.

Chart 10

POWER TRADED NOTIONALS BY VENUE AND OTC



SOURCES: FITRS, EMIR and ESMA.

Authorities (NCAs) on a daily basis. In terms of trading activity, a sizeable portion of the volumes traded on futures exchanges are performed by proprietary trading firms such as high-frequency traders, as well as by banks and energy firms (FSB, 2023). As in other electronic markets, proprietary trading firms tend to be very active in terms of trading volumes, but do not generally take directional positions overnight. For the natural gas derivatives markets, ESMA (2023b) shows that non-EU firms accounted for close to 60% of positions in early 2022, before declining to less than 50% in 2022 Q3, with more activity by non-EU firms on ICE Endex than on EEX. In terms of types of market participant, ESMA (2023b) reports that more than 70% of positions are held by non-financial corporates, typically energy firms and non-EU commodity trading firms, followed by banks at around 22%, while investment fund positions declined substantially from 16% in early 2022 to 4% in 2022 Q3, reflecting a sharp reduction in the positions of non-EU hedge funds.

Data fragmentation and data gaps

However, the analysis of risks in natural gas derivatives markets is hampered by data fragmentation and the shortage of data available to ESMA and NCAs. Data fragmentation refers to the fact that information on some derivatives is reported only to energy regulators or NCAs. Data gaps relate to the reporting requirements for energy firms.

First, while transactions in physically settled wholesale energy derivatives are reported to the European Union Agency for the Cooperation of Energy Regulators (ACER), such instruments do not qualify as financial instruments under MiFID. As such, they are excluded from MiFID transparency and reporting requirements under EMIR.

Second, the open positions of market participants at trading venue level, excluding positions in OTC derivatives, are reported to NCAs, but are not directly available to ESMA. Similarly, while EMIR provides detailed information on EU entities, it does not cover non-EU counterparties even if they trade on EU venues, making any analysis of the concentration of positions or trading activity at EU level a challenging prospect.

Finally, most energy firms are not regulated as investment firms, and are therefore exempt from a range of reporting requirements, making it hard to analyse liquidity risk at entity level. In addition, some large (non-EU) commodity trading firms are not listed, further reducing the information publically available on such entities.

3 Risks and vulnerabilities in energy derivatives markets following the Russian invasion of Ukraine

Natural gas and power derivatives markets have come under significant strain following the invasion of Ukraine by Russia in late February 2022. The surge in prices and volatility and the corresponding increase in margin requirements have shown how market and liquidity risks can be mutually reinforcing, as shown in Figure 2.

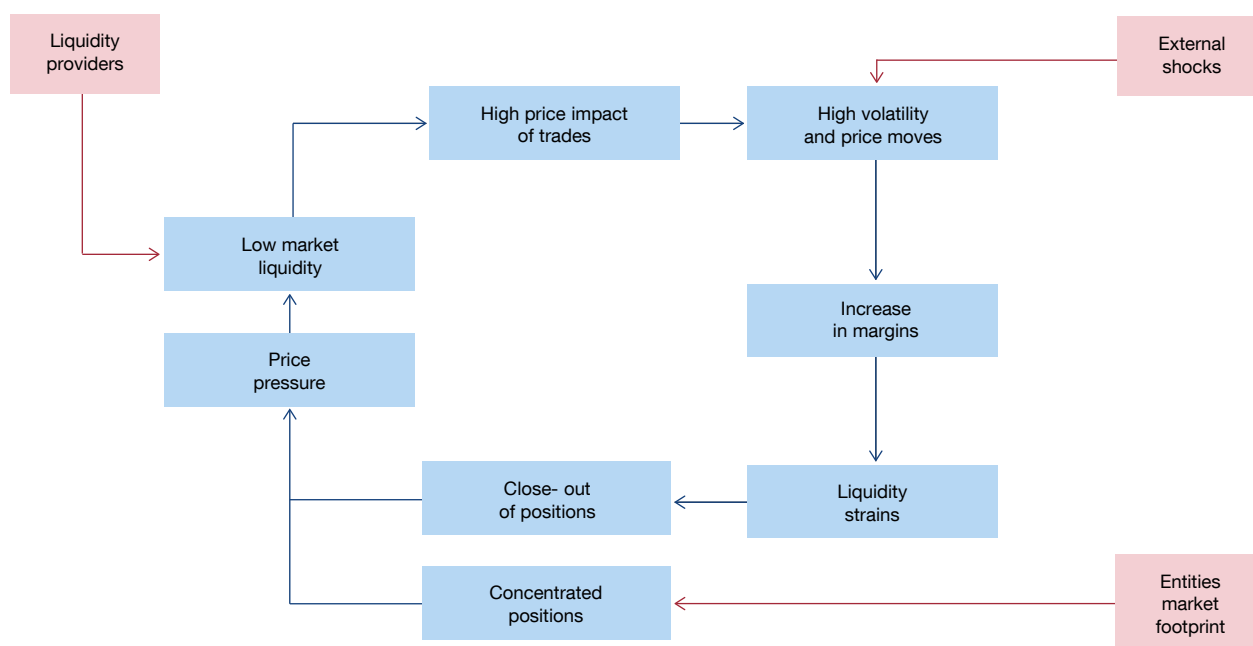
External shocks can result in large price moves and an increase in volatility. As volatility surges, margins are increased to protect market participants against counterparty and market risk. Some firms, especially non-financial corporates, may then face liquidity strains as they are required to post cash as collateral over a short period. Entities can choose to reduce their exposures by taking opposite positions, but this could amplify the price pressure on derivatives markets. This risk is magnified for entities with large and concentrated positions, as the liquidation of these positions is likely to result in heightened price pressure on markets already under stress. Given high levels of volatility and acute price pressure, along with risk management constraints or a reduction in risk appetite, liquidity providers may withdraw from the markets, resulting in lower liquidity. This, in turn, could amplify the price impact of each trade, resulting in further changes in prices and higher volatility, leading to a mutually reinforcing loop. Some of these risks crystallised in 2022, along the transmission channels outlined above.

Following the Russian invasion of Ukraine, natural gas and power derivatives markets experienced very high volatility amid low liquidity. Prices doubled in March 2022 for both commodities before settling at levels close to their pre-war levels from April to June. Prices then spiked again over the summer, peaking in late August. Prices were at that point around four times higher than their pre-war levels, as concerns arose about supply and the increased demand to fill natural gas storage facilities. Natural gas price tensions were also reflected in power markets, as power prices are strongly correlated with natural gas, reflecting the marginal pricing model used in the EU.⁹

⁹ For further details on the marginal pricing model used in the EU, see ACER (2022).

Figure 2

MUTUALLY REINFORCING LOOP IN ENERGY DERIVATIVES MARKETS



SOURCE: Devised by authors.

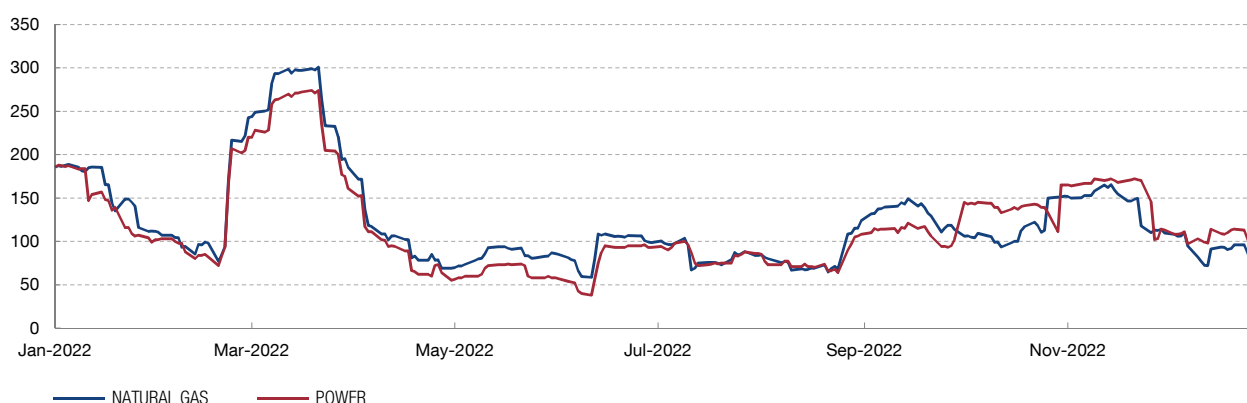
Volatility also spiked, reaching 300% in annualised terms in March and close to 150% in August (Chart 11). Since then, volatility and prices have declined substantially and both had fallen to below pre-war levels by the end of 2022.

The extreme volatility of prices was associated with a sharp deterioration in market liquidity: bid-ask spreads widened and market depth (a measure of the liquidity available to buyers and sellers) plummeted. For example, bid-ask spreads on ICE-Endex rose to more than 2% in March 2022 (up from 0.5% pre-war) and reached similar levels at the end of August as liquidity dried up (Chart 12). Similar patterns were observed in power derivatives, which are structurally less liquid due to the high volatility of power prices.¹⁰ Bid-ask spreads widened to more than 50% in July and August 2022, as liquidity dried up in power derivatives markets. Since then, liquidity has improved and was close to pre-war levels by early 2023 (Chart 13).

As price volatility surged, margin requirements on derivatives positions also increased, in line with CCP risk models. For natural gas ETDs, initial margins rose from around 20% of the notional in November 2021 to 40% in February 2022 on both ICE Endex and EEX, and up to 70% on ICE in March 2022 (Chart 14). Variation

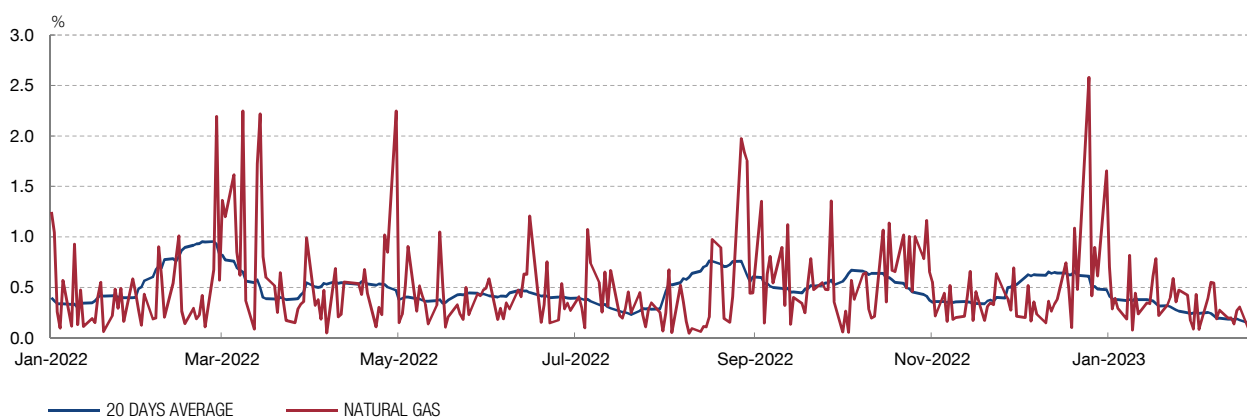
¹⁰ Power derivatives markets are characterised by seasonality, mean-reverting behaviour, high volatilities and the occurrence of jumps and spikes (Weron et al., 2004; Bierbrauer et al., 2007 and Cullet et al. 2013).

Chart 11
FUTURES' VOLATILITY



SOURCES: Refinitiv Datastream and ESMA.
NOTE: 20D annualised volatility of future prices of natural gas (Dutch TTF front-month contract) and power (Phelix front-month), in %.

Chart 12
GAS BID-ASK SPREAD



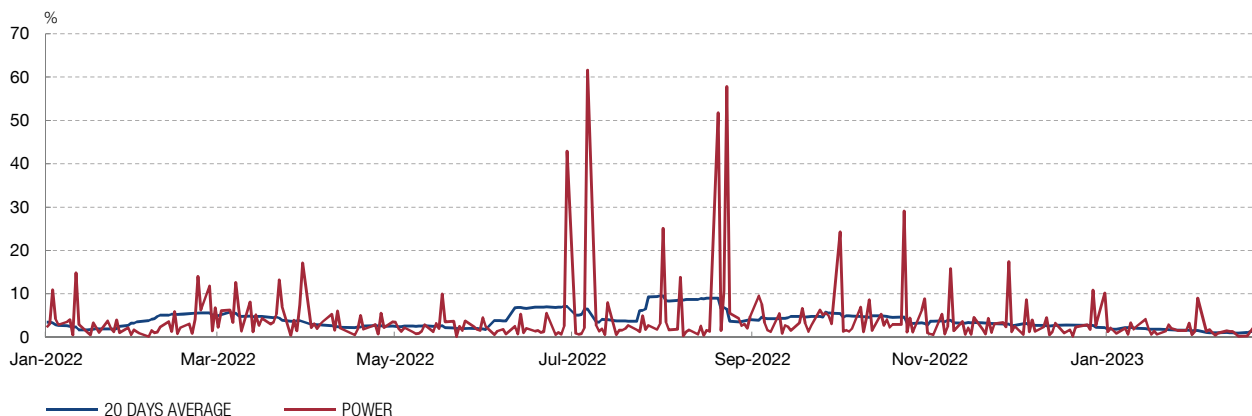
SOURCES: Refinitiv EIKON and ESMA.
NOTE: Bid-ask spread for Dutch front-month future traded on ICE-Endex. Basis points.

margins also increased for counterparties with mark-to-market losses, mainly firms with short positions on natural gas derivatives.

As counterparties faced margin calls, some non-financial corporates were hard pressed to obtain liquidity on a short-time horizon, as their balance sheet is typically less liquid than is the case for financial firms, and they have limited access to funding sources. In short, the price shock and the increase in margin calls led to liquidity strains for some firms (JA, 2022). In several EU countries and the UK, public support for energy firms has been introduced in the form of loans and credit guarantees and, in some cases, bailouts of troubled firms. Sgaravatti et al. (2023) estimate that such facilities amounted to EUR 194bn, representing more than 4% of GDP in some EU countries.

Chart 13

POWER BID-ASK SPREAD

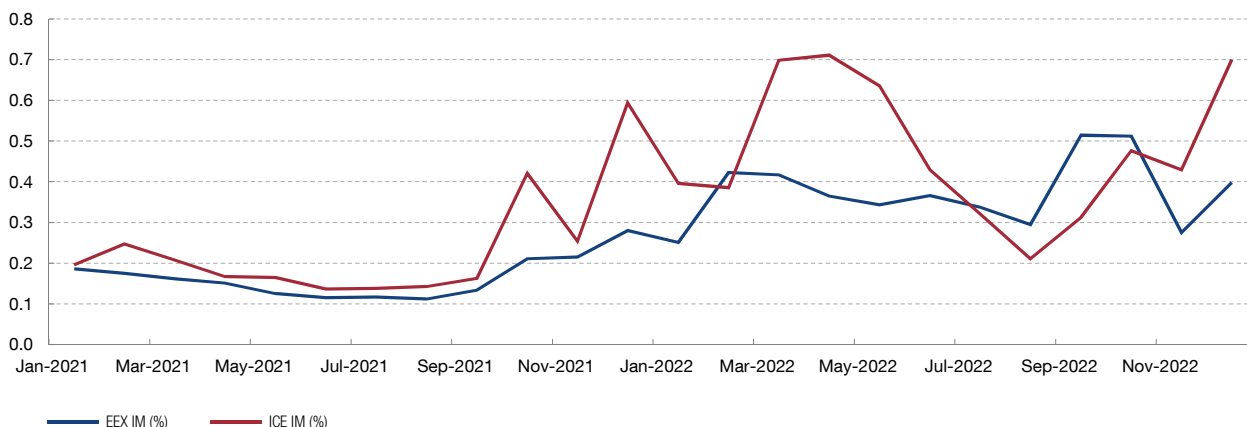


SOURCES: Refinitiv EIKON and ESMA.

NOTE: Bid-ask spread for Phelix front-month future traded on EEX. Basis points.

Chart 14

INITIAL MARGINS (% OF NOTIONALS)



SOURCES: ICE, EEX, ESMA.

NOTE: Initial margin on front-month Dutch TTF future contract on ICE-Endex and EEX. Basis points.

4 Changes in the structure of the energy derivatives network and liquidation risk

The severe stress experienced by EU energy derivatives markets following the Russian invasion of Ukraine has shown how some of the risks discussed above can crystallize. Market participants have also changed their behaviour, with some migrating from ETDs to OTCs. This section assesses the changes in the structure of the network of EU energy derivatives markets and takes a closer look at concentration risk, in particular as regards clearing activity and the existence of significant derivatives positions that might be challenging to liquidate.

a) The network of EU natural gas and power derivatives exposures

Understanding the interconnectedness between market participants is key to assessing risks. EMIR data can be used to further examine energy derivatives and their use in the EU and to assess potential concentration risk. Due to limitations, data on non-EU counterparties with exposures to EU energy derivatives through non-EU entities are not included, even though non-EU entities can play a significant role in EU markets.¹¹

Chart 15 displays the network of natural gas derivatives exposures in gross notional amounts among the top 30 EEA counterparties at the end of November 2022. In the ETD space (blue curved lines), most of the activity took place between energy firms (red squares) and clearing members (CMs), which are mainly banks (blue triangles). CMs tend to have a range of different clients, which are predominantly energy firms. A few energy firms trade ETDs on both futures exchanges, as shown by the links between those clients and CMs at the two different CCPs (yellow circles). The two CCPs clearing EEA natural gas futures have exposures to several EU CMs. The width of the blue edges — which is proportional to the relative size of gross exposures between CMs and CCPs — indicates that clearing is concentrated in a few banks.

Turning to the OTC space (red curved lines), most of the activity occurs between energy firms or through a few banks (blue triangles), which are not usually EU clearing members.¹² There are only a few ‘other’ firms (such as non-bank financial entities) in the network (green circles), showing that other financial firms play a limited role in EU natural gas derivatives markets.

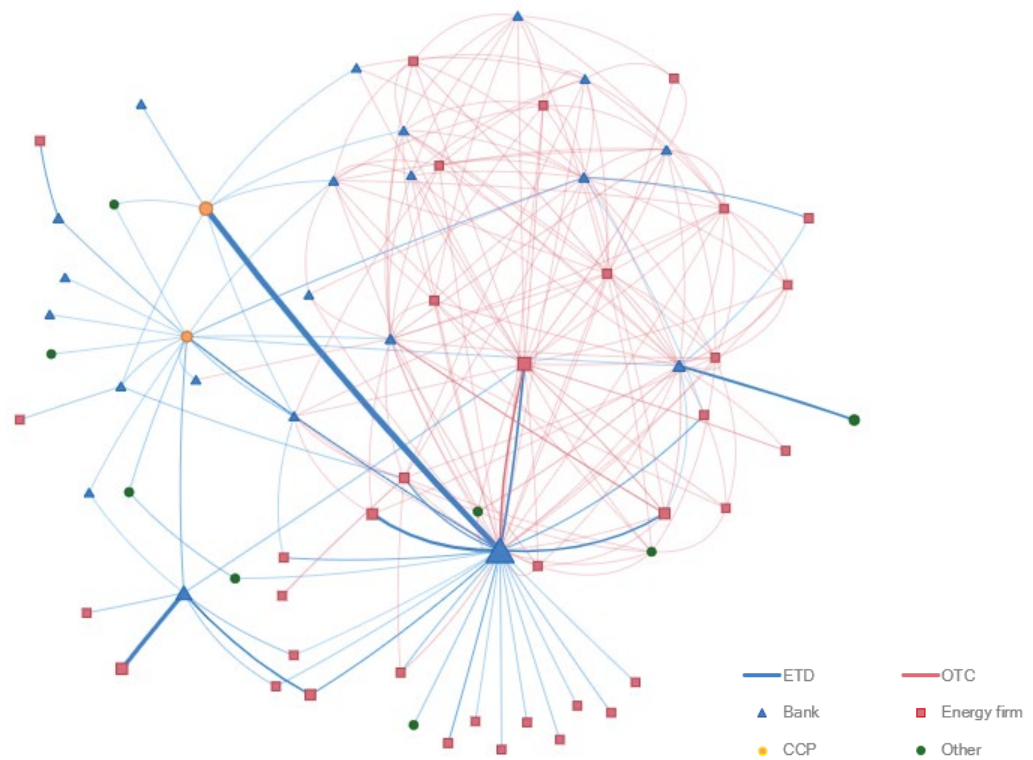
Chart 16 sets out a similar analysis for power derivatives markets. In the ETD space (blue curved lines), the three CCPs clearing EU power futures (orange circles) have exposures to several EU CMs, most of them banks (blue triangles) for two CCPs, while another CCP has a higher diversity of CMs, including banks but also energy firms (red squares) and other firms (green ovals). The width of the blue edges indicates that, as in the case of natural gas, clearing is concentrated in a few banks. Most clients of CMs are energy firms or other non-financial firms (including municipalities in some EU countries), and the CMs that account for most of the clearing activity tend to have a range of different energy and other non-financial firms as clients. A few energy firms trade ETDs on both exchanges, as shown by the links between those clients and CMs at the three different CCPs. Turning to the OTC space (red curved lines), most of the activity occurs between energy firms or through

11 More precisely, entities domiciled in the EEA have to report derivatives information under EMIR, which provides a broader scope than the EU. Thus, non-EEA entities trading on EU regulated markets, whose clearing is done in a third country CCP, are not covered, unless these entities clear their trades with an EU clearing member.

12 Since ESMA only has access to information reported by EU counterparties, non-EU clearing members are covered only if they are CMs of an EU CCP or to the extent that they have EU clients. Thus, the network only shows a partial overview of the market.

Chart 15

NATURAL GAS DERIVATES NETWORK



SOURCES: EMIR, ESMA.

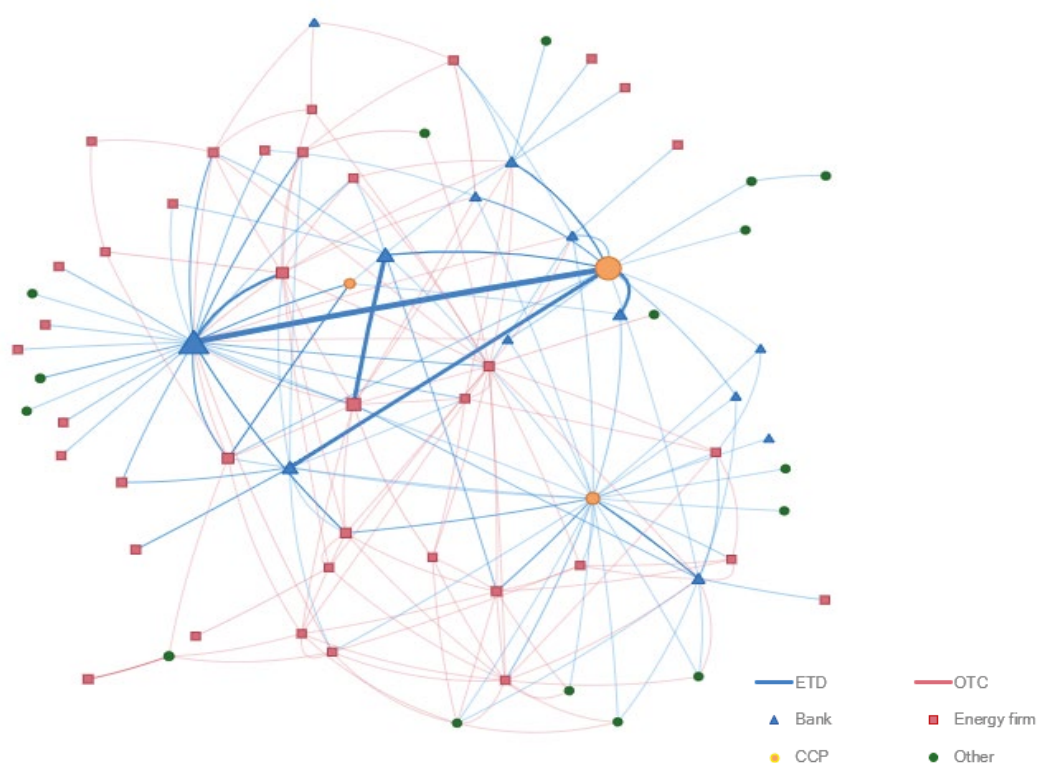
NOTE: Central counterparties, clearing members and largest 30 clients in all gas derivatives. Data as of end-November 2022, aggregated at group level, with intragroup trades excluded.

a few banks (blue triangles), which are not usually clearing members. Compared to the natural gas network, there are more other non-financial firms in the network, showing that they play a more significant role in power derivatives markets than in natural gas markets.

Overall, the network analysis indicates a degree of significant concentration of clearing activity in a few banks. This means that, in times of stress, those CMs will have to post additional collateral, and request that their clients do likewise. Since a large portion of the clients are energy firms, such entities (unlike banks) may not have ample liquidity pools or liquidity facilities that can be mobilised quickly. While some firms used credit facilities provided by banks, financing conditions tightened, creating liquidity strains for energy firms (ECB; 2022a; 2022b). In addition, the network is characterised by a degree of separation between ETD and OTC activity, with only a few firms trading on exchanges and OTC, which might point to some preference for one type of execution over the other.

The features of the natural gas and power networks are further explored using a range of network metrics (see Korniyenko et al., 2018 for a discussion of centrality

POWER DERIVATES NETWORK



SOURCES: EMIR, ESMA.

NOTE: Central counterparties, clearing members and largest 30 clients in power derivatives. Data as of end-November 2022, aggregated at group level, with intragroup trades excluded.

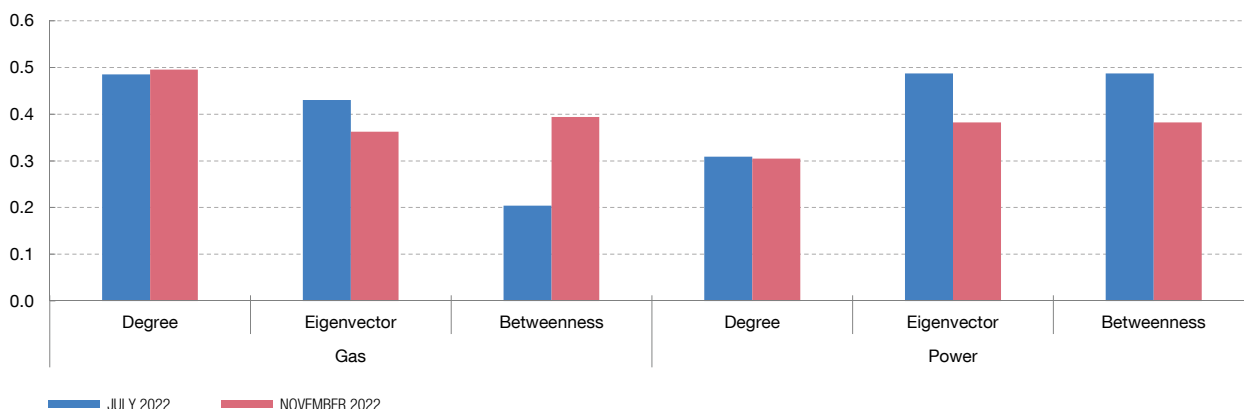
measures), which can then be compared over time and across derivatives.¹³ Chart 17 displays different indicators of centrality for the natural gas and power networks over two time periods: July and end-November 2022. Each centrality indicator is normalised and ranges between 0 and 1, with 0 being the minimum level of interconnectedness and 1 the theoretical maximum.

The first measure is the degree centrality, which indicates the number of connections that each node (i.e., market participant) has to other nodes, with higher values indicating that such market participants are exposed to a wide range of counterparties. A high degree centrality implies that shocks tend to be transmitted more broadly to other entities in the network. For natural gas, the normalised degree centrality increased slightly throughout 2022 (from 0.48 to 0.50), implying that market participants have kept their number of counterparties stable over time. Compared to other derivatives, degree centrality tends to be higher for natural gas derivatives than other asset classes which have degree measures below 0.50 (ESMA, 2021). We observe a similar pattern of stability for power derivatives, although the degree

¹³ See appendix for further details on network centrality measures.

Chart 17

NETWORK STATISTICS BY DATE AND MARKET



SOURCES: EMIR and ESMA.

centrality is lower (around 0.30), implying a lower number of connections compared with natural gas derivatives.

The second measure is the eigenvector centrality, which estimates the influence of a node by its connections to other influential nodes. High values indicate that some entities play a central role in the network, as they are exposed to other entities of significant importance.

Eigenvector centrality declined during 2022 for both natural gas (from 0.51 to 0.36) and power (from 0.49 to 0.38). This decline indicates that market participants have reduced their relative exposures to ‘central’ nodes. Compared to other derivatives, the natural gas and power networks have lower eigenvector centrality, implying more fragmented exposures across counterparties.

The third indicator is the betweenness centrality, which measures the number of times an entity lies in the shortest path between two other entities. A high value shows that some entities play the role of ‘bridges’ between other entities in the network.

The betweenness indicator increased during 2022, from around 0.20 in July to 0.39 in November 2022 for natural gas and from 0.12 to 0.23 for power.

Overall, centrality measures indicate that the importance of central nodes has declined (as shown by the fall in eigenvector centrality), which is consistent with the migration from ETD to OTC. At the same time, the increase in betweenness centrality suggests that more entities play the role of ‘bridges’ within the network (irrespective of the importance of their counterparties) than was the case before the war. One example would be where multiple EEA counterparties started trading with the same

new energy suppliers. This would increase fragmentation in notional amounts, further decreasing the eigenvector, while at the same time increasing interconnectedness, since fewer steps are needed to cross the whole network. The effect on the degree would be slightly positive as, on average, nodes have more edges.

b) Concentration risks and liquidity

Concentration risk encompasses a range of dimensions along the trade value chain. First, as shown above, there is a high degree of concentration at clearing level: a few CMs account for most of the clearing activity performed by EU entities on behalf of EU and non-EU clients. Second, trading tends to be concentrated in a few firms which account for most of the trading volumes. Some of those entities, such as proprietary trading firms (e.g. high-frequency trading firms), may withdraw from the market in times of stress, resulting in a significant reduction in the liquidity offered to market participants just when it is most needed.

Some degree of concentration is also visible at position and trading venue level, although market participants are subject to position limits on EU venues for critical or significant commodity derivatives.¹⁴ ESMA (2023b) reports that the positions of the top 5 largest EU clients on the natural gas derivatives markets amount to more than 50% of EU exchange traded positions, and around 40% of the broad EU natural gas derivative market (clients only). For power, these shares stand at 47% and 32%, respectively. The potential impact of liquidating such positions can be estimated by combining exposure information from EMIR with market data on trading volumes.

The ability to liquidate a position also depends on the behaviour of other market participants. In the case of a large symmetric shock to prices and liquidity, as seen in summer during power shortages, several energy firms may try to move out of their positions at the same time, making it more difficult for each of them to dispose of their assets. To assess this scenario, we estimate the time it would take to liquidate the short and long positions of the top 5 energy firms if these participants were to reduce their positions in those two highly liquid futures at the same time. We broaden the analysis of the gas market performed by ESMA (2023b) to include European power markets.

EMIR data from November 2022 is used to obtain positions in the two most liquid power futures contracts (based on notional amounts traded between October and November 2022) on the two largest European exchanges, i.e. EEX and NASDAQ OMX. For each EEA 30 counterparty, positions are totalled by long and short positions, resulting in net notional amounts. These net notional amounts are then

14 A commodity derivative whose net open interest is above 300,000 contracts on average over a one-year period is considered a critical or significant commodity derivative under MiFID II and hence subject to position limits. Currently, only TTF futures traded on ICE Endex are subject to position limits. Spot month positions are limited to 10% of deliverable supply and other months' positions to 10% of open interest (ESMA, 2022d).

combined with a measure of market liquidity based on average daily trading volumes (over October and November 2022). We use data from the MiFID Financial Instrument Transparency System (FITRS), which provides (among other information) daily trading volumes at instrument level.

Following this approach, two measures of concentration are calculated: one at the market level and another one at the instrument (i.e. futures) level. For the top 5 NFCs with the biggest long and short net exposures, their aggregated position is expressed as a percentage of average daily trading volumes (ADV), to indicate how long it would take to unwind those positions.¹⁵ A high figure implies that the liquidation of positions would either take a long time or would result in large price moves if executed quickly, as the trades could be multiples of the daily average trading volumes.¹⁶ It should be noted that this approach might underestimate the time needed to close out positions during periods of stress, as liquidity tends to vanish during times of crisis. On the other hand, it might be possible to close out positions faster than in the approach presented by using futures with different maturities. Nevertheless, we are convinced that the following calculation will give a sense of how strong the concentration in the positions of the two futures is.

Chart 18 shows the result of the calculation on the most liquid power future traded on EEX. It reveals that the net long and short positions of these top 5 NFCs combined are fairly comparable (EUR 4.5bn short vs EUR 4.9bn long). Putting these amounts into perspective, using trade data it emerges that these positions account for 551% of the ADV for short positions and around 593% of the ADV for long positions. This means that it would take more than five days if the top 5 NFCs (with net short or net long positions) were to try to close out their power derivatives portfolio at the same time.

Chart 19 shows a similar analysis for the most liquid power future on Nasdaq Oslo, where gross exposures are significantly smaller. In line with earlier results, we observe that the net long and net short positions of these top 5 NFCs combined are fairly comparable (EUR 641m short vs EUR 733m long). However, these positions account for a larger multiple of average trading volumes: 1,670% of the ADV for short positions and around 1,883% of the ADV for long positions. This means that it would take more than 16 days if the top 5 NFCs short or long were to try to close out their positions.

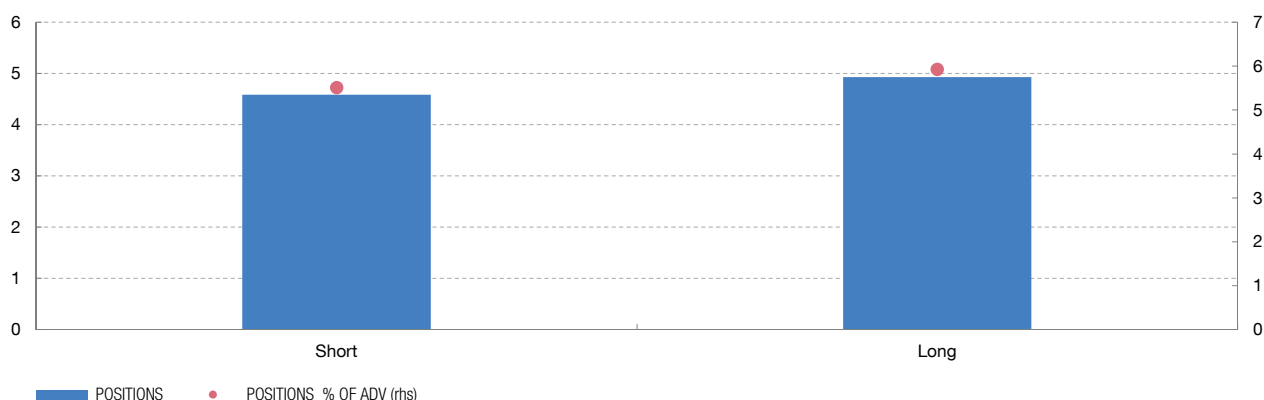
These results suggest that if several firms with similar directional positions were to reduce their exposures, they could amplify market moves. In turn, these market

15 This approach is in line with the methodology used for concentration modelling in the ESMA CCP stress tests (ESMA, 2022a).

16 The default of a clearing member with large positions can result in losses for the CCP and other clearing members, as observed in September 2018 for Nasdaq Clearing (Bell and Holden, 2018; Finansinspektionen, 2021), and, in extreme cases, the failure of the CCP, as occurred in 1974 in France (Bignon and Vuillemeys, 2020).

Chart 18

COMBINED POSITIONS OF FIVE LARGEST NFCs IN THE FRONT MONTH FUTURE AT EEX

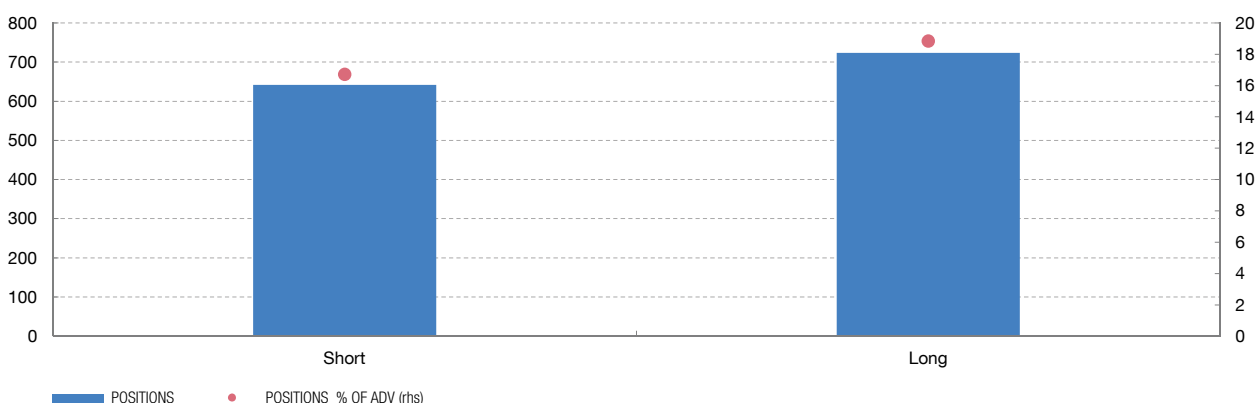


SOURCES: EMIR, FITRS, authors' calculations.

NOTE: Ratio of net exposures of top 5 NFCs on front-month Phelix futures on EEX in percent of average daily trading volumes.

Chart 19

COMBINED POSITIONS OF FIVE LARGEST NFCs IN THE FRONT MONTH FUTURE AT NASDAQ OSLO



SOURCES: EMIR, FITRS and ESMA.

NOTE: Ratio of net exposures of top 5 NFCs on front-month Nordic power futures on Nasdaq Oslo as a percentage of average daily trading volumes.

moves could lead to other firms liquidating their positions, creating the vicious circle observed in other markets.¹⁷ Overall, the results show that liquidation costs could be significant in the case of a simultaneous winding-up of positions, pointing to concentration risk.

17 For example, in September 2022 an abrupt rise in GBP sovereign yields led to a surge in liquidity demands for leveraged funds using Liability Driven Investment strategies, as the sovereign bonds used as collateral in repo transactions fell in value, while the funds also faced margin calls on their interest rate derivatives portfolios. To meet these liquidity demands, some funds began liquidating their GBP sovereign bonds, resulting in heightened pressure on the bond market and an inability to trade. Tensions waned after an intervention by the Bank of England (Breedon, 2022).

5 Conclusions and financial stability implications

The structure and functioning of EU energy derivatives markets can shed light on risks to financial stability.

First, while the aggregate direct exposures of financial institutions to energy derivatives markets are small in comparison with their size or capital, stress in the natural gas or power markets can spread throughout the real economy due to the exposures of non-financial corporations. Such firms tend to have less access to liquidity than financial institutions and can therefore be subject to liquidity strains as a result of margin calls on ETD and OTC positions (ECB, 2022b).

Second, concentration risk is high in energy markets across a range of areas, including concentration of clearing activity, the existence of large positions in ETD and OTC markets and the reliance on a few key liquidity providers (ESMA, 2023b). The unwinding of large positions could result in further pressure on prices, amplified by a reduction in market liquidity, ultimately leading to a substantial price impact on trades.

Third, natural gas and power prices can influence (in particular, through derivatives contracts) pricing on electricity markets as a whole (ACER, 2022). This interconnection is further strengthened by the EU system of marginal pricing in electricity markets. Thus, natural gas and power derivatives markets ultimately play a crucial role in price formation on energy markets.

Lastly, given that natural gas and power are key inputs in most production processes and critical infrastructures, financial instability in this market can soon spill over to the broader economy.

The Russian invasion of Ukraine triggered a surge in natural gas prices amid heightened volatility and a deterioration in liquidity.

An analysis of EU energy derivatives markets has shown that the concentration of clearing activity in a limited number of clearing members and the large market footprint of a small number of energy firms can amplify risks for financial stability through liquidation costs and funding liquidity issues for counterparties. In this context, the recent migration of some activity from ETD to OTC has resulted in a more fragmented market network, with a smaller role for central nodes, and an increase in the number of highly interconnected entities, which could exacerbate the propagation of shocks to a wider range of counterparties.

In addition, energy firms play a central role in natural gas and power derivatives markets as suppliers and consumers of such commodities. This suggests that energy firms and financial institutions have very direct interconnections. Such tight

linkages can transmit shocks from one sector to the other and may pose risks to financial stability through liquidity and concentration risks. Since energy firms are often non-financial companies, they are subject to less stringent oversight and reporting requirements than financial institutions (e.g. investment firms or credit institutions), and there is less transparency in terms of the balance sheet and liquidity profile of such firms.

Lastly, as with any commodity and unlike standard financial instruments, natural gas is subject to storage and supply constraints, making the pricing of derivatives more dependent on external factors, including geopolitical events.

Looking forward, the analysis of risks in energy derivatives markets requires further work in order to address data gaps and data fragmentation. With this in mind, further cooperation between energy and financial market regulators is warranted (ESMA; 2022c).

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This appendix provides additional details on the centrality measures used to analyse changes in the natural gas and power derivatives networks.

Degree centrality

The degree centrality $C_D(i)$ of a node i (before the normalization) can be defined as the sum of its relationships (or edges) x :

$$C_D(i) = \sum_{\substack{j=1 \\ (i \neq j)}}^N x_{ij}$$

Eigenvector centrality

The eigenvector centrality $C_E(i)$ of node i can be defined as:

$$C_E(i) = \frac{1}{\lambda} \sum_{t \in N(i)} x_{it}$$

Where λ is a constant and $N(i)$ is the neighbourhood of node i .

Betweenness centrality

The betweenness centrality $C_B(i)$ of node i can be defined as:

$$C_B(i) = \sum_{a \neq i \neq b \in E} \frac{\sigma_{ab}(i)}{\sigma_{ab}}$$

Where σ_{ab} is the sum of the shortest paths between nodes a and b , out of the total set of edges E . $\sigma_{ab}(i)$ is the set of those edges that pass through i .

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DIGITAL ASSETS AND REPORTING: IS THERE ANYTHING NEW UNDER THE SUN?

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Abstract

The disruptive effects of the digitalisation of assets call for legislative and regulatory adaptation and for a review of the reporting framework applicable to this general category of assets. But the dissemination of relevant information for decision-making in relation to digital assets, such as crypto-assets, faces challenges. The peculiar nature of these instruments has not only delayed a complete and consistent regulatory classification for them, but also a consensus on reporting needs and appropriate reporting types. This paper examines both the challenges posed by this issue based on the joint review of crypto-asset technology and use cases, and the existing general reporting standards. The paper also describes the status of some initiatives that aim to adapt existing reporting frameworks to crypto-assets and also addresses the dilemma between information quality and precision that arises for many crypto-assets as a result of their volatility.

Keywords: Crypto-assets, accounting, regulation, Basel.

1 Introduction

Digital assets do not escape reporting needs. The interests of a diversity of stakeholders in making decisions on the basis of appropriate information gives rise to statistical (macroeconomic) and/or conventional reporting needs for different types of digital tokens. Investors, lenders, audit professionals and regulators stand out as significant potential users of reporting on crypto-assets. The presence of various sorts of data gaps has been argued to be a major limitation in the assessment of the crypto-asset ecosystem (Financial Stability Board (FSB), 2022) and its risks to financial stability. On a similar note, the G20 Data Gaps Initiative includes recommendations for the development of a data collection framework for crypto-assets and the OECD Crypto-Asset Reporting Framework (Organisation for Economic Co-operation and Development (OECD), 2022) has set the ground for the exchange of information on crypto-assets for tax purposes. The compilation of information on digital assets relevant for macroeconomic and balance of payments purposes and its full regulation, have also been highlighted by the International Monetary Fund (IMF, 2023) as a priority. For the record, the initial inroads of official screening of crypto-assets addressed anti-money laundering use cases and users' identity matters.

But the challenging categorisation and taxonomy of some digital assets, such as crypto-assets, has raised doubts on the applicability of existing basic reporting

standards. A consistent treatment for them might be challenged by the perception that they are “new things under the sun”, paraphrasing the Book of Ecclesiastes.¹ Regulators are also faced with taxonomy challenges although they have so far paid scant attention to reporting issues, as argued by the European Systemic Risk Board (ESRB, 2023) in connection with MICA in the European Union (EU). Only recently has the Basel Committee of Banking Services (BCBS, 2022) redressed the problem of bank exposures to crypto-assets by putting forward prudential risk-based requirements. Among the recent prominent calls to improve disclosure in the crypto-asset space, the White House’s plea in the aftermath of the bankruptcy of FTX stands out.²

Against this general background, this paper examines the applicability of existing basic reporting standards, elaborates on the need for new interpretations and/or rules and attempts to identify the hard-to-crack reporting challenges. The paper reviews the work of some standard setters (Financial Accounting Standards Board (FASB) and International Accounting Standards Board (IASB)) on new principles and/or interpretations regarding the disclosure of relevant information. The arguments put forward in the paper mostly deal with the classification and valuation issues raised by the polymorphic profile of unbacked crypto-assets, a particularly contentious category of digital assets. By contrast, the paper argues that asset-referenced digital assets are more straightforward in terms of the applicable existing disclosure categories. The paper makes the case that progress on the general regulatory agenda for crypto-assets requires that outstanding reporting issues be addressed.

It also attempts to shed some light on the resulting trade-offs between disclosure and financial stability when the signal-to-noise ratio of prices is disproportionately low, as happens with some crypto-assets. The analysis conducted thus contributes to the broad call made by authorities to regulate crypto-assets in a complete and consistent manner (IMF, 2023). The paper also argues that international convergence on some basic classification and reporting seems necessary to avoid arbitrage.

The paper is aware of (but does not deal with) the positive contributions of the technology behind crypto-assets to reporting. Its contribution to facilitating audit and supervisory processes thanks to embedded transparency features merits a separate discussion. In the same vein, the emergence of “suptech” techniques in “embedded supervision” raises the expectation of enabling new more effective regulatory approaches to deal with some particularly elusive segments of the crypto ecosystem (Auer, 2022). The inherent potential of the technology for facilitating monitoring is already being tested by authorities, as evidenced by the project Pyxtrial

1 Ecclesiastes 1: “...What has been will be again, what has been done will be done again; there is nothing new under the sun”.

2 See White House (2023).

initiated by the BIS Innovation Hub to automatically monitor coverage with reserves of stablecoins.

The paper is structured as follows. The discussion of topics pertaining to the classification and valuation of crypto-assets for reporting purposes, undertaken in Section 3, is preceded by an analysis, in Section 2, of their technological and use-based underpinnings. Section 3 analyses the applicability of international reporting standards and describes the ongoing work by relevant standard setters to partially review some identified issues. Section 4 covers issues at the frontier between prudential regulation and basic reporting bearing in mind the low level of the signal-to-noise ratio in some crypto-assets' prices. The concluding remarks attempt to provide insights on the if, when and how of amendments to reporting standards.

2 Digital and crypto-assets: technological developments and diversity of use cases

For the purposes of this paper, digital assets encompass a broad category of tokens³ that resort to distributed ledger technology and cryptographic techniques to represent value. The range of assets included covers a diversity of use cases. Central bank digital currencies, tokenised assets or liabilities and crypto-assets are examples of digital assets. This section discusses the technological and use-based underpinnings for their classification for reporting purposes. The basic bottom line of the analysis, set out in Sections 2.1 and 2.2, is a distinction between asset referenced tokens, unbacked crypto-assets, utility tokens and a self-referential ecosystem of tokens (DeFi). The details feed the discussion in Section 3.

2.1 Technological underpinnings: distributed ledger technology (DLT)⁴ and the crypto ecosystem

The technology underpinning crypto-assets was originally shaped by a libertarian philosophy of value exchange that pursued the radical empowerment of individuals. A seminal monetary formulation of this objective by Nakamoto (2008) consisted in a peer-to-peer distributed software system capable of allowing the instruction of value transfers in a decentralised and trustless setting. The various information processing and cryptographic innovations orchestrated by Nakamoto (2008) thus led to the implementation of a type of synthetic commodity money called bitcoin that does not require a central bank, financial intermediaries or any issuer whatsoever. In a nutshell,

3 In general, token is a polysemic notion for unitary constructs that embed a unit of value, rights to vote or rights to use resources, inter alia. Here the construct is assumed to be wrapped in a digital and cryptographic solution whose embedded content has an expression in terms of economic value.

4 DLT and blockchain will be two interchangeable terms throughout the paper despite some technical differences of scope.

bitcoin was money organically produced within the corresponding so-called Bitcoin network.

But its original purpose of being the native money of a visionary “island” of exchange within the real fiat world quickly changed, becoming an intangible investment. First, exchanges between the virtual “island” and the fiat world gave rise to a cryptocurrency profile for bitcoin. Second, the original monetary logic of bitcoin quickly paved the way for a transactional and broader financial logic through new intangible tokens also following a market-based logic of exchange and aimed at lifting the intrinsic technological limitations of bitcoin and/or at expanding the use cases of crypto-assets beyond those that are just exchange-type ones.

As a driver of these developments, technology has had the collateral effect of impacting the conditions for basic reporting. The crypto program aspiration of a trustless, pseudonymous and decentralised exchange of value based on public and private cryptographic keys has altered ordinary contracting patterns and has required technological solutions to prevent tokens from being forged or spent in multiple transactions. The irreversible recording of transactions in distributed ledgers based on cryptographic processes operated by (competing) validators has jointly brought to fruition the ability to exchange value on a fully decentralised market and to account for the transfer in an open and trustworthy ledger. The technology underpinning bitcoin thus amounts to an implementation of triple-entry accounting under pseudonymity (Griggs, 2005). Reporting is thus close to the heart of the crypto-asset ecosystem.

As anticipated, the challenges of achieving trusted decentralised pseudo-accounting have influenced the innovation of and quest for new coins, as throughput and feature limitations inherent to bitcoin and succeeding tokens have led to exploring new networks and coins. A specific insight on the innovation dynamics at play and their new constructs illustrates some of the evolving reporting challenges. More specifically, the pace at which bitcoin can be supplied to support exchange in the virtual “island” is intrinsically limited by the fundamental logic that guides its network of actors. Namely, validators acting in an uncoordinated and decentralised way need to find a consensus on the acceptable (block of) transactions entered into by users and to be added to the ledger. But the so called proof-of-work protocol applied to achieve consensus is intensive on computing resources and time. In turn, this constrained pace of recognition of new acceptable transactions determines the supply of bitcoins mechanically. Its driver is the automatic remuneration with new tokens of that validator who, acting in competition with the rest, manages to notarise first the adequacy of the transactions.

The intrinsic bottlenecks in bitcoin production and payments can be said to have largely driven innovation and growth in relation to the scope of the crypto space. The quest for alternatives and the development of the crypto ecosystem can be

conceptually framed by the limits expressed through the so-called Buterin trilemma.⁵ Transaction throughput, security and scalability cannot be independently optimised. The amount of computing resources in competition needed for truthful validation of transactions (i.e. the security of the arrangement) limits the scalability of the virtual “island” of transactions and/or the processing rate. The industry’s attempts at optimising the trilemma have thus mushroomed. But as explained in Section 2.2, it still cannot organically provide a genuinely superior payment instrument.

The quest to expand the use cases of tokens has led to radical new constructs and new activities. This broader scope has relied heavily on so-called smart contracts, i.e. a self-executing code in a virtual machine that runs along the ordinary cycle of transaction validation and recording, with the ultimate result that the blockchain is updated as per the code’s instructions. The ability of smart contracts to implement new tokens and functionalities has opened up the range of services available within the virtual “island” of trade. New unbacked crypto tokens, lending and collateralisation, and virtual funding of entrepreneurial activity through what are known as initial coin offerings are some examples of the breadth achieved by the virtual “island”.

But the overall development of the crypto-asset ecosystem and the different reporting issues emerging have been led not only by technology but by the major business models driving the development of new capabilities. Namely, (i) the unbacked crypto model of virtual money along the lines of bitcoin, (ii) a self-service model to obtain access to virtual decentralised financial services (DeFi), (iii) a hybrid model that attempts to establish value links between the virtual and fiat world assets (it encompasses stablecoins and asset tokenisation) and (iv) a utility model that grants holders of tokens access to the network’s resources. Although utility tokens are only intended to be used within the blockchain’s network, their linkage with the network’s fortune has typically also converted them into an investment-type token in terms of performance. In turn, it will be argued later on that the asset referencing nature of stablecoins and tokenised assets is less prone to raising reporting issues, unless the assets backing the stablecoins are themselves virtual. As described later in this article, the stablecoins model largely follows the logic of settlement and/or deposit of value instruments and facilitates on-ramp and off-ramp moves between the fiat and virtual worlds as well as among different islands within the former.

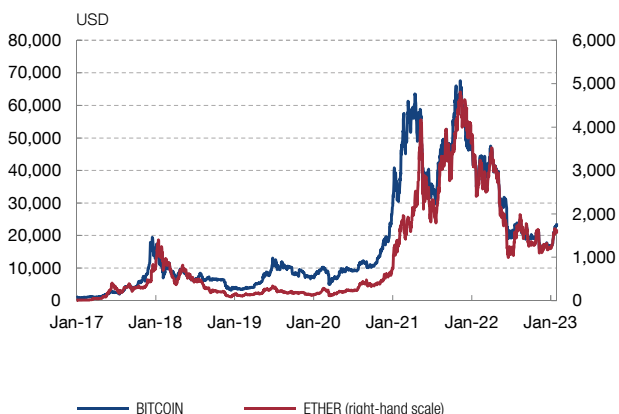
The radical DeFi protocols program entails profound innovations in the way business operations are conducted. The resulting impact on basic reporting issues is thus significant but still minor compared to the legal and mercantile issues raised. The fundamental driver of the radical developments in DeFi is the nature of the new information frictions arising as a result of the DeFi program to eliminate traditional

⁵ The consensus mechanism that directs the operation of the system of an open blockchain system does not allow the simultaneous optimisation of its transaction processing capacity (performance), its security or the decentralisation under which the registration takes place.

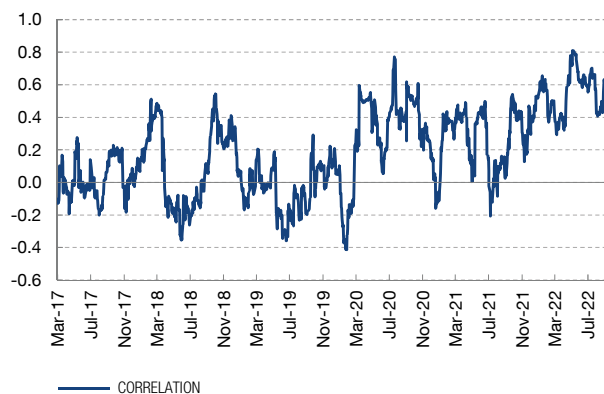
Chart 1

VOLATILITY OF CRYPTOCURRENCIES AND THEIR CORRELATION WITH TRADFI

1 BITCOIN AND ETHER PRICES



2 CORRELATION BETWEEN BITCOIN AND S&P500 RETURNS



SOURCES: CoinMarketCap, Yahoo Finance and own calculations.

financial intermediaries. Namely, DeFi attempts to: (i) provide universal access to financial services to users despite reliance on pseudonymous identity; (ii) follow transparent and deterministic rules coded in smart contracts; (iii) apply non-custodial arrangements; and (iv) cover multiple services through interoperability. DeFi poses challenges that go far beyond reporting challenges mainly because of the hard choices made in its design as regards the transactional environment. As its design does not allow for arranging contracts using identity-related information, this imposes widespread collateralisation requirements on every contract (Roukny, 2022). The limitations on commitment imposed by pseudonymity also lead to governance concerns addressed through so-called Decentralised Autonomous Organisations (DAOs). A DAO is a code-based collective governance mechanism, nominally with no single entity or centralised power in charge. The allocation of holdings to a DAO thus inherently obfuscates any sectoral breakdown of holdings. The need to expand the verifiable information used to support sound contracting in DeFi and the interest in broadening financial services also leads to complex trading patterns. In particular, the composition and inter-operation of various tokens and protocols to provide a single service raises new transparency issues.

The expansion of services with the help of smart contracts as basic infrastructure elements brings their value as intangibles that feed a longer chain of value into the assessment of different tokens. From a conceptual perspective, this argument would place bitcoin and ethereum (i.e. the currency of the Ethereum network built with the broadening of on-chain services in mind) in different camps. However, as discussed in Section 3, the inability to identify the amount of intangible value produced creates basic reporting issues. In any case, the pattern followed by their

respective prices over time (see Chart 1.1) does not evidence any key difference between them.

The crypto-asset ecosystem also contains non-fungible tokens (NFTs). Their intangible idiosyncratic value acquires a distinct character. NFTs are special cryptographic tokens that implement control rights over unique digital assets. Much like pieces of art, NFTs are tradable based on idiosyncratic valuations. NFTs are simply data memorised in smart contracts that manage intellectual property rights.

2.2 The diversity of services and use cases entails broad reporting needs

The technological versatility of blockchain technology has crystallised in multiple use cases and supporting activities. The kinds of services provided have extended beyond the strictly monetary and financial domains that motivated the original projects to also include services like the management of ownership of unique digital rights with NFTs.

The comparison and classification of multiple products and use cases is instrumental in finance, regulation and reporting since they provide precision (understood as a similar treatment for comparable items). This section attempts to briefly characterise some basic relevant features of the alleged use cases for the discussion in Section 3 of classification issues appropriate for reporting.

It is important to notice that crypto-asset features to be considered for reporting purposes may only partially overlap with others driving regulatory classifications that mainly deal with risk issues. The latter are outside the scope of this article other than through their interaction with basic reporting issues. Their interaction arises from two sources. First, through the influence exerted by these regulatory taxonomy programs for crypto-assets on the classification agenda for reporting purposes. A significant example in this regard is the long standing controversy in the US about classifying crypto-assets in the security or the commodity categories rather than as something radically new (Vereckey, 2022). Second, through the compatibility between the regulatory process and the disclosure tools. Section 4 highlights a compatibility issue between a recently approved prudential rule and existing reporting standards for crypto-assets.

The need for classifying crypto-assets into relevant categories follows from both precision and traceability considerations. The crypto-asset ecosystem is of a sufficient size to map them into a limited number of categories based on both qualitative (e.g. use) and quantitative features (e.g. liquidity, capitalisation). As a reference, it is worth noting that as at 1 February 2023 the cryptocurrency analytics firm CoinMarketCap reported a total of 8,861 fungible coins listed in the exchanges monitored by it, while the total number of tokens is currently around 20,000.

Table 1

TAXONOMY OF THE CRYPTO ECOSYSTEM

Type	Subtype	Service	Type	Subtype	Service	
Digital Currencies	Value Transfer		Digital Asset Applications (cont'd)	Business Services	<i>Professional Services</i>	
	Specialised	<i>Meme</i>			<i>Enterprise Solutions</i>	
		<i>Privacy</i>			Information Technology	<i>Data Services</i>
		<i>Remittance</i>				<i>Compute & Storage</i>
Blockchain Infrastructure	Smart Contract Platforms				<i>Wallets & Messaging</i>	
	Blockchain Utilities	<i>Network Scaling</i>			<i>Internet of Things</i>	
		<i>Cross-Chain Interoperability</i>		Metaverse		<i>Virtual Worlds</i>
		<i>Blockchain Networks</i>				<i>Gaming</i>
					<i>NFT Ecosystems</i>	
	Application Utilities	<i>Oracles</i>			Media Services	<i>Advertising</i>
		<i>Digital Identity</i>				<i>Content & Streaming</i>
		<i>Governance Tools</i>				
	Digital Asset Applications	Decentralised Finance	<i>Decentralised Exchange</i>	On-Chain Derivatives	Stablecoins	<i>Fiat-Backed</i>
			<i>Derivatives Trading</i>			<i>Crypto-Backed</i>
<i>Decentralised Lending</i>					<i>Algorithmic</i>	
<i>Stablecoin Issuers</i>					Tokenised Assets	<i>Asset-Backed Tokens</i>
<i>Prediction Markets</i>						<i>Synthetic Tokens</i>
<i>Asset Management</i>					Claim Tokens	<i>Liquidity Pool Tokens</i>
<i>Crowdfunding</i>						<i>Staked Tokens</i>
Intermediated Finance		<i>Intermediated Lending</i>				
		<i>Payments Platforms</i>				
		<i>Private Exchanges</i>				

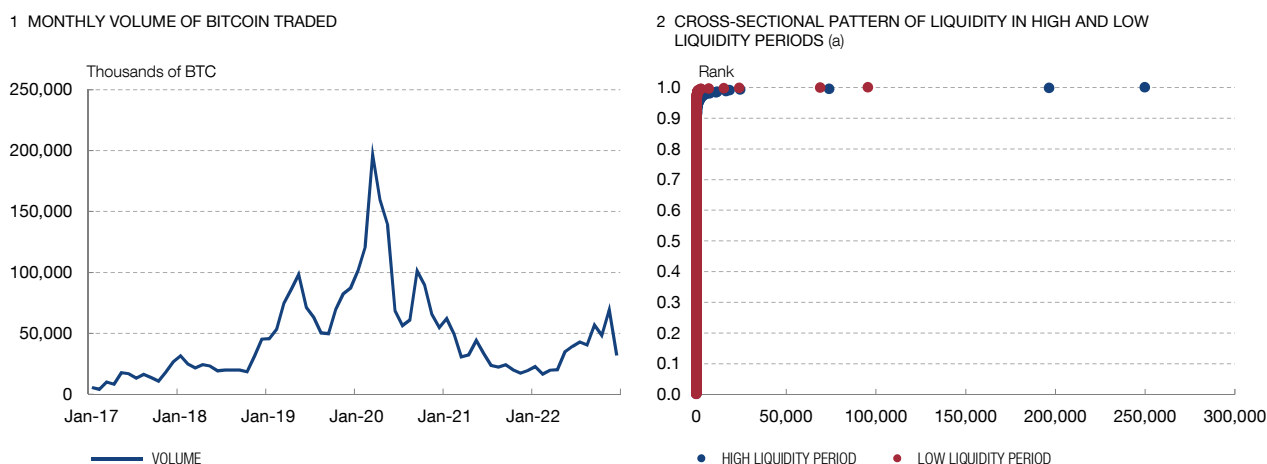
SOURCE: Datonomy.

The number of use cases of digital tokens is unsurprisingly large and growing. Table 1 displays a breakdown of the universe of tokens included in the index compiled by Datonomy (2023) into a multiplicity of qualitatively different use cases. The portfolio benchmarking purpose of the index resembles similar tools employed by traditional investment practitioners and highlights the relevance of investment-like reporting and disclosure for crypto-assets.

An outstanding feature of the crypto-asset ecosystem is its extreme volatility (see Chart 1.1). A well-known benchmark and common factor behind these dynamics is the changes in bitcoin prices. Moreover, the growing (but unstable) correlation with traditional assets reinforces the investment logic that guides the pricing of bitcoin (Chart 1.2). Because of its influence on basic reporting conditions, it is important to highlight the fact that the extreme short and medium-term volatility of crypto-assets unfolds in a context of a strongly uneven liquidity of crypto-assets on a cross-sectional basis and a strong procyclical behaviour. Chart 2.1 highlights the wide dynamic range of the (real) liquidity of bitcoin. Chart 2.2 illustrates both the concentration of liquidity in just a few tokens and the significant change over time in the overall pattern of liquidity.

Chart 2

HIGHLY VOLATILE AND UNEVEN PATTERNS OF LIQUIDITY



SOURCE: CoinMarketCap and own calculations.

a Liquidity ranking of a currently relevant basket of crypto-assets in both a high and a low liquidity period. The liquidity (x axis) is measured based on the monthly trading volume, and the high and low liquidity periods are March 2020 and November 2022, respectively. The chart highlights the concentration of liquidity in a small set of crypto-assets at any given time as well as the strong downsizing of the market during downturns.

The prevailing speculative investment profile of most of the crypto ecosystem as a whole, as documented so far, shadows the monetary or payment functionalities originally proposed for them. The throughput limitations faced by crypto-asset technology to satisfactorily serve payment purposes is shown in Chart 3.2, where the processing rates of existing retail payment rails are compared to those of the Bitcoin and Ethereum networks.⁶ Moreover, the introduction of new protocols and chains to alleviate the processing bottlenecks has achieved some success but has not been convincing enough to entice widespread adoption (see Chart 3.1).

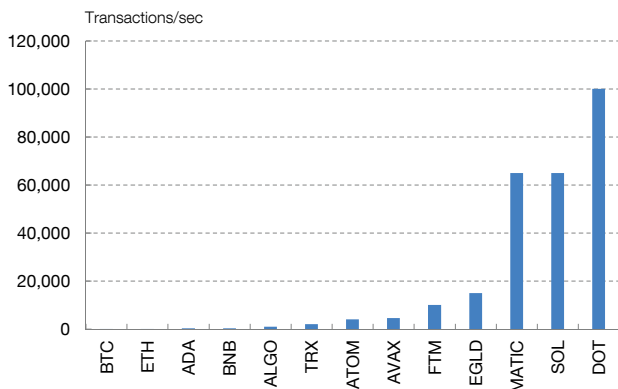
The investment profile of most crypto-assets has led to a corresponding regulatory perception and treatment in the jurisdictions that are ahead in the process of implementing FSB guidance on crypto-asset regulation (FSB, 2022). The specifics of such implementation are beyond this article. But it is informative to witness how the singular features of unbacked crypto-assets and DeFi have led to classification issues. The former category is treated under a financial instruments regulatory umbrella in the United Kingdom and under a special regime in the EU, while in the United States there is still indecision between the equity and commodity asset classes. Moreover, DeFi remains largely unexplored as regards its regulatory treatment owing to its elusive features. By contrast, the regulatory framing of stablecoins can be said to be more certain despite the remaining hurdles to considering them as ordinary financial instruments.

⁶ The transition from proof-of-work to proof of stake has not substantially altered the throughput of the Ethereum network.

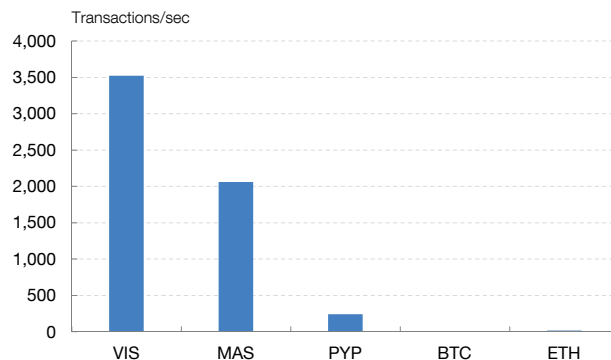
Chart 3

CURRENT CRYPTO-ASSET LIMITATIONS TO PROCESSING PAYMENTS AT SCALE

1 COMPARISON OF BLOCKCHAIN'S PROCESSING CAPACITY ACROSS CHAINS



2 PROCESSING CAPACITY. TRADITIONAL PAYMENT RAILS, BTC AND ETH



SOURCE: BIS and JP Morgan Asset Management.

Investment activity, ongoing regulatory recognition, taxation and statistical requirements justify the calls for consistent reporting. Table 1 illustrates the broad range of services and reporting situations that need to be covered. Section 3 essentially makes the case that from a basic reporting standards perspective there is really not necessarily much (fundamentally) new “under the sun” for that classification. But certainly some of the developments described call for clarifications and possibly interpretations of existing standards.

3 Basic reporting standards

This section draws on the arguments set forth in the previous section to address the classification and valuation challenges to crypto-assets posed by existing standards. Section 3.1 discusses the applicability of existing International Financial Reporting Standards (IFRS) and International Accounting Standards (IAS) issued by the International Accounting Standards Board (IASB). Section 3.2 provides a snapshot of the work programme on revisions to the basic crypto-asset reporting by the main global standard setters, i.e. IASB and the Financial Accounting Standards Board (FASB).

3.1 Applicability of existing standards

The edifice of international reporting is built upon a Conceptual Framework for Financial Reporting (Conceptual Framework) and a set of specific accounting standards. The former assist standard setters in the build-up of concepts for the consistent classification and measurement of economic activity as well as to support preparers in developing consistent reporting policies when no accounting standard

is applicable to a specific transaction or event. The absence of either a full-fledged standard or guidance specifically aimed at crypto-assets could thus make the Conceptual Framework a key interpretative tool for the application of existing standards. But a fully self-interpreted reporting seems less appropriate because of its potential to lead to fragmentation.

Crypto-assets can be said to meet the Conceptual Framework's very general definition of assets as economic resources controlled by their holders from which economic benefits are expected to be obtained. Thus, the enforceability of blockchain operations is deemed to, at least, sustain the right to resell the crypto-asset purchased or any other benefits resulting from the relevant smart contracts.

The various types of use cases described in Section 2 may sustain contemplating the classification of crypto-assets into the different categories envisaged under IASB. Based on the qualitative characteristics of the useful financial information included in the Conceptual Framework, information must faithfully represent the substance of what it purports to represent. The nature of the tokens, their use and their regulatory treatment might thus support mapping them into various categories: the financial instruments category (under IAS 32 and IFRS 9), the intangibles category (under IAS 38) and the inventories category (under IAS 2). However, this endeavour is far from automatic and is prone to contradictory outcomes.

Classifying crypto-assets according to existing reporting standards is especially challenging when the only future yield for the holder stems from the enforceable right to resell them, as happens with unbacked crypto-assets such as bitcoin. Their characteristics are peculiar: they are immaterial in nature, they lack a contractual underpinning, and they fail to feed an underlying "production" process the way commodities can do. Admittedly, a technological breakthrough that would facilitate the use of bitcoins and similar cryptocurrencies in the processing of payments might alter the conclusion. But that possibility has been refuted in Section 2 on the basis of structural arguments, as has their recording as cash equivalents.

Admittedly, existing standards still cope with assets broadly similar to bitcoins in terms of being peculiar. For example, gold bullion may be highly liquid but is not considered to be a financial instrument but rather a commodity. The analogy may have inspired initial pronouncements regarding the treatment of native crypto-assets.⁷ Be that as it may, in 2019 the IFRS Interpretations Committee (IFRS IC) clarified that cryptocurrencies should be classified either as intangible assets under IAS 38, or as inventory under IAS 2, depending on the purpose of the cryptocurrency holding (IFRS Foundation, 2019).

⁷ Other analogies sometimes used to capture the nature of unbacked crypto-assets as "a gamble disguised as an investment asset" (see Panetta, 2023) or similar to investments in numismatics fail to convey a reporting insight due to the expensed treatment of the former and the tangible nature of the latter.

The intangible asset classification implicitly links the value of cryptocurrencies to the existence of some intangible source of value as set forth in Section 2 and to an associated longer holding. Importantly, explicit sources of intangible value are not identified. In any case, the standard for recording exhibits a sense of prudence when it requires it to be at cost or at revaluation prices (both net of accumulated amortisation or impairments), the latter only being acceptable when there is an active market.⁸ Additionally, the prudent recording of value under the revaluation method follows from the fact that the income statement will show all the revaluation losses but only the revaluation gains to the extent that they reverse revaluation losses of the same asset that were previously recognised in the income statement. Other revaluation gains, i.e. movements in value above cost, are recorded under Other Comprehensive Income.

The second option (IAS 2) requires a commodity-type case of use for the crypto-asset that would justify holding it as inventory to support the ordinary course of business. The measurement now would have to take place at the prudent benchmark determined by the lower of acquisition cost and net realisable value. The impact of price changes on the income statement would thus be that of the asymmetric fair value recording, i.e. immediate recognition of losses in the income statement. It is important to note that the asymmetric recording of inventories is typically predicated on the basis of the stability of the holding on the balance sheet, a feature that tends to correlate with the (poor) liquidity of the asset in question. A business model for a token based on trading would thus contradict that model. But IAS 2 also envisages a recording model aimed at actively traded inventories. Inventories could then be valued at fair value with recognition in the income statement.

The investment-type case of use prevalent for cryptocurrencies does not support their classification as a financial asset. Importantly, this reporting-related argument is currently valid irrespective of the regulatory treatment of cryptocurrencies. IAS 32 defines a financial asset as cash, an equity instrument of another entity, a contractual right to receive cash, a contractual right to exchange financial assets or financial liabilities with another entity, or a particular contract that will or may be settled in the entity's own equity instruments. But in order to be cash they should be readily used as a medium of exchange. In turn, cash equivalents, based on IAS 7, are short-term, highly liquid investments that are readily convertible to known amounts of cash and which are subject to an insignificant risk of changes in value. However, as discussed in Section 2, cryptocurrencies are strongly handicapped to be considered cash by their significant volatility and the impact of such volatility on their widespread voluntary adoption as a payment instrument.⁹ Finally, cryptocurrencies do not qualify

⁸ IFRS 13 defines an active market as a market in which transactions for the asset or liability take place with sufficient frequency and volume to provide pricing information on an ongoing basis.

⁹ The adoption of a crypto-asset as legal tender is strongly discouraged by the IMF and by the World Bank. Although the adoption would still be possible, as evidenced in El Salvador, the extent of circulation remains limited to official purposes and is still questioned.

as financial assets only because they do not represent some equity interest in an entity or a contract establishing a right or obligation to deliver or receive cash or other financial instruments in exchange.

By contrast, fiat-backed stablecoins satisfy the conditions of financial assets under IAS 32, as expected bearing in mind the philosophy behind their design. Accounting for stablecoins will largely depend on the underlying asset and the use case as much as with other financial assets. The terms of digital assets can vary widely and, therefore, the accounting method to be applied needs to be considered on a case-by-case basis. Stablecoins will be valued at fair value through profit or loss if they are classified as financial assets or as inventories sold in the short term as part of the holder's ordinary course of business. If they qualify as intangibles they will not be valued at fair value through profit or loss. The reason is that the IASB does not provide for a category of intangible investment assets, as it does for tangible assets in its IAS 40.

NFTs do not seem controversial as regards the general nature of their mapping for reporting purposes. In contrast to cryptocurrencies, NFTs convey intangible identifiable rights after their acquisition. The accounting treatment of NFTs thus has a clear reference consisting in the treatment granted to the underlying intangible rights channelled through them.

3.2 Issues with reporting standards

The analysis carried out in Section 3.1 has highlighted a patchy matching between the use cases of some crypto-assets and existing classification/valuation guidance from IASB. The limitations of the different reporting models examined and/or the lack of guidance may pave the way for the adoption of accounting policies adapted to each user use case based on the interpretation of existing standards in accordance with IAS 8. But this outcome could give rise to heterogeneous interpretations among preparers and, more generally, to a disclosure framework inappropriate for a globally integrated set of markets. Luo and Yu (2022) highlight the reporting inconsistencies resulting from the absence of sufficient guidance and/or standards based on an analysis conducted with a diverse sample of international companies. Section 4.2 highlights a potential inconsistency in the capital treatment of bank exposures that has an accounting background. This section describes the general reporting issues at stake and the initiatives launched by some standard setters to bring more clarity.

Admittedly, most reporting issues are caused by a discrepancy between the use cases of most crypto-assets as either financial investments or as settlement assets and the profile of the traditional instruments that fulfil these purposes and their applicable standards. The discrepancy thus gives rise to the risk of a distorted

reporting of crypto-asset holdings. The increasing regulation and institutionalisation of the market may entail the beginning of the end for this state of affairs irrespective of the current “crypto winter”. The realisation that regulation should be complete is an important driving force to also systematise crypto-asset reporting treatment.

An overarching missing element that impacts on crypto-asset reporting is the fact that intangible assets are not recognised as a kind of non-financial investment (as per IAS 40). Using a proxy classification of cryptocurrencies based on the standard for intangible assets leads to several logical disparities. On the one hand, it is difficult to identify in crypto-asset prices the economic parallels with legally recognised intangibles like software, trademarks and licenses employed in value creation processes. For instance, unlike familiar intangible assets (e.g. software, intellectual property and brands), crypto-assets are meant to be actively traded and are often presented with trading or investment asset attributes (see Section 2.2). There are many potential difficulties in relation to the application of classification concepts contained in the intangibles standard. For example, the category of items “held in the ordinary course of business” used to exclude some intangible assets from the scope of the standard would need clarification as regards its meaning for crypto-assets.

A second “dissonance” results when one confronts potentially applicable standards (IAS 38 and IAS 2) with the volatility of most crypto-assets and/or their uneven liquidity profile. The economic characteristics of crypto-assets that have trading or investment asset attributes may not find an accurate representation. An asymmetric expression in terms of profits and losses of a liquid crypto-asset due to cost accounting leads to gains recognition in the income statement only upon sale while capital losses are recognised when they are incurred. The prudential contribution of the standard thus leads to a distorted disclosure. Meanwhile, revaluation accounting applied under IAS 38 (subject to the condition that markets are active) first requires a clarification of the meaning of that term. The ability to contribute to disclosure in an investment-type activity is also impaired by the fact that information on price gains and losses is dispersed between the full-fledged income statement and other comprehensive income. Admittedly, the valuation of crypto-assets at fair value through profit or loss is likewise not devoid of challenges due to liquidity and micro-structure pricing issues like the operation of multiple unregulated exchanges.

The highlighted issues tend to be apparent when applying automatic procedures for the standards. In particular, the mechanics necessary to apply the intangible solution pose specific problems in the absence of guidance. The calculation of amortisation rates is hampered by inherent difficulties in estimating the useful life, if any, of the crypto-asset intangible. For example, it is unclear how to factor into useful life or into residual value the overall limit to the size of bitcoins in circulation. In the same vein, the amount to be amortised needs to be calculated on the basis of acquisition price less residual value. But the residual value of a cryptocurrency could be extremely volatile if calculated on the basis of prices and, eventually, could result in negative

amortisation. These considerations may call into question the mandatory amortisation imposed by the standard for finite-life intangibles. On the other hand, amortisation does not seem conceptually relevant in the absence of wear-based degradation of value. Admittedly, one could argue that obsolescence is possible due to innovations (like transition from proof-of-work to proof-of-stake) that make a competing token more attractive (in the given example, a lower consumption of energy and public acceptance). But the mechanics for calculating impairment are equally tricky. Impairment of the crypto-asset classified as intangible must be calculated on the basis of its fair value, net of selling costs. It may not make much sense to consider employing the value in use for that purpose, because this would imply that a fungible cryptocurrency would follow an idiosyncratic pricing logic.

The “dissonance” between the alleged uses case of stablecoins as settlement assets and the requirements for applying a financial instrument model (IAS 32) highlight the significance in practice of non-accounting related standards and policies. In that regard, despite the advances made by CPMI-IOSCO in classifying stablecoins as payment instruments, conditional on the fulfilment of the principles more generally applicable to financial market structures, the use of stablecoins still seems to be confined to the purpose of a ramp between the virtual and fiat space or within the virtual space itself. The inroads into fiat world payments are still limited. An adaptation of IAS 7 might be needed if a complete regulation of stablecoins and elimination of risk (see Kronick and Zelner, 2023) would make them eligible for a cash or cash equivalent characterisation.

The absence of a standard and/or specific guidance on crypto-assets impairs the quality of disclosure in the notes to financial statements. Unless mandated by sectoral regulation (like BCBS for banks) holders most probably will not disclose information. The IMF’s call (IMF, 2023) for building a comprehensive view of where holdings sit (and how) is thus weakened from both a quantitative and qualitative perspective. Typically, as formulated by BCBS (2022), in addition to the quantitative information, disclosure requirements for holders’ exposures to crypto-assets should include at least the following: business activities and how these business activities translate into components of the risk profile of the holder, risk management policies of the holder, direct and indirect exposure amounts, and accounting classification.

Against this general backdrop, some national standard setters have started to work in the adaptation of their reporting rules for crypto-assets. In particular, the FASB is in the process of reacting to the calls made by practitioners¹⁰ and by the issues raised by other authorities. Investors, preparers and practitioners requested urgent accounting guidance (KPMG, 2022). Moreover, the issuance of a standard on the custody of crypto-assets by Securities Exchange Commission Staff (see Section 4.1 below) has further exposed discrepancies in the application of existing standards.

10 See ISDA, 2022 for a pronouncement on accounting policy for crypto-assets.

The work carried out to adapt the standards has yielded some interim conclusions. The scope of the project is narrow but some of the conclusions are illustrative. The FASB acknowledged certain similarities between many digital assets and commodities but finally decided (in May 2022) to exclude commodities from the scope of its revision project because, unlike digital assets, physical commodities can also be used in the production of other physical products.

The scope of the FASB's work has ultimately been narrowed to accounting for crypto-assets that satisfy the US GAAP definition of intangible assets, i.e. those not providing the asset holder with enforceable rights to, or claims on, underlying goods, services or other assets. So far, both stablecoins that did not meet the definition of a financial asset and unbacked crypto-assets have been accounted for as indefinite-lived intangible assets. Such treatment has the drawbacks of asymmetry highlighted above. Nonetheless, under the FASB's sectoral rules on investment companies (ASC 946) and broker-dealers (ASC 940) it has been possible to measure holdings of crypto-assets held for investment or trading purposes at fair value through earnings. The FASB's interim decision as a result of the revision projects widens the application of this standard by requiring the measurement of all in-scope crypto-assets at fair value. They should thus be measured at fair value, with fair value changes recorded in the income statement. The decision does not permit an alternative measurement, such as historical cost less impairment, for crypto-assets not traded in an active market.

In the EU, the European Financial Reporting Advisory Group (EFRAG) (EFRAG, 2020) has also made cautious recommendations on the adaptation of existing standards. EFRAG provides advice to the European Commission on whether newly issued or revised IFRS Standards meet the criteria of the IAS Regulation for endorsement for use in the European Union. EFRAG launched a research project on the reporting challenges of crypto-assets that has culminated in a tentative recommendations document (EFRAG, 2020) that recognizes the current gaps for the reporting of crypto-assets based on the international standards and suggests considering a gradual but comprehensive amendment of the standards. The recommendations discard an entirely new standard but recognise the issues mainly faced by holders of crypto-assets. Largely in line with the also cautious approach followed by the FASB, EFRAG recommends in particular that the intangibles standard IAS 38 be amended to allow fair value through profit and loss of cryptocurrencies. Recommendations on issuance of cryptocurrencies that would affect stablecoins, utility tokens and other crypto-assets are left to a second stage in their analysis.

The ongoing revisions do not yet provide clarifications to outstanding issues related with the "issuance" of produced crypto-assets. The production process, as described in Section 3.1, entails the allocation of resources by validators to access the competition to notarise transactions and thereby expand the ledger. In proof-of-work protocols the resources allocated are mainly significant computational power

and high amounts of energy consumption. The impact of these production techniques on climate and sustainability goals has led European legislators to include crypto-asset mining in the EU taxonomy for sustainable activities that would call for consistent standards for producers. For example, the open issue of how to account for costs incurred by unsuccessful miners (all but one at each block validation) could distort the picture (Prochazka, 2018). In proof-of-stake protocols the allocated resources are of a financial nature and validation is restricted to holders of the currency native to the blockchain.

However, proof-of-stake protocols raise their own reporting clarification issues. In fact, proof-of-stake protocols and, for that matter, also collateralisation in the DeFi, raise clarification needs as to the accounting ownership of the relevant tokens involved. The matter might just amount to clarifying the control tests applied in different scenarios of accounting de-recognition. But the gains from greater clarity may be large if double-counting is eliminated on aggregate in an already complex environment. The absence of standards may be more important for the state of reporting and the quality of data than the current non-regulated nature of DeFi, as suggested by the FSB (2023).¹¹

4 Reporting and prudential goals

The interface between general and sectoral reporting is traditionally a fertile ground for cross-breeding between disclosure and prudential considerations. The perceived trade-offs between the two perspectives arise ultimately because reporting matters both for financial stability¹² and for investor decisions (see Wall et al., 2014). This general issue has received significant attention in the past in the context of bank reporting of credit loss provisions. This section attempts to briefly frame a broadly similar perspective for the case of the highly volatile and risky crypto-assets. In particular, Section 4.1 links observations made in Section 2 on the risky profile of crypto-assets (as regards volatility, liquidity and market structure) with different accounting rules (existing, necessary and proposed). In particular, the section illustrates the attempt to exploit the complementarity between prudential and accounting rules to achieve regulatory goals based on an accounting rule for crypto-asset custody. Section 4.2 briefly examines two recent regulatory actions on crypto-assets that highlight the evolving conditions for the trade-off between disclosure and prudential considerations.

11 Namely, the FSB (2023) attributes the absence of reporting in the DeFi space to the non-regulated status in the following terms: “Data issues are largely due to the nature of crypto-assets and the associated blockchains as well as the incentives of market participants, in particular (...) the lack of reporting producing consistent and reliable data because parts of the crypto-asset ecosystem fall outside of, or are in non-compliance with, the regulatory perimeter at present. This means that crypto-asset market participants typically do not comply with common disclosure, recordkeeping and reporting rules covering entities in traditional finance, hampering data quality and comparability.”

12 For a central bank perspective, see Schwartz et al (2014).

4.1 Accounting policies in an extended sense

Accounting policies aimed at interpreting the existing reporting framework are known to be designed to cope with the practical gaps arising. Notwithstanding the fact that they are weaker than full-fledged standards and/or interpretations, they typically enable practitioners to appropriately match stylised criteria and a complex transactional reality.

In an extended sense, it has also been argued that accounting policies also enable authorities to deal with prudential concerns. The literature is broad. But Wall et al. (2014) is illustrative in that the authors examine the issues arising in the reporting of loan loss provisions in the US market due to the trade-offs between the different mandates of the prudential authority (the Fed and the securities market regulator (SEC)). In fact, this case is only a specific expression of a long-lasting and widespread debate that ultimately led to a revision of the standards for credit risk in financial instruments issued by the IASB and the FASB.

Some existing standards applied to crypto have been seen in Section 3 to contain a bias towards prudent reporting when they cap the booking price. But the prudential concerns raised by excess volatility and a low signal-to-noise ratio of crypto-asset prices could also be dealt with to some extent through prudential adjustments implemented outside the reporting standard. A “thought back-test” of the protection offered by conservative measurement criteria, as opposed to that offered by fair value with one-for-one impact on the income statement, illustrates the force (although limited) of a prudential case in the adoption of a reporting rule. The accumulation of implicit buffers as volatile prices follow an upward trend certainly protects from the impact of turnarounds. It may also deter entry in a volatile market because access to profits is restrained. A casual confirmatory observation of the merit of these arguments among practitioners is the words of appreciation in the US when the FASB hinted that it would pivot to a fair value with full impact on profit and loss from the currently capped prices rule. But Section 4.2 will argue that the development of full-fledged prudential rules addresses intrinsic limitations of proxy rules based on conservative reporting like their potential for arbitrage (across jurisdictions based on consolidated reporting), their potential to influence holding horizons and, most certainly, their asymmetric protection. The time of reckoning eventually arrives if the position is held long enough and the implicit buffers have been eliminated.

The interaction between prudential and reporting considerations also emerges when considering the liquidity and technology risks of crypto-assets. Liquidity in the crypto-asset market has been shown in Section 3.2 to be very volatile and uneven (see Charts 2.1 and 2.2). The alleged price transparency of crypto-assets may thus be hampered by their lack of depth. Liquidity issues have typically been handled in traditional mark-to-market assets through disclosure (under IFRS 13) and, for bank held assets, through prudential requirements. For example, Bischoff et al. (2022)

show the importance from a disclosure perspective of the splitting of mark-to-market assets held by banks in the euro area into the three complexity categories (Level 1, Level 2 and Level 3). A similar case for the role of supervision based valuation adjustments can be made for crypto-assets based on their poor liquidity (see Chart 2.2). But the recognition of a Level 3 category would now be more problematic owing to model based pricing difficulties.

Interestingly, some of the technology/market structure risks associated with crypto-assets have led to reporting-related decisions aimed at neutralising their impact. In turn, the decisions have revealed some of the discrepancies in the existing standards. More specifically, the custody of digital assets poses risks and features that led SEC staff to formulate its own interpretation of the conditions under which digital assets have to be treated as an ownership of the depositor for accounting purposes. Individuals frequently engage a third party to hold them in either a custodial or non-custodial wallet. The view expressed in Staff Accounting Bulletin 121 (SAB 121) elicited many opinions in the crypto ecosystem by revealing a view on the regulation of digital assets as a whole and by exposing reporting mismatches.

SAB 121 initially deals with companies that safeguard digital assets. But the increasing absence of separation from transaction facilitation services as well the technological, legal, and regulatory risks and uncertainties unique to crypto-assets led SEC staff to require the recognition of asset and liability entries in the balance sheet of these providers, even in the case of non-custodial wallet services. In this case, the safeguarding obligation liability is measured at the fair value of the digital assets held in custody and the corresponding safeguarding asset is measured in the same manner, except for actual or potential safeguarding loss events, such as those resulting from fraud or theft (including hacks). Moreover, the ruling also revealed reporting mismatches. Custodial wallets, (i.e. where control entails on balance sheet recognition under US GAAP) still entail that liabilities be measured at fair value, whereas digital assets under custody are not measured at fair value.

4.2 MiCA and BCBS rules

The brief reference in this section to the reporting regimes envisaged in two relevant packages (MiCA and BCBS) of rules for crypto-assets intends to complement the paper's basic reporting perspective which focuses on standards. Nonetheless, it is important to keep in mind the transformative boost that regulatory packages may have for disclosure standards due to the formal crystallisation of use cases and contexts that they entail. Thus a complete regulation of crypto-assets, as proclaimed by the IMF (2023), also calls for consistent reporting frameworks.

The MiCA regulation has introduced in the EU a special regulatory regime for crypto-assets with the intent of protecting investors and contributing to the preservation of

financial stability. MiCA regulates primary market activities (issuance/public offerings) and access to the secondary market (listings) as well as the provision of certain crypto-related services based on the features selection of in-scope crypto-assets. For the purposes of this section, it is important to mention that MiCA only contains reporting obligations on the issuance of the two types of stablecoins envisaged under the rule (asset-referenced tokens and e-money tokens) as well as on trading information from crypto-asset service providers (CASPs). But MiCA does not set out standardised reporting obligations (ESRB, 2023).

The BCBS standard on banks' exposures (BCBS, 2022) has pre-empted the deepening of interconnections with the traditional financial system and of the potential financial stability risks highlighted by the FSB (2022). The standard establishes a strong global minimum prudential framework for internationally active banks to mitigate risks from crypto-assets by focusing on the risk of their exposures. The framework is structured on the basis of three hierarchical criteria to classify the universe of crypto-assets. Ideally, the BCBS should serve as a blueprint for disclosure and risk control regimes applicable to other sectors of the financial industry, such as the funds sector and others.

The BCBS (2022) standards will significantly improve the visibility and control of risks due to holdings by banks and, as a result, will partially improve disclosure in the ecosystem as a whole. The standards classify crypto-assets into four categories based on a set of risk features broadly consistent with the ones highlighted in Sections 2 and 3 as relevant to classify crypto-assets from both technology and business case perspectives. Namely, the nature of the tokens at stake, their referencing and stabilisation mechanisms, their underlying technology, their liquidity and their hedging properties. The rules also envisage a disclosure regime to enhance the quantitative information on exposures and on associated capital requirements.

Interestingly, the classification of some crypto-assets in BCBS (2022) may reveal the drawbacks of the lack of a consistent set of basic reporting criteria. Typically, prudential rules for bank exposures are formulated only with an indirect regard for their basic reporting categories. The indirect (but fundamental) connection is the different risk profile of positions actively traded and held on the balance sheet. The risk-based approach thus tends to (apparently) de-link prudential and accounting rules on the surface except for the fact that the prudential rules turn out to be different for banking and trading books.

The general philosophy of splitting the duties of standard setters largely holds also for the crypto-asset classification contained in BCBS (2022). In effect, so-called qualifying group 1 assets have to be assigned to the banking book or trading book based on the application of the boundary criteria either to the non-tokenised equivalent traditional asset (tokenised assets or group 1A) or to the underlying reference asset (stablecoins or group 1B). But group 2 assets, consisting in the set of tokens not

qualifying for group 1, must be treated according to proposed market risk rules (group 2A) or conservative rules (group 2B) regardless of whether they stem from trading or banking book instruments (see paragraph 60.23 in BCBS, 2022). The reliance of the rules for group 2 crypto-assets on book values recorded which, based on the discussion held in Section 3, may derive from non-standardised measurement criteria, might lead to heterogeneous capital requirements across banks and jurisdictions. Moreover, the importance of the consistency between prudential and reporting rules is also highlighted by the potential for some group 2 crypto-asset arbitrage based on a choice of exposure measurement that suits market trends.

5 Concluding remarks

Crypto-assets have arguably turned regulators and accountants into taxonomists. The peculiar and risky features of crypto-assets are still being mapped into existing regulatory and reporting classifications. Do they really represent “something new under the sun” in terms of mappings? The question reformulates the ongoing struggle to find a mapping for crypto-assets and, more generally, for digital assets within existing reporting standards in a way that is useful from a public policy perspective.

The paper does not prejudge a general response to the mapping question to address the challenges of digital assets reporting. Instead, the paper recognises that the response regarding the most appropriate disclosure logic for digital and crypto-assets must be framed in the context of changes to the broader set of protections (beyond disclosure) and clarifications to a complex and sometimes risky category of instruments. The need for adaptations to the existing reporting standards, their timing and scope thus needs to be assessed jointly with the move towards complete regulation. But the progress made in crypto-asset regulation worldwide suggests that clarifications and/or adaptations of existing standards are already required to avoid inconsistent outcomes like those highlighted in the paper.

From a positive perspective, the paper’s analysis highlights the genuine and evolving developments in the crypto-asset space, the ensuing difficulties of using the existing reporting categories and the diversity of considerations involved as regards the optimal course of action. The paper documents how some standard setters are already moving while others are waiting for the scene to be clearer. Clarity in that regard is not meant to refer only to a less complex state of the overall ecosystem but also to a consensus on the complementary role of the various relevant policies for dealing with the risks posed by crypto-assets. The paper also briefly elaborates on these complementary contributions among various policies aimed at providing quality information to make decisions, on the one hand, and to entice prudent behaviour, on the other. The poor signal-to-noise ratio of most crypto-assets gives this question a strong dichotomous profile that is highly dependent on the existing prudential protections.

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CLIMATE CHANGE, FINANCIAL RISKS AND REPORTING: DISTANT HORIZONS?

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Abstract

The notes to financial statements and, in the case of credit institutions, Pillar 3 reports complete and supplement information contained in the balance sheet and income statement. This helps to provide a better estimate of the amount and timing of expected cash flows, and of the associated risks. The climate change challenge introduces new factors that affect the materialisation of those risks, and standards are being developed, from different vantage points and by various organisations, aiming to specify the type of public information – in addition to the notes to financial statements and Pillar 3 reports – that could provide a better picture of these factors. This article presents an overview of the initiatives under way to address the *disclosure* of climate-related financial risks, focusing on the main international work streams promoted by the International Financial Reporting Standards Foundation, the European Financial Reporting Advisory Group and the US Securities and Exchange Commission. It sets out the context and rationale behind the proposals, their current status and their main content. It also discusses the mechanisms being considered to make the initiatives interoperable and to link this type of information with that provided in the financial statements, in order to prevent fragmentation that could affect financial stability.

Keywords: climate change, disclosure, financial reporting, IFRS, ISSB.

1 The importance of transparency in light of the climate change challenge

In 1832, the British economist William Forster Lloyd introduced the so-called “tragedy of the commons” (also referred to as the “commons dilemma”), a concept that highlights the consequences of actions guided by the self-interest of individuals exploiting a finite common resource. The example used by Lloyd – overgrazing of common pastureland – recalls the externalities linked to activities based on the use of common goods and, in recent decades, has underpinned the debate and even some of the measures adopted in polluting sectors.

More recently, scientific evidence has gradually afforded climate change a structural nature, and the externalities and socialisation of climate-related losses have acquired a range of new dimensions. In 2015, in what has become a seminal address in the field, Mark Carney, who was then Governor of the Bank of England and Financial Stability Board (FSB) Chair, coined the expression the “tragedy of the horizon”,¹ adding a time dimension to Lloyd’s dilemma. The bulk of the financial

¹ Carney (2015).

effects of climate change will take years or even decades to materialise, and they are therefore often ignored by economic agents. Reverting this practice, by making it compulsory to recognise an uncertain, yet unequivocal, loss seems to be one of the key goals of regulatory authorities, and was certainly in the spirit of the above-mentioned address.

Information on the various climate risk factors is essential before regulatory tools and compliance mechanisms can be designed. Information is indeed one of the pillars that uphold financial market infrastructure,² and its relevance to investor protection is enshrined in the regulatory framework, one of whose objectives is to ensure transparency.³

To fulfil this objective, issuers must disclose their financial position, risks and other issues that may prove relevant for the adoption of investment decisions, it being understood that this helps reduce the variability of future cash flow projections. This makes this information especially useful in the case of firms and sectors that are subject to greater uncertainty. Appropriate consideration of climate-related risk factors could enable certain latent losses to be detected, preventing the build-up of positions that might be difficult to unwind, especially in the case of highly leveraged financial institutions.

Appropriate information should, for example, enable investors to identify a gradual decline in the value of oil and gas reserves in light of potential extraction restrictions, or value impairment of buildings erected on floodplains, or to be aware of contingent liabilities relating to damage, penalties or the need to adapt their business to sustainability standards. Otherwise, the inevitable readjustment of expectations – on the back of new scientific evidence, regulatory measures or geopolitical events, to cite just a few potential triggers – could have dramatic effects on the prices of shares and bonds issued by the firms concerned. It would also weigh on the financial institutions (not only banks but also insurance companies and other institutional investors) exposed to the activity of those firms through a variety of channels. As demonstrated time and time again, such disruptions tend to fuel procyclical spirals, and a tightening of financial conditions that ultimately becomes widespread.⁴

In other words, reliable information on climate-related financial risks contributes to an efficient allocation of resources and promotes market discipline. Moreover, in the case of regulated financial institutions, it streamlines supervision and prevents the build-up of positions that may be difficult to unwind, thus reducing systemic risk.

2 See, for example, Crockett (2002), Turner (2015) or Bailey (2016).

3 IOSCO *Objectives and Principles of Securities Regulation*.

4 Pérez Rodríguez (2021).

This article focuses precisely on disclosure of the various factors that contribute to the build-up of climate-related financial risks. A multitude of initiatives have been developed in this field in recent years. Following the initial impetus provided by the Task Force on Climate-related Financial Disclosures (TCFD) – a private sector initiative promoted by the FSB in 2015 – the landscape has evolved towards the definition of specific requirements, notably including the proposals of the International Sustainability Standards Board (ISSB), the Securities and Exchange Commission (SEC) in the United States and the European Financial Reporting Advisory Group (EFRAG) in the European Union (EU).

In the following sections this article examines the rationale behind these standards, their main requirements and the contribution they can make to the above-mentioned objectives, namely the efficient allocation of resources, market discipline and financial stability. First, it places the ISSB standards in the present regulatory and political context, in which the two major financial reporting jurisdictions – the United States and the EU – vie for conceptual leadership in designing climate-related financial risk disclosure requirements. After comparing the three regulatory frameworks proposed, a number of general considerations are presented on the importance of this process and a series of conclusions are drawn.

2 The *raison d'être* of climate change disclosures: the rationale behind and differences between the proposals

When analysing disclosure requirements on the financial effects of climate change, their similarities and differences vis-à-vis pure financial reporting, which they supplement, must be clear. It is also important to establish a distinction between these two types of reporting requirements and those specific to credit institutions (Pillar 3 reporting).

Traditional financial statements – the balance sheet or statement of financial position, income statement and notes to financial statements – are prepared according to the concept of *financial capital maintenance*. Behind this nebulous term lies the key to what is understood as relevant or *material* information, i.e. that which allows the *primary users* of financial statements – investors and creditors – to assess the change in net asset values over a specific period. Thus priority is given to the informational needs of agents that fund the reporting entity, and specifically those related to estimation of the amount, timing and variability of the cash flows expected from their activity.

The Basel Capital Accord's Pillar 3 has to do precisely with the last of these factors: the variability of expected cash flows. Discussions as to the importance of transparency for the safety and soundness of the banking system date back to 1998.⁵ However, it was not until the second Basel Capital Accord (Basel II) was being

5 Those discussions materialised in the “Krause report” of the Basel Committee on Banking Supervision (BCBS).

developed that the inclusion of Pillar 3 was considered, aiming to complement the capital requirements (Pillar 1) and the supervisory review process (Pillar 2) by means of reporting requirements that would enable investors and creditors to assess banks' exposures, risk management and capital adequacy.⁶ Under Basel II, this informational add-on was conceived as a counterpoint to the greater discretion afforded to banks to determine the applicable capital requirements through their internal models. In that sense, it was understood that market discipline reinforced Pillar 2, rewarding via lower funding costs banks that better manage their risks and penalising their less prudent peers.

It follows that, similarly to general purpose financial reporting, Pillar 3 aims to help credit institutions' investors and creditors in their resource allocation decisions, although it focuses on a subset of information relating to risks and banks' ability to manage those risks and address their potential consequences.

For their part, the ISSB's proposals are fully aligned with the spirit of general purpose financial reporting, with the focus on sustainability and climate-related financial risk information that can affect investors' and creditors' decision-making. The original wording of the proposal referred to *enterprise value*, understood as the sum of a company's market value and its net debt, and to primary users' ability to make judgements about the creation or destruction of that value. Although following replies to the public consultation the prominence of this concept was diluted,⁷ the idea of linking investors' and creditors' decisions to value created for all of the company's stakeholders, as a way to enhance information on their long-term prospects, remains. Specifically, it is understood that this will help explain the medium and long-term availability of resources and the quality of the relationships and dependencies on which companies rely, which include not only capital provided by shareholders and creditors, but also their staff, business know-how and their connections with local communities and natural resources.⁸

For instance, if a firm's business model relies on a natural resource, its prospects will be influenced by any change that affects the quality or availability of that resource, be it owing to natural causes or to potential restrictions or regulations. Likewise, if the firm's activity were to have an adverse impact on the health or well-being of local communities, the firm would become mired in litigation that could result in liability and reputational damage affecting its franchise. By contrast, favourable coexistence with its environment would help the firm to attract resources and staff, boosting the quality and stability of its links and dependencies. All of this equally affects the firm's

6 BCBS (2001).

7 For responses to the ISSB's public consultation, see [Draft General Sustainability-related Disclosures](#) and [Draft Climate-related Disclosures](#).

8 To identify significant risks and opportunities and their impact on the different stakeholders, the ISSB proposes using the descriptions included in *IFRS Practice Statement 2: Making Materiality Judgements*, in the [IASB proposals](#) on the information to be included in the management report, and even in the [descriptions](#) on the value creation process set out in the *Integrated Reporting Framework*.

counterparties, such as banks funding its business, as the value of their exposures will largely depend on the above-mentioned value creation or destruction.

Ultimately, appropriate reporting on all these matters influences estimates of firms' future cash flows and, therefore, decisions adopted by investors and creditors. Accordingly, information on climate-related financial risk, and sustainability reporting more broadly, is conceived as supplementary to the financial statements, enabling assessment of the financial impact of those risks. Disclosing such impact can help prevent the build-up of unsustainable financial positions which, when unwound, could seriously undermine financial stability.

3 The TCFD recommendations: first steps towards disclosure of climate-related financial risks and opportunities

Since the tragedy of the horizon was first mentioned, the FSB has been keenly aware of the importance of the financial system supporting transition towards a more sustainable economy and of the key role of information as a regulatory tool to achieve that objective.

To that end, as part of the roadmap encompassing the measures being developed to address climate-related financial risks,⁹ the chief focus of the FSB is on the disclosure-related initiatives, prioritising the ISSB's proposals. The FSB considers that the completion of work in this area will facilitate the development of initiatives in the other three categories of the roadmap: the definition of metrics (*data*), which enables *vulnerabilities analysis*, and the design of *regulatory and supervisory tools*.

However, the stepping stone that triggered the start of work on climate-related disclosures was the creation of the TCFD, following a proposal by the FSB to the G20 in 2015.¹⁰ The TCFD comprises representatives of various business spheres and economic sectors¹¹ and was shaped around the risk categories envisaged in Carney (2015). In 2017 the TCFD published a series of recommendations for voluntary disclosure of climate-related risks and opportunities,¹² with a view to offering guidance on the type of information firms should provide in the following four areas: governance, strategy, risk management, and metrics and targets.

So far, the TCFD's recommendations have served as a basis for climate-related disclosures by more than 3,800 organisations globally, including 1,500 financial institutions and 98 of the world's 100 biggest companies.¹³

9 FSB (2022).

10 FSB (2015).

11 TCFD members.

12 TCFD (2017).

13 TCFD (2022).

The rapid generation and dissemination of climate-related financial information – which in a relatively short period has evolved from good practice based on a voluntary framework to being one of the main focal points of global regulatory action – is largely attributable to the work of the TCFD and the widespread acceptance of its recommendations in both the public and the private sectors. Significantly, numerous international regulatory frameworks, such as those being drawn up by the ISSB, the SEC in the United States and EFRAG in the EU, are currently being designed drawing on the TCFD’s recommendations. These are examined in the following sections.

4 From voluntary to compulsory: proposals of the International Financial Reporting Standards Foundation

Culminating a fast-track process to define its governance structure and its decision-making, standard-setting and public oversight arrangements, the creation of the ISSB was announced at the Glasgow Climate Change Conference (COP 26) in November 2021. The ISSB aims to ensure that companies include sustainability and climate-related financial disclosures in their public reporting and that these disclosures are reconciled with the information presented in their financial statements.

Under the umbrella of the International Financial Reporting Standards Foundation (IFRS Foundation), the ISSB was established as a sister body to the International Accounting Standards Board (IASB), building on the success of the International Accounting Standards in terms of international acceptance and the credibility of their standard-setting due process.

With surprising speed given the usual time frames for IASB standard-setting, in late March 2022 the ISSB published two drafts for consultation (IFRS S1 and S2), designed as the embryo of the standards that will support sustainability-related financial reporting in capital markets. The public consultation period ended in July 2022. More than 700 comment letters were received, which the ISSB took into consideration in fine-tuning the technical content of the final standards. At the time of writing this article, the drafting and formal balloting of the standards is still ongoing. They are expected to be issued at the end of 2023 Q2, with entry into force in January 2024 and one year later for the requirements related to Scope 3 greenhouse gas (GHG) emissions.

IFRS S1, on general reporting requirements, asks companies to disclose all of their sustainably-related risks and opportunities. In a manner equivalent to the IASB’s Conceptual Framework, IAS 1 on the presentation of financial statements and IAS 8 on accounting policies, changes in accounting estimates and errors,¹⁴ IFRS S1

¹⁴ The IAS (International Accounting Standards) and IFRS (International Financial Reporting Standards) are the international accounting standards issued by the IASB.

establishes the general framework around which all other ISSB standards will be structured.

As regards sustainability disclosures in particular, IFRS S1 does not provide a definition or list of specific aspects that companies are required to consider. Unlike IFRS 2, with its more narrowly defined reporting requirements for climate-related financial risks, IFRS S1 directs companies to identify sustainability-related risks and opportunities considering external sources, such as provisions by the Sustainability Accounting Standards Board, the Climate Disclosure Standards Board framework for biodiversity-related disclosures, and recent pronouncements of other standard-setting bodies. It also allows companies to consider as their own the sustainability-related risks and opportunities identified by other companies operating in the same industries or geographies.¹⁵ Finally, in a clear attempt to foster interoperability between standards, the ISSB announced that it will reference EFRAG's European Sustainability Reporting Standards (ESRS) as a possible source of guidance for identifying metrics and disclosures in the absence of a specific ISSB standard, provided that they meet investors' information needs.

As noted above, IFRS S2 addresses disclosures on climate-related risks and opportunities from the standpoint of financial materiality and, therefore, in terms of the impact of physical and transition risks on the company's value creation. As we shall see, this differs from the EFRAG approach, which addresses climate-related risks bidirectionally, considering not only how they contribute to the creation or destruction of value, but also how a company's activities affect its environment.

IFRS S2 requires that companies disclose information about their exposure to climate-related risks and opportunities structured around the following four categories.

Governance

Companies are asked to report on the governance processes, controls and procedures applied in managing climate-related risks and opportunities, and on the related targets and progress towards their accomplishment. Among other aspects, they are required to disclose detailed information about the identity and powers of the bodies responsible for oversight of climate-related risks and opportunities, how often those bodies are informed or how climate-related decisions affect the company's strategic direction and major transactions.

¹⁵ In the medium term, the reference to external standards and frameworks is likely to be dropped given that the ISSB intends to identify the thematic standards that should be given priority. According to the most recent updates, topics could include biodiversity, human capital or human rights ([ISSB Consultation on Agenda Priorities](#), December 2022).

Strategy

Companies are required to identify the climate-related physical and transition risks and opportunities that could significantly alter or affect their business model, strategy and financial position. To that end, they are required to provide detailed information on how the risks and opportunities influence their financial position and cash flows, the company's resilience to those impacts and how they are distributed along the value chain (for example, across different geographies, asset types or distribution channels). Companies that use scenario analysis must also include details thereof, reporting on their outcomes and how they compare to the Paris Agreement goals. Moreover, they must disclose their assumptions regarding political decisions that could affect the transition path towards a net-zero economy, and break down the targets in their transition plan and progress towards meeting them, including details about their funding.

Risk management

Companies are required to disclose how climate-related risks are identified, assessed, monitored and mitigated. Among other information, they are asked to report how they estimate the probability of those risks materialising and to detail the parameters and information sources used.

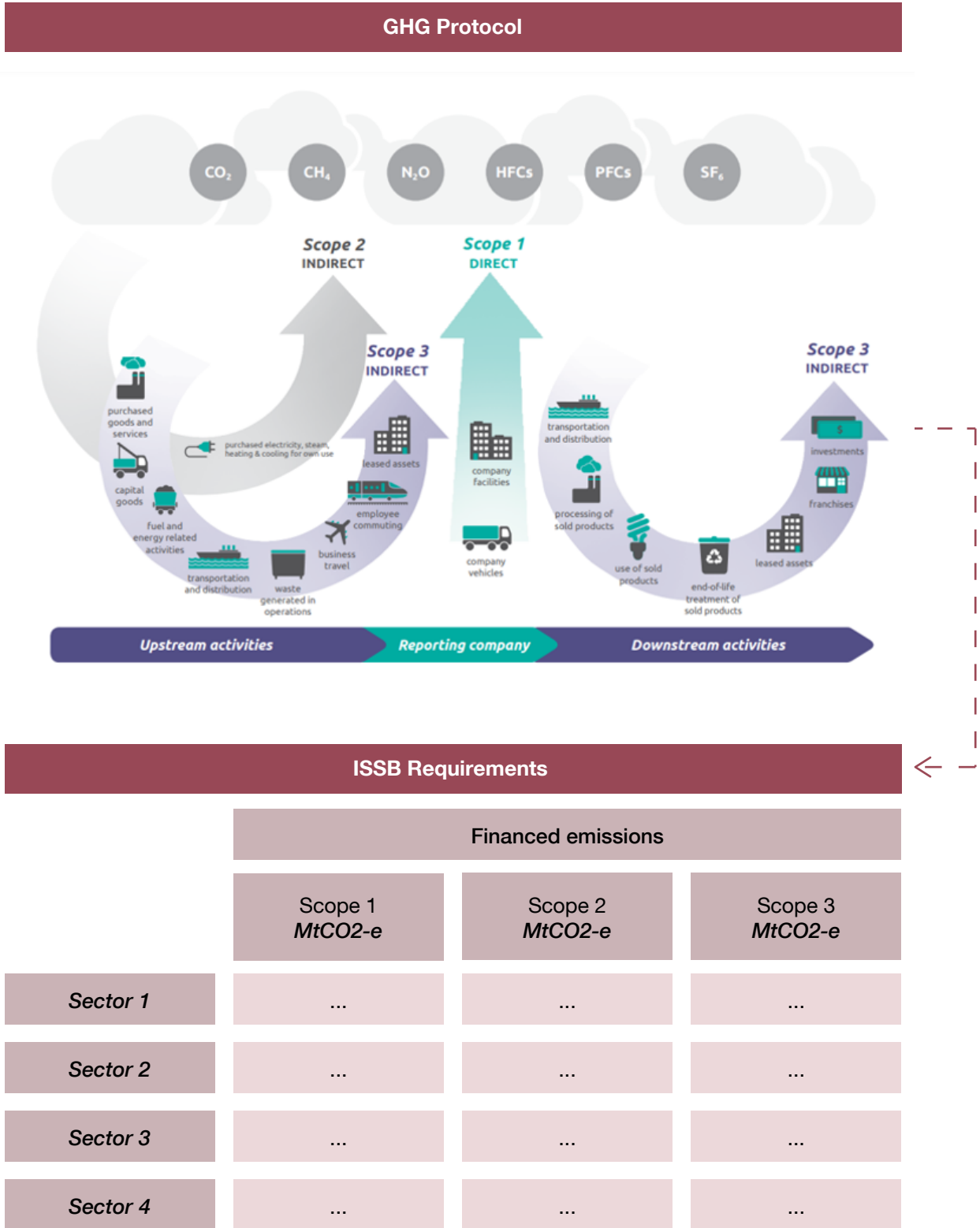
Metrics and targets to manage climate-related risks and opportunities

The standard requires seven general metrics that all companies should disclose regardless of their sector: i) GHG emissions broken down between Scope 1, Scope 2 and Scope 3 emissions and emissions intensity;¹⁶ ii) the amount and percentage of assets or business activities vulnerable to transition risks, iii) the amount and percentage of assets or business activities vulnerable to physical risks; iv) the amount and percentage of assets or business activities aligned with climate-related opportunities; v) the amount of investment or financing required to address climate risks; vi) internal carbon prices; and vii) the percentage of executive management remuneration that is linked to climate-related considerations.

¹⁶ The GHGs are those listed in the Kyoto Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), nitrogen trifluoride (NF₃), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). These are typically expressed in tonnes of CO₂ equivalent, converting non-CO₂ gases to their carbon dioxide equivalents (multiplying the mass of the gas in question by its global warming potential). Scope 1 emissions are direct GHG emissions from sources that are owned or controlled by the company (e.g. emissions from combustion in boilers, furnaces or vehicles). Scope 2 emissions are indirect GHG emissions from the generation of purchased electricity, heat or steam used by a company. Scope 3 emissions are those that occur in the value chain of the reporting company (both upstream and downstream emissions). The ISSB proposals include all 15 categories of emissions listed in the GHG Protocol, requiring companies to disclose gross emissions (in tonnes of CO₂ equivalent) and emissions intensity (expressed in tonnes of CO₂ equivalent per unit of physical or economic output).

Figure 1

GHG PROTOCOL VALUE CHAIN AND POSSIBLE ISSB REQUIREMENTS FOR FINANCED EMISSIONS



SOURCES: GHG Protocol and Banco de España.

The ISSB proposal also requires a number of industry-specific metrics. However, given the complexity of globally standardising these metrics, the latest updates from the ISSB indicate they will be relegated to an illustrative guidance in the final version of the standard. Conversely, the ISSB has decided to move the financed emissions metric (i.e. financing to GHG-emitting companies) from the industry-specific guidance to the main body of IFRS S2, which implies it will become a required disclosure for three industries, including commercial banking, with a breakdown by emission type (Scopes 1, 2 and 3), industry and asset type. This decision underlines the importance attached to measuring emissions that occur along the value chain of the financial industry, as evidenced in the Greenhouse Gas Protocol (GHG Protocol),¹⁷ and more specifically the analysis of Scope 3 emissions in Category 15 (investments).

Once the final versions of these standards are approved, their endorsement process will be similar to the process applicable to international accounting standards issued by the IASB. It will therefore be national legislators who determine whether or not the ISSB standards are mandatory in each jurisdiction. In the European Union, the European Commission is responsible for endorsement. In the case of the IASB standards, following EFRAG's endorsement advice, the Accounting Regulatory Committee (ARC)¹⁸ decides whether the standard is adopted and, if so, whether in full or with any refinements or carve-out. The Commission then prepares a draft regulation which is submitted to the European Parliament for approval, following favourable opinion by the EU Council. For sustainability disclosures, given that EFRAG has already submitted its own draft set of standards to the Commission, it will be important to give companies certainty regarding interoperability between the two frameworks, including on how the information should be prepared and the endorsement process.

5 Other international initiatives: European Financial Reporting Advisory Group and Securities and Exchange Commission

European Financial Reporting Advisory Group (EFRAG)

The Corporate Sustainability Reporting Directive (CSRD), which requires European companies to publish detailed information on sustainability issues, designates EFRAG as the technical advisor to designing the standards that will define those disclosure requirements. These will apply to large firms, defined as those that meet two of the following conditions: i) a balance sheet total of more than €20 million; ii) net turnover of more than €40 million; and iii) an average headcount of more than 250 employees. The requirements also extend to listed SMEs, excluding microenterprises.

¹⁷ The [GHG Protocol](#) provides global standards, guidance, tools and training to measure and manage GHG emissions.

¹⁸ All Member States participate in this level 2 committee. As an example, Spain is represented by the Instituto de Contabilidad y Auditoría de Cuentas (Accounting and Auditing Oversight Body).

In November 2022, EFRAG submitted the first set of EU Sustainability Reporting Standards (ESRS) to the European Commission, comprising 12 cross-cutting and topical standards structured around environmental, social and governance (ESG) aspects. As Figure 2 shows, one of these standards is specific to climate change, and EFRAG plans to develop sector-specific standards in the future.

As regards the climate change standard, it should first be understood that EFRAG approaches climate-related financial risks as a two-sided coin, considering both how climate change affects a company's expected profitability (financial materiality) and the impact of the company's business on its environment (environmental and social materiality).¹⁹ This more ambitious view of climate risk translates into some differences in content. Table 1 presents a high-level comparison of the ISSB and EFRAG requirements.

Once the draft standards are submitted to the European Commission, adoption of the final version will first require the opinion of the European Securities and Markets Authority. The opinions of various other bodies will also be sought, including the Technical Expert Group on Sustainable Finance (comprising representatives of all Member States), the European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority, the European Environment Agency, the EU Agency for Fundamental Rights, the European Central Bank (ECB), the Committee of European Auditing Oversight Bodies and the Platform on Sustainable Finance. In January 2023, both the EBA and the ECB issued opinions in which they expressed their appreciation of EFRAG's efforts to align its standards with those of the ISSB (e.g. by structuring the content around the TCFD's building blocks and aligning terminology) and suggested that reporting in accordance with the ESRS be automatically recognised as compliance with the ISSB standards to avoid double reporting.²⁰

Once the ESRS are approved, they will be adopted as delegated acts and will, therefore, be directly applicable in national legislation. The first set will foreseeably be approved in mid-2023 and, once adopted, will enter into force between 2025 and 2029.

Securities and Exchange Commission (SEC)

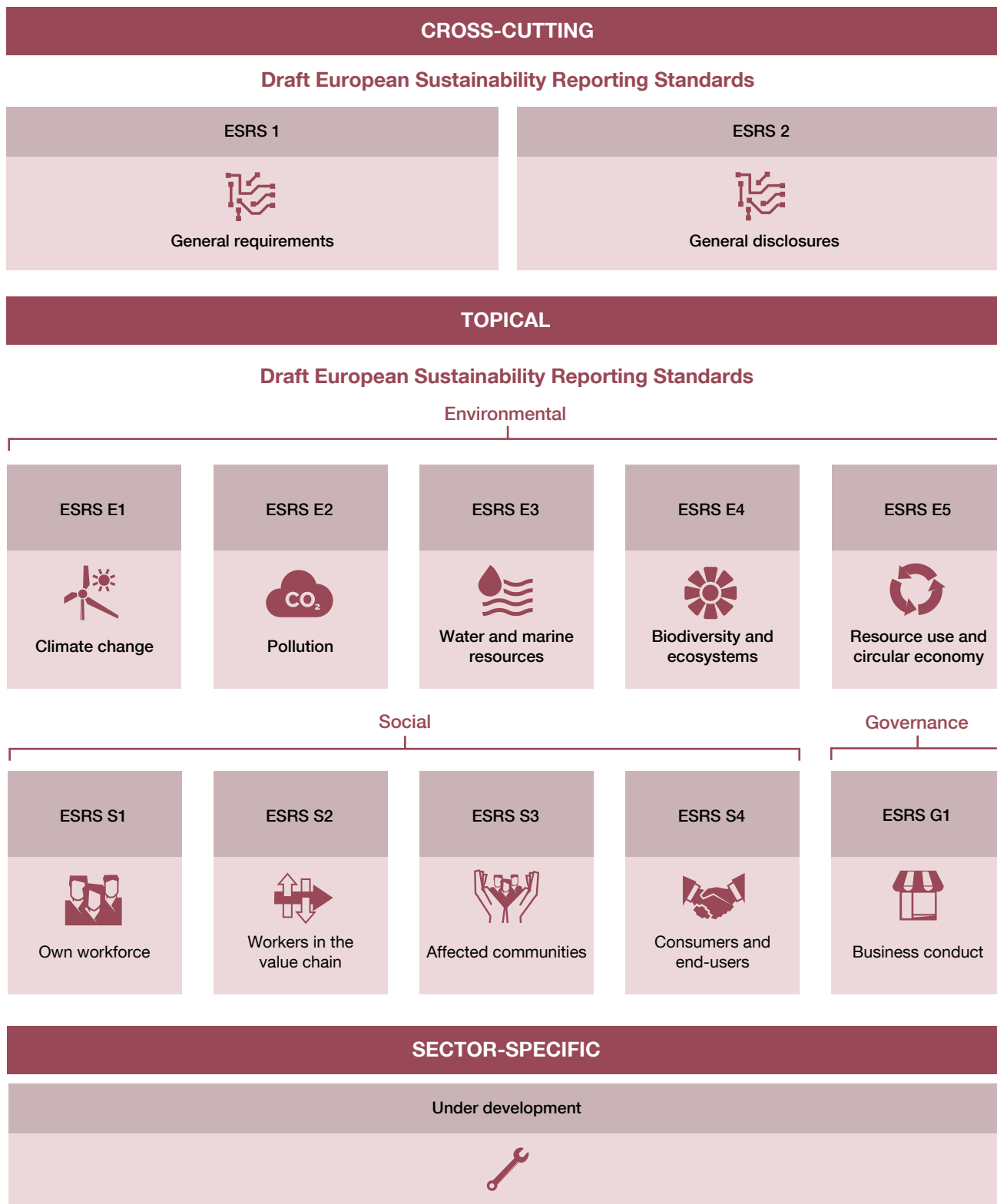
In March 2022, the SEC published a draft rule under which companies listed in US markets would be required to include climate-related disclosures in their annual

¹⁹ Alonso and Marqués (2019).

²⁰ The ECB opinion can be found at https://www.ecb.europa.eu/pub/pdf/other/ecb.staffopinion_europeansustainabilityreportingstandards202302~fc42a81b30.en.pdf, while the EBA opinion is available at <https://www.eba.europa.eu/eba-issues-opinion-european-commission-draft-european-sustainability-reporting-standards>. The EBA notes that Pillar 3 requirements will enable credit institutions to compile granular and quality information on the counterparties that they finance (such as information on GHG emissions or energy performance certificates, to name but a few), very much in line with the information needs of market participants.

Figure 2

EUROPEAN SUSTAINABILITY REPORTING STANDARDS



SOURCE: Banco de España.

Table 1

COMPARISON BETWEEN THE ISSB AND EFRAG PROPOSALS

Governance	All of the ISSB requirements are covered in the EFRAG standards.
Strategy	All of the ISSB requirements are covered in the EFRAG standards, which also require: <ul style="list-style-type: none"> – Information on the company’s products and services, including whether they are subject to any kind of ban in any market. – How the interests and views of the company’s main stakeholders are taken into account. – More details on the transition plan, in particular: i) details of GHG emission reduction targets and how these align with the Paris Agreement, with specific targets for 2030 and 2050; ii) a qualitative assessment of locked-in GHG emissions; and iii) if the company does not have a transition plan, what plans it has to adopt one. – With regards to the potential impact of climate change on credit institutions, specific disclosures aligned with, among others, the EBA requirements, such as the carrying amount of immovable property based on its energy consumption or the carrying amount of assets exposed to physical risk, including a breakdown by location and by type of acute and chronic events.
Risk management	All of the ISSB requirements are covered in the EFRAG standards, which also require greater detail on the processes to identify physical and transition risks, along with their impact, considering different climate scenarios (by way of guidance, a list of climate-related physical and transition events is provided).
Metrics and targets	All of the ISSB requirements for cross-cutting metrics are covered in the EFRAG standards, which also require the following: <ul style="list-style-type: none"> – Energy mix, distinguishing between renewable and non-renewable sources – More details on GHG emissions, with a breakdown of the share of Scope 1 emissions under the Emissions Trading System (EU ETS) and classification of the type of carbon offsets (GHG credits and capture and storage). – GHG emission reduction targets, identifying the mitigation levers (energy efficiency, switch to renewable energies or product substitution, among others).

SOURCES: EFRAG and Banco de España.

reports. Like the other proposals discussed previously, the SEC takes the TCFD framework as a reference, arguing that many companies already use it as a basis for their voluntary disclosures and acknowledging the benefits of aligning with international practice.

Unlike the ISSB and EFRAG draft standards, this proposal focuses solely on climate-related financial risks and leaves aside other sustainability issues. It is broadly aligned with the ISSB requirements on governance, strategy and risk management. However, there are some differences and specificities in relation to metrics and targets. First, the SEC proposal does not include sector-specific metrics and there are no plans to develop any in the near future. Second, it only requires the breakdown of Scope 3 emissions if they are material, and disclosure of those emissions is subject to a legal safeguard to prevent any resulting error from being deemed fraudulent, unless bad faith can be demonstrated. Lastly, the SEC proposal does not require disclosure of the percentage of executive management remuneration linked to climate-related considerations.

Initially the final standard was set to enter into force between 2024 and 2026, depending on each company’s market capitalisation, with an additional year for Scope 3 emissions. Although the consultation period ended in June 2022, no

significant progress has been made, possibly influenced by the June 2022 decision by the US Supreme Court in the case of *West Virginia v. Environmental Protection Agency (EPA)*,²¹ finding that the EPA has no authority to issue regulations limiting emissions and that such decisions can only be made by Congress or an agency with its expressly delegated authority.

6 Conclusions

This article has endeavoured to outline the main features of the three regulatory frameworks currently competing to become the international benchmark for disclosure of climate-related financial risks. All the proposals (ISSB, EFRAG and SEC) build on the TCFD's recommendations and respond to the paradigm that was set out in 2015 by Mark Carney and reflected in FSB discussions. However, it is instructive to analyse their differences and nuances, which essentially relate to how the principle of materiality is conceptualised and could affect the type of information required.

Notwithstanding these discrepancies, the criteria will foreseeably translate into more specific disclosure requirements as the final standards are built out and implemented. From a practical standpoint, it would make little sense to decouple this information from the estimation of cash flows. At the same time, it would be desirable for financial materiality, understood either from the capital maintenance or the enterprise value perspective, to take into account the company's relationships and dependencies and their impact on long-term value.

It will be interesting to watch the political developments over the coming months and how the required balance between the three proposals take shape. The European framework is highly ambitious and seems to be leading the way in several aspects. However, the relevance of the ISSB and SEC projects should not be underestimated, given the proven success of the IFRS Foundation's standard-setting due process and the importance of the US capital markets. In light of the numerous multinational companies that could potentially be subject to one or more of these requirements, the challenges would become even greater if the frameworks were ultimately incompatible or divergent on key matters. It is therefore paramount to ensure their interoperability, taking advantage of their parallel development.

In any event, the process is still in its infancy. Indeed, work on disclosures is just the first of four sequential stages envisaged in the aforementioned FSB Roadmap which covers ongoing initiatives in relation to climate-related financial risks. This is a complex structure in which each of the different pieces will have to fit together, but it first requires company information that allows these risks to be priced.

²¹ Supreme Court of the United States (2021).

How can we respond to the multidimensional challenge of climate change? Is it possible to address the different transmission channels to financial stability, and to do so without imposing burdens on future generations? To what extent can the necessary reforms be implemented using the existing mechanisms, institutions and markets? The answers to these questions are necessarily uncertain. Given the multiple dimensions of the challenge, an approach that explores different tools from a range of fields seems warranted. Using disclosures as a disciplinary mechanism might be a first step.

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CRYPTO-ASSET REGULATION IN THE CURRENT INTERNATIONAL AND EUROPEAN FRAMEWORK

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Abstract

The growth of crypto-assets in recent years, their potential use as a means of exchange or saving, and their possible risks to financial stability, arising, among other things, from their interconnections with the banking sector, have drawn the attention of national and international authorities. In terms of the regulation of these assets, of note at the European level is the European Union's proposal for a regulation on markets in crypto-assets, which establishes a regulatory framework for all those crypto-assets that currently lie outside the scope of the European Union's existing regulation on financial services. As regards their treatment in the banking sector, in December 2022 the Basel Committee on Banking Supervision published the global standard on the prudential treatment of banks' exposures to crypto-assets. In this article we review the main characteristics of these two regulatory developments, which are essential for the future of the crypto-asset ecosystem's relationship with the traditional financial world.

Keywords: Crypto-assets, stablecoins, tokenisation, prudential regulation, supervision, financial innovation, fintech, capital requirements, financial stability.

1 Introduction

Crypto-assets can be defined as private digital assets that depend on cryptography and distributed ledger technology (DLT) or similar technology (Financial Stability Board, 2022a). However, it should be noted that the term crypto-assets encompasses different types of instruments with different characteristics, uses and risk profiles. This issue will be addressed throughout this article, taking as a basis the regulatory references or international standards currently in place, despite the fact that there is no common taxonomy at international level to help categorise crypto-assets uniformly.

The rapid growth of crypto-assets in recent years, their potential use as a means of exchange or saving, and their possible risks to financial stability, arising, among other things, from their interconnections with the banking sector, have drawn the attention of national and international authorities. Consequently, intense regulatory activity has been observed in this field in recent years at both international and European level.

Crypto-asset market capitalisation reached almost \$3 trillion in 2021, although its volume decreased to one third of that figure in 2022 after the collapse of

Terra/Luna and FTX (Bains, Ismail, Melo and Sugimoto, 2022). Although there are over 10,000 different types of crypto-assets in operation, the largest proportion of the total capitalisation is accounted for by crypto-assets that are not backed by traditional assets, including most notably Bitcoin and Ethereum. The so-called stablecoins¹ currently represent around 15% of total market capitalisation.

Broadly speaking, crypto-assets pose risks and opportunities for the financial ecosystem which require a flexible response from the authorities to ensure an adequate level of protection without hampering development and innovation.

The potential benefits linked to the technology underlying crypto-assets include improvements in the efficiency, speed and resilience of some of the processes associated with financial transactions. The vulnerabilities identified in crypto-assets generally relate to market, liquidity and high-leverage risks, their potential use in illegal activities, the lack of operational transparency and high energy consumption, among others. Also, the fact that there is no past experience to draw on makes it difficult to compare the level of resilience and robustness of the underlying technology.

As regards the risks to financial stability, their impact will hinge on the potential vulnerabilities inherent to activity related to crypto-assets, and on the scale and interconnectedness of such assets with the traditional financial system.

Currently, few risk transmission channels between the two systems are thought to exist, despite the growing participation of institutional investors and traditional service providers (Financial Stability Board, 2022a; Banco de España, 2022).

Accordingly, there have been several international initiatives to promote regulation and supervision adapted to crypto-assets' unique characteristics.

At international level, the Financial Stability Board is working on a set of high-level recommendations for crypto-asset activities and markets, in general, and for global stablecoins, in particular (Financial Stability Board, 2022b and 2022c). In both cases, the aim is to promote global and consistent regulatory and supervisory frameworks, based on close international cooperation and coordination. Thus, it recognises the global nature of crypto-assets and the need for coordination at institutional level.

Notable in Europe is the proposal for a regulation on markets in crypto-assets (MiCA), which establishes a regulatory framework for all those crypto-assets which would currently fall outside the scope of existing European Union (EU) financial services legislation. Broadly speaking, the regulation includes a series of requirements regarding: (i) issuance, offers to the public and trading; (ii) issuers and service providers; and (iii) customer and investor protection.

¹ Stablecoins are defined as crypto-assets that aim to maintain a stable value in relation to a specific asset or a basket of assets.

As regards interconnectedness with the banking sector, in December 2022 the Basel Committee on Banking Supervision (BCBS) published the global standard on the prudential treatment of banks' exposures to crypto-assets. Generally speaking, the standard provides for a more stringent prudential treatment for those crypto-assets which are not representations of traditional financial assets, are not backed by a basket of financial assets or do not have an effective stabilisation mechanism. The standard aims to provide a global regulatory framework that promotes responsible innovation while preserving financial stability (Basel Committee on Banking Supervision, 2022c).

Given the importance of the two regulatory developments at European and international level, this article explores the main characteristics of the EU proposal for a regulation on markets in crypto-assets (MiCA) and the prudential standard drawn up by the BCBS, soon to be implemented by the different member jurisdictions, including the euro area.

2 European Union regulation on markets in crypto-assets

The Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a digital finance strategy for the EU was published on 24 September 2020. It included a proposal for a regulation on markets in crypto-assets (MiCA), which was subject to debate and negotiation until 5 October 2022. At the time of writing this article, MiCA has already been approved and is only awaiting publication in the *Official Journal of the European Union*.

MiCA introduces requirements on crypto-asset issuance, offers to the public and admission to trading on a trading platform for crypto-assets; requirements for the authorisation and supervision of crypto-asset service providers, issuers of asset-referenced tokens (ARTs) and issuers of electronic money tokens (EMTs), and for their operation, organisation and governance; requirements to protect holders of crypto-assets in the issuance, offers to the public and admission to trading; requirements to protect customers of crypto-asset service providers; and measures to prevent insider dealing, unlawful disclosure of inside information and market manipulation in relation to crypto-assets.

2.1 Crypto-assets regulated by MiCA

MiCA defines crypto-assets as digital representations of value or rights which may be transferred and stored electronically, using DLT or similar technology. However, MiCA does not apply to all the crypto-assets that fall under this definition. It excludes from its scope, inter alia, crypto-assets that qualify as financial instruments

or other products that are already regulated in existing legislation on financial services. Crypto-assets that are unique and not fungible with other crypto-assets are also excluded. The European Central Bank (ECB) and national central banks when acting in their capacity as monetary authorities are also outside its scope. Lastly, MiCA does not apply to crypto-asset services that are provided in a fully decentralised manner without any intermediary.

MiCA classifies crypto-assets into three types: ARTs, EMTs and all other crypto-assets. The latter are crypto-assets different from EMTs and ARTs and are not excluded from the scope of MiCA. These include a variety of crypto-assets, including utility tokens, a type of crypto-asset that is only intended to provide access to a good or service supplied by its issuer. An ART is a type of crypto-asset that is not an EMT and that purports to maintain a stable value by referencing another value or right, or a combination thereof, including one or more official currencies. An EMT is a type of crypto-asset that purports to maintain a stable value by referencing the value of one official currency.

2.2 Crypto-assets other than asset-referenced tokens and electronic money tokens

Any person intending to offer crypto-assets other than ARTs and EMTs to the public in the EU or seeking their admission to trading in the EU shall not be subject to authorisation, but is required to comply with several obligations. These include the obligation to be legal persons and to draw up, notify to the competent authority and publish a white paper. MiCA does not require the approval of the white paper by the competent authority. Such white paper shall essentially contain information on the offeror or person seeking admission to trading, on the crypto-asset and on the rights and obligations attached to the latter.

2.3 Asset-referenced tokens

Any person offering ARTs to the public in the EU or seeking their admission to trading must be the issuer of those ARTs and a legal person or undertaking established in the EU that has been duly authorised by the competent authority, or a credit institution that has drawn up a white paper which has been approved by the competent authority. MiCA regulates the essential elements of the authorisation regime for the former and the requirements to be met by the latter. The ECB must issue an opinion in both cases. If the opinion is negative on the grounds of a risk to the smooth operation of payment systems, monetary policy transmission, monetary sovereignty or financial stability, such authorisation or approval shall be refused by the competent authority; otherwise, the ECB's opinion shall be non-binding.

The issuance of ARTs is also subject to certain restrictions. When the estimated quarterly average number and average aggregate value of transactions per day associated with the use of ARTs as a means of exchange within a single currency area is higher than one million transactions and €200 million, respectively, the issuer shall: (i) stop issuing the ARTs and, (ii) within 40 working days of reaching that threshold, submit a plan to the competent authority to ensure that the number and value of transactions per day are kept below such figures. Additionally, the competent authorities shall limit the amount of an ART to be issued or impose a minimum denomination when the ECB issues an opinion concluding that the ARTs pose a threat to the smooth operation of payment systems, monetary policy transmission or monetary sovereignty, and specify the applicable limit or minimum denomination amount.

Issuers of ARTs shall constitute and at all times maintain a reserve of assets, which shall be composed and managed in such a way that the risks associated with the assets referenced by the ARTs are covered and the liquidity risks associated with the permanent redemption rights of the holders are addressed. The reserve of assets shall be legally segregated from the issuer's estate. Issuers shall ensure that the issuance and redemption of ARTs is always matched by a corresponding increase or decrease in the reserve. Issuers shall determine the aggregate value of reserve assets by using market prices. This aggregate value shall be at least equal to the aggregate value of the claims against the issuer from the holders of the ART in circulation. Issuers that invest a part of the reserve of assets shall only invest in highly liquid financial instruments with minimal credit risk, market risk and concentration risk. In any event, it should be noted that the minimum amounts in each official currency referenced to be held as deposits in credit institutions cannot be lower than 30% of the amount referenced in each official currency.

Holders of ARTs shall have a redemption right at all times against the issuers of ARTs and on the reserve assets when the issuers are unable to comply with their obligations, in accordance with the recovery and redemption plan they are required to draw up. At the request of an ART holder, the issuer must redeem, either by paying an amount in funds, other than electronic money, equivalent to the market value of the assets referenced by such ARTs, or by delivering the assets referenced by the ARTs.

MiCA provides for the existence of certain ARTs that are deemed significant when they meet certain criteria and thresholds. The criteria used to determine whether an ART is significant include the total value of the issue, the size of the reserve of assets, the number and value of transactions per day, the number of holders, etc. The European Banking Authority (EBA) shall classify ARTs as significant when at least three of the criteria established are met and shall then assume supervisory responsibilities on various aspects relating to the issuers.

Lastly, issuers shall draw up and maintain a recovery plan and an operational plan to support the orderly redemption of each ART. Specifically:

- The *recovery plan* shall provide for measures to be taken by the issuer to restore compliance with the requirements applicable to the reserve of assets when the issuer fails to comply with those requirements. The plan shall also include the preservation of the issuer's services related to the ARTs issued, the timely recovery of operations and the fulfilment of the issuer's obligations in the case of events that pose a significant risk of disrupting operations. The recovery plan shall also include appropriate conditions and procedures to ensure the timely implementation of recovery actions, including liquidity fees on redemptions, limits on the amount of the ART that can be redeemed on any working day and suspension of redemptions. The recovery plan shall be notified to the competent authority, which may require amendments to its content and, where appropriate, their implementation by the issuer.
- The *redemption plan* shall demonstrate the ability of the issuer of the ART to carry out the redemption of the outstanding ART issued without causing undue economic harm to its holders or to the stability of the markets of the reserve assets. As with the recovery plan, the redemption plan shall be notified to the competent authority, which may require amendments to its content. The redemption plan shall be implemented upon a decision by the competent authority that the issuer is unable or likely to be unable to fulfil its obligations.

2.4 Electronic money tokens

Any person offering EMTs to the public in the EU or seeking their admission to trading must be the issuer of such EMTs, be authorised as a credit institution or as an electronic money institution, publish a crypto-asset white paper and notify the competent authority of such publication. EMTs are deemed to be electronic money and, when referencing an official currency of an EU Member State, shall be deemed to be offered to the public in the EU. Issuers of EMTs shall not require authorisation for such issuance. They shall be subject to certain provisions of Directive 2009/110/EC on electronic money, and to some specific requirements under MiCA. These include compliance with the provisions on drawing up and maintaining a recovery plan and a redemption plan which apply to issuers of ARTs, and with the rules set out below.

Issuers of EMTs shall issue these tokens at par value and on the receipt of funds. Holders of EMTs shall have a claim against the issuer. Upon request by such holders, the issuer shall redeem the EMTs, at any time and at par value, by paying

holders the monetary value of the EMTs in the form of funds other than electronic money. The redemption shall not be subject to a fee and the issuer shall not grant interest in relation to EMTs. Any remuneration or any other benefit related to the length of time that a holder of an EMT holds such a token shall be treated as interest and, consequently, shall not be permitted.

Electronic money institutions issuing EMTs shall safeguard the funds received in exchange for EMTs. These funds shall be deposited in a separate account in a credit institution or shall be invested in secure, low-risk assets that qualify as highly liquid financial instruments with minimal market risk, credit risk and concentration risk and are denominated in the same official currency as that referenced by the EMT. In any case, at least 30% of the funds received shall always be deposited in a separate account in a credit institution.

Lastly, as with ARTs, MiCA provides for the existence of certain EMTs considered significant based on the same criteria and thresholds as those applied to ARTs. The EBA shall classify EMTs as significant when at least three of the criteria established are met, at which point it shall assume supervisory responsibilities on various aspects relating to the issuers. Electronic money institutions that issue significant EMTs shall be subject to certain provisions applying to issuers of ARTs, including those relating to reserve assets.

2.5 Crypto-asset services

Any person that provides crypto-asset services in the EU must be a crypto-asset service provider, or a credit institution, a central securities depository, investment firm, market operator, electronic money institution, a management company for an undertaking for collective investment in transferable securities or an alternative investment fund manager. Pursuant to MiCA, crypto-asset services may also be provided by undertakings that are not legal persons only if their legal form ensures a level of protection for third parties' interests equivalent to that afforded by legal persons and if they are subject to equivalent prudential supervision appropriate to their legal form.

Crypto-asset service providers must obtain authorisation from the competent authority, unless they are one of the aforementioned institutions (credit institution, investment firm, etc.), in which case they shall only be required to notify the competent authority of the activity they intend to engage in. Nor shall the authorisation requirement apply where clients established or located in the EU request at their exclusive initiative the provision of a crypto-asset service or activity by a third-country firm. However, if a third-country firm solicits clients in the EU, regardless of the means of communication used to that end, it shall not be deemed to be a service provided at the client's exclusive initiative. Moreover, a client's

exclusive initiative shall not entitle the third-country firm to propose new types or categories of crypto-assets or crypto-asset services to that client, unless it obtains authorisation as a crypto-asset service provider.

Crypto-asset service providers shall be subject to certain obligations. They must act honestly, fairly and professionally, and in the best interest of clients. They must meet certain governance requirements, have procedures in place for handling complaints and policies and procedures to identify, prevent, manage and disclose conflicts of interest. They shall also be subject to certain requirements when outsourcing operational functions. When providing certain crypto-asset services (custody, operation of a platform, exchanging and placing), they shall have an appropriate plan to support an orderly wind-down of their activities under applicable national law, including the continuity or recovery of any critical activities performed by those service providers.

Crypto-asset service providers that hold crypto-assets belonging to clients or the means of access to such crypto-assets shall make adequate arrangements to safeguard the ownership rights of clients and to prevent the use of a client's crypto-assets for their own account. Where their business models or the crypto-asset services require holding clients' funds other than EMTs, crypto-asset service providers shall have adequate arrangements in place to safeguard the ownership rights of clients and prevent the use of clients' funds for their own account.

Crypto-asset service providers may themselves, or through a third party, provide payment services related to the crypto-asset service they offer, provided that the crypto-asset service provider itself, or the third-party, is authorised to provide those services under Directive (EU) 2015/2366 on payment services.

Crypto-asset service providers may provide the following crypto-asset services throughout the EU, either through the right of establishment, including through a branch, or through the freedom to provide services:

- *Custody and administration of crypto-assets on behalf of clients:* the safekeeping or controlling, on behalf of clients, of crypto-assets or the means of access to such crypto-assets, where applicable in the form of private cryptographic keys.
- *Operation of a trading platform for crypto-assets:* the management of one or more multilateral systems, which bring together or facilitate the bringing together of multiple third-party purchasing and selling interests in crypto-assets – in the system and in accordance with its rules – in a way that results in a contract, either by exchanging crypto-assets for funds or crypto-assets for other crypto-assets.

- *Exchange of crypto-assets for funds or for other crypto-assets*: the conclusion of purchase or sale contracts concerning crypto-assets with clients in exchange for funds or other crypto-assets, by using proprietary capital.
- *Execution of orders for crypto-assets on behalf of clients*: the conclusion of agreements, on behalf of clients, to purchase or sell one or more crypto-assets or to subscribe for one or more crypto-assets, including the conclusion of agreements to sell crypto-assets at the time of their issuance.
- *Placing of crypto-assets*: the marketing, on behalf of or for the account of the offeror or of a party related to the offeror, of crypto-assets to purchasers.
- *Reception and transmission of orders for crypto-assets on behalf of clients*: the reception from a person of an order to buy or to sell one or more crypto-assets or to subscribe for one or more crypto-assets and the transmission of that order to a client for execution.
- *Providing advice on crypto-assets*: offering, giving or agreeing to give personalised recommendations to a client, either at the client's request or on the initiative of the crypto-asset service provider providing the advice, in respect of one or more transactions relating to crypto-assets, or the use of crypto-asset services.
- *Management of crypto-asset portfolios*: the management of portfolios in accordance with mandates given by clients on a discretionary client-by-client basis where such portfolios include one or more crypto-assets.
- *Providing crypto-asset transfer services on behalf of clients*: providing services involving the transfer, on behalf of a natural or legal person, of crypto-assets from one distributed ledger address or account to another.

However, MiCA does not address the lending and borrowing of crypto-assets, including EMTs, and therefore should not prejudice applicable national law.

2.6 Rules on market abuse involving crypto-assets

MiCA establishes rules to prevent market abuse involving crypto-assets. To this end, it defines inside information, establishes rules for the public disclosure of such information, prohibits insider dealing using that information and the unlawful disclosure thereof. It also prohibits market manipulation or attempts to manipulate the market, requiring any person arranging or executing transactions involving crypto-assets to have in place effective mechanisms, systems and procedures to prevent and detect market abuse.

2.7 Supervision of crypto-assets

The national authorities take on the lead role as competent authorities for the supervision of the subjects and activities regulated by MiCA. The white paper shall be notified to the national authorities, which shall be responsible for authorising and supervising issuers of ARTs and crypto-asset service providers. The EBA intervenes when ARTs or EMTs classified as significant are issued, at which point it assumes certain supervisory responsibilities with respect to the issuers. In addition, it should be noted that at the time of writing this article, the draft Law on Securities Markets and Investment Services was in passage through Parliament. According to this law, the Spanish National Securities Market Commission shall be the competent authority for supervising compliance with MiCA, and the Banco de España shall carry out supervisory, inspection and sanctioning tasks in relation to the obligations applicable to issuers of ARTs and EMTs under MiCA.

The powers of the competent authorities include requesting information, temporarily suspending or prohibiting the provision of crypto-asset services, requesting amendments to the white paper or to any marketing communications, temporarily suspending or prohibiting an offer to the public or admission to trading of crypto-assets, carrying out inspections or investigations at sites other than the private residences of natural persons in order to seize documents or data, requesting any person to take steps to reduce the size of its position or exposure to crypto-assets, or to take all necessary measures to remove content from an online interface. These powers are without prejudice to the powers conferred on the same or other supervisory authorities, including powers granted to competent authorities under the provisions of national law transposing Directive 2009/110/EC on electronic money, and prudential supervisory powers granted to the ECB under Regulation (EU) 1024/2013.

MiCA also confers temporary intervention powers on the EBA, the European Securities and Markets Authority (ESMA) and the competent authorities. Such powers essentially include the power to temporarily prohibit or restrict, subject to fulfilling certain conditions, the marketing, distribution or sale of certain crypto-assets or a type of activity or practice related to crypto-assets.

Lastly, **ESMA shall keep a register** of white papers of crypto-assets other than ARTs and EMTs, of issuers of ARTs and issuers of EMTs, and of crypto-asset service providers. ESMA shall also establish a non-exhaustive register of entities that provide crypto-asset services in violation of MiCA provisions.

2.8 Amendments to the Capital Requirements Directive and implementation date for MiCA

MiCA amends annex I of Directive 2013/36/EU on access to the activity of credit institutions and the prudential supervision of credit institutions, which lists the activities

of credit institutions that are subject to mutual recognition. Accordingly, these activities shall include the issuance of EMTs, the issuance of ARTs and crypto-asset services.

Lastly, **MiCA will enter into force 20 days after its publication in the Official Journal of the EU** and will become applicable **18 months** after this date, with the exception of the rules on ARTs and EMTs, which will apply **12 months** after the entry into force of the regulation. During this phase, the European authorities, particularly the EBA and ESMA, are to develop a series of implementing rules to give effect to MiCA provisions.

3 Treatment under the Basel framework

In December 2022 the BCBS published the final version of the standard on the prudential treatment of banks' exposures to crypto-assets.² This global standard is the last step in a work programme that began in 2018 and that includes, inter alia, a periodic quantitative review of banks' exposures to crypto-assets.³

The standard is applicable to all crypto-assets,⁴ **except for central bank digital currencies (CBDCs), whose treatment will be gradually addressed in the future, as they are issued.** The standard must be implemented by the BCBS member jurisdictions by 1 January 2025. In any event, the document includes a number of issues that will likely require additional review and clarifications.

The standard on crypto-assets establishes prudential treatment on the basis of a set of conditions determining the classification of crypto-assets into two broad groups. Crypto-assets that meet the conditions in full are classified in Group 1, whereas those that fail to meet any of the conditions are classified in Group 2, which entails more stringent prudential requirements since they entail greater risks. Each group is in turn divided into two sub-groups depending on the characteristics of the crypto-assets and on fulfilment of additional criteria (see Figure 1).

Prudential treatment has been incorporated into the consolidated framework in the form of an independent standard (SCO 60). Unlike the rest of the Basel framework, which primarily establishes distinctions by type of risk (market, credit, operational, liquidity, etc.) and, within each type, by type of asset, the standard on crypto-assets refers to the prudential treatment of a specific asset class. This is to allow for possible future adjustments and to provide an overall picture of the prudential treatment of this new asset class, given that the framework is constantly evolving.

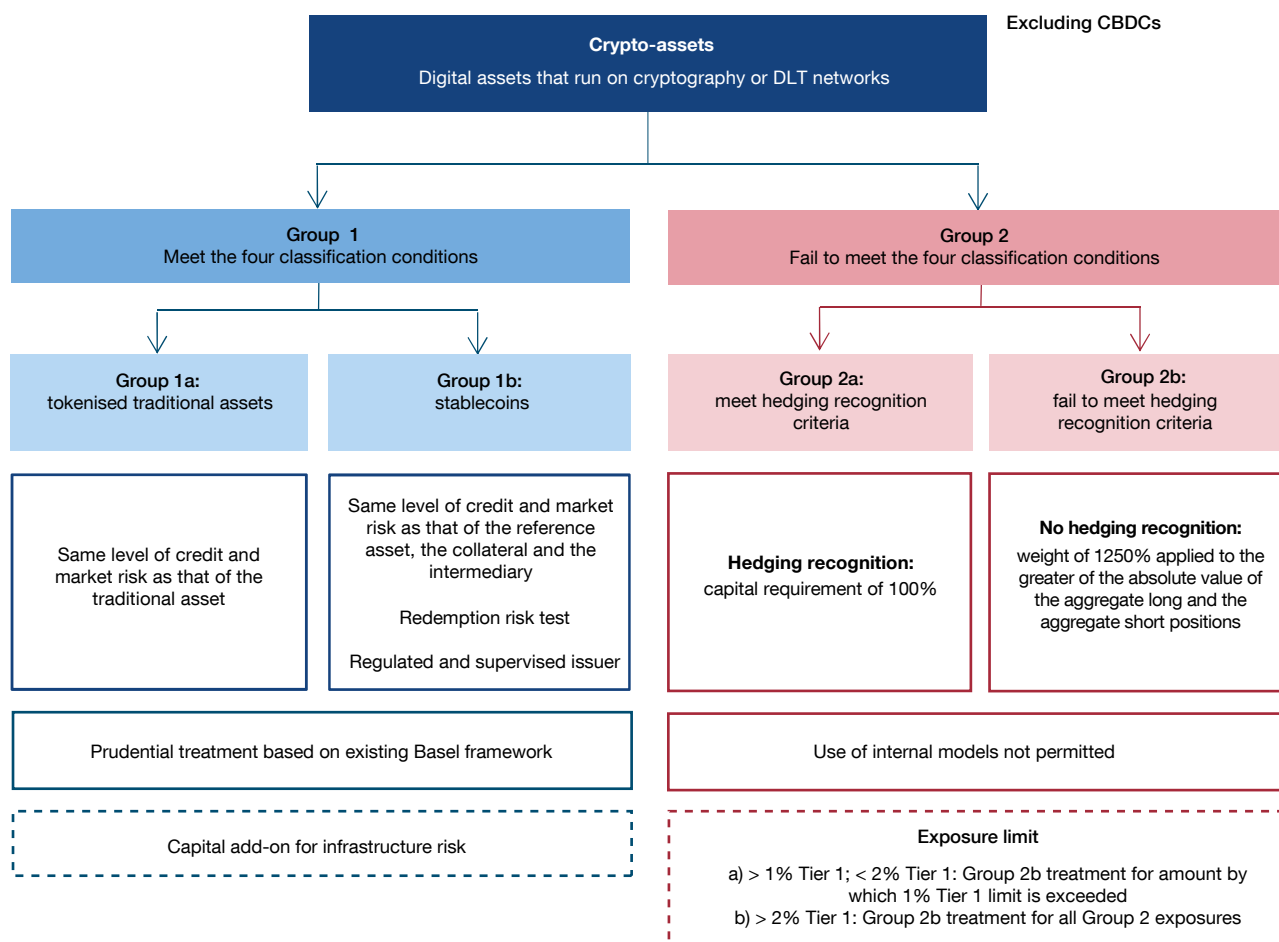
2 This standard has previously been submitted for two public consultations (summers of 2021 and 2022).

3 The Basel Committee had previously published a discussion paper on the risks stemming from these assets (BCBS, 2019a) and a public statement on their implications for supervisors and banks (BCBS, 2019b).

4 The standard defines crypto-assets as private digital assets that depend on cryptography and DLTs or similar technologies. Digital assets are digital representations of value, which can be used for payment or investment purposes or to access goods or services.

Figure 1

CRYPTO-ASSET REGULATION IN THE CURRENT INTERNATIONAL AND EUROPEAN FRAMEWORK



SOURCE: Devised by authors drawing on Banco de España (2023).

3.1 Classification conditions

The standard sets out four classification conditions which a crypto-asset must meet in full to be classified in Group 1. These conditions encompass the nature and stability of crypto-assets, the definition of the legal rights and obligations arising from crypto-assets, the security of the network on which they operate and the regulation of participants performing key functions.

Banks are responsible for assessing whether the crypto-assets to which they are exposed meet the classification conditions. Supervisors must review this assessment and may override banks’ classification decisions if they do not agree with them.

PEG VALUE AND RESERVE ASSET VALUE

Drawing a distinction between the peg value and the composition and valuation of the reserve assets is important. The former refers to the asset (or assets) to which the stablecoin's value is pegged and the redemption promise. The latter refers to the value of the assets comprising the collateral for potential redemptions.

One of the main examples of this type of stablecoin would be USDC, issued by Circle, an e-money institution subject to US regulations. USDC's value is pegged to the US dollar (USD) and its terms and conditions establish that USDC is always redeemable 1:1 for USD. To guarantee this value, Circle states that it has cash reserves and short-term US Treasury bonds for the equivalent value of USDC in circulation (USD 43.3 billion as at 26 January 2023), deposited at The Bank of New York Mellon and managed by BlackRock.¹

A distinction is generally drawn between the two values. However, this distinction is important in the case of stablecoins that are not pegged to a specific asset and the value of which is potentially stable, but linked to that of their own collateral. This latter type of crypto-asset could be deemed to function like a unit in a traditional investment fund.

Distinction between stablecoins and tokenised traditional assets: tokenised deposits

The BCBS standard accounts for the fact that in some jurisdictions certain bank-issued tokenised assets that

are backed by the general assets of the bank – and not by a pool of reserve assets – may be referred to as stablecoins. However, if they meet the classification conditions and demonstrate the same level of (credit and market) risk as traditional assets, they should be classified in Group 1a, regardless of their local name.

In any event, the BCBS acknowledges that the distinction between a stablecoin and a tokenised traditional deposit can be uncertain where issuers are banks. In addition, the classification of stablecoins pegged to a commodity (e.g. gold) and backed by the commodity itself, such as Pax Gold, can be confused between Group 1a and Group 1b.

There are, however, factors that could determine their classification into one group or another that have not been specifically incorporated into the standard. These include legal aspects and the determination of rights and obligations; the existence and segregation of a pool of reserve assets (on the balance sheet itself or held in a special purpose vehicle); and the coverage of depositor protection schemes.

This distinction has important implications for their prudential treatment, such as ineligibility as collateral for credit risk (see Section 3.3.1). In a holistic analysis, the BCBS will study over the medium term the implications of banks as stablecoin issuers.

¹ Information published by Circle on its [website](#).

Classification condition 1

This condition classifies Group 1 crypto-assets into two types: tokenised traditional assets and stablecoins.⁵ To meet this condition, tokenised traditional assets must demonstrate the same level of (credit and market) risk as their traditional form.

As regards stablecoins, the issuer must be regulated and supervised, subject to prudential capital and liquidity requirements. In addition, they must have a

⁵ Tokenised traditional assets are defined as representations of traditional assets using cryptography, DLT or similar technology to record ownership.

stabilisation mechanism that is effective at all times in linking the value of the crypto-asset to the traditional asset(s) to which it is referenced (e.g. the dollar). Algorithm-based⁶ stablecoins or those that are referenced by other crypto-assets do not meet this condition.

The effectiveness of the stabilisation mechanism is assessed through a redemption risk test. To pass this test, the reserve assets backing the crypto-asset must be sufficient to ensure full redemption for their peg value. This means that the value of the reserve assets must exceed the aggregate value of all the outstanding crypto-assets, expressed in terms of their peg value.

Additionally, there are requirements regarding the composition, valuation and management of the stablecoin reserve assets. More generally, for crypto-assets that are referenced by one or more fiat currencies, the standard requires the reserve assets to be comprised of assets with minimal market risk and credit risk, such as the expressly mentioned Level 1 high-quality liquid assets (HQLAs), and which are generally denominated in the same currency as that used for the peg value. Moreover, the value and composition of the reserve assets must be publicly disclosed on a daily and weekly basis, respectively, and be subject to an audit at least once a year.

Classification condition 2

Under this condition, all rights and obligations related to the crypto-asset must be clearly defined and legally enforceable in all the jurisdictions where it is issued and redeemed. Specifically, full transferability and settlement finality must be ensured at all times. To this end, crypto-asset arrangements must be properly documented. In the case of stablecoins, the standard requires that full redeemability be guaranteed and that redemption be completed within five calendar days of the redemption request.

Classification condition 3

This condition addresses the functions of the network on which the crypto-asset operates. All the transactions and participants must be traceable and the key functions (issuance, validation, redemption and transfer) must not pose any material risks that could impair the transferability, settlement finality or redeemability of the crypto-asset. Entities performing these functions must also follow robust risk governance and risk control policies and practices.

⁶ Crypto-assets whose stability does not depend on backing by traditional assets, but on protocols which regulate the supply to maintain their value.

Classification condition 4

Entities that execute redemptions, transfers, storage or settlement finality of the crypto-asset, or manage reserve assets, must be regulated and supervised, or subject to appropriate risk management standards and have in place and disclose a comprehensive governance framework. In particular, to meet this condition node validators must also be regulated and supervised or, alternatively, be subject to appropriate risk management standards.

3.2 Hedging recognition criteria

The standard also establishes a series of market criteria that divide Group 2 into two sub-groups (2a and 2b). Where all the criteria are met, banks may calculate the capital requirements for these crypto-assets using a specific credit risk framework and recognise a limited degree of hedging in the calculation of their exposure. Failure to meet any of these conditions would entail banks not being permitted to recognise any hedging. Under no circumstances may internal models be used for Group 2 crypto-assets.

Under these criteria, there must be regulated products that reference the underlying crypto-asset, the latter must be sufficiently liquid and sufficient market data must be available to assess it. Specifically:

- (i) The crypto-asset must be a spot where there exists at least one derivative or exchange-traded fund (ETF)/exchange-traded note (ETN) that is traded on a regulated exchange that solely references the crypto-asset, or it must be a derivative or ETF/ETN traded on a regulated exchange or, in the case of the derivative, cleared by a qualifying central counterparty.
- (ii) The bank's direct crypto-asset exposure, or the crypto-asset referenced by the derivative or ETF/ETN, must be highly liquid. In this respect, the average market capitalisation must have been at least USD 10 billion over the previous year, and the 10% trimmed mean of daily trading volume must have been at least USD 50 million over the previous year.
- (iii) There must be at least 100 price observations over the previous year and there must be sufficient data on trading volumes and market capitalisation.

With regard to the calculation of the exposure, for the crypto-assets that meet the above-mentioned conditions (Group 2a), only the regulated products described in (i) may be used to calculate the net position. The other products shall be subject to the requirements of Group 2b. In addition, only products that are traded on the same exchange or platform may be used for the purposes of offsetting.

TYPES OF DISTRIBUTED LEDGER TECHNOLOGY: PERMISSIONED OR PERMISSIONLESS, PUBLIC AND PRIVATE NETWORKS

A distributed ledger technology (DLT) is generally classified as a database managed by various participants that is subject to some level of decentralisation. Blockchains are a type of DLT, the main feature of which is that information is shared via blocks forming a sequentially ordered chain that can only be augmented and validated using hashes (Banco de España, 2022, and Romero, 2018).

Based on their degree of centralisation, they can be permissioned (where agents require authorisation from a central entity to participate as nodes in the chain) or permissionless. In addition, networks can be public or private, depending on how participants access them. Public networks are open to all, while private ones require an invite, which restricts access to a certain number of participants.

Therefore, permissionless networks are essentially public, fully decentralised networks that can be accessed by anyone. Meanwhile, within permissioned networks (some centralisation), there can be public networks (unrestricted access to information, albeit requiring authorisation to participate as a node) and private networks (an invitation is required to both participate and access information). In all permissioned networks there is some degree of participant identification, although this

may be aimed exclusively at participating nodes (public networks) or at any agent accessing information (private networks).

The different degrees of dispersion and regulation and supervision of the node validators give rise to the DLT trilemma (decentralisation, scalability¹ and security), where maximising one aspect detracts from the opposite vertex. Thus, permissionless networks are more scalable and decentralised, whereas permissioned networks sacrifice scalability in the name of an appropriate degree of security.

A critical aspect of the classification conditions established in the standard is the requirement for all participants to be regulated and supervised, which entails knowing their identity, including node validators (Classification condition 4). In this respect, although the standard does not explicitly state as such, using permissionless networks (where participant identification is not an inherent characteristic) would in practice mean that the crypto-assets transacted on them – including those tokenised traditional assets that meet the other three conditions – would be classified in Group 2.

This aspect is included among the elements subject to specific monitoring and review (see Section 3.6).

¹ The network's ability to adapt to increases in demand, processing a higher number of transactions per second while continuing to operate smoothly.

3.3 Prudential treatment

3.3.1 Group 1 - Treatment for credit and market risk

In general, tokenised traditional assets that meet all the classification conditions (Group 1a) shall be subject to requirements comparable to the traditional (non-tokenised) form of the asset. However, the Basel standard acknowledges the existence of particularities that should be assessed on the basis of the characteristics of the crypto-asset itself and that may distinguish it from its traditional form.

In the case of stablecoins that meet all the classification conditions (Group 1b), the standard takes into account these instruments' unique aspects. Specifically,

CAPITAL REQUIREMENTS APPLICABLE TO A STABLECOIN

There is more than one model for issuing a stablecoin. With this in mind, the prudential treatment will depend on the stablecoin’s structure and, in particular, against whom and under what circumstances a credit institution may exercise its right to redeem.

Where the bank transacts directly with the redeemer, the investment will be subject to the risk arising from: (i) impairment of the reserve assets, or default on the inherent payment obligations (e.g. default on bond coupons); and (ii) default by the redeemer. The latter shall not apply if the reserve assets are held in a separate institution, or a special purpose vehicle, and are effectively bankruptcy remote.

Based on the above, the calculation of the risk-weighted assets (RWAs) will be the result of applying and adding to the value of the direct exposure to the crypto-asset (i) the risk weight corresponding to the direct holding of the reserve assets (which will depend on factors such as asset type and currency); and (ii) the risk weight corresponding to an unsecured exposure to the redeemer. Where the reserve assets comprise a pool of financial assets, banks should apply the treatment for equity investments in funds.

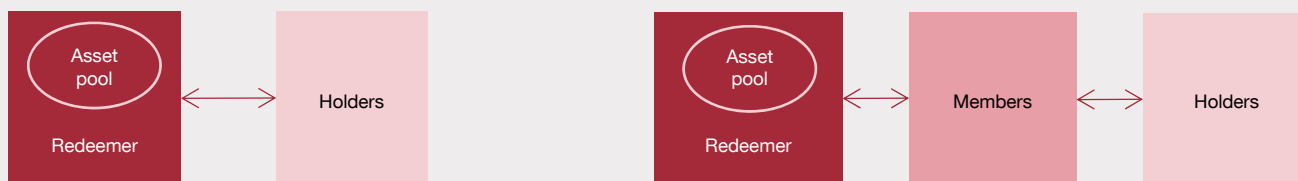
If, by contrast, the credit institution does not transact directly with the redeemer and the transactions are instead conducted through an intermediary, the prudential treatment will depend on whether or not the intermediary has committed to purchase crypto-assets from all non-member holders in unlimited amounts.

Thus, if the intermediary has not committed to purchase crypto-assets, the bank will be exposed to the above-mentioned risks (risk arising from the reserve assets and from default by the redeemer) and, in addition, to the credit risk of all the members that transact directly with the redeemer. The calculation of the RWAs must take into account all these sources of risk.

If, by contrast, the intermediary has committed to purchase crypto-assets in an unlimited amount, the bank will be exposed to the credit risk of the member(s) who has (have) committed to buy and to the risk arising from the changing value of the reserve assets and the risk that the redeemer defaults. The risk weight to be used should be the risk weight that would be applicable to the member with the highest credit rating (i.e. lowest risk weight).

In those cases where it is the credit institution itself that acts as an intermediary and therefore undertakes to buy crypto-assets from other investors at a predetermined price, the calculation of the RWAs must include this undertaking to pay. Specifically, the calculation shall include the total value of all the crypto-assets that the bank could be obliged to purchase multiplied by the risk weight applicable to an unsecured exposure to the redeemer. This treatment shall also apply where the bank is not legally obliged to buy crypto-assets, but it is understood that, in the event of redeemer bankruptcy, the bank would step in and purchase them (e.g. as a means of preventing an increase in reputation risk).

Figure 1
CAPITAL REQUIREMENTS APPLICABLE TO A STABLECOIN



SOURCE: BCBS (2021b).

not only does the calculation of credit risk requirements factor in the risk associated with the issuer, but it also considers the risk associated with the reference asset, the collateral, the redeemer and any other intermediary involved. Internal models can be used to calculate requirements for Group 1 crypto-assets.

Only Group 1a crypto-assets that are tokenised versions of the traditional assets listed as eligible collateral can be considered collateral for the purposes of credit risk mitigation (CRM). Consequently, in the case of stablecoins, the standard acknowledges the increase in counterparty risk associated with redemption and does not consider them eligible as collateral.

The treatment for market risk is equivalent to that for credit risk and also applies a look-through approach. The standard does not establish different treatments for Groups 1a and 1b, as in both cases the treatment depends on the traditional asset backing them, either the underlying asset or the collateral. The standard includes the possibility of calculating requirements using the internal models approach (IMA), the standardised approach (SA) or the simplified standardised approach (SSA).

Under both the IMA and the SA, the calculation should be decomposed into the same risk factors and sensitivities as the traditional asset the Group 1 crypto-asset digitally represents.⁷ In the case of the standardised approach, the same risk classes as those related to the traditional assets that the tokenised assets digitally represent shall be applied.⁸ Meanwhile, the IMA specifies that the tokenised assets and the traditional assets that they represent shall be considered separately in the calculation of loss given default.

For Group 1 crypto-assets, the calculation of counterparty credit risk (CCR) and, in the case of derivatives, credit valuation adjustment (CVA) risk follows the same rules as the traditional assets. However, in the case of Group 1a crypto-assets, the standard clarifies that differences in liquidity between the traditional and the tokenised asset should be taken into account. The internal models method (IMM) is therefore permitted for the calculation of CCR.

3.3.2 Group 2 - Treatment for credit and market risk

The standard specifies that Group 2 crypto-assets should be treated in accordance with the rules proposed in the standard for market risk and does not envisage the possibility of recognising them for credit risk. Under no circumstances is the IMM permitted.

Broadly speaking, Group 2 crypto-assets that meet the hedging recognition criteria shall be classified in Group 2a and the capital requirement shall amount to 100% of the net exposure – between the aggregate of the long and short positions – for each type of crypto-asset. A new risk class is created for the

7 This includes the gross jump-to-default in the calculation of the default risk capital.

8 In other words, interest rate risk, position risk, settlement risk and commodity risk.

SA (and the SSA) market risk requirements in Group 2a crypto-assets. Also, under the SSA,⁹ coverage is limited to 65% of the smaller of the absolute value of the long position and the absolute value of the short position.

This new class includes new specifications of delta, vega and curvature risk factors. In addition, a new bucket structure is introduced for each crypto-asset, with their respective sensitivities, calculated on the basis of market prices, exchanges – to calculate the delta – and times to maturity.

Use of the standardised approach for counterparty credit risk (SA-CCR) is permitted for Group 2a crypto-assets. However, the standard establishes a series of amendments to the calculation of replacement cost and the potential future exposure add-on, where a new risk class is also created.

In the case of Group 2b crypto-assets, positions may not be offset in the calculation of RWAs and a weight of 1250% must be applied to the greater of the absolute value of aggregate long positions and the absolute value of aggregate short positions. Therefore, the new market risk framework is not applied to these crypto-assets and there are no crypto-asset specific rules for applying the CVA.

3.3.3 Treatment for liquidity risk

Unlike credit and market risk requirements, the treatment for liquidity risk does not depend on meeting the classification conditions. Instead of differentiating between the aforementioned Groups 1 and 2, the treatment for liquidity risk distinguishes between i) crypto-assets representing claims on banks; ii) stablecoins; and iii) other types of crypto-assets. In addition, the treatment for liquidity risk is, by its very nature, the only risk addressed by the standard from both an asset and a liability (banks as issuers) standpoint.¹⁰

In general terms, the liquidity risk requirements are the result of the current liquidity risk framework being applied to each crypto-asset's specific characteristics.¹¹ Traditional tokenised assets may be considered as HQLAs if both the tokenised financial asset (e.g. a corporate bond issued using DLT) and the underlying asset in its traditional form are eligible for consideration as HQLAs.¹² Crypto-assets classified as Group 1b or Group 2 must not be considered as HQLAs.

9 Under the SSA, the new specifications are limited to applying a scaling factor of 1 and to using $\pm 100\%$ for the underlying price change and $\pm 100\%$ for the relative volatility change.

10 As part of its medium-term work programme, the BCBS intends to carry out a more wide-ranging analysis of the implications of banks as crypto-asset issuers (see Section 3.6).

11 This is principally reflected in the calculation and fulfilment of the liquidity coverage ratio and the net stable funding ratio.

12 As a result, a crypto-asset may be ineligible as HQLAs despite the eligibility of the underlying traditional asset.

For the purposes of calculating the liquidity coverage ratio (LCR) and net stable funding ratio (NSFR), Group 1a tokenised claims on regulated and supervised banks will be treated as “unsecured funding instruments”. To that end, they must i) represent a legally binding claim on the bank; ii) be redeemable in fiat currency at par value; and iii) have a stable value supported by the creditworthiness and asset-liability profile of the issuing bank.¹³ The issuing bank cannot treat liabilities associated with their crypto-assets as stable retail deposits, since it is understood that crypto-assets are usually less stable than a traditional retail deposit.

For their part, stablecoins, whether classified as Group 1b or Group 2, can be treated as financial assets when calculating the LCR and NSFR. In that case, they must be fully collateralised by a segregated pool of underlying assets that do not count towards the bank’s stock of HQLAs and must be subject to some additional considerations.¹⁴

Finally, for other Group 2 crypto-assets, the standard takes a conservative approach with some additional considerations for direct exposures.¹⁵ The standard does not enter into considerations of derivatives, collateral or off-balance sheet exposures, which, without further discussion, are to be treated as non-HQLA instruments.

3.3.4 Infrastructure risk add-on

The standard stipulates that authorities may apply an add-on to the capital requirement for exposures to Group 1 crypto-assets to cover potential risks arising from the (relatively new) technological infrastructure underlying all crypto-assets. This tool does not apply to Group 2 crypto-assets, which are already subject to conservative treatment in line with their high risk profile.

The add-on will initially be set at zero, but it can be increased by authorities based on any observed weakness in the technological infrastructure used by crypto-assets in Group 1.

This tool can be thought of as equivalent to the operational risk requirements that are applicable to banks’ crypto-asset activities. However, it is important to

13 In this case, bank-issued tokenised assets that are backed by the general assets of the bank are considered more liquid than those backed by an external pool of reserve assets (see Box 1).

14 Assets are subject to an 85% required stable funding (RSF) factor in the NSFR and must not result in inflows under the LCR (unless the asset is redeemable for fiat currency within a 30-day period). For liabilities, a 0%-50% weighting is established for the available stable funding (ASF) factor in the NSFR, based on the instrument type. The issuing bank must recognise 100% outflows in the LCR if the stablecoin is redeemable within 30 days.

15 Assets are given a 100% weight for the NSFR RSF factor and no inflows are recognised in the LCR. Liabilities are assigned a weight of 0% for the NSFR ASF factor and an outflow weight of 100% in the LCR if redeemable within 30 days.

distinguish between risks arising from the network specific to a crypto-asset (infrastructure risk is intended to address these risks) and banks' operational risk.

3.3.5 Exposure limit

Group 2 crypto-asset exposures – both direct and indirect – are subject to an aggregate exposure limit. Total exposure to Group 2 crypto-assets should not generally be higher than 1% of the bank's Tier 1 capital and must not exceed 2% of the bank's Tier 1 capital.

The methodology to calculate exposure for the purposes of the limit is the same as that used to calculate Group 2b exposures. That is, exposures to all Group 2 crypto-assets (Group 2a and Group 2b) must be measured using the higher of the absolute value of the long and short exposures in each separate crypto-asset to which the bank is exposed. Derivative exposures must be measured using a delta-equivalent methodology.

Exposures in excess of the 1% of Tier 1 capital threshold will be subject to the capital requirements that apply to Group 2b crypto-asset exposures. Any breach must be communicated immediately to the supervisor and must be rapidly rectified. If total exposure breaches 2% of the bank's Tier 1 capital, all Group 2 exposures will be subject to the capital requirements that apply to Group 2b crypto-asset exposures. In other words, the bank may not net long and short derivative positions when calculating its exposures that are in excess of the 1% limit – or for all Group 2 exposures if the 2% of Tier 1 capital is breached.

In practice, this system of thresholds will affect banks with exposures to Group 2a crypto-assets. If the bank only has exposures to Group 2b crypto-assets, the only restriction for reaching the limit of 2% of Tier 1 capital is an obligation to inform the supervisor of the breach and attempt to restore compliance as soon as possible.

3.4 Internal risk management

In addition to the quantitative requirements, the standard requires banks with exposures to crypto-assets to have policies and procedures in place to identify, evaluate and mitigate potential risks ex ante, based on current standards on operational risk management. Any decision to invest in crypto-assets must be consistent with the bank's risk appetite and strategic objectives.

Likewise, a sound risk management approach must be in place, including limits and hedging strategies and clearly assigned risk management

responsibilities. Further, the supervisor must be informed of the policies, procedures, risk assessment results and mitigation measures in place, as well as actual and planned exposures to crypto-assets.

The standard highlights a series of specific risks: i) crypto-asset technology risk (e.g. network stability, network design and type, node trustworthiness); ii) information, communication and technology and cyber risk; iii) legal risk (e.g. accounting, ownership, disclosure and consumer protection and uncertainty regarding legal status); iv) money laundering and financing of terrorism; and v) valuation risk.

3.5 Supervisory review

The standard also affirms the importance of the supervisory role, given the nature and rapid evolution of crypto-assets. In particular, it urges the competent authorities to review the appropriateness of banks' policies and procedures for identifying and assessing risks and require banks to address any deficiencies. Similarly, the standard specifically mentions that supervisors may recommend that banks undertake stress testing or scenario analysis to assess risks resulting from crypto-asset exposures.

The process of classifying crypto-assets into the aforementioned categories (Group 1a, 1b, 2a and 2b) does not require the supervisor's specific approval, but rather is the competence of each bank (which must notify the supervisor, ideally in advance of the implementation date). However, the supervisor is responsible for reviewing banks' classification decisions and may override a decision if they disagree with a bank's assessment. Analyses undertaken in other jurisdictions or by independent experts may, where necessary, be used as the basis for such a step.

3.6 Elements subject to refinement and clarification

The standard must be implemented by member jurisdictions by 1 January 2025. However, the BCBS recognises that there are some issues that will require ongoing review in the years to come and the standard may be revised in consequence, if justified by analyses and monitoring. In the document accompanying the standard, five specific points are highlighted.

- (i) Statistical tests and redemption risk test: further study will be performed into the existence of tests that can reliably identify low-risk stablecoins. The need for new specific requirements for the composition of reserve assets will also be considered.

- (ii) Permissionless blockchains: the risks posed by crypto-assets that use permissionless blockchains will remain under review, as will whether these risks can be sufficiently mitigated to allow for their inclusion in Group 1.
- (iii) Eligibility of Group 1b crypto-assets as CRM collateral: their inclusion will be reviewed if certain conditions are met.
- (iv) Group 2a hedge recognition: current thresholds and the degree of hedge recognition permitted under the current conditions will be monitored.
- (v) Calibration of the Group 2 exposure limit: the effectiveness and appropriateness of the current thresholds will be reassessed.

In addition, the BCBS work programme for 2023-24 notes the need to carry out a thorough, big-picture analysis of the implications of banks as crypto-asset issuers and assess banks' risk management practices in their role as custodians of crypto-assets. Likewise, the standard itself identifies the need to give further consideration to the prudential and financial stability implications of central bank digital currencies as they are issued.

4 Conclusions

Crypto-assets and their associated risks and opportunities have become an area of both interest and concern for domestic and international authorities. Recent crypto-asset market instability warrants the regulatory activity in this field in recent years.

A draft regulation on markets in crypto-assets (MiCA) was recently published in Europe. This initiative is part of a larger digital finance package aiming to adapt the EU to the digital age.

Specifically, MiCA sets out a regulatory framework for crypto-assets, such as EMTs, that currently lie outside the scope of EU legislation on financial services. Intended to ground these instruments in a sound legal framework, MiCA includes, in broad terms, requirements for token issuance and trading, authorisation and supervision of both issuers and service providers (for example, crypto-asset portfolio custody, advisory and management services), and sets out requirements to protect investors and customers of such services.

For its part, and in line with its mandate, the BCBS has focused its efforts on prudential regulation of banks' exposures to crypto-assets. Specifically, it has

chosen to issue a separate standard, rather than amending the standards for each risk type (for example, credit risk) to the specific case of crypto-assets.

The treatment proposed by the BCBS is based on classification conditions that sort crypto-assets into groups and sub-groups to identify the appropriate prudential treatment. The BCBS thereby acknowledges that not all crypto-assets entail the same risk. It also includes two new tools tailored to the unique nature of crypto-assets: the Group 1 infrastructure risk add-on (intended to take account of potential weaknesses in the technology underlying crypto-assets) and the Group 2 exposure limit (if no issuer could be identified for a Group 2 crypto-asset, they would have fallen outside the scope of the large exposures requirement).

The regulatory developments set out in this article represent a further step forward in the handling of this new type of asset. There is more work to be done in both cases. In Europe, the EBA and the ESMA are expected to develop a series of implementing rules to give effect to MiCA provisions. In the case of the Basel Committee, the standard reflects the ever-changing nature of crypto-assets by including a list of aspects requiring further analysis and monitoring.

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THE EUROPEAN CENTRAL BANK AND FINANCIAL STABILITY: A QUARTER OF A CENTURY OF EVOLUTION AND TRANSFORMATION (1998-2023)

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Abstract

This article examines the evolution of the mandate and tasks of the European Central Bank (ECB) in the field of financial stability since its establishment in 1998. Over this period, the significance of the ECB's financial stability function has increased markedly, in parallel with the growth of macroprudential policy and driven by the institutional reforms stemming from the creation of the European Systemic Risk Board in 2010 and the start of the Single Supervisory Mechanism (SSM) in 2014. To carry out its tasks, the ECB has a Financial Stability Committee, which is made up of representatives of the central banks and banking supervisory authorities of the SSM area – including the Banco de España – , that acts as an internal forum for the ECB's governing bodies to prepare issues relating to the analysis of risks and vulnerabilities and national macroprudential policies in the banking union. Lastly, an overview is provided of the main ECB publications and public interventions in this field.

Key words: macroprudential policy, systemic risk, financial stability, institutions.

1 Introduction

Modern central banks have increasingly oriented their activities towards safeguarding the stability of the financial system in the face of crises and adversity. As authorities endowed with the privilege of issuing currency and as lenders of last resort, over time central banks have played a key and irreplaceable role in ensuring the proper functioning of the financial system and the economy. Historically, the mandate, objectives and functions of central banks around the world have evolved significantly in line with economic, financial, political and social developments and advancement. In this process, and based on the premise that price stability and financial stability are mutually supportive, the latter has gradually been explicitly enshrined as an objective in the basic legislation of these bodies¹, often linked – in many, but not all, jurisdictions – to the function of supervising the solvency of financial institutions.

The European Central Bank (ECB), which celebrates its first 25 years of operations in 2023, has a significant financial stability mandate in the European

1 By way of example, in the case of Spain, Article 7.5 of Law 13/1994 of 1 June 1994 on the Autonomy of the Banco de España stipulates that the Banco de España shall exercise the function of "promoting the smooth functioning and stability of the financial system". Subsequently, Law 10/2014 of 26 June 2014 designated the Banco de España as the authority responsible for the formulation, adoption, implementation and oversight of macroprudential measures applicable to credit institutions in Spain.

Union (EU). The ECB, which since 1998 stands as one of the seven EU institutions², has since its foundation been assigned the duty to contribute – through the European System of Central Banks (ESCB)³ “to the smooth conduct of policies pursued by [national] competent authorities relating to [...] the stability of the financial system”⁴. In connection with this task, the Statutes of the ESCB and of the ECB provide for a specific advisory task: “The ECB may offer advice to and be consulted by the Council, the Commission and the competent authorities of the Member States on the scope and implementation of Community legislation relating to the prudential supervision of credit institutions and to the stability of the financial system”⁵.

The notion of “financial stability” lacks a commonly accepted definition, and its interpretation differs depending on the context in which it is employed.

Thus, the ECB has traditionally promoted in its financial stability reports⁶ the definition of “a condition in which the financial system – which comprises financial intermediaries, markets and market infrastructures – is capable of withstanding shocks and the unravelling of financial imbalances. This mitigates the prospect of disruptions in the financial intermediation process that are severe enough to adversely impact real economic activity”. Other central banks may define it slightly differently⁷ to underline that the maintenance of financial stability can be seen as the absence of instability events, in the form of periods of crisis or episodes of stress. Ultimately, as the ECB points out, financial stability is “all about balance”⁸.

Consequently, there is no single benchmark indicator available to provide an informative and reliable summary regarding the (un)stable nature of the financial system.⁹ This makes the analysis of financial stability decidedly difficult and means that any assessment thereof calls for a wide range of information (both quantitative and qualitative) to be able to monitor cyclical and structural developments in financial markets, their main participants and, in general, the macro-financial context. This analysis is often disclosed by central banks as a descriptive and narrowly focused account of the predominant risks and vulnerabilities to the stability of the financial system.

Risks to financial stability can have a wide variety of origins and take on different forms. For example, as the ECB notes on its website, a general economic

2 Article 13 of the Treaty on European Union (TEU).

3 The ESCB is made up of the ECB and the national central banks of the EU Member States.

4 Article 127.5 of the Treaty on the Functioning of the European Union (TFEU).

5 Article 25.1 of the Protocol on the Statutes of the ESCB and of the ECB (annexed to the TEU and to the TFEU).

6 See, for example, the Foreword of the *ECB Financial Stability Review* of November 2019.

7 Similarly, the Banco de España defines on its website that a stable financial system is one that “will be able to absorb the impact of shocks and the materialisation of risks without the financial intermediation process being adversely affected and further damage being inflicted on economic activity”.

8 “Spotlight on financial stability”, 24 May 2016 (website content of the ECB).

9 In contrast to other economic concepts such as “price stability” (for which metrics based on widely used consumer price indices are available).

slowdown raises the level of indebtedness of homeowners and causes their properties to fall in value, while the lenders who financed their mortgages may find customers without sufficient means to repay their debts¹⁰. This increase in default as regards banks' loan portfolios erodes their solvency, with a consequent adverse impact on their ability to finance new projects for households and businesses.

To safeguard financial stability, macroprudential policy has been established and developed in recent years. One of the lessons of the 2008 global financial crisis (GFC) was the need to complement the traditional microprudential supervisory approach – based on the stability and resilience of individual institutions (a necessary, but not sufficient, condition for maintaining financial stability) – with a new set of tools that banking authorities could aim towards strengthening the solvency of the financial system as a whole (or significant portions of it).

The aim of macroprudential policy is twofold. First, to contribute preventively to checking the development of risks that could be systemic in nature – i.e. affect the whole of a country's banking system – and, further, to strengthen the solvency (resilience) of institutions in order to mitigate the negative effects arising from the possible manifestation of such risks. In other words, a primary objective of macroprudential policy is to address systemic risks that evolve over the credit cycle (time dimension); for example, in a situation of credit growth that is branded exuberant or unsustainable, macroprudential policy would seek both to curb this growth path and to strengthen the financial system so that it is better able to absorb any losses that could be generated. The other objective of macroprudential policy is linked to its structural (cross-sectional) dimension, which has to do with the impact on systemic risk arising from the size, complexity and interconnectedness of banks¹¹. With this second objective, macroprudential policy aims to ensure that the most systemically important institutions internalise the impact that their decisions have on other institutions and the economy as a whole. This aspect is another lesson from the GFC, when certain strongly interconnected institutions collectively had a major impact on the development of this crisis.

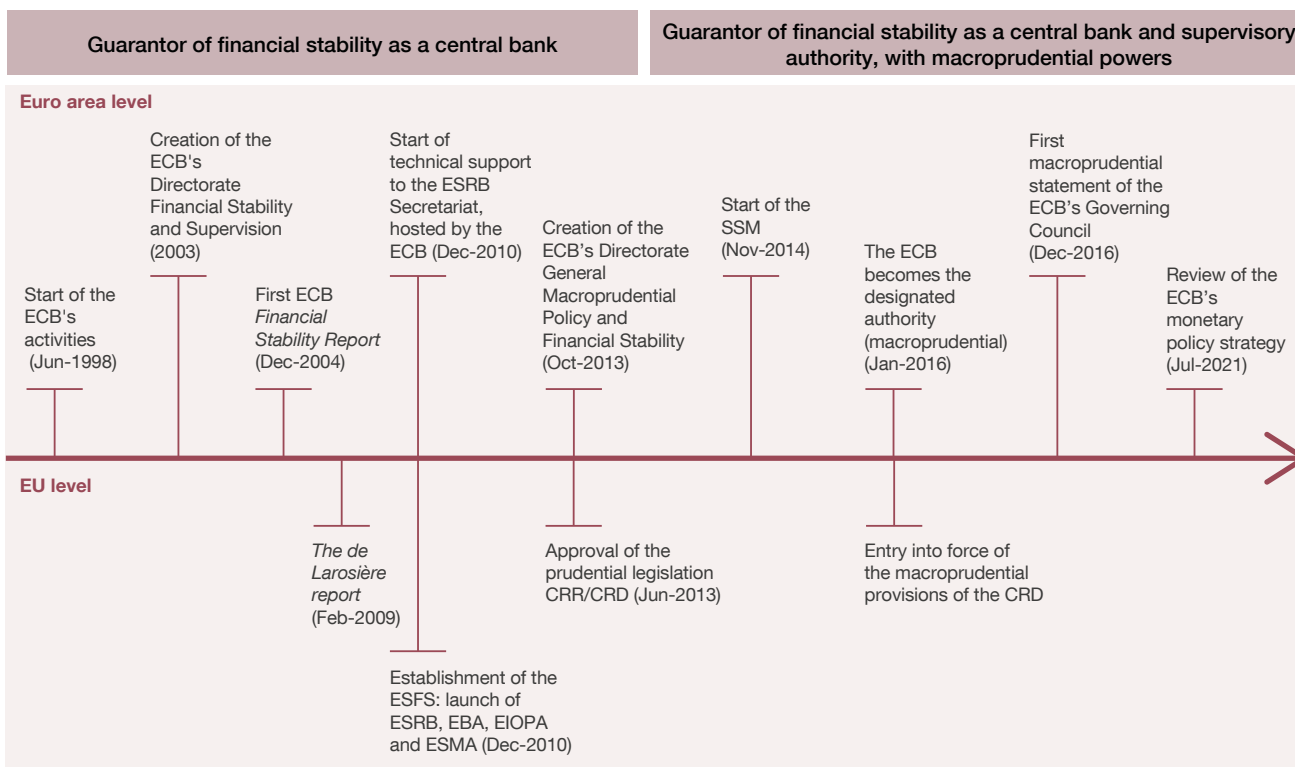
Macroprudential policy is articulated through various instruments or tools to prevent financial stability risks and vulnerabilities from increasing and spreading to the rest of the financial system¹². On the one hand, there are capital buffers, such as the countercyclical capital buffer (CCyB) and capital buffers for systemically important institutions, which are calibrated by macroprudential authorities and serve to increase institutions' own funds available to absorb potential losses. Also, in certain countries, use is also made of so-called “borrower-based measures”, that condition the maximum amount of a loan granted by a bank

10 They will also have to set aside more provisions because of falling house prices and lower collateral coverage, even in the event that customers do not default.

11 Mencía and Saurina (2016).

12 Estrada and Mencía (2021).

MILESTONES IN THE DEVELOPMENT OF THE ECB'S FINANCIAL STABILITY AND MACROPRUDENTIAL POLICY FUNCTION



SOURCE: Banco de España.

depending, for example, on the collateral provided or the income of the loan applicant, or the maximum term of the transaction. The introduction of macroprudential policy is a relatively recent phenomenon, made possible by the far-reaching regulatory changes agreed upon at global level (since 2010, in the context of the Basel III framework) and at EU level (since 2014) and developed and implemented by national legislators¹³.

The ECB monitors risk factors and vulnerabilities affecting the euro area financial system and reports on possible national macroprudential policy actions in the banking sector. As illustrated in Schema 1 and explained in this article, the ECB's financial stability function has evolved over the past decade as a result of two deep institutional changes stemming from the GFC and the ensuing sovereign debt crisis: i) the creation in 2010 of the European Systemic Risk Board (ESRB), which is hosted and chaired by the ECB; and ii) the establishment in 2014 of the Single Supervisory Mechanism (SSM), which entailed the attribution to the ECB of prudential supervisory powers – including macroprudential policy tasks – in all countries of the banking union¹⁴.

13 Hernández de Cos (2021).

14 At the time of writing, the banking union consists of the 20 euro area Member States and Bulgaria (which joined voluntarily).

2 The European Central Bank and the establishment of the European Systemic Risk Board

The 2008 GFC triggered an exhaustive reform of financial regulation and supervision globally and in Europe, with major implications for the design of the institutional framework¹⁵. The GFC underscored the inadequacy of the traditional purely microprudential supervisory framework (focusing on the solvency of individual institutions) to ensure financial stability, and also prompted a rethink of central bank governance in this area¹⁶. It was therefore necessary to develop mechanisms to enhance the monitoring of the financial system as a whole, as well as the national and international interconnections between its constituent parts. In the years following the GFC, the EU and Member States undertook reforms of their institutional architecture in order to: i) shore up cooperation between authorities with mandates in the area of financial system stability, regulation and oversight, usually divided between the central bank and a variable number – depending on the country – of financial supervisory authorities (banking, securities markets, insurance and pension funds), and ii) formalise the allocation of macroprudential policy responsibilities. In this context, the EU established the ESRB in 2010 following a recommendation made in a consultative report prepared by the High-Level Group on EU Financial Supervision, chaired by Jacques de Larosière.

The *de Larosière Report*, published in February 2009, proposed strengthening the ECB's financial stability function with the creation of a European Systemic Risk Council¹⁷. The report called for the ECB to become more involved in the macroprudential oversight of the European banking sector and recognised that for the ECB/ESCB to effectively fulfil their financial stability role, it was necessary to endow them with a formal mandate to assess macro-financial risks and, if necessary, to issue macroprudential warnings. The de Larosière Group emphasised the unique position of the ECB, at the head of the ESCB, to carry out these tasks, in close cooperation with national authorities¹⁸. For this reason, the de Larosière Group recommended the creation of a European Systemic Risk Council within the ECB with the task of promoting financial stability and mitigating negative impacts on the internal market and the real economy of the EU. The new body should be chaired by the head of the ECB and logistically supported by it.

15 Rodríguez Rico, Corcóstegui and Vendrell Simón (2020).

16 Bank for International Settlements (2011).

17 See The de Larosière Group (2009) and a summary thereof in Field and Pérez (2009).

18 The ECB, as part of the Eurosystem and in cooperation with the FSC of the ESCB, monitored financial stability risks and assessed the resilience of the euro area financial system. During this period, the focus was placed on credit institutions, which were the main financial intermediaries. However, it also monitored other financial institutions and other non-financial sectors which were considered to be closely related to the banking sector in their intermediation function.

Remaining faithful to the proposal of the de Larosière Group, the EU co-legislators agreed in November 2010 to establish the ESRB¹⁹. In Regulation (EU) No 1092/2010, the EU Council considered that the ECB and national central banks should have “a leading role in macroprudential oversight because of their expertise and their existing responsibilities in the area of financial stability”. It was also envisaged that the ECB should provide “analytical, statistical, administrative and logistical support” to the new body, with technical support and advice coming from central banks and national supervisory authorities. This support was to entail the establishment of the ESRB Secretariat at the ECB²⁰ – Regulation (EU) No 1096/2010 – and the periodic provision of non-confidential statistical information (under a Memorandum of Understanding signed by the ECB and the ESRB in 2013). From its inception, the President of the ECB would chair the ESRB and the Vice-President of the ECB would be a voting member on the ESRB General Board. The support provided by the ECB to the ESRB should be without prejudice to the principle of the independence of the ECB in the performance of the tasks pursuant to the TFEU.

The establishment of the ESRB has made it easier for the ECB to extend its financial stability function. Among other matters, with the launch of the ESRB in 2010, the ECB has been involved in work and discussions on a variety of issues which, in addition to macro-economic and banking issues, affect the stability of the EU financial system. The ESRB also facilitates the ECB’s regular contact and institutional relations with a wide range of national prudential authorities, including securities markets, insurance and pension fund supervisory authorities – both in the euro area and in other EU/EEA countries – with which it does not coincide at other fora and committees at the European or global level. The ECB has fostered ongoing coordination with the ESRB through its Financial Stability Committee (FSC), as explained below.

3 The European Central Bank as a macroprudential authority in the Single Supervisory Mechanism

The establishment of the SSM in 2013 was motivated by financial stability. The euro area sovereign debt crisis of 2011-2012 – aggravated by the so-called sovereign-bank nexus –²¹ highlighted the fragmentation of the financial sector as a threat to the integrity of the euro and the EU’s internal market. Against this backdrop, between 2012 and 2013 EU leaders agreed to intensify the integration of banking supervision in the euro area in order to restore financial stability and lay the foundations for

19 Gutiérrez de Rozas (2022) provides a detailed account of the organisation, work and publications of the ESRB in its first decade of activity.

20 Following, therefore, an organisational model similar to that of the global committees hosted at the Bank for International Settlements in Basel.

21 For an analysis of the timing and associated risk channels, see [Box 2.3](#) of the *Financial Stability Report*, autumn 2021, Banco de España.

economic recovery. To this end, it was decided to confer specific tasks on the ECB with regard to the prudential supervision of banks in order to contribute to their resilience and soundness, and thus to the stability of the financial system of the EU and its Member States²².

The TFEU already provided for the possibility of entrusting the ECB with supervisory tasks over financial institutions²³. Through Regulation (EU) No 1024/2013 (SSM Regulation), the Council made use of this option under the TFEU to confer specific tasks on the ECB in respect of policies relating to the prudential supervision of credit institutions²⁴, although the ECB's governance structure is separate from its monetary governance structure to avoid potential conflicts of interest. The regulatory text appreciated that, "as the euro area's central bank with extensive expertise in macroeconomic and financial stability issues, the ECB is well placed to carry out clearly defined supervisory tasks with a focus on protecting the stability of the financial system of the Union". This decision was also influenced by the fact that in most Member States – as well as in other jurisdictions in the rest of the world – central banks were already responsible for banking supervision²⁵.

The new responsibilities conferred on the ECB in the SSM Regulation also include macroprudential policy tasks. The SSM Regulation acknowledged that "The ECB's tasks should include measures taken in pursuance of macroprudential stability, subject to specific arrangements reflecting the role of national authorities". To this end, and to ensure coordination within the SSM, an advanced notification obligation was stipulated for the relevant national authorities to inform the ECB of those macroprudential instrument measures that they intend to adopt in respect of credit institutions²⁶, as well as the ECB's power to – on reasoned grounds of systemic risk – impose stricter requirements (top up) than those applied by national authorities (Art. 5 SSM Regulation)²⁷.

The SSM thus configures the ECB as an asymmetric macroprudential authority. While national authorities can introduce, recalibrate (upwards or downwards) or terminate a macroprudential measure, the ECB can introduce or tighten (but not relax or unwind) a macroprudential measure in a Member State. This peculiar set-up

22 In this case, the advice of the de Larosière Group went unheeded, as in its 2009 report it ruled out a SSM linked to the ECB: "While the Group supports an extended role for the ECB in macro-prudential oversight, it does not support any role for the ECB for micro-prudential supervision." The proposal for microprudential supervision was based on an integrated network of supervisors – the European System of Financial Supervision (ESFS) – consisting of national supervisory authorities, the European Banking Authority, the European Securities and Markets Authority, and the European Insurance and Occupational Pensions Authority.

23 With the exception of insurance undertakings (Art. 127.6 of the TFEU).

24 For further information on the origin, organisation and operation of the SSM, see Torres (2015).

25 As is the case of the Banco de España in Spain.

26 Without a distinction between significant institutions (subject to direct microprudential supervision by the ECB) and less significant institutions (supervised directly by national authorities and indirectly by the ECB).

27 Detail on the practical operationalisation of these tasks is set out in Regulation (EU) No 468/2014 (SSM Framework Regulation).

– which sets the ECB apart from any other authority in Europe or the rest of the world – is explained by the need to reconcile the aims of: i) maintaining the regular exercise of macroprudential policy at the national level (albeit on a common regulatory basis at the EU level); ii) endowing the ECB with powers to offset possible biases of inaction by national authorities; and iii) enhancing the ECB’s role in conducting analysis on cross-border effects and disseminating best practices, thereby increasing the coordination and consistency of national macroprudential policies²⁸.

The ECB’s scope of action is also limited in terms of the raft of macroprudential instruments under its control. Macroprudential instruments subject to ECB scrutiny include the CCyB, the buffers for institutions identified as systemically important, the systemic risk buffer and other macroprudential own funds instruments provided for in the Community directive and regulation on capital requirements for credit institutions²⁹. The ECB’s macroprudential mandate does not cover national measures on macroprudential instruments for which the legal basis is not contained in Union legal acts, as is the case, for example, of measures on limits on the terms and conditions on lending (currently developed exclusively in national legislation, at the discretion of the Member States)³⁰.

When performing its macroprudential tasks, the ECB has consistently assessed notifications of new measures submitted by national authorities. In particular, since 2016 – when most of the macroprudential instruments of the CRD were first implemented – ECB staff have been thoroughly assessing the adequacy of the macroprudential measures proposed by national authorities. In 2021 alone, the ECB received more than one hundred macroprudential notifications³¹ from SSM national authorities. Each of these notifications is processed internally at various levels and forwarded on to the Supervisory Board for subsequent escalation and decision by the ECB’s Governing Council. This process is mandatory for the subsequent formal adoption and implementation of the measures by the national authorities.

To date, the ECB has not exercised the power to apply more stringent macroprudential measures than those applied by national authorities. The

28 Draghi (2017).

29 Directive 2013/36/EU and Regulation (EU) No 575/2013 (CRD and CRR).

30 Among them, Spain. Other macroprudential instruments available in Spanish legislation, but not included in EU legislation – and therefore outside the control of the ECB – are the sectoral concentration limits and the sectoral CCyB.

31 European Central Bank (2022b). By way of illustration, by December 2022 the Banco de España had notified the ECB of a total of 45 proposals for macroprudential measures, of which 29 relate to the CCyB, eight to global systemically important institutions (G-SIIs) and eight to other systemically important institutions (O-SIIs). In this period, the Banco de España maintained the CCyB at the regulatory percentage of 0% for credit exposures located in Spain, and set buffers for one G-SII (Banco Santander, S.A.) and six O-SIIs (at the date of writing four institutions: Banco Santander, S.A., Banco Bilbao Vizcaya Argentaria, S.A., CaixaBank, S.A. and Banco Sabadell, S.A.). The frequency of these measures is set out in the CRD (quarterly for the CCyB and annually for the systemic institutions buffer). In all cases, the Banco de España’s notifications were favourably assessed by ECB staff – and backed by its decision-making bodies – .

ECB has not publicly notified any authority to change or tighten any of its macroprudential measures and neither has it exercised the competence conferred by the SSM Regulation to tighten a measure previously adopted at the national level. In this regard, the ECB's consultative role – and the ongoing dialogue of its staff with national authorities – has allowed a shared understanding to be attained on the most appropriate macroprudential measures, taking into account the specific circumstances (cyclical, structural or otherwise) of each country, which appears to have contributed to correcting the inaction bias mentioned earlier and to reducing the possible scenarios that would lead the ECB Governing Council to agree upon a direct intervention in a country's macroprudential policy.

In relation to systemically important institutions, one aspect of the ECB's favourable assessment of national macroprudential measures relates to its participation in the Basel Committee on Banking Supervision (BCBS) and the Financial Stability Board (FSB), and also to the existence of macroprudential policy guidelines agreed upon in the ECB's Governing Council. In the particular case of G-SII buffers, there is a commitment between the ECB and national authorities to implement the capital buffers identified in the annual lists of global systemically important banks (G-SIBs)³² in Basel. This commitment stems from the membership of the ECB/SSM and the main national authorities of the SSM of both the FSB and the BCBS. Moreover – as mentioned below – for so-called “other systemically important institutions” (at the national level), since 2016 the ECB has used a framework that guides the minimum calibration (floors) of buffers for these institutions in the banking union according to a mapping scheme for predefined buckets based on scores of systemic importance (as explained below).

Lastly, it should be noted that the launch of the SSM made the ECB a potential recipient of ESRB warnings and recommendations. In the early years of the ESRB's activity, the ECB's status as the central bank responsible for monetary policy in the euro area meant that it was not subject to guidance from the ESRB, as was the case for national central banks with responsibilities for financial supervision and macroprudential policy. This situation has changed since November 2014, with the transformation of the ECB into i) a competent authority for the microprudential supervision of credit institutions, and ii) a designated authority for the (possible) tightening of macroprudential requirements applied by national authorities³³. The EU co-legislators amended the founding Regulation of the ESRB in 2019 in order to, among other changes, explicitly reflect the new status of the ECB (and ECB Banking Supervision) in the ESRB. In connection with this change, the participation of a representative of the ECB's Supervisory Board on the General Board of the ESRB

32 The global list of G-SIBs is approved and published annually by the FSB, following a proposal by the BCBS.

33 Thus, when Recommendation ESRB/2020/7 on restricting distributions during the COVID-19 pandemic was issued in May 2020, one of the authorities to which it was addressed was the ECB, in its dual capacity as competent authority (microprudential) and designated authority (macroprudential).

was formalised. The chair of the ESRB was also conferred, on a permanent basis, on the President of the ECB.

4 Revision of the European Central Bank's monetary policy strategy

In July 2021 the ECB adopted a revised monetary policy strategy which, inter alia, emphasises the importance of financial stability as a precondition for price stability, and vice versa³⁴. The ECB's new strategy explicitly acknowledges the interdependence of price stability and financial stability, and the possible interactions – often complementary – of monetary policy and macroprudential policy. The ECB also notes that monetary policy can have undesirable effects on financial stability, and that macroprudential policy may be constrained at certain stages of the financial cycle.

In view of the risks to price stability associated with financial crises, it is noted that the ECB should take financial stability considerations into account in its regular monetary policy deliberations. The ECB anticipates that these considerations be addressed under a flexible approach (i.e. without predetermined monetary policy reactions to financial stability risk contingencies) and without losing sight of the objective of medium-term price stability, as it is for microprudential and macroprudential policies – each with their own requirements and instruments – to be the lines of defence against financial stability risks³⁵. The ECB maintains, in any event, the application of a principle³⁶ of separation of objectives, tasks and internal processes between monetary policy and macroprudential policy (and microprudential supervision).

The ECB's monetary policy strategy assigns an important role to the analysis of monetary and financial indicators. One of the objectives of this analysis is to provide the Governing Council of the ECB with a regular assessment of the build-up of financial imbalances and vulnerabilities and their implications for GDP and inflation in extreme scenarios. Furthermore, the analysis also aims to assess the extent to which macroprudential measures implemented at the national level are effectively mitigating those systemic risks that are relevant from a financial stability standpoint.

The relationship between price stability and financial stability is a close one³⁷ and is a focus of attention for the ECB, considering the importance of monetary and macroprudential policy coordination. The assessment of this issue is conducted on a regular basis and is underpinned and complemented by the ECB's

34 European Central Bank (2021a).

35 Guindos (2018).

36 Schnabel (2021).

37 As evidenced by the March 2023 macro-financial developments that affected individual US financial institutions with business models vulnerable to interest rate risk.

extensive work in preparing its spring and autumn financial stability reports. From a communication standpoint, the ECB has let it be known that financial stability and macroprudential policy issues take centre stage at its Governing Council meetings in June and December (see Chart 1.3).

5 Internal organisation and governance of the European Central Bank

In the early years of the ECB's existence, the financial stability function had not yet taken root in the organisation charts of the national central banks. The process was gradual from the publication of the Bank of England's first report on financial stability in the autumn of 1996 onwards. Central banks around the world steadily followed the Bank of England's lead by establishing financial stability units and starting to publish regular financial stability reports on a six-monthly or annual basis.

In 1998 the ECB brought together various financial stability tasks within the remit of its Prudential Supervision Division. This division had been created mainly to carry out tasks deriving from the TFEU with regard to the ECB's contribution to: i) the proper conduct of policies implemented by the competent authorities in the field of prudential supervision and financial system stability; ii) support in the preparation of advisory opinions on proposed Community and national legislation relevant to banking supervision and stability; and iii) other tasks that might arise from a direct conferral of new financial supervisory responsibilities. Through this division, the ECB would manage the secretariat of its Banking Supervision Committee (BSC) – explained below – as a forum for liaison with the Eurosystem central banks on financial stability matters.

Shortly after the introduction of the euro in 2003, the ECB established a Directorate Financial Stability and Supervision, consisting of two divisions. This change in the organisational structure reflects the ECB's intention to increase its resources in this field in order to catch up with other Eurosystem central banks³⁸ and, among its new tasks, to start publishing a regular financial stability report every six months. The first edition would appear a year later, at the end of 2004³⁹.

The ECB would be further strengthened in 2010 by reconfiguring this area of its organisational structure as the Directorate General Financial Stability (DG-F). This restructuring was driven by a number of factors linked to developments related to the sovereign debt crisis, most notably including: i) the reform of the European System of Financial Supervision, with the establishment of the ESRB – which

38 By way of comparison, the Banco de España's Financial Stability and Macroprudential Policy Department has its origins in the Financial Stability Division, created in 2000 and transformed into a department in 2005. It has had its current name since 2017.

39 The Banco de España had published its first *Financial Stability Report* two years earlier (in November 2002).

required new analytical support tasks (although its Secretariat was not integrated within the ECB's Financial Stability staff) – and of the European Banking Authority – in which the ECB participated as an observer – ; ii) the development of new analytical capabilities, such as those related to the conduct of stress tests; and iii) the ECB's technical cooperation (in the International Monetary Fund and European Commission's adjustment programmes for the economies and financial systems of several euro area countries, known as “troikas”). With this reorganisation, the ECB positioned financial stability as a policy area of comparable importance to other policy areas that had been established at the institution since its early days, such as monetary policy (economics), market operations, market and payment infrastructures, statistics and economic research.

In 2013 the ECB undertook what is, to date, its last major reorganisation and expansion of its financial stability staff, with the formalisation of the Directorate General Macroprudential Policy and Financial Stability (DG-MF). The creation of the SSM (approved in October 2013 and in operation a year later, in November 2014) entailed the incorporation of the new tasks conferred on the ECB in the area of macroprudential measures (Article 5 of the SSM Regulation) into the pre-existing Directorate General Financial Stability, which thus saw its functions – hitherto, for the most part, analytical – significantly extended to include involvement in the macroprudential policy of the national authorities. Moreover, as a result of the SSM, the ECB would see its status as a member institution (full participant in working groups) in various international bodies, such as the BCBS and the FSB in Basel, increase in 2014.

As with other policy areas, the ECB has recently continued to review its organisational structure. The Directorate General Macroprudential Policy and Financial Stability was expanded in 2017 with a new division dedicated to market issues and non-bank financial intermediation. In view of the increasing workload and responsibilities, its management team was reinforced in 2018 with a second Deputy Director General (complementary to the one introduced with the 2010 reform)⁴⁰. Schema 2 shows the organisational evolution described above, which illustrates the growing functional and human resources importance of this policy area for the ECB and the Eurosystem – an importance that has also been reflected in an increasing number of publications and public statements on the subject by the ECB (see the communication section below) – .

The ECB entrusts its Vice-President with the internal management of the financial stability and macroprudential policy area. In the distribution of responsibilities of the members of the Executive Board of the ECB, the Vice-President has traditionally (for the last two decades) been assigned this responsibility⁴¹. The

40 European Central Bank (2023).

41 European Central Bank (2022a).

EVOLUTION OF THE BUSINESS AREA OF FINANCIAL STABILITY AT THE ECB

(1998) Inception of the ECB	Prudential Supervision Division
(2002) Commencement of circulation of the euro	Directorate Financial Stability and Supervision – Financial Stability Division – Financial Supervision Division
(2010) Establishment of the ESFS	Directorate General Financial Stability – Financial Stability Surveillance Division – Financial Stability Assessment Division – Financial Services Policy Division
(2013) Creation of the SSM	Directorate General Macroprudential Policy and Financial Stability – Financial Stability Surveillance Division – Macro-Financial Linkages Division – Macro-Financial Policies Division – Financial Regulation Division
Since 2017	Directorate General Macroprudential Policy and Financial Stability – Systemic Risk and Financial Institutions Division – Stress-Test Modelling Division – Macroprudential Policy Division – Market-Based Finance Division – Financial Regulation and Policy Division

SOURCE: ECB and devised by author.

current head of the ESRB is therefore Luis de Guindos, who was preceded by Vítor Constâncio and Lucas Papademos. For her part, the President of the ECB is responsible for overseeing the organisational unit of the ESRB Secretariat. To the extent that macroprudential policy issues have an important connection with SSM banking supervision, an ECB representative is also appointed to its Supervisory Board for macroprudential issues (for more details, see the Annex).

6 The Financial Stability Committee of the European Central Bank

In performing its work in the area of financial stability, the ECB has always maintained permanent contact with national authorities at various levels. In the spirit of Eurosystem cooperation, the ECB has established a number of thematic committees – for each relevant area of activity – to bring together expert staff from

the national central banks (and, where appropriate, other national prudential banking supervisory authorities) to exchange information, share knowledge and jointly develop work which, with relative frequency, is ultimately submitted for deliberation to the ECB's highest decision-making body – the Governing Council (comprising the six members of the ECB's Executive Board and the governors of the euro area national central banks) – . One of these committees is specifically dedicated to financial stability and macroprudential policy issues.

In 1998, the ECB established the Banking Supervision Committee (BSC). Formally established as an ESCB (EU-wide) committee, the BSC was given a general mandate to assist the Eurosystem in the exercise of its tasks in the field of prudential banking supervision and financial stability⁴². In a setting marked by the expectation of increasing banking integration as a consequence of the introduction of the euro and the implementation of EU financial regulation, the BSC focused – from an aggregate perspective – on analysing issues related to structural changes and the solvency of the banking sector, as well as possible threats to financial stability.

In 2011 the BSC became the FSC⁴³. Following the major institutional changes in 2010 described above, the ECB aligned the name of the committee with that of its organisational unit, from which the secretariat work supporting it is carried out. The FSC would see its importance and tasks strengthened from 2014 onwards, as it also became the committee in charge of all matters related to macroprudential analysis and policy, including the assessment of national macroprudential measures. Over time, the composition of the FSC has increased with the enlargement of the Eurosystem (in 2002 there were 12 countries in the euro area, in 2023 there are 20)⁴⁴ and, since 2014, other SSM supervisory authorities⁴⁵.

During this time, the FSC has been the main consultative body in the preparation of banking-related reports and other related ECB publications. Special mention must be made of the *Financial Stability Report*, published regularly in May and November, which is the ECB's flagship publication in this field, and, to a lesser extent, also the (multi-)annual reports on financial integration and structures in the euro area. The FSC has been involved in other tasks related to the ECB's advisory role, supporting the ECB in providing opinions on draft EU legislation, formulating responses to public consultations or at the request of the European Commission (on future legislative initiatives), and preparing ECB Governing Council statements on

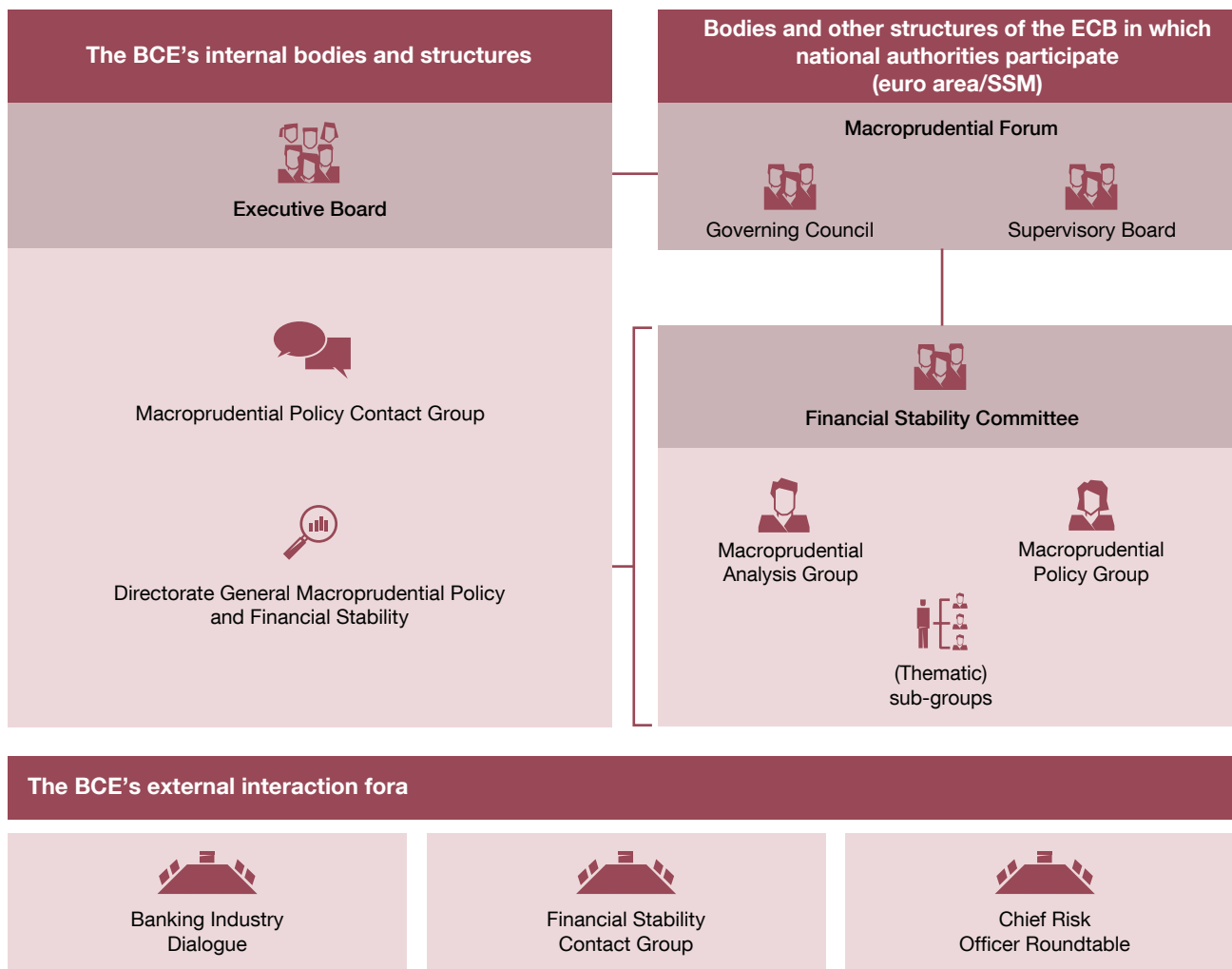
42 Scheller (2004) and Grande (2017).

43 *Financial Stability Committee*.

44 During this period, Slovenia (2007), Malta and Cyprus (2008), Slovakia (2009), Estonia (2011), Latvia (2014), Lithuania (2015) and Croatia (2023) joined the euro area. Moreover, Bulgaria (together with Croatia) joined the banking union in October 2020.

45 In 2023 there are seven banking union countries with supervisory authorities institutionally separate from the national central bank (Austria, Estonia, Finland, France, Germany, Luxembourg and Malta). Until 2022, Latvia also found itself in this situation.

ECB STRUCTURES RELATED TO THE AREA OF FINANCIAL STABILITY



SOURCES: ECB and devised by author.

macroprudential policy. Schema 3 shows how the FSC fits into the ECB's working and decision-making structures.

Through the FSC, the ECB coordinates with the ESRB. The FSC is configured as a committee with its own technical and thematic working sub-structures, involving expert staff from the ECB and national authorities. The FSC and the ESRB regularly exchange information and coordinate their work programmes to ensure that they are aligned (with the aim of enhancing synergies and avoiding overlaps) – given that there is also significant cross-membership in the FSC and the ESRB – . Evidence of this close cooperation can be found in the reports published jointly in areas of shared interest (such as risk analysis in a low interest rate environment or, more recently, studies of the risks associated with climate change for the financial system).

The ECB relies on the FSC to address issues prior to their referral to the decision-making bodies. Following a bottom-up approach, the FSC – which at its highest level is composed of national financial stability officials and senior ECB staff – regularly submits its work to the Governing Council and, depending on the dossier, also to the Supervisory Board. To facilitate high-level discussions between the Eurosystem and the SSM, a Macroprudential Forum (MPF) was established as a common platform in which to address, inter alia, issues raised by the FSC. The preparation of MPF meetings is the responsibility of an internal ECB coordination body, the Macroprudential Policy Contact Group, which is co-chaired by the Vice-President of the ECB and a representative of the ECB on the Supervisory Board⁴⁶.

7 The European Central Bank's structures for external interaction

The ECB has established a number of high-level fora for dialogue with the private sector on financial stability issues, which are an important channel for gathering market intelligence. According to the ECB's website, there are currently three operational groups: i) the Banking Industry Dialogue; ii) the Financial Stability Contact Group; and iii) the Chief Risk Officer Roundtable. The existence of these groups is part of the ECB's strategy of interacting with representatives of economic (and social) groups in the EU on a wide range of issues related to its mandate. These groups afford the ECB first-hand access to information relevant to the performance of its tasks. With considerable transparency, the ECB publicly disseminates the mandate (charter), agendas and summaries of the content of the meetings (e.g. aggregated results of financial stability surveys completed by the attendees). The ECB convenes each of these meetings by invitation (thereby avoiding permanent or priority attendees and, at the same time, fostering business, geographical and gender diversity of interlocutors).

The Banking Industry Dialogue (BID) is a forum between the ECB and some of the main banks active in the euro area. It aims to provide the ECB with input from senior industry experts on recent macro-financial developments and other economic issues of relevance to financial stability and macroprudential policy. It is chaired by the President of the ECB and its composition includes the members of the ECB's Governing Council, members of the ECB's senior management and CEOs from various banks. Since 2016 it has met on an annual or biannual basis and has been attended by around 15 banks on each occasion.

Similarly, the Financial Stability Contact Group (FSCG) brings together market analysts and representatives of the various sectors of the financial system. It is chaired by the Vice-President of the ECB and since 2015 has held two meetings a year to discuss the financial stability risk situation with representatives of banks,

46 Constâncio et al. (2019).

investment fund managers, insurance undertakings, clearing houses, rating agencies and also consultancy firms (up to 20 participants per meeting).

More recently established is the ECB's Chief Risk Officer Roundtable. Established in 2022, this contact group meets annually to discuss issues related to conjunctural and structural risks affecting financial stability and macroprudential policy. The Vice-President of the ECB leads this group, which has a smaller membership than the two previously mentioned fora: around ten risk officers, mainly from euro area banks and insurance undertakings.

8 The European Central Bank's advisory role in the regulatory field

The ECB plays an important advisory role on draft Community and national legislation. This task was assigned to the ECB at the time of its establishment, with the TFEU, Article 127(4) of which stipulates that the ECB shall be consulted: (i) on any proposed Union act in its fields of competence; and (ii) by national authorities regarding any draft legislative provision in its fields of competence. The ECB may submit opinions (which are of a non-binding nature) to the appropriate Union institutions, bodies, offices or agencies or to the national authorities of the Member States on matters in its fields of competence.

As regards Community legislation, the ECB has made numerous contributions through various channels. As regards opinions issued on the occasion of proposed regulations and directives – such as those on capital requirements for credit institutions – it should be noted that the ECB has also contributed its technical expertise on an ad hoc basis in the form of Eurosystem responses – or ECB responses – to documents submitted for public consultation on potential draft regulations (green papers) or responses to calls for advice from the European Commission (which is the EU institution that retains the power of legislative initiative). A recent example is the ECB's response to the European Commission's call for advice on the review of the EU macroprudential framework. In 2022 the ECB prepared a report⁴⁷ in which it reviewed its assessment of the current regulatory framework for macroprudential tools and put forward proposals for the Commission's consideration with a view to its further development and improvement.

At the national level, the ECB issued a total of 23 opinions on draft Spanish legislation between 1998 and 2022. Of these, four opinions are of particular relevance from a financial stability perspective. The creation of the Spanish Macroprudential Authority Financial Stability Council (AMCESFI) in early 2019 and, in parallel, the attribution of new powers to the Banco de España on macroprudential tools, were preceded by favourable ECB opinions. More recently, the ECB issued an

47 European Central Bank (2022c).

SELECTION OF ECB OPINIONS ON SPANISH LEGISLATIVE INITIATIVES

Identifier	Approval	Opinion
CON/2013/3	9.1.2013	On early intervention, restructuring and resolution of credit institutions in Spain
CON/2018/58	21.12.2018	On macroprudential tools
CON/2019/10	28.2.2019	On the establishment of a macroprudential board
CON/2022/36	2.11.2022	On the imposition of temporary levies on certain credit institutions

SOURCES: ECB and devised by author.

opinion on the proposed new levy on net interest and fee commission income earned by banks. The ECB considered the proposed design and assessed its implications from financial stability, prudential supervision and monetary policy standpoints.

Occasionally, the ECB has even issued opinions on national macroprudential measures for which the legal basis is not contained in Union legal acts. While it is usual for national authorities to implement their macroprudential policy measures through administrative acts, it is also possible that a Member State may decide to do so by means of a regulation. In such cases, under Article 127(4) TFEU, the ECB may issue an opinion, making known its assessment of the appropriateness of the proposed measure.

9 Financial stability publications and macroprudential policy statements

The *Financial Stability Review (FSR)* is the ECB's core publication. It summarises much of the regular work carried out by the Directorate General Macroprudential Policy and Financial Stability, and also reflects the technical insights provided by national authorities through the FSC. The FSR follows a mainly quantitative and indicator-based approach – based on extensive use of statistical and market information – which is complemented by market intelligence, i.e. qualitative information gathered from the private sector by ECB staff through various channels. In its current structure, the report provides an in-depth review of the macro-financial and credit environment in the euro area and the situation in financial markets, analyses recent developments in the banking and non-bank financial sectors, and then goes on to addresses the latest regulatory and macroprudential policy developments.

The FSR is published twice a year (May and November) and is complemented by several thematic *special features and boxes*, which are usually authored by ECB staff members. Since its first edition in 2004, the FSR has grown in depth and sophistication, while – along with other authorities – the ECB has made headway in

developing methodologies for financial stability analysis and new sources of exploitable data have emerged. Naturally, the ECB has adapted the FSR to focus on issues of significance for macroprudential policy, for which it has been partly co-responsible since the launch of the SSM.

Another benchmark publication is the ECB's *Macroprudential Bulletin*. More recently established, the *Macroprudential Bulletin* compiles short, informative articles by ECB authors on regulatory macroprudential analysis and policy issues. With a varying frequency (since 2016 there have been between two and three issues per year), each bulletin has a monographic focus. The topics covered include some of the most pressing (and still the most attention-grabbing) issues among central banks and supervisors, such as risks in the real estate market, the challenges associated with crypto-assets and decentralised finance, climate risks, the reform of money market funds, the estimated macroeconomic impact of the Basel III reforms, the impact of restrictions on dividend payouts by banks (during the COVID-19 pandemic) and the usability of credit institutions' capital buffers. The topics dealt with in the ECB's *Macroprudential Bulletin* represent a highly representative sample of the research work produced in the Directorate General Macroprudential Policy and Financial Stability (in certain cases also with authors from other areas of the ECB).

At another level are the macroprudential statements of the ECB's Governing Council. These statements – which are intended to provide guidance on the use of macroprudential tools or considerations on systemic risks – are not a regular publication, and they are issued at the discretion of the ECB's highest decision-making body. Since the start of the SSM, four statements have been released, three of which were concentrated in 2022.

An important issue addressed by the ECB in its macroprudential statements concerns the setting of capital buffers for O-SIIs. In its first statement in December 2016, the ECB reported on the issues discussed at a meeting of the Macroprudential Forum (MPF) and detailed the agreement reached between the ECB and the euro area national authorities to use a common reference framework for setting capital buffers for O-SIIs in the future (an issue that can be treated differently depending on the authority concerned, as EU legislation is not prescriptive in this respect). At the end of 2022, the ECB unveiled a new – and more stringent – framework for minimum O-SII buffers⁴⁸, which will guide its assessments of proposals notified by national authorities in relation to the use of these buffers from 1 January 2024 onwards. These minimum buffers range – depending on the score of systemic importance obtained for each O-SII – from 0.25% to 1.5% of the banking group's risk-weighted assets on a consolidated basis.

48 For more detail, see [Section 3.2](#) of the *Financial Stability Report*, spring 2023, Banco de España.

ECB GOVERNING COUNCIL STATEMENTS ON MACROPRUDENTIAL POLICY

Link	Date of publication	Statement issues
CCGPM-1	15.12.2016	Situation of cyclical systemic risks and real estate risks Designation of global systemically important banks in 2016 Main national macroprudential decisions in the SSM area published in the last three months The ECB's methodology for assessing O-SII buffers
CCGPM-2	27.6.2022	Treatment of the European banking union in the assessment methodology of G-SIBs
CCGPM-3	2.11.2022	Reaction of the ECB to the warning from the ESRB on vulnerabilities in the Union financial system
CCGPM-4	21.12.2022	Review of the ECB's methodology to assess O-SII buffers

SOURCE: ECB and devised by author.

In June 2022, the ECB issued a macroprudential policy statement on the revision of the assessment methodology for G-SIBs⁴⁹. The document expands on the previous announcement⁵⁰ made by the BCBS on the review of its G-SIB framework. In order to adequately reflect the level of integration achieved in the banking union – as a supranational jurisdiction endowed with single supervision and resolution mechanisms –, the methodology reviewed by the BCBS entails a parallel measurement of an institution's systemic importance through the 66% reduction of cross-border exposures within the banking union. The ECB develops the application of this adjustment – known as ASTRA (Adjustment for Structural Regional Arrangements) –, which supposes the recognition of the level of regional integration achieved with the establishment of the banking union.

The analysis of the situation of systemic risks also led to a macroprudential statement from the ECB. In November 2022, the Governing Council endorsed the ESRB risk assessment contained in ESRB Warning/2022/7, on vulnerabilities in the EU financial system⁵¹. The ECB shares the ESRB's diagnosis that in several banking union countries macro-financial vulnerabilities have increased in recent years, in particular as a result of the COVID-19 pandemic, and that the outbreak of the war in Ukraine in February 2022 has contributed to worsening the situation, with the consequent increase in the probability of short-term risks materialising. The ECB calls for the cautious application of macroprudential policy, the response to which must take into account the current short-term disturbances to economic growth, in order to prevent an increase in capital buffers from translating into a situation of excessive tightening of credit conditions.

49 Global Systemically Important Banks.

50 Basel Committee on Banking Supervision (2022).

51 European Systemic Risk Board (2022).

The ECB disseminates information on macroprudential measures in the banking union. Through its website⁵², the ECB disseminates – in the form of a regularly updated repository – information on macroprudential measures implemented in the countries participating in ECB Banking Supervision, with particular attention to the CCyB, the buffers for systemically important institutions and the buffer against systemic risks. In coordination with the ESRB, the ECB provides information resources on the size and composition of the combined buffer requirement for each of the systemic entities identified in the banking union.

10 Communication through public speeches and other documents

The public speeches of the members of the Executive Board represent one of the most important communication channels available to the ECB. Due to the context in which they are made and the media attention they receive, the speeches of the ECB's senior officials represent a valuable source of information on the most relevant issues that concern the institution at all times. In the context of their relative importance in the ECB's mandate, the issues of financial stability and macroprudential policy have figured regularly – albeit variably – in public speeches, mainly by ECB vice-presidents (due to their status as members of the Executive Board of the ECB with responsibility entrusted to them in this area)⁵³.

An interesting indicator of the importance attached by the ECB to this issue is given by the number of mentions of the terms “financial stability” and “macroprudential” in its speeches. As illustrated in Chart 1, the concept of financial stability began to receive regular attention in the public speeches of the ECB's Vice President from 2005 onwards, coinciding with the start of the publication of the six-monthly financial stability reports. From 2009-2010 it becomes evident that “financial stability” begins to give way to “macroprudential” (policy)⁵⁴, coinciding with the creation of the ESRB as a result of the sovereign debt crisis in the euro area, and again from 2013 onwards, on the occasion of the legislative process that would lead a year later to the establishment of the SSM – and to conferring policy tasks to the ECB in this area – .

Analysis of the terminology in the ECB's annual reports and monetary policy reviews reflects different patterns to those observed in public speeches. Unlike the wording of the speeches, the ECB's annual reports have a relatively stable content structure, including a chapter dedicated to the European financial sector, where financial stability and macroprudential policy issues are concentrated. The

52 It may be consulted in this [section](#).

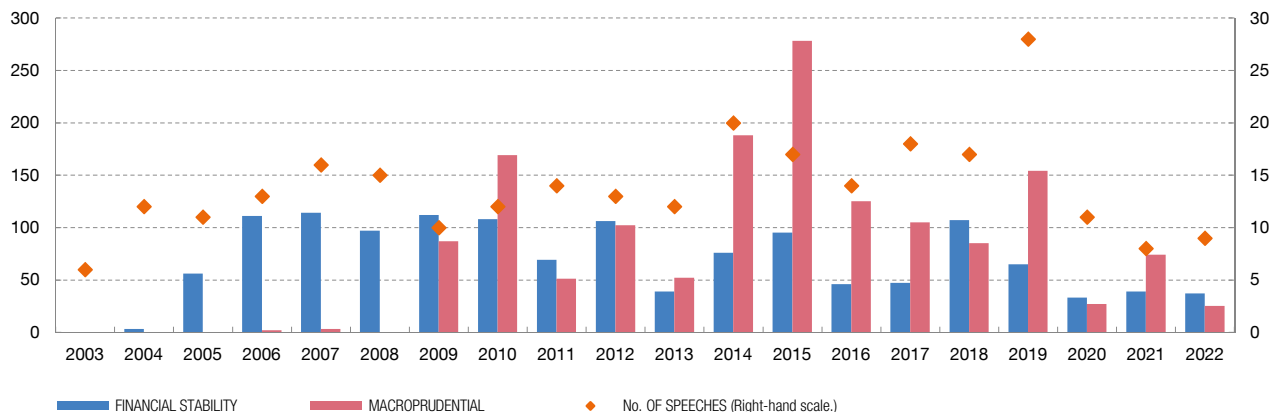
53 On a more occasional basis, other members of the Executive Board of the BCE also address issues related to financial stability in their speeches.

54 As documented in Clement (2010), prior to the GFC (and the subsequent reforms of the Basel III framework by the BCBS), the general use of the term “macroprudential” had been relatively limited at international level.

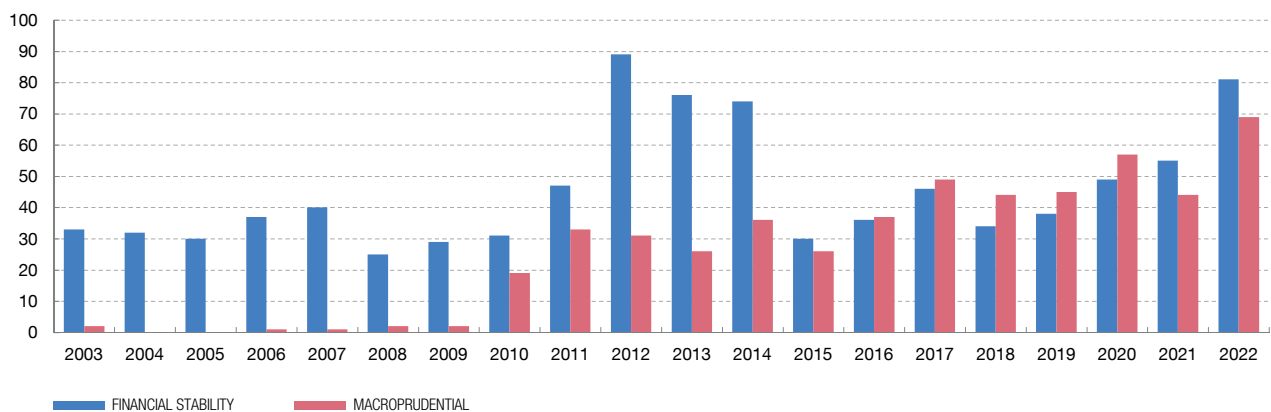
Chart 1

MENTIONS OF THE TERMS "FINANCIAL STABILITY" AND "MACROPRUDENTIAL" IN ECB COMMUNICATIONS (2003-2022)

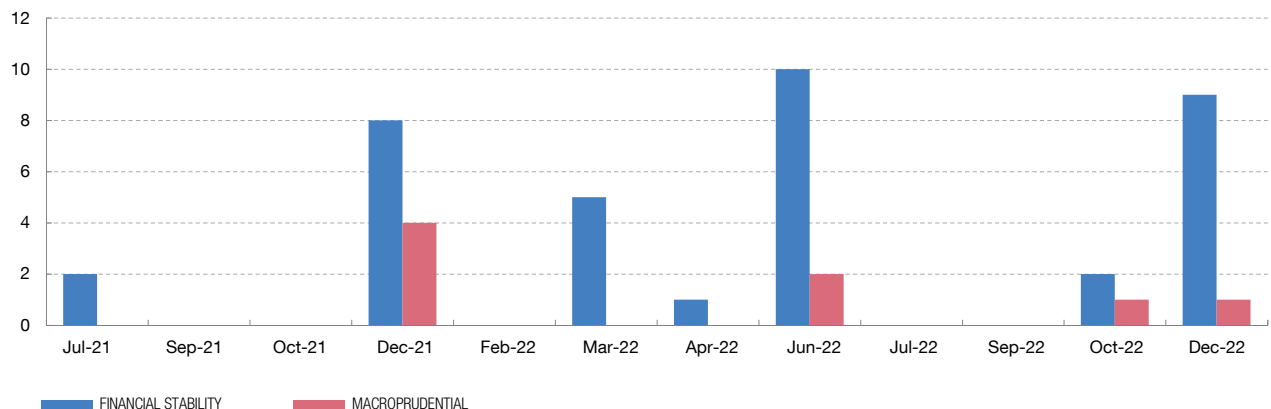
1 SPEECHES OF THE ECB'S VICE-PRESIDENT



2 ECB ANNUAL REPORTS



3 MONETARY POLICY ACCOUNTS (2021-2022)



SOURCES: ECB and devised by author.

attention paid to financial stability peaks in 2012 (with the *Annual Report 2011*) and significantly reduces in 2015 (*Annual Report 2014*), once the SSM was up and running. Since then, both “financial stability” and “macroprudential” (policy) have obtained a comparable number of mentions, with an increasing trend also witnessed during the period of the COVID-19 pandemic.

Lastly, it should be noted that the public reviews of the ECB Governing Council meetings still do not provide enough information to be able to assess the scope of the changes introduced in the 2021 review of the monetary policy strategy. The monetary policy reviews published by the ECB provide an indication of the attention devoted to financial stability issues in the meetings at the end of each six-month period – June and December – . However, the relative absence of references to macroprudential policy in the summaries of the monetary discussions of the ECB’s governing body suggests that the interaction of both policies is an issue that has room for development in the future, since their complementarity (also with fiscal policy) is key to addressing inflationary shocks and imbalances in the financial system⁵⁵.

11 Final comments

In the first quarter of a century of the Eurosystem’s activity, the ECB’s financial stability function has undergone a profound transformation, which has been especially intense over the last 12 years. As reviewed in this article, this evolution is attributable to factors of a diverse nature, but, ultimately, it has been the institutional changes triggered by the GFC and the sovereign debt crisis in the euro area that have led to a marked acceleration in the organic and functional evolution of the institution. In this period, the number of ECB staff dedicated to these tasks has increased exponentially, in line with the increased responsibilities assigned and also with the increasing complexity of the macroeconomic environment and the financial system.

The financial stability function is not a stand-alone area within the work performed by the ECB. Naturally, financial stability clearly interacts with banking supervision and monetary policy. Other key central banking areas of action are also permeable to financial stability, as evidenced, for example in the area of payment systems, by the current ECB project for a digital euro. Its impact from the point of view of financial stability is a major focus of attention⁵⁶.

In parallel to the changes described in this article for the ECB, there has also been a significant strengthening of the financial stability function and

55 Guindos (2022).

56 Panetta (2022).

macroprudential policy at national central banks in the EU. In the majority of Member States, the attribution of macroprudential policy powers derived from changes in Union legislation on capital requirements or by recommendation of the ESRB⁵⁷ has fallen – totally or partially – on the central banks (as in the case of Spain)⁵⁸. These national institutional developments that have taken place in the last decade have facilitated and strengthened the intense institutional link between the ECB and the national authorities in the Eurosystem and the SSM. In the future, the evolution of the function of financial stability and macroprudential policy at the national level and in the ECB will continue to condition each other.

57 European Systemic Risk Board (2013). Recommendation ESRB/2011/3 led to the creation in various EU Member States of inter-agency committees with the participation of the national central bank and regulatory and supervisory bodies with responsibilities for financial stability. In this context, the AMCESFI was created in Spain.

58 Since 2014, the Banco de España has been the designated authority to propose, approve and implement measures of macroprudential instruments applicable to credit institutions. In addition, it is a member institution of AMCESFI – since its creation in 2019 – and holds *ex officio* the vice-chair of its Council (in the person of the governor) and the chair and secretariat of its Technical Committee on Financial Stability (respectively, in the persons of its deputy governor and director general Financial Stability, Regulation and Resolution).

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BASIC REGULATIONS

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Council Regulation (EU) No 1096/2010 of the Council of 17 November 2010 conferring specific tasks upon the European Central Bank concerning the functioning of the European Systemic Risk Board.

Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC (consolidated version).

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Regulation (EU) No 1092/2010 of the European Parliament and of the Council of 24 November 2010 on European Union macro-prudential oversight of the financial system and establishing a European Systemic Risk Board (consolidated version).

Regulation (EU) No 468/2014 of the European Central Bank of 16 April 2014 establishing the framework for cooperation within the Single Supervisory Mechanism between the European Central Bank and national competent authorities and with national designated authorities (SSM Framework Regulation).

Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013, on prudential requirements for credit institutions and amending Regulation (EU) No 648/2012 (consolidated version).

Treaty on the Functioning of the European Union (consolidated version).

Chart A1

POSITIONS OF RESPONSIBILITY IN THE ORGANISATIONAL STRUCTURE OF THE EUROPEAN CENTRAL BANK

Dates	Presidents	Vice-Presidents (since 2003, members of the ECB's Executive Board with responsibility for financial stability)			
Since Nov-2019	Christine Lagarde	Since Jun-2018	Luis de Guindos		
Nov-2011 - Oct-2019	Mario Draghi	Jun-2010 - May-2018	Vitor Constâncio		
Nov-2003 - Oct-2011	Jean-Claude Trichet	Jun-2002 - May-2010	Lucas Papademos		
Jun-1998 - Oct-2003	Wim Duisenberg	Jun-1998 - May-2002	Christian Noyer		
Senior management (a) Position					
Since Dec-2022	Cornelia Holthausen	Director General Macroprudential Policy and Financial Stability			
Jan-2015 - Nov-2022	Sergio Nicoletti Altissimi	Director General Macroprudential Policy and Financial Stability			
Mar-2014 - Dec-2014	John Fell	Acting Director General Macroprudential Policy and Financial Stability			
Oct-2013 - Feb-2014	Ignazio Angeloni	Director General Macroprudential Policy and Financial Stability			
Sep-2012 - Sep-2013		Director general Financial Stability			
Feb-2010 - Aug-2012	Mauro Grande	Director general Financial Stability			
Feb-2003 - Jan-2010		Director Financial Stability and Supervision			
Since Oct-2013	John Fell	Deputy Director General Macroprudential Policy and Financial Stability			
Feb-2010 - Sep-2013		Deputy Director General Financial Stability			
Since May-2022	Livio Stracca	Deputy Director General Macroprudential Policy and Financial Stability			
Dec-2018 - Apr-2022	Fatima Pires	Deputy Director General Macroprudential Policy and Financial Stability			
Chairs of the BCE's Supervisory Board					
Vice-Chairs of the ECB's Supervisory Board (members of the ECB's Executive Board with responsibility for banking supervision)					
Representatives of the ECB's Supervisory Board, with responsibility for macroprudential issues					
Since Jan-2019	Andrea Enria	Since Feb-2021	Frank Elderson	Since Oct-2019	Kerstin af Jochnick
Jan-2014 - Dec-2018	Danièle Nouy	Nov-2019 - Dec-2020	Yves Mersch	Apr-2019 - Sep-2019	(vacant)
		Feb-2014 - Oct-2019	Sabine Lautenschläger	Mar-2014 - Mar-2019	Ignazio Angeloni

SOURCES: ECB and devised by author.

a Since December 2018, the Directorate General Macroprudential Policy and Financial Stability has had two deputy directors general.

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