

**ARTICLE**

# The ECB's asset purchase programme: Theory, effects, and risks

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**Abstract**

In response to the Covid-19 crisis, the European Central Bank (ECB) has relaunched a massive asset purchase programme within its combined-arms monetary strategy. This paper surveys and discusses the theory and the evidence of the central bank's unconventional monetary tools for the euro area. It analyses the role of the asset purchase programmes in the ECB's toolkit and the associated risks, focusing specifically on the gradual unwinding of these unconventional initiatives. Finally, the paper offers some insight into the possible evolution of the ECB's monetary policy.

**KEYWORDS**

APP, monetary policy channels, PEPP, unconventional monetary policy, unwinding

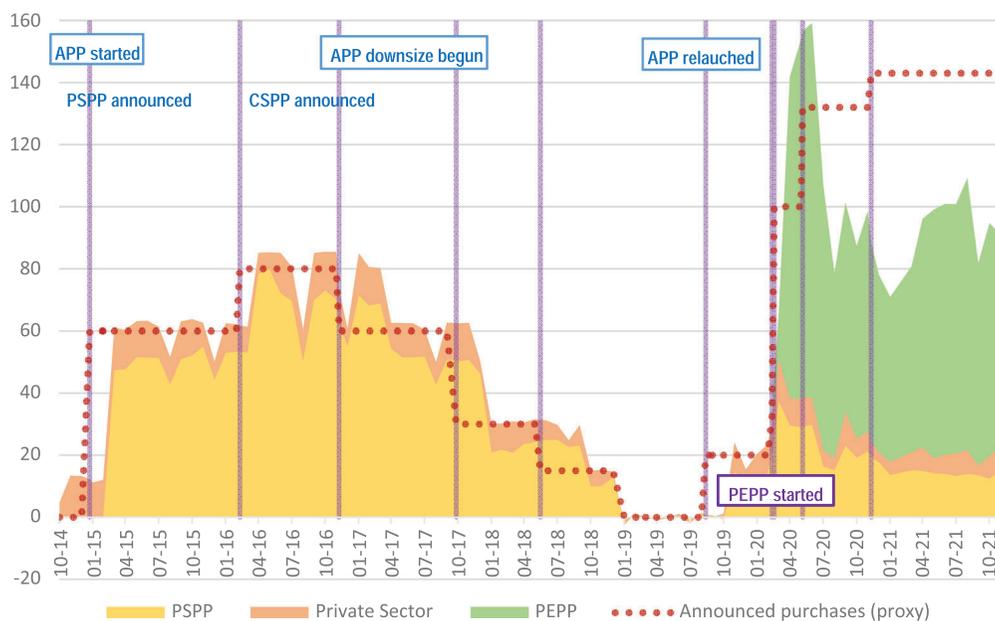
## 1 | INTRODUCTION

This paper surveys and discusses the theory and the evidence of the central bank's asset purchase programs (APPs) as part of a "combined-arms" strategy, which includes other policy tools, for the euro area (EA).

The European Central Bank's (ECB's) policy interest rate essentially reached the zero lower bound (ZLB) in the summer of 2014, forcing policy to use only unconventional tools.<sup>1</sup> Following the initiatives taken by other central banks (Federal Reserve and Bank of Japan), the ECB started to systematically purchase assets in September 2014 (through the asset-backed securities

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**FIGURE 1** ECB's net asset purchases (billions of euro)

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Source: Authors' elaboration of ECB data ("Private Sector" includes ABSPP, CBPP3, and CSPP)

purchase programme [ABSPP] and the covered bond purchase programme 3 [CBPP3]), and then government bonds (through the public sector purchase programme [PSPP]) in March 2015.<sup>2</sup>

In January 2015, the ECB announced a monthly purchase of EUR 60 billion starting in March 2015 for at least 19 months. However, since the beginning of the purchase programme, the ECB considered potential extensions in the event the inflation rate did not approach 2%; in other words, the APP was open-end. This is equivalent to stating that the APP's overall amount was at least equal to EUR 1140 billion. A large part (88%) of this amount was devoted to the PSPP. A small percentage (20%) of the purchases under the PSPP was based on a sharing principle, while the remaining 80% was carried out by the national central banks (NCBs) of the euro-system without any risk sharing. In fact, the NCBs largely purchased bonds that had been issued by their central governments. The total amount of the monthly purchases of the government bonds of each country should have been proportional to the ECB's capital key.<sup>3</sup>

The dynamics of the ECB's net asset purchases from 2014 to 2021 is summarized in Figure 1. The figure also includes a proxy of the announced monthly amounts of purchases (red dotted lines) and the timeline of the most important ECB announcements related to the APP (blue lines) and to the additional pandemic emergency purchase programme launched in March 2020 (PEPP: purple lines). The figure also shows the impact of ABSPP and CBPP3 announced in September 2014, and the upward discontinuity induced by the PSPP in March 2015. Box 1 provides a list of a large part of these announcements since the beginning of 2015.<sup>4</sup>

As stated in Figure 1 and Box 1, the ECB's APP and the PEPP have been modified several times. For instance, in March 2016 the ECB decided to increase the monthly average of the APP to EUR 80 billion (including the new programme for corporate securities, CSPP) starting in April that year.<sup>5</sup> Then, after several decreases in the monthly purchases, the APP temporarily ended in December 2018. From March 2015 to December 2018, the total amount of the APP reached EUR 2590 billion.<sup>6</sup> However, in one of the last meetings chaired by Mario Draghi (September 12, 2019), the ECB's

**Box 1: The ECB's announcements: A roadmap**

This box describes the dynamics of the asset purchases implemented by the ECB, reporting the most significant European central bank announcements in the 2015–2021 period.

**January 22, 2015.** The ECB announces an expanded APP relating to bonds issued by euro-area central governments, agencies, and European institutions, which—together with ABSPP and CBPP3—implies a monthly purchase of EUR 60 billion.

**March 10, 2016.** The APP is enriched by corporate sector purchases (CSPP). The overall monthly purchases increased to EUR 80 billion starting from April 1, 2016.

**December 8, 2016.** The ECB announces that the EUR 80-billion purchases will continue until March 2017 and will be reduced to EUR 60 billion from April 2017 until December 2017, or beyond in case of necessity.

**October 26, 2017.** The monthly purchases will continue to be EUR 60 billion until the end of December 2017 and, starting from January 2018, will be reduced to EUR 30 billion per month until the end of September 2018.

**June 14, 2018.** After September 2018, the monthly net purchase will be reduced to EUR 15 billion until the end of December when the programme will end.

**September 12, 2019.** The APP will restart with a monthly amount of EUR 20 billion from the beginning of the following November.

**March 12, 2020.** A temporary additional purchase of EUR 120 billion will be added to the APP until the end of 2020. Then, the APP will continue at the pace of EUR 20 billion until required by the macroeconomic conditions.

**March 18, 2020.** The ECB announces the PEPP with an overall amount of EUR 750 billion until the end of 2020.

**June 4, 2020.** The total amount of purchases under the PEPP is increased to EUR 1350 billion at least until the end of June 2021. Moreover, the ECB decided to reinvest the proceeds (including interests) from securities purchased under the PEPP and at maturity until the end of 2022.

**October 29, 2020.** The ECB announced that its monetary policy instruments will be recalibrated to support economic recovery and will counteract the projected negative inflation path, according to the new empirical evidence provided in December.

**December 10, 2020.** The ECB implemented the further strengthening of the PEPP from EUR 1350 to EUR 1850 billion at least until the end of March 2022. Moreover, it extended the reinvestment of the proceeds (including interests) from securities purchased under the PEPP and at maturity until the end of 2023.

**September 9, 2021.** Due to the more positive economic conditions and the temporary increases in inflation rates, the ECB decided to implement a moderately lower pace of asset purchases under the PEPP.

**December 16, 2021.** The ECB announced the end of PEPP at the foreseen date (March 2022). To partially compensate for the consequent decrease in its monthly asset purchase, the ECB took two decisions: to increase the monthly purchase pace under the APP to EUR 40 billion in the second quarter of 2022 and to EUR 30 billion in the third quarter; and to extend the reinvestments of the proceeds (including interests) from securities purchased under the PEPP and at maturity until the end of 2024.

Source: ECB's press releases.

Governing Council decided to restart the APP from November 2019 with a monthly purchase of EUR 20 billion. Hence, when the pandemic shock hit the EA, the ECB's unconventional monetary policy was still in action. After the outbreak of the Covid-19 crisis, the programme was relaunched.

On March 12, 2020, the ECB decided to temporarily increase its asset purchases by adding EUR 120 billion to the APP until the end of 2020 as a response to the Covid-19 outbreak.<sup>7</sup> Then, in March 2020, the ECB announced the implementation of PEPP, until the end of 2020. The initial resources for the PEPP amounted to EUR 750 billion. In June 2020 they were increased to EUR 1350 billion, and the use of PEPP was extended until, at least, the end of June 2021. It is worth noting that the PEPP introduced a higher degree of flexibility in the allocation of ECB's purchases, as the capital key ratios had to be satisfied only at the end of the programme.

The rest of this paper aims to provide a critical survey of the literature that has studied the impact and risks deriving from the ECB's APP and PEPP (from now on: APPs). It is worth underlining that these programmes are part of a "combined-arms" strategy which includes T-LTRO, forward guidance (FG), and negative interest rate policies (NIRP). Therefore, the effects of the APPs cannot be analyzed without accounting for other unconventional policies that contribute to the whole ECB strategy.<sup>8</sup> The originality of our approach is in first characterizing the effectiveness of APPs through three channels: the interest-rate channel, the credit channel and the implicit-guarantee channel. This is detailed in the first part of Section 2. Then, in the same section, we move to an analysis of the empirical evidence of APPs macroeconomic effects. Section 3 looks at the potential risks and side effects associated with APPs. In particular, it discusses the problem of their unwinding after the pandemic along the lines of the three channels previously discussed. Section 4 concludes the paper by discussing some alternative tools to APPs.

## 2 | THE ECB'S APP: THEORY AND MACROECONOMIC IMPACT

### 2.1 | The transmission channels

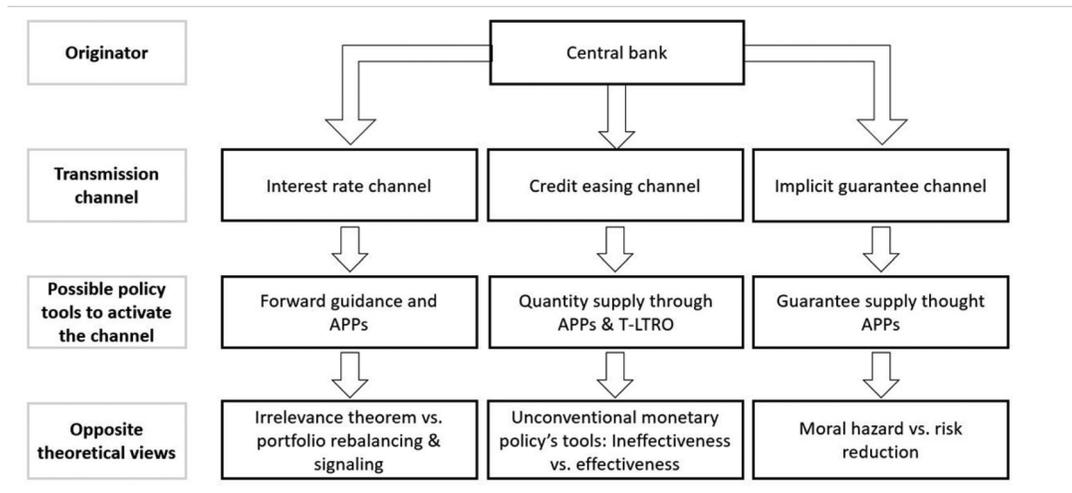
APPs have been classified as part of the set of **unconventional tools** available to central banks. To understand the effectiveness of these programmes, it is important to describe the features that characterize them as unconventional with respect to the conventional monetary policy framework in use at the ECB before the autumn of 2014.

In a nutshell, the conventional monetary policy framework is characterized by three main features: (1) the specification of the short-term policy rate, eventually through a corridor system, to determine the short-term risk-free rate of the economy and therefore to activate the transmission mechanism of monetary policy with the objective of controlling the inflation rate and indirectly influencing economic activity; (2) the open-market operations to provide liquidity to the banking sector on an ordinary basis, in combination with more direct liquidity operations (i.e., banks' window), and the accounting management of banks' withdrawals and reserves through the lending and deposit facility, respectively; and (3) a composition of the balance sheet of the central bank with assets that include gold, foreign reserves and short-term treasury bills and with liabilities that include cash and reserves held by commercial banks.

In the above framework, APPs represent a clear departure from feature (3) and aim at providing a complement to feature (1) in activating the transmission mechanisms of monetary policy.

APPs change feature (3) because they imply a different composition of the central bank's assets by including long-term securities issued by the government and/or the private sector as opposed to the standard composition of short-term government securities only. At the same time, asset

TABLE 1 Central bank's transmission channels



Source: Authors' elaboration.

purchases can also change the size of the central bank's balance sheet and, therefore, the amount of reserves held by depository institutions at the central bank. Through these two different features, the short-term policy rate is integrated by an additional tool to influence the transmission mechanisms of monetary policy. However, the feature of expanding reserves is not peculiar to APPs and can also be accomplished by just purchasing short-term securities. Therefore, to theoretically determine the effectiveness of an APP as opposed to other conventional tools, the key aspect to examine is the purchase of long-term securities.

We discuss three channels that can be impacted by this purchase: the **interest rate channel** which operates through either a portfolio-rebalancing or a signaling mechanism, the **credit easing channel**, and the **implicit-guarantee channel**. A guide of our reasoning is provided by Table 1.<sup>9</sup> The table emphasizes the issues covered here, that is, channels, tools activating them, and the debate about their effects.

Let us start our analysis with the **interest rate channel**. Portfolio rebalancing considerations have often supported the effectiveness of APPs on the basis that purchases by the central bank should create an excess demand for certain securities in the secondary market, bringing down their yield (see Bernanke, 2002; and Tobin, 1969). At the same time, investors could rebalance their portfolio towards other securities; and this additional demand could lower yields in other markets too. With these means, the central bank should be able to lower yields in many securities markets and in the long tail of the yield curve.

In principle, this is not the only possible tool to affect the term structure of interest rates even if the central bank has already reached the ZLB on the short-term interest rate. In fact, at the ZLB interest-rate policy can only be exerted by acting on long-term rates. One way to do that is through a policy labeled FG, that is, by providing clear and transparent guidance to future short-term interest rates. This policy by itself could be sufficient to control long-term rates in one way or another. However, according to the portfolio-rebalancing theory, APPs could be a more effective and direct way to lower long-term yields.

This view does not find much support in standard economic theory. Wallace (1981) illustrates an irrelevance theorem for which any open-market operation does not provide an additional tool to the monetary policymaker, and therefore APPs are irrelevant.<sup>10</sup> Wallace's theoretical argument is based on two simplifying assumptions: (i) investors can purchase arbitrary quantities of the

same assets at the same prices (frictionless asset markets); and (ii) the assets involved in the open-market operations provide only pecuniary returns. Under these two conditions, any APP amounts to a mere reallocation of assets from private investors to the central bank without affecting the inflation rate and economic activity. There is a specific reason behind this neutral impact: risk is not actually reallocated from the private sector to the central bank. When the central bank purchases assets from the private sector, it will bear some gains or losses depending on the contingencies. However, these gains or losses are in the end transferred back to the private sector through remittances given to the treasury, so that the risk goes back to the private sector in a different form. Therefore, the reallocation of assets between different economic agents should not necessarily produce any change in inflation rates and economic activity.

In some respects, the peculiar institutional setting of the APPs implemented by the ECB seems to fall within Wallace's neutrality result. We recall that 80% of the purchases of government bonds are carried out by the NCBs mainly with respect to the sovereign debt of their national jurisdiction. Hence, it could be the case of risk going back to the source, given the institutional specification of the treasury's remittances policy.

By breaking the two assumptions behind Wallace's argument, it will be possible to obtain some significant results on the effectiveness of APPs on interest rates through the portfolio-rebalancing mechanism for, at least, three reasons.

First, financial frictions such as transaction costs break Wallace's irrelevance theorem by limiting the ability of private investors to arbitrage assets in their portfolio. Among others, Vayanos and Vila (2009) argue that investors may have preferences for assets of different maturities following a "preferred habitat" motive. In such a case, by altering the relative demand for long-term versus short-term assets, the asset purchases of a central bank may affect bond returns and flatten the yield curve. Second, the assets purchased by central banks can have a value for providing not only pecuniary returns but also additional services or benefits, such as their usefulness for liquidity purposes. This is often the case of high-quality assets that offer collateral services or can be used in exchange for other assets or goods. A central bank's purchases of such securities can lower their convenience yield, therefore producing other impacts on the financial markets. Third, central bank's asset purchases are effective when the central bank bears the losses/gains on the securities purchased, without transferring them back to the private investors through the treasury. However, the losses should be significant enough to be resolved through the inflation rate (Benigno & Nisticò, 2020).

Let us add that the interest-rate channel can be activated by an APP also through a different signaling mechanism. In this case, an APP can become an effective way to signal a change in the monetary policy stance (see, among others, Bhattari et al., 2015; and Jeanne & Svensson, 2007).

In this respect, we should consider Wallace's irrelevance environment where what matters as a tool of monetary policy is just the specification of the current and future policy interest rates. When the economy reaches the ZLB, the central bank is left with the specification of the path of future short-term interest rates (FG). If there were no credibility issues, a clear and transparent announcement of future policy actions would be immediately incorporated into market forward rates, and therefore it would lead to some control of the yield curve by the central bank (in particular, the long-term tail). However, future policies are subject to a credibility problem, especially if there is no history of fulfilled actions. Therefore, a policy announcement can be incapable of affecting market forward rates and shaping the yield curve. By implementing an APP, the central bank may instead strengthen its credibility and enhance FG policies in keeping interest rates low for a long period of time. Indeed, deviations from the announced path of future policy interest rates can be costly for the central bank as a purchaser of long-term assets. If policy rates are raised

earlier than promised, the central bank will experience losses on its stock of securities. Therefore, by purchasing long-term assets, the central bank strengthens its commitment to maintaining a desired path for interest rates.

APPs can also be effective through a second transmission channel: the **credit-easing channel**, according to which the central bank acts directly on the supply side of credit markets.<sup>11</sup> Financial intermediaries are constrained in the amount of risk-weighted assets held in their balance sheets for a variety of reasons relating to a shortage of capital. For instance, there can be a limit due to regulatory measures on the losses that these intermediaries can bear and on the minimum capital ratios that they must meet. This limit can influence the amount of borrowing and of raised funds under adverse market conditions. Moreover, during a financial crisis, the assets held by the intermediaries may become riskier and therefore the capital ratios' constraints can become tighter. The low-capitalized intermediaries are, thus, forced to sell their assets and to bear the related losses. If these sales involve many intermediaries, losses in the overall financial system can have multiplicative effects, tightening further capital ratios' constraints for each regulated lender. All these effects induce an increase in credit spreads which also signals a worsening in borrowing and lending conditions. As a consequence, many intermediaries may borrow only at higher interest rates due to their increased riskiness; and they should lend at higher interest rates to keep their expected unit profits constant or—at least—to protect their future profitability.

The central bank can fix the policy rate to the ZLB or even to a lower (negative) effective bound (ELB). However, these latter accommodations would be ineffective if spreads in the credit market widened. APPs could, instead, directly purchase corporate impaired assets held by intermediaries, and thus they could counteract the tightening in lending conditions and reduce the credit market spreads. In principle, the central bank would then improve the transmission mechanism of monetary policy by acting directly on the functioning of credit markets and by softening financial distress. This kind of policy, which acts through the credit channel, has been labeled **credit easing**, as opposed to the quantitative easing that instead works more through the portfolio-rebalancing channel analyzed above.

It is worth noting that the ECB's APP has never made direct recourse to the credit easing channel. However, the APP indirectly implemented this channel through the purchase, in the secondary markets, of government bonds held by European banks. This purchase alleviated one of the main problems affecting banks' balance-sheets,<sup>12</sup> although it involved all the holders of government bonds as potential sellers and, thus, directly utilized the interest rate channel (see above). In any case, the ECB activated the credit easing policy by means of different tools (LTRO and T-LTRO); and, in this respect, the ECB's Governing Council rightly maintains that both the APP and T-LTRO are unconventional monetary policies (UMPs) and utilize complementary market mechanisms.

The third transmission channel is the **implicit-guarantee channel**. The central bank, unlike any other agent in the economy, is not subject to any insolvency risk. By purchasing risky securities, the central bank thus signals that it is extending an implicit guarantee on the issuers of these securities. Note that central banks should not be involved in addressing solvency problems but just illiquidity problems. However, APPs implicitly extend a guarantee on the issuer's solvency, especially if its purchases occur in periods of financial stress. The ECB's purchases of government bonds and private assets provide stable financing, albeit indirect (that is, through the secondary market), for the relative issuers; moreover, they guarantee that the private investors acting as potential buyers on the primary market will find a strong institutional buyer on the secondary markets.

If the APP is perceived this way, it will reduce the issuers' default risk, therefore lowering the yields concerning the risk premium component. The duration of the APP's purchases, whether temporary or permanent, is an important ingredient to weaken or, conversely, enhance the implicit-guarantee channel. However, even temporary purchases that only offer short-term guarantees could be a relief for the issuers and an incentive for the potential private buyers under adverse market pressure, thus allowing better allocations and a consequent reduction of the default risk.

It should be emphasized that the APP offers an implicit guarantee and not an explicit one. Otherwise, there would be a violation of Article 123 of the Treaty on the Functioning of the European Union (TFEU), which prohibits the ECB and NCBs of the euro-system from purchasing public debt instruments on the primary market.<sup>13</sup> The implicit guarantee also questions an important pillar of the EA's economic governance because it blurs the distinction between monetary and fiscal policy. The consequent limitations in the extension of the implicit guarantee create a disadvantage for the public debts of EA countries with respect to those of competing areas. In other countries such as the United States, the borders between monetary and fiscal policies are even thinner; therefore, the Federal Reserve (Fed) can easily provide this type of guarantee to its treasury.<sup>14</sup> This backing implies that the risk-free properties of the central bank's liabilities are extended to the treasury's debt, which is therefore (at least, partially) free of any default risk. In this respect, if substantial in size and prolonged in time, the ECB's APPs can reduce the European handicap.

In conclusion, in the EA, the first and third channels emphasized above lead to lower yields at different maturities (particularly, medium and long term) for various government and private securities. Spill-overs occur in other securities markets and in markets for real assets.<sup>15</sup> It is worth noting that the effectiveness of these impacts does not require, at least from a theoretical point of view, the economic system to be at the ZLB or ELB. Although obvious policy reasons imply that the APP or comparable tools are activated when policy interest rates are at the ZLB or ELB, there are a few exceptions. For example, the SMP was implemented by the ECB in 2010 and 2011, when policy rates in the EA were well above the ZLB.

## 2.2 | An evaluation of the macroeconomic effects

At the end of the chain, APPs aim at providing households and firms with better financing conditions for their consumption and investment plans. The rise in the prices of financial and "real" assets increases the nominal wealth of the holders of these assets; and, if APP policies are believed to succeed in jump-starting the economy, the same will apply to the expected wealth. Agents may then be induced to spend more (**wealth effect**). The effectiveness of this mechanism mainly depends on the size and composition of the portfolio of financial assets held by households. Indeed, if successful in anchoring long-term inflation expectations, APPs signal that a fall in long-term yields will directly translate into a fall in the real interest rate. The latter is the intertemporal price that activates the **intertemporal substitution mechanism**. Households are encouraged to borrow more or to save less to increase their current consumption. Simultaneously, firms are induced to invest more. The overall effect is an increase in aggregate demand.

Consumption and investment plans are stimulated not only by the conditions at which ultimate borrowers can raise funds or wealth owners can sell assets, but also by the lending activity of financial intermediaries. The implicit-guarantee channel and the other expansionary UMP tools help to avoid disruption in the credit markets by strengthening the stability in the balance sheet of financial intermediaries. This **balance sheet mechanism** operates not only in favor of

intermediaries but also in favor of borrowers, since the implied improvement in economic activity and the lowering of interest rates reduce the default risk for borrowers. Therefore, the balance sheet mechanism enhances the intermediation activity and increases the probability that credit will flow into the economy. Moreover, the implicit guarantee and the interest rate channels lead to a decline in government bond yields, therefore lowering the servicing costs of the public debt and relaxing the budget constraint of the public sector. Additional resources are then available to boost the economy and to stimulate an adequate inflation rate (**government budget constraint mechanism**).

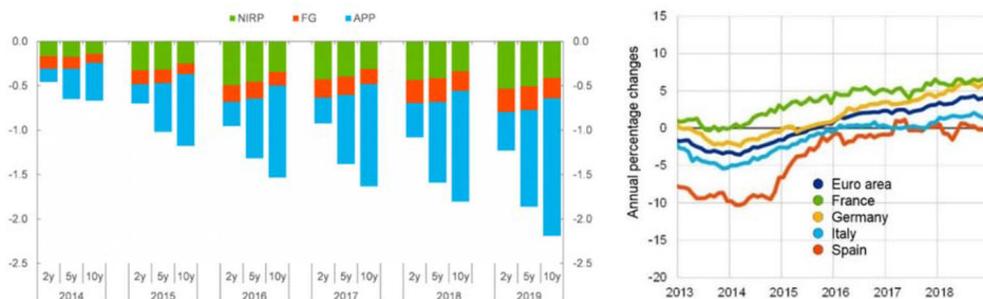
The reduced amount of unsold securities in the domestic financial markets implies a portfolio rebalancing also toward foreign denominated assets, thus contributing to an exchange rate depreciation (**exchange rate mechanism**). In the case of the euro, its depreciation increases the EA's price competitiveness, making domestically produced goods relatively less expensive than those offered by foreign competitors.<sup>16</sup> The result is, *ceteris paribus*, an expansion of domestic and foreign aggregate demand.

Almost all empirical studies agree that the ECB's APPs substantially improved financing conditions and stimulated aggregate demand within the EA. Several transmission mechanisms appear to have been activated within the channels described in the previous sub-section, reducing assets' yields and supporting bank credit. By means of alternative methodologies (e.g., event studies, structural VARs, DSGE models), empirical evidence also suggests a significant upward effect on aggregate demand, economic activity, and price dynamics. It is not our purpose here to fully review the empirical literature (see Hammermann et al., 2019; Rostagno et al., 2019). We merely focus on the selected issues which relate to the transmission mechanisms analyzed above, and we summarize the impact of the ECB's APPs on macroeconomic variables. This limitation implies that we will be unable to prove that the ECB's APPs utilized the credit channel only indirectly; however, it will allow us to consider that the ECB's APPs are part of a combined-arms strategy which includes T-LTROs and FG. Note that the inclusion of other policy tools will make it more difficult to empirically identify the APPs' specific impacts.

Existing evidence suggests that the ECB's APPs signaled that lower policy rates would have continued until at least 2017—enforcing the NIRP and FG, which are the main drivers of the ECB's signals (Rostagno et al., 2019). After the first APP announcement and in almost all the 2015 quarters, forecasts on ECB's policy rates recorded systematic decreases; and, on average, these rates were expected to decline from 11 to 6 bps for 2016 and from 43 to 31 bps for 2017 (Andrade et al., 2016; Figure 4; see also Altavilla et al., 2015). Moreover, Andrade et al. (2016) document that the implementation of the ECB's APPs led the private sector to expect a future accommodative stance of monetary policy. Finally, during the 2015–2018 period, the European portfolio rebalancing contributed to compressing yields across a wide range of assets and, due to the existing market segmentation, to decreasing asset yields also in market segments not targeted by the ECB's purchases. As far as the PSPP is specifically concerned, there was the activation of the portfolio rebalancing channel with large effects on longer maturities and risky assets (see Altavilla et al., 2015; and Zaghini, 2019).

The ECB estimates that the compression in sovereign yields due to its policies was around 100 basis points for the 10-year maturity, with a confidence interval between 70 and 130 bps (Eser et al., 2019; Hammermann et al., 2019). Figure 2a shows the relative importance of the APPs compared to other ECB policies. For long maturities, the contribution of the ECB's APPs had an incidence of greater than 50%.

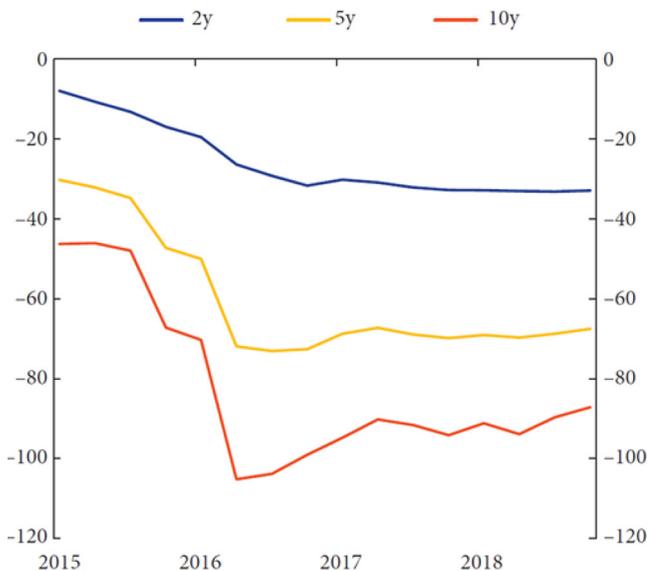
The European banking sector also played a crucial role in the transmission of the ECB's APPs to lending conditions (Hammermann et al., 2019). After mid-2015, growing increases in loan volumes



**FIGURE 2** Compression of the sovereign yield curve and the evolution of bank loans. (a) Compression of the euro-area sovereign yield curve due to the ECB's non-standard measures (percentage points)

[Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

Source: Rostagno et al. (2021), Figure 10, p. 40 [Panel (a)]. Notes: The impact of NIRP, FG, and APP on the euro-area sovereign yield curve over time is captured by the vertical bars. (b) Loans of main financial institutions (MFI) to non-financial corporations. Source: Hammermann et al. (2019), Chart 8b). Notes: Loans by MFI to non-financial corporation are adjusted for sales, securitization, and notional cash pooling



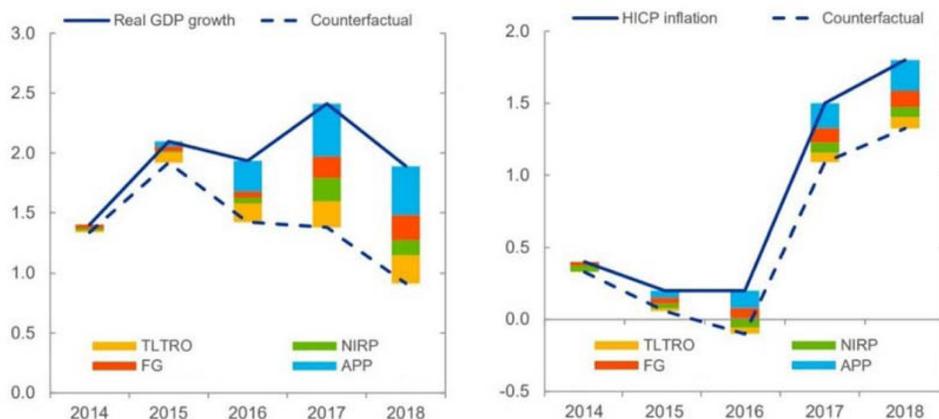
**FIGURE 3** The APP impact on euro area sovereign term premia at selected maturities

[Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

Source: Rostagno et al. (2021), Figure 6.18, p. 377)

to non-financial corporations were observed (see Figure 2b). As already stated, the ECB's APPs increased bank liquidity directly (through the purchase of government bonds held by banks) and indirectly (through the depositors' bond sales.) Hence, together with other UMP instruments, the ECB's APPs induced a credit expansion also supported by a marked decline in bank lending rates. It is difficult to disentangle the relative contribution offered to these dynamics by each of the different policy instruments. According to granular data, on average the ECB's APPs had a strong impact on the liquidity of 20% of EA banks; and, by focusing just on banks with higher holdings of sovereign bonds before the APPs started, this figure increased to 30% (Altavilla et al., 2018).<sup>17</sup>

Figure 3 shows the specific impact of APP on sovereign yields across 2-, 5-, and 10-year maturities,<sup>18</sup> estimated by Rostagno et al. (2021), Figure 6.18) with the Eser et al. (2019) arbitrage-free affine model of the term structure with a quantity factor.



**FIGURE 4** The impact of QE measures on real GDP growth and HICP inflation. (a) Actual real GDP growth, and counterfactual paths in absence of ECB's non-standard measures. (b) HICP inflation, and counterfactual paths in absence of ECB's non-standard measures. Sources: Rostagno et al. (2019), Figure 6.22, p. 307

[Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

*Notes:* The overall estimated impact of the ECB's policy measures is represented by the distance between the actual data (solid line) and the counterfactual path in absence of those measures (dashed line). The colored bars display the contribution of each policy measure

The reported empirical evidence shows that the flattening of the yield curve of sovereign debt and the increase in bank loans at decreasing interest rates played a significant role in strengthening the EA's economic recovery after the European recession (2011–2013) and before the pandemic. However, quantifying the actual impact of the APPs on macroeconomic variables is subject to several layers of uncertainty related to, for example, the methodology used, the model specification, the estimation window, and the measures for quantification.<sup>19</sup>

By analyzing the possible macroeconomic impact of the ECB's unconventional policies by means of a large suite of different models based on various methodologies, a coordinated euro-system assessment group estimates a median of 2.2 percentage points for EA real GDP growth and 1.9 percentage points for the EA inflation rate over the 2015–2018 period (Rostagno et al., 2019, p. 306). By using a BVAR approach, Rostagno et al. (2019, 2021) decompose the effects of T-LTRO, NIRP, APP, and FG on these same variables. The results are illustrated in Figure 4. The importance of the ECB's APPs is quite evident in GDP growth in 2017 and 2018.

The results from Rostagno et al. (2019, 2021) lie in the upper (lower) part of the range that includes a larger set of empirical studies relating to real GDP growth (inflation rate dynamics). Compared to dynamic stochastic general equilibrium (DSGE) models, time-series models (including BVARs) tend to produce higher (lower) estimates. The same assessment applies to the comparison between Rostagno's results and the evidence offered by SVAR models; as noted again by Rostagno et al. (2021, p. 44), Gambetti and Musso (2017) find a GDP increase of 0.02% by using quarterly data; Wieladek et al. (2016) and Lhuissier and Nguyen (2021) find a GDP increase of 0.1% by using monthly data.

Additional empirical evidence is provided by Hohberger et al. (2019). They estimate a state-of-the-art DSGE model with Bayesian techniques, assuming imperfect substitutability among assets of different maturity along the lines of the already cited preferred habitat's model (Vayanos & Vila, 2009). Considering the 2015–2018 period, Hohberger et al. (2019) find that the ECB's policies contributed for 30 bps to the average annual growth rate of the EA's GDP; they also estimate a

50-bps contribution of the APPs to the EA's harmonized index of consumer prices (HICP) inflation. According to this model, the peak of the APPs effectiveness was in 2016 (and not in 2017, as stated by Rostagno et al., 2019).

With a few exceptions, the empirical evidence examined above confirms the effectiveness of the ECB's APPs. Significant quantitative effects are also documented by studies which adopt calibrated DSGE models. Cova et al. (2015) build and calibrate a five-country DSGE model, taking account of international trade and assuming, as Hohberger et al. (2019) do, imperfect substitutability among assets of different maturities.<sup>20</sup> Concerning the ECB's APPs, they consider monthly temporary sovereign bond purchases in the EA of EUR 60 billion lasting for seven quarters with a gradual exit in the other additional seven quarters. According to the authors, by inducing a fall in the long-term interest rates and an increase in liquidity, this APP would generate a rise in the EA's real GDP and inflation rate of approximately 100 bps compared to the benchmark (i.e., model predictions without policy intervention) after 2 years. Cova et al. (2015) also document non-trivial expansionary international spill-overs, which depend on the monetary policy stances and the response of international relative prices.

Andrade et al. (2016) adapt the model of Gertler and Karadi (2013) to the EA. Thanks to a preliminary evaluation of the expanded APPs' effects on the financial markets, they document that the ECB's announcement in January 2015 reduced yields on long-term sovereign bonds and raised the share prices of banks holding these bonds. In their stylized model, financial intermediaries thus enjoyed a relaxation of the duration risk as well as of the leverage constraints, so that the implementation of this ECB APP increased inflation rate by 40 bps and output by 101 bps after about 2 years, when the peak was reached.<sup>21</sup>

Gambetti and Musso (2017) estimate a vector auto-regression (VAR) with time-varying parameters and stochastic volatility, which is identified by using a proxy variable that captures the unexpected component of the APP announcements. The APP announcements had a significant and positive impact on the inflation rate, on output growth, and on financial variables. In fact, these announcements affected the yield curve through changes in the long-term interest rates: a flattening in the short term, but a steepening in the medium term. These empirical results are consistent with the implementation of the portfolio rebalancing and, as far as we know, with the indirect utilization of the credit channels (see the previous sub-section). They also stress the importance of the euro depreciation—as it is argued by the Bundesbank (2017) and Cecioni (2018).<sup>22</sup>

### 3 | THE LONG-RUN RISKS OF THE ECB'S APP AND PEPP

In the previous section, we emphasized that a central bank's APP can positively affect the functioning of the economy through different transmission mechanisms, and that these effects are confirmed by rich empirical evidence concerning the EA from 2015 to the beginning of 2020. However, it would be a stretch to interpret these results by concluding that the ECB's asset purchases did not determine any drawback during the past 7 years, or that the observed positive macroeconomic impact will be mechanically reproduced at the beginning of 2022 and in the (near) future.

As is well known, since the first quarter of 2020, the pandemic shock has caused the worst worldwide economic depression of the last 90 years. Hence, despite the strong rebound that characterized many countries in 2021, the post-pandemic recovery will be challenging. Specifically, the consolidation of this recovery will require radical changes in the organization of production

processes, in the architecture of global value chains, in the combination of public and private investments, and in the functioning of the labor market. What is still unclear, however, is the role that the ECB's APPs could play in the EA's changing economic environment and the consequences of its future unwinding.

In the following two subsections, we will offer a provisional analysis by focusing on two aspects: (i) the potential drawbacks of the continuation of the ECB's APP until the end of 2018 and its relaunch in November 2019 in combination with other conventional and unconventional monetary policy initiatives which characterized the EA and were then strengthened as a response to the pandemic shock (Section 3.1); (ii) the risk that the ultra-expansionary monetary policy, rightly adopted by the ECB since March 2020 (implementation of the PEPP and new LTRO, besides the strengthening of the APP and T-LTROIII), will determine substantially negative impacts when it gradually unwinds, as announced in the ECB's meetings of mid-December 2021 and beginning of February 2022 (see Section 3.2).

### 3.1 | The early debate on the risks of the ECB's APP continuation

The recent economic literature stresses at least four potential drawbacks of the central bank's prolonged APPs. The concerns are related to the possible negative effects of asset purchases on bank profitability, future bubbles (due to an overvaluation of private securities and government bonds), inequalities in income distribution, and the blurring distinction between monetary and fiscal policies.

The literature emphasizes that the ECB's UMP could negatively affect **bank profitability** in case of banks' traditional business models (BIS, 2018). The ECB's UMP aims at lowering the interest rate structure and eventually flattening the yield curve so that, with everything being equal, banks' net interest income on new short-term and long-term loans falls. This impact was significant in the EA before the pandemic crisis due to the large dependence of European non-financial firms on bank lending; and it has remained important in the last years (2020–2021).

Let us focus on the mid-2014—beginning of 2020 period. The negative impact on bank profitability was strengthened by two additional elements. First, the ECB's conventional monetary policy fixed negative interest rates on the EA banks' reserves in excess of the minimum requirements (since June 2014); and banks had difficulty in absorbing the losses by applying equivalent negative rates on household deposits. Second, combined with the ECB's APP, these policy rates led to negative interest rates on a large component of European government bonds, which are purchased, for a significant part, by the European banking sector and other financial intermediaries (mainly, insurance companies).

However, it must be noted that the ECB's APP and the utilization of other unconventional tools (T-LTRO) also had positive consequences on banks' balance sheets (see above, Section 2.1). They improved the macroeconomic conditions so that the borrowing firms' insolvency risk decreased, and banks became less exposed to non-performing loans (NPLs) and unlikely-to-pay loans (UTPs). Moreover, the APP increased the market values of financial assets and of government bonds so that the asset side of banks' balance sheets incorporated capital gains which possibly more than compensated for the low or negative interest rates. These positive effects were particularly important for those banks which were deeply exposed to the borrowers' insolvency risk, and which held a large amount of national government bonds accounted as "bonds held to be sold."

Empirical evidence suggests that the positive impacts on the average European bank's profitability tended to prevail over the negative ones (see for instance: Boucinha & Burlon, 2020).

After verifying the endogeneity of the policy measures with regard to expected macroeconomic and financial conditions, Altavilla et al. (2018) find that the positive effects on loan loss provisions and non-interest income largely offset the negative effect on the net interest income.<sup>23</sup> Similar results are shown in an earlier evaluation by Demertzis and Wolff (2016), who focus on NPLs and report that bank profitability had increased at least until the end of 2015; however, this evidence should be revised in the light of the possible lagged impact of Covid-19 on NPLs and UTPs.

Although empirical evidence seems to suggest that the ECB's conventional and unconventional monetary policies from mid-2014 to the beginning of 2020 did not have a negative impact on bank profitability, a generalization of this assessment would raise further questions. It would be necessary to introduce additional factors to the picture, such as the economic cycle phase and the prevalent composition of the banks' balance sheets, and to consider that the influence exercised by each of these factors is not independent from the other.<sup>24</sup> Moreover, it should be recognized that, in the long term, the fall in interest rates and even the negative interest rates are not just determined by a series of low or negative policy interest rates but mainly depend on recessionary macroeconomic trends. From 2011 to 2019, the EA was characterized by growing negative gaps between aggregate investments and aggregate savings, so that the long-term equilibrium interest rate (the "natural" interest rate) fell. In this perspective, even if the ECB's APP and PSPP contributed to lowering and flattening the yield curve of interest rates in the short term, they should have contrasted the decreasing and negative interest rates in the long term by improving the macroeconomic conditions, and hence by promoting increases in investments relative to savings and reducing the downward pressure on long-term equilibrium interest rates.

This last factor, as well as a large part of the others analyzed, has become even more important during the pandemic crisis. It is however worth noting that the large incidence of public guarantees and moratoria and the temporary weakening of financial regulation and accounting rules reduced the balance sheets' constraints and improved the profitability of EA banks in the 2020–2021 period. The unsolved question regards the impact deriving from the upcoming withdrawal of these exceptional interventions. Hence, it is not surprising that the ECB (2021) stresses that EA banks have improved their capitalization and resilience after the international financial crisis but remain characterized by weak profitability prospects.

A second cause for concern is that the ECB's APP could lead to an overvaluation of financial assets and government bonds, and that this overvaluation could imply a **financial bubble** bursting in the near future. The bank-centric structure of the EA's financial markets apparently weakens the significance of this risk. Moreover, empirical evidence shows that equity valuations were in line with historical standards in the first stage of the UMP and that the data did not signal exuberant price dynamics for government bonds also in the years preceding the economic stagnation of 2018–2019 (see Blot et al., 2017; Cecchetti & Taboga, 2017; Droes et al., 2017; ECB, 2018). Hence, the risk of asset price bubbles was not a major concern in the EA at the peak of the recovery after the international crisis.<sup>25</sup> The question becomes: does this conclusion still apply to the pandemic phase and the current situation (beginning of 2022)?

To address this question, it is important to take into account three empirical elements. First, leaving aside a severe but very short decrease in shares' and bonds' prices during March 2020, the trends in the EA (and the US) financial markets were very positive and the financial volatility astonishingly low in the last 2 years, despite the health and economic uncertainties. This trend can be explained by a second and a third element, which are strictly related. The second derives from the huge amount of liquidity in the hands of EA financial intermediaries, non-financial firms, and households. An excess of liquidity already characterized the period preceding the pandemic shock due to the long-lasting ECB's UMPs; however, the ultra-expansionary monetary policy

implemented by the ECB since March 2020 indirectly allowed a dramatic growth in public spending at national levels and a consequent further increase in the financial wealth held by European agents. The third element is due to the allocation of this increased financial wealth. Even though the incidence of the most liquid assets in the EA's financial portfolios underwent a significant increase in 2020–2021, a part of the additional liquidity was utilized to purchase those assets with expected positive returns, that is, risky assets.

Regarding the allocation of the increased financial wealth, let us note that the falling net interest incomes and the possibility for re-financing at negative interest rates by the ECB through the T-LTROIII have made it worthwhile for European banks to “bet” on the increases in financial market prices due to the ECB's purchases in the secondary markets. Analogous bets have been made by insurance companies and pension funds on the portfolio components exceeding the regulation constraints. Finally, the wealthiest households have pursued similar choices to avoid negative or zeroing nominal returns. These strategies have pushed the main actors of the European financial market to increase the riskiness of their portfolios and to the overpricing of many financial assets. Hence, even if the risk of asset price bubbles was not so high in the second part of the 2010s, we would not be ready to extend this conclusion to the situation characterizing the beginning of 2022.

The third concern is that, by increasing financial asset prices, the ECB's APP may have caused undesirable **income and wealth redistribution effects**. It is obvious that increases in financial market prices favor financial asset holders, who are concentrated in the income and wealth upper deciles. In the EA this reverse “Robin Hood effect” could have led to the allocation of a part of the increased financial wealth in additional “real” (including the housing) and financial assets, thus contributing to further increases in their prices. Moreover, if prolonged over a significant but temporary time span (as is actually happening in the EA), these trends tend to imply perverse distributional effects across generations, since young people—differently from the elderly—need to buy assets for their retirement so that their future real wealth will be negatively affected by the current peaks in asset prices. Finally, low-income pensioners could have suffered an erosion of their financial rents due to the low (or even negative) interest rates.<sup>26</sup>

Nevertheless, the ECB's APP may have also produced opposite effects on income and wealth inequalities for three reasons. First, having contributed to a reduction of the long-term interest rates, it could have favored people with high debt service to income ratio; and these people are usually low-income households.<sup>27</sup> Secondly, the abovementioned fact that—*ceteris paribus*—house prices have been positively affected by the ECB's APP could have favored the middle class. In the EA, a significant part of the income and wealth of middle-class people is devoted to serving debt mortgages; hence, these people have benefitted from a reduction in mortgage interest rates as well as from positive collateral and wealth effects. Thirdly, as already stated, the ECB's UMPs stimulated economic activity and employment before the pandemic shock; moreover, these monetary policies had indirectly strengthened social protection from the pandemic's impact on economic activity and unemployment. These macroeconomic effects have been particularly positive for poorer people, whose main source of income comes from wages and whose employment positions are low-skill and—as such—less stable.

It follows that, although inequality is not a target for central banks, the ECB should have taken it into account as a side effect of its policies since increasing inequality can worsen economic instability during a depression and can be detrimental for long-term growth and the inflation rate (Darvas & Wolff, 2014). However, even in the case of income and wealth distribution, it is difficult to assess the net impact of the ECB's APP.<sup>28</sup> Empirical evidence shows that the pandemic crisis increased social inequalities and poverty in the EA, even if at a lower degree than in other advanced economic areas; however, it is too early to assess whether these increases have

been weakened or strengthened by the ECB's monetary policy. In this respect, the only empirical evidence available refers to the years preceding Covid-19.

This evidence argues that the ECB's UMP had a non-negative impact. Focusing on micro data from the four largest EA countries, Ampudia et al. (2018) point out that the APP led to a modest reduction in income inequality, which was mainly driven by its impact on the unemployment rate of low-income households. Similar results are obtained by Lenza and Slacalek (2018), who find that the APPs and T-LTROs compressed income distribution, while they had only negligible effects on wealth inequality. Similar results are documented, for example, by Casiraghi et al. (2018) for the Italian case.

The main cause for concern about the ECB's UMPs is the fourth effect listed at the beginning of this section: the ECB's APP and its other tools could have **blurred the distinction between monetary and fiscal policy** and allowed for a set of national fiscal policies incompatible with the corresponding national fiscal capacity. In this respect, it has been argued that the ECB's APPs have encouraged opportunistic behavior on the part of national policymakers, delayed the implementation of structural reforms, and slowed down the efforts for fiscal consolidation in countries with huge government debt.

Benigno et al. (2021a) show that the restrictive or neutral stance of the EA's fiscal policies in the 2011–2019 period overburdened the ECB's role: monetary policy remained the “only game in town,” so that relationships between fiscal and monetary policies in the EA were characterized by fiscal and financial dominance.<sup>29</sup> Hence, we are ready to recognize that the ECB's independence was severely threatened before the pandemic shock; and that, despite the new and more balanced “policy mix” attained in the EA during recent years (2020 and 2021), fiscal and financial dominance could retake center stage in the post-pandemic period. However, differently from the thesis found in some of the recent literature, Benigno et al. (2021a) maintain that fiscal and financial dominance have not implied extended overlapping between monetary and fiscal policies. In the following paragraphs, we focus only on this point to show that most of the concerns supporting the opposite view are not supported by a well-founded theoretical apparatus and strong empirical evidence.

From a theoretical point of view, the border between monetary and fiscal policies would blur if monetary policy decisions were not inspired by the need to have transmission mechanisms function properly. In this respect, it is true that APPs can have a risk-sharing impact (even if limited and temporary) and can, thus, produce a “public good” in the EA. However, these results do not improperly occupy the space of fiscal policies; they simply aim at transmitting the monetary impulses to the real economy by reducing the risk of bank hoarding and of new forms of the “liquidity trap.” APPs thus emphasize the complementarity between monetary and fiscal policies, in the sense that the effectiveness of the monetary policy is an essential condition for an efficient national fiscal policy.

By reducing the uncertainty of price dynamics in 2014, the ECB's APP strengthened the confidence of different agents regarding the evolution of the European economy and improved the political consensus concerning reform implementation (Visco, 2015). As clarified by Corsetti et al. (2006), this result specifically applies to negative economic phases through the confidence channel: by avoiding self-fulfilling sovereign debt crises and deflationary spirals, an expansionary UMP is more likely to support than to dis-incentivize the implementation of national reforms by increasing their expected benefits. It follows that, in a monetary union, this UMP tends to support efforts aimed at consolidating the fiscal balances of some members because it operates as a sort of risk-sharing mechanism reducing the probability of contagion and domino effects (Canofari et al., 2019).

Along these lines, empirical evidence shows that the downward shift of the interest rate structure tended to promote national reforms in the period after the international crisis (Dias Da Silva et al., 2017). This evidence is strengthened by the opposite mechanism: the lack of reforms increased the probability of sovereign debt crises and required monetary and fiscal policy adjustments with huge potential costs (e.g., Del Giovane et al., 2017; Neri & Ropele, 2015).<sup>30</sup>

### 3.2 | The problem of the UMPs' unwinding after the pandemic

In the recent meeting of mid-December 2021, taking into account the rise in the EA's inflation rates, the promising revival of European economies and the restrictive moves of the Federal Reserve, the ECB announced that the PEPP will not be extended beyond the scheduled deadline (March 2022) and that the T-LTROIII will probably end in June 2022 with the last scheduled operation. As we pointed out above (see Section 1), these decisions have been counterbalanced by a temporary strengthening of the APP, the reinvestment of the proceeds from securities purchased under the PEPP and at maturity until the end of 2024, and the invariance of policy interest rates, so that the stance of the ECB's monetary policy will continue to be moderately expansionary. However, as confirmed by the meeting of February 2022, the signal is clear-cut: in the absence of new negative shocks, the near future will be characterized by the unwinding of the ECB's UMPs.

Unwinding does not necessarily imply reducing to zero all unconventional programs. Indeed, the ECB's decision to restart the ECB's APP already in 2019 could be interpreted as a way to signal that asset purchases could be transformed into a "standard" monetary tool to manage business fluctuations, especially in the face of significant recessions. In light of these considerations, which are the consequent risks of unwinding of APPs specifically for EA countries with high public debt?

The answer to this question depends on many unknown factors, such as the post-pandemic economic and productive reorganization, the related degree of progressive centralization of European fiscal policies, the dynamics of the inflation rate, the process of convergence between different member states, and the evolution of European financial markets. We are obviously unable to elaborate a forecast of these factors and to offer a related analysis of the appropriate intensity of the UMPs' unwinding by the ECB.<sup>31</sup> We are also unable to propose an educated guess on the macroeconomic impact of this unwinding. Our contribution consists of focusing on some specific points that re-elaborate the previous considerations and could open a theoretical and empirical discussion on monetary policy's evolution in the EA.

The contemporaneous expansion of fiscal and monetary policies implemented during the pandemic crisis satisfies a recurrent ECB claim and is the fundamental ingredient for relaunching the EA's economy. We know that the NGEU will continue at least until 2026. In this new framework, if the war at the eastern border of the EU and the related bottlenecks in the energy goods and other raw materials did not cause a stagnation in the EA and a further acceleration in its inflation rates, we would hope that economic agents will regain confidence and put into circulation the huge amount of liquidity that was locked up in financial circuits during the crisis.

The return to normality of the monetary policy stance, when the ZLB or the ELB are no longer binding, implies that the ECB starts to raise the policy interest rate to put the inflation rate under control. At first, the huge stock of long-term securities held by the central bank can mitigate the effects of the new contractionary monetary policy stance. This stock is the result of the past purchases of long-term securities that made the interest rate channel in lowering long-term interest rates effective. Therefore, despite the increase in the short-term policy rate above the ZLB, the ECB's past asset purchases could still calm the rise in the long-term interest rates. In

principle, the central bank could continue using FG to direct market expectations on future rates in a way as to control the long-term tail of the yield curve. However, if the new stance on monetary policy persisted over time, the ECB would have to sell—even gradually—a non-negligible part of its existing stock of securities. These sales should produce a more significant rise in long-term yields and, therefore, result in a more contractionary monetary policy in the medium-long term.

The latter effect cannot be compensated for by the credit easing and implicit-guarantee channels. At first, the existing stock of assets purchased in the past by the ECB could calm the securities and credit spreads even through these two channels. However, if the spreads are “normal” for ‘normal’ times, in the medium-long term this effect will vanish or will not necessarily produce a more expansionary policy than the one the central bank aims to implement.

The consequences of the unwinding of the ECB’s monetary policy could be even worse. In fact, the contractionary impact of the new monetary stance could be strengthened by the interest rate and the credit easing channels. The effectiveness of these two channels in transmitting the expansionary APPs was significant because the central bank also purchased securities under stress, which unveiled a default problem rather than a liquidity problem for the issuer. When the central bank starts selling these securities, if the old default problems concerning a given country and/or its companies are still not solved, there will be a substantial and multiplied increase in the related yield curve and spreads. Moreover, the increase in credit spreads would directly affect the banking sector of this country, worsening banks’ balance sheets and restricting lending.

The above concerns are amplified by the implicit-guarantee channel. During the expansionary APPs, this channel signals to the market that the central bank is providing implicit backing to the issuer of securities, therefore extending the risk-free properties of the central bank’s liabilities to those of the issuer. The unwinding of the APP could change the market perception of whether this implicit backing is really in place. Hence, the impact of the unwinding could also result in a loss of access to the market for issuers (government or private agents) with a potentially unsustainable stock of debt. In other words, the likely unwinding of the ECB’s APPs could be accompanied by a dramatic rise in spreads for countries that—at that time—still have not achieved a significant adjustment in their balance sheets to fully restore the sustainability of their debt. Consequently, a financial crisis could not be ruled out and could require recourse either to Outright Monetary Transactions’ (OMT) facilities or to the European Stability Mechanism’s (ESM) aid programmes with the related conditionality. In such a case, the usefulness of the APP as a monetary policy tool, through the interest rate and credit easing channels, can be offset by switching on and off the implicit-guarantee channel.

Our analysis thus emphasizes that the possible negative impacts of the APPs’ unwinding in the near future are directly related to the intensity of the ECB’s previous utilization of UMPs. During the expansionary phase, the PEPP substantially contributed to the effectiveness of the interest rate and the credit easing channels; and it significantly reinforced the perception of an implicit guarantee extended by the ECB on the EA’s government debts. As observed, a direct effect of this perception has been the significant fall in the sovereign spreads among the EA’s more indebted countries, on the one hand, and the EA’s ‘core’ countries, on the other, since the second half of March 2020. However, it is obvious that a strong and prolonged PEPP will also worsen the consequences of its unwinding mainly through the implicit-guarantee channel. Together with the *de facto* suspension of the SGP, the ECB’s extraordinary expansionary monetary policy allowed for the national expansionary fiscal policies of EA countries with low fiscal capacity; hence, the unwinding of this monetary policy could highlight the fragility of these countries’ balance sheets and worsen the sovereign debt crisis in the post-pandemic European economy.

To avoid these consequences, it is necessary that the process of the ECB's unwinding put all the potential negative effects under strict control. This implication is further strengthened by the well-known fragility of the EA's architecture: there is one central bank and many fiscal policymakers, thus there is no single public debt that the ECB can implicitly back—as it happens in countries such as the US and the UK. To limit this fragility, it would be necessary to match the gradual implementation of the UMPs' unwinding and the centralization of the EA and EU fiscal policies. The NGEU initiative could be the first step in that direction, opening the possibility to develop “vertical coordination” between a centralized fiscal policy and national fiscal policies (see Buti & Messori, 2021).

## 4 | CONCLUSIONS

Surveying the existing literature, our analysis has argued that the APPs and the PEPP have become a part of a complex combined-arms strategy, which also includes T-LTROs and FG, in the face of huge adverse events such as the beginning of the EA's depression triggered by the Covid-19 shock. However, the novelty raises new potential concerns. Significant risks may be associated with the way the purchase programmes operate and will evolve in the EA and the EU. In this respect, we have stressed how the working of the so-called implicit-guarantee channel could be problematic, especially in the EA's current architecture, due to the absence of fiscal backing in normal time. The implicit-guarantee channel, in fact, could lead to some sovereign debts deleveraging.

Our analysis has suggested that the APPs can become a “standard” tool for stabilization purposes according to the interest rate channel because they can affect long-term yields across various securities markets. In this conclusion, it can be interesting to list other policy instruments that can be used to shape the yield curve in the desired direction without the drawbacks brought about by the implicit-guarantee channel of APPs.

As already stated, the first alternative is enhancing current FG policies. Note that, by paying the interest rate on reserves, a central bank determines the short-term risk-free interest rate in its economic area. It is worth noting that this policy is not constrained to the short-term interest rate but should involve all the future policy rates. This could be done by transparently communicating the contingent path of future policy rates. Ideally, if this communication was effective and credible, market participants could incorporate this contingent path into the price of long-term securities.<sup>32</sup> The second alternative is to focus on the yield-curve targeting, according to which the central bank communicates a cap or a target for long-term rates at a certain and defined maturity. This control may or may not involve purchases of securities. Indeed, in accordance with the same principle for which FG can be effective for controlling long-term rates, yield curve control can happen without any market intervention, given that a central bank can specify and control current and future policy interest rates. The third alternative for controlling long-term rates is to issue the central bank's deposit with longer maturity. The interest rate set on this long-term deposit would, thus, determine the risk-free long-term rate at the same maturity. In this case, appropriate asset purchases can be useful for reducing any resulting variability in the central bank's profits generated by this policy.

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## ENDNOTES

<sup>1</sup> At the end of 2008, the ECB's policy rate was 2.5%. It reached 0.15% in June 2014 and 0.05% in the next September, despite two astonishing upward adjustments in the spring of 2011. The ECB implemented expansionary policies already at the peak of the “doom-loop” (December 2011 and February 2012). However, these initiatives still utilized conventional tools: two longer-term re-financing operations for the European banking sector (LTROs), implying the “full allotment” of the borrowers' total demand at a fixed and low interest rate (around 1%) and with poor collateral requirements.

<sup>2</sup> The ECB had already purchased government bonds in the period of May 2010–September 2012 through the securities markets program (SMP) to contribute to the handling of the sovereign debt crises of the EA's weakest member states; however, the additional amount of liquidity thus injected into the economic system had been fully sterilized. As part of the SMP, the ECB spent about EUR 218 billion between May 2010 and September 2012, with an average monthly purchase of about EUR 12 billion (Eser & Schwaab, 2013). At the end of the financial crisis and at the peak of the EA crisis, the ECB had also launched limited purchases of private long-term assets through the covered bond purchase program (CBPP1: July 2009–June 2010; and CBPP2: November 2011–2012).

<sup>3</sup> These proportions were adjusted to account for the participation in the ECB's capital of the European Union (EU) member states which did not belong to the EA and were not involved in the PSPP.

<sup>4</sup> The path of the monthly amounts of purchases is based on the ECB's announcements. It includes both APP and PEPP. The ECB's APP announcements report monthly resources, while the PEPP ones report the total resources. Therefore, between March and May 2020, the PEPP's monthly amount is obtained by averaging from the March announcement of EUR 750 billion until the end of 2020 (March 18, 2020 announcement). Then, the PEPP's monthly average is obtained by considering the June 4, 2020 announcement of the increase to EUR 1350 billion until the end of June 2021—adjusted by the PEPP resources already used at the time of the announcement. In December 2020, the ECB further strengthened the PEPP from EUR 1350 to EUR 1850 billion; and in December 2021, it announced the end of the PEPP after March 2022. Hence, since December 2020, the PEPP monthly average is calculated according to these new decisions.

<sup>5</sup> The ECB also strengthened the Targeted-LTRO (T-LTRO), launched in the summer of 2014, by allowing bank refinancing at zero or negative interest rates. This refinancing program was labeled T-LTROIII.

<sup>6</sup> This figure should be augmented by the principal payments from maturing securities held in the APP portfolios.

<sup>7</sup> As emphasized by Messori (2020), the ECB also decided to significantly strengthen the T-LTROIII (June 2020 to June 2021) and announced a new LTRO to incentivize banks to finance the economic system.

<sup>8</sup> It also makes the identification of the effects of the APP and PEPP much more difficult to detect, as we will later discuss.

<sup>9</sup> It is worth noting that the APP transmission channels are well-described by other studies, which stress their different aspects by using, sometimes, slightly different taxonomies and terminologies. In this respect, see Andrade et al. (2016), Neri and Siviero (2018). It is also worthwhile to analyze the direct effect exerted by the central bank's announcements of long-term asset purchases in orienting the private sector's self-fulfilling expectations towards a “good” equilibrium in a multiple equilibrium context (Benhabib et al., 2001; Gurkaynak et al., 2005). In the ECB's case, many authors refer to this channel as the re-anchoring one because it moors the private sector's expectations to the ECB's long-run target, avoiding deflationary traps (e.g., Andrade et al., 2016). A similar argument is used to state that the ECB's announcements of APPs may steer the private sector's expectations to the “good” equilibrium, avoiding public defaults (Corsetti & Dedola, 2016) or bank runs (Gertler & Kiyotaki, 2015).

- <sup>10</sup> It is worth mentioning that Wallace's proposition rests upon a no-arbitrage argument mutated from Modigliani and Miller (1958). Hence, as stated in the following, it is subject to analogous restrictive assumptions.
- <sup>11</sup> See, among others, Curdia and Woodford (2011), Gertler and Karadi (2011, 2013). For a theoretical approach, see Woodford (2012).
- <sup>12</sup> It is well known that the EA's banking sector held (and, in some countries—specifically Italy, still holds) an excess of government bonds in its balance sheets (Véron, 2017). The main feature of this holding is the home bias: especially in the most fragile EA member states, the purchases of the banking sectors concentrate on their national government bonds, thus strengthening the “doom-loop” risk between a possible new sovereign debt crisis and the liquidity or solvency crisis of the banking sector (Dell'Ariccia et al., 2018). Hence, even if accounting rules imply that the banks' holding of European government bonds is risk-free and does not affect capital requirements, and even if this holding allows for a kind of carry-trade with a positive short-term impact on banks' profitability, the possibility to reduce an excess of national government bonds increases the stability and flexibility of banks' balance sheets.
- <sup>13</sup> The prohibition is reinforced by the clarification provided for in Council Regulation (EC) No 3603/93.2, stating that secondary-market purchases cannot be used to circumvent the prohibition of monetary financing.
- <sup>14</sup> Given the role of the dollar as the international reserve currency, the US treasury benefits of another exorbitant privilege that implies the sustainability of its debt and recurrent fiscal deficit at very low risk premia with respect to other securities. Moreover, the reserve status of the dollar contributes to making current account imbalances sustainable. On these aspects, see for instance: Gourinchas et al. (2010).
- <sup>15</sup> See, among others, the studies based on microdata from Koijen et al. (2017) and Bergant et al. (2020).
- <sup>16</sup> This mechanism was particularly effective at the beginning of the process, that is, when the first ECB's APP was announced at the end of 2014 (Bundesbank, 2017; Cecioni, 2018).
- <sup>17</sup> According to Hammermann et al. (2019), almost half of the increased amount of loans in 2018Q3 can be attributed to the effects of the APPs.
- <sup>18</sup> Sovereign yields are derived using GDP-weighted averages of the yields of the big-four sovereign issuers (Germany, France, Italy, and Spain).
- <sup>19</sup> Hutchinson and Smets (2017) provide a clear discussion on the reliability of the different methodologies and discuss the empirical evidence for the Fed's and Bank of England's policies. See also Borio and Zabai (2018), Neri and Siviero (2018), and Carlson et al. (2020).
- <sup>20</sup> The assumption is that assets of different maturities provide different liquidity services.
- <sup>21</sup> The model of Gertler and Karadi (2013) is also used by Sahuc (2016), who finds significant effects of the ECB's APP. Considering a one-year policy, the study shows an impact of 20 and 10 bps on output and the inflation rate, respectively. A two-year policy leads to an increase of the average growth and inflation rate by 60 bps. Finally, Mouabbi and Sahuc (2019) formalize a shadow EONIA rate in a DSGE model. Focusing on the APP in the EA (2014–2017), they show that year-on-year average GDP growth and inflation rate would have been lower by 110 and 60 bps, respectively, in the absence of this policy.
- <sup>22</sup> Belke and Gros (2019) maintain, instead, that the impact of the ECB's QE was moderate. Their results represent a minority position.
- <sup>23</sup> These authors consider the impact of the ECB's policies on bank profitability by using, both, accounting data for a cross-section of European banks and bank-level data (focusing on the impact on profitability components using a dynamic multivariate macro model). They also assess the impact of the ECB's policies on banks' market valuations and credit risk.
- <sup>24</sup> Let us add two points that make the assessment even more complex. First, in launching its new APP (September 12, 2019), the ECB tried to mitigate the effects of its decision to increase the negative interest rate on banks' reserves in excess of the minimum requirements (from -0.40% to -0.50%). The ECB adopted a two-tier system which applies to the excess liquidity held by banks in their current accounts with the Eurosystem, but not to banks' holdings of the ECB's deposit facility. This system has replaced the -0.50% interest rate with a 0 rate for a multiple of 6 of each of the banks' minimum reserve requirements since October 30, 2019. Secondly, banks are not the financial intermediaries most hit by the negative interest rates. At least in the EU countries where insurance contracts are largely based on a minimum positive return clause (e.g., in Germany), insurance companies and pension funds are experiencing difficulties in meeting this clause and, at the same time, in allocating a large part of their financial portfolios to safe assets, as required by the EU regulation, if these safe assets have a negative return (see ECB 2021).

- <sup>25</sup> Even in the case of a country-specific asset overvaluation, there is no need to depart from the monetary stance as financial tensions can be solved by region-specific macroprudential policies designed to stabilize the financial allocation of private wealth (Burlon et al., 2018).
- <sup>26</sup> Apparently, the European welfare system should protect young people as well as pensioners from these distortions, which are implicitly based on a “life-cycle model” conditioned by the US institutional setting (see Modigliani 1986; Deaton 2005). However, it must be noted that social protection is decreasing even in the EU and in the EA.
- <sup>27</sup> In the EA, according to the ECB’s Household Finance and Consumption Survey, this ratio is decreasing in income distribution. The ratio is about 0.24 for the bottom 20% of the distribution, whereas it is around 0.10 in the top 10%. The ratio is instead hump shaped in wealth distribution. In fact, a peak (0.18) is observed in the 40%–60% range of the distribution. See Claeyns et al. (2015, figure 6) for further details.
- <sup>28</sup> See Claeyns et al. (2015) and Ampudia et al. (2018) for detailed reviews on how monetary policy directly and indirectly affects income and wealth inequality.
- <sup>29</sup> Benigno et al. (2021a) use the definition of fiscal dominance, which implies that national policymakers are incentivized to build unsustainable public deficits and debts, eventually leading to central bank interventions through lower policy interest rates or purchase of government bonds.
- <sup>30</sup> Fiscal consolidation plans without monetary policy support might be very costly in terms of output and employment reduction (for the Italian case see Acocella et al., 2020).
- <sup>31</sup> When this paper was completing, a new dramatic exogenous shock hit the EU and EA: The Russian invasion of Ukraine. Despite this new shock, the ECB’s meetings of March 2022 confirmed (and even strengthened) the monetary policy decisions taken in December 2021. PEPP ended last March, and APP’s light expansion will last by the end of next June so that the program can be concluded in the third quarter of 2022. This evolution of monetary policy increases uncertainty, and it would make any forecast even more ventured.
- <sup>32</sup> Changes in the ECB’s strategy are moving in this direction (see Benigno et al., 2021b).

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