The ECB's Asset Purchase Programmes: Effectiveness, Risks, Alternatives

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Abstract

We summarise the empirical evidence on effects of asset purchases in the euro area, including the PEPP programme launched in response to the COVID-19 crisis. We conclude that QE is particularly effective during times of high financial stress, i.e. at the peak of a crisis, but tends to lose impact over time. At the same time, QE policies come with prominent risks which may materialise only in the longer term. We suggest a scheme of rule-based intervention in sovereign debt markets that preserves the role of yield spreads as a market signal, while containing the risk of bad equilibria.

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LIST OF ABBREVIATIONS

APP   Asset Purchase Programme

CDS   Credit Default Swap

DFR   Deposit Facility Rate

ECB   European Central Bank

FOMC   Federal Open Market Committee

LSAP   Large Scale Asset Purchases

LTRO   Longer-Term Refinancing Operation

PEPP   Pandemic Emergency Purchase Programme

PSPP   Public Sector Purchase Programme

OMT   Outright Monetary Transactions

PELTRO   Pandemic Emergency Longer-term Refinancing Operation

QE   Quantitative Easing

SMP   Securities Market Programme

SVAR   Structural Vector Auto Regression

USD   US Dollar

VAR   Vector Auto Regression

VECM   Vector Error Correction Model

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EXECUTIVE SUMMARY

- **The ECB's asset purchases have been particularly effective in stabilising financial market conditions during times of high financial distress, i.e. at the peak of a crisis. There are, however, tendencies of decreasing efficacy over time.** Asset purchases have a stronger effect on risk perception compared to inflation expectations. Effects of quantitative easing (QE) on output and inflation are highly uncertain. Effects on "periphery" relative to "core" countries seem to be larger. While there is strong evidence for a stabilising role of asset purchases in the short term, it is less clear to what extent the effectiveness of QE is lasting over time. The available APP evidence points in the same direction as the international evidence, with the effects on euro area long-term yields, output, and inflation being somewhat smaller compared to the US and the UK, but larger than for Japan.

- **Large scale asset purchases by the central bank may lead to unintended side-effects which need to be taken into account.** Important potential drawbacks of QE policies include decreasing the incentive to engage in fiscal consolidation and structural reforms, putting undue constraints on future monetary policy, encouraging excessive risk-taking in the financial sector, reducing the growth potential of the economy via a misallocation of resources, a "zombification" effect, and increasing wealth inequality.

- **First assessments of the effect of the emergency programme in response to COVID-19 suggest a substantial stabilising impact on financial market variables as well as on the outlook for economic activity and inflation but could be skewed to the upside.** While asset purchases have been instrumental to stabilise sentiment in the acute crisis, it remains unclear what the contribution of additional liquidity is once uncertainty has returned to normal levels.

- **While QE seems to have become a standard policy measure over recent years, a sustained policy of large-scale asset purchases entails substantial side effects and risks.** Asset purchases of the ECB have been successful in stabilising expectations and supporting growth in the euro area over recent years, but at the same time allowed other policy areas not to deliver on important policy challenges. A cost-benefit analysis of asset purchases and QE is complicated by the difficulty to quantify its exact effect on the economy as well as the side risks. Using asset purchases not regularly but only under extraordinary circumstances is a possible strategy to consider because of both, the emerging evidence that QE is particularly effective in times of crisis and the risk that unintended side-effects build up over time.

- **To help create an environment that would enable the ECB to exit from QE, we suggest the introduction of a rule based fiscal back-stop mechanism for sovereign debt risk premia.** Bond yield risk premia of Member States would be allowed to fluctuate freely in the capital markets, but only up to a politically chosen ceiling, of say 500 basis points, at which a common institution funded by solvent euro area Member States would intervene to cap the yield spread. This would preserve the role of yield spreads as a market signal, incentivising Member States in progressing with structural adjustments, while fully containing the risk of shifting to bad equilibria due to non-fundamental market movements.

1. INTRODUCTION[1]

Asset purchases, originally designed as an emergency measure, have become a standard tool of monetary policy in an environment of persistently low interest rates. In response to the Global Financial Crisis, many central banks have lowered their policy rates to the effective lower bound. Subsequently, they have implemented a variety of unconventional monetary policy measures with the aims of stabilising financial markets, increasing inflation and inflation expectations, and stimulating economic growth. While these measures were initially thought as temporary departures from conventional monetary policy, in many economies the effective lower bound has been binding for several years now. In others, like the US economy, the effective lower bound has become binding again during the current recession, following a temporary return to positive though still low policy rates. One major reason for the persistently low policy rates is the series of crises that occurred over the last years, starting with the Global Financial Crisis followed by the euro area sovereign debt crisis, a period of pronounced weakness in the global economy associated with the meltdown of commodity prices in the mid-2010s, and the current COVID-19 crisis, leaving not enough time for a lasting recovery. Further, estimates of the natural interest rate have decreased since the Global Financial Crisis, so that the effective lower bound might bind more frequently in the future even in the absence of severe crises. Therefore, many economists expect the usage of unconventional monetary policy to remain an integral part of central banks' toolkits for the foreseeable future.

The ECB's response to the ongoing COVID-19 crisis and its adverse impact on the economy includes another large increase of asset purchases. The pandemic emergency purchase programme (PEPP) was announced on 18 March, amounting to EUR 750 billion until the end of 2020 (ECB, 2020a) on top of the asset purchase programme (APP) already in place.[2] In doing so, the ECB aims to "*ease financial conditions in order to avoid adverse feedback loops between the financial system and the real economy, support confidence and proactively respond to the downward shift in the outlook for growth and inflation*" (Lane, 2020).

In this paper**, we summarise the empirical evidence on the effects of asset purchases, review potential effects of the (PEPP) programme, and discuss perspectives for monetary policy as well as alternatives to QE.** We start by presenting evidence based on the ECB's APP and QE programmes of other central banks on the likely effects of such policies (Section 2). Key takeaways are that QE is particularly effective in stabilising financial market conditions during times of high financial stress, i.e. at the peak of a crisis. There are, however, tendencies of decreasing efficacy over time. Further, the effects of QE on output and inflation are highly uncertain. Overall the effects seem to be larger on "periphery" relative to "core" countries. The range of estimates and the uncertainty surrounding these is, however, large so that there is the possibility that stabilisation effects on output and inflation could be possibly low. This particularly holds for periods when the most acute phase of a crisis is over. Potential drawbacks and side-effects are discussed in Section 3. We proceed by pointing out potential effects of the PEPP (Section 4). We conclude by discussing alternatives to QE (Section 5) and propose a ceiling strategy which would allow price signals in sovereign debt markets to work in principle, but restrict bond yield risk premia of Member States to increase only up to certain level.

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[1] The authors thank Lisa-Marie Ebner and Christina Graf for excellent research assistance.

[2] The Corporate Sector Purchase Programme (CSPP) was also expanded to new asset classes, such as commercial papers.

2. EFFECTIVENESS OF THE ECB'S ASSET PURCHASE PROGRAMME (APP)

2.1. Estimation methods of QE effects

A number of studies have estimated the effects of the ECB's APP on long-term bonds and other financial variables. Results across studies are comparable insofar as all studies investigate the same program. However, the assessment of persistency differs as some studies focus on effects around announcement dates, while others consider cumulative effects from the 2015-start of net asset purchases until its end in December 2018. This difference is based on the different methods. Two approaches prevail: event studies and vector autoregressions (VARs).

Event studies use high-frequency data to study the effect of central bank announcements on financial market expectations and variables. To do so, the announcement effect is captured within a short event window ranging from one hour to one or two days around the announcement. To establish causality, two key assumptions need to hold: first, the announcement is assumed to be the sole driver of changes within the chosen time window and second, the announcement was not triggered by financial market dynamics at the time of announcement (Gertler and Karadi, 2013). To ensure that the effects are not distorted by other economic news announcements within the chosen time window, one can control for these using regression techniques. While the event study approach is very useful in context of identifying causal effects of unconventional monetary policy announcements, it has important limitations. Firstly, anticipation effects of market participants are not considered so that only the surprise element of the announcement is captured which, secondly, hinders comparison across different policy measures.[3] Thirdly, as the identification of the causal effect only works in a high frequency environment, studying the announcement's impact on slow-moving macroeconomic variables, such as output and inflation, as well as its persistency is either not feasible or requires very strong assumptions.

VARs, on the other hand, estimate systematic correlations between the policy instrument and relevant macroeconomic variables. To study the effects of unconventional monetary policy, typically the volume of the central banks' balance sheet is considered as the policy instrument. Recently, shadow rates have also been used as an alternative measure (see, e.g., Elbourne et al., 2018, or Elbourne and Ji, 2019). By imposing restrictions on the relationship among the variables included in the VAR, unconventional monetary policy shocks can be identified so that the effect of these shocks on the macroeconomic variables can be assessed. While the restrictions usually stem from theory, identification remains challenging and the restrictions might remain disputable. Further challenges emerge from the relatively short sample available to study unconventional monetary policy as well as the difficulty to disentangle effects from different unconventional monetary policy measures in context of monthly or quarterly data and their distinction from anticipation effects.

High frequency monetary policy shocks can also be included in VAR models. Some studies have also used high-frequency comovement around policy announcements of interest rates and stock prices to disentangle different effects of monetary policy: the idea is that a surprise policy tightening raises interest rates and reduces stock prices, while a complementary positive central bank information shock raises both (Kersenfischer, 2019).

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[3] When using high frequency data, anticipation effects can be partly included by performing regressions around a 24-hour window before and after an announcement.

2.2.   Euro area evidence: financial markets effects

The empirical evidence on the ECB's APP suggests that the APP significantly reduced bond yields across the euro area, with larger effects for "periphery" than for "core" countries. We summarise the effect on 10-year sovereign bonds below in Table 1 and briefly discuss effects on the exchange rate. First, we focus on aggregate euro area effects, followed by a detailed look into Member State effects. Intra-euro area government bond spreads decreased during the APP.

Despite using different methodologies with different abilities to assess persistency, the estimated effect sizes are similar in magnitude. Studies are either conducted as event studies around announcement dates or are VAR-based. Event studies find that the announcements regarding the APP had a significant negative effect on long-term yields, depressing them on average between 29 to 50 basis points. Results vary due to the considered number of events ranging from just considering the main announcement and initial implementation date (Andrade et al., 2016) to the accumulated effect of a series of 48 events based on the ECB's official communications including press conferences, speeches, and interviews (Bulligan and Delle Monache, 2018). Further, studies differ with respect of measuring the effects over 1- or 2-day windows with larger effects for the latter. Though using a different framework, focusing on micro-level portfolio rebalancing, Koijen et al. (2019) estimate a similar yield compression of 47 basis points due to the APP. The studies relying on VAR or VECM (vector error correction model) techniques indicate slightly larger effects of 60 to 70 basis points. A possible reason is that these techniques can capture persistency effects beyond the short time windows typically considered in event studies. Wieladek and Pascual (2016) report a substantially larger magnitude effect based on a Bayesian VAR, approximately double the size compared to the other studies. The authors interpret these numbers as an upper bound as they note that the simultaneous implementation of TLTRO, the APP announcement, and the cut in the deposit facility rate (DFR) with all measures targeting decreasing long-term interest rates makes it very difficult to empirically estimate individual programme effects within their framework. Therefore, Hartmann and Smets (2018) do not differentiate between programmes, but estimate an aggregate effect of credit easing, the APP, and the cut in the DFR. They find a sizeable effect of 150 basis points. Finally, there is evidence that the yield compressions reported in the literature are rather persistent with Eser et al. (2019) estimating a half life time of 5 years on the 10-year term impact.

Table 1:   Aggregate yield effects of the ECB's APP

Study/Method/*Sample period*	Impact on the Euro Area's:	
	10-year sovereign bond yields	**10-year sovereign bond spreads vs. Germany**
Altavilla, Carboni, and Motto (2015) Event Study, cumulated effect of 17 announcement events *Sep 2014 – March 2015*	-29 bp (1dw) -47 bp (2dw)	-7 bp (1dw) -26 bp (2dw)
Andrade, Breckenfelder, De Fiore, Karadi, and Tristani (2016) Event Study, cumulated effect on main announcement day (22 Jan 2015) and initial implementation effect (9 March 2015)	-47 bp (2dw)	
Blattner and Joyce (2016) **Bayesian VAR with latent yield curve factors** *Estimation period: 2000 to Apr 2013*	-30bp *(2015)* -18bp *(2016)* -12bp *(2017)*	
Bulligan and Delle Monache (2018) **Event Study based on 48 announcement events**	-50 bp (2dw)	

Sep 2014 – July 2017		
De Santis (2016) **Error correction model** *Sep 2014 – Oct 2015*	-63 bp	
Eser, Lemke, Nyholm, Radde, and Vladu (2019) **Event study building on arbitrage-free term structure model**	-50 bp *(2dw, Sep 2014 – Mar 2015)* -95 bp (by *June 2018 (whole duration of the APP))* [90% confidence interval: 65bp;130 bp]	
Koijen, Koulischer, Nguyen, and Yogo (2019) **IV-regression-based risk accounting framework** *2013Q4 – 2017Q4*	-47 bp	
Wieladek and Garcia Pascual (2016)[4] **Bayesian VAR** *2012M6 – 2016M4*	-102 bp	

Sources: Studies quoted in the table. 1dw: 1-day window, 2dw: 2-day window.

For the transmission of QE to long-term interest rates, the importance of the portfolio rebalancing and the signalling channel has been particularly emphasised in the literature. Both are also explicitly targeted by the ECB (see Altavilla et al., 2016 and the institutional sources cited therein). The former affects the risk premium, while the latter lowers expectations of future short-term interest rates. The portfolio rebalancing channel works if short- and long-term bonds are imperfect substitutes, so that the purchase of long-term government bonds changes the relative supply of short and long bonds (Gagnon et al., 2010). Arbitrage processes induce investors to rebalance their portfolios, so that yields of similar long-term assets decrease as well. Some investors might subsequently switch to riskier assets, so that these yields decline as well.[5] Further, private sector asset purchases directly reduce market risk premia.[6] Yields on government bonds are additionally lowered via the signalling channel where QE is presumed to strengthen central bank credibility to keep short-term interest rates lower for longer since an early exit would trigger losses. Theoretical and economic evidence suggests that the slope of the yield curve is positively related to economic activity and bank profitability. Financial health of non-financial firms is positively affected by government bond purchases through a reduction in borrowing conditions, while the situation of banks deteriorates in the medium run after a short-lived improvement. The overall effect on economic activity is positive (Kühl, 2016). Empirically, both the portfolio rebalancing channel and the signalling channel, are of relevance for the transmission of the APP, though Wieladek and Garcia Pascual (2016) find that the portfolio rebalancing channel is more important.

It is not straightforward to disentangle the effect of asset purchases on the expectations and term premium component, respectively. Recent evidence suggests that the term premium can be considered as a single monetary policy instrument to foster output and prices. Eser et al. (2019) find that the contemporaneous impact of the APP flattens the yield curve and amounts to around 95 basis points for the 10-year maturity. They contribute this finding to a decreasing market price of risk which

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[4] In the article, the authors report results for a 1% QE shock. We scale the average results across identification schemes given in Table 2 to 11% as this was the APP programme size (Andrade et al., 2016).

[5] Another strand of the literature focuses on portfolio-rebalancing at the micro level. Investors are found to rebalance their portfolios from domestic and other euro area debt securities purchased by the ECB towards foreign debt which is considered the closest substitute. Non-financial corporations and households have been net sellers of euro assets and especially PSPP eligible assets. Particularly households made use of investment funds to gain exposure to foreign sovereign debt (Bergant et al, 2019).

[6] Alongside this classical rebalancing channel, Ryan and Whelan (2019) emphasize the contribution of a 'hot potato' effect to declining European bond yields where banks manage excess liquidity via debt security purchases rather than loan creation.

compresses the term premium component of bond yields across the term structure. The findings by Lemke and Werner (2020) suggest that yield declines of around 70 basis points in German bonds almost exclusively reflect the term premium as opposed to the expectation component.

The contribution to lower bond yields via the signalling channel is generally estimated to be modest. Chadha and Hantzsche (2018) quantify a minor contribution of a small direct signalling effect of the PSPP, reducing the risk-free rate by only 3 basis points. Lastly, Altavilla et al. (2015) proxy the expected risk-free rate for the euro area with overnight index swap (OIS) rates to quantify the contribution of the signalling channel. They estimate that the signalling effect contributes at most 10 basis points at the 2-year horizon. Once the signalling effect is accounted for, the portfolio rebalance channel contributes another 10 basis points via the duration channel at longer maturities. Moreover, the authors estimate a substantial decline in credit risk premia, where a 100 basis point decline in sovereign bond spreads reduces corporate spreads by 75 and 34 basis points for financial and non-financial corporations.[7]

Comparing the APP's effects on individual Member States across studies suggests that yields and spreads decreased relatively more in "periphery" than "core" countries. Country-specific estimates of effects on bond yields are presented in Table 2. Compared to the aggregate evidence discussed above, there is, however, greater uncertainty regarding the effect size for individual Member States. Chadha and Hantzsche (2018) and De Santis (2016) find that the decrease in yields was twice as strong in Italy and Spain compared to Germany, while Altavilla et al. (2015) find an effect for Italy and Spain that is even three to four times larger than the one for Germany. The larger effects in the case of "periphery" countries are supported by the estimated reduction in spreads reported in Bulligan and Delle Monache (2018). Regarding differences within the "core" or "periphery" country groups, the studies point to larger effects in France compared to Germany, while the difference between the effects on Italy and Spain are rather small.

Table 2:   Member State yield effects of the ECB's APP

Study/Method/*Sample period*	Impact on:	10-year sovereign bond yields	10- year sovereign bond spreads vs. Germany			
Altavilla, Carboni, and Motto (2015)	Italy	-75 bp (1dw) -60 bp (2dw)	-63 bp (1dw) -50 bp (2dw)			
Event Study, cumulated effect of 17 announcement events	Spain	-80 bp (1dw) -65 bp (2dw)	-54 bp (1dw) -56 bp (2dw)			
Sep 2014 – March 2015	France	-30 bp (1dw) -27 bp (2dw)	-13 bp (1dw) -13 bp (2dw)			
	Germany	-17 bp (1dw) -18 bp (2dw)	-----------			
Bulligan and Delle Monache (2018)[8]			*09/14 - 07/17*	*09/14 - 03/15*	*04/15 - 09/16*	*10/16- 07/17*
Event Study based on 48 announcement events	Italy (1dw/2dw)		-104/-104 bp	-60/-58 bp	-38/-32 bp	-8/-17 bp
Sep 2014 – July 2017	Spain (1dw/2dw)		-100/-83 bp	-41/-31 bp	-47/-29 bp	-13/-27 bp
	France (1dw/2dw)		-22/-31 bp	-11/-17 bp	-9/-9 bp	-2/-5 bp
Chadha and Hantzsche (2018)	Italy	-42 bp (2dw)				
	Spain	-42 bp (2dw)				

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[7]   Nakamura and Steinson (2019) find that the effects of US monetary policy announcements on longer-term real interest rates is not driven by changes in risk premia, but rather reflects changes in expected future short-term real interest rates.

[8]   We do not report the results for Germany here as they are not significant over the full sample.

Event Study based on 9 announcement events Sep 2014 – Sep 2015	France	-56 bp (2dw)	
	Germany	-20 bp (2dw)	
De Santis (2016) Error correction model Sep 2014 – Oct 2015	Italy	-80 bp	
	Spain	-75 bp	
	France	-70 bp	
	Germany	-43 bp	
Lemke and Werner (2020) Four-factor term structure model 2014M9 – 2015M3	Germany	-68 bp	
Wieladek and Garcia Pascual (2016)[9] Bayesian VAR 2012M6 – 2016M4	Italy	-160 bp	
	Spain	-141 bp	
	France	-122 bp	
	Germany	-100 bp	

Sources: Studies quoted in the table. 1dw: 1-day window, 2dw: 2-day window.

Effects of the APP might have varied over time. On the aggregate level, Blattner and Joyce (2016) estimate changes with the initial announcement being the main driver and later implementation effects being rather small (see Table 1). Moreover, Bulligan and Delle Monache (2018) show that the overall reduction in spreads was mainly driven by early QE on the country level as well, though there are some differences across countries. For Italy, the decline was significant during the first stage (September 2014 – March 2015), whereas Spanish spreads continued to decline significantly until September 2016, while later there is no evidence for further significant declines (see Table 2). Hence, not only does the effect size vary across Member States, but so does the persistence of the programme's impact.

Evidence on earlier unconventional monetary policy programmes of the ECB suggests similar financial market effects. Fratzscher et al. (2016) find that announcements related to the ECB's OMT (outright monetary transactions) and SMP (securities market programme) programmes reduced 10-year government bond yields in Italy and Spain by 74 and 121 basis points, respectively, as well as spreads of these two countries relative to Austria, Finland, Germany, and the Netherlands. Gibson et al. (2016) find that spreads between the GIIPS countries (Greece, Ireland, Italy, Portugal, and Spain) and Germany decreased modestly under the SMP (between 3 and 22 basis points), whereas Falagiarda and Reitz (2015) find that the ECB's unconventional monetary policy announcements have decreased these spreads substantially between 2008 and 2012. Most studies for the US suggest that large scale asset purchases (LSAPs) reduced yields on 10-year Treasuries by about 100 basis points. However, Greenway et al. (2018) argue that this consensus overstates the effect and find that the results are not persistent.

Announcement of asset purchases may affect the euro exchange rate. Currency markets are also affected by monetary policy announcements, but the overall evidence is inconclusive. Mueller et al. (2017) find that currency investment strategies and returns involving short positions in USD and long positions in foreign currencies exhibit distinct price patterns around scheduled FOMC meetings. Increased trading activity on foreign exchange markets at days of scheduled FOMC announcements is also observed (Fischer and Ranaldo, 2011). However, the overall evidence suggests that the euro area's asset purchases themselves have not achieved any significant additional exchange rate effects beyond announcement and expectation effects which have tended to depreciate the effective exchange rate of the euro (Deutsche Bundesbank, 2017).

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[9] In the article, the authors report results for a 1% QE shock. We scale the average results across identification schemes given in Table 2 to 11% as this was the APP programme size (Andrade et al., 2016).

Announcement of asset purchases are also important relative to other monetary policy effects. Altavilla et al. (2020) construct the Euro Area Monetary Policy Event-Study Database, which contains intraday asset price changes around the policy decision announcement as well as around the press conference. The largest QE effect is observed on 22 January 2015 – the day the APP was launched.

Overall, while there is strong evidence for a stabilising role of asset purchases in the short term, it is less clear to what extent the effectiveness of QE is lasting over time. Available studies strongly suggest that the ECB's APP and its previous unconventional monetary policy programmes had a stabilising effect on financial markets, offsetting large financial turbulences as argued by Karadi and Nakov (2020). However, it is less clear how persistent the impact is and whether QE remains effective if it is employed over a longer period of time.

2.3. Evidence on expectations

Asset purchase programmes were originally also launched as a measure against decreasing longer-term inflation expectations. The inflation expectations or inflation re-anchoring channel is an important part of the signalling channel and reflects the idea that asset purchases increase longer-term inflation expectations (Gambetti and Musso, 2017). This is even more important at the zero lower bound where changes in expected real interest rates are solely driven by changes in expected inflation. Purchase programmes and monetary policy announcements also have the potential to affect expectations regarding other macroeconomic variables, such as GDP growth, exchange rates, or the current account. Expectations are also an important element in the context of risk premia or expected default probability of Member States of the euro area which have been discussed in the previous section.

Expectations are an ambiguous concept and the adopted measures depend on the variables under consideration. Market-implied sovereign default probabilities are measured via credit default swap (CDS) spreads, based on interest rate spreads, or yield-curve dynamics. The adopted measures for inflation expectations include market-based measures based on future prices, inflation-adjusted bonds, or survey measures for households and professionals. Survey data is based on selected participants and a lower frequency, but the underlying expectations are not contaminated by term premia.

There is rich evidence that ECB announcements of asset purchase programmes significantly increased the expected inflation based on survey data and swap rates in the euro area, but the effects are smaller compared than those on sovereign bond yields. Rieth and Gehrt (2015) use the daily change in basis points in inflation expectations as measured by euro area inflation-indexed swap rates for different forward rate maturities and find inflation raised by 20 to 30 basis points. Bulligan (2018) and Gambetti and Musso (2017) use the ECB survey of professional forecasters as a proxy for inflation expectations. They find that an asset purchase shock had a significant impact on longer-term inflation expectations of about 10 basis points in the medium run. These results align with the findings of Ciccarelli et al. (2017) who find that the expansion of the Federal Reserve's balance sheet contributed to a re-anchoring of US long-term inflation expectations during the 2009-2014 period.

Effects on expectations regarding other macroeconomic variables are rather small. Market-based expectations have also been considered when it comes to the identification of monetary policy shocks in the context of announcements. While central bank announcements have strong effects on interest rates, effects on other economic expectations and stock prices are often found to be small or even counterintuitive (Kerssenfischer, 2019). Recent research has emphasised that central bank announcements simultaneously convey information about monetary policy and the central bank's assessment of the economic outlook. Kerssenfischer (2019) confirms the importance of information

effects and finds that monetary policy announcements in the euro area affect interest rates but have small effects on professional survey-inflation expectations. Recent evidence based on household surveys in the US also shows that monetary expectations have rather small effects on private household expectations (Lamla and Vinogradov, 2019).

All in all, the empirical evidence on survey-based expectations displays lower effects compared to studies based on sovereign bond yields. This finding is in line with the result that effects on bond yields predominantly reflect changes in risk perception rather than effects on inflation expectations.

2.4. Euro area evidence: economic activity and inflation

Beyond stabilising financial markets, the impact of QE on economic activity and inflation is of ultimate interest for economic perspectives of the euro area. Various studies have estimated the efficacy of the ECB's APP on economic activity. Results are quite heterogenous across studies with output and inflation effects ranging from close to zero to quite sizable effects. Figure 1 provides an overview on the range of output and inflation effects from various studies.

Figure 1:   APP effects on euro area output and inflation
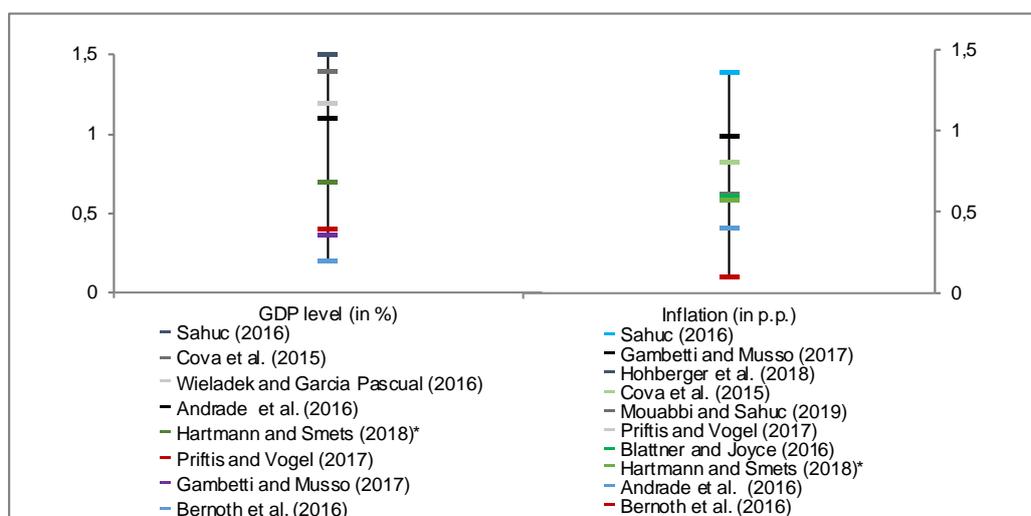
Sources: Studies quoted in the chart. *Hartman and Smets (2018) report the median across various ECB calculations based on different methods (VAR, NiGEM, CMR, DKR and DSGE). Hutchingson and Smets (2017) report the same results as Hartman and Smets (2018), so that we do not include these results twice in the figure.

Methodologically, two broad approaches are employed: VAR-based studies and model-based simulations. The studies by Gambetti and Musso (2017), Bernoth et al. (2016), Blattner and Joyce (2016), Andrade et al. (2016), and Wieladek and Garcia Pascual (2016) rely on empirical approaches, whereas the remaining studies use model-based simulations to investigate the APP's impact on economic activity. Overall, studies relying on model-based simulations report larger effects on output (average across studies: 1.1%) and inflation (average: 0.8 percentage points) compared to purely empirical approaches, with averages of 0.7% and 0.5 percentage points, respectively. Hartmann and Smets (2018) and Hutchinson and Smets (2017) provide useful benchmarks as they report a median euro area output and inflation response of 0.7% and 0.6 percentage points, respectively, based on multiple methods and ECB calculations. These results are more in line with the empirical studies, indicating that simulation-based results might overemphasize the effects of QE on economic activity.

Further, the results indicate that the output response was somewhat stronger than the inflation response which is in line with the consensus in the (international) literature on QE effects on output and inflation (see, e.g., Elbourne et al., 2018 for a summary).

Singling out the effect of asset purchases is challenging. Hammermann et al. (2019) report cumulative effects of various unconventional monetary policy measures, including the APP, of 1.9% for euro area output and 1.9 percentage points for inflation. This is distinctively larger than the estimated effect of the APP alone, especially in context of the inflation response. This, again, highlights the difficulty of disentangling the individual effects of unconventional monetary policy measures in empirical and quantitative exercises. Abstracting from the signalling channel, Andrade et al. (2016) provide a quantification of the relative importance of the portfolio rebalancing channel and the re-anchoring channel, focusing on the central bank's ability to reassure the private sector to align inflation expectations and price stability. They find that the former explains around 2/3, while the latter explains 1/3 of the peak response in inflation.

Effects on output and inflation tend to be stronger in distressed countries. Studies investigating differences across member states such as Wieladek and Garcia Pascual (2016), Elbourne et al. (2018), or Mandler and Scharnagl (2020) find that output and inflation responses vary across countries, being stronger for vulnerable members that experienced greater financial distress during APP implementation. Moreover, Mandler and Scharnagl (2020) report positive output effects for all four countries under investigation (Germany, France, Italy, and Spain), whereas inflation responses were weaker, being strongest for Spain. This cross-country evidence is well in line with the financial market evidence summarised above which found relatively stronger stabilisation effects in "periphery" countries than in "core" countries. Hence, the APP, as previous unconventional monetary policy measures, has apparently contributed meaningfully to the stabilisation of financially stressed Member States, at least in the short to medium-run.[10]

Evidence from earlier unconventional monetary policy programmes suggests similar effects. Boechx et al. (2017), for example, find that GDP and inflation would have been 1.2% and 1.3 percentage points lower in 2012 without the ECB's 3-year LTROs. Building on the identification strategy in Boechx et al. (2017), Burriel and Galesi (2018) emphasize the heterogeneity in output and inflation responses to unconventional monetary policy shocks among Member States, finding that functioning banking systems are crucial in the transmission of unconventional monetary policy measures. However, Elbourne and Ji (2019) question the reliability of SVAR-based studies such as Burriel and Galesi (2018), Boeckx et al. (2017), or Gambacorta et al. (2014) in terms of the identification of unconventional monetary policy shocks. As in Elbourne et al. (2018), they use shadow rates instead of a balance-sheet-based monetary policy instrument. Both Elbourne et al. (2018) and Elbourne and Ji (2019), find very small effects of the APP on economic activity. However, as they use shadow rates, comparability and scaling of the effects is not straightforward. We, therefore, refrain from including the studies in the summarising chart above.

All in all, the APP led to a suppression of government bond yields and also had some expansionary effects on real activity, especially in vulnerable Member States. However, effect sizes remain rather inconclusive. The reduction in yields dominantly reflects changes in the risk perception rather than changes in inflation expectations.

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[10] We discuss potential drawbacks and risks for the longer term in Section 3.

2.5. Comparison to international evidence on the effectiveness of QE

A number of studies assess the efficacy of QE programmes of other central banks. These are particularly interesting because central banks, such as the Fed or the Bank of England (BoE), implemented large-scale asset purchasing programmes in response to the Global Financial Crisis much earlier than the ECB, so that the evaluation sample is longer. The ECB's initial reaction to the Global Financial Crisis focused on direct bank lending to stabilise the euro area's bank-centric financial markets (Fawley and Neely, 2013), with QE being implemented only later, by the end of 2014, to counter disinflationary tendencies (Praet, 2018). Due to the differing implementation strategies, studies on the efficacy of QE on key financial and macroeconomic variables became available later for the euro area. To assess whether there are substantial and euro area-specific differences, we briefly recap the available international evidence.

Like for the euro area, evidence on the US, the UK, and Japan suggests that the announcement of large-scale asset purchases stabilises financial markets. Quantitatively, a USD 1 trillion QE program, for example, reduces 10-year Treasury yields on average by 40 basis points, similar to cutting the short-term interest rate by about 1.5 to 1.75 percentage points (Gürkaynack et al., 2005; Chung et al., 2012; Williams, 2014; Gern et al., 2015; Fiedler et al., 2016; Swanson, 2017). Similar results are found in studies focusing on the UK (Joyce et al., 2012) or Japan (survey in Ugai, 2007). To enable international comparison, we follow Andrade et al. (2016) and scale the results summarised in Table 1 to 10 % of euro area GDP and consider an average across studies, yielding an average compression of 10-year euro area sovereign bond yields by 54 basis points. According to the studies that are listed by Andrade et al. (2016) the respective average standardised effect of QE on 10-year bond yields was 64 basis points for the UK, 17 basis points for Japan, and 75 basis points for the US. Thus, euro area yields were compressed stronger than yields in Japan, but somewhat less than those in the UK and in the US. Extending this exercise to the individual Member States suggests that the compression for Italian and Spanish yields (76 and 73 basis points, respectively) was comparable to the average US effect. While the effect on French yields reflects the euro area average (55 basis points), German yields were, on average, only suppressed by 36 basis points.

Effects on output and inflation tend to be smaller in the euro area than in the US or in the UK, but the range of estimates is large. Fiedler et al. (2016) and Fiedler and Gern (2019) provide comparisons of average US output and inflation responses. Considering an average across studies indicates that a USD 1 trillion QE programme would increase output by about 0.86% and inflation by 0.55 percentage points. Compared to the average euro area effect across the empirical studies suggests that the euro area output response (0.7%) was somewhat smaller, whereas the inflation response (0.5 percentage points) was rather comparable. These figures are in line with the results reported in Hartmann and Smets (2018). Extending the comparisons to the UK, Hartmann and Smets (2018) show that euro area output and inflation responses were smaller compared to UK responses. This might likely be traced back to the ECB's later implementation of QE, during a period when market conditions were not as turbulent and disrupted as during the Global Financial Crisis (Andrade et al., 2016). Engen et al. (2015) and Wu and Xia (2016) further quantify that QE led to a reduction in the US unemployment rate by 1.2 percentage points between 2009 and 2013. The range of estimates regarding the macroeconomic effects in the literature is, however, very wide and some studies find quite large effects. According to Weale and Wieladek (2016), for example, a USD 1 trillion QE programme would increase GDP by 4% and inflation by 4 percentage points. The authors conclude that the ECB's QE was 2/3 times less effective than in the UK and the US. The estimates of Kim et al. (2020) suggest increases in US industrial production by 3% and in the level of the US CPI by 1.6%, and a reduction in unemployment by 0.8 percentage points.

There is evidence for both, the euro area and the US, that the timing of asset purchase programmes matters. Similar to the euro area evidence by Blattner and Joyce (2016) and Bulligan and Delle Monache (2018), studies for other economies find diminishing effects of QE over time. Kuttner (2018), for example, provides a recent and comprehensive summary that indicates that the effects of US QE were largest for QE1 (approx. -100 basis points for 10-year Treasuries yields), smaller for Q2 (-30 to -40 basis points), whereas Q3 hat only minor yield impacts. This is in line with the evidence suggesting that QE seems to be most effective when market function needs restoring so that financial conditions can be kept favourable for governments, banks, firms, and households (Kuttner, 2018). For example, Cui and Stark (2019) argue based on a theoretical model that the effectiveness of US QE during the Global Financial Crisis was highest during the period of acute financial distress, avoiding an even greater slump in output and inflation. This reasoning is supported by recent empirical evidence. Dalhaus (2017) finds that US monetary policy is more effective during times of financial distress, Jannsen et al. (2019) show that monetary policy is particularly effective during the recessionary phase of financial crises, while Bech et al. (2014) show that it is ineffective in further stabilising output in the aftermath of financial crises.

Regarding transmission, studies on the US and the UK find that both, the portfolio rebalancing and the signalling channel, are important. While in the euro area, studies generally emphasize that both channels are at work, the empirical results discussed above suggest that the APP was mainly transmitted through the portfolio rebalancing channel as the size of a direct signalling effect has been estimated to be rather small, mattering especially for "core" countries (Chadha and Hantzsche, 2018). For Japan the signalling channel seems to be more important (for a survey see Ugai, 2007).

To sum up, while the available APP evidence points in the same direction as the international evidence, the effects on euro area long-term yields, output, and inflation were likely somewhat smaller compared to the US and the UK, but larger than for Japan. The smaller effects compared to the US and the UK can possibly be explained by the later implementation of QE measures when markets were not as disrupted as during the Global Financial Crisis. Comparing effects across Member States, shows that effects were similarly strong in Italy and Spain as in the US and the UK, while the effects for Germany and France were smaller. This observation is in line with the proposition that the effects of QE are largest in times of financial distress.

3. POTENTIAL DRAWBACKS AND UNINTENDED SIDE-EFFECTS

Large scale asset purchases by the central bank may lead to unintended side-effects which need to be taken into account. To decide whether the use of non-standard monetary policy tools, such as different forms of QE, is appropriate, one needs to weigh the potential benefits against the potential costs associated with them. This chapter provides an overview of the potential drawbacks that should be considered in this respect. These include the reduction of incentives for needed fiscal consolidation and structural reforms, the impairment of the independent conduct of future monetary policy, excessive risk-taking in the financial sector, the misallocation of resources and a "zombification" of the economy, and an increase of wealth inequality (cf. Fiedler and Gern, 2019).

Purchase programmes under which the Eurosystem buys government bonds are in many respects equivalent to Eurobonds. Whenever the Eurosystem implements such a purchase programme, it creates new central bank money and uses it to buy government bonds. Therefore, assets for which liability rests (at least as long as no-bailout rules are observed) with individual Member States are taken out of circulation and replaced by assets that are a common liability of the euro area.

Reducing the risk spreads of certain government bonds decreases the incentive to engage in fiscal consolidation and structural reforms. Fiscal as well as many economic policy decisions are the purview of individual Member States. However, as asset purchase programmes partially shift costs and risks onto other countries, each individual Member State may find it less costly to stay on an unsustainable fiscal path and to delay structural reforms, thereby reducing economic growth and employment in the longer term as well as increasing the likelihood of future fiscal crises. Despite a prolonged period of very low interest rates (and a significant debt restructuring in the case of Greece), public debt in many euro area countries did not decrease significantly over the past decade and is far from converging towards reference levels as envisaged by the Fiscal Compact (Figure 2).

Figure 2: General government gross debt in selected euro area countries in % of GDP
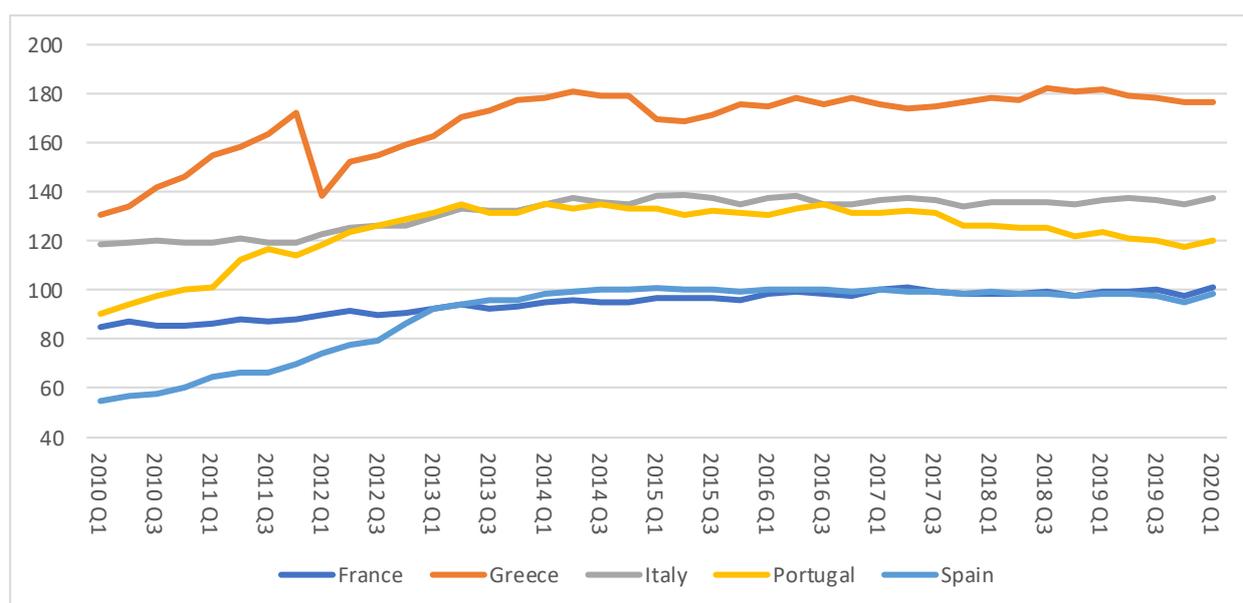
Source: Eurostat.

Large-scale asset purchase programmes can put undue constraints on future monetary policy. For one, if monetary conditions in the future are such that the central bank should want to tighten monetary policy by reversing its asset purchases, it may nevertheless hesitate to do so, for two reasons. First, by selling the accumulated bonds, the central bank would allow risk spreads to re-emerge. With that, fiscal pressure on certain issuers would return as well. Second, if the sale became necessary at a time of rising nominal interest rates (e.g. due to rising inflation or increased risk premia after another fiscal crisis in the euro area), the central bank might have to recognise substantial losses by selling: higher interest rates mean that the value of a given fixed-rate bond will be lower. In addition, if the value of the central bank's asset portfolio falls too much (either due to adverse developments in the interest rate environment or because some creditors are unable to honour their obligations and the central bank is included in a haircut), the central bank may be unable to reabsorb enough central bank money to stabilise inflation by itself. It would then be dependent on recapitalisation by governments, and ultimately through either higher taxation or lower public spending, which may not be forthcoming, especially as this requirement is likely to arise in economically difficult times.

Extraordinary monetary policy can encourage excessive risk-taking in the financial sector. Expansionary policy measures can weaken financial stability and introduce financial imbalances through an increase in risk taking (Rajan, 2005; Maddaloni and Peydro, 2011; Drehmann et al. 2012), and these risks may be higher the longer those policies stay in place (Kahn, 2010; Maddaloni and Peydro, 2012). Of course, increased risk-taking is to some degree an intended consequence of the extraordinary measures. Asset purchase programmes are supposed to work, at least in part, through the portfolio rebalancing channel: after selling government bonds to the central bank, commercial banks are supposed to invest their money into other assets, thereby providing financing to the economy. Refinancing operations of increased duration with lower collateral requirements and at potentially negative interest rates are likewise intended to increase credit provision. For the time being, the evidence for unintended side effects in the form of the excessive growth of house prices, depressed stock market volatility, or excessive credit growth is weak (Beck et al., 2019). Still, from a

macroeconomic perspective, it may be difficult to distinguish between appropriate and excessive risks in real time, to then adjust policies in such a way that allows the former but minimises the latter.

Extraordinary monetary policy can reduce the growth potential of the economy via a misallocation of resources and a "zombification" effect. If these policies produce excessively low interest rates for certain market participants, the share of funding going to less productive firms can increase at the expense of their more productive competitors, thus inhibiting structural change and productivity growth. The reason is that too low interest rates allow banks to "evergreen" loans: rather than face write-offs on loans to non-viable companies they will continue to renew them. For the bank, this can be a "gamble for resurrection": if interest rates were not artificially low, debtors would be unable to make the recurring payments and they would default on their loans. If loan losses are large enough, then the creditor bank would also face bankruptcy. However, for as long as interest rates are artificially low, unproductive firms and banks can avoid recognising the inability to repay. The bank can postpone the repayment of the loan so that both, debtor and creditor, can continue on and avoid recognising their economic death (bankruptcy), thus the moniker of "zombification", and may even hope that they get lucky and future shifts in the economic environment turn the debtor once again into a viable concern who can repay the bank ("resurrection"). Japan has had an extraordinary monetary environment even before the Global Financial Crisis, and Hoshi and Kashyap (2004) as well as Caballero et al. (2008) found some early evidence for "zombification" there. There are also some studies looking at the euro area. Here, small Italian banks seemed to engage in some "evergreening" of loans after central banks reacted to the Lehman bankruptcy (Albertazzi and Marchetti, 2010). Furthermore, the main beneficiaries of the OMT announcement by the ECB appear to have been firms in periphery countries with a low credit-worthiness, whereas investment and employment did not benefit from the additional credit provided to these firms (Acharya et al., 2019a). Excess production capacity might have also been additionally expanded via a "zombie credit channel" through the provision of cheap credit to impaired firms (Acharya et al., 2019b). Thus, while QE was introduced to meet disinflationary tendencies (Preat, 2018), it might have instead contributed to continuously subdued inflation dynamics itself. In the US, the decision of the Fed to purchase large volumes of corporate bonds in response to the COVID-19 crisis has fuelled the discussion about "zombification" in the economy, although the issue is not new. During a decade of extremely low interest rates and successive stages of QE the number of US corporations unable to earn enough profits to cover their debt-servicing costs in the long term has tripled since 2008 to more than 18%, according to Deutsche Bank estimates (Financial Times, 2020). The OECD uses a different concept of "zombie" firms, referring to low productivity growth and suggests that the increasing prevalence of weakly productive firms is a notable factor behind the productivity slowdown observed in many OECD countries. A rising share of firms that would normally be expected to be restructured or exit the market is observed in several countries and is closely related to weaknesses in the banking system and insolvency regimes (Andrews et al., 2017).

Asset purchase programmes may have distributional consequences across groups with different incomes and wealth. Because people differ with respect to the amounts of assets they own and their exposure to financial markets, some may be able to profit more from large-scale purchases by the central bank than others. In fact, there are some indications that wealth inequality increased because of the ECB's unconventional policies (Horvath, 2017). However, Lenza and Slacalek (2018) argue that the effect of QE on wealth inequality is small compared to the large reduction in income inequality stemming from those low-income people who were only able to find work due to this monetary policy intervention.

4. POSSIBLE EFFECTS OF ASSET PURCHASES IN RESPONSE TO COVID-19

The economic slowdown and progressive increase of uncertainty in the wake of the COVID-19 pandemic led to a pronounced tightening in financial conditions and triggered a strong reaction of the ECB. During February and March it became increasingly apparent that COVID-19 would not be limited to China, but was spreading across Europe, with potentially dramatic effects on the economy. As a result, risk premia in financial markets shot up and stock prices collapsed. Due to the flight to safety, yield spreads in European sovereign bond markets widened massively, raising concerns that fiscally weak European countries would be unable to raise funds in the capital markets to finance appropriate policy responses. The ECB responded with a number of measures designed to support liquidity and funding conditions and shore up confidence, including (1) improvement of the conditions of its Targeted Long-term Refinancing Operations (TLRTO III) and introduction of Pandemic Emergency Longer-term Refinancing Operations (PELTROs); (2) collateral easing measures and expansion of the range of eligible assets under the corporate sector purchase programme (CSPP) to non-financial commercial paper; (3) introduction of an additional temporary envelope of EUR 120 billion to its existing asset purchase programme until the end of 2020, with the aim of ensuring a strong contribution of the private sector purchasing programmes; (4) launch of a new temporary Pandemic Asset Purchase Programme (PEPP) with a volume of EUR 750 billion until the end of 2020 and more flexible provisions with respect to the allocation across jurisdictions. In addition to asset categories eligible under the existing asset purchase programme (APP), non-financial commercial paper is also eligible for purchases under the PEPP. Under PEPP, a waiver for the eligibility requirements will be granted for securities issued by the Greek government. The envelope of the PEPP was increased by €EUR 600 billion in June and the time frame extended to at least mid-2021.

First assessments of the effect of the PEPP suggest a substantial stabilising impact on financial market variables as well as on the outlook for economic activity and inflation but could be skewed to the upside. After the ECB announced its PEPP on 18 March in response to increasing signs of market fragmentation, there were first indications of market stabilisation in early April that continued and became more evident during May. The ECB attributes these developments to the PEPP (Lane, 2020). Based on previous episodes for which the literature found large stabilising effects of asset purchases by the central bank on financial markets at the height of a crisis, this view is quite plausible. The ECB itself estimates that the PEPP decision together with the scaling-up of the APP have reduced GDP-weighted 10-year sovereign yields by almost 45 basis points (Hutchinson and Mee, 2020. This reduction of risk premia is in line with the existing evidence related to early asset purchases outlined previously. These estimates are based on elasticities derived from the PSPP. The authors view these estimates as being rather conservative and that estimates based on an event study approach might show a higher effect. The ECB estimates a cumulated euro area GDP growth contribution of 1.3 percentage points and an inflation contribution of 0.8 percentage points until 2022 (Hutchinson and Mee, 2020), based on average estimates from previous studies on the effects of QE in the euro area (Rostagno et al., 2019). Our take from the literature on quantitative estimates of the effects of the APP and QE programmes of other central banks is that the effects of the PEPP on output and inflation are highly uncertain (see Section 2). Estimates of the effects of previous QE programmes range from effects close to zero to quite sizeable effects. We find that in particular simulation-based studies find rather large effects, while empirical studies find lower effects. Therefore, the effects of the PEPP on output and inflation could also be quite a bit lower than the ECB estimates if one views purely empirical studies as more reliable compared to model-based simulation studies. Point estimates can, at the very best, serve as a rough guideline.

While asset purchases have been instrumental to stabilise sentiment in the acute crisis, it remains unclear what the contribution of additional liquidity is once uncertainty has returned to normal levels. The emergence of the COVID-19 pandemic and the measures implemented to get it under control with their massive restrictions of economic activity have been a singular event that led to an almost unprecedented surge in economic uncertainty. In such an environment, the assumption of risk by the central bank by provision of additional liquidity against unusually weak collateral and through unusual channels makes a huge difference and is an appropriate response. However, the value added of a continued expansion of the central bank's balance sheet is more questionable – especially in light of the risk of adverse side effects discussed in the previous section – in a situation of "normalisation", with the economy recovering and experience and increased knowledge allowing a more targeted policy response to potential new increases of COVID-19 infections.

5. THE ROLE OF ASSET PURCHASES IN THE FUTURE

QE has become a standard policy measure over recent years in the attempt of monetary authorities to increase inflation expectations and stimulate growth in a low interest rate environment. While the empirical evidence supports the view that QE has helped stabilise expectations and keep inflation at positive levels, the effect on inflation has been modest, and even prolonged stretches of substantial net purchases of assets have failed to achieve a sustained increase of inflation to the target level of close to 2 percent in the medium term.[11]

The monetary policy approach of the ECB has been successful in stabilising expectations and supported growth in the euro area over recent years but has at the same time allowed other policy areas not to deliver on important policy challenges. Asset purchase programmes have helped the ECB calm investors and financial markets and ensured that the transmission of short-term interest rates to long-term interest rates was not disturbed by extraordinary risk premia. Essentially, the ECB absorbed risks associated with unsustainable fiscal policies, fiscally stretched governments, and shaky banking sectors in some countries. This had initially been imperative, given the alternative of a downward spiral in some economies and even the threat of a break-up of the euro area. In the beginning, asset purchases were considered as a limited short-term solution to fight breakup-risks and buy time to correct policies and institutional arrangements and return responsibility to fiscal policy. However, the success of the ECB masked the need for responsibility of private investors and fiscal policy and led to complacency and insufficient reform. Nowadays, with a long history of asset purchases and this policy increasingly embedded in expectations, it is much more difficult to abandon QE given that this would be considered a major adjustment.

A cost benefit analysis of asset purchases and QE is complicated by the difficulty to quantify its exact effect on the economy as well as the side risks. The evidence suggests that asset purchases have a stronger effect on default risk compared to inflation expectations which shows that the stance of monetary policy substantially changes the risk assessment of financial markets. Effects on consumer inflation expectations are also significant but comparatively small.

There is no guarantee that conducting QE aligns with the price stability mandate of the ECB in the future and trade-offs between both could significantly harm the credibility of the ECB. The assumption of risks in sovereign debt markets which resembles monetary financing of government budgets through ECB asset purchases has already resulted in the perception that the ECB is conducting policies which are outside its mandate, with the German constitutional court taking a critical approach towards the asset purchases. These discussions are likely to intensify when the economic environment normalises.

Using asset purchases not regularly but only under extraordinary circumstances is a possible strategy to consider both, the emerging evidence that the QE is particularly effective in times of crisis and the risk that unintended side-effects build up over time. The experience of the Fed with exiting QE prior to COVID-19 shows that a gradual return to conventional monetary policy does not necessarily coincide with turbulences on financial markets or a recession.

To leave the current path of monetary policy in the euro area seems feasible only in a period of reduced uncertainty, a scenario which needs a credible solution to the fiscal challenges building up in the crisis. The core problem is that there is no consensus among Member States when it comes to fiscal responsibility, the role of monetary policy, and the overall policy stance. Some members stress

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[11] Japan is another example of an economy where the response of consumer price inflation to massive QE has been disappointing.

the importance of fiscal responsibility of Member States as originally outlined in the Maastricht Treaty, while others argue in favour of a fiscal union and emphasise solidarity.[12] Given that the debt levels of (some) European countries were already critically high at the outset of the COVID-19 crisis, part of a solution could be to involve creditors, for example as part of a haircut, although this would imply also costs for the ECB.

A fiscal back-stop mechanism for sovereign bond risk premia could compromise on the conflict between strict fiscal responsibility (Maastricht II) and a comprehensive fiscal union. Such a mechanism would allow bond yield risk premia of Member States to fluctuate freely in the capital markets and increase noticeably if necessary, but only up to a politically chosen ceiling, say 500 basis points, at which a common institution funded by solvent euro area Member States would intervene to cap the yield spread.[13] This ceiling strategy would re-install market-based risk pricing and retain fiscal policy responsibility at the Member States level, while also making clear that the community would not accept excessive risk premia and is willing to act as a safety net. Within this setting, changes in bond yields would create strong incentives for fiscal consolidation and structural reforms without exposing fiscally distressed Member States to the risk of excessive refinancing costs (thus avoiding "bad" self-fulfilling equilibria in sovereign bond markets). Such a supranational mechanism would operate as part of the fiscal policy regime of the euro area outside the Eurosystem. By doing so, it exempts the ECB from making undue allowances for the fiscal situation in individual Member States such that the monetary policy stance gains substantial latitude in focussing on price stability. In this scenario, the transmission from risk-free rates to sovereign yields would account for the heterogeneous landscape of the euro area while at the same time avoiding break-up risks in times of crisis. This would enable the euro area to mitigate potential turbulences on the way from currently high sovereign debt levels towards solid territory, thus coping with the legacy problem that some Member States currently face. However, all transitory proposals require a consensus on the final target of such a process. Without such a consensus, any attempt to reduce central bank interference with government financing would be vane.

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[12] For a discussion of the two approaches see Gern et al. (2019).

[13] "Accountability bonds" as proposed by Fuest and Heinemann (2017) follow a somewhat different approach but share the same logic of combining market pricing and limited fiscal support for those countries that are faced with huge debt levels.

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We summarise the empirical evidence on effects of asset purchases in the euro area, including the PEPP programme launched in response to the COVID-19 crisis. We conclude that QE is particularly effective during times of high financial stress, i.e. at the peak of a crisis, but tends to lose impact over time. At the same time, QE policies come with prominent risks which may materialise only in the longer term. We suggest a scheme of rule-based intervention in sovereign debt markets that preserves the role of yield spreads as a market signal, while containing the risk of bad equilibria.

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