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Financial stability and the ECB

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European Parliament

DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

Financial stability and the ECB

IN-DEPTH ANALYSIS

DRAFT

Abstract

For nearly two decades, the policy debate has focused on the attitude of central banks regarding financial stability and asset price bubbles. This debate is resurfacing with the recent episodes of expansionary monetary policies implemented through unconventional measures. The aim of this policy brief is to feed reflections on the risks for financial stability associated with the extension of quantitative easing (QE) by the ECB. We first recall that the theoretical and empirical literature does not provide a clear consensus on the influence of monetary policy on asset price bubbles. Then, we propose indicators of asset price bubbles for the euro area and we discuss the effect of monetary policy on these indicators. So far, there is no evidence of presence of asset price bubbles in the euro area. Besides, the change in the ECB balance sheet would not trigger bubbles in the stock and housing markets. However, it may be a concern for the bond market. From this, we argue that a gradual decline in ECB's balance sheet would be important to limit the risk of a new banking crisis in the euro area.

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EXECUTIVE SUMMARY

- The recent extension of the ECB's quantitative easing (QE) raises concerns on its impact on financial stability. Stated briefly, does the protracted monetary stimulus generate financial bubbles?
- It is important that two key points are kept in mind. First, overall evidence of the impact of monetary policy shocks on asset price bubbles is not clearly established. Second, the identification of bubbles remains a strong empirical challenge. Separating the fundamental value of an asset from its bubble component remains a difficult and disputable task.
- As neither theoretical, nor empirical literature has reached a consensus on how to identify a financial bubble, we identify financial bubbles following an agnostic approach consisting in averaging the most commonly used models. Although none of these models has reached a consensus, we assume that altogether they can capture the main properties of asset price bubbles.
- Our data on the euro area show that the recent increase in stock prices is not characterized by a bubble. There is also no sign of a bubble in the bond market in the recent period. However, since 2015, a period of asset overvaluation has begun in the housing market.
- We estimate the possible impact of monetary policy on the computed bubble component of asset prices. Our results suggest that the unconventional monetary policy implemented by the ECB did not inflate stock market and house market bubbles. There may be some impact on the bond market, where most operations related to the QE are now realized through the public sector purchase programme (PSPP). Consequently, results suggest that there is no strong and stable causal link between monetary policy and asset price bubbles, except on the bond market.
- Summing up, the presence of asset price bubbles is not a major concern in the euro area so far. Besides, the change in the ECB balance sheet – limited to the use of unconventional policies via SMP, CBPP, ABSPP and PSPP [1] – has not triggered an increase in the bubble indicator of the stock and the housing market. However, it is suggested that the bubble indicator of the bond market reacts positively to unconventional monetary. QE – implemented at a lower monthly pace – should not create an overall bubble in the future. However there may be some risks in the bond market. This is not a concern for the pursuit of the QE but it might be for the phasing out of QE measures that should consequently be implemented very carefully.
- A gradual decline in ECB's balance sheet would be important to limit the risk of a new banking crisis in the euro area. A rapid reduction in ECB's balance sheet under financial frictions may trigger a bubble burst on the bonds' market which would have negative and dangerous spillovers on banks and, by contagion, on the real economy.

  We also recommend a close cooperation between monetary and fiscal policies to limit the risk that the phasing out of QE measures produces a higher perceived risk of public debt unsustainability. Forward guidance on the terms and conditions of the end of QE could help in this respect. It would give information on ECB's inflation and output forecast and help plan future optimal fiscal policies in the euro area.

[1] Securities Markets Programme (SMP), https://www.ecb.europa.eu/pub/pdf/other/mb201006_focus01.en.pdf; For Covered Bond Purchase Programme (CBPP), Asset-Backed Securities Purchase Programme (ABSPP) and Public Sector Purchase Programme (PSPP), see https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html

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1. INTRODUCTION

The planned extension of ECB's quantitative easing (QE) until the end of 2017 has raised concerns about the current and forecast economic situation of the euro area – the extension signals that the ECB continues to have doubts on its ability to reach its inflation target in the mid-run; meanwhile it has raised concerns about the consequences of a protracted monetary stimulus on financial stability.

Financial stability is now clearly a critical issue for policy makers and especially for central banks. Financial history has shown that episodes of financial crises are costly as they notably trigger deeper and longer recessions (Bordo et al., 2001, Claessens et al., 2008 & 2011, and Bordo, 2014). However, literature has not yet provided a clear consensus on the way central banks, through monetary policy should deal with it (see Smets, 2014). A central issue in this debate is related to the connection between asset prices and the conduct of monetary policy. Does expansionary monetary policy contribute to the emergence and growth of asset price bubbles? And can monetary policy tightening reduce the size of bubbles? This debate has recently resurfaced with the QE programmes implemented after 2008 by the major central banks, fuelling the fear that unconventional monetary policies could be too expansionary and feed asset price bubbles. Some commentators in the financial press were notably prompt to see asset price bubbles when stock prices soared again.

These fears were motivated by the correlation between the purchase of securities by the Federal Reserve – the US central bank – and the stock market index (S&P 500) in the United States (Figure 1). While the argument may sound convincing at first glance, the facts still need to be discussed and clarified. First, it is useful to remember that correlation is not causation. Secondly, an increase in asset prices is precisely the scope of both conventional and unconventional monetary policy. Finally, an increase in asset prices cannot be treated exclusively as a bubble: developments related to fundamentals need to be distinguished from purely speculative changes.

These fears largely echo a policy debate which emerged at the end of the nineties. According to a first view, central banks had weak responsibility in the build-up of asset price bubbles and should not try to burst them. This view formed the "Jackson Hole" consensus and was built around two pillars. It was first argued that financial stability was correlated with price stability. Central banks focusing on price stability would therefore also deliver financial stability. Second, Bernanke and Gertler (1999, 2001) suggested that it was optimal for central banks to intervene *after* a burst, rather than *before* it. Two reasons were put forward: first, bubbles are hard to identify and, second, central banks are supposed to be able to cushion financial crises efficiently – cleaning afterwards – through an appropriate monetary policy easing. This view was challenged by Borio and Lowe (2002) and Cecchetti et al. (2003) who promoted a "leaning against the wind" approach claiming that central banks should strive to reduce asset price bubbles.[2] Regarding the recent episode of expansionary monetary policy with unconventional measures, Borio and Zabai (2016) fear that the risks of financial instability could outweigh their benefits. Juselius et al. (2016) advocate the adoption of an effective "leaning against the wind" approach and revive the debate on the attitude of monetary policy makers towards asset prices. Adrian and Liang (2016) argue that the "leaning against the wind" approach could have higher benefits than costs, under conditions that Svensson (2017) considers as highly unrealistic. Svensson (2017) keeps on arguing that a "leaning against the wind" approach would not be optimal.

The debate on the potential side-effects of QE echoes the criticisms raised by Taylor (2009) who suggested that the sustained period of low interest rate in the United States between 2001 and 2004 fuelled the boom in the housing market and caused thereafter the subprime crisis. The global financial crisis has undoubtedly illustrated that price stability was not a sufficient condition for financial stability.[3] As regards the ability for monetary policy to

[2] See White (2009) for a survey.

[3] See Blot et al. (2015) for empirical evidence.

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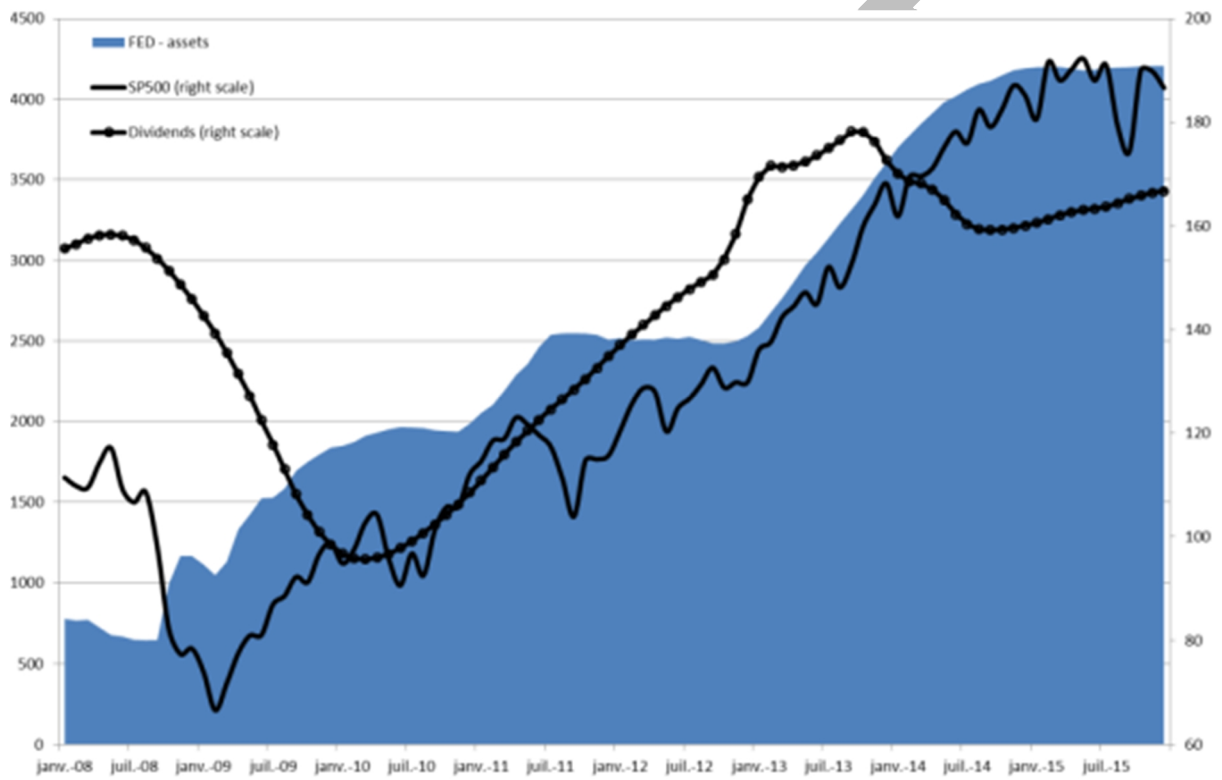
influence effectively asset price bubbles, the theoretical literature has not reached clear-cut conclusions. It notably depends on the intrinsic properties of bubbles.

In this policy brief, we first review theoretical and empirical literature on the link between monetary policy and asset price bubbles. Though financial stability does not boil down to asset prices and the existence of bubbles, the price of financial assets is clearly a key indicator to assess the risk of financial instability.[4] Then, we propose simple indicators for the euro area of asset price bubbles that may help to assess some risks over financial stability. In the third section, we discuss the effect of monetary policy on these indicators. In the fourth section, we discuss about the risks that fiscal policy, on the one hand, and banks' balance sheet, on the other hand, put on financial markets and on QE's effectiveness. Section five concludes and draws some policy recommendations.

Figure 1. QE and stock market prices in the US



Note: *2010 = 100, y_axis in Bn$.* Dividends paid shows strong seasonality and have been smoothed by a 12-month moving average.
Sources: Datastream, Federal Reserve and Bureau of Economic Analysis.

[4] Adrian and Shin (2008) notably emphasize the role of financial leverage and credit booms. See Jorda, Schularick and Taylor (2013, 2015) for empirical analyses on long term sample period.

2. MONETARY POLICY AND ASSET PRICE BUBBLE: A SURVEY

If the ultimate goal of central banks is macroeconomic stability, the transmission of their decisions to the target variables (inflation and growth) takes place through various channels, some of which are explicitly based on changes in asset prices. Thus, the effects expected from QE are supposed to be transmitted in particular by so-called portfolio effects[5]. By buying securities on the markets, the central bank encourages investors to reallocate their securities portfolio to other assets. The objective is to ease broader financing conditions for all economic agents, not just those whose securities are targeted by the QE programme. In doing this, the central bank's actions push asset prices up. It is therefore not surprising to see a rise in equity prices in connection with QE programmes. The main issue is then whether the impact of monetary policy goes beyond this expected effect and creates or contributes to the growth of asset price bubbles. It might be helpful to first review theoretical literature as it emphasizes that theoretical models on bubbles have not delivered a clear consensus on the role of monetary policy. On the empirical side, the evidence is also mixed and the identification of bubbles remains a strong empirical challenge.

2.1. Asset price bubbles: a brief review of theory

The theoretical assumptions related to the nature of the bubble have different implications regarding the role of monetary policy. Actually, an asset price bubble is an unobserved component of an asset price. The other component is the fundamental value and is also unobserved. Theory provides some insights on the decomposition between the fundamental value and the bubble component. The standard asset price model states that the fundamental value of a given asset corresponds to the discounted sum[6] of expected cash-flows. For stocks, the expected cash-flows are given by futures dividends that will be paid to the owner of the shares.[7] It must be noticed that there is uncertainty on the future dividends. It explains why this fundamental value cannot be observed. From this simple representation of an asset, the bubble component is the deviation of the asset price from the fundamental value.

There have been two different strands of literature regarding financial bubbles. The first strand assumes rational behaviour, as e.g. Blanchard and Watson (1982). Under this assumption of rational expectations, it is noteworthy that the role of monetary policy remains highly debated. In the rational bubble à la Blanchard and Watson (1982), the bubble grows with the *real* interest rate. According to Gali (2014), a restrictive monetary policy can fuel instead of deflating a bubble. Thus, there would be no rationale for central banks to try to "lean against the wind". Such a policy would even be counterproductive.

However, this view is very specific and relies on strong hypotheses and notably the absence of financial markets imperfections. Consequently, other authors like Allen and Gale (2004) suggest that expansionary monetary policy would feed bubbles through the credit dynamics.

[5] The three main transmission channels of QE are the expectations' channel, the segmented markets' channel and the duration risk channel (or portfolio-effect channel) (see Yu, 2016, for a presentation and discussion). The traditional theory of the term-structure of the interest rates draws on an economy without frictions and according to it, QE measures like purchasing large amounts of long-term bonds should not affect long-term rates. Once some frictions intervene, like banking regulations (e.g. solvency ratio), market segmentation (e.g. some investors are prone to hold extensively long-term assets to match their long-term liabilities, like life insurance companies) and risk tolerance (e.g. some investors are willing to hold risky assets and when the central bank buys those assets, investors tolerate a longer exposure to risk and accept lower risk premia on long-term bonds), QE may impinge on long-term rates.

[6] Discounting financial flows takes into account the fact that receiving 1 euro today is not the same as receiving 1 euro in 1 year. The current value of one euro received next year is depreciated as the investor loses the opportunity to invest today one euro at the given interest rate. The discount or depreciation factor of 1 euro received next year is therefore the real interest rate.

[7] For housing asset, the future revenues are future rents perceived by the owner. Finally, for bonds, future cash-flows are known and correspond to the coupon associated to the bond.

In the same vein, Christiano et al. (2010) claim that central banks that would only focus on inflation would amplify the cycle and create boom-bust cycles in the stock market. They consider the case of positive news on productivity that would reduce inflation. Observing that inflation is reducing, the central bank would decrease the policy rate to bring the inflation rate back to the target. This would stimulate credit, investment and consumption amplifying the economic and financial cycles. If the initial positive news turns to be less favourable than expected the promising returns on investments are not realized triggering a decrease in asset prices.[8] They argue that monetary policy has therefore been too much expansionary. The bust of credit follows the boom and amplifies the decrease in stock prices.

The second strand of literature on bubbles questions the rational expectations' hypothesis. There, models do not give much role for monetary policy. The behaviour of private agents is the key determinant of bubbles. They may arise also after positive news, generally technology innovations, triggering a rise in the fundamental value. The role of interest rate is of minor importance as the bubble mainly grows because of irrational agents, overconfident investors and coordination failures. Kindleberger (2005) and Schiller (2015) have largely documented those episodes in financial history where exuberant increases in asset prices have been observed after technological booms.

2.2. Empirical evidence on monetary policy and asset price bubbles

Empirically, the link between monetary policy and asset price bubble has received much more attention. For Taylor (2009), it is clear that interest rates in the US had been too low for too long after 2001 hence triggering the housing boom in the United States. However, Taylor (2009) does not explicitly identify the bubble term but rather assumes it. His diagnosis and conclusions have been challenged by Dokko et al. (2009) who show that monetary policy after 2001 has not been that expansionary in contrast with past episodes of monetary policy expansions. Besides, according to model's simulations, they suggest that the housing market dynamics would not have been strongly modified had interest rates been more in line with usual indicator of monetary policy stance (following a Taylor rule).[9] Del Negro and Otrok (2007) also concluded that monetary policy weakly contributed to the housing price dynamics in the United States.

The empirical literature has often focused on the correlation between *excessive* changes in asset prices and the stance of monetary policy. By observing the relative path dynamics of several variables (inflation rate, interest rates notably) during the period preceding the burst in asset prices, Bordo and Wheelock (2007) provide evidence of a weak correlation between interest rate and stock prices. The correlation was not systematically observed after 1970 in the United States and for other countries. Contrasting Bordo and Wheelock (2007) results, Ahrend, Cournède and Price (2008) find that asset prices, and notably house prices, increase when monetary policy is expansionary, that is when the policy rate is below the level suggested by a Taylor rule. There is yet no systematic correlation with stock prices as significant increases of asset prices are also observed when monetary policy stance is not expansionary. But it must be stressed here that the authors consider the house price and do not provide clear evidence that the rise in asset price can be considered as "excessive". More recently, Gali and Gambetti (2015) suggest that monetary policy tightening in the US may

[8] Financial history has illustrated several episodes where technical innovations were expected to generate higher future profits, which did not materialize. The dot.com bubble is the most striking evidence of such a common belief on the stock market.

[9] The Taylor rule is a usual indicator to measure the monetary policy stance. It relates the policy rate to the output gap (the gap between the real GDP and the potential GDP) and the gap between the inflation rate and the inflation target. All else equal, when the inflation rate is below the inflation target, the central bank is expected to reduce the policy rate.

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increase asset prices confirming Gali's (2014) result that a rise in the policy rate would increase the stock market bubble rather than deflate it.

Overall evidence of the impact of monetary policy shocks on asset price bubbles is not clearly established. Moreover, empirical evidence has not yet reached a consensus on the *identification* of bubbles, an issue which blurs conclusions on the role of monetary policy.

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3. NOT ALL ASSET PRICE VARIATIONS ARE BUBBLES

The correlation between asset price and monetary policy easing cannot be considered as an indicator of a growing bubble *per se* as not all asset price increases can be considered as bubbles. Separating the fundamental value from the bubble component remains a major empirical challenge since asset price bubbles are not observed. The choice of identification reflects theoretical controversies, which are illustrated by Brunnermeier (2008): "Bubbles are typically associated with dramatic asset price increases followed by a collapse. Bubbles arise if the price exceeds the asset's fundamental value". Two interpretations of bubbles emerge from this definition. Bubbles would either rely on the notion of a fundamental value or on excessive variations in asset prices. In what follows, we consider alternative specifications, stemming from several approaches. None of these models has reached consensus, however altogether they may capture the main properties of asset price bubbles.

On the one hand, rational expectations models provide a first theoretical framework where the fundamental value is determined by the discounted sum of future cash-flows and where rational bubbles (movements in asset prices which are not related to the fundamental component) may also arise. Bubbles may also be represented in models where not all agents behave rationally. On the other hand, an empirical literature has relied on statistical definitions of bubbles where the latter are considered as excessive – positive or negative – changes in asset prices beyond given thresholds, or related to boom or bust periods which are identified either through a statistical filter or from methods determining turning points (peaks and troughs).[10]

As neither theoretical, nor empirical literature has reached a consensus on this issue, Blot, Hubert and Labondance (2017) propose an agnostic approach consisting in averaging the most commonly used models (see appendix for details). The figure 2 presents the results of the methodology applied in the euro area for three types of assets: stocks, bonds and house prices. An overall bubble indicator for all three markets is also computed. It shows that the recent increase in stock prices is not characterized by a bubble. As for the housing market, there would be a positive bubble but its size remains low in contrast with the period before the global financial crisis. Finally, the bond market is characterized by a *negative* bubble since 2015. The bubble indicator of the bond market was even declining at the beginning of this year. It has increased recently and is close to zero at the end of the sample (June 2016). There is therefore no sign of a bubble in the bond market in the recent period. Finally, the overall bubble indicator shows that since 2015, a period of asset overvaluation has begun; this overall bubble is mainly driven by the housing market.

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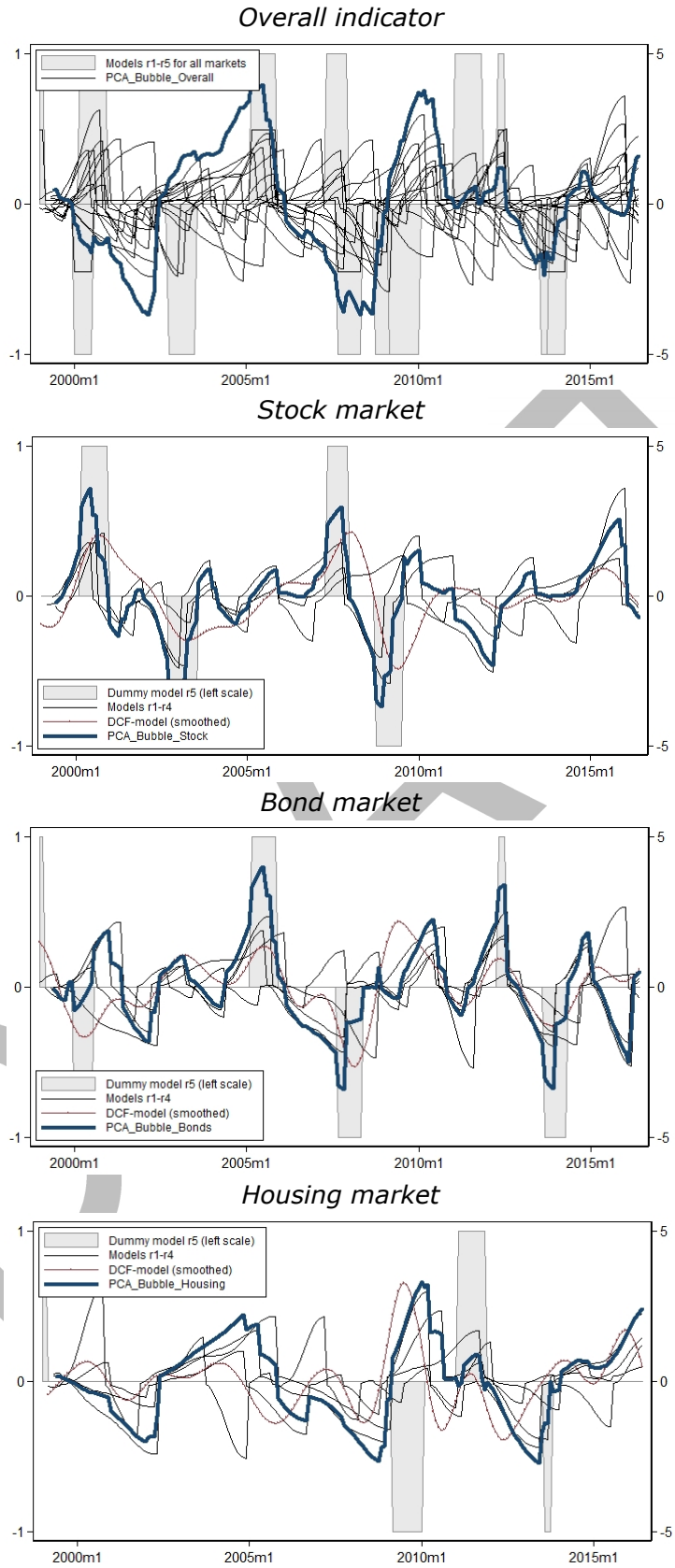
[10] See Bordo and Wheelock (2007) and Jorda, Schularick and Taylor (2015).

Figure 2. Bubbles in the EA



Note: Bubbles' indicators are represented by the blue bold lines. Each underlying models used to compute the indicators are represented by the other thin lines.
Source: Blot, Hubert and Labondance (2017)

4. DOES EXPANSIONARY UNCONVENTIONAL MONETARY POLICY CREATE ASSET PRICE BUBBLES?

We wonder whether unconventional monetary policy can be made responsible for increases in bubble components of asset prices and we also give an appraisal on the ability of this policy to smooth the bubble component. We assess the impact of unconventional monetary policy on the three bubble indicators using Jorda (2005)'s Local Projection method. Monetary policy shocks are measured following the Romer and Romer (2004) approach and using the amount of securities purchased by the ECB for monetary policy purposes as the policy instrument (the item 7.1 in ECB's weekly financial statements, which includes the Securities Market Program, the three Covered Bond Purchase Programs, the Asset-Backed Securities Purchase Program and the Public Sector Purchase Programme).

To analyse the risks associated with the recent QE episode implemented by the ECB, we focus on the impact of unconventional monetary policy after July 2008 and until June 2016, also accounting for the effect of long-term refinancing operations that have played a major role in the implementation of ECB unconventional monetary policy. It should be kept in mind that the whole period was not characterized exclusively by QE-type measures. Here we only consider expansionary shocks in the EA, which may be easily justified by the stance of monetary policy since 2008 (figure 3). The response of the overall bubble indicator to an expansionary monetary shock is positive but only weakly significant. The decomposition across markets shows that this is driven by the bond market. It would have no effect on the housing market bubble and the response of the bubble component turns negative after 14 months for the stock market. Consequently, our results suggest that the unconventional monetary policy implemented by the ECB did not inflate stock market and house market bubbles. There may be more risks on the bond market, where most operations related to the QE are now realized through the PSPP. Figure 2 has illustrated that there was no bubble in bond market since 2015, i.e. since the launch of the QE programme. But in June 2016, the bubble indicator was increasing, though being still close to zero. With the pursuit of QE since June 2016, it might be possible that the bond market is now characterized by a bubble since the indicator reacts positively to expansionary monetary policy.

Overall, our results suggest, first, that there is currently no clear evidence of bubbles due to ECB's QE programme, and, second, that there is no strong and stable causal link between monetary policy and asset price bubbles, except on the bond market.

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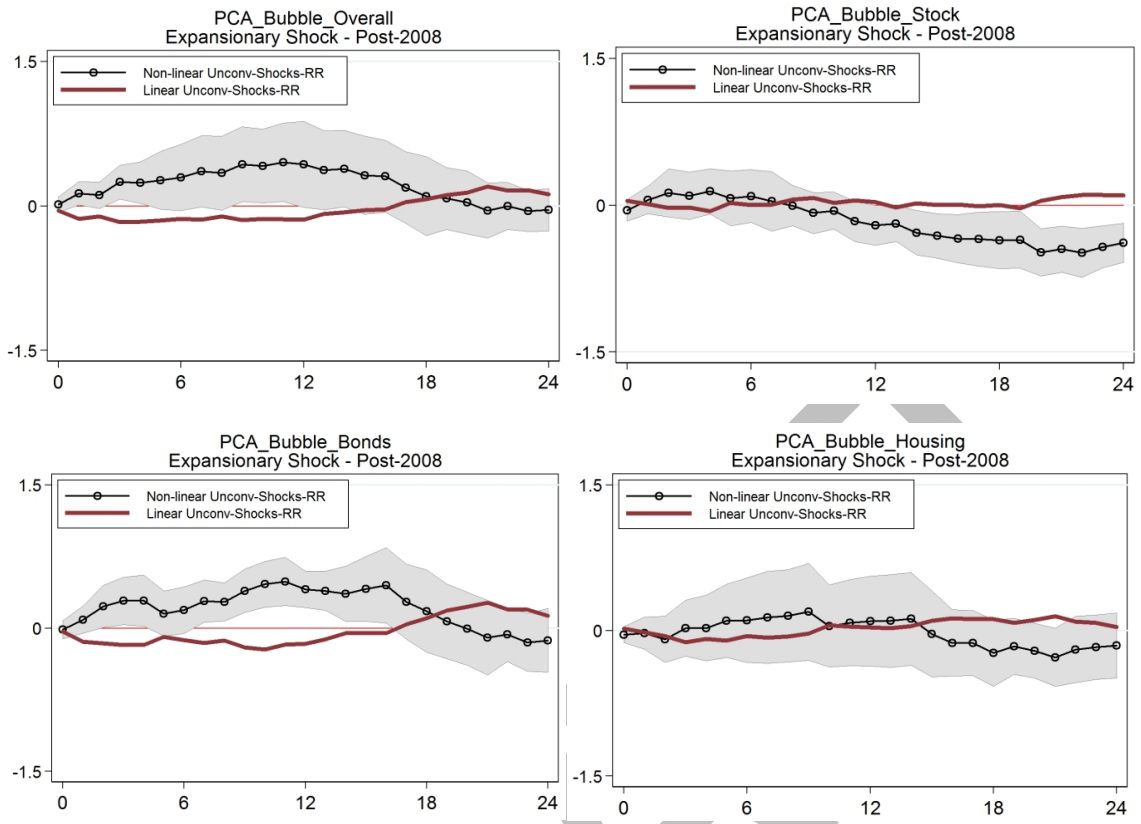
Figure 3. Bubble responses to an expansionary shock of unconventional policies
Euro area



Note: Shaded area represents the 90 per cent confidence interval. The red line plots the linear response of bubble components to shocks to unconventional policies.
Source: Blot, Hubert and Labondance (2017).

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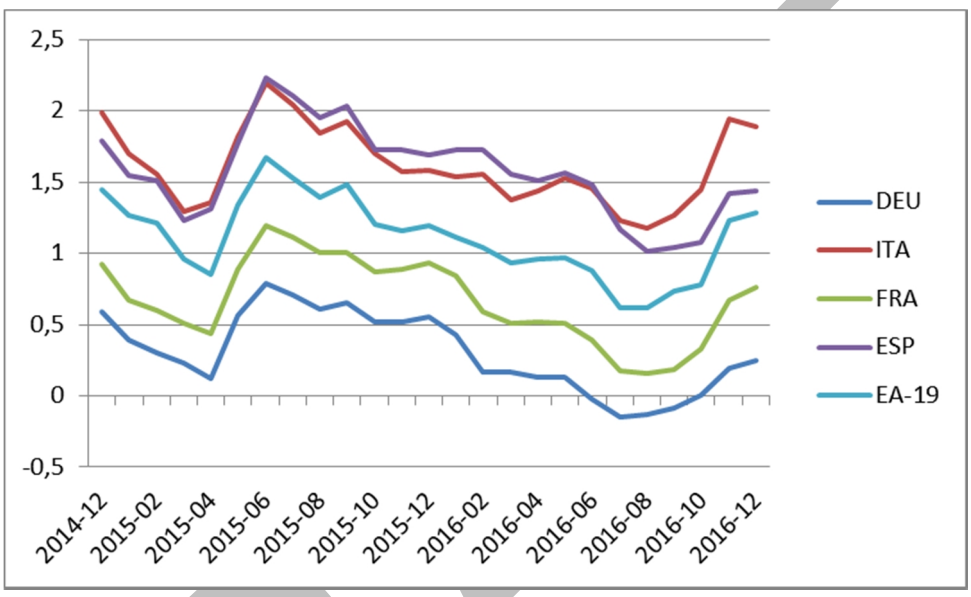
5. FINANCIAL RISKS IN THE EURO AREA

The fact that our data show a limited risk of a bubble on euro area financial markets does neither mean that there are no financial risks nor that these potential risks may not have an impact on the effectiveness of QE.

Indeed, the recent rise in sovereign bonds' interest rates of euro area countries (see figure 4) may signal higher perceived risk on the sustainability of public debts, at a moment when economic recovery remains elusive (iAGS, 2016).

Figure 4. Long-term interest rates on 10-year public bonds



Source: OECD, monthly data.

It must be kept in mind though that long-term interest rates remain at very low levels in historical terms in the euro area. Consequently, the risk of public debt unsustainability should not be overstated. Besides, the recent rise in sovereign yield may not reflect a higher perceived risk but a rise in expected inflation. The announcements of a large public investment plan in the United States may also increase the future supply of sovereign bonds pushing up interest rates in the US but also in other bond markets.

Moreover, the current euro-area policy mix of a broadly neutral fiscal stance and still expansionary monetary policy reduce debt sustainability risks (in 2017 and beyond). As a matter of fact, QE should contribute to lift inflation expectations (to their pre-crisis levels), to rise inflation towards the ECB target and spur the recovery. Higher inflation and growth would in turn help to curtail the debt dynamics.

The higher perceived risk on sovereign bonds may fuel some financial instability, not directly on debt sustainability as we have just argued, but indirectly. The fact that private banks continue to hold public bonds whose prices are declining with the increase in interest rates may deteriorate their balance sheets and even prompt a 'balance-sheet' crisis. This is all the more true in countries where the share of non-performing loans in total gross loans is already high and weakens the domestic banking system. We can think of Italy as a case in point where the deterioration of banks' balance sheets may require a public intervention, further increasing government debt and thus putting debt sustainability at risk..

What have these indirect effects got to do with QE? Since QE has been able to curb long-term interest rates, its planned extension ought to hold back deteriorations of balance sheets. Symmetrically, the end of QE will require close scrutiny to banks' balance sheets in order to remove the risk of a new bank crisis.

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6. CONCLUSIONS AND POLICY RECOMMENDATIONS

The former sections have shown that the presence of asset price bubbles is not a major concern in the euro area so far. Besides, the change in the ECB balance sheet – limited to the use of unconventional policies via SMP, CBPP, ABSPP and PSPP – has not triggered an increase in the bubble indicator of the stock and the housing market. However, it is suggested that the bubble indicator of the bond market reacts positively to unconventional monetary.

We can infer from that that extending QE – at a lower monthly pace – is not expected to generate an overall bubble in the future. Keeping in mind that the bubble component of bonds' prices has remained at a very low level, there may be some risks in the bond market. This is not a major concern for the pursuit of the QE but it might be for the phasing out of QE measures that should consequently be implemented very carefully.

As a matter of fact, the reversal in the ECB's monetary stance might well have an impact on bonds' prices in the future. To smooth that impact, the monetary stance needs to be incorporated in the information set of private agents so that it is finally reflected in the fundamental value of assets, rather than as a "surprise" of the bubble component. To achieve that, forward guidance applied to the end of QE will be central. It shall consist in clear and forward communication on a gradual exit from QE after 2017. As it has been shown that the measures taken by the ECB have contributed to increase bond prices, the phasing out of QE programmes would reduce bond prices and therefore push up sovereign yields. It is then of crucial importance that once the QE programme is over, the ECB does not try to reduce the size of its balance sheet too rapidly by selling bonds. Considering that the ECB is aware of the risks, it may act cautiously and follow a strategy close to the one implemented by the Federal Reserve, which consists in maintaining its policy of reinvesting principal payments from its holdings of securities (agency debt, Treasury debt and asset-backed securities).

A gradual decline in ECB's balance sheet would also be important to limit the risk of a new banking crisis in the euro area. A rapid reduction in ECB's balance sheet under financial frictions may trigger a bubble burst on the bonds' market which would have negative and dangerous spillovers on banks and, by contagion, on the real economy.

Finally, our argument that a change in the ECB's monetary stance should not jeopardize debt sustainability draws on two assumptions.

First, we assumed that there can be coordination between fiscal and monetary policies in the euro area. This is a strong assumption since there is no such institutional coordination in the current framework. Coordination at the euro area level must be the result of discretionary behaviour: it may or may not happen. In order to reduce perceived risk on debt sustainability in the euro area, coordination of fiscal and monetary policies is necessary.. The recent plea by the Commission in favour of a euro area fiscal stimulus during a period of weak recovery is the very example of a lack of rule for fiscal, not fiscal and monetary, coordination. The plea has been interpreted as a *discretionary* appeal to those countries having some fiscal space to act. Concerned countries have replied that this is not part of the current fiscal *rules*. If the ECB took the role of the lender of last resort for euro area member states, an institutional framework for *ex-ante* coordination of fiscal and monetary policies to dampen the risks of debt unsustainability would become feasible.

The second assumption relates to the behaviour of the ECB. When we depicted the rise of the policy rate after 2017, we have assumed that the stance of monetary policy depends on inflation expectations and the output gap, following some kind of non-mechanical Taylor rule. A rise in the policy rate would be a reaction to a rise in inflation expectations and an improvement in the output gap, with the change in the three variables having a broadly neutral impact on debt sustainability. Though this assumption may seem reasonable, it

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remains open to discussion and interpretation. A central bank with a clear mandate, a variety of instruments and a transparent strategy may well take optimal decisions for the euro area. Therefore, it would remove the fears that its policy might be detrimental to some at the benefits of others. At this stage, the mandate of the ECB and the variety of its instruments are well-known and clear. However, two caveats are worth mentioning. The first relates to the ECB mandate: shall the ECB focus more on financial stability issues, its mandate should be clarified. It should also be made clear whether the ECB fulfils a "leaning against the wind" policy or not. The second caveat relates to the horizon of the strategy: beyond 2017, the ECB' monetary stance is unclear. Tapering or not, this is a question to be answered soon by the ECB to provide a clear signal to both the real economy and financial markets on the monetary policy stance.

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REFERENCES

- Adrian, T. and H. Shin (2008). "Financial intermediaries, financial stability and monetary policy", FRB of New York Staff Report, n°346. https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr346.pdf
- Adrian, T. and N. Liang (2016). "Monetary Policy, Financial Conditions, and Financial Stability," FRB of New York Staff Report, n°690, revised December 2016. https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr690.pdf
- Ahrend R., B. Cournède and R. Price (2008). "Monetary policy, market excesses and financial turmoil", OECD Working Paper n°597. http://www.oecd-ilibrary.org/docserver/download/244200148201.pdf?expires=1485811654&id=id&accname=guest&checksum=2C24ABB58298993D85319F4E32035C99
- Allen F. and D. Gale (2004). "Asset price bubbles and monetary policy", in Global Governance and Financial Crises, edited by M. Desai and Y. Said, 19-42. https://core.ac.uk/download/pdf/6649878.pdf
- Bernanke, B. and M. Gertler (1999). "Monetary Policy and Asset Price Volatility", Jackson Hole Conference, Federal Reserve Bank of Kansas City. http://www.nber.org/papers/w7559.pdf
- Bernanke, B. and M. Gertler (2001). "Should central banks respond to movements in asset prices?", American Economic Review, 91(2), 253-257. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.201.6324&rep=rep1&type=pdf
- Blot, C., Creel, J., Hubert, P., Labondance, F., and Saraceno, F. (2015). "Assessing the link between price and financial stability". Journal of financial Stability, 16, 71-88. http://fessud.eu/wp-content/uploads/2015/03/Journal-of-Financial-Stability-FESSUD-WP33-2015-02.pdf
- Blot, C., Hubert, P., and Labondance, F. (2017). "Does Monetary Policy generate Asset Price Bubbles?". Mimeo, OFCE.
- Bordo, M., Eichengreen, B., Klingebiel, D., and Martinez-Peria, M.S. (2001). "Is the crisis problem growing more severe?". Economic policy, 16(32), 52-82. http://siteresources.worldbank.org/DEC/Resources/cris_problem_more_severe.pdf
- Bordo M.D and D.C. Wheelock (2007). "Stock market booms and the monetary policy in the twentieth century", Federal Reserve Bank of St. Louis Review, March-April, 91-122. https://pdfs.semanticscholar.org/14b7/a5e27785c6464bae3083999530d6ce95a58f.pdf
- Borio, C. and P. Lowe (2002). "Asset prices, financial and monetary stability: exploring the nexus", BIS Working Paper, n°114. http://www.bis.org/publ/work114.pdf
- Borio, C. and A. Zabai (2016). "Unconventional monetary policies: a re-appraisal", BIS Working Paper, n°570. http://www.bis.org/publ/work570.pdf
- Borio, C. (2014). "The financial cycle and macroeconomics: What have we learnt?". Journal of Banking & Finance, 45, 182-198. http://www.bis.org/publ/work395.htm
- Brunnermeier, M. (2008). "Bubbles", The New Palgrave Dictionary of Economics, second edition edited by S.N. Durlauf and L.E. Blume. https://scholar.princeton.edu/sites/default/files/bubbles_survey_0.pdf
- Cecchetti, S.G., H. Genberg and S. Wadhwani (2003). "Asset prices in a flexible inflation targeting framework", in Asset Price Bubbles: The Implication for Monetary, Regulatory, and International Policies, ed. W.C Hunter, G.G. Kaufman and M. Pomerleano, MIT Press, 427-444.

DRAFT

- Christiano, L., C. Ilut, R. Motto and M. Rostagno (2010). "Monetary Policy and Stock Market Booms", Jackson Hole Conference, Federal Reserve Bank of Kansas City. https://www.kansascityfed.org/publicat/sympos/2010/Christiano_final.pdf
- Claessens, S., Kose, M. A., and Terrones, M.E. (2009). "What happens during recessions, crunches and busts?". Economic Policy, 24(60), 653-700.
- Claessens, S., Kose, M. A., and Terrones, M.E. (2011). "Financial cycles : What? How? When?". IMF Working Paper 08/76. https://www.imf.org/external/pubs/ft/wp/2008/wp08274.pdf
- Del Negro M. and C. Otrok, 2007, "99 Luftballons: monetary policy and the house price boom across the US states", Journal of Monetary Economics 54, 1962-1985. https://www.researchgate.net/publication/222977228_99_Luftballons_Monetary_policy_and_the_house_price_boom_across_US_states
- Dokko J., B. Doyle, M. Kiley, J. Kim, S. Sherlund, J. Sim and S. Van den Heuvel, 2009, "Monetary policy and the housing bubble", Federal Reserve Board Discussion Series 49. https://www.federalreserve.gov/pubs/feds/2009/200949/200949pap.pdf
- Gali J. (2014). "Monetary Policy and Rational Asset Price Bubbles", American Economic Review, 104(3), 721-752. http://www.nber.org/papers/w18806.pdf
- Galí J. and L. Gambetti (2015), "The Effects of Monetary Policy on Stock Market Bubbles: Some Evidence", American Economic Journal: Macroeconomics, 7(1), 233-57. http://crei.cat/wp-content/uploads/2016/09/gali-gambetti-aej2015-1.pdf
- iAGS (2016). iAGS 2017: the elusive recovery, 5th report by AK, ECLM, IMK & OFCE, Revue de l'OFCE, December. http://www.iags-project.org/documents/iAGS%202017%20The%20elusive%20recovery%2023%2011%202016.pdf
- Jordà, Ò., M. Schularick and A.M. Taylor (2015). "Leveraged Bubbles", Journal of Monetary Economics, 76, 1-20. http://www.frbsf.org/economic-research/files/wp2015-10.pdf
- Jordà, Ò., M. Schularick and A. Taylor (2013). "When credit bites back", Journal of Money Credit and Banking, 45(s2), 3-28. http://www.frbsf.org/economic-research/files/wp11-27bk.pdf
- Juselius M., C. Borio, P. Disyatat and M. Drehmann (2016). "Monetary policy, the financial cycle and ultra-low interest rates", BIS Working Papers n°569. http://www.bis.org/publ/work569.pdf
- Kindleberger, C. (2005). Manias, Panics and Crashes: A History of Financial Crises, 5th Edition, New York Wiley.
- Romer, C. and D. Romer (2004). "A New Measure of Monetary Shocks: Derivation and Implications," American Economic Review, 94(4), 1055–1084. http://eml.berkeley.edu/~dromer/papers/AER_September04.pdf
- Schiller, R. (2015). Irrational Exuberance, 3rd edition Princeton University Press.
- Smets, F. (2014). "Financial stability and monetary policy: How closely interlinked?", International Journal of Central Banking, vol.10 n°2, 263-300. https://www.financialforum.be/sites/financialforum.be/files/media/1323.pdf
- Svensson, L.E.O. (2017). "How Robust Is the Result That the Cost of 'Leaning Against the Wind' Exceeds the Benefit? Response to Adrian and Liang," CEPR Discussion Paper DP11744. https://larseosvensson.se/files/papers/how-robust-is-result-that-cost-of-leaning-exceeds-benefit-response-to-adrian-and-liang.pdf
- Taylor J.B., 2009, "The financial crisis and the policy responses: an empirical analysis of what went wrong", NBER Working Paper, No. 14631. http://www.nber.org/papers/w14631.pdf

DRAFT

- White, W.R. (2009). Should monetary policy 'lean or clean'?. Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper, 34. http://www.williamwhite.ca/sites/default/files/White_Article_CentralBanking.pdf
- Yu E. (2016). "Did Quantitative Easing work?", FRB of Philadelphia Research Department, Economic Insights, First Quarter, pp. 5-13. file:///C:/Users/Paternoster%20Dario/Downloads/eiQ116_did-quantitative_easing_work.pdf

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APPENDIX: IDENTIFICATION OF FINANCIAL BUBBLES

Following Blot, Hubert and Labondance (2017), bubbles are identified on three different financial markets: stock, bond and housing, by focusing on the common component from different bubble models, using euro area data from January 1999 to June 2016. These models are the following:

1. Cash-flow model adjusted for risk-premium (estimated with OLS and ECM)

2. Full-information price model (estimated with OLS and ECM) yielding the best prediction of the fundamental value from a set of macro and financial variables

For the previous models, the bubble component is defined as the sum of the (Christiano-Fitzgerald) filtered residuals, as long as these residuals have the same sign.

3. Statistical approach, where the boom (resp. bust) period is defined as a deviation from the trend above (resp. below) 1.5 standard-deviation

From these models 5 series of bubble for each asset price (stock, bond and housing) in the euro area can be identified. Using Principal Component Analysis (PCA), Blot et al. (2017) estimate the first component of the 5 series for each asset class and consider it as a bubble indicator. With such an approach, the bubble indicator maximizes the common variance among the 5 series, with no prior about which bubble model is best, and drops idiosyncratic evolutions specific to each bubble model. This procedure should be seen as model averaging with estimated weight (the PCA eigenvalues).

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