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'New Normal' or 'New Orthodoxy'?

Elements of a Central Banking Framework for the After-Crisis

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ABSTRACT

Two different approaches to central banking in the aftermath of the crisis are contrasted. In the first one, labelled 'New Normal', the monetary policy strategy is broadened to encompass such objectives as financial stability or full employment. Furthermore, the inflation target is raised and large scale asset purchases (LSAPs) are retained as a standard instrument for implementing monetary policy. In the second approach, which we label 'New Orthodoxy', central banks keep the same objectives but interest rates can be brought to unprecedented negative levels, thus making LSAPs possibly unnecessary. The role of central banks in preserving financial stability is also explicitly recognized, both by themselves and by society, making their contribution to this task more effective and transparent.

Keywords: Central banks, Monetary policy, Financial stability.

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NON-TECHNICAL SUMMARY

In the wake of the crisis, some authors and institutions have suggested that the monetary policy framework should be updated to incorporate such features as including a financial stability objective in the strategy, raising the definition of price stability from today's most frequent target of 2% or slightly below to higher levels, or keeping some 'unconventional' instruments, specifically large scale asset purchases –LSAPs –, in the central banks' toolkit. Although the notion of a 'New Normal' primarily refers to the latter proposal regarding the implementation of monetary policy, it is also frequently associated with the idea that monetary policy should aim at ensuring financial stability on top of price stability and possibly also low unemployment. In contrast, this paper exposes some elements of a new central banking framework that would make it different both from the current one most of central banks operate in and from the 'New Normal'. Those elements relate to the conduct of monetary policy and to the role of central banks in preserving financial stability. They implicitly rely on two old-fashioned principles: a clear assignment of responsibilities, keeping monetary and fiscal policies separate; and having at least one instrument per objective, in the spirit of the 'Tinbergen rule'. Furthermore, they also keep central banks' monetary policy objectives and instruments basically unchanged, in comparison with the pre-crisis period, while supporting their traditional role in pursuing financial stability. As a consequence, we label them parts of a 'New Orthodoxy'.

In a first part, we show how monetary policy, without changing the strategy, could greatly diminish the risk of the economy falling into deflation, while making LSAPs unnecessary. This could be achieved if nominal interest rates could be brought to sufficiently negative levels, thus overcoming the "effective lower bound" (ELB). However, converting reserves or a deposit into currency and using the latter in transactions or storing it in vaults prevents monetary policy from achieving NIRs significantly below zero. We discuss the advantages and drawbacks of NIRs in comparison with other instruments such as LSAPs, forward guidance or the depreciation of the exchange rate. We then review the rather scant literature on NIRs, although the subject has recently gained renewed interest. We ask how far interest rates might have, if used alone, to be brought into negative territory to fight a (risk of) deflation. We examine different scenarios to overcome the ELB constraint by introducing an exchange rate for currency: on a permanent basis (A), when interest rates are negative (B), or when the exchange rate is below parity (C). Scenario A would generate more credibility gains in pursuing a NIR policy and would eliminate shoe leather costs, but would have negative consequences for seigniorage and would likely lead to double pricing (for paying with currency or with scriptural money). Scenarios B and C would less likely lead to double pricing and would have a positive impact on seigniorage but credibility gains would be lower than in scenario A, shoe leather costs would be eliminated only transitorily and the public would have to adapt to the exchange rate each time NIRs are implemented. Furthermore, in scenario B, there would be a "jump" in the exchange rate when the NIR policy is discontinued, which would necessitate to withdraw the currency and introduce a new one. Possible reactions of the private sector (general public, long-term interest rates and the banking system) to adopting NIRS are also discussed.

In a second part, we expose how the role of central banks in preserving financial stability could be explicitly recognized, both by themselves and by society, making their contribution to this task more effective. We first review how central banks reacted in the face of the financial crisis in order to fulfill their mission as lenders of last resort (LoLR), then the issues that were raised by the crisis experience. Drawing on the lessons from this experience, we propose some elements of a new framework for acting as LoLR. This framework could incorporate the following three features. Firstly, central banks could offer liquidity support on a standing basis. Secondly, the interest rate on the LoLR facility could be set significantly above the policy rate or above the one on the marginal lending facility for those central banks that, as the ECB, operate a corridor. Thirdly, to avoid that banks in need of liquidity assistance rely on standard monetary policy instruments instead of the LoLR instrument(s), the list of eligible instruments accepted in the former ones could be narrowed to the highest quality instruments with the overall list remaining unchanged, thereby not reducing the potential overall provision of liquidity in comparison with the present situation. Also, central banks should be provided with the appropriate institutional environment. In particular, putting a

limit on how long the central bank can lend a specific institution through its LoLR window (for instance three months in normal times and six months in crisis periods) could be useful. Once this limit is reached, the central bank would either appropriate the collateral posted by the institution the management of which would be taken over by the resolution board or be reimbursed by the resolution fund of the LoLR loan previously granted. The resolution fund would itself have to be pre-funded with enough resources and benefit from a fiscal backstop. Finally, charging the central bank with responsibility for financial stability without giving it adequate powers would generate risks, the main one being an over-burdening monetary policy). The central bank should thus have at its disposal appropriate macro-prudential tools it could activate at its own initiative or prompt other authorities to activate. In those cases where the central bank does not have a direct power of decision on the use of macro-prudential instruments but has instead to go through a separate committee to have its proposals enacted, transparency and accountability requirements for the functioning of this committee should be structured so as to reduce the risk of inaction.

Impacts of an exchange rate for currency according to different scenarios

	Permanently	When interest rates are negative / Exchange rate is below parity
Seigniorage	Negative	Positive
Shoe leather cost	Eliminated	Transitorily eliminated
Cost of adapting	One-time	Periodic
Credibility gains in fighting deflation	High	Medium

« Nouvelle Normale » ou « Nouvelle Orthodoxie »

Éléments d'un nouveau cadre d'action pour les banques centrales

RÉSUMÉ

Ce document contraste deux approches des activités de banque centrale dans le sillage de la crise. Dans la première, dénommée « Nouvelle Normale », la stratégie de politique monétaire voit son domaine élargi pour s'étendre à des objectifs tels que la stabilité financière ou le plein emploi. En outre, la cible d'inflation est relevée et les achats massifs d'actifs (AMA) sont retenus comme instrument standard de mise en œuvre de la politique monétaire. Dans la deuxième approche, que nous dénommons « Nouvelle Orthodoxie », les banques centrales conservent les mêmes objectifs mais les taux d'intérêt peuvent être portés à des niveaux négatifs sans précédent, permettant éventuellement de se passer d'AMA. Le rôle des banques centrales dans la préservation de la stabilité financière est aussi explicitement reconnu, à la fois par elles-mêmes et par la société, rendant leur contribution à cette tâche plus efficace et plus transparente.

Mots-clés : Banques centrales, Politique monétaire, Stabilité financière.

In the wake of the crisis, some authors and institutions have suggested that the monetary policy framework should be updated to incorporate one or several of the following features:

- Regarding the monetary policy strategy: including a financial stability objective in the strategy, with a view to avoiding financial crises which have a very high economic cost (Borio, 2014); raising the definition of price stability from today's most frequent target of 2% or slightly below to higher levels, in order to avoid hitting the zero lower bound – ZLB (Blanchard *et al.*, 2010; Ball, 2014); pursuing an unemployment objective, as the Phillips curve would have flattened (IMF, 2013);

- Regarding the implementation of monetary policy: keeping some 'unconventional' instruments, specifically large scale asset purchases – LSAPs –, in the central banks' toolkit, either because financial crises would be more frequent than previously thought (Mishkin, 2013) or in order to influence long-term interest rates independently from short-term ones, in relation with their important role in the financing of the economy (Friedman, 2014).

Although the notion of a 'New Normal' primarily refers to the latter proposal regarding the implementation of monetary policy, it is also frequently associated with the idea that monetary policy should aim at ensuring financial stability on top of price stability and possibly also low unemployment (Bayoumi *et al.*, 2014; Friedman, 2014; Pfister and Valla, 2015a, b).

Beyond the mere monetary policy framework and also drawing the lessons from the crisis, this paper proposes some elements of a new central banking framework that would make it different both from the current one most of central banks operate in and from the 'New Normal'. Section 1 shows how monetary policy, without changing the strategy, could greatly diminish the risk of the economy falling into deflation, while making LSAPs unnecessary. Section 2 exposes how the role of central banks in preserving financial stability could be explicitly recognized, both by themselves and by society, making their contribution to this task more effective. Section 3 summarizes and concludes.

1. Avoiding deflation without changing the monetary policy strategy

Avoiding deflation while keeping the monetary policy objective unchanged could be achieved if interest rates could be brought to sufficiently negative levels. With hindsight, negative nominal interest rates (NIRs) would have allowed stabilizing the U.S. economy sooner and more quickly than was the case during the 'Great Recession' (Ireland, 2011). Indeed, whatever the level of inflation – or possibly deflation – , there has to be a level of NIRs where private demand will respond to lower interest rates, allowing to jumpstart the economy. In the present circumstances, NIRs are getting widespread around the world, with several European central banks (Denmark's Nationalbanken – DN –, European Central Bank – ECB –, Riksbank, Swiss National Bank - SNB) and the Bank of Japan (BoJ) implementing them by and large within existing operational frameworks (Bech and Malkhozov, 2016). In the medium term, the implementation of NIRs could become widespread to help fight deflationary pressures: using a flexible time-series model with a good inflation forecasting record, Aruoba and Schorfheide (2015) find that the risk of experiencing deflation over the next five years is close to 50% for Japan, about 15% for the US and about 20% for the euro area.

To the extent that they would be set at so far unknown levels, possibly opposite to those reached by positive interest rates (*i.e.* -2% to -5% instead of +2% to +5% in normal circumstances), NIRs

would overcome the zero lower bound (ZLB) on nominal interest rates. This would be particularly useful when the economy is in or threatens to fall into a liquidity trap following an unexpected deflationary shock at a time when inflation is inflation is already low. From a theoretical point of view, recourse to NIRs should alleviate the concerns of authors (Kocherlakota, 2010; Andolfatto and Williamson, 2015; Cochrane, 2015) who point that, due to long-run monetary neutrality, keeping interest rates at very low levels during a protracted period of time might result in a permanent below target inflation or mild deflation, as exemplified by the case of Japan. By contrast, NIRs would allow a more aggressive reaction to deflationary pressures and thus help reduce the output gap much more rapidly than a zero interest rate policy. This would be especially instrumental in a situation where the natural rate of interest has fallen and would remain low (Laubach and Williams, 2015), while a recession occurs.

Furthermore, possible alternatives to NIRs may appear less appealing:

- Raising the inflation target entails permanent costs. In fact, NIRs would allow to lower the inflation target currently set by many central banks at or around 2% and thus reduce the costs of inflation. The reason is that the ZLB is, together with measurement biases in the price deflators and the concern to facilitate relative price adjustments, one of the three factors why central banks do not target exact price stability: they need room for maneuver in case of deflationary shocks in order to avoid the economy to fall in a liquidity trap. This factor would disappear with NIRs;

- When the economy is already caught in a liquidity trap, announcing a positive inflation target or a price level target path is unlikely, by itself, to be credible (Svensson, 2003). By having NIRs at its disposal, a central bank would make the target more credible to the private sector;

- Depreciating the currency raises the issue of the effectiveness of foreign exchange intervention. Even unlimited intervention to prevent the appreciation of the currency, as suggested by Svensson (2001) in his 'Foolproof Way', may not be credible. This is what the experience of the SNB tends to show, even though the SNB did not strictly follow Svensson's prescriptions, inter alia by not introducing a crawling peg. More generally, a central bank would not credibly accept to let its monetary base inflate indefinitely. Furthermore, especially if the depreciation is undertaken by a major economy, it is likely to trigger international protest, if not 'currency wars' that would cancel the expected benefits of the measure in the economy taking the initiative of the measure;

- Large Scale Asset Purchases – LSAPs – generate risks of creating distortions in asset prices and penalizing long term investment as term premia turn negative. LSAPs are also difficult to exit as the various phases of gradual reduction in asset purchases ('tapering'), return to strictly positive interest rates ('lift-off') and elimination of the stock of purchased assets ('phasing out') should be conducted in a transparent and predictable manner in order to avoid sharp adjustments on financial markets that might damage the economic recovery (Pfister and Valla, 2015a,b);

- Although forward guidance is useful to promote transparency, it seems to have been mildly effective in influencing the market policy rate path at the ZLB, suggesting a lack of credibility (Svensson, 2015). The possibility to have NIRs would make the capacity of the central bank to lower expected short-term interest rates much more effective in case a

deflation is foreseen. Indeed, NIRs would allow central banks to fight a deflationary threat much more aggressively than by committing to keep interest rates at the ZLB until a given price level path has been reached, as suggested by Woodford (2012). NIRs would also be more amenable than LSAPs to a rule rule-based approach of monetary policy, thus making it more predictable.

However, there are legal, tax and practical obstacles to implementing NIRs. The latter ones, on which this paper focuses[3], relate to the issuance of currency. Converting reserves or a deposit into currency and using the latter in transactions or storing it in vaults prevents monetary policy from achieving NIRs significantly below zero. This means that the effective lower bound – ELB – can actually be below zero. Jackson (2015) mentions estimates for storing cash of around 0.2 percent to 1 per cent, depending on the size of bills, with larger denomination bills making it easier to store large amounts of currency. Indeed, in the thirteen months that followed the introduction of NIRs by the SNB, the circulation of 1 000 franc notes (around 915 euros) increased by 17% (Letzing, 2016), instead of 9% for all cash holdings (Cecchetti and Schoenholtz, 2016). Conversely, the DN, which issues a 1 000 Danish krona note (around 135 euros) as its largest denomination, witnessed no significant impact of NIRs on banknote circulation in the months following their implementation (Moselund Jensen and Spange, 2015). In that regard, a forced removing of large denomination notes from circulation where they exist, *e.g.* in the euro area or in Switzerland, would enlarge the space for NIRs before an exchange rate between currency and reserves is set (it would also avoid the possible emergence of an above par exchange rate for these notes against lower denomination ones). However, costs of holding currency could be reduced through financial innovation: Cecchetti and Schoenholtz (2015) suggest that banks could offer customers "cash reserve accounts", a product backed by cash kept in a vault that would allow easy transfers and could act as a substitute for transfers (in fact, such accounts could also be used for interbank transactions). Conversely, McAndrews (2015) points that building a currency warehouse takes time and that the investment would be undertaken only if there are prospects of NIRs reaching very low levels and/or being implemented for a protracted period (his objection is also valid as regards the exchange of banknotes afore-mentioned).

We first review the main conclusions of the rather scant recent literature on the subject (1.1). In view of the lack of consensus in that literature and of the drawbacks of the various methods it puts forward, the issue of how to implement NIRs is then revisited (1.2). Finally, we consider another issue that has recently surfaced due to the persistence of very low rates of inflation in some areas that already have NIRs (Giugliano, 2015; Cecchetti and Schoenholtz, 2016): how far in negative territory might interest rates be brought (1.3)? Indeed, for NIRs to be a credible instrument to thwart a protracted period of below target inflation, central banks might have to bring interest rates to levels substantially below the ones recently reached in Europe.

1.1 Literature review

NIRs tend to be viewed as an eccentricity (Buiter, 2005). This, together with the fact that the concern with a possible deflation has resurfaced only recently with the Great Recession, may account for the paucity of the related literature. Basically two authors, Marvin Goodfriend and Willem Buiter, have written on the practical aspects of how to implement NIRs before the crisis. Very recently, the subject has however attracted renewed interest.

[3] Regarding legal and tax issues, one can refer to Danish Minister for Business and Growth (2015) for mortgages, to Endreo (2015) for bonds and to Zumbrun (2016) for central banks, in each case within a specific institutional context.

Goodfriend (2000) asks how to overcome the ZLB. He proposes three options: monetary transfers (*helicopter money*), open market operations (an anticipation of Large Scale Asset Purchases, although he does not use the phrase) and NIRs. He suggests that the latter ones could be implemented through a 'carry tax' on electronic bank reserves (what some European central banks currently do by charging interest on reserves) and that a 'carry tax' could be imposed on currency to create more leeway to make interest rates negative. Goodfriend (2000) refers to Keynes (1936) as endorsing a carry tax on money in principle. However, he rejects Keynes' objections that such a tax would be impractical on the ground that currency has been taxed by inflation without causing a flight from the monetary base as the medium of exchange and that the imposition of the tax could be relatively infrequent and of short duration. Regarding the relation between the two carry taxes, he suggests that the carry tax on currency could be varied with the one on reserves or that the carry tax on currency could temporarily be fixed high enough, say, at 5 per cent per year, so that the central bank could move nominal interest rates in a range from zero to negative 5 percent by varying the tax on reserves alone. To collect the tax on currency, he proposes that a magnetic strip imbedded in each bill could record when a bill was last withdrawn from the banking system: the carry tax could be deducted from each bill upon deposit according to how long the bill was in circulation and how much carry tax was 'past due'. These practical details have two drawbacks: firstly, if the magnetic strip could not be easily read by the holders of banknotes, there would be uncertainty on their value; secondly, the value of banknotes of the same denomination would vary according the amount of time they would have been in circulation, making the use of currency very impractical.

Buiter (2005, 2007, 2010) and Buiter and Panigirtzoglou (2003) go very much into such details. They distinguish between two categories of financial instruments: bearer instruments, including currency, and registered instruments. Their point is that, whereas paying interest, positive or negative, on registered instruments is trivial, this is not the case for bearer instruments. In particular, the holders of currency are unknown to the central bank, and there is thus a risk that currency may circulate while it is 'past due' because the holders neglect to pay the negative interest.

Buiter (2010) considers three methods to solve that issue. The first one is to abolish currency altogether, which he also views as a useful crime-fighting measure, a view that may overstate the hindrance caused to crime activities with regard to their profitability. The second method is to enforce negative interest by stamping currency in the spirit of Gesell (1916) and Fisher (1933) and imposing controls and penalties (a variant of this option would be to give currency an expiration date). However, Buiter (2010) discards this option as being illiberal, probably unpopular and administratively costly. Moreover, the tax rate would have to be set in advance (Buiter and Panigirtzoglou, 2003). Thus, unless stamping dates are not known in advance, which would be very inconvenient, setting the tax rate would put a lower limit to the level at which the central bank might set the NIR on reserves during the period before stamping (or re-stamping): this would limit the room for manoeuver of the central bank and send a possibly undesired signal on its monetary policy intentions (Buiter does not mention that drawback of the Gesell tax). In any case, Buiter (2010) favors the third method, attributed to Eisler (1932), which consists of decoupling the numéraire from the currency/medium of exchange/means of payment and introducing an exchange rate between the numéraire and the currency. He also suggests that the exchange rate could be a fixed parity, in which case the old currency could be retained, or that it could be a floating exchange rate, with the central bank setting the initial value of the spot exchange rate in that period at the value of the one-period forward exchange rate from the previous period. In the former case, the drawback is that by definition, the currency cannot depreciate vis-à-vis reserves, which gives it an advantage when interest rates are negative, and economic agents would then

substitute currency for deposits, making the reform a one-time shock. In the latter case, there is uncertainty on the value of currency after the initial period as risk premia will develop, as signaled by Buiter (2010) himself.

Agarwal and Kimball (2015) have recently suggested creating a deposit fee between private banks and the central bank, allowing the central bank to introduce a crawling-peg exchange rate between paper currency and what they refer to as "electronic money"[4]. This approach is quite similar to the one we advocate (1.2), although in some of the cases envisaged by the authors, where the crawling-peg exchange rate is set on the basis of an interest rate that differs from the interest rate paid by the central bank on reserves, it would lead to arbitrage by banks between currency and reserves. It is however fair to say that, in a situation like the one that prevailed in many countries before the crisis, where a positive interest was paid on reserves and not on currency, banks had an incentive to promote the use of deposits instead of currency. But precisely creating a crawling-peg exchange rate for currency under the conditions we propose (1.2) allows to remove this distortion that seems hard to justify since reserves and currency are both central bank money and there is no clear reason why the central bank should discriminate either against or in favor of one or the other.

1.2 How to implement NIRs?

For a central bank, remunerating reserves at a NIR is certainly easy from a technical point of view, provided it is entitled to do so. It is also unlikely to harm its reputation as monetary policy is pursued in conformity with central bank statutes consistent with the achievement of social welfare. However, paying negative interest does not appear trivial, even for registered instruments, as far as private agents are concerned. The reasons are probably transitory in nature: there is a need for adapting software and payment systems design and reputational problems linked to asking investors to pay interest may arise before private agents get accustomed to NIRs. Accordingly, so far floating rate notes (FRNs) issuers have in most cases refrained from asking holders to pay interest when they were allowed to by the terms of the contract (they seem to have done so only on some French short-term notes, BloombergBusiness, 2015) and NIR bond issues have been zero coupons with a redemption price below their issue price (Endreo, 2015). Although they have paid NIRs on wholesale deposits, banks have so far refrained from paying NIRs on retail deposits for fear of substantial substitution of currency for deposits (Bech and Malkhozov, 2016)[5].

The behavior of FRN issuers gives a hint of how to consider currency if central banks wish to push interest rates further in negative territory. Currency can be viewed as a perpetual bearer bond with a zero coupon. Indeed, currency cannot be redeemed except against the other form of central bank money – reserves – or against new currency in case of a monetary reform. Paying interest on

[4] In this paper, we instead refer to "bank money" as opposed to currency, and use the phrase "electronic money" in the sense of the EU Directive 2009/110/EC of the European Parliament and Council of 16 September 2009, *i.e.* "electronically, including magnetically, stored monetary value as represented by a claim on the issuer which is issued on receipt of funds for the purpose of making payment […], and which is accepted by a natural or legal person other than the electronic money issuer".

[5] Central banks, especially those that target an exchange rate, such as the DN and the SNB, but also the BoJ, have discouraged banks from paying NIRs on retail deposits by introducing exemption thresholds beyond which NIRs do not apply to reserves. The ECB and the Riksbank did not introduce such thresholds, although, in March 2016, the ECB launched a new series of targeted longer-term refinancing operations (TLTRO II) that allow banks to get refinancing at the same NIR as the one on reserves, thus potentially offsetting the cost of NIRs for those banks that have recourse to TLTRO II. However, even if they wish to neutralize the transmission of NIRs to the domestic economy, central banks cannot prevent firms from demanding cheaper credit conditions from banks as a result of lower market rates.

currency would thus just amount to shifting the coupon to a non-zero level. However, in doing that, three objectives should be reached:

- The administrative costs should be minimized and the collection of the tax or the decoupling of the numéraire from the currency designed in such a manner as to be acceptable by the public;

- There should not be uncertainty on the value of currency among private agents, unlike in some of the proposals reviewed in the first section of this paper. In particular, for the banks to be able to exchange banknotes with deposits and for the public to accept to use the currency in transactions or for saving motives, the current rate of exchange of currency against reserves should be known with certainty;

- Different banknotes on the same denomination should have the same value and the central bank should provide no incentives to banks to substitute reserves for currency or encourage the substitution of currency for deposits by non-financial agents, thus preserving the unity of the monetary base and not distorting the choices of private agents as regards the holding of different monetary assets.

One simple way to achieve these objectives would be a decoupling of the currency from the numéraire in which (scenario A in the summary table below):

- From a given day, the central bank starts paying interest permanently on all currency it has issued (including the currency in the vaults of banks). This would allow all banknotes of the same denomination to have the same value, unlike in Goodfriend's (2000) proposal. Getting positive interest on currency (or the prospect of it in case the central bank starts with paying NIRs) would to a certain extent offset in the eyes of the private agents the inconvenience caused by the beyond one-period ahead uncertainty on the value of the currency and by the breakdown of the fixed parity between the numéraire and the currency, and would thus make the measure more acceptable to them. It would eliminate the 'shoe-leather cost', thus lowering the cost of inflation, and increasing social welfare to the extent that the loss of seigniorage is not offset by a more distortive form of taxation (the main contribution of NIRs to social welfare would however be to increase the capacity of monetary policy to smooth the economic cycle in the face of large shocks). It would also address the reproach of regressivity often mentioned against taxing currency (Goodfriend, 2000; Buiter, 2003), even though this reproach can be seen as excessive since NIRs also affect securities holders that are concentrated among the wealthier and allows fighting more efficiently unemployment that hits the poor more severely. Paying interest on currency would also dispense the central bank from changing the currency when it introduces significantly negative interest rates and when it returns to close to zero or positive interest rates. This would both save administrative costs and reduce the welfare costs of having to change from one currency to the other, bringing back the old currency to the central bank and getting accustomed to the new one. However, agents conducting many operations in cash, such as small retailers, would be hurt. In that sense, the measure would have distributional consequences beyond the reduction of seigniorage[6]. One natural

[6] The distributional consequences that are usually put forward (Goodfriend, 2000; Buiter and Panigirtzoglou, 2003) rather refer to the use of currency abroad (impact on seigniorage) and to regressivity, with the poor holding a relatively large portion of their wealth in currency. However, the costs incurred by currency holders that are mentioned in those papers relate to the taxation of currency and should be more than offset in the long run by the payment of positive interest.

way of alleviating this problem would be to use rounded figures in small everyday transactions, thereby making the shift from one exchange rate to the other less frequent in such transactions. Also, a double pricing, with one price for paying in currency and another for paying in scriptural money, might emerge but this would not jeopardize the efficacy of NIRs as the pricing for paying in currency would incorporate the exchange rate of currency. Such a development would be more likely in countries that have had an experience of double pricing, like those of the euro area in the years before and after the introduction of the new currency. Finally, paying interest on currency would make it much easier for banks to pay NIRs on retail deposits, thus avoiding the perverse adjustment that took place in Switzerland where banks increased mortgage rates, seemingly to compensate for the interest they had to pay on part of their reserves after the SNB started to implement NIRs (Bech and Malkhozov, 2016). However, to the extent that the yield on its assets might not be high enough, paying positive interest on currency may cause the central bank to run losses. This would risk making it dependent on a Government subsidy to pay for its operating expenses, potentially jeopardizing its independence. It would thus be desirable to ensure that the central bank has a substantial level of own funds before it starts paying positive interest, possibly also starting by paying negative interest;

- It announces every day at the end of the day, on the basis of the rate at which it remunerates reserves, the exchange rate of a unit of currency against reserves for the next day, in the same vein as Buiter (2010) suggests setting the initial value of the new currency, except that the old currency would be kept and an 'initial value' would be set every day, at which the central bank would buy and sell any amount of currency against reserves. This creates certainty on the value of currency at a one-period horizon. Simple arbitrage then propagates the exchange rate of currency in private and public transactions involving currency, including transactions with the banking sector, with the value of currency differing from its face value;

- It pays both positive and negative interest on currency at the same rate it remunerates excess reserves. Choosing the rate of remuneration of excess reserves would help preserve a margin for the central bank as this rate is usually the lowest policy rate, in particular for those central banks that, as the ECB, operate a 'corridor' system for implementing monetary policy. It would also make sense as excess reserves can be seen as a perfect substitute for currency with which they can be exchanged at par (this would not necessarily be the case in the scenarios described by Agarwal and Kimball (2015) where the interest rate on paper currency would be a different interest rate that could be set at levels not consistent with money market interest rates, also with a view to penalizing the holding of currency, thus making the central bank act as a tax collector, a confusion we wish to avoid). The interest would be paid when currency is returned to the (central) bank and exchanged for deposits at the exchange rate of the day.

Summary table: Impact of introducing an exchange rate for currency according to three different scenarios

	Permanently (A)	When interest rates are negative (B)	When exchange rate is below parity (C)
Start	Anytime	Adoption of negative interest rates	Adoption of negative interest rates
End	Irrelevant	Return to interest rates close to zero	Return to parity
'Jump' in exchange rate (a)	No	Yes	No
Impact on seigniorage	Negative	Positive	Positive
Shoe leather cost	Eliminated	Transitorily eliminated	Transitorily eliminated (b)
Cost of adapting	One-time	Periodic	Periodic
Introduction of a double pricing	Likely	Less likely	Less likely (c)
Credibility gains (d)	High	Medium	Medium

a) Hence need to withdraw the currency and introduce a new one when the exchange rate is suppressed; b) Longer than in (B); c) More likely than in (B); d) In the sense of signalling *ex ante* the willingness to adopt negative interest rates.

Alternatively, in order in particular to preserve and in fact increase seigniorage, the central bank may wish to pay interest on currency only when it is negative (scenario B in the summary table below) or when the exchange rate of currency is below parity (scenario C), with the latter scenario also avoiding the cost of withdrawing the currency and introducing a new one. However, both scenarios would be less flexible than scenario A that can be introduced at any time. They would eliminate the shoe leather cost only transitorily, and would so in a way that the general public would consider unappealing. They would imply a periodic cost to adapt to the new system, would be less amenable to the introduction of a double pricing. Finally, by implying no seigniorage sacrifice by the central bank, they would convey less monetary policy credibility gains in terms of signaling the willingness to adopt NIRs if need be and thus in terms of convincing banks of paying NIRs on retail deposits.

1.3 How far in negative territory?

As stated above, NIRs are already common in Europe and have also been implemented in Japan. Would taxing currency by exchanging it against reserves at a depreciated price in comparison with its issue price allow the central bank to set interest rates at a level substantially lower than the so far

lowest -0.75% the DN and the SNB have set for their deposit rates? Indeed, private agents may react in different ways that would mitigate or amplify the transmission of NIRs to the economy:

- Using substitutes for currency, such as foreign banknotes or precious metals as Keynes (1936) suggested in chapter 23 of his *General Theory*. However, as shown in reverse by the experience of countries with hyper-inflation, this process of substitution is likely to kick in only at very low negative rates since the values of the assets that would be used in transactions would themselves be subject to a high degree of uncertainty[7]. More likely, private agents would substitute electronic means of payment for currency. However, electronic money could be submitted to the same treatment as currency and thus also depreciate vis-à-vis deposits. Private agents would also reallocate their wealth towards real assets (shares, real estate), thus creating the risk of feeding bubbles (Hannoun, 2015). But macro-prudential policies can be used to mitigate the risk of bubbles developing. This would also provide another reason for giving central banks the capacity to have recourse to macro-prudential tools, as developed in the section 2 of this paper, since they would be best placed to internalize the consequences of NIRs for financial stability;

- Creating a market for currency at more than overnight maturity. This in turn may generate volatility in the demand for currency: as central banks usually smooth interest rates, generating interest rate cycles, the demand for currency may abruptly pick up at the end of the accommodating phase of the cycle and subsequently subside[8]. However, this drawback is also present in the proposal favored by Buiter (2010), where there is furthermore uncertainty on the value of currency one day ahead after the introduction of NIRs. Also, the cost of storage should limit the speculative demand for currency. Finally, the rate of interest on excess reserves, and thus on currency, could be set at zero when the policy rate is positive (scenario A) or when the exchange rate of currency is below parity (scenario C): this would limit variations in the present discounted value of currency. However, scenarios B and C appear to be dominated by scenario A on most criteria (1.2);

- Using the currency as the numéraire. As Buiter (2010) puts it, the numéraire would then 'follow the currency', thus threatening to make the measure pointless (Buiter draws a parallel with the change from old French francs to new French francs in January 1960). In such a scenario, to the extent that the rate of remuneration of excess reserves would provide a floor to short-term money market rates, as is usually the case, interest rates on very-short maturities could remain positive provided they are paid in currency. However, this would very inconvenient and would entail high payment costs;

- Just as individuals may increasingly prefer to use electronic means of payment instead of currency in some of their transactions, the banking sector may consider shifting its payments out of the central bank, in order to avoid using reserves and thus receive negative interest, and move them to a bank that would be held collectively and would serve as a clearinghouse. If the unit of account issued by this bank was to bear an interest rate that was different from the one on excess reserves, then this would be tantamount to creating a

[7] If only for privacy reasons, substitution for foreign banknotes or precious metals would certainly occur, thus causing substantial social welfare losses, if paper currency was phased out (Rogoff, 2014) or replaced by a government-backed electronic currency (Haldane, 2015). This is why we do not consider those possibilities in this paper. Other possible costs mentioned by Rogoff (2014) are seigniorage loss (also present but to a lesser extent in our proposal), with potential risk to central bank independence, possible unexpected macroeconomic instabilities induced by abandoning a century-old social convention and protection of civil liberties.

[8] This may particularly be the case if, due to traceability difficulties, profits made on currency are tax exempt.

new central bank, except that the new unit of account would not be legal tender (*i.e.* one would not have to accept it). However, the banks would still hold reserves in the historical central bank and the amount of reserves they would hold would even increase as they return currency to the central bank.

Two other uncertainties regarding the reaction of the private sector relate to the impact of adopting NIRS on long-term interest rates and on the banking system:

- Regarding long-term interest rates, while their reaction is difficult to anticipate due the novelty of the measure, short-run and longer-run impacts could differ. In the short run, some "overshooting" could likely take place, all the more if the decision is unanticipated and highly credible (*i.e.* a permanent exchange rate for currency is introduced), with long-term interest rates falling to extremely low levels, possibly in negative territory. If they so wished, central banks could sell some assets purchased as part of their LSAPs to counteract such an 'overshooting'. In the longer run, the impact of significant NIRs might be a rise in long-term interest rates, as can be expected by distinguishing between the two components of those rates: anticipated short-term interest rates and term premia. On the one hand, the anticipated levels of average future short-term interest rates would not necessarily differ, with the possibility to have NIRs for short periods more or less offsetting the expectation of reaching the ZLB for extended periods. On the other hand, term premia should increase, reflecting the broadening of the range of anticipated short-term rates. So, overall, long-term interest rates would rise. Such a rise would also be in line with the Fisher identity: under the assumption of long-term monetary neutrality, the natural rate of growth should be unaffected; however, average anticipated inflation should increase as the possibility of having inflation below target during protracted periods would disappear. One consequence for financial stability is that, while the short-term impact of NIRs for the profitability of the financial system, especially the bank and insurance sectors, may be detrimental, its longer-term impact could be positive as the yield curve would steepen. In that regard also, NIRs appear preferable to 'unconventional' monetary policy instruments, such as LSAPs, which compress term premia, thus lowering the return on the assets of financial intermediaries, especially the longer-term ones, and flattening the yield curve until they have been removed;

- Regarding the banking system, the assumption in this paper is that, although banks may at first be tempted to shield their depositors from NIRs, and accordingly may be unwilling to charge NIRs on retail deposits in the first course and possibly eventually on the loans they distribute, they will at some point have to yield to competitive pressures as interest rates go further into negative territory, with the example of the central bank setting an exchange rate on currency helping them to do so. Of course, this assumption is essential for the adoption of NIRs to have the same efficacy as positive ones and, regarding the remuneration of deposits, for the profitability of banks to be preserved.

Overall, by introducing an exchange rate for the currency against reserves, central banks could lower NIRs to unprecedented levels. What remains to be seen is whether economic conditions will someday warrant such a bold move.

2. Recognizing explicitly the role of central banks in preserving financial stability

Whereas the crisis has shown that financial instability can have a huge economic cost, most central banks do not yet have a clear and explicit mandate to preserve financial stability at a systemic level,

with their statutes usually giving them instead a more focused mandate. For instance, the Treaty on the Functioning of the European Union just mentions in its Article 127(1) the promotion of the smooth operation of payment systems as one of the 'basic tasks' of the Eurosystem. Article 127(2) also provides that the Eurosystem contributes to the smooth conduct of policies by the competent authorities as regards the prudential supervision of credit institutions and the stability of the financial system. Finally, on the basis of Article 127(6) and the Council 'SSM Regulation', the ECB is now responsible for supervising banks and for specific tasks concerning the prudential regulation of credit institutions established in participating Member States, within a Single Supervisory Mechanism (SSM) composed of the ECB and the national competent authorities. However, for complementing the Treaty by giving the ECB a clear and explicit mandate for preserving financial stability in the euro area would still be useful (Valla, 2014), not only for transparency and accountability reasons, but also because it would allow the ECB to play more easily its role of LoLR in the euro area. The lack in most countries or areas of an explicit and clear mandate for ensuring systemic financial stability, in spite of demands in that direction forcefully expressed by central banks (BIS, 2011), is surprising in two respects:

- While the issue of whether central banks should be in charge of banking supervision is a debated one in the academic literature (see Blinder, 2010, Calomiris, 2010 and Eichengreen and Dincer, 2011for recent overviews), there is a consensus on the usefulness of entrusting them with a macro-prudential mandate that would complement their monetary policy mandate, as both macro-prudential policies and monetary policy are directed toward the economy as a whole with a view to managing the cycle and have to be conducted by an independent institutions facing strict accountability requirements (De Bandt *et al.*, 2013);

- In relation with their role as lender of last resort – LoLR –, central banks have historically played an important role since their creation in preserving financial stability. That was also the case in the recent financial crisis (Drumetz *et al.*, 2015)[9].

The lack of an explicit and clear mandate has two negative consequences:

- Central banks tend to act has as LoLR in an unprepared manner, as if unwillingly, without having *ex ante* the proper instruments in place. This creates unnecessary uncertainty on their action, may generate moral hazard and is detrimental to transparency and accountability;

- They do not always benefit from an appropriate institutional environment that would enable them to intervene promptly and efficiently, with both the institutional architecture and its governance in some cases lagging behind.

There is thus a need that central banks act to be able to fulfill their role of LoLR at any moment (2.1) and are provided with the appropriate institutional environment (1.2).

2.1 Getting prepared to act as LoLR

We first review how central banks reacted in the face of the financial crisis in order to fulfill their mission as LoLR (i), then the issues that were raised by the crisis experience (ii). Finally, drawing on

[9] However, from a political economy point of view, the lack of an explicit and clear mandate is less surprising as politicians tend to delegate, *inter alia*, when rents are weak and decisions over policies do not imply redistribution, neither of which is the case in the financial sector (Alesina and Tabellini, 2004).

the lessons from this experience, we propose some elements of a new framework for acting as LoLR (iii).

(i) Reactions in the face of the financial crisis

Basically, central banks have fulfilled their role of LoLR in two ways, using conventional monetary policy instruments in an unconventional manner (Pfister and Valla, 2015a).

- Those central banks that had a monetary policy operational framework that was open enough to channel liquidity to all parts of the financial system did not have to create new instruments. For instance, the ECB, that has potentially around 3500 counterparties to its main refinancing operations, made three seemingly technical sorts of adjustments. Firstly, it progressively increased the duration of its longer-term refinancing operations (from 3 months before March 2008 to 4 years in September 2014). Secondly, and that was the most important measure, it moved in October 2008 from a variable rate allocation to a fixed-rate full allotment procedure in all its refinancing operations, thereby allowing all its counterparts to get access to liquidity at the same interest rate in any amount, provided they had appropriate collateral. Thirdly, it broadened the already broad eligible list of collateral that it accepted in its refinancing operations, mainly by lowering minimum ratings thresholds requirements, and waived any requirements for the securities issued by or guaranteed by those Member States under EU/IMF programs, provided the program was respected (ECB, 2013a);

- Those central banks that relied on a small number of counterparties, as the Fed with the primary dealers, created some facilities temporarily[10]. In particular, as early as December 2007, the Fed created the Term Auction Facility (TAF) that allowed it to allocate reserves at various maturities – mainly 28 days – to more than 7000 US commercial banks. It also created a series of facilities that gave access to central bank refinancing to some categories of financial intermediaries that did not previously have that possibility, including in the shadow banking system (money-market mutual funds and securitization bodies). All the facilities created during the crisis had made their last operations by mid-2010 and were then progressively closed.

For the ECB, it was 'unconventional' to give banks quasi unlimited access to its refinancing; just as for the Fed it was 'unconventional' to give access to non-banks.

In spite of the difficulty to build a counterfactual, central banks' interventions at the beginning of the crisis have generally been credited with avoiding a collapse of the financial system and of credit, thereby mitigating the risk of the deep recession, of the sort of the Great Depression (Cecchetti, 2008; Giannone *et al*, 2012; De Socio, 2013; Bordo, 2014). However, delays in the adjustment of the banking system seem to have played a role in the slow recovery of credit and the economy in the euro area (Reichlin, 2014), notably in comparison with the US where the recapitalization of banks was essentially completed as soon as 2009 (Carpenter *et al*., 2014). This has consequences for the appropriate institutional environment in which central banks should operate (2.2).

[10] In fact, the Fed has a discount window to which the banking system has a wide access and that aims at serving the purpose of a LoLR facility but there is a stigma attached to accessing it (Armantier *et al*., 2011).

(ii) Issues raised by the crisis experience

Four main sorts of issues were raised by the central banks interventions during the crisis (Drumetz *et al.*, 2015):

- They were not fully in line with the classical LoLR doctrine that aims at limiting the costs of financial crises not just in the short term, but also in the medium term by mitigating moral hazard (Thornton, 1802; Bagehot, 1873). Central banks did lend 'freely' – *i.e.* accommodated the demand for reserves – as prescribed by 'Bagehot's Rule' but the principle and the modalities of their intervention were not set in advance, the liquidity was not supplied at a penalty rate and not always against good collateral or to clearly respond to a liquidity problem (De Socio, 2013; Bordo, 2014; Hogan *et al.*, 2015). This diminished the incentives for banks to restructure rapidly, especially as the maturity of the refinancing was extended (Bini Smaghi, 2010). It also diminished the incentives for Governments to intervene rapidly to resolve or recapitalize the banks;

- Acting in a piecemeal manner, creating specific programs, can suggest that the central bank interferes in the allocation of resources, playing a fiscal role. Reflecting such a concern, the Dodd-Franck Act – DFA – of 2010 has put some limits to the possibilities of the Fed to act as LoLR, prohibiting it from giving access to the discount window to non-bank financial intermediaries, forcing it to get Treasury's approval before creating programs in support of specific categories of financial intermediaries and requiring it to disclose to the Congress its counterparties and other conditions of its discount window lending within two years after termination of the program. However, Goodfriend (2014) is of the opinion that the DFA does not go far enough, in part because the Treasury shares the same incentives as the Fed (*i.e.* they both wish to avoid a panic). He suggests that the Fed should deviate from a 'Treasuries only' asset acquisition policy only for occasional, temporary, well-collateralized last resort lending to solvent, supervised depository institutions ; beyond that last resort lending, Fed credit initiatives would be undertaken only with prior approval of the fiscal authorities, and only as bridge loans accompanied by take-outs arranged and guaranteed by the fiscal authorities;

- Apart from not conforming to 'Bagehot's Rule', using the standard monetary policy operations to act as LoLR may also create difficulties. The full allotment procedure used by the ECB created excess liquidity, making the deposit facility rate the *de facto* policy rate, with the rate of the main refinancing operations – the usual policy rate – providing a ceiling to short-term money market rates, a role normally dedicated to the marginal lending rate (Drumetz *et al.*, 2015);

- Even when there are procedures for 'emergency liquidity assistance' – ELA (*i.e.* lending of last resort to those banks that do not own collateral that is eligible to monetary policy operations), which is the case in the Eurosystem (ECB, 2013b), two sorts of problems can arise. Firstly, novel legal interpretations may be introduced to justify discretionary interventions (Orphanides, 2014). Secondly, within a multi-country area as the euro area, when a large part of a national banking system if not the whole of it requires access to ELA, refusing it would amount to rejecting the country from the union. As the latter decision should normally be taken by a political body rather than by the central bank, the rules that have been set in advance are hardly enforceable and ELA can be granted on a lasting basis, as has been the case for the Greek banking system.

(iii) Elements of a new framework

Some of the lessons that can be drawn from the crisis experience regarding the role of central banks as LoLRs are the following:

- Instead of reacting in *ad hoc* manner, creating specific facilities or turning monetary policy instruments into LoLR facilities, central banks could offer liquidity support on a standing basis. The provision of liquidity would be triggered, as in any standing facility, by the financial intermediaries the central bank is allowed to refinance. This would ensure that the central bank lends 'freely' provided the list of eligible collateral is broad enough;

- The provision of liquidity through the LoLR facility – or facilities if there are several of them – should interfere as little as possible with the everyday conduct of monetary policy. To this end, the interest rate on the LoLR facility could be set significantly – for instance 100bp for the cheapest one – above the policy rate or above the one on the marginal lending facility for those central banks that, as the ECB, operate a corridor. It would thus be a penalty rate that would strengthen incentives for banks to monitor the quality of borrowers and as a consequence for borrowers to improve their credit quality, thus reducing the risk of instability at source[11]. Of course, as reserves borrowed from the LoLR facility would then be used to make payments in the interbank market, putting pressure on the overnight rate, the supply of reserves through open market operations would have to be adapted correspondingly while the LoLR facility would be used, by reducing the amount of those operations, possibly even borrowing at the policy rate instead of lending. For central banks that operate a corridor, another possibility, used in isolation or in combination with the former one, would be to narrow significantly the corridor – for instance to ± 10bp – in order to keep a tight control of the overnight rate;

- To avoid that banks rely on standard monetary policy instruments instead of the LoLR instrument(s) to satisfy their liquidity needs, thus putting undue pressure on interest rates in open market operations, the list of eligible instruments accepted in the former ones could be narrowed from the current extent to the highest quality instruments with the overall list remaining unchanged, thereby not reducing the potential overall provision of liquidity in times of financial stress, in comparison with the present situation. In that regard, the Bank of England, has introduced 'liquidity insurance' in its Sterling Monetary Framework between 2008 and 2011, distinguishing three sets of collateral, with only the first one eligible in monetary policy operations (Bank of England, 2014[12]). Such a distinction implies that lending of last resort would not be granted against 'good' – in the sense of 'the best'– collateral as prescribed by 'Bagehot's Rule'. However, requiring that

[11] In the regulatory and supervisory field, such an approach would have to be complemented by a treatment of sovereign risk more in line with a full fair-value accounting framework, as suggested by Hannoun (2011).

[12] Level A collateral comprises certain high-quality highly liquid sovereign securities; Level B collateral comprises high-quality liquid collateral, including other sovereign, supranational, mortgage and corporate bonds; Level C comprises less liquid securitizations, own-name securities and portfolios of loans. However, the Bank of England's 'liquidity insurance' is different from the framework we suggest as it combines a discount facility that exchanges the different sets of collateral for gilts, open market operations labelled 'Indexed Long-Tem Repo' providing funds monthly at a six-month maturity and at rates that may vary according to the level of collateral, and a 'Contingent Term Repo Facility' that the Bank can activate 'in response to actual or prospective market-wide stress of an exceptional nature'. This scheme thus provides considerable discretion to the Bank of England unlike the one we propose. It also aims at facilitating banks' treasury management rather than being solely dedicated to last resort lending. In that regard, there is no obvious reason why a scheme aiming at repairing liquidity should require that eligible collateral is liquid and give precedence to sovereign securities. Finally, the Bank of England has also a specific ELA arrangement under which it can provide liquidity to institutions that have no eligible collateral, with the prior approval of the Chancellor of the Exchequer.

banks post the best collateral in times of crisis to access a LOLR facility is probably too demanding, if not contradictory, for two reasons. Firstly, liquidity needs substantially increase in such times, which justifies in turn the intervention of the LoLR. Secondly, the increase in liquidity needs is likely to be heterogeneous across banks, with those banks that do not own high quality collateral requiring more liquidity. Accepting lower quality collateral in LoLR operations would not necessarily increase the risk exposure of the central bank as it can apply higher haircuts if to lower quality collateral, thus also increasing the implicit cost in using lower quality collateral rather than higher quality one, as the ECB has done when it broadened its list of eligible collateral (ECB, 2013a). Finally, in order to limit any stigma effect, the names of the institutions resorting to the LoLR facility could kept secret, with just an aggregate average being published after a certain lapse of time (it is set at 5 quarters for the discount facility of the Bank of England described in footnote 8), unless there are opposite legal prescriptions, as is the case in the U.S.;

- To avoid that ELA – *i.e.* all lending of last resort in the framework we propose unless a specific ELA arrangement implying the Government prior approval is also kept and activated (2.2) – is used on a discretionary and/or lasting basis, adjustments could be made to the institutional environment in which central banks operate as LoLR (2.3).

Of course, this framework could not easily be adopted by central banks that are concerned with 'stigma effects', as the Fed with the discount window. In that case, it has been suggested that the TAF could be made permanent (Madigan, 2009; Selgin, 2012). However, the TAF allocated a set amount, not an amount that was only limited by the amount of collateral counterparties could post, and did so at market rates, thus not clearly at penalty rates[13].

2.2 Providing the appropriate institutional environment

Would it be sufficient to give central banks an explicit and clear mandate for ensuring financial stability? In particular, would this mandate allow the central bank to act preemptively, on top of standing ready to act as LoLR (2.1), just by including a financial stability objective in its monetary policy strategy and adjusting its monetary policy instrument – the short-term interest rate – so as to 'lean against the wind' (Borio, 2014)? From the opposite perspective, would not allowing the central bank to have recourse to some other instrument(s) – namely, macro-prudential instruments –, either because it would possess them or because they would be at its disposal, make the conduct of monetary policy more efficient, alleviating possible conflicts of objectives between price and financial stability as well as short and long-term horizons? The answers to those questions are by and large nowadays: no, no and yes (recent reviews include Bordo and Landon-Lane, 2013, Galì, 2014, Galì and Gambetti, 2014, Smets, 2014, Svensson, 2014 and Yellen, 2014). In particular, that the Fed consistently did take financial stability considerations into account in setting the U.S. monetary policy, as shown by Oet et al. (2015), was not enough either to avoid the financial crisis or to prompt a rapid recovery in its aftermath. Thus, to pursue efficiently their financial stability mission, central banks would have to be provided with the institutional environment, as regards both the architecture of financial architecture (i) and its governance (ii).

[13] This was all the more the case as the allotment procedure was a 'uniform price' format, in which all successful bidders pay the lowest accepted price, and not a 'discriminatory price' format, in which each successful bidder pays the price it has auctioned.

(i) Architecture

Regarding the architecture of financial stability, to act credibly and efficiently as the LOLR while limiting moral hazard, the central bank should avoid that lending of last resort is used on a lasting basis, whereas it aims at providing liquidity and not solvency support.

In that respect, requiring that institutions pay a penalty rate and post collateral of reasonably good quality (2.1) may not be sufficient. An efficient and well-designed resolution regime (Čihák and Nier, 2009; Dewatripont and Freixas, 2011) would also be required. In particular, putting a limit on how long the central bank can lend a specific institution through its LoLR window (for instance three months in normal times and six months in crisis periods[14]) could be useful. Once this limit is reached – or before if the institutions that require LoLR support do not have eligible collateral left –, the central bank would either appropriate the collateral posted by the institution the management of which would be taken over by the resolution board or be reimbursed by the resolution fund of the LoLR loan previously granted. The resolution fund would itself have to be pre-funded with enough resources and benefit from a fiscal backstop. In a sense, our proposal echoes the one of Acharya and Öncü (2013). The authors suggest the creation of a repo resolution fund. This fund would basically have two roles when facing a 'run' in the repo market. On the one hand, it would pay financiers of risky collateral a recovery amount based on a conservative assessment of the value of the collateral. On the other hand, the repo resolution fund would take over the underlying (risky) repo collateral and liquidate it in an orderly manner over a pre-specified period – for instance not more than six months – and in case the recovery value is lower than the estimate paid to the repo financiers, require a 'claw-back' from them for the difference. One important difference with our proposal is that Acharya and Öncü (2013) focus on assets and liabilities rather than institutions as we do. However, the aim is similar: having a set of resolution mechanisms which is not only capable of inducing market discipline and mitigating moral hazard, but also of addressing the associated systemic risk.

Whereas the Federal Deposit Insurance Company (FDIC) came into operation in the US as early as in 1934, the Single Resolution Mechanism (SSM) was launched in Europe on 1 January 2016. In the course of an eight-year establishment phase, the SRF will receive contributions by participating banks for an estimated total of around 55 billion euros. Furthermore, those European countries that do not have a national resolution regime and fund yet should have established them by 1 January 2016.

(ii) Governance

Regarding the governance of the financial architecture, charging the central bank with responsibility for financial stability without giving it adequate powers would generate risks.

The main risk would be over-burdening monetary policy, inducing the central bank to use interest rates in a way that would jeopardize its price stability objective. Another risk would be to create a mismatch between what the public can expect and what the central bank, with possible adverse consequences for risk-taking, if there is moral hazard, and for accountability (BIS, 2011). The central bank should thus have at its disposal appropriate macro-prudential tools it could activate at its own initiative or prompt other authorities to activate. This would be particularly important for policy tools that aim at influencing credit growth and leverage, such as counter-cyclical buffers and

[14] Of course, an issue would be how to determine that a systemic crisis prevails: this could be achieved either by setting a pre-defined trigger (for instance, a ratio of the assets held by the institutions that get LoLR support to those held by the institutions that have access to central bank refinancing) or by a decision of the central bank itself.

systemic risk buffers, which have important synergies and overlaps with interest rates. Furthermore, macro-prudential concerns should normally prevail over micro-prudential ones, to the extent that the stability of the financial system is more important than the one of its individual components (ESRB, 2014). This justifies that the central bank rather than the supervisor should be in charge of macro-prudential decisions in case the two are different (in case the central bank is also in charge with supervision, it has two different decision-making committees).

Also, in those cases where the central bank does not have a direct power of decision on the use of macro-prudential instruments but has instead to go through a separate committee to have its proposals enacted, transparency and accountability requirements for the functioning of this committee should be structured so as to reduce the risk of inaction. Such a risk exists both because making a decision in a board is generally more difficult than within a single institution and because macro-prudential policies raise the same time-inconsistency issue as monetary policy, with costs of a tightening that are immediate and benefits that are less visible (Knot, 2014). The latter argument applies more forcefully when the Government plays an important role in the committee (ESRB, 2014). As a consequence, the committee in charge of macro-prudential policies could publish minutes of its meetings, including nominative votes on proposals made its members.

In the US, the DFA has established the Financial Services Oversight Council (FSOC), chaired by the Secretary of the Treasury, as the macro-prudential body. The FSOC has powers in relation to determining aspects of the regulatory boundary, such as designating institutions that warrant heightened supervision and regulatory standards because of their systemic importance; it can recommend and, in some cases, require action by member agencies, and its recommendations are public. The European Systemic Risk Board (ESRB), which is responsible for macro-prudential oversight in the European Union, does not have either direct authority over any policy instrument, but can as the FSOC issue recommendations. However, those recommendations do not systematically have to be public. Furthermore, although under the Single Supervisory Mechanism (SSM) Regulation the ECB may adopt, instead of the national competent or designated authorities[15], higher buffer requirement or take stricter measures provided for in the CRD IV and CRR, decisions on macro-prudential policies are mainly taken at the national level by the designated authorities. Among the 28 members of the Banking Union, and also counting the Banking Union itself, the designated authority is the central bank in 20 cases (including the Banking Union in which it is the ECB), the financial authority in 7 cases and a committee in 2 cases (France and Poland; ESRB, 2014)[16].

3. Summary and conclusions

Instead of a 'New Normal' that might include a change in the monetary policy strategy and would keep LSAPs in the central bank toolkit, we have investigated elements of a new framework for central banking that would include:

- A full use of the standard monetary policy instrument, with the short term interest rate being allowed to take negative values, possibly to a significant extent, by setting an exchange rate for currency against numéraire. Doing so on a permanent basis by

[15] Under EU law, the competent authority is the one in charge of supervision and Member States can choose to have decisions taken by a designated authority that differs from the competent authority. That choice was rarely made. The competent and the designated authorities can also vary according to the macro-prudential instrument. In most cases, it is the same authority for all instruments.

[16] Romania has designated the central bank for banks and the financial authority for investment firms, which explains why there are 29 cases for 28 members of the Banking Union.

remunerating currency at the interest rate on excess reserves would likely make LSAPs unnecessary in the future. It would also reduce the costs of inflation by eliminating shoe-leather cost, and allow to lower the inflation target ;

- An explicit recognition of the role historically played by central banks since their creation in the realm of financial stability, both by themselves in offering an LoLR facility – or several facilities – and by society that would provide them with the appropriate institutional environment. This would be achieved by putting in place a special resolution regime with a pre-funded resolution fund acting as a complement to the LoLR and by putting macro-prudential instruments at the disposal of central banks.

These proposals implicitly rely on two old-fashioned principles:

- A clear assignment of responsibilities, keeping monetary and fiscal policies separate by avoiding both LSAPs and the financing of possibly insolvent institutions through lending of last resort;

- Having at least one instrument per objective, in the spirit of the 'Tinbergen rule'.

As a consequence, we label these elements parts of a 'New Orthodoxy'.

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