Philippe Moutot*

Independence of Central Banks: The Need for an Urgent Revamp!

<https://doi.org/10.1515/ael-2019-0070>

Abstract: Over the last years, independent central banks were often criticized. Many critics felt that the fatal flaw of the current system lied in its independent nature. Some critics argued that the remedy to such problems was to replace independence with interdependence. Such a drastic measure is completely unnecessary. No more time should be lost discussing further the merits or the weaknesses of central bank independence. But taking central bank independence as a given, one should simply try to equip central bankers with the mandates, the tools, and the values best fitted to help them face future shocks. Deeper checks and balances with other institutions and the fair financing of investment by all economic agents, including startups and SMEs, are urgently necessary to head off financial crises that will inevitably arise in this era of growing wealth inequality, disruptive technologies and climate change.

Keywords: monetary policy, financial stability, Central Bank independence, start-ups, climate change

Table of Contents

- 1 Introduction
- 2 Why Independent Central Banks Could Not Remain Simple “Inflation Targeters”
- 3 Assessing the Action of Independent Central Bankers or “What Could Have Gone Better?”
 - 3.1 Could Central Banks Have Better Forecast the Financial Crisis?
 - 3.2 What Could Have Gone Better From a Macroeconomic Viewpoint?
 - 3.3 What Could Have Gone Better From a Financial Stability Viewpoint?
- 4 The Need for a Revamp of Central Bank Independence
 - 4.1 Dealing with the First Three Reproaches
 - 4.2 Better Controlling Asset Prices
 - 4.3 Central Bank Financing Techniques and Level Playing Field Across Sectors? Obviating the Bias against the Financing of Small Innovative Businesses and Projects
- 5 Concluding Remarks
- References

***Corresponding author: Philippe Moutot**, Department of Economics, European Central Bank, Sonnemannstrasse 20, Frankfurt, Germany, E-mail: philippe.moutot@gmail.com

1 Introduction

Central banks are independent when shielded from political interference. This independence may cover several complementary and cumulative aspects such as institutional independence from government and/or parliament, functional and operational independence, and personal independence, without which other forms of independence are not possible. In practice however, most political economists and social scientists use the term “independent central bank” in a narrow sense, synonymous with a “central bank with an inflation target ... both operationally and functionally independent from government”.¹

Whereas for a full generation, such independence of central banks was supported and accepted by economists and by the public,² over the last 2–3 years, it has become an object of criticism and of negative assessment. Central bankers have been criticized for:

- using public money to support banks and private firms in the aftermath of the 2007–2008 financial crisis,
- the protracted periods of low inflation and growth as well as the increased distributive inequalities which followed,
- the inability of their models to forecast accurately and thereby the delays encountered in meeting their own objectives.

At the same time, Bitcoin appeared on the scene offering profitable alternatives to investment in national currencies and the blockchain technology forged the argument that national currencies could be easily replaced by private digital currencies. Also, populist parties argued for more supportive policies or for national monetary policies and withdrawing from the Euro. This led many analysts including Pr. Riles (2018) in her book “Financial Citizenship”³ to identify a culture clash between supporters and opponents of central bank independence and to infer a loss of legitimacy of the independence concept.⁴

¹ See https://en.wikipedia.org/wiki/Central_bank#Independence for a more extensive definition.

² The IMF and World Bank have often included such independence of central banks within the structural reforms their programs have fostered.

³ Annelise Riles, ‘Financial Citizenship: Experts, Publics, and the Politics of Central Banking’, Mario Einaudi Center for International Studies, Meridian 180 Cornell Global Perspectives Series, 2018, Cornell University Press, Ithaca and London.

⁴ See also O. Issing (2018) in <https://voxeu.org/article/uncertain-future-central-bank-independence>.

The purpose of this paper is not to deny each of the points above. But rather to demonstrate that opponents of central bank independence have missed the mark in their conclusions and that no more time should be lost discussing further the merits or the weaknesses of central bank independence. Instead, by equipping central bankers with the mandates, tools and values best fitted to help them face past and future shocks, the independent central bank can help better achieve the broad socio-economic objectives of society and do it legitimately.

For instance, when opponents generally conclude that the independence of central banks should give way to an “interdependence.” In my opinion, the notion of central bank independence has been made more relevant by each of these developments and, rather than a watering down, deserves a revamp and a deepening to reflect both pre- and post-crisis wisdoms and opportunities. This does not imply that “interdependence” is wrong. Indeed, certain aspects of interdependence offer sound improvement. A functionally autonomous central bank may usefully coordinate with other authorities, including Treasuries and banking authorities, when accomplishing its missions. Indeed, interdependence may be useful if the sharing of information and motivations that it implies also allows the best solutions to emerge from the debate between stakeholders, thereby allowing to better comply with broad socio-economic objectives. But it should also allow the best decisions to be reached and made. Therefore, – and this is crucial- expertise needs to be accumulated and listened to, which implies protection from political interference thus preserving independence. The benefit of interdependence is therefore only guaranteed when it is consistent with “independence.”

The recent economic and financial history supports this view. Indeed, 10 years after the 2007–2008 financial crisis,⁵ it was high time to reach an opinion on the reactions of central bankers to that crisis and to differentiate between what was positive and what could have gone better. At least in the case of the US and Euro Area, this opinion should be broadly positive as the main objectives given to independent central banks were reached or are close. It was also high time to realize that among what could have gone better, – and many things could have gone better- most of it does not depend on central banks and the rest may materialize if the objectives given to independent central banks are refined and relations between the central bank and other institutions than the government are well organized. However, little of that kind would naturally be consistent with central banks under the control of governments. Finally, while crypto currencies do not fulfill their promises, much better outcomes may be expected from central bank digital currencies. Especially if these public currencies are issued by independent central banks, and thus remain independent from states and market influences.

5 That is when we started writing this paper.

But these views are the conclusions that I will reach rather than the outline that I plan to follow in order to reach them:

- First, I will explain that the notion of central bank independence is a relatively new one. The occurrence of the global financial crisis challenged the definition of objectives which was associated to it before the financial crisis. This definition was in most cases limited to price stability as a target and was extended in most cases only after 2008 (Section 2).
- Taking this fact into account, I will examine what could have gone better from both an economic and financial viewpoint (Section 3).
- Then, I will infer how relations with executive and legislative authorities may be organized to reach best outcomes. In particular, how modified objectives, tools and values could contribute to such improvements (Section 4). How an independent central bank digital currency (CBDC) may bring important services to citizens is also relevant but will be the theme of an upcoming paper on the way its public good nature can help compensate for some of the inefficiencies associated to the market disruptions created by digitalization itself.
- I will summarize in Section 5 the general lessons learned as a result of the 2007–2008 financial crisis and how the proposed measures would mitigate future crises.

2 Why Independent Central Banks Could Not Remain Simple “Inflation Targeters”

Before the 2007–2008 financial crisis, the role of central banks as lenders of last resort was rarely discussed in the open. The objectives officially given to them did not take this precise role into account in general, most of the focus was on price stability and sometimes included also employment like in the US. During a very long period, this role went unmentioned or was described by terms like “constructive ambiguity.”⁶ Then at the end of the 90’s, a controversy arose in the run-up to the global financial crisis as to whether central bankers should try to

⁶ For an analysis of this view, see Freixas, X. (1999), Optimum Bail-Out Policy, Conditionality and Constructive Ambiguity’. The ‘constructive ambiguity camp subsumed both a non-interventionist view and a mixed-strategy view. The former by Goodfriend and King (1988) is based on Bagehot’s advice not to lend to unsound people and on the fear that bailing out banks distorts incentives and leads bank managers to excessive risk taking. The latter view argues that bailing out banks may be efficient under the necessary but not sufficient condition that the level of uninsured funding is low.

“lean against the wind” and influence securities markets in order to avoid financial instability.⁷ Therefore, before 2008, financial stability was, with the possible exception of the Bank of England and Bank of Sweden, neither formally defined nor formally integrated within the objectives of the independent central banks⁸ which remained mostly inspired by inflation targeting.

Then the crisis happened in 2007 and disrupted in 2008. Central bankers did what they had learned to do since the 1930’s or before⁹ in their role as lenders of last resort: they acted in connection with treasuries, trying to avoid a Great Depression and they, along with governments, succeeded. But their success in reestablishing financial stability took time and efforts and was not simultaneous across countries. Hence, a period arose¹⁰ in which the public was feeling and watching the full fallout of the financial crisis, in terms of income and wealth as well as prices and inflation and was simultaneously aware of ongoing risks to financial stability while central banks official objectives still only dealt with the stability of prices. This led to an obvious remark: the stated objectives could not be used to fully justify the decisions reached in view of financial stability. Therefore, the lender of last resort activity needed to be better reflected in the main objectives of an independent central bank and to be embodied in its legal framework if this functioning was to be legitimate.

However, this better reflection was difficult to develop in a short period of time. This was a context where no general agreement on an economic and financial model to explain the crisis and deduct the best reaction to it was (and still is) available. As a result, the problem was “papered away” by academics as well as by

7 Stephen G. Cecchetti, Hans Genberg, and Sushil Wadhvani (2002) ASSET PRICES IN A FLEXIBLE INFLATION TARGETING FRAMEWORK Working Paper 8970; June 2002 <https://www.nber.org/papers/w8970>.

8 Despite a number of informal discussions in the context of the BIS.

9 Earlier examples include Thornton who discussed such role as early as at the beginning of the nineteenth century, Bagehot at mid-nineteenth century, and discussants of the Federal Reserve establishment between 1907 and 1913.

10 For instance, researchers at the Bank of England estimate that between 2008 and 2014, ‘households around retirement age gained the most from the support to wealth, but that support to incomes disproportionately benefited the young’ as a result of quantitative easing. From approximately 2010 to 2016 the share of wealth held by the first decile grew. See: Bunn, Pugh, and Yeates (2018) ‘The distributional impact of monetary easing in the UK between 2008 and 2014’, Bank of England, Staff working paper n720.

central bankers: financial stability was defined as a natural consequence of price stability in the “absence of financial instability and of systemic crisis.” That is, financial stability was defined in terms of what it was not.¹¹ This conveniently avoided having to identify an economic source of past financial instabilities or implying the existence of trade-offs between price stability on the one hand and financial stability on the other. As argued in Section 2 below, this avoided putting focus on the development of debt and of credit and monetary aggregates: these were the only macro-economic variables which, at least in the Euro area, could have indicated, in due time, some departure from equilibrium.¹² This also avoided having to face the reasons why these aggregates failed to provide the impetus for governments, central bankers, supervisors and academics to react earlier.

This was relatively clever. Lacking a precise definition of objectives to be reached, it still allowed authorities to act by developing a set of measures able to control the systemic risk affecting the banking system, based on a wealth of academic papers already dealing with systemic risks. Moreover, this allowed to consider not only the stability of each bank or firm but also the interactions which could threaten them. The definitions of financial stability put forward by the European Central Bank (ECB) and the Federal Reserve are reported in Table 1.^{13,14}

But this did not allow integrating into numerical objectives any element which would directly reflect desirable characteristics of financial stability. Nor would this definition lead to emphasizing the role of money and liquidity in the economy¹⁵ and help avoid developments like the actual liquidity effects of the 2008 crisis and their delayed but supposedly substantial redistributive impacts. Consequently, this did

11 See Houben, Hakes and Schinasi, 2004 for a description of opinions at the time: “Some define it in terms of what it is not: a situation in which financial instability impairs the real economy (Crockett, 1997), notably when information problems undermine the financial system’s ability to allocate funds to productive investment opportunities. A similar approach is taken by those focusing on systemic risk, specifically in terms of financial problems that stem from linkages between financial institutions or markets and that have a potentially large adverse impact on the real economy (Aglietta and Moutot, 1993; De Bandt and Hartmann, 2000; Group of Ten, 2001).

12 See Biondi and Zhou (2018) Interbank Credit and the Money Manufacturing Process. A Systemic Perspective on Financial Stability. *Journal of Economic Interaction and Coordination* (2018). <https://doi.org/10.1007/s11403-018-0230-y>; Available at SSRN: <https://ssrn.com/abstract=2924402> or <https://doi.org/10.2139/ssrn.2924402>.

13 The ECB defines financial stability on its website: <https://www.ecb.europa.eu/pub/financial-stability/html/index.en.html>.

14 The Federal Reserve definition of financial stability, is recent (2018) – see <https://www.federalreserve.gov/faqs/what-is-financial-stability.htm>.

15 Although interdependence is factual and functional when interbank credit which backs payment systems is considered. See again Biondi, Yuri and Zhou, Feng, Interbank Credit and the Money Manufacturing Process. A Systemic Perspective on Financial Stability.

Table 1: Definitions of Financial Stability.

The ECB definition of financial stability	<ul style="list-style-type: none">- Mainly is a condition in which the financial system – which comprises financial intermediaries, markets and market infrastructures.- is capable of withstanding shocks and the unraveling of financial imbalances.- This mitigates the prospect of disruptions in the financial intermediation process, severe enough to adversely impact real economic activity.	
The Federal Reserve definition of financial stability	<ul style="list-style-type: none">- Mainly is about building a financial system that can function in good times and bad and can absorb all the good and bad things that happen in the economy at any moment.- it isn't about preventing failure or stopping people or businesses from making or losing money.- It is just helping to create conditions where the system keeps working effectively in spite of such events.- The economy is a dynamic, growing economy full of businesses that are starting, expanding, succeeding, as well as failing.- standard functions of the normal business cycle.- A financial system is considered stable when financial institutions—banks, savings and loans, and other financial product and service providers—and financial markets are able to provide households, communities, and businesses with the resources, services, and products they need to invest, grow, and participate in a well-functioning economy.	<p>Financial stability is a financial system that meets the needs of average families and businesses to borrow money to buy a house or a car, or to save for retirement or an education. Likewise, businesses need to borrow money to expand, build factories, hire new workers, and make payroll. All these things require a functioning financial system that works best when most people don't even think about it very much. Consumers and businesses just know that they can finance large expenses like the construction of a factory, or that their savings are safe, or that they'll be able to get short-term loans to make payroll.</p>

not fully ensure that these developments would be better controlled.¹⁶ Also, this did not necessitate changes in Treaties or legislation and was viewed as a simple interpretation of existing objectives. Somehow, a binary measurement of financial stability combined with price stability objectives promoted financial stability without dealing precisely with its practical aspects and social consequences.

Does this imply that the independence of central banks was the source of these social consequences? Alternatively, does this imply that non-independent central banks would have performed better?

A priori not. As disagreements between treasuries and central banks on such issues were relatively limited at the time of the financial crisis, there is no evidence that governments were aware of such social consequences at that point in time. Hence, there is not much evidence to support the view that central banks under the control of governments would have done better.¹⁷ Moreover, some criticized central bankers for agreeing too much with treasuries, thereby not showing enough independence. To the extent however the result was deemed unsatisfactory it cannot be excluded that either the objectives pursued by central banks were inadequate or that the “checks and balances” necessary for an optimal coordination of relevant institutions (government, parliament, and central bank) or the set of tools used were incomplete.

This should not astonish. The concept of central bank independence only dates back to the 1990's,¹⁸ and has rarely been integrated in the discussion on the separation of powers launched by Locke, Montesquieu, and Sieyès.¹⁹ Most authors discuss such independence in relation to the government but do not take into account²⁰ the relations of central banks with other institutions or the legislative branch. They concentrate on the reasons for governments to handover authority to independent central bankers, that is, their expertise and technical knowledge as well as the need for a credible commitment technique. Hence, discussions cover issues of independence as issues of submission to the government and rarely cover issues of

16 See Ricks (2015) and the discussion of his book on ‘The money problem’ in Accounting, Economics, and Law: Convivium (2018): <https://www.degruyter.com/view/j/ael.2018.8.issue-2/issue-files/ael.2018.8.issue-2.xml>.

17 Even before the financial crisis, governments did not support a more restrictive monetary policy, as explained under Section 2.

18 For a discussion of how this discussion arose, see: E. Le Heron and P. Moutot 2008, *Les banques centrales doivent-elles être indépendantes?*, Editions Prométhée, Bordeaux pages 9–37.

19 See for instance: https://fr.wikipedia.org/wiki/S%C3%A9paration_des_pouvoirs#Rousseau:l'interm%C3%A9diaire.

20 For an example which deals with inflation target but does not take into account financial stability, see: KEEFER, P., & STASAVAGE, D. (2003). The Limits of Delegation: Veto Players, Central Bank Independence, and the Credibility of Monetary Policy. *American Political Science Review*, 97(3), 407–423. <https://doi.org/10.1017/S0003055403000777>.

separation of powers and of accountability: considering relations between government, central bank, and legislative authorities would lead to considering the necessary “checks and balances” and hence the distribution and best use of information across authorities. The only author addressing these issues is Paul Tucker, in his 2018 book on “Unelected Power”²¹ where he convincingly argues that independence needs to appear legitimate to citizens and that such legitimacy has precise implications for the type of contract an independent central bank has with the general public,²² including the way its objectives are defined, the rules it is submitted to, the exceptions to these rules, the body to which it is accountable and the way this accountability is implemented. Moreover, as legitimacy is only gradually acquired, only small changes to such contract should be undertaken on a regular basis and great leaps forward should be attempted only when essential.

Also, the issue of the right separation between central bank activities and activities of banks and private payment services suppliers in view of broad socio-economic objectives and technological developments is rarely addressed in conjunction.

In order to cover these issues of optimal contract of independent central bankers, I propose to first let the facts speak for themselves. Let us assess central bank policies in view of both their actual objectives and official responsibilities and actual developments and further desirable effects by asking “what could have gone better?.” As a result, we use traditional price stability objectives joint to the definition of financial stability as set since 2008 to evaluate the possible reproaches made to independent central bankers. This leads us to identify more easily what depends on central bank independence, and the extent to which this does or does not imply coordinated action with other institutions.

3 Assessing the Action of Independent Central Bankers or “What Could Have Gone Better?”

Be it sheer luck or due to its intrinsically virtuous effect on inflation, inflation targeting since its adoption in the mid-90’s has been associated with increasing moderation of measured inflation rates. Hence, in both the US and the Euro area, inflation rates, whether measured or targeted, were close to the objective since the turn of the century.

²¹ Tucker, P. (2018). *Unelected Power: The Quest for Legitimacy in Central Banking and the Regulatory State*. Princeton; Oxford: Princeton University Press. Retrieved from www.jstor.org/stable/j.ctvc7789h.

²² Such legitimacy implies that the main output of the independent activity and its objective is well identified, that the unelected manager of that activity is responsible and controlled by a committee as diverse in terms of opinions as the citizenship and that this activity and its implementation are fully transparent to the general public.

However, other variables traditionally associated to price and financial stability like financial and real asset prices and monetary aggregates had exhibited wider variations prior to 2008. Market volatility and financial derivatives have also been quite volatile.

So, a first issue is: would independent central banks have neglected available information that could otherwise have been used to forecast a financial crisis and possibly avoid it? Would governments have done better? A connected issue is whether central banks can now better model the unfolding of and exiting from financial crises or have made progress toward it.

A second issue deals with the ability of independent central banks to reach price stability while avoiding depression. As we know prices have remained broadly stable, the issue is rather the speed with which this stability was reestablished and how this stability may be related to the undesirable shifts in the distribution of income and wealth perceived by citizens in several countries. Beyond, have growth and investment rebounded in a satisfactory manner after the financial crisis and, if not, has that anything to do with central banks' policies?

A third issue is whether financial stability was durably and sustainably attained and at which cost. Noting that up to 2020, no new crisis had yet materialized, we will discuss the actual cost of the lender of last resort activity in the US up to the start of 2020, the related consequences for the exchange of information across central banks and legislative branch, and in view of remaining difficulties in explaining the development of financial crises, our degree of preparation to a new crisis.

3.1 Could Central Banks Have Better Forecast the Financial Crisis?

The answer is “yes, probably.” A simple “yes” is a knee-jerk response in the aftermath of the financial crisis and is based on too recent data. Indeed such a positive answer should only be considered when such forecasts were anterior to the crisis itself and were loud and clear enough to allow countervailing action in due time. This disqualifies increases of volatility in the course of 2007 in specific markets and in derivatives. They came too late: from the beginning of August 2007, central banks had already started to react to the worsening liquidity crisis.

Hence, anticipating the crisis could only have been done usefully earlier and based on debt aggregates and bank credit or monetary aggregates, as theorized by authors such as Irving Fisher (1933), Hyman Minsky (1992), Richard Koo (2003), or John Geanakoplos (2010) who all put more emphasis on a debt cycle of some sort. Indeed, an acceleration of monetary and credit aggregates occurred in the Euro

area as early as 2004²³ and was interpreted by the ECB monetarist economists including O. Issing, as creating some upward pressure on inflation. However, at that time most academics in the US and many in the Euro area believed (and are for some still believing) that credit and monetary aggregates had lost any meaning (see Woodford, 2003²⁴ and Stanley Fischer's speech in 2016²⁵) for forecasting inflation and growth and did not include liquidity and debt developments within their equilibrium models.²⁶ Also, governments and treasuries who commented on monetary policy refrained from arguing in favor of any interest rate increase up to end-2005, rather hoping for stable or decreasing rates. Even up to that point, the IMF and the OECD argued for a delay of the increase in Euro area interest rates which could perhaps have reined in credit aggregates. Hence, the only variables that could have helped avoid or mitigate the risk of the financial crisis were viewed as irrelevant at the time.

As a result, interest rates were kept lower than necessary in the Euro area and their increase happened only at end 2005. Such delay possibly amplified the risk of financial crisis and its size. However, on the same token, the independence of central banks was not the reason for not forecasting in due time the financial crisis. Rather, this episode demonstrates the need for even more central bank independence: those statistics that were giving importance to potential risks reflected by bank credit and monetary aggregates already belonged to the ECB tools but were only followed with delay or not at all.

However, it should also be recognized that this indication from monetary and credit aggregates on inflationary pressure did not amount to an actual model forecast of a financial crisis as it did not forecast real economic variables. Indeed, despite academic progress in macro-econometric modeling and the desire of central banks like the FED and the ECB to integrate such improvements,²⁷ it is not clear which models could have been improved and how in order to better forecast and help identify better policies and better calibrate decisions.

23 The growth of the aggregate M3 corrected for the estimated impact of portfolio shifts accelerated in 2004, as apparent in Chart 6, page 99 of Papademos L. and Stark J. (2010) 'Enhancing Monetary Analysis', European Central Bank.

24 Michael Woodford, *Interest and Prices: Foundations of a Theory of Monetary Policy* Princeton: Princeton University Press, 2003, 785 pp.

25 at "A Conference in Honor of Michael Woodford's Contributions to Economics," cosponsored by the Federal Reserve Bank of New York, Columbia University Program for Economic Research, and Columbia University Department of Economics, New York City, 19 May 2016. <https://www.bis.org/review/r160608a.pdf>.

26 On the contrarian position see <https://ssrn.com/abstract=2924402> and <https://doi.org/10.1515/ael-2017-0047> as well as Ricks(2015)'s book.

27 See Papademos L. and Stark J. (2010) 'Enhancing Monetary Analysis', European Central Bank.

Both the FED and the ECB availed of the latest Dynamic and Stochastic general equilibrium models, in particular the Smets and Wouters model (2007)²⁸ and the Christiano, Motto, Rostagno model (2007).^{29,30,31} But these models did not suffice.

Moreover, it is essential that such models explain both financial crises and their follow-up, liquidity disappearance as well as its reestablishment. The research along that track led to a new literature on liquidity theory and its role in macroeconomics. A part of it was initiated by Gorton et al.^{32,33} and has concentrated on the role of “safe assets” demanded by households and by emerging countries: when demand for them pushes their substitution by “private safe assets” this increases the supply of money-like assets by private banks and leads to a possible crisis afterward.

Another part of it was initiated by Cooper and John (1988). Adverse selection in the stock market, that is private information on firms, is combined to resale considerations to explain the evolution of the liquidity and prices for securities issued

28 Smets and Wouters (2007) Working paper series no 722 / February 2007 shocks and frictions in us business cycles a Bayesian DSGE approach.

29 Christiano, Lawrence J., Roberto Motto, and Massimo Rostagno. 2007, ‘Shocks, Structures or Policies? The Euro Area and the US After 2001,’ *Journal of Economic Dynamics and Control*, Vol. 32(8) (August): 2476–2506.

30 See Claudio Borio, Piti Disyatat and Mikael Juselius (2013) ‘Rethinking potential output: Embedding information about the financial cycle’, BIS Working Papers No 404.

31 Neo-keynesian general equilibrium modeling, even augmented to account for credit and monetary variables, has the following limitations. It rarely gives an intrinsic role to money and other financial variables. Moreover, as the business cycle lasts 6–7 years on average, equilibria are forecast to be reached about 3 years after a major shock or any financial crisis. Consequently, unless one makes ‘*ad hoc*’ assumptions on residuals, neo-keynesian models are unlikely to yield accurate forecasts after a lasting financial shock like the 2008 one. From a practical viewpoint, this forces forecasters to make ‘*ad hoc*’ assumptions on shocks following a crisis instead of keeping them nil in order to make realistic forecasts. From a more theoretical viewpoint, this has led to the view that financial variables should be integrated to the models. This, in turn, leads to considering a longer cycle, which lasts about 15 years on average and includes banks, credit, monetary and financial variables and may better describe financial crises. However, this is still to be done in a fully convincing manner.

32 See Gorton, G., LeWellen, S., and Metrick, A. (2012). The safe-asset share. *American Economic Review*, 102(3):101–06. Gorton, G. and Metrick, A. (2012). Securitized banking and the run on repo. *Journal of Financial Economics*, 104(3):425–451.

33 See Gorton, G. and Metrick, A. (2012). Securitized banking and the run on repo. *Journal of Financial Economics*, 104(3):425–451. Gorton, G. and Ordonez, G. (2014). Collateral crises. *American Economic Review*, 104(2):343–78.

by private firms.^{34,35,36} But, despite the progress, the challenge remains mostly with researchers to integrate all sides of the story into a meaningful model explaining the disappearance as well as the return of liquidity.

Consequently, the unorthodox 2-pillar strategy adopted by the ECB, mixing forecasts from models to assessments from monetary and credit data could have helped prevent the financial crisis more than it did. However, this could not amount to the certainty that an explicit macro-model would have brought. Anyway, both in the case of the FED and of the ECB, it is doubtful that central bank independence played any role in delaying the perception of the crisis. Moreover, one can regret in both cases that research efforts have not and had not yet born all their fruits. One can also regret that the ECB did not communicate more forcefully between 2004 and 2005 on the message of its monetary pillar and was not encouraged to do so.

3.2 What Could Have Gone Better From a Macroeconomic Viewpoint?

The period which follows 2008 is not very different from the period before from the point of view of inflation. Since 2008, inflation rates, as measured by official statistics, have generally remained very limited both in the US and in the Euro area, usually below 2% and often lower but positive. Moreover, in the recent period, they

34 Developed by Morris and Shin (1998) and (2004), by Bernardo and Welch (2004), it was more recently complemented by Brunnermeier and Pedersen (2008), Chiu and Koepl (2016), Damey and Green (2016) and finally Asriyan, Fuchs and Green (2018). For instance, the techniques of Asriyan, Fuchs, and Green (2018) lead to emphasizing rational sentiments as major factors in the price and market turnover changes but their logic concentrates on adverse selection and the distribution across agents of private information on the firms' productivity.

35 Credit Market Freezes, NBER Macroeconomics Annual 2017, volume 32 (2018), Martin Eichenbaum and Jonathan A. Parker, editors (p. 493–523) Conference held April 7–8, 2017. Published in June 2018 by University of Chicago Press https://pdfs.semanticscholar.org/7384/e8f7b24b4f1c2d9e8bf68545c8ee6af63678.pdf?_ga=2.209707218.1540156133.1536241876-1595096862.1536241876.

36 However, although this may create aggregate movements in liquidity and in output, this is less likely to fully explain the dynamics of liquidity in sovereign bonds. Indeed, adverse selection is not as relevant for sovereign bonds as for private securities, as the owners of a sovereign bond are unlikely to have any more information on fiscal policy than other investors. Moreover, the level of demand is influenced by the safe nature of these assets. In addition, liquidity in the sovereign bond market may play an autonomous role in influencing other markets as sovereign bonds are used as collateral. After all, when using adverse selection to explain the illiquidity of private bonds in periods of financial crisis, only a quarter or a third of the illiquidity increase can be explained (Benmelech, E and Bergman N.K [2017]). This implies that the variation of the sovereign bonds' liquidity may itself play some autonomous role.

are closer to 2%, indicating that inflation rates may be very slowly converging toward the objectives of the Federal Reserve and the European Central Bank. Also, unemployment has sharply diminished in the US and retreated recently below its 2008 level in the Euro area. At the same time, no new major financial crisis happened up to 2020 although fears of financial instability resurfaced several times. Also, growth after undergoing a major slowdown in 2008–2009 and recovering thereafter was slowing down globally, due to risks associated to Brexit, climate change, and trade wars or rifts between the US and China and the EU.

The official objectives of these central banks have therefore been gradually reached or are close. “2% or close, but below 2%” is the ECB interpretation of the price stability objective defined in the Maastricht Treaty. 2 percent or close is the FED interpretation of their price stability. Thus, independent central bankers cannot be criticized for not reaching their objectives, unless the criticism is either about the speed with which they were reaching them or about the calculation and/or significance of these objectives.

Some,³⁷ however, would contend that the slowdown of growth prior to 2020, although usually considered a government primary responsibility and objective, should itself be viewed as a proof of failure of independent central bank regimes. Also concerning the speed with which price stability is being reached, some analysts would point to the slowness of the inflation movement recently in the Euro area or the US as a sign of impotence of monetary policy and the sign of an inefficiency of independent central banks. However, this ignores the increase of shocks and risks linked to climate change over the same period. These shocks are increasingly considered as credible while the policies associated to the fight against them are heavily debated and therefore very uncertain. Thus, they affect both the long term in the case of the worst scenarios and the short term. They are consistent with a decrease of expected potential growth at least in the absence of international agreements. Moreover, they offer a perspective where labor productivity, wage growth, and inflation are uncertain, due both to uncertainty on temperature change and on public policies. Hence one should not necessarily see the recent stabilization of inflation below 2% or the irregularity of its progression as a sign of impotence for monetary policy. Rather, it is the sign that markets are faced with real developments which are difficult to forecast but are certainly sensitive to expectations dynamics.

Moreover, the conclusions to be drawn from the so-called “Modern Monetary Theory”³⁸ remain unproven. This theory takes as a basis that inflation can only be

³⁷ See <https://www.youtube.com/watch?v=7sd-EIKMbPI> for a presentation of these views usually presented as the ‘Modern Monetary Theory’.

³⁸ See Vox article for an introduction to Modern Monetary Theory at: <https://www.vox.com/future-perfect/2019/4/16/18251646/modern-monetary-theory-new-moment-explained>.

caused by high government spending in a country with a national currency rather than by interest rates or by the quantity of money. Hence, the level of the debt to GDP ratio does not matter as long as a national currency remains a reserve currency. In fact, it is unclear as to whether it's a general theory or a new way to present ideas. Many questions arise: If the budget deficit were to drive inflation up, then why would wage growth have remained so modest in the US just 2 years after major tax cuts? And if that is a normal outcome, what is different from normal theories where there is still slack in the economy? And if there is still slack in the economy which can only be gotten rid of through further government expenditures, why is this argument right in the US when implemented by the Trump administration and unimportant in Europe when made by an independent central bank like the ECB inviting states to increase expenditures? And if it is right on both sides of the Atlantic, why make such a difference between the US and the Euro Area in terms of explaining a rather similar behavior of growth and inflation? Hence drawing strong conclusions from short term developments while forgetting a major achievement like the quasi stability of prices across a major financial crisis can only be confusing.

Indeed, the success in stabilizing prices was the result of measures called “quantitative easing” but was also accompanied by two types of unexpected phenomena. On the one hand, the inflation rates of various goods and services diverged, leading to diverse perceptions of inflation across consumers, depending on age, occupation, and location. The younger consumers, especially if consuming a lot of digital goods, saw the cost of their consumption baskets decrease sharply. Older consumers, purchasing more traditional goods saw the cost of their consumption basket increase faster. At the same time, the cost of housing is usually equated to the cost of rentals inside inflation indices, which does not always reflect real estate prices and their divergence across regions fully. This is more relevant for regions where renting is less common and the housing supply limited. This divergence in the prices of consumption baskets across consumers depending on age and social background may have given rise to diverging inflation perceptions themselves amplified by the increase in asset prices which led to a divergence in the distribution of wealth. Diverging perceptions may put in question the significance of the objective.

However, this can be dealt with easily by an independent central bank if it is a statistical issue affecting the determination of the price objective or by the legislative branch if it implies the addition of a secondary objective like employment or the distribution of wealth. The question whether it implies a better control of real estate prices, through a change in the structure of governance, will be dealt with in Section 4 below.

On the other hand, the rebound in growth was accompanied by a significant rebound in consumption but a dismal rebound in investment and a slowdown of potential growth both in the US and in the Euro area. This was partly due to a

slowdown in public investment but also connected to a lower development of private investment in the US and the Euro area in the period following the financial crisis. However, as productivity increases usually come from start-ups and small and medium enterprises (SMEs) after a growth slowdown, a criticism could concern the ability of central bank financing to support the financing of start-ups and SMEs as successfully as it has supported the financing of large firms, and more generally its ability to support the financing of the private sector as successfully^{39,40,41} as that of states. Indeed, the quantitative easing was in the US and in the Euro area largely limited to purchases of assets from sovereigns. Then it was widened to large firms in the Euro area, thereby possibly depriving start-ups and other small businesses of an equal access to financing over the whole period since the financial crisis.

This would assume that the central bank actions could and should ensure a level playing field across the state(s), large firms, and the SMEs. The first issue to clear in this respect is whether the central bank should care about the actual channels through which an economy is financed. After all, the Modigliani–Miller⁴² theorem would assume that this is irrelevant in a world of perfect information and competition. However, external funds are in practice more costly than internally-generated cash flows for firms and the issue is empirical as very clearly explained by Garcia-Posada (2018) in his ECB Economic Bulletin article.⁴³ Hence, after discussing such issue in detail,⁴⁴ economists usually reach the conclusion that the sovereign debt crisis in Europe caused credit constraints which themselves limited

39 This point is at issue in the current debate on public debt management especially in Europe: <https://doi.org/10.1515/ael-2018-0003>.

40 Buca and Vermeulen argue for instance that the tightening of bank credit may explain a significant proportion of the drop in aggregate investment by non-financial corporations during that period.

41 Buca, A. and Vermeulen, P., “Corporate investment and bank-dependent borrowers during the recent financial crisis,” *Journal of Banking & Finance*, Vol. 78, May 2017, pp. 164–180.

42 O Modigliani, F. and Miller, M.H., “The Cost of Capital, Corporation Finance and the Theory of Investment,” *American Economic Review*, Vol. 48, 1958, pp. 261–297.

43 ECB Economic Bulletin, Issue 2 / 2018 – Article The real effects of credit constraints.

44 The seminal work of Fazzari et al. found that investment was more sensitive to cash flows in financially constrained firms. But cash flows may proxy for other, unobservable determinants of investment, such as investment opportunities. Moreover, a greater sensitivity of investment to cash flows is not a reliable measure of financing constraints, as argued by Kaplan and Zingales (Kaplan, S. N. and Zingales, L., “Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?,” *Quarterly Journal of Economics*, Vol. 112, No 1, 1997, pp. 169–215). Consequently, researchers have increasing recourse to survey data to assess the impact of financial constraints on real variables (See Ferrando & Lekpek, 2018 and Ferrando, Popov, & Udell, 2017 and Veugelers, Ferrando, Lekpek, & Weiss, 2019) or Acharya, Eisert, Eufinger, and Hirsch (2016) and (2018).

investment by non-financial corporations and particularly those of SMEs and start-ups which have a more limited access to financial markets. This shows that, at least based on the Euro area example, central banks should care more about creating a level-playing field across financing channels.

So how to implement such a level-playing field? On the long term, the overall productivity of an economy may be weakly influenced by public investments. On the short term however, such productivity may be strongly associated to the availability of various types of infrastructures (roads, networks). Hence the level-playing field that needs to be established does not and should not negate either the need for public investment when increasing the overall productivity, or the investment of large firms. It only means that the specific constraints – which bear on the financing of SMEs and start-ups as well as on the financing of other productive projects in a period when overall productivity durably stalls – may need to be lessened to become less binding. In other words, regulation may need to be optimized so that markets yield a more favorable outcome, by ensuring that private banks and markets help finance SMEs and start-up projects on par with similar projects of large firms and states. This need for equal treatment addresses both technological change and climate change. Moreover, the creation of a level-playing field by central banks for the financing of small businesses may impose the support of various markets for securities when they exist and their creation and development across sectors with various maturities.

Since rating agencies tend to favor old or large firms, venture capital can be scarce for start-ups and SMEs and public banks unable or unwilling to fill the void. Also, some rating agencies employ big and microdata while others do not. Furthermore, some accounting techniques are biased against new technologies and start-ups are inherently risky. Moreover, it should be clarified how to calculate the “profit” from an investment in the ecological transition so that the level playing field between green investments and non-green investments is created.

Finally let us note that the relevance of that criticism on the financing of SMEs and start-ups concerns governments and central banks alike and has fiscal, financial and international trade and finance aspects. Hence, reaction to it may also be dealt through other means, depending on coordination or interdependence preferences. However, before discussing the issue in Section 4, let us remark that the issue is more relevant to the Euro area and also that its pursuit by the central bank is easier to legitimize in the sense of Tucker there.

While the US faces the same phenomena, government reactions were different, and the US capital markets deeper and more mature. What resulted from stable wages and increasing asset prices was an ever-expanding wealth inequality. The effects were felt by older and low-qualified consumers similarly fueling populist movements in the US and Euro area. Also, the slowdown in investment was

accompanied by a renewed attention given by politicians to the financing, attraction, taxation and subsidization of (start-up) investment in all the countries concerned and in their competitors' countries. But in the US, the large availability of venture capital had already allowed for the development of its main unicorns (Google, Apple, Facebook, Amazon, or GAFAs) and made them able to finance many start-ups or to acquire them pre-IPO. This led the Trump administration to concentrate on US taxation issues first and then to focus on trade relations, particularly with China, emphasizing the need for "fair trade." The need to support start-ups or SMEs also did not appear as essential as some exceptional attention had been given to financing the Small Business Firms by the Fed and the US Treasury in the original 2008 package. By contrast, in the Euro area, the Juncker Plan and in countries like France and Germany, the lending efforts of large public banks were a first but incomplete and delayed response to the lack of venture capital. More recently, the monitoring of trade with competitor countries has also garnered more support in the Euro area. Finally, on taxation, the US has simultaneously decreased the incentive to invest abroad by asking GAFAs⁴⁵ to repatriate their foreign profits and lowered the level of the flat tax to a level in line with the most competitive countries. On the contrary, in the Euro area, the taxation of start-ups and of firms in general is still very divergent across countries and no agreement on a common EU scheme has yet been reached while the taxation of GAFAs remains a controversial issue. Hence, the relevance of the criticism on the financing of start-ups for investment and potential growth, although pertinent for both the US and the Euro area, may in the future be even stronger in the Euro area, particularly in countries with still high business taxation. But this does not exonerate governments of their responsibility on the matter. They have the main responsibility for supporting growth.

3.3 What Could Have Gone Better From a Financial Stability Viewpoint?

As recently put forward by Janet Yellen speaking about the US but in a way that could apply to the Euro area also, "the reforms put in place [over the last 10 years] significantly boosted the resilience of the U.S. financial system. Banks are better capitalized and have more liquidity. The risk of runs owing to maturity transformation has declined. New mechanisms to make it easier for the government to resolve systemically important firms have promoted market discipline and reduced the problem of too big to fail. And a system was devised to more effectively monitor risks that arise outside the regulatory perimeter."

⁴⁵ See <https://www.degruyter.com/view/j/ael.2017.7.issue-1/issue-files/ael.2017.7.issue-1.xml>.

So, could anything have gone better during and after the 2008–2009 financial crisis? As we do not have homogeneous information on the US and the Euro area countries, we examine the issue for the US and thereafter answer by reference to the US example and the limited costs of its interventions.

a) The cost of US public interventions

In 2008 and 2009, the Federal Reserve had to lend both to non-banks and to banks and did so in the context of three asset purchasing programs in order to avoid a closure of financial markets. The “ex ante” cost of these interventions generated an outcry in the US. This has impressed analysts right from the start of the crisis and led many to argue that these interventions had saved from bankruptcy those that should have been punished for making wrong investments. This view also implied that the actual cost of such interventions would be significant.

However, these actual costs must be considered in view of both their latest net “ex post” estimates, which are the most popular and easier way to calculate estimates, and their “fair” estimates at the time of crisis (Lucas 2019)⁴⁶ which take

46 See Deborah Lucas who inventories, on a consistent and economically meaningful basis, the direct costs and beneficiaries of the major post-2007 U.S. bailouts. The direct cost of a bailout is the difference between the value of resources committed to the rescued entity by the government or the central bank and the value of potential recoveries and fees. She distinguishes three types of approaches:

a) A first approach simply adds together all realized cash flows between the government and the bailed out entity, positive and negative. This is referred to as ex post cash accounting. This approach neglects time value and risk adjustment and ignores the possibility that the outcome could have been different than what transpires. Nevertheless, it is most frequently the way costs are calculated in popular accounts and government reports, as well as in some analyses by academics.

b) A second approach consists in evaluating the value of all resources committed as of a fixed point in time on a market or fair value basis. In most cases, the natural choice is the year the bailout is initiated, for instance, when new legislation is passed or administrative policy changes are announced or implemented, or shortly thereafter. The cost is then the net present value of associated stochastic past and future cash flows, evaluated using a market or fair value methodology.

c) Other events do not have a well-defined starting point. In such cases, a measure of bailout costs is the NPV of the subsidies delivered or expected to be delivered on new credit support extended during the crisis period, plus the subsidy element of outstanding credit support just before the start of the crisis. Estimates using this third approach are referred to as ex ante bailout costs.

Deborah Lucas (Lucas 2019). prefers the b) approach occasionally complemented by c) as it takes the uncertainty over outcomes and time value into account. However, this is clearly sensitive to assessment of fair values for risk premia which are clearly very variable in a financial crisis. Also, this refers to an Arrow–Debreu world where financial crisis cannot happen. Therefore, this paper prefers to consider both the Lucas and the a) approaches jointly, while referring to the estimates collected by Deborah Lucas as the best source.

into account the value of time and risk generated by guarantees. This led also to similar criticism in other countries and especially in the Euro area.

Did the US intervention reach its overall goals? The first of these goals was to make financial markets liquid again and thus to avoid the major impacts on GDP associated with liquidity crises. This goal was reached. A second goal was to achieve a rapid rebound of investment and consumption. The US was the first country to witness a rebound of growth, consumption, and investment. Other countries, and the Euro area, were less successful. The Euro area experienced a slowdown after the first rebound so that a crisis which originated from the US finally became a Euro area crisis. Third, the US intervention, which was widely believed to be very costly originally, turned out to have a limited cost in net terms for the taxpayer⁴⁷ at an estimated level of 3.5 % of GDP in 2009 according to recent calculations by Deborah Lucas (Lucas 2019). All the more that a large share of it is due to implicit and official guarantees offered to Fannie Mae, Freddy Mac and more generally to mortgages through the Federal Housing Administration (FHA) that may be viewed as reflecting public housing policies as much as or more than lender of last resort policies.

Considering estimates based on an “ex post cash accounting” basis, Deborah Lucas also explains that “ProPublica, a highly regarded non-partisan news organization, has been keeping a running tally of government asset purchases and cash receipts under the Troubled Assets Relief Purchase (TARP) program and from the bailout of Fannie Mae and Freddy Mac. In their most recent update dated September 27, 2018, they report a total net government “profit” of \$97 billion.” Moreover, in 2012 former president Barack Obama claimed that, “We got back every dime used to rescue the banks.” However, this approach fails to recognize time value and, more importantly, risk at the time of the interventions.⁴⁸

⁴⁷ It is useful to quote Deborah Lucas (Lucas 2019), on this issue: ‘the total direct cost of crisis-related bailouts in the U.S. was on order of \$500 billion, or 3.5 percent of GDP in 2009. The largest costs arose from Fannie Mae, Freddie Mac, TARP and the FHA. The contingent liabilities of the Federal Reserve and the FDIC were greatly elevated, but taxpayers were largely shielded from those exposures. The largest direct beneficiaries of the bailouts were the unsecured creditors of financial institutions. Those conclusions stand in sharp contrast to popular accounts that claim there was no cost because the money was repaid, and with claims of costs in the multiple trillions of dollars. The cost is large enough to suggest the importance of revisiting whether there might have been less expensive ways to intervene to stabilize markets. At the same time, it is small enough to call into question whether the benefits of ending bailouts permanently exceed the regulatory burden of policies aimed at achieving that goal.’

⁴⁸ Another more clearly flawed approach that has contributed to the confusion is to claim all at-risk government funds as the cost of bailouts. For example, a 2015 guest article in *Forbes* stated that the “total commitment of government is \$16.8 trillion dollars with the \$4.6 trillion already paid out.” This shares with ex post cash accounting the problems of ignoring risk adjustment and time value. On top of that, it fails to recognize the high probability that not all available monies will be drawn upon, and that substantial recoveries are likely on funds that are extended.

Overall, Deborah Lucas (Lucas 2019), presents a best estimate of total US crisis-related bailouts of the order of \$ 500 billion while “ex post cash accounting” would hint to “profits.” This mixes measures connected to the FED lender of last resort activity to measures connected to Fannie Mae and Freddy Mac which should be viewed as more directly under the responsibility of the government or as costs related to the subsidization of FHA and FDIC activities. This assumes also that a fair value of risk exists. Of these \$ 500 billion, only \$121 billion come from activities which are directly related to the Fed activity (TARP and its other purchase programs) and to the increase of subsidization by FDIC. As these costs nevertheless represent only 1 percent of the 2009 US GDP, it is difficult to criticize ex post the set of measures taken by the Federal Reserve, in conjunction with the US Treasury.⁴⁹

Beyond costs of intervention, it is important to realize that the debate which took place between the FED and the Treasury on the one hand, and the US Congress on the other hand, was a major factor in allowing, explaining but also focusing and limiting the ambition of measures decided by the two former institutions.

Somehow, the relative resignation of private banks at end-2008 in their efforts to obviate the crisis has been rightly complemented by the extensiveness of the FED action. Combined to the severity of the overall control imposed by Congress, who originally sent back the first proposals made by the Fed and the Treasury but accepted the second ones, this may have played a role in the relatively quick rebound of the US economy. Therefore, the debate over “Treasury-Finance nexus,” made public and possible by such process at a time when the extensiveness of interventions and the size of the guaranteed liabilities mesmerized public debates, may have – unwittingly – played a positive role.⁵⁰ We will see later that this may have consequences for the way independent central banks organize the governance of their financial stability activities, in day-to-day activities and in exceptional circumstances like financial crises.

b) What could have gone better by reference to the US in the Euro area?

Moreover, by comparison with the US, many things could have gone better in the Euro area recovery. More than 10 years after the crisis, it is striking that banks in the US and in Europe are still in quite different positions. In the Euro area, capital ratios of banks although currently much higher than in the past, have been lagging those of US banks and concentration in the banking sector is stalling. Moreover,

⁴⁹ This shows that the amount of fiscal expenditures financed through the FED intervention was at most 2.5% of the 2009 US GDP and was largely concentrated on federal housing policies. Noting that the mobility of labor in the US went down strongly since the 1930's and went on decreasing after the financial crisis, it is also difficult to criticize this financing.

⁵⁰ See Moutot, P., 2015.

their profitability is still low.⁵¹ This may imply vulnerability for the least profitable of those banks in case of a new financial stability shock. A world where growth and productivity are lower and lower, where interest rates on banks assets are low and even negative on some maturities and where interest rates received by depositors remain nevertheless positive is inevitably riskier for banks and insurance companies.

More generally, the reaction of the Euro area banking sector to the 2008 financial crisis has been more protracted than that of the US banks. Progress materialized after the Banking Union was launched in 2014 and the leading role given to the ECB in bank supervision. But much remains to be done or finalized. This depends on the ability of the Euro area states to agree on sharing together the burden of a European deposit insurance. Also, mergers of banks across the Euro area countries have been very limited. Clearly, this says little about the independence of the ECB and depends more on the States' ability to share their sovereignty in an ever larger set of fields.

c) What could have gone better in the US and Euro area or the degree of preparation to the next crisis

As also explained by Janet Yellen recently,⁵² one may regret that the financial stability measures taken since 2009, including the Dodd–Frank legislation, end up depriving the Federal Reserve, from the ability to purchase private non-bank assets as done in 2009. Although capital ratios of banks are much improved and banks are more likely to weather any liquidity crisis due to new liquidation tools, it is not clear that all liquidity risks posed by systemic banks and non-banks could be resolved over the short term using such tools. Concerning the Euro area, similar strengthening of the banking regulation took place. However, it should also be noted that, as mentioned above, the banking sector is less profitable than in the US, that a profitable clientele of banks is traditionally the clientele of small successful start-ups and rich individuals, and that lending to non-banks would not be covered either.

This does not imply that one should enable central banks to monetize all kinds of banking bets on issued securities again. On the contrary. However, it also hints to the risks of a strict rule-based behavior of central banks when faced with liquidity needs that are difficult to anticipate. It may be useful, as advised by Bagehot, to be in a position to buy good private paper in the midst of a financial crisis even though it may not be bought under other circumstances.

⁵¹ Evidence-based analysis shows the tension between shareholder value strategy maximizing profits and financial stability considerations: see for example <https://doi.org/10.1515/ael-2019-0083>.

⁵² <https://www.brookings.edu/blog/up-front/2019/01/03/seven-questions-for-janet-yellen-on-financial-stability/>.

Also, as mentioned earlier, the inability to fully explain how liquidity disappears and reappears in an economy is disquieting.⁵³ Beyond usual discussions of this issue pointed to in the previous footnote, it may also point to an insufficient attention given by macroeconomists to the link between liquidity shocks and the debt collection processes associated to crises and to the best way to organize them in order to make the economy more stable. In particular, the non-linearities introduced by the use of legal concepts like non-performing assets and the absence of link usually made between such issues and the functioning of insurance markets (life and health insurance) may make the focus of most macroeconomists on debt markets only look excessive. Indeed, the joint consideration of insurance and debt markets may be necessary to better understand liquidity processes.

In this context, limitations on the type of possible interventions put central bankers under even stronger pressure. Moreover, improvements in the soundness of the banking sector do not guarantee that other sectors could not become a source of instability. In particular, the stability of the insurance sector, which is constrained both by the low level of official rates and the lower productivity of the economy, can raise issues. These issues may depend on the stability of sectors that are more difficult to understand and follow for central bankers. They may be somewhat simplified if one follows the interesting suggestions of Ricks (2015) on extending the deposit insurance to all money-like financial products. However, this is unlikely to be the end of the story as separating the banking sector from the other financial sectors might be illusory (see Moutot, 2017) or require a huge command and control approach.

As a result, there is a case for an independent central bank having to assess and apply a set of rules and procedures in normal times but to remain able to propose exceptional measures to complement the implementation of these rules, when needed. Indeed, an optimal reaction by financial authorities and institutions to a crisis is a complex strategic process rather than the result of a simple exercise by the State(s) and/or the central bank over its/their regulated banking sector at the time of a crisis. On the one hand, it is important that central banks apply on a continuous basis strong regulation on banks, such as the one developed since the crisis, identifying systemic institutions and the way they may be disbanded in case of need. On the other hand, it remains that another crisis may involve the need for rapid learning in action of authorities and the gathering of a large information set coming from all sources in society. It is also true that the risks from unregulated activities remain largely unaddressed although the financial crisis originated from them, especially the monetization of such speculative positions through the banks.

⁵³ Please refer to footnotes 34 to 37 for a description of how researchers deal with various components of this issue but have not yet reached an encompassing view.

Overall, summarizing Section 3 and our answers to the question “What could have gone better,” the criticisms made against independent central bankers are just a few but some are limited in impact while others may be more difficult to legitimate in the sense of Tucker, at least in full. Where reproach is warranted using a fact and responsibilities-based approach is in that central banks:

1. targeted imprecise targets which rightly orientate their action toward price stability across time but do not sufficiently prevent the perception or the development of wealth inequalities across agents;
2. used incomplete although state of the art models leading to delays in decisions and impact, underlining the need for well-targeted research and its urgent application.
3. do not grant enough say to legislative authorities in the context of lender of last resort interventions while being excessively constrained when facing a full-blown financial crisis;
4. failed to adequately control asset prices effectively and/or had ineffectively controlled those that mattered albeit the identity of assets to be controlled may vary depending on analysts. The most mentioned are real estate prices, as they impact price indices and inflation perceptions; but other assets could also be considered.
5. did not employ adequate financing techniques in view of the weakness of start-up investment and of the need for green investment.

4 The Need for a Revamp of Central Bank Independence

Overall, summarizing Sections 2 and 3, the criticism of independent central bankers has two main sources which can interact and complement each other:

- the view that they should have done better or should do better in the future. In this case, either changes in their mode of action would bring a response to the criticism or central bank independence should be reconsidered.
- a deficit in legitimacy in the sense of Tucker, that can only be dealt with a framework better demonstrating the benefits of independence to the public through improved accountability and transparency.

The financial crisis and the period after it showed that, far from being a reason to doubt independence, some of the reproaches that can be retained against independent central bankers (the first, second, and third reproaches of Section 2)

simply need to and can be taken care of by independent central bankers or by the legislative branch to which they are accountable if their objectives are refined. Concerning another type of reproach (fourth reproach), the benefits of independence and interdependence can be combined to control asset prices effectively although legitimacy may take time to establish for some kinds of assets. Concerning a last type of reproach (fifth reproach), solutions exist but may differ in the USA and in Europe as legitimacy may be harder to establish on one side of the Atlantic than on the other side.

However, one caveat is in order. Central bank independence is no panacea. It cannot replace adequate fiscal policies forever, nor adequate trade and competition policies. It is just a tool which may improve the functioning of a representative democracy if used wisely.

Thus the framework for accountability of the independent central bank may need to be adjusted in view of strengthening legitimacy. The faster the better. And work on checks and balances needs to progress fast. Hence, while it is crucial to avoid the proverbial throwing out the baby with the bathwater, it is essential to revamp central bank independence in view of facing best new challenges, including the next financial crisis. The following describes the various elements of this revamp.

4.1 Dealing with the First Three Reproaches

The first reproach – targeting inadequate targets – is not very deep as targets can be altered and independent central bankers can only pursue the objectives they are given. Therefore, real estate prices may have to be better reflected in inflation indices and policies adjusted to that effect. This may be done at the initiative of central bankers or upon request of legislative authorities interpreting the existing definition of price stability.

Changes may be deeper than statistical adjustments to inflation indices but would still consist in interpretations of the current objectives. If targets are modified to include or reflect measures of wealth inequality, and if policies are available to better reach them, central bankers may pursue such policies. It then becomes the responsibility of the legislative authority to identify the right type of or combination of targets or to request central bankers to do it. If employment is, like in the US, made a secondary target, not much will change. But the independent central banker should again remain responsible for reaching them. In any case, this would show that he/she cares about wealth inequality when society cares about it.

The second reproach – using inappropriate models – is slightly deeper. It may point to an insufficient investment in research or, in case the investment was made but not applied, to an insufficient transparency on the results of such research. This may also be easily dealt with, to the extent that the main characteristic of an independent central banker is his/her expertise and incentive to keep his/her reputation.

However, dealing with it effectively and successfully may take time and implies oversight efforts from the authority to which the independent central bank is accountable. It may take time as solving the issue of liquidity appearance and disappearance has already taken time and may take further efforts. Its outcome may not be easy to reach and may have to be combined with progresses to be made in other fields by economists.

For instance, this would coincide with a growing awareness of the limitations of Economics itself. Economists would want expectations to be rational, that is to include all available information. But they have to accept that a natural consequence of this rationality in markets should be that trading should not be necessary on a regular basis. This is contradicted by reality and markets. Hence the difficulty of modeling and controlling liquidity issues and the perceived risks of financial instability.

Economists are also in favor of free trade. But they are also aware that the use of taxes and subsidies can, in a context where large scale effects matter, end up endogenizing long term comparative advantages. Globalization and large-scale effects have moreover combined to create in an increasing set of sectors disruption as well as a new governance which led to a new concentration of capital and profits. Finally, economists are increasingly aware that large scale effects and the concentration of capital greatly affect the distribution of wealth and the growth potential.

However, if the results of the research effort may be delayed, having the central banks undertake such effort should not be complex. The authority to which the independent central bank is accountable can only be part of the legislative branch and may easily request the independent central bank to undertake adequate research and hold them accountable for it. This may also point to an inadequate recruitment of insufficiently research-oriented central bankers. This may also indicate that the link made by the central bank between the result of its models and its decisions is insufficiently transparent. But again this does not put independence of central bankers into question. Moreover, an independent research department would be no novelty.

The third reproach – giving a say to legislative authorities in the lending of last resort – can also be addressed without putting central bank independence into question. As found in the 2008–2009 US case, the influence of Congress on the US

package has been positive in the sense that it did limit its cost and that central bankers were still able to buy some private assets. However, new arrangements have determined the behavior of central bankers in lender of last resort situations. In normal times, they should apply and strongly limit the cost of interventions based on liquidation rules. In exceptional circumstances, one could complement them in case independent central bankers would propose it and the legislative branch would consider it preferable.

Practically, this would assume that central bankers who would consider it necessary to the current context could, in the face of a new financial crisis, take the initiative to present 2 alternative scenarios to their legislative branch:

- a scenario based on rules available for liquidations,
- a scenario based on expected liquidations and perceived needs, if exceeding rules.

The legislative branch could modify the second scenario to the extent its final cost would not exceed the cost of the second scenario put forward by central bankers. It could also equate it to the first scenario, if the legislative branch considers that the worries of central bankers are baseless. The implemented scenario would be chosen by central bankers between the scenario on the basis of rules available for liquidations and the modified one if different. This would both associate the legislative branch to exceptional acts where the taxpayer may be impacted and ensure that information available to it is included or considered.

The fourth and fifth reproaches – asset prices control and scope and financing of start-ups and green investment- are more difficult to deal with as their solutions assume the existence of better but still unchartered policies. Assessing their desirability of such unchartered policies is delicate. If such solutions however are to be legitimate in the sense of Tucker, and taking into account that up to now independent central banks have been relatively successful in reaching their objectives, they need either to offer very big payoffs or limited but not very risky ones. However, we will also show that the independence of central banks is an advantage rather than a hindrance when facing them.

4.2 Better Controlling Asset Prices

The fourth reproach can be addressed to central bankers only if one holds them and only them responsible for the stability of asset prices. This is usually not the case. Moreover, to the extent that assets would see their price partly influenced on

the long term by structural measures taken by either government or local authorities, there is a case for considering this reproach as more addressed to the overall organization of financial stability than specifically to the independent central bankers. Hence, there is a case for encouraging to direct monetary and financial stability policies at their most effective targets. Better organizing the work of policy makers may thus be an interesting avenue.

One may note that the consequences of the millennium high-tech boom and bust were controlled mostly through monetary policy and easily absorbed in the US and globally. On the other hand, the absence of sufficiently restrictive monetary and financial stability policies allowed excess leverage, aggressive securitization and doubtful monetization and was the source of the 2007 real estate crisis and of the subsequent banking crisis in the US. It combined with the absence of a single supervisory mechanism (SSM) in the Euro area, which was created subsequently precisely to ensure the survival of the Euro.

Would it not make sense, then, to give financial stability policies, that is regulatory policies, the main responsibility for avoiding real estate and other asset price booms and to monetary policy the main responsibility for avoiding high tech and other booms and busts?

This would not affect the primary nature of the price stability objective that monetary policy would continue to target. It would, however, target price stability even better if it were assured that financial stability measures would reduce the likelihood of asset price booms. Consequently, monetary policy would probably be even more effective at making price stability consistent with the stabilization of the business cycle, which would limit the incidence of high-tech or of other types of booms and busts on financial stability.

In the case of real estate booms, excesses are often local or regional, making it difficult for monetary policy to intervene successfully but much easier for supervisors and other authorities who can adapt their action to local conditions. This is even facilitated inside the Euro area by the new responsibilities of the ECB in the context of macro-prudential supervision and the SSM. On the other hand, high-tech or other booms and busts are less local, are much more connected to private investment and hence to productivity, as well as to consumption prices and macro-economics. They are much more akin to inflation developments and hence are more natural to control using monetary policy. As both policies would be more successful, the oscillation between one extreme and another may be reduced.

Of course, given the lack of actual experience in this field, especially in other sectors than real estate, it is difficult to be sure how effective and powerful this reshuffling of objectives might turn out to be. Obviously, this depends on the types

of assets considered, the way they are regulated, and how powerful structural measures taken by regulators may be.

For a few years, the use of such a countercyclical buffer has been made possible within the Euro Area.⁵⁴ As the competence to determine such capital requirements normally stays at national level, a legal framework had to be developed in order to make it consistent. Such framework leaves the decision of changing such countercyclical buffers to national authorities under the monitoring of the ECB which can also modify them. Some of these national authorities belong to the Eurosystem while others do not. This shows again that a system of “checks and balances” can be operated to complement the independence of the ECB. It would complement the agreements reached between the Council, the European Parliament and the ECB⁵⁵ when creating the SSM.

However, only experience will show whether this is sufficient to avoid a new financial crisis. Also, this should not be an excuse for monetary policy to ignore again – as they did in 2004/5 – messages from monetary or debt aggregates. In this respect, the optimality of the so-called “separation principle” internally applied by the ECB to segregate its monetary policy and its financial stability policy may have to be assessed or reassessed. And the absence of a consistent price objective for guiding the use of such buffer analyzed. Finally, in view of the need of legitimacy in the sense of Tucker, in order to extend the responsibilities of independent central banks, one may have doubts on the possibility at this stage to extend such buffers beyond the real estate sector.

54 See ‘Shelter from the storm: recent countercyclical capital buffer (CCyB) decisions’ by Domagoj Babić and Stephan Fahr, https://www.ecb.europa.eu/pub/financial-stability/macprudential-bulletin/html/ecb.mpbu201903_04~b8ad0c67e9.en.html#toc6.

55 Please see the following documents describing these inter-relations:

1. Interinstitutional Agreement between the European Parliament and the ECB on the practical modalities of the exercise of democratic accountability and oversight over the exercise of the tasks conferred on the ECB within the framework of the Single Supervisory Mechanism OJ L 320, 30.11.2013, p. 2.

2. Memorandum of Understanding between the Council of the European Union and the ECB on the cooperation on procedures related to the Single Supervisory Mechanism (SSM) 11.12.2013.

3. Regulation of the ECB of 16 April 2014 establishing the framework for cooperation within the Single Supervisory Mechanism between the ECB and national competent authorities and with national designated authorities (SSM Framework Regulation) (ECB/2014/17), OJ L 141, 14.5.2014, p. 1.

4. Recommendation for a Council Regulation amending Regulation (EC) No 2532/98 concerning the powers of the ECB to impose sanctions (ECB/2014/19), OJ C 144, 14.5.2014, p. 2.

5. Decision of the ECB of 14 April 2014 concerning the establishment of an Administrative Board of Review and its Operating Rules (ECB/2014/16), OJ L 175, 14.6.2014, p. 47.

4.3 Central Bank Financing Techniques and Level Playing Field Across Sectors? Obviating the Bias against the Financing of Small Innovative Businesses and Projects

Whenever the Modigliani–Miller theorem does not apply and investment matters for growth, the central bank needs to care about the way it finances the economy. Indeed, whenever its action helps monetize a specific security, the issuer of the security may issue it more easily and is more likely to receive funding from its bank. This in turn makes more likely investment by this issuer. Hence, investment may be influenced by the mix of issuers chosen by the central bank for its portfolio.

However, for its normal business, the Federal Reserve has long preferred to limit itself to sovereign bonds. This may be fair under most situations if growth is strong and stable and the sectoral partition of investment a non-issue. Moreover, this may avoid any risk of bias in the choice of issuers by the central bank. But this may be suboptimal in periods of strong technological change (including climate change) when the financing of small firms and start-ups becomes pivotal for growth. Therefore, despite a general prejudice against the purchase of non-sovereign bonds, and until Dodd–Frank, the FED kept the possibility to buy private paper in the context of crises. And it used it quite successfully at the beginning of 2009.

By contrast, the European Central Bank usually does not limit itself to sovereign bonds and treats all businesses equally in normal times. For loans to banks may be collateralized with a large range of public or private papers, valued for start-ups like for other firms or sovereigns. It treats them differently from states and large businesses only when dealing with asset purchases and hence in the context of “quantitative easing,” that is in a financial crisis environment. However, the role of start-ups in supporting productivity increases in the follow-up to a financial crisis which also replaces loans and repos with quantitative easing. This may thus make this equal treatment of start-ups and small businesses particularly relevant.

It is thus necessary to request central bankers to explore ways to finance the economy that are consistent with a level-playing field for large firms, start-ups and SMEs, especially in the context of financial crises and climate change. Such level-playing field may be absent when some markets for papers issued by start-ups and/or SMEs are missing or mispriced. Banks may for instance refuse as too risky and for too long the financing of short-term activities of start-ups beyond their first 3 years in cases where such financing is viewed as standard for bigger or older firms. This condemns start-ups to obtain such financing from venture capitalists at higher cost and for longer than needed by large firms which can tap

banks for the bulk of their short run needs. Alternatively, this may allow unicorns, with large cash holdings, to decrease competition from new entrants in their sector by buying such start-ups. In the case of climate change, banks may have difficulties rating the projects of all firms, large or small, because the horizon at which the impact of climate change is maximal is unknown, too long and that public countervailing policies and the resulting price of carbon are uncertain.

In practice, this is the case when the rankings of projects rated by rating agencies or in Europe by central banks do not use all available and relevant information or are simply not available. In that case, the purchase of private bonds by central banks, if allowed, may amplify the bias. It can only concentrate on bonds of large firms in the sectors affected by technological change and ignore start-ups. In the field of climate change, it may fail to identify green papers in a sufficiently clear manner. In both fields, a different attitude in the field of rating could help correct the current financing bias.

Two angles may therefore be used to create or support the creation of missing markets for start-ups and SMEs papers:

- calculate and purchase a maximum share of overall monetary policy portfolio which may be reserved by the central bank to start-ups and SMEs; their maturity should be long enough to bridge the period on which the bias in financing appears. The maximum share, very low at the start, would be gradually adjusted.
- a technique for ranking innovative and green projects should be agreed upon. This technique should be advanced enough to allow some new classes of data, cumulative historical receivables and Big Data as well Green deal taxonomy characteristics, into credit analysis. Such data are not part of the public disclosure package and so far, are not shared with bond and equity investors. This should ensure that the right ranking of projects by larger or smaller firms is made available.

Hopefully the purchase of papers from startups and SMEs of ranks equivalent to those of large firms up to such maximum share would diminish the bias against the financing of start-ups and SMEs. Indeed, the bias seems to largely relate to the techniques currently used for the ranking of innovative projects by banks and by markets and are damaging only if the right ranking of projects by smaller firms is not available to markets and banks.

In any event, this should be considered by central banks in their collateral policies and in their quantitative easing policies and by national bank and

financial market regulators. Central banks were often created as the first purchasers of public bonds and only later financed the private economy through the issuance of banknotes and the financing of banks. However, if they need to purchase private bonds along public ones, the tools they use for that purpose have to take into account differences between large and small firms in a fair manner and finance the best investments.

The issue here is not any degree of interdependence with other institutions. It is rather to ensure the independence of central banks vis-à-vis the states as well as market participants, so that the decisions made by the central bank do not end up being unduly influenced by or protecting special public or private interests. Central banks, to the extent that they seek financial stability, need banks to finance the best projects rather than the projects favored by politicians or tycoons if productivity is going to reach its optimal level. Although central banks are not in charge of investment or of its monetization, they may through their action limit or increase some of the biases which affect investment and, hence, need to control these latter biases.⁵⁶ This would not limit the mission of public Investment banks⁵⁷: this would simply ensure a level playing field between private banks and public banks when competition may be strong as more banks get interested in financing start-ups and SMEs.

Avoiding conflicts of interest in a strict manner has therefore become an important motto among independent central bankers, who need to show integrity and transparency. This is especially important concerning speeches and meetings with specific rules being increasingly imposed to Board members of independent central banks.⁵⁸ This would become even more pivotal if central banks would issue national or regional digital currencies. Indeed, in such case all citizens might want to hold accounts at the central bank and a lot of micro and big data could be

56 Indeed, there is a deep contradiction between the traditional desire to have central banks not meddle into economic policy and especially issues of income and wealth distribution and the reproach also often addressed to central bankers that their quantitative easing policies combined to banks' policies lead to unbalanced income or wealth distribution. Short of a functioning Modigliani–Miller theorem, the solution of this contradiction implies that the central banks care at least about the distribution of money across SMEs and Start-ups, states and other firms linked to quantitative easing and that banks further distribute it within such categories.

57 For the start, one could ask a public investment bank, for example the EIB or the EIB and the BERD, to perform this new task for the ECB. The ECB could buy this minimum share from EIB/BERD which would then have to address the whole market and make the choice of papers. But this would be acceptable only in the first years. As EIB would not be the only banker of SMEs, a way of redistributing this share across banks would be needed. Hence the need for agreement on the way to rate projects.

58 Please see ECB communication guidelines: <https://www.ecb.europa.eu/ecb/orga/transparency/html/eb-communications-guidelines.en.html>.

collected by central banks which could only extend the need for avoiding conflict of interests.

5 Concluding Remarks

Overall, the debate about “what could have gone better since the 2008 financial crisis” does not give much reason to abandon the independence of central banks as a core ingredient of their success. There is no proof that things would have gone better in the absence of such independence.

This is not to deny that some degree of interdependence may improve outcomes. Gathering information from other institutions and ensuring it is considered whenever this leads to superior outcomes is beneficial. The examples above also support that view. But this would lose all meaning should the independence of the central bank be diminished in any way.

Hence, the objectives and tools of independent central banks should be refined when needed. Price stability is important and financial stability too. But not only. Wealth and income distribution matter as much, if not more than employment. So too is the ability to support investment over the medium term in line with potential productivity and climate change.

Independent central banks can help pursue these concerns. They may help ensure a fairer distribution of financial flows across states, large businesses and small businesses with the aim of supporting investment and adapting to climate change. Other concerns may be addressed by outlining secondary objectives added to primary ones. Technological change can lead them to offer new products like digital currencies to the general public, thereby modifying the relative importance of central bank versus private activities in the field of payment services activities. Finally, some concerns on liquidity dynamics are to be addressed by recognizing that they are to be researched more actively.

Indeed, the independence of central banks is a recent phenomenon which helped many countries rein in inflation. But it needs to be complemented to help face the challenges of modern economies, including financial flows and bubbles, globalization, climate change, health and pandemics shocks, and technological disruption as well as the management of the corresponding data. At the same time, each of these new challenges makes the corresponding revamp of central bank independence more urgent although it does not make it a panacea dispensing government or legislative branches from playing their role. What needs to be made legitimate through better accountability processes needs to proceed fast. Equipping central banks with the tools and values will help them face financial instability as well as possible. Twelve years after the last financial

crisis of 2007–2008, this is also urgent in view of the coronavirus shock and its financial consequences. As is the fair treatment of small businesses so as to ensure a higher productivity growth in view of it and of a timely adaptation to climate change.

To conclude, time is of the essence. No more time should be lost discussing the merits or the weaknesses of central bank independence. But taking central bank independence as a given, one should simply try to equip central bankers with the mandates, the tools, and the values best fitted to help them face future shocks.

References

- Acharya, V., Eisert, T., Eufinger, T., & Hirsch, C. (2016). *Whatever it takes: The real effects of unconventional monetary policy*. NYU working paper.
- Acharya, V., Eisert, T., Eufinger, T., & Hirsch, C. (2018). Real Effects of the Sovereign Debt Crisis in Europe: Evidence from Syndicated Loans. *Review of Financial Studies* 31, 2855–2896. <https://ssrn.com/abstract=2740338>.
- Aglietta M., & Moutot P. (1993). “The systemic risk and its prevention”, *Cahiers Economiques et Monétaires* No. 41, Banque de France, 1993. <https://gallica.bnf.fr/ark:/12148/cb343796043/date>.
- Biondi, Y., Zhou, F., & Interbank Credit and the Money Manufacturing Process. (2018). A Systemic Perspective on Financial Stability. *Journal of Economic Interaction and Coordination*. <https://doi.org/10.1007/s11403-018-0230-y>.
- Borio C., Disyatat P., & Juselius, M. (2013). *Rethinking potential output: Embedding information about the financial cycle*, BIS Working Papers No 404.
- Buca, A., & Vermeulen, P. (2017). Corporate investment and bank-dependent borrowers during the recent financial crisis. *Journal of Banking & Finance*, 78, 164–180. <https://ssrn.com/abstract=2707562>.
- Bunn P., Pugh A., & Yeates C. (2018). *The distributional impact of monetary easing in the UK between 2008 and 2014*. Bank of England, Staff working paper n°720.
- Cecchetti S., Genberg H., & S. Wadhvani, (2002). *Asset prices in a flexible inflation targeting framework working paper 8970*; National Bureau of Economic Research 1050 Massachusetts Avenue Cambridge, MA 02138 June 2002. <https://www.nber.org/papers/w8970>.
- Christiano, L. J., Motto R., & Rostagno M. (2007). Shocks, structures or policies? The Euro area and the US after 2001. *Journal of Economic Dynamics and Control*, 32(8), (August): 2476–2506. <https://doi.org/10.1016/j.jedc.2007.09.014>.
- Crockett, A. (1997). Why is financial stability a goal of public policy? *Economic Review*, 82(issue Qiv), 5–22.
- De Bandt, O., & Hartmann, P. (2000). *Systemic risk: A survey*. ECB Working Paper No. 35.
- Ferrando, A., & Lekpek, S. (2018). *Access to finance and innovative activity of EU firms: a cluster analysis*. European Investment bank Working paper 2018/02.
- Ferrando, A., Popov, A., & Udell G. (2017). Sovereign stress and SMEs’ access to finance: Evidence from the ECB’s SAFE survey. *Journal of Banking and Finance*, 81, 65–80. <https://doi.org/10.1016/j.jbankfin.2017.04.012>.
- Fisher, I. (1933). The debt-deflation theory of great depressions. *Econometrica*, 1(4), 337–357.

- Freixas, X. (1999), *Optimum bail-out policy, conditionality and constructive ambiguity, economics working papers 400*. Department of Economics and Business, Universitat Pompeu Fabra.
- Geanakoplos, J. (2010). Solving the present crisis and managing the leverage cycle. *FRBNY Economic Policy Review*, 16(1), 101–131. <https://ssrn.com/abstract=1678171>.
- Goodfriend, M., & King, R. G. (1988). Financial deregulation, monetary policy, and Central Banking (April 1, 1988). Federal Reserve Bank of Richmond. Working Paper No. 88-1. Available at SSRN: <https://ssrn.com/abstract=2120879> or <https://dx.doi.org/10.2139/ssrn.2120879>.
- Group of Ten. (2001). <https://www.imf.org/external/np/g10/2001/01/Eng/pdf/file1.pdf>.
- Hoelscher & Quintyn. (2003).
- Houben, A., Hakes, J., & Schinasi, G. (2004). Toward a Framework for Safeguarding Financial Stability. *IMF Staff Working Papers*, wp 04/101.
- Keefer, P., & Stasavage, D. (2003). The limits of delegation: Veto players, Central Bank Independence, and the credibility of monetary policy. *American Political Science Review*, 97(3), 407–423. <https://doi.org/10.1017/S0003055403000777>.
- Koo, R. C. (2003). *Balance sheet recession: Japan's struggle with unchartered economics and its global implications*. Singapore: John Wiley.
- Le Heron E., & Moutot P. (2008). *Les banques centrales doivent-elles être indépendantes?*. Editions Prométhée, Bordeaux, (pp. 9–37).
- Lucas, D. (2019). *Measuring the cost of bailouts*, February 2019. MIT. <https://gcfp.mit.edu/wp-content/uploads/2019/02/BailoutsV12.pdf>.
- Minsky, H. P. (1992). “The financial instability hypothesis” *Jerome Levy Economics Institute of Bard College Working Paper 74, May 1992*.
- Moutot, P. (2017). Morgan Ricks: The money problem: Rethinking financial regulation. *The Journal of Accounting, Economics, and Law: A convivium*. 20170029. <https://www.degruyter.com/downloadpdf/j/ael.2018.8.issue-2/ael-2017-0029/ael2017-0029.pdf>.
- Moutot, P. Power of inaction or ability to learn in action within a political process? Comments on the book “The Power of Inaction” by Cornelia Woll. *Journal of Accounting, Economics and Law - A Convivium*. <https://www.degruyter.com/view/j/ael.2016.6.issue-1/ael-2015-0009/ael-2015-0009.xml>.
- Papademos L., & Stark J. (2010). *Enhancing monetary analysis*. European Central Bank.
- Ricks M. (2015). *The money problem: Rethinking financial regulation*. University of Chicago Press.
- Riles A. (2018). *Financial citizenship: Experts, publics, and the politics of central banking*, Mario Einaudi center for international studies, meridian 180 Cornell global perspectives series, 2018. Ithaca and London: Cornell University Press.
- Smets F., & Wouters R. (2007). *Working paper series no 722/February 2007 shocks and frictions in us business cycles a Bayesian DSGE approach summer, 2003*.
- Tucker, P. (2018). *Unelected power: The Quest for legitimacy in Central Banking and the regulatory state*. Princeton; Oxford: Princeton University Press. Retrieved from www.jstor.org/stable/j.ctvc7789h.
- Veugelers R., Ferrando A., Lekpek S., & Weiss C. T. (2019). Young SMEs as a motor of Europe's innovation machine. *Intereconomics*, 54, 369–377.
- Woodford, M. (2003). *Interest and prices: Foundations of a theory of monetary policy*, Princeton: Princeton University Press, 785 pp.