

Resilience of hybrid organizations: The case of OECD central banks *

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Draft working paper, IIAS Conference Tunis - June 2018

* Early draft version. Please do not cite.

Abstract

There is little doubt that the great financial crisis (GFC) that started in 2007 has substantially changed central banking. Central banks (CBs) were forced to undertake financial interventions that were larger and financially riskier than any previously undertaken. Such interventions have led CBs balance sheets – together with the corresponding underlying risks – expand to record levels. Such interventions have undoubtedly intensified the debate about central bank equity and financial resilience. If the public wants to find reasons for criticism, then an easy target may be central bank (negative) equity, and more generally, central bank financial resilience. Overall, the financial strength and resilience of CBs have come under closer academic, political and also public scrutiny. Despite closer scrutiny, there exists surprisingly little academic work concerning the role and importance of central bank financial resilience. This paper will complement limited academic research with respect to central bank financial resilience and aims to establish a comprehensive framework to manage and govern financial resilience through combining operational and institutional aspects of CB. Based on the established theoretical resilience framework, we aim to analyze and measure the resilience of all 36 OECD central banks, by scrutinizing CB legislative frameworks and financial statements in order to elaborate different roles, targets and managing aspects of CB financial resilience. First results show a heterogeneous landscape of CB financial resilience and that the consequences of weak financial resilience might be underestimated significantly. The paper reveals the need to establish a recognized practice guideline, to govern and monitor CB financial resilience.

Introduction

There is little doubt that the great financial crisis (GFC) that started in 2007 has substantially changed central banking. Central banks (CBs) were forced to undertake financial interventions that were larger and financially riskier than any previously undertaken. Such interventions have led CBs balance sheets – together with its corresponding underlying risks – expand to record levels. As consequence of altered policy pursuit and the condition of the world economy, many western CBs have been facing large balance sheet losses and dropping equity levels. Hence, the financial strength of CBs and their resilience have come under closer academic, political and public scrutiny. If the public wants to find reasons for criticism, then an easy target may be the central bank's balance sheet (Horáková, 2011). In 2011, the director of the Swiss National Bank (SNB) was moved to give a speech covering the role and importance of CB financial strength (Jordan, 2011). Although he provided some reasonable arguments, not to raise serious concerns about the financial strength (resilience) of CBs, there remain arguments that low financial strength might seriously interfere with an independent CB to efficiently achieve its policy objectives. The European Central Bank (ECB), for example, has raised serious concerns regarding low financial strength of Eurozone CBs and requires national CBs to be sufficiently capitalized (ECB, 2004).

Overall, however, there exists surprisingly little academic work concerning the role, importance and management of CB financial strength (resilience). Most authors focus on the relationship between financial weakness and macroeconomic indicators, such as inflation targets. However, such studies do not take into account the way CB financial strength (resilience) can or should be managed on a mere micro-level. A recent paper by Archer and Moser-Boehm (2013) of the Bank of International Settlements (BIS, 2013) attempted to explicitly address CB financial strength (resilience) in a more comprehensive way. Although this paper provides some important general findings, it only focuses on a limited sample of CBs and it does not systematically link operational, macroeconomic and institutional issues of CB financial strength (resilience). In essence, the work reveals different aspects for further research and closer scrutiny, some of them being addressed in this paper. This paper includes different research innovations in the field of central bank financial management. It shall contribute towards increasing policy debates about the role and importance of CB financial strength (resilience) by developing and applying a new framework to assess the level of financial resilience of OECD CBs.

This paper is structured as follows. The first section of this paper provides a discussion of central bank financial strength (resilience). The second part of the paper focuses on the role and importance of CB financial strength (resilience). In the third section, a financial resilience framework for CBs is developed and applied to assess the level of financial resilience of all OECD central banks. The final part of this paper presents the main findings and implications.

Research Objectives and Research methodology

This paper aims to combine different aspects and research with respect to CB financial strength (resilience). The paper is a first attempt to combine and integrate operational, macro-economic and institutional issues of CB financial strength (resilience). In particular, this paper includes the following three research goals:

(i) To discuss the role and importance of CB financial strength (resilience);

A comprehensive literature analysis shall shed light on the role and importance of CB financial strength (resilience). These findings will form the basis to achieve research goals (ii) and (iii).

(ii) To newly develop a framework to assess the level of CB financial resilience;

Based on the findings of the literature review, a new financial resilience framework for central banks will be inductively developed.

(iii) To assess the level of financial resilience of all 34 OECD countries.

The newly developed financial resilience framework will be applied to all OECD central banks. Methods and operationalization of the assessment framework is being discussed in the relevant sections of the paper.

Literature Review

Subsequent to the recent economic and fiscal crisis, research in the field of crisis- and austerity management became popular amongst scholars in the domain of public administration. While most research focused on the governmental and managerial reactions to restore fiscal equilibrium (i.e. Overmans & Timm-Arnold, 2016; Peters, 2011; Pandey, 2010), less research was undertaken with regard to implementation of ex-ante measures aiming at strengthening financial resilience against future shocks and crises. However, following the notion of Peters, Pierre and Randma-Liiv (2011), New Public Management (NPM) and its forms of governance led to a fragmentation of the state and the therefrom-stemming division of the public sector and dissociation of certain special entities could be an obstacle towards effective monitoring and regulation. In that light, the prevailing attitude and governance patterns need to be critically challenged, in order to proactively build institutional strength to cope with adversity and shocks.

Financial resilience

The concept of resilience is multifaceted and comes with a diversity of perspectives. Originating in the fields of physics and ecology (see Davoudi, 2012), it has been adopted and transferred to other disciplines and fields of study, including organizational theory (Somers, 2009), management (Linnenluecke, 2017), public economics (Montoro & Rojas-Suarez 2012) and public administration (Barbera et al., 2017). In general, resilience can be seen as the capacity to deal with uncertainty (Shaw, 2012), which underpins its strong link to risk management. While risk management could be referred as strategic and tool-based activity aiming at the ex-ante identification, mitigation and derivation of adequate combating measures, resilience describes the status of an organization with respect to its exposure, vulnerability and recovery capacity (Somers, 2009; Linnenluecke, 2017). Designating resilience as the outcome of risk management might fall short, since risk management only captures identifiable risks (Boin & Lodge, 2016). In contrast, resilience facilitates buffering any kind of adverse events and effects uniformly, without systematically linking a specific risk with an adequate measure. Wildavsky (1988) also took a differentiated perspective by not reducing it to a pure “passive” dependent variable kicking in in case of adversity, as he rather highlighted also its active component in form of efforts undertaken in increasing the ability to cope with events. Even though the concept of resilience and its definition remains ambiguous to some extent and different authors have a different conceptual understanding (Linnenluecke, 2017), one could put down that it goes beyond the traditional risk management orthodoxy. As a latent buffer and organizational capacity, its manifestation can be diverse – the conception of Legnick-Hall and Beck (2003), who summarize it as a “*complex blend of behaviors, perspectives and interactions*” is exemplary. Focusing on financial resilience and the public sector, one specific study becomes of crucial importance, since it is to the authors best knowledge the first attempt

of theorizing and operationalizing public sector financial resilience. According to the theoretical lens of Barbera et al. (2017), which emerged from their multiple case study analysis, three reciprocally interacting dimensions/capacities (i-iii) coin the concept of resilience:

- (i) *Robustness (Vulnerability)*: A stable financial position adds resistance to an entity. This includes sustainable debt rates and a solid revenue base as well as functioning revenue collection mechanisms.
- (ii) *Anticipatory Capacity*: Along the lines of risk management, resilience includes identifying financial risks and crises as well as monitoring of the environment.
- (iii) *Coping Capacity (Flexibility and Recovery Ability)*: In order to cope with adverse events and sustain external shocks, an organization needs to be able to adjust and hence be flexible as well as to have the ability to recover to the previous financial strength.

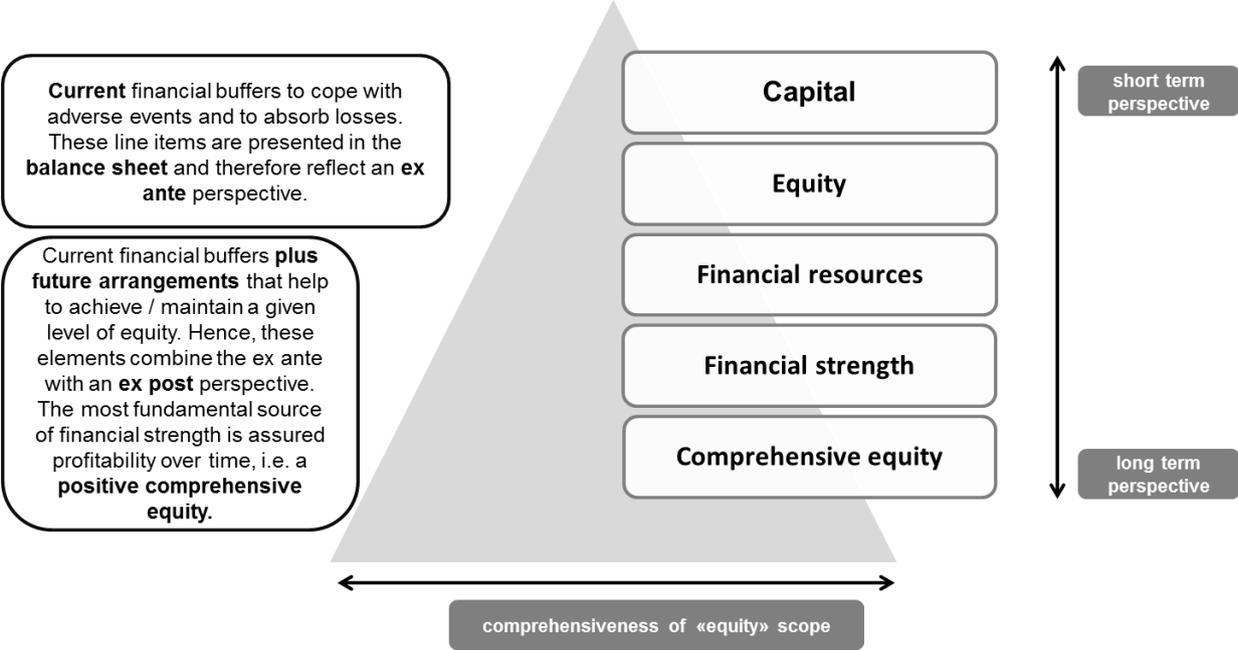
In consideration of its well achieved theory-building aims and its context of European local authorities, the article of Barbera et al. (2017) constitutes the underlying theoretical understanding to build on for the subsequent paragraphs of this paper.

Financial resilience and central banks

While the concept of financial resilience has resurged in the theoretical and practical context of governments around the world, it has not yet produced significant spillover effects to other public sector entities such as central banks. A reason might be that in “normal” times the financial performance of central bank and its financial strength tends to draw little attention. Technically, a central bank cannot be declared insolvent as it can, due to its monopoly on currency issuance, always create the liquidity it requires (e.g. Horáokvá, 2011 ; Stella, 1997). However, the GFC and subsequent developments have clearly accentuated issues about the role and importance of central bank financial strength and resilience (Adler, Castro and Tovar 2016, Sullivan, 2014, Archer and Moser-Boehm 2013, Horáokvá 2011). Quasi-fiscal operations to bail out heavily affected financial institutions, the provision of emergency liquidity assistance to solvent financial institutions with temporary liquidity problems, the continuing quantitative easing operations to reduce long-term interest rates or the reduction of target interest rates as well as substantial FX interventions to weaken domestic currencies have placed central banks’ balance sheets under closer scrutiny. It is well acknowledged that the size of CB balance sheets (both, in developed and developing countries) has been significantly increased in the aftermath of the great financial crises.

For these reasons, academics and practitioners around the world have been focusing on the role and importance of central banks' balance sheets and its macroeconomic implications (see for example Horáková 2011). While balance sheet risks might represent an important factor of financial resilience, it ignores other sources of fiscal risks and strengths. Cargill (2005), for example, criticized that academic research had been long ignoring the institutional, organizational and economic contexts of central banks. Although Cargill (2005) does not explicitly express the need for a financial resilience framework, he implicitly addresses many issues of such a concept. It was only in 2013, when the Bank for International Settlements (BIS) resurged the debate about the role and importance of central bank financial strength. In their seminal paper, Archer and Moser-Boehm (2013) specifically address the issue on how to conceptualize different components of central bank financial strength and provide a hierarchy. Besides tangible balance sheet items such as capital and equity, they also include organizational and institutional arrangements such as recapitalization rules, risk transfer arrangements, distribution rules or other institutional design features that help maintain financial resources over time. The concept of financial strength and its variables is discussed below in more detail. It will act as a main reference point for the remainder of this paper.

Figure 1: From central bank capital to financial strength



Source: Own compilation, modified from Archer and Moser-Boehm, 2013, p. 9-12.

Capital (i.e. paid-in capital, statutory capital) reflects the money committed by the owners of the CB, either at the CB's foundation or subsequently by way of new injection of funds (Archer and Moser-Boehm, 2013). Ownership can be in the hands of governments (e.g. the Reserve Bank of New Zealand), commercial banks (e.g. Federal Reserve Bank), other CBs (e.g. the ECB), or some type of combination between public and private sector shareholders (e.g. in the case of the SNB or the South African Reserve Bank). Traditionally, the capital is small relative to discretionary reserves and the total of assets. For example, the capital of the SNB only constitutes 0.004% (25 million CHF) of the total assets (SNB Financial Statements, 2014). The Bank of Korea, established as a special purpose entity, has no capital at all, in accordance with the Bank of Korea Act (2012). Therefore, capital rarely acts as a buffer and is rarely written down. For example, some CBs reveal negative equity ratios (e.g. the Bank of Israel), where accumulated losses are not offset and base capital is still positive. The Bank of Chile, in contrast, which has a negative equity ratio as well, reports negative capital.

CB equity combines the capital and any other active financial buffers to cope with adverse events such as retained earnings (that are not distributed to shareholders), revaluation accounts (e.g. related to price movements for gold or FX securities) and general provisions, for example against currency risks. Thus, equity gives the possibility to cover a net loss below the line. However, on average, the CB equity ratio (compared to total assets) is still fairly low, substantially lower than the equity thresholds for commercial banks as set out in the Basel III requirements by the Financial Stability Board (FSB). Own calculations reveal that a clear majority of all OECD CBs (N=34) have an equity ratio between 0 and 5 per cent (n=19).¹ Three central banks, namely the Czech National Bank, the Bank of Chile and the Bank of Israel even face negative equity ratios mainly occurring from unrealized losses carried forward. The SNB reveals the highest equity ratio of roughly 15 per cent. However, as we will discuss later in this paper, a large share of the SNB equity has been wiped out due to the strong appreciations of the Swiss Franc after the SNB has capped the currency peg against the Euro at the beginning of 2015.

Financial resources combine CB equity and other callable resources from its shareholders and/or the government. Some central banks have the right to call for fresh capital from their owners (e.g. the Bank of Korea), and that call is enforceable (Archer and Moser-Boehm, 2013). Other CBs have specific agreements with the treasury to cover up certain losses arising from financial exposures (e.g. the New Zealand Reserve Bank with respect to FX interventions).

¹ Own calculations based on OECD financial statements 2015

The concept of financial strength and comprehensive equity might come closest to the idea of financial resilience, as developed by Barbera et al. (2017). It includes any sort of risk transfer mechanisms that work in favor of keeping the central bank's financial resources intact. These mechanisms apply especially in the context of profit distribution rules to central banks' shareholders. Hence, certain surplus distribution arrangements of certain central banks give strong priority to achieve and/or maintain a given level of equity. Such examples include the SNB, the Czech Central Bank or the Federal Reserve Bank. All these central banks may halt the standard distributions to shareholder and/or their governments under given circumstances and may retain up to 100 per cent of any year's surplus in order to achieve the targeted outcome (Archer and Moser-Boehm, 2013). In the longer run, such arrangements may be considered as an implicit part of equity (although not shown as a separate equity position in the balance sheet) as they provide financial strength, whereas distribution arrangements that give priority to continue transfers to the government do not. Regarding the latter, Spain would serve as an example since 90 per cent of the surplus must be paid to the treasury (Art. 1.1 of the Royal Decree 2009/2008), regardless of the current equity situation.

To summarize this section, one may conclude that the idea of actively shaping central bank financial strength (resilience) has grown in importance within the last decade. While the work from Archer and Moser-Boehm (2013) might act as a good reference point to operationalize the concept of resilience in the context of central banks, there exists further room for improvement. Before we do so, we aim to discuss the role and importance of financial strength (resilience) in the context of CBs in a more comprehensive way by scrutinizing academic and practical evidence from past decades.

The role and importance of central bank financial strength (resilience)

Keeping in mind that central banks have faced major shifts in the composition, size and risks of their balance sheets over the past decade, we aim to discuss the link between central bank financial strength (resilience) to policy pursuit. In theory, we may find reasons to believe that financial weakness might impose risks – or even inhibit – central banks to achieve their policy objectives. In the following, the role and importance of financial strength (resilience) will be discussed in relation to three main areas, namely (i) policy objectives (e.g., macroeconomic and price stability), (ii) policy actions (e.g., interest rates, quasi-fiscal operations) and (iii) institutional settings (e.g., policy independence, legitimacy).

(i) Financial strength and policy objectives outcomes

Different authors emphasize the fact that low financial strength might interfere with central banks policy objectives and in particular with price stability (e.g. Stella 1997, 2003, 2005, 2008, 2011; Stella and Lönnberg 2008; Klüh and Stella,

2008; Ize 2006, 2005; Bindseil et al. 2004, Sims 2004; Fry 1993). The main argument is that central banks might be pressured to abandon price stability as a goal by financing losses through money creation with obvious adverse consequences. As a consequence, the markets will have reason to anticipate a less stability-oriented behaviour of the CB, which in turn drives up inflationary expectations. Stella (2003, 2008, 2011), for example, stylized facts in various sample cases, showing that CB financial weakness is empirically associated with higher inflation rates. Using time series data from 1992, 1997 and 2004, he shows that the inflation rate was on average 23.8 per cent for financially weak CBs (i.e. the sum of capital and «other items net») and 11.2% for the strong ones, while correcting for hyperinflationary outliers. A first attempt to econometrically assess the relationship between CBs financial strength and inflation was a paper by Klüh and Stella (2008). Using a range of control variables to take into account other relevant inflation determinants they conclude that there appears to be a relatively stable negative relationship between financial strength and inflation. However, it is acknowledged that only a relatively significant diminution of CB equity would result in a substantial worsening of inflation, therefore suggesting some non-linearity in the linkage. Stella and Lönnberg (2008) condensed the long strand of literature covering the role and importance of financial strength and introduced the concept of «policy insolvency», as opposed to «technical insolvency». Although a CB technically cannot be declared insolvent, perpetual low financial strength might severely interfere with central bank's policy objectives. These findings are mainly based on the argument of an independent central bank (e.g. Goodhart, 2011) and that, in practice, treasuries frequently failed to provide CBs with genuine financial support on a timely basis, leaving them excessively reliant on seignorage to finance its operations and/or forcing them to abandon policy objectives. Another argument provided by Sims (2003) is that in general equilibrium models, the uniqueness and stability of the price level depends on public beliefs. Hence, under financial stress, the expectations of the public as to how the CB will respond to an extreme deterioration in its financial position will determine the effectiveness of CB policies outcomes. This being said, Jeanne and Svensson (2007) developed a theoretical model in which they showed that a positive weight on central banks balance sheet might actually provide a welcome commitment device for the successful achievement of policy objectives.

However, there exist counterfactual arguments and/ or evidence, as provided by Archer and Moser-Boehm (2013), Benecká, Holub, Kadlcáková and Kubicová (2012) or the EZB (2004) to only name a few. In short, they argue that financial weakness might not be an issue when it comes to CB policy outcomes. Moreover, it is depending on a wide range of other variables such as exchange rate regimes, institutional settings or CBs responsibilities. Underlying this point, that few conclusions can be drawn when a CB is in financial distress and as a result its policy objectives will be achieved or not, Archer and Moser-Boehm (2013) discuss some recent examples of clear policy success, regardless of

an overall weak CB financial situation. Among these examples are Chile (-16%), the Czech Republic (-2.3%) and Israel (-15%), which all have displayed clear negative equity ratios in 2010 and still do by the end of 2014. All of these CBs have experienced negative equity over most of the preceding 15 years. But in each case *"macroeconomic stability has been attained alongside a noticeable improvement in trend growth rates"* (Archer and Moser-Boehm, 2013: 60). Given these mixed empirical and theoretical results, one might assume observers of a CB with apparent financial weakness to accord a moderate – but non-linear empirical link – of future problems to achieve its desired policy outcomes.

(ii) Financial Strength and policy decisions

Adler, Castro and Tovar (2016) find evidence that a low financial strength can influence the conduct of monetary policy but acknowledge a non-linear relationship. Nevertheless, the authors concluded that CB financial strength plays a statistically significant role in explaining «suboptimal» monetary policies. Large deviations from “optimal” policies are associated with very low financial strength, thus indicating a nonlinear empirical link.

(iii) Financial strength and institutional role

Several authors have assessed the relationship between CB financial strength and its influence on the institutional role and importance of CBs. The reviewed literature considered issues of independence or the legitimacy of quasi-fiscal activities (e.g. Archer and Moser-Boehm, 2013; Cukierman, 2011 ; Stella, 1997, 2005, 2008 ; Ize, 2005 ; Sims, 2004 ; Fry, 1993) and particularly expressed the point of view, that financial weakness might undermine the independence or legitimacy of CBs. However, to comprehensively understand why limited CB independence might impose a risk related to future policy actions, we must first take into account, why CB independency is deemed as a relevant issue in the academic world. Goodhart (2011) and Crowe and Ellen (2008) discuss the evolution of CB independence of the past decades. Their conclusion is that CBs nowadays tend to be substantially more independent from government control, then between the 1930s and the end of the 1960s, a period affected by the great depression and the accompanying collapse of the gold standard. Hence, their objectives, models and mental framework fell apart while – for pragmatic reasons – many governments took over monetary policy. However, the collapse of the Bretton Woods system in the 1970s and the subsequent large growth and inflation rates – punctuated by the 1973 oil price shock – led many countries (e.g. New Zealand in 1988) to adopt inflation targets. Although, in essence, such a target could also be carried out by the government, a (autonomous) CB is assumed to be more credible in achieving the policy objectives. This issue is also known as the time inconsistency problem (e.g. Barro and Gordon, 1983). It is – among others – probably the strongest argument in favour of CB independence. The time inconsistency problem mainly addresses the issue that

government control of CBs might lead to a conflict of interest, especially when national debt burdens are high. As a consequence, a government-controlled CB might rather focus on a low interest environment to serve public debt burdens and therefore taking the risk of abandoning inflation targets. Therefore, the delegation of monetary policy to independent CBs (Rogoff, 1985) or to any independent policymaker with suitable incentives and a well-specified mandate (Walsh, 1995) has clearly been emphasized in the academic world. These arguments have led to a fast and on-going devolution of monetary policy tasks to independent CBs, while both instrument and goal independence measures have been vastly increasing. In this respect, recent findings point out that greater CB independence corresponds with a lower inflation rate (e.g., Crowe and Ellen, 2008).

Noting that, we are able to better link the relationship between financial strength and CB independence, especially if we see central banking not as a mere technical exercise but rather as a political game. One argument is that some countries may explicitly restrict or limit CB (quasi-fiscal) operations, if the government owns the financial risks (and rewards), or are mandated to make up negative equity levels. In such a context, the level of the CB's financial strength might be an important proxy, which is needed to independently implement those functions assigned to the CB. Hence, one could summarize that the location of financial resources and associated financial gains and losses is aligned with those of the decision-making authority (Archer and Moser-Boehm, 2013). In this respect, Horáková (2011) points out, that low financial strength might weaken the bargaining position of the CB towards the government. Financial weak CB will tend to be more pliable towards the government, even if it does not want to ask the government to re-capitalize it. A final argument provided by Archer and Moser-Boehm (2013), is, that CB financial capacity can be used as a signal and constraint on quasi-fiscal actions. Because such actions usually bear large financial risks, financial weakness might be an indication that CBs stepped into quasi-fiscal activities, which – in turn – may raise questions of legitimacy. Stella (1997) therefore points out, that a first best solution would be to remove such quasi-fiscal operations completely from the CB balance sheet. A second best would be to provide sufficient capital so that the operations do not generate losses interfering with CB independence or legitimacy.

A financial resilience framework for central banks

Empirical evidence shows that financial strength (resilience) is an important prerequisite to achieve intended policy objectives and outcomes for central banks. However, in the absence of a comprehensive financial resilience framework for central banks, it will be difficult to assess and benchmark their performance. In the following, we aim to develop a financial resilience framework for central banks and apply it to all OECD central banks. The assessment framework builds on the concept of financial resilience as developed by Barbera et al. 2017 that is financial shocks, vulnerability, anticipatory capacity and coping capacity. In order to reflect recent research in the context of CBs, findings from Archer and Moser-Boehm (2013) are additionally considered. The following resilience framework thus merges the most recent academic findings in the area of resilience research with practical findings and issues in the area of central bank financial management practices.

Table 1: Operationalizing the financial resilience framework for central banks

Variables according to Barbera et al.	Operationalisation in the context of central banks	Description and operationalization of dummy variables
Financial Shocks	The level of exposure to potentially price volatile assets is taken as a proxy for financial shocks. This is measured by the percentage of potentially volatile assets (e.g., gold, FX positions, securities, derivative assets) in relation to the balance sheet sum.	<i>Low (2)</i> = Countries with relatively low exposure to potentially price volatile assets, i.e., countries which are in the lowest third compared to all 34 OECD countries; <i>Medium (1)</i> = Countries with medium exposure to potentially price volatile assets, i.e., countries which are in the middle third compared to all 34 OECD countries; <i>High (0)</i> = Countries with relatively high exposure to potentially price volatile assets, i.e., countries which are in the top third compared to all 34 OECD countries.
Vulnerability / Robustness	Existing financial buffers such as central bank equity. It is considered that visible financial buffers in form of equity might reduce financial vulnerability or increase robustness.	<i>Low (0)</i> = Negative equity levels, i.e., no financial buffers available; <i>Medium (1)</i> = Existing financial buffers are positive but lower than the median equity of all 34 OECD countries; <i>High (2)</i> = Existing financial buffers are positive and larger than the median equity of all 34 OECD countries.
Anticipatory / Monitoring Capacity	Certain central banks actively monitor and set distinct equity targets. In order to do so, they need to run distinct monitoring systems. It is assumed that the rigorousness of equity targets is a proxy to detect the level of anticipatory and monitoring capacity.	<i>Low (0)</i> = No monitoring of equity targets as a proxy for low monitoring of monitoring and anticipatory capacity; <i>Medium (1)</i> = Low rigorousness of equity targets as a proxy for less rigorous monitoring and anticipatory capacities; <i>High (2)</i> = High rigorousness of equity targets as a proxy for rigorous monitoring and anticipatory capacity.

Flexibility	Distribution rules of central bank surpluses widely differ within OECD countries in terms of flexibility. Certain distribution rules aim to preserve financial buffers / equity of central banks, while others force distribution of surpluses to treasury and governments.	<i>Low (0)</i> = Distribution rules with low flexibility to strengthen equity/financial buffers; <i>Medium (1)</i> = Distribution rules with medium flexibility to strengthen equity/financial buffers; <i>High (2)</i> = Distribution rules aiming to strengthen equity/financial buffers.
Recovery	Certain central banks enjoy pre-defined recapitalization rules or enjoy conditional transfers from the governments to make up incurred losses.	<i>Low (0)</i> = No recapitalization rules in place; <i>High (2)</i> = Strong recapitalization rules in place;

Empirical Results

This section aims to empirically investigate the level of financial resilience of all OECD central banks. Empirical data is drawn from public available data and documents. In particular, the following set of documents were considered:

- Financial Statements (2015);
- Central Bank Acts (as of 2015);
- Accounting policies (as of 2015);
- If publicly available: Additional documents such as risk reports and strategy reports.

[Discussion of empirical results to be included]

	Indicators of Financial Resilience						
OECD Countries	Financial Shocks	Robustness	Monitoring Capacity	Flexibility	Recovery	Total Dummy	Percentage
Australia	<i>medium</i> (1)	<i>medium</i> (1)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	6	60%
Austria	<i>medium</i> (1)	<i>medium</i> (1)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	6	60%
Belgium	<i>medium</i> (1)	<i>high</i> (2)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	7	70%
Canada	<i>high</i> (0)	<i>low</i> (0)	<i>high</i> (2)	<i>high</i> (2)	<i>high</i> (2)	6	60%
Chile	<i>high</i> (0)	<i>low</i> (0)	<i>low</i> (0)	<i>high</i> (2)	<i>high</i> (2)	4	40%
Czech Republic	<i>low</i> (2)	<i>low</i> (0)	<i>low</i> (0)	<i>high</i> (2)	<i>low</i> (0)	4	40%
Denmark	<i>high</i> (0)	<i>medium</i> (1)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	5	50%
Estonia	<i>low</i> (2)	<i>medium</i> (1)	<i>low</i> (0)	<i>high</i> (2)	<i>low</i> (0)	5	50%
Finland	<i>medium</i> (1)	<i>medium</i> (1)	<i>high</i> (2)	<i>low</i> (0)	<i>high</i> (2)	6	60%
France	<i>medium</i> (1)	<i>high</i> (2)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	7	70%
Germany	<i>low</i> (2)	<i>medium</i> (1)	<i>high</i> (2)	<i>low</i> (0)	<i>low</i> (0)	5	50%
Greece	<i>medium</i> (1)	<i>medium</i> (1)	<i>high</i> (2)	<i>medium</i> (1)	<i>low</i> (0)	5	50%
Hungary	<i>high</i> (0)	<i>medium</i> (1)	<i>low</i> (0)	<i>medium</i> (1)	<i>high</i> (2)	4	40%
Iceland	<i>medium</i> (1)	<i>medium</i> (1)	<i>high</i> (2)	<i>high</i> (2)	<i>high</i> (2)	8	80%
Ireland	<i>medium</i> (1)	<i>high</i> (2)	<i>low</i> (0)	<i>low</i> (0)	<i>low</i> (0)	3	30%
Israel	<i>high</i> (0)	<i>low</i> (0)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	4	40%
Italy	<i>medium</i> (1)	<i>low</i> (0)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	5	50%
Japan	<i>high</i> (0)	<i>low</i> (0)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	4	40%
Korea	<i>low</i> (2)	<i>low</i> (0)	<i>high</i> (2)	<i>high</i> (2)	<i>high</i> (2)	8	80%
Luxembourg	<i>low</i> (2)	<i>high</i> (2)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	8	80%
Mexico	<i>high</i> (0)	<i>low</i> (0)	<i>high</i> (2)	<i>high</i> (2)	<i>low</i> (0)	4	40%
Netherlands	<i>medium</i> (1)	<i>high</i> (2)	<i>high</i> (2)	<i>high</i> (2)	<i>high</i> (2)	9	90%
New Zealand	<i>high</i> (0)	<i>medium</i> (1)	<i>high</i> (2)	<i>high</i> (2)	<i>high</i> (2)	7	70%
Norway	<i>high</i> (0)	<i>high</i> (2)	<i>high</i> (2)	<i>medium</i> (1)	<i>high</i> (2)	5	50%
Poland	<i>high</i> (0)	<i>medium</i> (1)	<i>high</i> (2)	<i>low</i> (0)	<i>low</i> (0)	3	30%

	Indicators of Financial Resilience						
OECD Countries	Financial Shocks	Robustness	Monitoring Capacity	Flexibility	Recovery	<i>Total Dummy</i>	<i>Percentage</i>
Portugal	<i>medium (1)</i>	<i>medium (1)</i>	<i>low (0)</i>	<i>high (2)</i>	<i>low (0)</i>	<i>4</i>	<i>40%</i>
Slovak Republic	<i>medium (1)</i>	<i>low (0)</i>	<i>low (0)</i>	<i>high (2)</i>	<i>low (0)</i>	<i>3</i>	<i>30%</i>
Slovenia	<i>low (2)</i>	<i>medium (1)</i>	<i>high (2)</i>	<i>high (2)</i>	<i>high (2)</i>	<i>9</i>	<i>90%</i>
Spain	<i>medium (1)</i>	<i>low (0)</i>	<i>low (0)</i>	<i>low (0)</i>	<i>low (0)</i>	<i>1</i>	<i>10%</i>
Sweden	<i>high (0)</i>	<i>high (2)</i>	<i>high (2)</i>	<i>low (0)</i>	<i>high (2)</i>	<i>6</i>	<i>60%</i>
Switzerland	<i>high (0)</i>	<i>high (2)</i>	<i>high (2)</i>	<i>high (2)</i>	<i>low (0)</i>	<i>6</i>	<i>60%</i>
Turkey	<i>high (0)</i>	<i>medium (1)</i>	<i>high (2)</i>	<i>low (0)</i>	<i>low (0)</i>	<i>3</i>	<i>30%</i>
United Kingdom	<i>Low (2)</i>	<i>low (0)</i>	<i>low (0)</i>	<i>medium (1)</i>	<i>low (0)</i>	<i>3</i>	<i>30%</i>
United States	<i>low (2)</i>	<i>low (0)</i>	<i>low (0)</i>	<i>high (2)</i>	<i>high (2)</i>	<i>6</i>	<i>60%</i>
<i>Total Dummy</i>	<i>29</i>	<i>28</i>	<i>48</i>	<i>50</i>	<i>24</i>	<i>179</i>	
<i>Percentage</i>	<i>43%</i>	<i>41%</i>	<i>71%</i>	<i>74%</i>	<i>35%</i>	<i>53%</i>	

Implications and conclusion

[Implications and conclusion to be included]

Notes

The empirical findings of this paper are derived from the publicly available financial statements of all OECD member countries CB's of the 2015 reporting period and their institutional/organic laws as well as the relevant accounting policies. Only external available documents were taken into account. Be aware that in the bibliography of this paper, we did not list the analyzed financial reports, bylaws and policies except those cited.

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