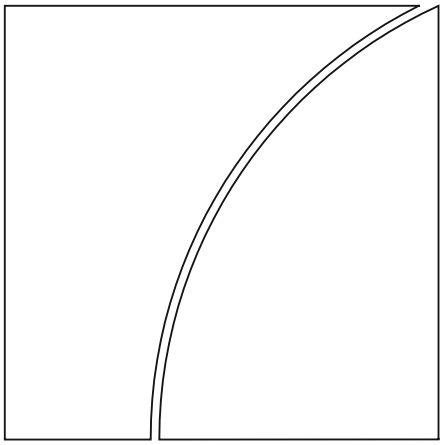
Basel Committee
on Banking Supervision

Working Paper 28



The interplay of accounting and regulation and its impact on bank behaviour: Literature review

January 2015

BANK FOR INTERNATIONAL SETTLEMENTS

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This publication is available on the BIS website (www.bis.org).

ISSN 92-9131-1561-8854

ISBN 978-92-9131-569-7 (online)

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1. Introduction and outline

Many contend that accounting rules fuelled the recent global financial crisis. While there is broad consensus that accounting rules are an important determinant of bank behaviour, the specific mechanisms and their interaction with regulatory requirements are less well understood. The implications of the use of fair value accounting and the incurred loss approach of loss provisioning under International Financial Reporting Standards (IFRS) are cases in point. Both have been criticised as contributing to a pro-cyclical[1] behaviour in banks' decision making, ie adding exuberance and fuelling investments in the up-turn and triggering downward spirals and throttling investments in the down-turn of the credit cycle. If these accusations are justified, then a natural question to ask is whether regulatory intervention[2] can help to prevent a reoccurrence of such developments in the future.

From a regulatory perspective, it is crucial to understand how and to provide evidence on where accounting rules lead to undesirable incentives (additional to those incentives that are set by the regulatory capital framework) and how regulation can mitigate such unintended effects. In that direction, this paper comprises a review of the existing literature, and highlights the evidence suggested by recent studies examining the effects of accounting standards and regulation on bank behaviour. It also sketches out fruitful avenues of further research in this field. Four relevant research areas are reflected in the following sections of this paper. They can be motivated by the following guiding questions:

1. Has **fair value accounting** contributed to default contagion in the financial crisis and under which circumstances could this become an issue in the future?
2. What are the implications of different **provisioning** regimes for bank management? How can specific approaches mitigate pro-cyclical effects?
3. What are the economic implications of **prudential filters** and their removal?
4. To what extent can **disclosure** rules enhance market discipline? How do disclosure rules affect bank behavior, in particular how is **market discipline** affected by recent regulatory developments in reaction to the financial crisis? Does the extent of market discipline differ between crises and normal times? What lessons can be learned, for example, for public disclosure, either by banks or by regulators, eg the disclosure of regulatory stress test results?

All four research areas can be understood from the perspective of their implications for the behaviour of the relevant economic agents: How does fair value accounting, in particular through an increased volatility of profit and loss figures, affect investment and risk management decisions in banks? How will a provisioning regime designed to act counter-cyclically affect these decisions? How will banks behave when prudential filters are (partly) removed? What are the potential implications of the reaction of investors for example to regulatory disclosure of stress test results? How will this affect banks' investments and their risk management?

[1] In regulatory circles, "pro-cyclicality" is sometimes carefully distinguished from "cyclicality" in the context of regulatory minimum capital requirements. Whereas "cyclicality" of capital requirements refers to their movement in sync with the credit cycle, including implications for the banking system itself, "pro-cyclicality" requires in addition an impact on the real sector of the economy through adverse feedback effects. In this paper, however, we follow a more loosely use of the word "pro-cyclicality" that reflects a more common use in policy discussions as well as in the literature. Here, "pro-cyclicality" refers in general to effects arising from a movement of capital requirements, provisions or other variables that occur in sync with the credit cycle and that affect the financial sector and may or may not have also an effect on the real sector.

[2] Such intervention could include, for example, changes to prudential regulations aimed at affecting the way in which accounting rules affect regulatory capital ratios or liquidity profiles, both of which can influence lending and risk-taking behaviour and, in turn, financial stability more broadly.

Another way to characterise the four research areas is in terms of the affected financial instruments. **Fair value accounting** is foremost relevant for the asset side of the balance sheet, in particular for traded instruments such as bonds, shares and derivatives.[3] **Provisioning** instead is relevant for instruments that are valued at amortised costs. This is commonly the case with traditional bank loans. **Prudential filters** address an impact on capital that has been considered as undesirable from a prudential perspective, for example, a capital increase from unrealised gains or from a lower value of its own debt when a bank's credit quality declines. The former type of filter has been removed under Basel III whereas filters regarding the fair value changes of liabilities from changes in the credit standing of the bank itself are maintained. Both cases are interesting from a research perspective which is concerned both with the question of the consequences for banks' incentives if prudential filters – either for unrealised gains or for unrealised losses – are removed and with the implications in case they remain. **Market discipline** and **disclosure** differ from the other three research areas as they do not depend on a particular type of instrument but can affect rather all components of a bank's balance sheet.

While both the different effects on the behaviour of the relevant economic agents and the different types of affected instruments can be used to distinguish between the four areas, the research areas are at the same time also linked by the aspect of **pro-cyclicality**. As already stated above, a key concern are potential pro-cyclical effects of accounting rules. Whether these effects exist is relevant to all four sections. Fair value accounting has been blamed to act pro-cyclically for the trading book and incurred loss provisioning to have similar effects for the banking book.[4] Notice that banking book positions may also be subject to fair value accounting, and it may be questioned which instruments are more relevant in the context of potential pro-cyclicality. Prudential filters in turn can be motivated by limiting pro-cyclical investment behaviour by neutralising for example the effect of unrealised gains on capital. Regulatory disclosure policy has also been alleged to act in a pro-cyclical way, for example, when the European Banking Authority requested banks to disclose their sovereign exposures at a point in time when the sovereign debt crisis was close to its peak.

The research strand on market discipline and disclosure can also be understood as embracing the first three strands through the aspect of **transparency**. It may be asked, for example, whether fair value accounting leads to transparency and causes changes in market discipline as well as management behaviour. In this paper, we see transparency not as information dissemination as such but in a more narrow sense as it also requires a meaningful interpretation of the information by market participants. In this sense, the questions about the implications of fair value accounting, of different approaches to loan loss provisioning and of the use of prudential filters are linked through their impact on transparency and the resulting effects on market discipline and management behaviour. Given both the vast amount of literature on disclosure and market discipline and its stricter focus on the link between markets and bank behaviour, we believe that addressing these aspects in separate strands of research is justified.

This paper is structured along the four research areas as follows:

Section 2 is concerned with fair value accounting. This is often mentioned first when one is asked for an example of an accounting aspect with high relevance from a prudential perspective. Furthermore, it has been the object of substantial work, both of theoretical and empirical nature, already well before the financial crisis unfolded.

[3] The relevance of fair value accounting on the liability side of the balance sheet for regulatory capital ratios is mitigated by prudential filters.

[4] In its "Report on addressing procyclicality in the financial system", the Financial Stability Forum (2009) has recommended a review of the standards referring to provisioning and of the standards associated with fair value accounting to dampen potentially adverse dynamics.

Loan loss provisioning is addressed in **Section 3**. It has also been the subject of a significant amount of research, although arguably to a lesser extent than fair value accounting. Provisioning in corporate loan portfolios is an important aspect due to the high economic relevance of this portfolio for banks. Furthermore, new changes being developed by international standard setters on a more forward-looking provisioning approach lend this area a high degree of topicality.

Certain prudential filters have been introduced by regulators as a means to mitigate potential pro-cyclical effects of accounting. Their rationale and their mechanics are considered in **Section 4**. The scarce literature on their effects on banks' capital and capital buffers as well as previous results related to how they can affect risk management are outlined.

Section 5 on disclosure and market discipline concludes this literature survey. It is put at the end because of its overarching nature relative to the other three research areas. After briefly considering the economic rationale for disclosure rules, the connection to market discipline and effects on bank behaviour and financial stability are discussed. Special emphasis is given afterwards to the question of when disclosure is socially optimal and to the effects of disclosing supervisory information (eg stress test results).

2. Fair value accounting and contagion

2.1 Background: Has fair value accounting contributed to contagion in the crisis?

Fair value accounting has been criticised for fuelling the balance sheet contagion channel during the 2007–2009 financial crisis. On the one hand, critics blame the accounting regime for creating a mechanical link between the decrease in asset prices, accounting losses and the resulting asset fire sales needed to satisfy regulatory constraints. Moreover, disclosing large fair value losses at the height of the crisis may lead to market overreaction and hurt financial stability. On the other hand, some authors have argued that funding constraints amplified by the opaque balance sheet of banks and hidden losses have been the trigger of bank failure. In this sense, disclosing less information on potential losses (ie reporting at amortised cost) would only have made matters worse.[5]

The fundamental change in the business model of banks over the last decades, with trading activities gaining in importance relative to traditional bank lending, called for a redesign of the amortised cost model, the so far dominating accounting framework under national GAAP. Starting in January 2005, the European Union endorsed the IFRS standards for publicly listed financial institutions. The IFRS adoption was accompanied by opposition from some politicians and banks in some countries like France and Germany whose accounting regimes had been characterised by the prudence principle at the expense of transparency. The main critique concentrated on the fact that fair value accounting would fuel irrational bubbles in expanding periods and amplify downswing movements in contracting periods of the cycle. These arguments expressed by academics were reiterated by banks, politicians and regulators during the 2007–2009 crisis, leading to the ad-hoc change in accounting rules in October 2008[6] (see for example Banziger (2008), Remsperger (2008) and Wallison (2008)). Andrew Haldane, then-Executive Director for Financial Stability at the Bank of England, stated that "accounting rules in general and fair value principles in particular, appear to have played a role in both over-egging the financial

[5] Specifically for mark-to-market accounting, see also Securities and Exchange Commission (2008) for more details.

[6] The IFRS amendment from October 2008 allowed banks to reclassify assets from the fair value to the amortised cost category, provided they had the intent and ability to hold these assets to maturity.

upswing and elongating the financial downswing. They have tended to over-emphasise return in the boom and under-emphasise risk in the bust. That is not a prudent approach. Indeed, it is a procyclical one. We need accounting rules for banks which are crisis-neutral, valuation conventions for all seasons.[7] Against this background, more research on the role of accounting, its interaction with regulatory capital requirements and the role of information provision during periods of financial distress seems warranted.

2.2 Fair value accounting and regulatory constraints

As mentioned above, the main argument used by critics of fair value accounting is the negative feedback between fair value losses, regulatory capital requirements and asset fire sales. In this context "fire sales" are defined as transactions in which banks are forced to sell assets in illiquid markets due to regulatory or funding constraints.[8] The latter, the argument goes, will create additional downward pressure on prices, leading to further write-downs and regulatory constraints of banks holding the same asset and applying mark-to-market valuation, reinforcing downward asset price spirals. While theoretical papers focus on the potential domino effect of pure mark-to-market accounting, direct interbank links and capital requirements, there is little empirical evidence so far on the degree to which fair value accounting leads to the above mentioned spiral. This critique is silent on the **pro-cyclical character of Basel II capital requirements**. The debate about the pro-cyclicality of Basel II capital requirements is on-going (see for example Repullo and Suarez (2012), Repullo et al (2010) and Gordy and Howells (2006)). Given that the effect of the Basel II implementation on European banks materialised in 2008, it is difficult to disentangle the pro-cyclical effect of accounting from the pro-cyclical effect of capital regulation on the regulatory constraints of banks. Empirical work by Amel-Zadeh et al (2014) on the pro-cyclicality of accounting leverage finds that, after controlling for the change in risk-weighted assets, the positive relation between the change in assets and the accounting leverage vanishes. The author interprets this as evidence that accounting leverage is not pro-cyclical. The economic intuition is that banks seek to maximise their return on equity, and thus maximise leverage subject to the regulatory capital constraint. In this setting, accounting leverage can only be pro-cyclical if the risk-weight of assets sold or purchased in response to changes in asset values is lower than the average initial risk weight before the transaction. The empirical results should be interpreted with caution since the empirical identification of the setting described above is rather weak. In the same vein, Xie (2012) finds that fair value gains and losses do affect the subsequent lending behaviour of banks, but that these fair value gains and losses are not pro-cyclical. Thus, even though the author finds a relation between fair value gains and losses and the lending behaviour of banks, it cannot be assumed that this relation can exacerbate the credit crunch in recessions. However, more research is needed on the pro-cyclicality of capital requirements and its relationship to accounting leverage and earnings.

Several theoretical papers analyse a potential **negative feedback loop between asset prices and regulatory constraints**. In these papers the mark-to-market accounting regime plays a key role in amplifying contagion in the financial sector. Thus, contagion arises due to asset commonality even in the absence of direct links within the financial sector. The study by Allen and Carletti (2008) shows how market frictions can lead to liquidity pricing, unrelated to the fundamental value of the long asset. The net asset value of banks turns negative because they apply mark-to-market accounting and because they hold the same asset as the insurance sector. Interbank links can amplify these effects, as shown by Cifuentes et al (2005), who model contagion due to the interplay between mark-to-market accounting

[7] See Haldane (2011).

[8] Shleifer and Vishny (2011) define a fire sale slightly differently as "a forced sale of an asset at a dislocated price". Our definition is broader as it does not require that the price is "dislocated", which is hard to measure, and it emphasises the importance of regulatory and funding constraints.

and regulatory constraints. In their network model banks apply mark-to-market, hold liquid and illiquid assets and have to satisfy a regulatory capital ratio. Since there are no capital requirements for cash, a shock to asset prices either can be accommodated if the bank holds a sufficiently high liquidity buffer or if it can obtain enough cash by selling assets to improve the denominator of the regulatory capital ratio. Contagion arises because the drop in the price of the illiquid asset leads to regulatory constraints of some banks in the network which are forced to engage in fire sales, depressing prices even further. Second round effects occur in which banks fail due to the failure of connected counterparties or because the drop in asset price affects their regulatory capital.

Anecdotal evidence by Friedman and Schwartz (1963) assigns a key role to mark-to-market accounting in propagating bank failure during the Great Depression. However, empirical evidence, from the recent global financial crisis does not support the claim that banks faced regulatory constraints due to large fair value losses and there is no conclusive evidence on fire sales resulting from accounting induced constraints (see Merril et al (2012)). Balance sheet data on large international banks shows that the share of fair value losses from available-for-sale securities affecting Tier 1 capital during the crisis was rather small. Shaffer (2010) estimates that the decline in Tier 1 capital due to impairments in available-for-sale and held-to-maturity securities was around 2.1% for the 14 largest US banks. Furthermore, prudential filters ensured that temporary changes in the value of available-for-sale securities were not relevant for the calculation of regulatory capital. Hence, given that available-for-sale securities represent the most important fair value item in the balance sheet of commercial banks, the relevance of fair value losses for the regulatory constraints of banks during the crisis is debatable (Laux and Leuz (2009)). Other items, such as bad debt expenses, played a larger role in the regulatory capital reduction of US banks during the crisis (Badertscher et al (2012)). Bad debt expenses reflect management's expectations about future uncollectible loan amounts. The authors cannot find that banks sell higher amounts of securities during the crisis (which in the sample is the period 2007–2008) compared to the period before the crisis. This is also true for banks with the lowest regulatory capital levels. Overall Badertscher et al (2012) do not find that securities were sold at losses during the crisis. This goes against the hypothesis that banks were involved in fire sales during the 2007–2009 crisis, leading to depressed prices that further deteriorated balance sheet of banks holding similar assets.

Empirical papers do not find conclusive evidence of fire sales related to regulatory constraints. Merrill et al (2012) study the relation between capital requirements, accounting rules and asset fire sales for insurance companies. Exploiting the differences in accounting rules between property and casualty (P&C) and life insurance companies, the authors find that (capital constrained) P&C insurance companies were more likely to engage in asset fire sales due to large other-than-temporary impairments. The authors conclude that capital requirements and mark-to-market accounting can lead to asset fire sales. It is not clear whether this result can be extended to banks. The incentives for banks to gamble for resurrection are higher than for insurance companies, suggesting that banks will be reluctant to engage in fire sales to improve their regulatory constraints.

Even if fire sales due to direct interbank exposures did not take place, market participants may consider that the existence of indirect links between banks due to asset commonality and fair value accounting can increase contagion risk. Khan (2009) analyses the empirical relationship between fair value accounting and bank contagion risk in an empirical setting, by relating the probability of extreme negative returns of banks to the probability of extreme negative returns of money centre banks depending on the degree to which the reporting regime has become more fair value oriented. The author finds that the fair value accounting regime led to an increase in systemic risk and that this effect became stronger in periods of high market illiquidity. However, these findings should be interpreted with caution, as the share of fair value assets in the balance sheet of banks could capture unobserved bank

characteristics unrelated to fair value accounting that are common to banks across the system, such as an increase in asset commonality as more and more banks increase their securitised portfolio.

One explanation for the absence of feedback loops and fire sales may be the use of **"circuit breakers"**,[9] ie accounting rules to mitigate the recognition of an asset price decline in accounting values. A large portion of the toxic asset portfolio was held under Level 2 and Level 3 assets, for which banks were allowed to use internal models instead of distorted market prices (Laux and Leuz (2009)). Following the IASB amendment in October 2008 banks were also allowed to reclassify assets from the fair value to the historical cost category. Although the latter change in accounting rules was a one-off ad-hoc measure, it effectively acted as a circuit breaker. European banks made ample use of this possibility. Kholmy and Ernstberger (2010) document that the use of this option was influenced by a couple of bank-specific factors (such as size and profitability), and Fiechter (2011) finds that around one third of the sample of 219 European banks applied the reclassification option, with the regulatory capital ratios of reclassifying banks increasing only from 8.3% to 8.8% after the reclassification. This limited effect on capital ratios, however, does not prove that the reclassification did not achieve its purpose since it may have also been motivated by the goal to avoid future additional losses from further declining market prices.

The implicit assumption in the fair value critique and in the papers outlined above is that banks mechanically engage in fire sales whenever they cannot satisfy regulatory constraints. It seems reasonable to assume that banks are rational players facing a trade-off between engaging in fire sales or "gambling for resurrection" by waiting for better times when asset prices return to their fundamental value (see Diamond and Rajan (2011)). Thus, there may be little incentive for banks to engage in fire sales in the first place. The gap between the results obtained in the theoretical and empirical papers on this topic may come from the fact that theoretical papers focus on the asset fire sales spiral and ignore the behavioural aspect described above.

In summary, various reasons may have dampened or even prevented the materialisation of negative feed-back loops between asset fire sales and regulatory constraints. Among these reasons are government bail-outs, accounting circuit breakers, prudential filters,[10] the ad-hoc amendment of the accounting rules in September 2008 allowing banks to reclassify assets out of the fair value category into historical cost, and last not least a missing economic rationale if a bank decides to hold to its assets and gamble for an asset price recovery. In addition, preferred methods used by European banks to raise capital during the crisis were strategic asset sales, dividend cuts or equity issuance.

2.3 Fair value accounting and funding constraints

Anecdotal evidence from the 2007–2008 crisis shows that the combination of an **opaque balance sheet with funding constraints** and not the failure to meet regulatory minimum capital requirements due to large fair value losses led to the demise of systemically important banks. Banks like Bear Stearns, Lehman Brothers, Fortis and Northern Rock experienced a "silent" run on their wholesale funds, although their

[9] Accounting circuit breakers allow banks to deviate from the application of pure mark-to-market when no reliable market price exists for a certain asset due to market inactivity. In particular, Level 1 assets are assets which are marked-to-market on the basis of observable trades, Level 2 assets are assets evaluated using internal models but calibrated with certain parameters for which market prices are available, while Level 3 assets are assets marked to model with no other input from market prices.

[10] Prudential filters ensure that accounting information is separated from regulatory information. The effect of gains and losses from available-for-sale securities for example is neutralised from the regulatory capital.

regulatory capital ratios were adequate.[11] It seems plausible to assume that banks would have faced these difficulties irrespective of the accounting regime and it has been argued that less information, as envisaged by the proponents of the amortised cost regime, would only have made matters worse (see Laux and Leuz (2010), Amel-Zadeh and Meeks (2013), Acharya et al (2009), Shin (2009)).

When asset prices drop, banks will have difficulties rolling over their short-term debt. In this context, **funding constraints, too, can be a trigger for fire sales**, irrespective of the way assets are valued on the balance sheet. Thus, the same mechanism that leads to the margin/haircut spiral for broker dealers can lead to the demise of banks with a high reliance on short-term wholesale funds and a low collateral value. The negative feedback loop between asset prices and fire sales is a direct consequence of the business model of banks. The assumption that financial institutions use fire sales to raise liquidity in a crisis is supported by Allen and Carletti (2008), Adrian and Shin (2010) and Diamond and Rajan (2011).

So far, there is no conclusive empirical evidence that banks engaged in fire sales during the crisis. In addition, any inference on the occurrence of asset fire sales due to funding constraints is difficult given the substantial liquidity injections undertaken by central banks in Europe and the United States. If fire sales did take place, funding constraints most likely played a larger role than the risk to violate regulatory constraints due to fair value losses (see for example De Haan and Van den End (2011)).

2.4 The role of the reporting regime during a crisis

While critics of fair value accounting argue that disclosing fair value results based on distorted market prices can lead to market overreaction and amplify contagion, some other authors argue that too little rather than too much information was provided during the crisis (see for example Laux (2012)).

These different opinions originate in different views on the role of the reporting regime. The pressure exerted on the IASB to amend IAS 39 suggests some support to the view that **accounting rules should be another tool used by regulators to strengthen financial stability.** The IASB expressed agreement with this view when it changed the accounting rules at the height of the crisis. On 13 October 2008, Sir David Tweedie, chairman of the IASB declared that "the IASB is committed to taking urgent action to ensure that transparency and confidence are restored to financial markets."[12] To the extent that fair value information provides more timely information than historical cost information, relaxing fair value rules is equivalent to providing less information. One could interpret the decision by the IASB to relax the fair value rules in October 2008 as an implicit acknowledgment that in periods of bust, less information may be better than more information. A few months after the amendment, EU Commissioner McCreevy (2009) explained that "[accounting standards] have also exacerbated the market's recent problems because of rules that are "procyclical"... That is why I recently brought forward a measure to provide firms with more flexibility on the mark-to-market requirements and to facilitate asset transfer from the trading to the banking book."

The **main role of fair value accounting** as promoted by the IFRS standard setters is **to enhance transparency by providing a "true and fair view"** of the company's accounts. From this perspective, financial stability concerns may be better addressed through prudent regulatory capital requirements than by adjustments to the accounting regime. Existing evidence suggests that banks were

[11] See BCBS (2013b) for an overview of the types of funds that are most vulnerable during stressed times. In the context of a stress test, however, it would be inappropriate to assume, for example, ad-hoc interventions by governments or central banks that prevent fire sales in a stress scenario.

[12] See IASB (2008b).

not forced to engage in excessive write-downs in 2008, but rather that they used accounting discretion to report asset values above market prices (Laux and Leuz (2010), Barth and Landsman (2010), Securities and Exchange Commission (2008)). Bhat et al (2011) find that changes in banks' positions in mortgage-backed securities were positively associated with changes in prices of mortgage-backed securities and that this relation is reduced after the April 2009 mark-to-market rule clarification. Barth and Landsman (2010) argue that rules and disclosure related to securitisation and to CDS derivatives were insufficient.

These different views on the role of the reporting regime are relevant when analysing the effect of fair value accounting during a crisis, as they imply a different trade-off between financial stability and transparency.

2.5 Conclusions

Critics of fair value accounting argue that it can have a pro-cyclical effect during a crisis due to the negative feedback between asset prices, fire sales and regulatory constraints. Theoretical papers on the role of fair value accounting during the crisis build on this domino effect but ignore the fact that banks may have had little incentives to engage in fire sales in the presence of implicit guarantees, accounting circuit breakers and ad-hoc changes in accounting rules. There is little empirical evidence on the above mentioned asset fire sales spiral. One reason could be that reputational concerns prevent banks from disclosing information on those types of transactions. However, as explained in the previous subsections, existing evidence on the use of circuit breakers, the low magnitude of fair value losses as well as economic arguments for why banks may have little incentives to engage in fire sales do not support the assumption that these fire sales existed in the first place. Given data limitations and the difficulty to account for the impact of government support measures on bank behaviour, it is doubtful that much progress can be achieved by further research on the occurrence of fire sales in the financial crisis. Nevertheless, in principle more empirical research is welcome on the role of fair value accounting and of the reporting regime in general during periods of financial distress (see also Section 5 on disclosure and market discipline).

3. Loan loss provisioning models, banks' practices, and pro-cyclicality

Following the financial crisis of the late 2000s, concerns were raised about the incurred loss method of loan loss provisioning, and in particular about the timeliness of banks' recognition of loan loss expenses under that method. Such concerns prompted the International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB) to aim to replace their existing incurred loss methods of loan loss provisioning by a more forward-looking expected loss method. This gave rise to a series of sets of proposals that resulted in the publication of IFRS 9 "Financial Instruments" in July 2014.[13] The current incurred loss models employed by the IASB and FASB require banks to assess whether there is any objective evidence (a "loss event") that a financial asset or group of financial assets (such as a loan or a group of loans) is impaired. If there is objective evidence that an impairment loss on a loan has been incurred, the amount of the loss needs to be calculated.[14] Losses expected as a result of future events are

[13] The IASB published the final version of IFRS 9 "Financial Instruments" on 24 July 2014 to replace most of the guidance in IAS 39. As part of IFRS 9, the IASB has introduced an expected-loss impairment model that requires more timely recognition of expected credit losses. IFRS 9 will come into effect on 1 January 2018 with early application permitted.

[14] Several methods apply to measure the amount of the loss that depends on the classification of the financial asset. For instance under IAS 39 the amount of the loss of financial assets that are classified as "loans and receivables" or "held-to-

not recognised. Although most of the empirical research examined in this literature review is based on the incurred loss model employed under IFRS and US GAAP, there is some evidence available relating to more forward-looking provisioning or different models of provisioning (notably "dynamic provisioning") as summarised in Section 3.3.

The literature cites several reasons for the use of provisioning, other than purely providing a realistic valuation of outstanding loans. The discretionary use of provisioning is frequently associated with the practice of earnings management. Additionally, as far as general provisions are treated as regulatory capital,[15] they may be used to manage the capital ratio (see for example Ahmed et al (1999)). We will discuss prior literature on factors influencing loan loss provisioning in Section 3.1. Another important strand of research in the area focuses on the connection between provisioning practice and the cyclicality of the lending business (summarised in Section 3.2). While it is theoretically straightforward that delayed loss recognition may amplify the lending cycle, the strength of this effect is still to be investigated empirically. In order to address pro-cyclical reactions, the countercyclical capital buffer has been introduced as a new regulatory instrument under Basel III. While the countercyclical capital buffer specifically affects the dynamics of capital requirements for financial institutions, it is designed to counter systemic risk and pro-cyclicality in the entire financial system. As capital requirements are intended to absorb unexpected losses only, the cyclicality of expected losses instead would have to be addressed through a new, forward-looking provisioning regime.

3.1 Which factors influence loan loss provisioning, what are bank management's incentives, and how do they relate to different provisioning regimes?

Loan loss-provisioning practices vary across institutions and jurisdictions, yet empirical research has had limited success in identifying key drivers or the broader consequences of variations in banks' loan loss provisioning policies. The topic gained attention when the Securities and Exchange Commission (SEC) questioned the loan loss accounting of SunTrust Banks, Inc. in the autumn of 1998. Reviewing prior theoretical and empirical evidence, Wall and Koch (2000) argue that banks have incentives for using their discretion in establishing loan loss provisions to **manage reported capital and earnings.** Even if economic losses remain unaffected by this action, reported accounting losses may play an important role in imperfect markets because obtaining and analysing information by market participants is costly, and individuals tend to reduce these costs by using earnings benchmarks (eg zero earnings, prior year's earnings per share, and stock analysts' earnings expectations) as rules of thumb.[16] A similar rationale holds for the management of accounting (or regulatory) capital, which is used as an indicator of capital adequacy by the market, banking regulators and supervisors.[17] However, there is mixed empirical evidence on the question of whether banks use (discretionary) loan loss provisions for their earnings management.[18] Evidence is not much clearer about the relation of bank capital and provisions: While

maturity investments" (carried at amortised cost) is measured as the difference between the asset's carrying amount and the present value of the future cash flows discounted at the original effective interest rate (IAS 39.63).

15 Under both the Basel II and Basel III capital regimes (part of the) general provisions qualify for inclusion in Tier 2 capital for banks using the standardised approach for credit risk (BCBS (2011), paragraph 60). As noted by O'Hanlon (2013), however, one of the effects of the introduction of IAS 39 in the United Kingdom was to eliminate general loan loss provisioning. This holds for several other countries reporting under IFRS as well. Under some local GAAPs, general provisioning is allowed.

16 See in a context not focusing on banks Dye (1988), Barth et al (1999) and Degeorge et al (1999).

17 The observation that earnings reported by firms are often slightly above these targets, but infrequently below, is taken as empirical evidence supporting this "earnings management" hypothesis.

18 See Beatty, Chamberlain and Magliolo (1995) who provide evidence of earnings management via loan loss provisions, whereas in the same issue of the journal, Collins et al (1995) do not report any significant relation. In contrast, earlier work

some studies find that well-capitalised banks make higher provisions (thus showing a positive relation to bank capital), others even report a negative relation (Moyer (1990), Beatty et al (1995), Collins et al (1995), Ahmed et al (1999), Hasan and Wall (2004), Bouvatier and Lepetit (2008), Leventis et al (2011)). Although there is better evidence that firms use earnings management, and in particular loan loss accounting, to meet regulatory capital standards, more work is still needed to fully understand both the theory and practice of banks' loan loss accounting.

It is worth noting that the implementation of IFRS had important implications regarding the use of loan loss provisions for managing earnings and capital. Leventis et al (2011) show empirically that earnings management using loan loss provisions was substantially reduced after implementation of IFRS, thus improving the quality of banks' earnings numbers. This reduction was particularly prevalent for high-risk banks, which engaged in more earnings management than low-risk banks before IFRS adoption, while the management of regulatory capital was not found to be a significant determinant of loan loss provisions in the European sample used by Leventis et al (2011). However, this effect may well be driven by confounding factors, as noted by Christensen et al (2013), who emphasised the importance of, for example, changes in enforcement compared to the introduction mandatory IFRS reporting.

A similar, likewise significant question is how the strictness of accounting standards influences the **timeliness of banks' loan loss provisioning**. Using the stricter evidence requirements of the IAS 39 incurred loss regime implemented in 2005 (compared with the previous regime in the United Kingdom) as an example, the results in O'Hanlon (2013) do not suggest that provisioning has become less timely. Neither is there evidence that general provisioning, as permitted under the pre-IAS 39 regime, improved the timeliness of loan loss provisioning. However, given that banks have discretion in their establishment of general provisions, the concept of reporting incentives is very important in this context.[19] While these results do not suggest that stricter requirements regarding the evidence needed to maintain recognition of loan losses have resulted in less timely loan loss provisioning, there is also contrasting evidence based on the adoption of IFRS reporting (eg Barth et al (2008), Leventis et al (2011), Gebhard and Novotny-Farkas (2011)). The timeliness of provisioning is further discussed in Section 3.3.

In this context, it is important to highlight the **additional objectives of regulators** relative to the aim of accounting standard setters in determining banks' loan loss provision accounting rules. While regulators would additionally like to ensure the safety and soundness of the banking system, accounting standard setters would first and foremost like to ensure that banks provide transparent and informative financial statements (see Balla and Rose (2012), Barth and Landsman (2010), Bushman and Williams (2012)). Referring to the case of SunTrust Banks, which was suspected of manipulating and overstating loan loss reserves in 1997, Balla and Rose (2012) show that the SEC's decision to require SunTrust to restate earnings and to lower loan loss reserves was associated with a decrease in loan loss reserves among other publicly traded banks. The authors argue that the SEC's policy, which was intended to increase the transparency of financial statements, was at odds with regulatory objectives, and possibly threatened the safety and soundness of the banking industry by lowering loan loss reserves in the banking system.

Empirical studies have also examined whether bank managers use loan loss provisions to **signal private information about future earnings changes**, as investors may interpret an increase in loan loss provisions as a sign of strength (Beaver et al (1989)). However, the study by Ahmed et al (1999) documents that loan loss provisions are negatively related to changes in future earnings and to

based on US data documents earnings management in banks (Ma (1988), Scholes et al (1990) and Greenawalt and Sinkey (1988)).

[19] Burgstahler et al (2006) examine how capital market pressures and institutional factors shape firms' incentives to report earnings that reflect economic performance.

contemporaneous stock returns, which implies that the desire to signal private information to outsiders is not an important determinant of loan loss provisioning behaviour, while the management of regulatory capital seems to dominate.

The impact of **macroeconomic variables** on banks' loan loss provisions, through their influence on asset quality, is a crucial parameter for the assessment of potential pro-cyclical effects of loan loss provisioning, which we discuss in Section 3.2. The evidence by Laeven and Majnoni (2003) indicates that banks on average postpone provisioning when faced with favourable business-cycle and income conditions until negative conditions start to set in. More specifically, Pain (2003) documents that banks' provisions are negatively related to real GDP growth and positively related to real interest rates as well as lagged aggregate lending. The evidence by Bikker and Metzemakers (2004) confirms the negative relation of provisioning and GDP growth, reflecting the higher riskiness of the credit portfolio when the business cycle contracts. However, this effect is mitigated to some extent as provisions rise along with higher earnings, pointing towards income smoothing, and when loan growth is higher, reflecting increased exposures.

More generally, **prior abnormal loan growth** by an individual bank (so as to seize new lending opportunities, gain market share or expand to new geographic markets) tends to be positively related to provisions for loan losses with a time lag of two to four years (Foos et al (2010)). Pain (2003) investigates the importance of bank-specific factors such as the **composition of the loan portfolio** in determining loan loss provisions. Not surprisingly, he finds that increased lending to riskier sectors has generally been connected with higher provisions.

Looking at yet another driver of the variation in banks' practices, Black and Gallemore (2012) document the link between **managerial characteristics**, particularly bank-executive overconfidence, and loan loss provisioning. Loan loss provisions recognised by overconfident bank CEOs and CFOs are found to be lower and to be less linked to the current and future deterioration in non-performing loans.

Finally, the existence of **internal control systems** has been documented to increase the quality of accounting, specifically of loan loss provisioning. Empirical evidence indicates that the relation of loan loss provisions and future charge-offs is more significant for banks using FDICIA-mandated internal control requirements (Altamuro and Beatty (2010)). This higher loan loss-provision validity was accompanied by higher earnings persistence and cash-flow predictability, and reduced benchmark-beating and accounting conservatism. The authors also find that greater auditor presence tends to serve as a substitute for internal control regulation. Furthermore, the impact of risk modelling of internal control systems is investigated in a paper by Bhat et al (2013) which will be presented in the subsequent section.

The literature has progressed by testing different hypothetical explanatory factors in separate studies, frequently motivated by the view that banks decide on loan loss provisions either to manage regulatory capital or to manage earnings and investors' expectations. While a few studies arrive at directly contradictory results, the majority of papers taken together provide a less contradictory but still incoherent picture, which allows neither to choose between the earnings and regulatory capital management hypotheses based on empirical evidence, nor to arrive at a robust ranking of the explanatory factors tested in their order of importance. More comprehensive empirical results within a single study based on a consistent modelling and identification strategy could help to tie some of the previous findings together and allow for a better comparison of loan loss provisioning drivers and hypotheses.

3.2 Provisioning and the business cycle

While theory and evidence in the previous section focused on the determinants of loan loss provisions, another strand of the literature analyses the effects of provisioning rules and banks' practices on (the

cyclicality of) their lending business, which may potentially spill over into the real sector and reinforce pro-cyclical effects of bank capital regulation.

In one of the recent key contributions addressing this connection, Beatty and Liao (2011) analyse if **delays in expected loss recognition** have an effect on banks' willingness to lend. While lending is generally more sensitive to regulatory capital constraints during recessions, the authors claim that loan loss-provisioning rules may magnify this effect. This is even more pronounced if banks delay the recognition of expected losses until an economic downturn materialises. In this case, loan loss reserves may be too small to cover credit losses during recessions so that higher provisioning would be required, which in turn reduces capital adequacy and may generate pro-cyclical lending behaviour. Beatty and Liao (2011) document that banks with longer delays in expected loss recognition tend to reduce their lending more during recessions and are more frequently affected by the capital-crunch effect during recessions than banks with smaller delays. This suggests that delays in expected loss recognition increase the pro-cyclicality of bank lending.[20] Interestingly however, the authors cannot provide any evidence of a relation between pro-cyclicality in lending and the capital ratio in the period prior to the introduction of capital regulation in 1982, highlighting that **regulatory capital requirements** combined with delayed expected loss recognition bear the risk of causing a capital-crunch effect in lending during recessions. It should also be noted that it is not clear whether the methodology applied in this paper (as well as in the papers presented below) is successful in separating demand and supply effects in the lending market. Unless this is the case, the results reported could also reflect a decline in demand in bad times.

In another very recent contribution, Bushman and Williams (2013) analyse the degree to which delayed expected loss recognition increases **capital adequacy concerns** and **equity financing frictions** as drivers of banks' balance-sheet contraction during downturns. Their results show that delayed expected loss recognition coincides with debt overhang that may lead to capital inadequacy in downturns, and that it is linked with stock-market illiquidity costs that increase equity financing frictions due to lower bank transparency. Through these factors, delayed expected loss recognition contributes significantly to banks contracting their balance sheets, ie reducing their lending during downturns.

Bhat et al (2013) build on the work by Beatty and Liao (2011) and analyse whether banks' **credit risk modelling** (such as statistical analysis and stress testing) plays a disciplining role for the timeliness of their loan loss provisions, and how it influences the pro-cyclicality of their loan originations. The empirical evidence shows that banks using credit risk modelling on average are associated with timelier loan loss provisions, and that their loan originations are less pro-cyclical. This effect is more pronounced in the case of homogeneous loans if banks are using statistical analysis, and in the case of heterogeneous loans if banks conduct stress-test analyses.

In summary, the timeliness of loan loss provisions, often in conjunction with the need to meet a regulatory capital constraint, has emerged in the literature as an influencing factor of cyclicality. Delays in expected loss recognition have been found to contribute to reduced lending since the delays put pressure on the bank to increase provisions even more exactly in the part of the business cycle when capital requirements are most binding. It is no surprise that credit risk modelling instead has been identified as a mitigating factor as it impacts the dynamics of capital requirements and encourages timelier provisioning.

[20] At the same time, banks with smaller delays increase their pre-provision equity more during non-recessionary periods and reduce their pre-provision equity less during recessions compared with banks with greater delays in expected loss recognition. This indicates that banks with smaller delays have a better ability to avoid shrinking their lending activities during recessions without increasing their regulatory capital adequacy concerns.

3.3 Forward-looking and dynamic provisioning: can it mitigate pro-cyclical effects?

While under standard accounting practices, such as the incurred loss model, loan loss provisions can only be made following a loss event, it could also be argued that provisions are intended to account for expected loan losses while bank capital is meant to account for unexpected loan losses. As discussed above, there is evidence that banks usually wait "too long" before increasing loan loss provisions, which exacerbates the impact of business cycles on banks' capital ratios (eg Laeven and Majnoni (2003)), and that the lending of banks that recognise loan losses in a timely fashion is more stable during economic downturns (eg Beatty and Liao (2011)). However, because the incurred loan loss model is generally followed in practice, these studies are unable to analyse the likely consequences of banks' provisioning for expected losses. In particular, there is no guarantee that moving to an expected loss provisioning regime will necessarily dampen the cyclicality of banks' lending business since the expected loss model may still have a pro-cyclical impact compared to a perfect counter-cyclical provisioning scheme that fully absorbs any cyclicality.

In order to mitigate the drawbacks of the incurred loss model, accounting standard-setting bodies around the world have been working on new forward-looking accounting standards intended to account for expected loan loss provisions prior to loss events. In the empirical literature, the **forward-looking orientation** reflected in discretionary loan-provisioning practices is examined by Bushman and Williams (2012). The authors observe that forward-looking provisioning, if designed for smoothing earnings, increases banks' risk-taking, as measured by either the sensitivity of bank capital to risk or observed risk-shifting behaviour. In contrast, provisioning practices that capture the extent to which provisions explicitly anticipate future changes in non-performing loans (scaled by lagged total loans), ie forward-looking provisioning, are linked to improved discipline in bank risk-taking. This differentiation is inspired by the insight that changes in loan loss provisioning rules with the aim of reducing pro-cyclical effects may also lead to unintended consequences, such as losses in transparency and constrained monitoring by outsiders, which reduce market discipline and lead to less prudent risk-taking policies. Such an outcome would be more prevalent if the "earnings-smoothing" motive dominates. Bushman and Williams' (2012) findings imply that policymakers should be cautious when permitting more discretion over loan loss provisioning, as opportunistic bank managers may exploit available room for discretion for shaping loan loss provisions, which could lead to lower risk-taking discipline and adverse real consequences. Again, the concept of reporting incentives (Burgstahler et al (2006)) plays a crucial role in this context, as policymakers need to ensure that banks have incentives to use the discretion in a way consistent with financial stability.

Individual countries have taken steps to overcome the limitations of the incurred loss model of loan loss provisioning. For example, Spain adopted **dynamic loan loss provisioning** in 2000 in order to reduce pro-cyclical effects. For more details on the mechanics and practical experience to date of dynamic loan loss provisioning in Spain, see Saurina (2009a, 2009b) and Trucharte and Saurina (2013). Dynamic loan loss provisioning allows banks to incrementally accumulate loan loss reserves prior to loss events, with the intention of enabling banks to better weather stress events. However, dynamic loan loss provisioning does not fully account for future expected loan losses, nor can it completely overcome the limitations of the incurred loss model of loan loss provisioning (Balla and McKenna (2009)).

Pérez et al (2008, 2010) explore the impact that the introduction of counter-cyclical loan loss provisions in the Spanish regulatory framework has had on bank managers' **incentives for income-smoothing**. The authors focus on the question of whether bank managers have incentives to distort profit reporting for their own benefit or if on the contrary, other explanations (based on market imperfections that make smoothing behaviour beneficial also for shareholders and others) are more likely. Pérez et al (2008) find that Spanish banks generally use loan loss provisions for managing earnings but not for managing regulatory capital. In Pérez et al (2010), they show that the income-smoothing effect is only present from 1988 to 1999 when banks did not yet apply the statistical (ie dynamic) provisioning rules. From 2000 to 2004, when banks had to set aside the statistical provisions, there is no more evidence of any income smoothing, which indicates that banks, when faced with a transparent

smoothing mechanism, stop smoothing profits. This finding suggests that there may be efficiency gains from reducing the volatility of accounting earnings over time. A further possible explanation would be that information asymmetries between bank managers and investors may increase the cost of capital and banks' probabilities of default. To mitigate such increases in cost of capital, bank managers may then be inclined to use earnings-smoothing devices.

Jiménez et al (2012) add to the analysis of the dynamic-provisioning experience in Spain by looking at the resulting changes in credit availability to the real economy. The authors find that both credit growth during booms and credit-supply contraction during downturns are significantly reduced as a result of the Spanish provisioning regime. However, Spain is not the only country where regulatory dynamic provisioning was introduced. Fernandez de Lis and Garcia Herrero (2010) explore the experiences of Spain, Colombia and Peru, and they conclude that dynamic provisioning is not well-suited for smoothing credit growth, while it appears to be more successful in encouraging the creation of reserves in good times that would then serve as buffers in bad times. Furthermore, the authors point out that for any solution to the problem of pro-cyclicality, it needs to be borne in mind that there will be a trade-off between making regulation more counter-cyclical and reinforcing the transparency of banks' financial statements. Wezel et al (2012) corroborate the findings of Fernandez de Lis and Garcia Herrero (2010) by applying the Spanish and Peruvian provisioning regimes to a sample of Chilean banks in a simulation study.

3.4 Conclusions

Building on the existing literature and cognisant of the contradictory findings across some of the previous contributions, we consider it possible to reconcile and improve upon some of the prior work on the drivers and role of loan loss provisioning. For one, only a minor part of the literature has explicitly employed European data panels, and relatively little work has been invested in analysing IFRS regimes. Since the 2007–8 financial crisis and introduction of the Basel II framework, an increased focus has also been placed on the question of the (pro-) cyclicality of regulatory and accounting rules, which could also receive more emphasis in loan loss provisioning-related research. In addition to exploiting a larger and possibly longer data set and events such as the introduction of IFRS accounting rules, we also see some further scope for more explicit statistical evidence through sharpening the econometric setup in which the research question is addressed. Specifically, we plan to challenge the results of previous studies by controlling adequately for unobserved heterogeneity in the data and by disentangling the impact on loan supply from demand-driven effects. Although the interaction between loan loss provisioning and (Basel) capital requirements has been examined in prior literature, this research focuses mostly on the role of general provisions under the Basel II capital requirements (which can be included in Tier 2). To our knowledge there is no research available yet on the interaction with the excess/shortfall mechanism under the Basel IRB capital requirements.[21] Lastly, a very useful and relevant extension of previous work would be an explicit analysis of the expected loss model, which has frequently been referred to in the literature but has not been subject to any formal examination.

[21] Any shortfall of the stock of provisions (in accounting) to expected losses under the IRB approach should be deducted from capital, whereas any excess may be recognised in Tier 2 capital (subject to a cap). Under Basel III banks are required to deduct any shortfall from Common Equity Tier 1, whereas under Basel II a shortfall could be deducted 50% from Tier 1 and 50% from Tier 2.

4. Accounting and prudential filters

4.1 Overview on the economic implications of prudential filters and their removal

Companies and, in particular, listed companies have to publish their financial statements based on agreed financial reporting rules.[22] The supporting principles and concepts on which accounting standards are based are not always in line with those underpinning banking regulation.[23]

The figures produced for public financial reporting are the starting point for the calculation of a bank's capital requirement, but prudential regulators discuss whether they need to be filtered if more prudential principles are to be embodied in them. The objective of prudential filters is to maintain the desired characteristics of regulatory capital, especially in terms of magnitude, quality, and stability, for prudential purposes, for those institutions that follow accounting standards, such as IFRS, which aim at promoting a fair and comprehensive description of the company's economic reality with no conservative or counter-cyclical bias. In short, prudential filters should provide a more prudent measure of an institution's capability to withstand unexpected losses on a going concern basis than the one derived from pure accounting standards.

The discussion on the need and the effects of the use of prudential filters for regulatory capital can be embodied in the discussion on the appropriateness of aligning regulatory, economic and accounting capital.[24]

4.2 Tensions between the objectives of financial reporting and prudential regulation

The aim of financial statements is the provision of information about the financial position, performance and changes in the financial position of an entity to a range of users, that include investors, employees, lenders, suppliers, customers, governments and the public, in general.[25] Therefore, good accounting standards favour transparency that contributes to the well-functioning of markets.

The main objective of prudential regulation is the stability of financial institutions and of the financial system as a whole. So, on the one hand, it is concerned with the solvency of financial institutions and with the consequences of a failure of a firm, and, on the other hand, it has to contribute to macroeconomic stability thus avoiding situations that could deepen the recession or exacerbate the boom. In this sense, it should prevent financial crises, without constraining competition or innovation, while promoting efficient and ordered markets.

The search for individual and systemic financial stability and for an adequate level of credit in accordance with the prevailing economic conditions justifies a counter-cyclical approach in prudential regulation so as to compensate for the pro-cyclical behaviour of private agents, which does not have an automatic correspondence in accounting.[26] Additionally, the high volatility that can be attributed to

[22] In the European context, reporting on a consolidated basis follows IFRS, adapted trough EU regulation.

[23] See also Financial Crisis Advisory Group (2009) for a brief discussion.

[24] See Jackson and Lodge (2000) and Chisnall (2000) for a discussion on exploring fair value disclosure before contemplating a change in the way in which financial statements are to be presented and Borio and Tsatsaronis (2005) for a proposal to provide measures of the uncertainty associated to the estimates of financial conditions and profitability.

[25] Art. 10 of the Framework for the Preparation and Presentation of Financial Statements.

[26] In any case, the sensitivity to risk in current prudential regulation may have the undesired effect of exacerbating the cycle.

changing market conditions and expectations may also be undesirable from a prudential perspective, as it may only reflect short term conditions.

It has been argued that there is a natural conflict between accounting and regulatory objectives, specifically in the areas of asset valuation and provisioning, that extends to the definition of capital. From the point of view of the prudential regulator, who focuses on a longer-term perspective, capital and reserves are a resource to meet future losses, both expected and unexpected, ensuring the viability of the institution. From the accounting point of view, which is to some extent focusing on the current value of capital, a provision is a loss (reflected in the income statement), while capital does not have this nature, feeding on retained earnings and/or new issues.

Financial statements and regulatory returns have different functions and different audiences, so there is a need to reconcile them, minimising unintended effects on risk and risk management. Prudential filters for regulatory capital aim at building the bridge between the two approaches, potentially giving rise to changes in banks' behaviour.

4.3 Prudential filters for regulatory capital[27]

The objective that regulatory capital must be able to fulfil its loss-absorbing function at all times is currently achieved by a qualitative upgrading of own funds which includes, among others, adjustments to capital from the balance sheet.

Equity in the balance sheet can include elements arising from fair value changes. Such changes which are unrealised gains or losses, have to be booked either directly into equity (via the "other comprehensive income") or are recognised in the income statement, depending on the respective accounting rule. For example, IAS 39 *Financial Instruments*,[28] which in the EU is still the most important international accounting standard for banks, requires a distinction between instruments which are "held for trading" (HFT) and those which are "available for sale" (AFS).[29] A fair value change of an HFT instrument is recognised in the income statement, whereas a gain or loss arising from a change in the fair value of an AFS instrument has to be recognised in "other comprehensive income" (except for impairment losses or if the selling takes place) instead of the profit and loss account (P&L).

Unrealised gains may not fulfil the loss-absorbing function so that the required permanence in capital is in doubt. Thus, supervisors are using "prudential filters" to eliminate the effects of fair value changes onto own funds. In addition, supervisors "neutralise" to some extent balance sheet items, eg intangible assets and deferred tax assets. The term "prudential filter" is sometimes used for these qualitative upgrades as well. In this review, however, the term is only used for the filters on unrealised gains and losses in the profit and loss account and the "other comprehensive income".

The concrete design of prudential filters in Europe is defined by the Capital Requirements Directive[30] of 2006 and the Guidelines, which were published by CEBS[31] in 2004. Both followed the

27 Readers familiar with the mechanics of prudential filters and their application in the EU may want to skip this section.

28 The IASB plans to replace IAS 39 by IFRS 9. Although the categories are going to be changed, the mechanisms of fair value accounting will be the same.

29 Instruments of the two other IAS 39 categories ("loans and receivables" and "held to maturity") are measured at amortised cost, ie only realised gains and losses are recognised.

30 Directive 2006/48/EC.

31 CEBS (2004). The "Committee of European Banking Supervisors" became the "European Banking Authority" in 2011.

introduction of the IAS/IFRS into the European Union's accounting regulation.[32] Their aim is to maintain the quality of regulatory capital for institutions using IAS/IFRS for prudential reporting, according to the capital definition as per Basel II.

The Directive formally introduces two mandatory prudential filters into EU legislation. In particular, gains and losses on cash flow reserves, which do not arise from cash flow hedges on AFS instruments, as well as gains and losses resulting from valuing liabilities at fair value due to changes in own credit standings are to be excluded from own funds for the calculation of regulatory capital.[33] As for the first of these filters, the CEBS guidelines that developed the Directive, recommended applying prudential filters to revaluation reserves on AFS instruments and on those arising from the fair value measurement of investment properties and property, plant and equipment.

Implementation of CEBS guidelines by members was voluntary, so that the analysis carried out in 2007 came to the conclusion, that although the guidelines were broadly applied there was some diversity with regard to their specific definition across Europe.[34] Especially unrealised gains were treated differently under different jurisdictions and losses were treated differently from gains.

The measurement of the quantitative impact of such filters on own funds for all EEA countries presented in the 2007 CEBS analysis shows that for banks applying IFRS, the prudential filters decreased Tier 1 capital by 5.2% and increased Tier 2 capital by 8.3%. Total eligible own funds were reduced by 0.9% due to prudential filters.[35] Moreover, a survey conducted by the Accounting Task Force (the predecessor of the Accounting Experts Group) of the Basel Committee reveals that if the filters for the revaluation reserve had been removed during 2006 and 2011, unrealised gains and losses on AFS instruments would have been the largest contributor of changes in the banks' Tier 1 capital.[36]

As part of the Basel III framework, the Basel Committee agreed to an international harmonisation of prudential filters,[37] such that Common Equity Tier 1 capital includes all accumulated other comprehensive income and other reserves, which are recognised on the balance sheet, ie no adjustments to remove unrealised gains or losses apply.[38] Following this agreement, the EU Capital Requirements Regulation, which came into force in January 2014, disposes of nearly all prudential filters for the calculation of own funds, and in particular the one referring to unrealised gains and losses which are recognised in the revaluation reserve. It retains, however, a prudential filter for unrealised gains and losses arising from cash flow hedges and for the changes in the value of liabilities (debt instruments and derivatives) due to changes in own credit risk. These measures will reduce the differences between regulatory and accounting capital.

When the Basel Committee decided to dispose of the prudential filters for unrealised gains and losses, it was aware that the accounting treatment of financial instruments would likely change, although

32 See 1606/2002/EC.

33 Art. 64 (4) of Directive 2006/48/EC.

34 CEBS (2007), p 10.

35 CEBS (2007), p 21.

36 The outcome of the survey was not made public. See the working paper *Interaction between accounting and prudential frameworks: Impact of the unrealised gains and losses in Other Comprehensive Income on regulatory capital,* 24 January 2013, p 1.

37 BCBS (2011), p 2. See also press releases of the Basel Committee on 8 June, 20 July and 15 December 2004 on the potential impact on regulatory capital of the implementation of certain International Financial Reporting Standards.

38 BCBS (2011), p 13. For unrealised losses transitional arrangements shall apply. The Basel Committee takes into account the developments in international accounting standards for the future treatment of unrealised gains.

the exact nature of the changes were unknown.[39] In recent months banks have re-raised concerns towards the Basel Committee regarding possible volatilities in their Tier 1 capital due to the removal of prudential filters under Basel III. However, the Basel Committee's position, established through Basel III, is that in order to maintain the quality of regulatory capital, unrealised losses must not be filtered out. During the crisis, market participants saw through the prudential filter on unrealised losses when assessing banks' solvency positions. Regarding unrealised gains, jurisdictions are free to maintain a prudential filter. The European Banking Authority (2013) has informed the European Commission that it sees advantages in introducing prudential filters for unrealised gains.

4.4 Volatility and cyclical effects

It has been argued that, under fair value accounting, the profit and loss account could be overly influenced by on-going market conditions, which could have a very temporary nature, generating artificial volatility.[40] The increase in recorded fluctuations could give rise to greater regulatory risk, in the sense that there would be an increased likelihood that an entity would not meet the minimum capital requirements at one point in time. In fact, the evidence gathered in Barth et al (1995) shows that if fair value accounting for investment securities had been used to determine regulatory capital during the period 1971–90 in the US, banks would have not met regulatory capital requirements more frequently than under historical cost accounting.

The literature on determinants of precautionary capital stocks, especially as regards the hypothesis that banks have the objective of minimising capital fluctuations, could be relevant for the analysis of the interrelation between accounting and prudential filters. Under a filtered approach, there is less volatility than under an unfiltered framework, ceteris paribus. On the one hand, only materialised gains and losses affect capital while the unrealised part that never materialises does not and, on the other hand, unrealised gains may disappear subsequently to the reporting date within a very short time period, as a result of unfavourable developments in the corresponding markets while unrealised losses may also materialise. Therefore, without prudential filters, when the volatility of regulatory capital would be higher,[41] banks might face an incentive to increase their capital buffers if we assume that banks want to minimise capital fluctuations[42] and regulatory capital compliance costs. If symmetric filters are established, volatility is reduced, but the amount of capital available to absorb losses can be overestimated[43] as unrealised losses are not deducted. If uncertainty leads to more prudency in capital behaviour we can expect larger desired capital buffers under an unfiltered approach than when filters have been applied.

39 The IASB issued in December 2012 its Exposure Draft *Classification and Measurement: Limited Amendments to IFRS 9*. It proposes that some financial assets should be mandatorily measured at fair value through OCI.

40 Volatility may be excessive or artificial to the extent that prices do not only reflect fundamentals but also influence the actions taken by market participants. In particular, financial statements may generate an excessive behavioural response in the sense that accounting conventions influence a firm's action and its market value. If the decision has a short term horizon, a feedback process can result as, anticipating these price changes, such participants amplify price movements. In this sense, fair value introduces an endogenous source of volatility (Plantin et al (2008)).

41 Barth et al (1995) conclude that their findings "are consistent with investors perceiving volatility in historical cost earnings to be a better measure of economic risk than volatility in fair value earnings".

42 Other models postulate that banks try to maximise their return on capital to satisfy their investors so that a partial adjustment model for desired capital is formulated. See, for instance, Flannery and Rangan (2006) and Memmel and Raupach (2010).

43 If filters are asymmetric, so that gains are not computed as capital, but losses are deducted, volatility is higher than in the case of symmetric filters although still lower than in the case of no filters.

Moreover, we could expect that decisions on capital arising from the impact of unrealised gains and losses depended also on the phase of the cycle. During the expansionary part, the expectations of materialisation of unrealised gains can increase while the expectations regarding unrealised losses can decrease, thus increasing regulatory capital. The opposite could happen in the downturn, when the expectation of materialisation of unrealised losses would be higher while those on unrealised gains would be lower, thus reducing regulatory capital. Banks would be induced to increase capital buffers in expansions more than in recessions. If banks cannot quickly raise sufficient new capital in a downturn, their lending capacity falls and a credit crunch may follow. In the expansionary part of the cycle, their increased lending capacity results in more credit being offered to the market, thus contributing to the cycle. It needs to be established whether the self-protective reaction of increased buffers under an unfiltered approach and the counter-cyclical effect on buffers mitigates, compensates or even counterbalances its added pro-cyclicality.

In fact, critics of fair value argue that, in the recent crisis, valuations of long term investments based on prices obtained from illiquid markets[44] created a pro-cyclical effect whereby mark-to-market adjustments reduced regulatory capital, forcing banks to sell off investments which further depressed prices, thus leading to bank instability. Following this argument, unfiltered regulatory capital contributed to the cycle. Moreover, in a crisis, we can expect that banks find it more difficult to raise capital so that they cannot reach the desired buffer, and we will tend to observe that buffers under a non-filtered approach also fall during a downturn. It is an empirical question to assess which effect dominates and whether banks really act to minimise their capital volatility.

There is little empirical evidence on the effects of establishing prudential filters on the level of capital or on capital buffers. For instance, Moyer (1990) finds that commercial banks adjust accounting measures, in particular securities gains and losses, among others variables, to capital adequacy ratio regulation. The analysis in de Groen (2011) shows that the high regulatory capital reported by the Belgian bank Dexia in 2008 was largely due to the fact that the large negative available-for-sale reserve, ie hidden losses, was filtered out of regulatory capital. In addition, the bank made ample use of the reclassification option introduced by the IASB in October 2008 and transferred a large portion of these assets to the amortised cost category (see Section 2 for a more detailed discussion on the implications of fair value accounting and Section 5 for the link to disclosure and market discipline).

4.5 Incentive effects on risk management

Recent empirical research provides some insights about how the interaction of accounting standards and prudential filters might affect the behaviour of banks seeking to minimise regulatory capital compliance costs. These compliance costs include the expected costs of regulatory intervention in the event of a breach of regulatory minimums. Bischof et al (2011), for example, examine whether different cross-country treatments of prudential filters affected incentives to engage in regulatory capital arbitrage during the crisis. As mentioned in subsection 4.3, during that time, accounting standards allowed banks to reclassify assets to mitigate the recognition of fair value losses and ultimately the expected regulatory costs of supervisory intervention. They find that country-specific prudential filters that temper the link between fair value accounting and regulatory capital reduced the incentive to use the reclassification option. Their study shows how the interaction between accounting standards and regulatory filters can have implications for bank-specific capital management practices and prudential assessments of capital adequacy.

[44] IFRS 13 establishes that fair value can be obtained from three levels: Level 1: observed market prices; Level 2: values indirectly obtained from markets; and Level 3: data obtained from models.

If there are no filters, the hypothesis that financial institutions prefer less volatile regulatory capital would have the effect of shortening the maturities of debt instruments in banks' portfolios and of discouraging banks from engaging in investment activities used as an important asset-liability management tool. The same result could be obtained if an asymmetric filter is established, in the sense that gains are not included (or only partially) and losses are completely deducted. Under a filtered approach, if a bank sells an asset at the balance sheet date and reacquires it immediately thereafter, the resulting realised gain will be included in CET1, in contrast to when the bank chooses to keep the asset, as the unrealised gain will not be reflected in CET1. The solvency of the two banks as captured by CET1 will be different, while the balance sheet values will be identical. Evidence from the insurance industry by Ellul et al (2012), who investigate the differences between life insurers who have greater flexibility to hold speculative-grade instruments at historical cost than property and casualty (P&C) insurers, underlines this argument. Ellul et al (2012) observe that while life insurers keep downgraded securities at historical cost, they selectively sell bonds with the highest unrealised gains to improve their capital positions. This so-called "gains trading" is particularly widespread among those life insurers that face regulatory capital constraints, it is not prevalent among P&C insurers, and the authors conclude that it may "alter financial institutions' portfolio allocation, potentially engender distortions in key regulatory metrics, and transmit shocks across otherwise unrelated markets."

The desire to influence the numbers in the financial statements, including equity volatility, may affect investment portfolio management as, on the one hand, banks' risk-taking incentives are a function of the economic value of their capital and, on the other hand, accounting standards interact with prudential filters. As far as there are gains or losses on investment securities that are not recognised in either equity or earnings, decisions on sales will influence reported equity or earnings as banks may realise the unrealised gains by selling the related assets (or by using an adequate hedging strategy).[45] So, under a filtered approach, we could expect that the proportion and maturity of investment in securities, as well as the proportion of securities classified as available-for-sale would be reduced. In fact, such a result could be more pronounced under asymmetric filtering, when unrealised losses are not neutralised, while unrealised gains are not accounted for in regulatory capital.

Some papers look precisely at the effect of setting an asymmetrical treatment of unrealised gains and losses on regulatory capital. In particular, Beatty et al (1995) looks at the impact of the change in accounting standards requiring fair value accounting for investment securities that took place in the United States in 1993 that was accompanied by the Board of Governors of the Federal Reserve System proposing that capital requirements be amended to include unrealised holding gains and losses on available-for-sale securities in Tier 1 capital. The authors estimate a profit model for the decision to early adopt the new accounting standard and regression models for the changes in investment securities holdings, its timing and the determinants of the proportion of securities classified as available for sale. They find that bank holding companies decreased both the proportion and maturity of investment securities held in the quarter when they adopted the new accounting rule. These results suggest that banks' behaviour does respond to changes in accounting standards if those changes are expected to affect regulatory capital ratios. Using a system of simultaneous equations, Hodder et al (2002) address the same question and reach similar conclusions. They find that stronger banks under-allocated securities to the AFS portfolio because the decision to classify securities as HTM impaired liquidity. They interpret this under-allocation as an identifiable cost of the choice to use amortised cost accounting. They find that, across the board, when banks adopted the new standard, they decreased the fair value sensitivity (interest rate risk) of their securities portfolio and increased the fair value sensitivity of their loan portfolio. On the other hand, Carey (1995) analyses the effects on regulatory discipline and costs of

[45] If hedging is perfect, filtered capital measures will be accurate as the changes in values of securities and hedging resulting from moves in interest rates will offset.

regulation of establishing for US banks that only a fraction of securities be marked to market. He finds, using bank failure prediction models, that such change has little effect on regulatory discipline of bank risk taking. Using simulations of the effects on measured capital of applying the partial filtering and their consequences in terms of the changes in the category assigned for supervisory purposes, he finds that the costs are modest. He concludes that partial filtering will constrain portfolio reallocations to the extent securities are designated held-to-maturity and may pose disincentives to hedging of interest rate risks for some banks.

Accounting standards determine not only total income, but also the part of the income that can be distributed as dividends or bonuses, in the sense that under most commercial law regimes only the net income account (P&L account) can be used to distribute dividends. A revaluation of assets that is reflected in the P&L account of the entity could lead managers to receive pressure from shareholders to pay dividends. Therefore, the bank's ability to smooth inter-temporal shocks would be affected.[46] Specifically, it is argued that entities could thus have incentives to establish new dividend or asset management policies that would neither maximise the economic value of the company in the short term, nor provide value-added to investment in risky assets.

4.6 Conclusions

The additional objectives of prudential regulators which go beyond those of accounting standard-setters provide a rationale for the application of prudential filters. The interaction between these filters and accounting standards, however, may generate behavioural responses that warrant further research.

Prudential filters not only arise because of the adoption of fair value accounting, but also result from other adjustments, such as those that affect the treatment of intangible assets, of deferred tax assets or of defined benefit pension schemes. The review that we have carried out has focused on the effects arising from AFS fair value accounting.

Very few papers have analysed the behavioural impact of the links between prudential filters and accounting rules. On the one hand, the literature on determinants of precautionary capital stocks, especially as regards the hypothesis that banks have the objective of minimising capital fluctuations, could be relevant in this context. Empirical analysis showing whether banks' behaviour is in accordance with such hypothesis could contribute to the debate on the stabilising effects of filtering. On the other hand, literature related to the effects on risk taking of accounting adjustments can constitute the basis for the analysis of the effects of prudential filters on short-term incentives and risk-management. The impact of the interaction of accounting and prudential filters on lending decisions can be another area of research, although isolating such causality could prove to be difficult. Finally, the analysis of the effects on the credibility of capital in relation to the size of unrealised gains and losses and what its impact is on the cost of capital could also be explored.

5. Information disclosure, market discipline and bank behaviour

5.1 Introduction: to what extent can disclosure rules enhance market discipline?

By virtue of their risk-taking and maturity transformation role, banks are notoriously opaque, making them difficult to assess without considerable information on, for example, their financial position and

[46] See Freixas and Tsomocos (2006) and Enria et al (2004).

risk-taking and corporate governance practices (Morgan (2002), Flannery et al (2012)). Indeed, many have suggested that this opacity contributed to the recent financial crisis by magnifying uncertainty about the underlying value of bank assets as well as on- and off-balance sheet exposures to structured credit products. Heightened fears about banks' financial condition and exposures to structured products led to considerable reluctance by counterparties to trade, further fuelling the market turmoil. Others have also shown (eg in the context of debt markets) how such opacity can foster credit booms and financial fragility, as it contributes to similar market perceptions about the quality of borrowers (Gorton and Ordonez (2012)).[47] Extending these concepts to banking implies that opacity prevents market participants from distinguishing high-risk from low-risk institutions, ie they do not have sufficient information with which to make comparisons across banks (ie a coordination failure). If, however, market perceptions about the condition of banks in general are high, market participants may supply funds not only to healthy (less risky) banks, but also to unsound (more risky) banks on similar terms and conditions. These information problems afford more banks access to the funds necessary to support credit activity on terms not commensurate with the actual underlying risks of their asset portfolios or on-going lending activities. Many contend that such mispricing further contributed to the crisis.

In response to the crisis, regulators have made a number of recommendations for expanding disclosures aimed at increasing transparency and fostering market and supervisory discipline more specifically.[48] The intended effects are to reduce the likelihood and severity of financial crises and promote financial stability more widely. As a step towards better understanding these outcomes and identifying issues that could benefit from additional research, this subsection reviews literature on disclosure regulation and market discipline. The literature on these topics is vast, with a large wave of this work beginning in the 1990s as regulatory attention on the role of the market in bank supervision grew (Berger (1991), Board of Governors (1999, 2000), BCBS (2000), De Ceuster and Masschelein (2003)). During this time, there was a noticeable increase by accounting researchers to enhance the understanding of the economic consequences of financial reporting and disclosure requirements (Leuz and Verrecchia (2000), Healy and Palepu (2001) and Leuz and Wysocki (2008)). To help focus our review, we concentrated on addressing the following questions: (i) To what extent do disclosure rules promote market discipline?; (ii) What are the consequences of disclosure rules on bank behaviour?; (iii) Does the extent of market discipline differ in crisis versus normal times?; and (iv) What shapes socially optimal disclosure rules?

In describing what the literature says about each of these issues, we also highlight areas where answers are not readily apparent and where further work would be helpful. While these areas are discussed in more detail below, it is worth bringing two to the fore. The first area relates to the reactions of market participants to disclosures (voluntary and mandatory) over the economic cycle – and especially during a crisis. More work on understanding how banks, bank creditors and bank supervisors respond to disclosures under different economic conditions could be beneficial. Better knowledge in these areas will provide a basis for identifying costs and benefits of regulating, shaping and enforcing disclosures in banking more broadly.

[47] Quite similar asymmetric information issues that emerge between banks and their investors have been analysed by Gorton and Ordonez (2012) in the context of a borrower-lender relationship. They develop a theory showing how "information-insensitive" lending can support credit booms and contribute to the build-up of financial fragility over time when information about the credit quality of the borrower decays. In their framework, crises occur when small shocks significantly reduce the perceived quality of collateral (or borrowers' repayment capacity more generally). A key issue highlighted in their paper is that after a credit boom, in which more and more lending is supported by collateral of unknown type – but with high perceived quality – a negative aggregate shock affects more collateral than it would, had the boom period been shorter or the actual quality of the collateral been known. The implication is that the size of a downturn depends on the duration of such "information-insensitive" debt usage.

[48] See, for example, BCBS (2014, 2012) and Enhanced Disclosure Task Force (2012).

The second area where the extant research appears lacking has to do with the overall macroeconomic effects of disclosure. Our limited review of the literature suggests that these aggregate real economy impacts are still not well known and could benefit from further exploration. This work may be particularly informative in light of new regulations and structural reforms designed to strengthen market and supervisory discipline (eg resolution and recovery, contingent capital, supervisory stress tests, ring-fencing).[49] Aggregate macroeconomic effects are likely important, since they capture costs and benefits that banks may ignore or not fully internalise when making individual disclosure decisions.

The rest of this section is arranged as follows. Subsection 2 reviews the economic justification for disclosure regulation. Subsections 3 and 4 provide background on the relationship between disclosures and market discipline and the incentives that banks have to make voluntary disclosures, respectively. In subsection 5, we present findings on the effects of disclosure rules on bank behaviour and financial stability. Subsection 6 touches on the extant work examining how market discipline may change in response to economic conditions. Subsections 7 and 8 report what the literature suggests about releasing supervisory information, including stress test results. Finally, subsection 9 concludes and offers a few initial suggestions for research.

5.2 Economic rationale for disclosure rules

Three market failures typically justify regulation of bank disclosure: externalities, information asymmetries and coordination failures.[50] The externality and asymmetric information arguments suggest that, without intervention, banks may disclose less information than is socially optimal. Coordination problems imply that banks do not provide comparable information as they have no mechanism or incentive to cooperate over disclosures. In addition, there are external factors, including, for example, discretions allowed under accounting standards and capital regulations that further reduce the relevance of disclosures and aggravate coordination problems. These factors make it difficult for investors and creditors to assess a bank's risk profile and compare risks across firms. The lack of comparable information hinders market discipline and, in turn, efficient resource allocation.[51] Indeed, the recent Basel III proposals expanding Pillar 3 disclosure requirements and standardising reporting formats specifically seek to address these coordination problems.[52]

5.3 Disclosure rules and market discipline

To assess whether disclosure rules promote market discipline, it is useful first to have a broad understanding of the concepts of disclosure, transparency and market discipline, their relationship and the factors that affect each. This background is helpful for understanding whether and how information reaches the market and for thinking through the hypothesised behaviours that may arise in response. It also assists in contextualising the identified research gaps discussed in this paper.

[49] At a minimum, it might be worth re-examining the channels (and their strength) through which disclosures affect financial stability and economic activity under these new regulations.

[50] See Frolov (2007) for more details on these problems and their effects on market discipline.

[51] BCBS (2013a) provides evidence on how regulatory discretion offers banks the opportunity to influence disclosures and affects information comparability, both of which potentially dampen the relevance of disclosure and scope for market discipline.

[52] See BCBS (2014, 2012).

It is important to distinguish between the ideas of disclosure and transparency, since many researchers and policymakers incorrectly presume that they are the same and, therefore, imply that more disclosure unequivocally improves transparency.[53] Disclosure is the act of providing information to the market, while transparency arises only if the information is reliable and appropriately interpreted and used by the market. It is this concept of transparency that underpins effective market discipline. In its broadest terms, market discipline is the mechanism by which market participants (eg shareholders, debt holders, depositors) monitor and discipline, through price and quantity responses, excessive bank risk-taking behaviour.[54] At a more detailed level, market discipline refers to market-based incentive schemes in which investors in bank equity and liabilities, such as subordinated debt or uninsured deposits, effectively punish banks for taking greater risk either by demanding higher yields on or cutting supply of such funding. For market discipline to be effective, these incentives schemes must also alter bank risk-taking behaviour.

However, there are a number of obstacles that interfere with transparency that, in turn, impede effective market discipline.[55] Expectations of government support, either explicitly (eg deposit guarantee schemes) or implicitly (eg government bail-outs) may reduce bank creditors' incentives to use, scrutinise and demand information on bank conditions. Ongoing policy efforts aimed at ensuring that banks hold sufficient amounts and types of bail-in capital and develop credible recovery and resolution plans should help reduce these obstacles and bolster market discipline going forward. Still, it is also worth noting that incentives on the part of the information providers also affect transparency. This issue may be especially pronounced during more trying economic conditions, when banks' incentives to hide or shade information disclosures, for instance through the use of accounting or regulatory discretions, may increase in an attempt to manage market responses or dampen potential market overreaction. The ability of the market to process information (eg make proper comparisons across firms or over time) is yet another possible impediment. As the recent crisis showed, economic conditions likely play a key role in affecting this ability. It seems imperative, then, to recognise these confounding issues when examining whether and how disclosure rules promote market discipline and deliver appropriate economic benefits.

5.4 Voluntary disclosure incentives

What incentives are there for banks to release or not to release information voluntarily? Capital markets provide substantial incentives for banks to disclose information voluntarily.[56] The ability to influence (lower) cost of capital is a prime motivation. Still, for several reasons voluntary disclosures are not always optimal. One relates to the fact that disclosures are costly, and banks, in their profit-maximising behaviour, weigh these against the benefits of reducing funding costs when deciding on the quality, level and frequency of disclosures. Another reason that voluntary disclosures may fall short is that it is not always in the best interest of bank owners (or managers) to disclose information fully, particularly if they want to expropriate a portion of investment returns (Ostberg (2006)). Banks also have considerable

[53] See Freixas and Laux (2012) for cogent arguments on this issue.

[54] See Flannery (2001) for a good overview on the theory underlying market discipline. Demirguc-Kunt and Huizinga (2004), Flannery and Sorescu (1996) and King (2008) provide empirical evidence consistent with market discipline.

[55] Hamalainen et al (2005) set out a useful framework for understanding the conditions necessary for market discipline to be effective. Stephanou (2010) reassesses the use of market discipline for prudential purposes in light of the financial crisis. In doing that, he also highlights key problems contributing to a lack of effective market discipline prior to the crisis. Freixas and Laux (2012) provide a lucid discussion of the concepts of disclosure, transparency and market discipline and their connections. Finally, Angkinand et al (2012) provide more evidence on the failures with market discipline.

[56] See, for example, Leuz and Verrechia (2000) and Leuz and Wysocki (2008) for a discussion of the theoretical motivations. Bauman and Nier (2004) and Tadesse (2006) provides empirical evidence on these incentives.

discretion in their transmission of information, which also means that voluntary disclosures may not necessarily generate optimal outcomes. For example, Landsman (2006) notes that banks may be able to affect disclosure content through the timing of earnings announcements and balance sheet adjustments. Karaoglu (2005) finds evidence of such behaviour, showing that US bank holding companies use gains from loan transfers to influence reported earnings and regulatory capital levels. Gunther and Moore (2003) show that US banks in poorer financial condition are more likely to understate financial losses.

5.5 The effects of disclosure rules on bank behaviour and financial stability

The theories vary on the consequences of mandatory disclosures on individual bank behaviour and bank safety. For example, Cordella and Yeyati (1998) examine the impact of public disclosure of information about banks' risk exposure on the probability of bank failures. They specifically look at how disclosure requirements affect the likelihood of bank failure when risk is exogenous and, therefore, out of the control of the bank (eg through macroeconomic shocks). They show that when risk is exogenous, disclosure no longer affects risk-taking behaviour, but still induces negative feedback on failure probability because funding costs rise in response to disclosure. A key implication is that (too much) public disclosure may have perverse effects on individual bank soundness and overall financial stability if banks do not have complete control over their risk exposures. This is because the market discipline channel becomes toothless when risk taking is not endogenous to the bank. In this case the benefits of disclosure are outweighed by market overreaction rendering transparency inefficient ex-post.

Researchers have also shown how too much disclosure can actually lead to systemic banking crises if it improperly suggests that problems are systemic rather than idiosyncratic (Rochet and Vives (2004) and Chen and Hasan (2006)). This issue is particularly relevant given the significant role of wholesale funding – including purchased funds, such as repurchase agreements – as sources of funds for banks. Huang and Ratnovski (2008), for instance, show that noisy signals on the quality of banks' asset portfolios (eg as reflected in risk-based capital measures) can induce sellers of wholesale funds to acquire less information and engage in less efficient monitoring. In this setting, receipt of unexpectedly negative information can generate significant withdrawals of wholesale funds, leading to socially inefficient asset sales and an overall drop in credit activity by banks.

On the other hand, Vauhkonen (2012) examines the impact of mandatory information disclosure on bank safety in a spatial model of bank competition, where bank survival depends on the quality of its risk measurement and management systems. He specifically looks at how requisite disclosures on risk systems might affect bank behaviour. Analytical results show that mandated disclosures incentivise banks to strengthen risk management efforts, thereby improving safety and soundness overall. In his setup, this behaviour arises through the shareholder channel as disclosure enables banks to commit to better risk controls, lowering the cost of equity overall.[57] These theoretical studies suggest the importance of market signals and responses in policymakers' considerations about the need for and design of disclosure regulation.

Providing some empirical evidence on the effects of disclosure on bank behaviour, Nier and Baumann (2006) investigate whether market discipline is effective in providing incentives for banks to limit their risk of default by holding capital buffers against adverse outcomes in portfolio risk. They

[57] A key assumption underlying this framework is that banks cannot voluntarily disclose information on the level of their effort in managing risk. The fact that banks have typically been cautious in their release of information beyond minimal requirements (Frolov (2007)) supports this assumption. In addition, there is evidence that in the absence of stringent disclosure requirements providing a common benchmark, outsiders cannot easily compare banks based on voluntary information. As noted above, accounting and supervisory discretions affect the comparability and credibility of these disclosures.

specifically examine the effect of three factors related to transparency and, therefore, the strength of market discipline on banks' incentives to hold capital buffers: (i) the degree of implicit government support, (ii) the amount of uninsured funding employed by a bank, and (iii) the extent to which banks disclose information about their risk profiles. The authors find evidence supporting the idea that banks that disclose more information (either voluntarily or because of mandated provisions) are subject to stronger market discipline and limit their risk by having higher capital buffers.[58]

There is some evidence that improved systems for financial data disclosure promote safer banks in general. Podpiera (2006), for example, finds evidence showing that adherence to Basel I core principles around regular and accurate financial reporting improved bank performance. Demirguc-Kunt et al (2008) also show that nations adhering to these Basel I reporting mandates had sounder banks (as measured by Moody's financial strength ratings). Providing some indirect evidence, Nier (2005) investigates whether transparency increases or decreases the chance of severe banking problems. He finds that banks that disclose more information are less likely to experience problems.

While these studies provide evidence linking banking conditions to the level of disclosure and transparency, they pertain to individual banks and not the system as a whole. Some also do not distinguish between mandatory versus voluntary disclosure effects. Tadesse (2006) offers some initial clues about the possible impact of disclosure rules on banking stability overall. Using cross-country data on banking systems across 49 countries in the 1990s, he finds that banking crises are less likely in countries with greater regulated disclosure and transparency. Joao (2013) uses historical evidence on the effect of the introduction of mandatory disclosure in the United States and finds that the failure rate of state banks falls after the introduction of mandatory reporting requirements, while the effects of periodic supervision requirements are not statistically significant. In general, however, research on the effects of disclosure rules on financial stability appears sparse.

5.6 Market discipline in normal versus crisis times

Flannery et al (2012) provide evidence that bank opacity changes over time and with market conditions and increases significantly during stressful economic conditions. This finding implies that the level of transparency also changes, having potentially different effects on market discipline over the course of the economic cycle or during crisis periods. Our limited review of the literature indicates, however, that there are no studies that directly test whether or how market discipline changes as economic conditions change. This is an area that could benefit from further work, since the findings could have implications for understanding the merits of disclosure rules in normal and crisis periods.

There are a couple of studies worth mentioning as they offer some ideas that could prove fruitful for designing tests to examine this issue. Cubillas et al (2012) analyse how depositor market discipline changes after a banking crisis and, in particular, in response to changes in regulations, official supervision, institutions and intervention policies taken to deal with the crisis. They document that market discipline weakens on average after a crisis, but to varying degrees across countries.[59] There is greater weakening in countries where bank regulation, supervision and institutions work to enhance market discipline before the crisis. A crisis, however, does not change market discipline in countries where discipline rarely existed before the crisis. They also show that market discipline weakens more in countries with less stringent barriers to entry, less official supervisory power and better-quality institutions.

[58] Wu and Bowe (2010) employ a framework similar to that of Nier and Baumann (2006) and find that banks in China that release more transparent financial information hold more capital.

[59] Their empirical tests employed data spanning 66 countries covering 79 banking crises over the period 1989–2007.

In a similar vein, Hadad et al (2011) analyse the impact of regulatory changes to deposit guarantee schemes introduced in response to the Asian financial crisis on market discipline in the Indonesian banking markets. They find that government guarantee schemes reduce market discipline, especially if perceived to be credible. Results from both studies clearly show the importance of controlling for such confounding effects in any tests designed to investigate whether and how market discipline differs under different economic conditions.

5.7 Socially optimal disclosure: private incentives and risk sharing

When deciding on whether and how to disclose public and private supervisory information, supervisors need to tackle challenges related to the collection of information from banks and to the disclosure of this information. Banks will have a natural incentive to withhold negative news and reveal data that flatter their accounts, thus biasing the information collected by supervisors. Setting this issue aside, supervisors may need to decide how to aggregate the collected information in order to preserve some uncertainty about individual banks and thus take advantage of the risk-taking capacity of funding markets.[60]

The ability of a supervisor to gauge the health of a bank and the incentives of a bank to keep information about its underlying condition quiet in bad times are fundamental problems in bank regulation. Prescott (2008) develops a simple theoretical model that explicitly takes into account the incentives of a bank to report information accurately to the supervisor and the effect of broad disclosure requirements on these incentives. He shows that disclosure of supervisory information may impede the ability to collect critical information about bank condition, as banks become less truthful about their quality. He uses the results to argue that public dissemination of information can hurt the ability to collect it in the first place and that it matters who receives the information and for what purpose.

Such unintended consequences may depend on how banks perceive market participants will use and act on supervisory information. Mandatory disclosure rules of such information may incentivise banks to obfuscate reported information through, for example, discretionary accounting and regulatory choices (eg valuation methods, IRB model parameters, loan loss recognition), thereby dampening the (supervisory) relevance of reported information. More work on these issues and assessing the unintended effects could benefit the debate about the release of supervisory information.

Even when a supervisor has collected the desired information from banks, the socially optimal strategy may be to withhold some of this information. This would happen when funding markets have the capacity to absorb risk but, under full disclosure, private incentives result in actual risk taking that is too low from a social perspective (Hirschleifer (1971)). In this case, the optimal disclosure rule would be to lump the strongest institutions together with weaker but promising ones, thus forcing markets to accept risk sharing. By assigning a joint, flattering rating to institutions of different strength, a supervisor would exploit markets' risk-taking capacity in order to lock in the upside potential of the overall sector.

A comprehensive analysis of disclosure rules would need to take into account additional tools at the disposal of policy authorities, as well as additional policy objectives. For instance, temporary difficulties at some institutions may be addressed more effectively when partial disclosure is implemented in conjunction with a direct provision of liquidity by the central bank. Importantly, a particular disclosure rule may not be able to attain different policy objectives. Authorities may wish to use public announcements as a self-disciplining device: as a commitment to put pressure on weaker

[60] Nosal and Wallace (2009) formalise the issue of whether some degree of information revelation by a social planner (eg a supervisor) is optimal (in the sense that it reduces the chance of bank runs) relative to the cases of both no disclosure and full disclosure.

institutions to repair their balance sheets (Goldstein and Sapra (2012)). This may not work if the weaker institutions have been given flattering ratings on risk-sharing grounds.

Dang et al (2012) develop a theory of money markets and private money and show that limiting information disclosures that preserves "symmetric ignorance" is welfare-maximising and dominates symmetric or even perfect information.[61] In particular, they show that symmetric ignorance creates liquidity in money markets and that the provision of imperfect public information can trigger the production of private information – or, in other words, prompt market reactions and market discipline – that can lead participants to trade less, which has implications for the liquidity provision. If maintaining such symmetric ignorance is critical for liquidity provision in banking, then the results from this paper have implications for banking regulation and information disclosure policies in this sector.

5.8 The effects of disclosing supervisory information (eg stress test results)

There is some mixed empirical evidence on the consequences with respect to supervisory disclosures. Jordan et al (2000) document a drop in share prices around the announcement of formal supervisory actions against US banks. The declines differ according to the quality and timeliness of prior bank disclosures. This finding suggests that these disclosures reveal new, adverse information about a bank's financial condition. The extent of these reactions could have implications for individual bank safety, especially in cases where a bank was particularly opaque prior to the disclosure.

Gilbert and Vaughan (2001), on the other hand, look at the reaction of the deposit market in response to these disclosures. They find no evidence of unusual deposit withdrawals or spread increases around the announcements of regulatory enforcement actions. They conclude that public announcement does not spark bank runs or enhance depositor discipline.

Recent work examines this debate in the context of stress test results (Goldstein and Sapra (2012)). For example, Spargoli (2012) shows how a welfare-maximising regulator faces a trade-off when deciding whether to disclose capital shortfalls in crisis times. In his setup disclosure forces banks to reduce their default risk, but leads them to downsize unless the regulator is able to recapitalise banks that do not replenish their shortfall. He shows that a regulator that cannot recapitalise will prefer less information disclosure if the costs of downsizing (eg to the real economy via a reduction in credit supply) exceed expected default costs. If, on the other hand, a regulator can recapitalise, then disclosure is preferred.

There is some empirical evidence that bank behaviour responded to the disclosure of stress test results. Bischof and Daske (2012), for example, examine bank behaviour in response to the 2011 European Union stress test results. They find that banks participating in the stress test increased their subsequent voluntary disclosures on sovereign credit exposures to peripheral Eurozone countries. At the same time, these banks experienced declines in equity bid-ask spreads and improvements in liquidity, suggesting that these voluntary disclosures increased transparency. Additionally, banks with more significant capital shortfalls were more active in reducing sovereign risk exposure between December 2010 and September 2011, consistent with a disciplining effect of supervisory disclosure.

Ellahie (2012) also examines the 2011 European Union stress test results to determine whether their disclosure affected information asymmetries. The paper found no statistical decline in information asymmetry, consistent with the idea that stress results provided no additional information to the market. The study did find, however, that details on sovereign risk exposures disclosed as part of the stress test

[61] By symmetric ignorance, they mean that while information asymmetries exist, market participants know that these exist and, importantly, that there are no incentives for others to acquire information to speculate in money markets.

affected banks' debt and equity prices as well as CDS spreads, suggesting that these more granular data were informative and increased bank transparency. The robustness of these results depends to a large extent on the adequate choice of the EU control group. This may have been a problem, since there is hardly a large European bank with a significant sovereign exposure that did not participate in the stress test.

Petrella and Resti (2013) find evidence that the stock market reacted significantly to the disclosure of the 2011 European Union stress test results. Their findings imply that the stress test revealed new information. They also document evidence that the market found both the data on stressed capital positions as well as the more granular historical data released along with the results informative. They argue that these findings are consistent with the idea that stress tests have provided market investors with relevant information and are an effective tool to mitigate bank opacity.

5.9 Conclusions

The relationship between disclosures and market discipline has important implications for bank behaviour that should be considered when evaluating the costs and benefits of disclosure rules more broadly. Debates about disclosure rules also need to consider a number of obstacles that interfere with the mapping from disclosure to market discipline. These obstacles include other policy measures (eg too-big-to fail, government bail-out, deposit insurance) that directly affect the incentives for market participants to use and act on information disclosures. Without proper consideration of these effects, however, the intended effects of disclosure initiatives may not result in robust market discipline.

This review revealed that while there is a vast amount of work in the areas of disclosure and market discipline, there are a number of outstanding issues regarding disclosures and market discipline that could benefit from further research. First, there appears to be little empirical work on evaluating **how voluntary disclosure incentives and mandatory disclosure rules interact with and are affected by recent policy reforms** and directions designed to promote market discipline (eg recovery and resolution, wider regulatory recognition of bail-in capital, living wills, remuneration). Providing some clues, theoretical work by Bertomeu et al (2010) shows that the firm's capital structure and optimal disclosure policy are jointly determined. This is because when the firm's financing decisions change, the residual claim of the owners changes, and implicitly also the optimal disclosure policy. Introducing mandatory disclosure inhibits voluntary disclosure when the capital structure is fixed. When the capital structure is endogenous, mandatory disclosure leads to expanded voluntary disclosure. This work seems most relevant for spotting potentially unintended effects of disclosures on market reactions and bank behaviour. Second, debates on disclosure rules could also benefit from more work on the overall **macroeconomic effects of disclosures and the channels through which these effects arise**. A key issue in this regard would be the extent to which the release of supervisory information, eg on firm-level capital adequacy assessments and stress test results, affects economic growth through the lending channel (eg as suggested by Spargoli (2012)). Finally, there is a need for additional research examining **how market participants behave and market discipline evolves over the course of the economic cycle** and during more stressful periods. Recent studies documenting changes in bank transparency leading up to the crisis (eg Flannery et al (2012)) suggest that the efficacy of market discipline could also change and could have implications for bank risk-taking behaviour. This issue could benefit from research examining the direct effects of bank transparency on market discipline. Findings from this work may suggest a need for time-varying disclosure policies.

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