

# Does the business model influence income smoothing? Evidence from European banks

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## Abstract

**Purpose** – The purpose of this paper is to explore whether the business model (BM) influences bank income smoothing by considering two competing perspectives, the opportunistic and the information enhancement one. Additionally, the paper addresses the role of auditors' involvement in national supervision and external governance.

**Design/methodology/approach** – Income smoothing is measured by regressing loan loss provisions on unmanaged earnings, and the moderating role of country-level factors is tested employing three-way interactions. The sample consists of European banks observed from 2004 to 2015.

**Findings** – Results indicate that the BM affects smoothing and that retail-funded banks exhibit smoother earnings due to informative reasons. National supervisors' emphasis on audit is positively associated with smoothing by market-oriented banks, whereas external governance constrains smoothing in diversified-retail banks.

**Research limitations/implications** – European reforms strengthening monitoring bodies could bring the unintended effect of inducing opportunistic behaviours in market-oriented BMs. However, this study employs indirect proxies for institutional factors and does not consider internal-governance issues.

**Practical implications** – Evidence sustains the IASB choice of the expected-loss approach for estimating credit losses as it could enhance the informativeness of retail-funded banks' accounting numbers.

**Originality/value** – This paper contributes to the income smoothing literature by addressing the role of the BM as a whole in explaining smoothing propensity, not limiting the observation to partial features of the balance sheet. Moreover, it supports a counterintuitive argument, the *penalty hypothesis*, assuming that stronger supervision increases bank incentives to manage earnings to avoid penalties.

**Keywords** Earnings management, European Union, Banks, Business model, Income smoothing, Institutional factors

**Paper type** Research paper

## 1. Introduction

In the aftermaths of the 2008 global financial crisis, the consequences of banks' business model (BM) on their transparency have attracted the attention of the global accounting standard setter and European supervisors due to the part played by the banking industry in the market turmoil and the decline of the real economy. On the one hand, the International Accounting Standard Board (IASB) embraced the BM as a criterion for classifying and measuring financial assets in the new standard on financial instruments (IFRS 9) to facilitate users' understanding of the firm actual financial position and improve preparers' application of accounting provisions (IFRS Foundation, 2008). On the other hand, European authorities moved beyond the approach traditionally used in prudential supervision (Cavelaars and Passenier, 2012) and worked to ensure adequate monitoring on bank BMs (EBA, 2014) and on the quality of bank accounting numbers to achieve transparency and maintain market confidence (FSF, 2008).

This paper aims at exploring the link between the BM and the transparency of bank accounting numbers by testing whether the BM influences bank income smoothing, a type of earnings management aimed at reducing earnings variability (Beidleman, 1973), considerably exploited by banks to decrease perceived risk (Beaver, 1970; Kanagaretnam, Lobo and Mathieu, 2004; Kanagaretnam, Lobo and Yang, 2004). This link is not straightforward because



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bank managers could have distinct incentives to engage in income smoothing due to the different structure of costs and revenues characterising the BM and the associated income variability and the expectations of major subjects involved in the bank BM, namely funds providers. From an opportunistic perspective (Leuz *et al.*, 2003), market-oriented BMs would smooth earnings to reduce the variability of their primary income source, namely non-interest income, which is highly volatile (Baele *et al.*, 2007; Köhler, 2015), and to satisfy the expectations of wholesale financiers, as certain types of funds imply strict covenant constraints. Instead, from an information enhancement perspective (Dechow *et al.*, 2010), BMs relying on customer deposits and diversified income would exhibit smoother earnings as reflective of an overall stable performance. Indeed, these banks are typically more stable as retail deposits are generally stickier, and often balance interest income with non-interest one (Stiroh, 2004; Köhler, 2012) through asset diversification.

Based on these considerations, whether and to what extent bank propensity to smooth earnings varies depending on the BM is ultimately an empirical question. In line with prior research on bank funding structure (Jin *et al.*, 2018), the paper expects that banks characterised by retail deposits and income diversification show higher smoothing propensity and that this behaviour is driven by informative reasons.

Additionally, the paper aims at understanding whether country-level factors indicated as influential to bank accounting quality (Ball *et al.*, 2000) affect the link between the BM and income smoothing, based on the idea that these factors could shape managerial incentives depending on the BM. More specifically, the study examines the effect of external auditors' involvement in supervisory activities and governance exerted by private investors (Fonseca and González, 2008; Bouvatier *et al.*, 2014).

The analysis uses a sample of 198 banks (820 bank-year observations) from 27 European countries across the 2004–2015 timeframe. The European context is particularly suitable because it is a unique setting with a common perimeter of regulation on the intermediation activities, thus avoiding substantial differences among countries in terms of restrictions to banking activities. Additionally, it exhibits a variety of regulatory settings allowing to study the effect of country-level factors.

The cluster analysis performed on banks individuates three BMs, namely retail-funded, market-oriented and diversified-retail banks. The results of the multivariate regressions indicate that smoothing propensity varies among the BMs and that retail-funded banks engage more in income smoothing compared to other BMs. Additionally, the test on cash flow predictability shows that these banks exhibit higher quality earnings, suggesting that income smoothing is consistent with the information enhancement perspective.

Furthermore, results indicate that country-level complementarity between the audit function and national supervision is positively associated with income smoothing by market-oriented banks. External governance reduces smoothing in diversified-retail banks, in line with prior evidence on non-financial firms (Leuz *et al.*, 2003).

This study contributes to the income smoothing literature in two main ways. First, it extends the findings on the role of bank funding structure (Jin *et al.*, 2018) by addressing the role of the BM as a whole in influencing smoothing propensity. Indeed, the paper broadens the investigation from the liability side to encompass also the bank asset composition, which mirrors the management's hypothesis about how the entity creates value to customers (Tece, 2010; Massa *et al.*, 2017). In doing so, it highlights that banks whose BMs are typically risk-averse smooth income for informative reasons.

Second, since reporting practices are closely linked to the institutional context and the banking industry is highly regulated, the paper provides further insights into the role of country-level factors by highlighting that their influence changes depending on the BM-specific features. Evidence of higher recourse of market-oriented banks to income smoothing in case of supervisory emphasis on the audit function can provide support to the

penalty hypothesis assuming that powerful monitoring bodies increase bank incentives to manipulate earnings to avoid supervisory penalties (Shen and Chih, 2005). These findings complement prior EU-based research showing that stricter supervision is associated with greater bank income smoothing (Gebhardt and Novotny-Farkas, 2011).

The remainder of this paper is organised as follows. Section 2 reviews the relevant literature developing the research hypotheses. Section 3 illustrates the research design, whereas Section 4 presents empirical results. Section 5 concludes and provides policy implications.

## 2. Literature review and hypothesis development

### 2.1 *BM and earnings management*

A number of studies have shown that the differences among BMs influence firms' recourse to earnings management, providing mixed evidence on the role of firm choices in terms of funding structure. Some find leverage positively associated with income increasing strategies (Sweeney, 1994; Chan *et al.*, 2008), particularly in poorly performing and distressed firms (Christie and Zimmerman, 1994; Easterwood *et al.*, 1997) and given specific conditions related to competing reporting objectives (Darrough *et al.*, 1998), whereas other studies support a constraining effect of leverage on earnings management (Jensen, 1986; Denis and Denis, 1993; Jelinek, 2007). Moreover, research has used the positive relation between the fixed capital intensity – namely the gross level of property, plant and equipment – and accruals to model total accruals, as in the Jones and the modified Jones models (Jones, 1991; Dechow *et al.*, 1995) as well as in the subsequent models developed by Kothari *et al.* (2005) and Francis *et al.* (2005). Additionally, research implicitly considers that BMs differ in terms of working capital intensity (Ettredge *et al.*, 2010) and documents that working capital is used as an earnings management tool more than other components of net operating assets (Kreutzfeldt and Wallace, 1986; DeFond and Jiambalvo, 1994) with managers exploiting its variations to increase earnings (Burgstahler and Dichev, 1997).

Focussing on the banking industry, several features differentiating BMs have been found associated with earnings management. The loan portfolio composition conditions the managerial ability to exercise discretion over LLP. Indeed, consumer loans are typically homogeneous and provisions determined on a statistical basis, while commercial loans present higher heterogeneity and the provisioning system is based on judgement, thus enabling managers to manipulate easily LLP (Liu and Ryan, 1995, 2006). Additionally, funding structure diversity implies different earnings quality and recent research documents that the ratio of core deposits to total liabilities (Dagher and Kazimov, 2015) is associated with a smaller magnitude of earnings management through discretionary LLP, lower likelihood of meeting-or-beating earnings targets, and reduced propensity to smooth income through LLP (Jin *et al.*, 2018).

Overall, the literature provides evidence on the role of the BM by focussing on single features of the bank asset-liability mix. However, the BM embraces “the logic, the data [...] that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value” (Teece, 2010, p. 179), and it cannot be fully described by focussing on partial features of the bank balance sheet.

Indeed, the mix of asset and liability as a whole mirrors the management's hypothesis about the way in which the entity creates value to customers (Massa *et al.*, 2017) and is inherently linked to the bank structure of costs and revenues and to the broad range of subjects that interact with the bank being involved with the BM sustainability over time (Zott *et al.*, 2011). These subjects include retail depositors and wholesale financiers that have distinct interests in monitoring bank earnings and to assess bank stability (Barth and Landsman, 2010; Acharya and Ryan, 2016). Accordingly, the combination of earnings variability and riskiness characterising BMs, and expectations of subjects involved in the BM creates distinct incentives for managers to engage in income smoothing.

This leads into the following hypothesis:

H1. Bank characterised by distinct BMs have different propensity to smooth income.

### 2.2 *Competing reasons for income smoothing*

The multiplicity of reasons for smoothing practices (Khalil and Simon, 2014) can be framed by resorting to two competing theoretical perspectives. From an information enhancement perspective (Kanagaretnam *et al.*, 2005), smoothing enables managers to communicate private information as it makes easier for users to predict future earnings (Warfield *et al.*, 1995; Beatty and Harris, 1999; Dechow *et al.*, 2010) by smoothing out noise (Subramanyam, 1996; Tucker and Zarowin, 2006). Instead, from an opportunistic perspective, managers use smoothing to mislead the market (Healy and Wahlen, 1999), thus weakening earnings quality (Leuz *et al.*, 2003; Ball and Shivakumar, 2005, 2006; Khalil and Simon, 2014; Liu and Skerratt, 2018). Predictable earnings produce advantages to smoothers, such as lower cost of capital (Affleck-Graves *et al.*, 2002) and trading costs for the bank's securities (Kanagaretnam, Lobo and Yang, 2004), increased market liquidity and value of securities (Callahan *et al.*, 1997).

These competing perspectives can be used to interpret the incentives of banks characterised by distinct BMs to engage in income smoothing. On the one hand, market-oriented BMs would provide managers with reasons to use smoothing opportunistically to reduce earnings volatility, since the most relevant source of income to these banks is non-interest income, typically highly volatile (Baele *et al.*, 2007; Köhler, 2015). Additionally, certain forms of wholesale lending, such as repurchase agreements (Gorton and Metrick, 2012), provide lenders with limited incentives to examine bank financial reporting practices (Jin *et al.*, 2018) and this weak monitoring leaves room to manipulate earnings in order to meet the covenant restrictions of other types of wholesale funds (such as subordinated debts; Goyal, 2005).

On the other hand, banks funded mainly through retail deposits show higher earnings quality than banks relying mainly on wholesale funds (Jin *et al.*, 2018). Indeed, despite the limited financial skills of retail depositors (Macey and Miller, 1988; Demirgüç-Kunt and Huizinga, 2004) and their limited resources to influence the bank behaviours (Calomiris and Kahn, 1991), retail-funded banks have lower incentives to manage earnings because they are generally closer to depositors, enabling them to assess risk easily (Loutskina and Strahan, 2011) and to obtain private information. Banks funded through deposits can further enhance earnings' stability by diversifying the asset side to balance interest income with non-interest one (Stiroh, 2004; Köhler, 2012). Accordingly, these BMs have smoother earnings as reflective of an overall stable future performance and future cash flows (Dechow *et al.*, 2010).

Based on these considerations, it is likely that for banks characterised by traditional funding and income diversification the information enhancement perspective prevails and that these banks smooth income for informative purposes. Accordingly:

H2. Banks relying on traditional funding and income diversification exhibit higher cash flow predictability.

### 2.3 *The moderating role of country-level institutional factors*

As the banking industry is highly regulated (Levine, 2004; Chortareas *et al.*, 2012), bank incentives to manage earnings can be considerably influenced by the country-level factors conditioning the reporting environment and shaping managerial incentives (Ball *et al.*, 2000; Leuz *et al.*, 2003; Ball and Shivakumar, 2005; Burgstahler *et al.*, 2006; Bushman and Piotroski, 2006). Prior studies underscore the importance of the supervisory system, showing that in worldwide samples stricter supervision constrains income smoothing

(Fonseca and González, 2008), whereas the opposite effect is found in the European context (Gebhardt and Novotny-Farkas, 2011).

Additionally, research documents that regulatory involvement of auditors in national supervision is positively related to the reduction of income smoothing (Bouvatier *et al.*, 2014), and negatively associated to the ability of LLP of predicting the actual losses in IFRS banks (Marton and Runesson, 2017). However, the effect of the auditor involvement in supervision on bank income smoothing is not straightforward. Indeed, the increased complementarity between the audit function and national supervisory activities (BCBS, 2002, 2008, 2014) can increase auditors' concerns for bank stability especially in case of BMs that, due to their very nature, are typically more prone to market dynamics and higher variability of income. Being income smoothing aligned to prudential provisioning (Gaston and Song, 2014), it is likely that market-oriented banks in countries characterised by high auditor involvement in supervision engage in income smoothing to produce an impression of alignment with supervisory objectives (Peterson and Arun, 2018) and avoid the close eye of supervisors.

Consequently:

*H3.* In banks with market-oriented BM, the auditor involvement in national supervision is associated to income smoothing.

The national regulatory system shapes the intensity of external governance on the industry, namely those mechanisms external to banks that expose banks' management to external disciplining forces. Research documents a positive association between the intensity of external governance and earnings quality of non-financial firms (Leuz *et al.*, 2003), consistent with the view that legal, extra-legal and political factors decrease the consumption of private control benefits by firms' insiders (LaPorta *et al.*, 1998; Dyck and Zingales, 2004; Haw *et al.*, 2004). However, extending findings on non-financial firms to banks is not straightforward as this industry is characterised by additional non-accounting regulations (Giner and Mora, 2016) that could influence managerial accounting policies. The intensity of external governance exerted by private investors at the country-level might reduce managerial incentives to smooth income, especially for banks characterised by BMs highly reliant on wholesale markets. However, due to the uncertainty of the effects of external governance, the fourth hypothesis is formulated as follows:

*H4.* External governance exerted by private investors moderates bank income smoothing differently depending on the BM.

### 3. Research design

#### 3.1 Regression models

*3.1.1 Measures of income smoothing.* To test the relation between bank BMs and income smoothing (*H1*), this study follows prior research and focusses specifically on LLP as these are the banks' main accrual explaining much of the variability in total accruals (Beatty and Liao, 2014). Specifically, the models employed are adapted from Kanagaretnam *et al.* (2003), and Kanagaretnam, Lobo, and Yang (2004). Accordingly, LLP are modelled as a function of a set of explanatory variables for the non-discretionary component of provisions (Wahlen, 1994; Beatty *et al.*, 1995; Beaver and Engel, 1996; Kim and Kross, 1998), such as the change in total loans and the beginning balance of loan loss allowance. To measure smoothing, the models include pre-managed earnings; indeed, if managers engage in income smoothing, they increase LLP when pre-managed earnings are high and reduce provisions being unmanaged earnings low. Thus, the positive coefficient of pre-managed earnings expresses the income-smoothing propensity.

The models control for the listing status as the incentives to manage earnings might vary between publicly traded or privately held banks due to the different levels of information

asymmetry and long-run investors (Beatty and Harris, 1999) and since accounting properties could differ depending on listing status (Nichols *et al.*, 2009; Kanagaretnam *et al.*, 2014).

Additionally, the models control for the capital management issue (Kim and Kross, 1998; Ahmed *et al.*, 1999) and for the procyclical effect of LLP (Fonseca and González, 2008; Pérez *et al.*, 2008).

Accordingly, in order to assess whether sampled banks overall smooth earnings, Model 1 is run:

$$LLP_{i,t} = \beta_0 + \beta_1 EBTP_{i,t} + \beta_2 CLoans_{i,t} + \beta_3 LLA_{i,t-1} + \beta_4 List_{i,t} + \beta_5 CAP_{i,t} + \beta_6 GDP\_GR_t + \beta_7 \Sigma T_t + \varepsilon_t, \quad (1)$$

where  $LLP_{i,t}$  is loan loss provisions reported by the bank  $i$  in year  $t$  and  $EBTP_{i,t}$  represents earnings before taxes and provisions at year  $t$ . A positive coefficient of current pre-managed earnings expresses the income-smoothing propensity.

The two explanatory variables  $CLoans_{i,t}$  and  $LLA_{i,t-1}$  control for non-discretionary part of  $LLP_{i,t}$ .  $CLoans_{i,t}$  is the change in loans from year  $t-1$  to year  $t$  and  $LLA_{i,t-1}$  is the total loan loss allowance at the beginning of the year  $t$ . The sign of  $CLoans_{i,t}$  and  $LLA_{i,t-1}$  should highlight a positive association with  $LLP_{i,t}$  because they are related to changes in default risk.

Following previous literature,  $List_{i,t}$  is a dummy variable that controls for the listing status of the bank (it equals 1 if the bank is publicly listed and 0 otherwise) and  $CAP_{i,t}$  (calculated as the bank capital scaled by risk-weighted assets) controls for capital management issue.  $GDP\_GR_t$  is the growth of GDP from year  $t-1$  to year  $t$  is intended to control for the procyclical effect of provisioning; its coefficient is expected to be negative and statistically significant.

Consistent with the literature, accounting variables are normalised by the total assets at the beginning of the year to mitigate potential estimation problems with heteroscedasticity.

To test  $H1$ , Model 2 is run:

$$LLP_{i,t} = \beta_0 + \beta_1 EBTP_{i,t} + \beta_2 BM_{i,t} + \beta_3 EBTP_{i,t} \times BM_{i,t} + \beta_4 CLoans_{i,t} + \beta_5 LLA_{i,t-1} + \beta_6 List_{i,t} + \beta_7 CAP_{i,t} + \beta_8 GDP\_GR_t + \beta_9 \Sigma T_t + \varepsilon_t, \quad (2)$$

where  $BM_{i,t}$  is a dummy variable that equals 1 whether the BM of the bank  $i$  in year  $t$  is, alternatively, equal to each of the three BMs derived from the cluster analysis, namely retail-funded banks (BM1), market-oriented banks (BM2) or diversified-retail ones (BM3). The coefficient of interest is  $\beta_3$ , namely the coefficient of the interaction term  $EBTP_{i,t} \times BM_{i,t}$ . It expresses the increase/decrease in income smoothing propensity for banks characterised by a specific BM, compared to other BMs.

To test  $H3$  and  $H4$ , Models 3 and 4 develop from Model 2 by sequentially incorporating country-level factors, namely the involvement of external audit in the supervisory function (Model 3) and the level of external governance exerted by private investors (Model 4).

Specifically, to test  $H3$ , Model 3 is run:

$$LLP_{i,t} = \beta_0 + \beta_1 EBTP_{i,t} + \beta_2 BM_{i,t} + \beta_3 AUD_t + \beta_4 EBTP_{i,t} \times BM_{i,t} \times AUD_t + \beta_5 EBTP_{i,t} \times BM_{i,t} + \beta_6 EBTP_{i,t} \times AUD_t + \beta_7 BM_{i,t} \times AUD_t + \beta_8 CLoans_{i,t} + \beta_9 LLA_{i,t-1} + \beta_{10} List_{i,t} + \beta_{11} CAP_{i,t} + \beta_{12} GDP\_GR_t + \beta_{13} \Sigma T_t + \varepsilon_t, \quad (3)$$

where  $AUD$  is the strength of external audit index and reflects the involvement of external auditors in the supervisory activities. The coefficient of interest to test  $H2$  is  $\beta_4$ . It expresses the moderating effect of the involvement of auditors on the propensity to smooth income of

the different BMs, namely the marginal effect of the increase in the auditor involvement on the variation of the income-smoothing propensity corresponding due to a specific BM.

In order to test *H4*, Model 4 is run:

$$\begin{aligned}
 LLP_{i,t} = & \beta_0 + \beta_1 EBTP_{i,t} + \beta_2 BM_{i,t} + \beta_3 GOV_t + \beta_4 EBTP_{i,t} \times BM_{i,t} \times GOV_t \\
 & + \beta_5 EBTP_{i,t} \times BM_{i,t} + \beta_6 EBTP_{i,t} \times GOV_t + \beta_7 BM_{i,t} \times GOV_t + \beta_8 CLoans_{i,t} \\
 & + \beta_9 LLA_{i,t-1} + \beta_{10} List_{i,t} + \beta_{11} CAP_{i,t} + \beta_{12} GDP\_GR_t + \beta_{13} \Sigma T_t + \varepsilon_t,
 \end{aligned} \quad (4)$$

where *GOV* is the Private Monitoring Index and expresses the extent to which regulation enables private investors to exert effective governance on banks. The coefficient of interest to test *H3* is  $\beta_4$  that represents the moderating effect of the governance by private investors on the propensity to smooth income of the different BMs, namely the marginal effect of the increase in external governance on the variation of the income-smoothing propensity corresponding to a specific BM.

**3.1.2 Predictability of cash flows.** To test *H2*, this study tests cash flow predictability by regressing the one-year ahead cash flows on current earnings (Dechow *et al.*, 2010; Kanagaretnam *et al.*, 2014) in line with prior literature (Model 5):

$$\begin{aligned}
 EBTP_{i,t+1} = & \beta_0 + \beta_1 PBT_{i,t} + \beta_2 BM2_{i,t} + \beta_3 BM3_{i,t} + \beta_4 PBT_{i,t} \times BM2_{i,t} + \beta_5 PBT_{i,t} \\
 & \times BM3_{i,t} + \beta_6 List_{i,t} + \beta_7 SIZE_{i,t-1} + \beta_8 GDP\_GR_t + \beta_9 \Sigma T_t + \varepsilon_t,
 \end{aligned} \quad (5)$$

where  $EBTP_{i,t+1}$  is one-period-ahead earnings before taxes and provisions, which is employed by the literature as a proxy for future cash flows.  $PBT_{i,t}$  is profit before taxes reported by bank *i* in year *t*, and  $SIZE_{i,t}$  is the natural logarithm of total assets at the beginning of the year *t*. The coefficient of interest is  $\beta_1$  expressing the association between current earnings and future cash flows for retail-funded banks. A positive and statistically significant coefficient means that current earnings are good predictors of future performance, suggesting that income smoothing is performed for informative purposes.

All the variables are as defined in Table I.

All the models include a set of dummy time variables  $\Sigma T_t$  controlling for time effects that are bank invariant, control for banks' fixed effects and include robust standard errors.

### 3.2 Identification of BMs

To identify banks' BMs, this study follows prior banking research arguing that the information concerning the BM is reflected in the composition of the balance sheet (Ayadi *et al.*, 2012; Ayadi and De Groen, 2014; Ayadi *et al.*, 2016; Roengpitya *et al.*, 2014). Accordingly, ratios from the balance sheet are used as inputs for the cluster analysis (Roengpitya *et al.*, 2014) considering the single bank in a given year as the unit of analysis (Table II).

In particular, this study uses *K*-means clustering, which requires specifying the number of clusters to extract. The maximum value of the Calinski and Harabasz's pseudo-*F* index is associated with the number of clusters that performs better as clusters appear more distinct. In this case, the pseudo-*F* reaches its maximum in the case of three clusters (Table III).

### 3.3 Sample

The initial sample includes all the listed and non-listed banks operating in the European Union (EU28) across the 2003–2015 timeframe (14,339 bank-year observations). Accounting data on consolidated financial statements are obtained from the BankScope database. Outliers and potential data errors have been cleared by excluding the values of each accounting variable collected that lie outside the first and the 99th percentile. Then, all the banks for which data on the BM were not available have been excluded, achieving

Variable	Definition	Model
<i>Dependent variables</i>		
$LLP_{i,t}$	Loan loss provisions reported by the bank $i$ in year $t$ scaled by lagged total assets	(1), (2), (3), (4)
$EBTP_{i,t+1}$	Earnings before taxes and provisions at year $t+1$ scaled by lagged total assets, used as proxy of one-period-ahead cash flows	(5)
<i>Independent variables</i>		
$EBTP_{i,t}$	Earnings before taxes and provisions at year $t$ scaled by lagged total assets	(1), (2), (3), (4)
$PBT_{i,t}$	Earnings before taxes at year $t$ scaled by lagged total assets	(5)
$BMI_{i,t}$	Dummy variable that takes the value of one when the bank BM is retail-funded and zero otherwise	(2), (3), (4), (5)
$BM2_{i,t}$	Dummy variable that takes the value of one when the bank BM is market-oriented and zero otherwise	(2), (3), (4)
$BM3_{i,t}$	Dummy variable that takes the value of one when the bank BM is diversified-retail and zero otherwise	(2), (3), (4)
$AUD_t$	Strength of External Audit Index provided by Barth <i>et al.</i> (2008, 2013). The index expresses the extent to which banks' auditors are involved within the process of supervision. Concerning the timeframe 2005–2008, data are taken from Survey III; with reference to the years from 2009 to 2015, data are provided by Survey IV	(3)
$GOV_t$	Private Monitoring Index provided by Barth <i>et al.</i> (2008, 2013). The index expresses the extent to which regulation enables private investors to monitor banks' behaviours and to exert an effective governance on the banks. Concerning the timeframe 2005–2008, data are taken from Survey III; with reference to the years from 2009 to 2015, data are provided by Survey IV	(4)
<i>Control variables</i>		
$CLoans_{i,t}$	Change in loans from year $t-1$ to year $t$ scaled by lagged total assets	(1), (2), (3), (4)
$LLA_{i,t-1}$	Total loan-loss allowance at the beginning of the year $t$ scaled by lagged total assets	(1), (2), (3), (4)
$SIZE_{i,t-1}$	Natural logarithm of total asset at the beginning of the year $t$	(5)
$List_{i,t}$	Dummy variable that takes the value of one when the bank is publicly listed and zero otherwise	(1), (2), (3), (4), (5)
$CAP_{i,t}$	Regulatory capital held by the bank $i$ in year $t$ scaled by risk-weighted assets	(1), (2), (3), (4)
$GDP\_GR_t$	Growth of GDP from year $t-1$ to year $t$ for the country	(1), (2), (3), (4)

**Table I.**  
Definition of the variables included in the models

Clustering variable	Definition
Importance of traditional activities	Gross loans scaled by total assets
Size of the trading book	Assets measured at fair value through profit and loss scaled by total assets
Amount of loans to banks	Loans and advance to banks scaled by total assets
Size of loans to customers	Sum of retail, mortgage and residential loans scaled by total assets
Importance of long-term funding	Long-term funding scaled by total assets
Importance of customer deposits	Customer deposits scaled by total assets
Derivative liabilities	Derivative liabilities scaled by total assets

**Table II.**  
Definitions of clustering variables

a final sample of 820 bank-years observations from 198 banks operating in 27 European Countries (Table IV).

GDP data of European countries have been extracted from World Bank databases. Additionally, country-level data for supervisory and regulatory factors have been gathered from the World Bank's dataset by Barth *et al.* (2008, 2013). Particularly, this study uses the Strength of External Audit Index that reflects the involvement of external auditors in the supervisory activities through different tools, and the Private Monitoring Index,



representing the extent to which regulation enables private investors to exert effective governance on banks. Due to unavailability of country-level data, the models testing the effects of country-level factors have been run either on 788 bank-year observations (194 banks) – concerning the Strength of External Audit Index – or on 754 bank-year observations (189 banks) – regarding the Private Monitoring Index.

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#### 4. Results

The cluster analysis individuates three distinct BMs (Table V). Retail-funded BMs are characterised by a high reliance on customers' deposits for funding and diversified activities,

Number of clusters	Calinski/Harabasz pseudo- <i>F</i>
2	737.34
3	804.98
4	729.68
5	686.84
6	715.32
7	671.45
8	644.23
9	603.58
10	582.71

**Table III.**  
Calinski/Harabasz pseudo-*F*

Country	Observations per year														Bank-year observations	
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Frequency	Per cent		
Austria	0	0	0	0	3	2	4	6	8	7	6	5	41	5.00		
Belgium	0	0	0	1	1	1	3	2	4	4	4	4	24	2.93		
Bulgaria	0	1	1	1	0	1	3	7	6	6	4	4	34	4.15		
Croatia	0	0	0	0	0	0	1	2	1	1	1	0	6	0.73		
Cyprus	0	1	1	2	1	0	0	2	3	3	3	3	19	2.32		
Czech Republic	0	1	2	2	2	3	3	3	3	4	4	2	29	3.54		
Denmark	2	0	0	0	0	0	2	3	1	1	1	1	9	1.10		
Estonia	0	0	1	1	0	0	0	0	1	0	0	0	3	0.37		
Finland	0	0	0	0	0	0	1	1	2	2	2	0	8	0.98		
France	0	1	5	6	5	6	5	7	9	10	10	7	71	8.66		
Germany	0	2	1	5	6	8	6	8	11	14	11	7	81	9.88		
Greece	0	3	3	3	4	3	4	4	3	2	2	2	33	4.02		
Croatia	0	0	0	0	0	0	1	2	1	1	1	0	6	0.73		
Hungary	0	2	2	1	2	2	3	3	3	3	1	1	23	2.80		
Ireland	0	0	1	3	2	2	2	2	3	2	3	3	23	2.80		
Lithuania	0	0	1	0	0	1	0	1	0	1	1	0	5	0.61		
Luxembourg	0	1	0	0	1	1	1	1	2	2	3	3	15	1.83		
Latvia	0	0	3	3	4	4	7	4	5	5	9	5	49	5.98		
Malta	0	0	0	0	0	0	0	0	0	1	1	0	2	0.24		
The Netherlands	0	2	3	4	5	6	7	7	8	10	11	11	74	9.02		
Poland	0	0	0	3	3	2	3	4	6	7	7	6	41	5.00		
Portugal	0	1	4	4	5	4	5	5	6	8	7	7	56	6.83		
Romania	0	0	0	1	1	1	2	2	3	3	4	4	21	2.56		
Sweden	0	0	1	0	1	2	1	1	1	1	2	2	12	1.46		
Slovenia	1	1	1	2	1	0	1	1	2	2	1	0	13	1.59		
Slovakia	0	1	1	1	1	1	1	1	1	1	1	1	11	1.34		
Spain	0	2	2	1	1	2	1	1	1	2	2	2	17	2.07		
United Kingdom	0	1	6	9	10	9	9	9	8	14	14	11	9	100	12.20	
Total	3	20	39	53	59	61	75	86	107	116	112	89	820	100		

**Table IV.**  
Distribution of bank-year observations by country

**Table V.**  
Business models'  
identification

Clustering variable	Business models		
	Retail-funded BM1 (%)	Market-oriented BM2 (%)	Diversified-retail BM3 (%)
<i>LOANS</i>	63.26	42.77	77.56
<i>TRADING BOOK</i>	4.70	17.86	3.53
<i>INTERCONNECTION</i>	9.66	13.93	5.12
<i>CUSTOMERS</i>	16.13	11.67	60.13
<i>INTERBANK_LIAB</i>	10.23	19.64	17.78
<i>DEBT</i>	8.18	17.93	18.39
<i>CUSTOMER_DEP</i>	63.30	28.15	47.17
<i>DER_LIAB</i>	1.80	8.45	1.75
<i>Diversification</i>	71.51	212.36	50.35
No. of observations	473	215	142
% observations	57.68	26.22	17.32

**Notes:** The clustering variables are defined in Table II. Diversification is calculated as non-interest income on interest income

amounting the traditional book to the 63.26 per cent of total assets and income diversification being relatively high for retail banks (71.51 per cent) (Köhler, 2012). Market-oriented banks exhibit the highest share of trading assets, the greatest reliance on derivative liabilities and a good degree of connections with the interbank market. The cluster of diversified-retail BM presents the highest share of loans to customers and a remarkable diversification among interbank liabilities and customer deposits (Ayadi and De Groen, 2014).

Table VI presents the descriptive statistics for all the variables used in the analysis. Tables VII and VIII show the correlations among the variables used in models estimating income smoothing, while Table IX shows the correlations among the variables used to test cash flow predictability.

The results of the estimation of Model 1 indicate that sampled banks smooth earnings (first column, Table X). Indeed, the coefficient of  $EBTP_{i,t}$  is positive and statistically significant. Concerning the non-discretionary components of  $LLP$ ,  $LLA$  presents a positive and statistically significant relation with  $LLP$ , in line with prior literature (Greenawalt and Sinkey, 1988; Wahlen, 1994; Fonseca and González, 2008). Instead, the coefficients of  $CLoans$  is negative and not significant.  $List$  exhibits a positive and statistically significant sign

Variable	Mean	SD	Min.	Median	Max.
$LLP_{i,t}$	0.0087	0.0131	0	0.0039	0.0757
$EBTP_{i,t}$	0.0428	0.1520	-1.1212	0.0087	1.4889
$PBT_{i,t}$	0.0328	0.1578	-1.7988	0.0014	1.4286
$BMI_{i,t}$	0.5768	0.4944	0	1	1
$BM2_{i,t}$	0.2500	0.4333	0	0	1
$BM3_{i,t}$	0.1732	0.3786	0	0	1
$CLoans_{i,t}$	0.0359	0.1177	-0.2362	0.0163	0.6703
$List_{i,t}$	0.3329	0.4715	0	0	1
$LLA_{i,t-1}$	0.0255	0.0298	0.0000	0.0158	0.1869
$SIZE_{i,t-1}$	16.8932	1.9815	11.0508	16.7498	20.9593
$List_{i,t}$	0.3329	0.4715	0	0	1
$CAP_{i,t}$	0.1774	0.1046	0.0800	0.1499	0.7520
$GDP\_GR_t$	0.0127	0.1070	-1.0000	0.0227	0.4407
$AUD_t$	6.0761	0.7318	5	6	7
$GOV_t$	8.2667	1.2902	8	8	11

**Table VI.**  
Descriptive statistics  
for the variables  
included in the  
regression models

**Note:** Definitions for all the variables are provided in Table I

(1 per cent level), indicating that listing is positively associated with the amount of provisions for loan losses, thus suggesting that publicly listed banks employ more conservative accounting policies, in line with prior research (Nichols *et al.*, 2009). The coefficient of *CAP* is not statistically significant, indicating that the capital management issue does not play a primary role in explaining *LLP* for sampled banks, consistent with evidence provided by other studies in the European context (Pérez *et al.*, 2008; Gebhardt and Novotny-Farkas, 2011; Curcio *et al.*, 2017). Finally, the coefficient for *GDP\_GR* is negative and statistically significant, supporting the procyclical effect of *LLP* (Fonseca and González, 2008; Pérez *et al.*, 2008).

The other columns of Table X provide estimations of Model 2 sequentially introducing the interaction term between pre-managed earnings and the dummy variables corresponding to each BM. In particular, retail-funded banks (third column) smooth earnings more than other BMs, as the coefficient of  $EBTP_{i,t} \times BM1_{i,t}$  is positive and statistically significant at the 1 per cent level, indicating an increase in earnings smoothing propensity for banks whose assets' structure is diversified and funding relies mainly on customers' deposits. Conversely, the coefficients of  $EBTP_{i,t} \times BM2_{i,t}$  and  $EBTP_{i,t} \times BM3_{i,t}$  are negative and significant, indicating that market-oriented (BM2) or diversified-retail (BM3) banks smooth income less than other BMs.

These results support to the idea that the variation of the smoothing propensity depends on the BM and that retail-funded banks, characterised by higher stability and lower risk

	(1)	(2)	(3)	(4)	(5)	(6)
(1) <i>LLP<sub>i,t</sub></i>	1.0000					
(2) <i>EBTP<sub>i,t</sub></i>	0.1940***	1.0000				
(3) <i>CLoans<sub>i,t</sub></i>	-0.0048	0.0345*	1.0000			
(4) <i>LLA<sub>i,t-1</sub></i>	0.5722***	0.1268***	-0.2083***	1.0000		
(5) <i>List<sub>i,t</sub></i>	0.0264	-0.1217***	0.1355***	0.0558	1.0000	
(6) <i>CAP<sub>i,t</sub></i>	0.0338	-0.0234	-0.0761**	0.0388	-0.0775**	1.0000

**Notes:** Definitions for all the variables are provided in Table I. \*, \*\*, \*\*\*Correlation is significant at 10, 5 and 1 per cent level, respectively

**Table VII.**  
Correlations among accounting variables included in Models 1, 2, 3, 4

	(1)	(2)	(3)
(1) <i>GDP_GR<sub>t</sub></i>	1.0000		
(2) <i>AUD<sub>t</sub></i>	0.0527	1.0000	
(3) <i>GOV<sub>t</sub></i>	0.0489	0.0618*	1.0000

**Notes:** Definitions for all the variables are provided in Table I. In particular, *GDP\_GR<sub>t</sub>* is included in Models 1, 2, 3, 4, *AUD<sub>t</sub>* is included in Model 3 and *GOV<sub>t</sub>* is included in Model 4. \*, \*\*, \*\*\*Correlation is significant at 1, 5 and 10 per cent level, respectively

**Table VIII.**  
Correlations among country-level factors included in Models 1, 2, 3, 4

	(1)	(2)	(3)	(4)	(5)
(1) <i>EBTP<sub>i,t+1</sub></i>	1.0000				
(2) <i>PBT<sub>i,t</sub></i>	0.7785***	1.0000			
(3) <i>SIZE<sub>i,t-1</sub></i>	-0.2430***	-0.2357***	1.0000		
(4) <i>List<sub>i,t</sub></i>	-0.1645***	-0.1407***	0.2184***	1.0000	
(5) <i>GDP_GR<sub>t</sub></i>	0.0365	0.0546	-0.0997**	0.0238	1.0000

**Notes:** Definitions for all the variables are provided in Table I. \*, \*\*, \*\*\*Correlation is significant at 10, 5 and 1 per cent level, respectively

**Table IX.**  
Correlations among variables included in Model 5

$LLP_{i,t}$	Model 1	Model 2 BM1 Retail funded	Model 2 BM2 Market oriented	Model 2 BM3 Diversified retail	Model 2.b Retail funded vs Market oriented Diversified retail
$EBTP_{i,t}$	0.0146*	-0.0001	0.0234***	0.0208**	0.0026
$BMI_{i,t}$		0.0004			
$EBTP \times BMI_{i,t}$		0.0363***			
$BM2_{i,t}$			-0.0018		-0.0011
$EBTP \times BM2_{i,t}$			-0.0271***		-0.381***
$BM3_{i,t}$				0.0009	0.0003
$EBTP \times BM3_{i,t}$				-0.02143*	-0.0334***
$CLoans_{i,t}$	-0.0033	-0.0030	-0.0034	-0.0034	-0.0032
$LLA_{i,t-1}$	0.0655*	0.0630**	0.0649*	0.0651*	0.0631**
$List_{i,t}$	0.0163***	0.0178***	0.0162***	0.0168***	0.0174***
$CAP_{i,t}$	0.0017	0.0028	0.0024	0.0015	0.0026
$GDP\_GR_t$	-0.0360***	-0.0366***	-0.0361***	-0.0360***	-0.0364***
Intercept	0.0041	0.0032	0.0045	0.0039	0.0038
Year controls	Included	Included	Included	Included	Included
Bank fixed effects	Included	Included	Included	Included	Included
$R^2$	0.2442	0.2929	0.2677	0.2566	0.2940
No. of observations	820	820	820	820	820
Banks	198	198	198	198	198

**Notes:** Definitions for all the variables are provided in Table I. \*, \*\*, \*\*\*Significant at 10, 5 and 1 per cent levels, two-tailed, respectively

**Table X.**  
The effect of bank  
BM on income  
smoothing (*H1*)

aversion, engage more in income smoothing than other BMs. This is confirmed by the estimation of Model 2b including two interaction terms between pre-managed earnings and the BM ( $EBTP_{i,t} \times BM2_{i,t}$  and of  $EBTP_{i,t} \times BM3_{i,t}$ ). The coefficients of these terms express the variation of smoothing propensity in case of market-oriented and diversified-retail banks if compared with the smoothing propensity of retail-funded banks. Both the coefficients are negative and highly significant, indicating that these banks smooth earnings to a lower extent compared to retail-funded banks.

The results of the test on cash flow predictability are reported in Table XI. The coefficient of the term  $PBT_{i,t}$  expresses the extent to which earnings of market-oriented and

$EBTP_{i,t+1}$	Model 5
$PBT_{i,t}$	0.4400***
$BMI_{i,t}$	0.0048
$PBT_{i,t} \times BMI_{i,t}$	0.5913***
$List_{i,t}$	0.0101
$SIZE_{i,t}$	-0.0543
$GDP\_GR_t$	-0.2100**
Intercept	0.9172***
Year controls	Included
Bank fixed effects	Included
$R^2$	0.2868
No. of observations	593
Banks	165

**Table XI.**  
The predictability of  
cash flows in retail-  
funded banks (*H2*)

**Notes:** Definitions for all the variables are provided in Table I. \*, \*\*, \*\*\*Significant at 10, 5 and 1 per cent level, two-tailed, respectively

diversified-retail banks predict future cash flows. It is positive and statistically significant, showing that earnings reported by these banks are good predictors of future performance. The coefficient of interest to test  $H2$  is the coefficient of the interaction term  $PBT_{i,t} \times BM1_{i,t}$ , which is positive and highly statistically significant. This indicates that retail-funded BMs are characterised by greater cash flow predictability than other BMs and means that earnings reported by retail-funded banks can be used to predict of future cash flows. This highlights that income smoothing leads to earnings that are informative of future bank performance.

Table XII reports the results for the estimation of Model 4, testing the moderating effect of the involvement of external auditors in national supervision. Consistent with  $H3$ , the coefficient of the interaction term  $EBTP_{i,t} \times BM2_{i,t} \times AUD$ , namely  $\beta_4$ , is positive and statistically significant (fourth column), supporting the idea that auditors' participation to supervisory activities has a positive association with income smoothing by market-oriented banks. This result is not in line with studies showing a negative association between auditors' involvement and income smoothing (Bouvatier *et al.*, 2014) but it does not contrast with the negative association to the ability of LLP of predicting the actual losses in IFRS banks found by Marton and Ruesson (2017), although they do not study smoothing effects. Overall, results are consistent with the view that, in countries with regulation providing for higher auditor involvement in supervision, market-oriented banks smooth income to produce an impression of alignment with supervisory objectives (Peterson and Arun, 2018).

Conversely, there is no moderating effect of the national regulation of the audit function on income smoothing practices of retail-funded and diversified-retail BMs. Indeed the

$LLP_{i,t}$	Overall effect	Model 3-BM1 Retail-funded	Model 3-BM2 Market-oriented	Model 3-BM3 Diversified-retail
$EBTP_{i,t}$	0.0311	-0.0126	0.0885***	-0.0344
$AUD_t$	0.0013	0.0006	0.0011	0.0008
$EBTP_{i,t} \times AUD_t$	-0.0028	0.0022	-0.0113*	0.0108
$BM1_{i,t}$		-0.0012		
$EBTP \times BM1_{i,t}$		0.0093		
$BM1_{i,t} \times AUD_t$		0.0002		
$EBTP_{i,t} \times BM1_{i,t} \times AUD_t$		0.0054		
$BM2_{i,t}$			-0.0014	
$EBTP \times BM2_{i,t}$			-0.1168***	
$BM2_{i,t} \times AUD_t$			-0.0000	
$EBTP_{i,t} \times BM2_{i,t} \times AUD_t$			0.0164**	
$BM3_{i,t}$				0.0020
$EBTP \times BM3_{i,t}$				0.0873
$BM3_{i,t} \times AUD_t$				-0.0001
$EBTP_{i,t} \times BM3_{i,t} \times AUD_t$				-0.0192
$CLoans_{i,t}$	-0.0041	-0.0039	-0.0040	-0.0043
$LLA_{i,t-1}$	0.0605*	0.0547*	0.0611*	0.0584
$List_{i,t}$	0.0168***	0.0183***	0.0168***	0.0169***
$CAP_{i,t}$	0.0018	0.0027	0.0032	0.0014
$GDP\_GR_t$	-0.0386***	-0.0391**	-0.0389**	-0.0382**
Intercept	-0.0034	0.0000	-0.0022	-0.0010
Year controls	Included	Included	Included	Included
Bank fixed effects	Included	Included	Included	Included
$R^2$	0.2586	0.3082	0.2916	0.2794
No. of observations	788	788	788	788
Banks	194	194	194	194

**Table XII.**  
The moderating effect of auditor involvement in national supervision ( $H3$ )

**Notes:** Definitions for all the variables are provided in Table I. \*, \*\*, \*\*\* Significant at 10, 5 and 1 per cent levels, two-tailed, respectively

coefficient of the triple interaction term  $EBTP_{i,t} \times BM1_{i,t} \times AUD$  is positive but not statistically significant (third column) as well as the coefficient of  $EBTP_{i,t} \times BM3_{i,t} \times AUD$  (fifth column), suggesting that smoothing behaviours adopted by retail-funded banks are not influenced by the involvement of auditors in national supervision.

Concerning the moderating effect of external governance (Table XIII), the coefficient of the triple interaction term is not statistically significant referring to retail-funded and market-oriented banks. Nevertheless, the coefficient of  $EBTP_{i,t} \times BM3_{i,t} \times EGOV$  is negative and statistically significant, suggesting that the effect of external governance on bank income smoothing differs depending on the BM. Specifically, in countries with higher governance by private investors, external monitoring reduces incentives to smooth income in banks characterised by the highest share of loans to customers and diversification among interbank liabilities and customer deposits. This finding is consistent with evidence on worldwide samples provided by Fonseca and González (2008), who document the constraining effect of external governance on bank income smoothing, and by Leuz *et al.* (2003) with reference to non-financial firms.

Additional analyses have been conducted to tests the robustness of results. Model 2 and Model 2.b have been run including the lagged formulation of the BM dummy variables to avoid that the effects of earnings management in year  $t$  affect the BM of the previous year. Results maintain their validity even after the inclusion of the lagged dummy variable. Additionally, the discretionary component of LLP – estimated as the residuals from Model 1 – is negatively associated to retail-funded BMs. This shows that

$LLP_{i,t}$	Overall effect	Model 4-BM1 Retail-funded	Model 4-BM2 Market-oriented	Model 4-BM3 Diversified-retail
$EBTP_{i,t}$	0.0119	-0.0030	0.0719***	-0.0496
$GOV_t$	-0.0000	0.0002	0.0002	-0.0007
$EBTP_{i,t} \times GOV_t$	0.0004	0.0004	-0.0063*	0.0104
$BM1_{i,t}$		0.0073		
$EBTP \times BM1_{i,t}$		0.0398		
$BM1_{i,t} \times GOV_t$		-0.0009		
$EBTP_{i,t} \times BM1_{i,t} \times GOV_t$		-0.0003		
$BM2_{i,t}$			-0.0060	
$EBTP \times BM2_{i,t}$			-0.0856**	
$BM2_{i,t} \times GOV_t$			0.0005	
$EBTP_{i,t} \times BM2_{i,t} \times GOV_t$			0.0078	
$BM3_{i,t}$				-0.0005
$EBTP \times BM3_{i,t}$				0.0798
$BM3_{i,t} \times GOV_t$				0.0002
$EBTP_{i,t} \times BM3_{i,t} \times GOV_t$				-0.0145**
$CLoans_{i,t}$	-0.0044	-0.0039	-0.0034	-0.0047
$LLA_{i,t-1}$	0.0571	0.0534	0.0476	0.0575*
$List_{i,t}$	0.0164***	0.0178***	0.0170***	0.0186***
$CAP_{i,t}$	0.0015	0.0020	0.0032	0.0022
$GDP\_GR_t$	-0.0408**	-0.0409**	-0.0391**	-0.0414**
Intercept	0.0057	0.0029	0.0031	0.0095
Year controls	Included	Included	Included	Included
Bank fixed effects	Included	Included	Included	Included
$R^2$	0.2497	0.3042	0.2821	0.2768
No. of observations	754	754	754	754
Banks	189	189	189	189

**Table XIII.**  
The moderating effect of external governance exerted by private investors ( $H4$ )

**Notes:** Definitions for all the variables are provided in Table I. \*, \*\*, \*\*\*Significant at 10, 5 and 1 per cent levels, two-tailed, respectively

earnings reported by these banks exhibit higher quality and corroborates results of the cash flow predictability test. Finally, 15 observations out of 820 correspond to banks reporting under National GAAP. Then, the models have been run considering only IFRS adopters, leading to unvaried results.

## 5. Concluding remarks

This paper explores whether bank income smoothing can be influenced by the BM and the extent to which this link is affected by country-level factors, namely the auditor involvement in supervision and external governance.

The results of the regression analysis support the idea that income stability and fewer debt covenants motivate retail-funded BMs to smooth income due to informative reasons. These findings are partially in contrast with studies that relate higher earnings quality of banks with traditional funding structure to lower income smoothing. Additionally, findings on the moderating role of country-level factors show that the supervisory emphasis on the audit function is positively associated with income smoothing in market-oriented banks. This suggests that, being income smoothing aligned to prudential provisioning (Gaston and Song, 2014), market-oriented banks use income smoothing to create an impression of alignment with supervisory objectives (Peterson and Arun, 2018) in European countries characterised by high complementarity between the audit function and national supervision. Moreover, in line with prior evidence on non-financial firms (Leuz *et al.*, 2003), results show that external governance constrains smoothing in diversified-retail banks. This suggests that, in the case of diversified-retail BMs, the high reliance on wholesale markets could make banks more sensitive to external governance.

Differently from prior literature, this paper does not limit the observation to partial features of the balance sheet using them as proxies of the BM. It focusses on the BM by considering the combination of the features of the asset-liability mix that mirrors the management's hypothesis about the way in which the entity creates value to customers (Teece, 2010; Massa *et al.*, 2017) based on the idea that the BM cannot be adequately described by resorting to partial features. Additionally, the paper observes the role of the BM through two competing perspectives on income smoothing, namely the opportunistic and the information enhancement perspective.

Moreover, the findings provide further support to a counterintuitive argument, namely the penalty hypothesis (Shen and Chih, 2005), which assumes that stronger national supervision could even increase bank incentives to manipulate earnings to avoid supervisory penalties and has already been verified empirically in the European context.

The findings are of interest to standard setters and European regulators. From the standard setters' point of view, evidence lends empirical support to the usefulness of the expected-loss approach for estimating credit losses recently introduced in Europe by the application of IFRS 9. Such change has been indicated as a double-edged sword (Bushman and Landsman, 2010; Bushman, 2016) due to the broader room left to bankers to manage provisions, but it could produce an actual improvement of informativeness of financial reporting in case of retail-funded banks, key to the real economy.

From a regulatory perspective, at a general level, the link between BM and accounting underscores the crucial role of the BM analysis also to understand the reporting incentives and the motivations leading to opaque accounting practices. More specifically, the positive association between supervisory emphasis on the audit function and market-oriented banks' income smoothing deserves the attention of European supervisors. Indeed, regulatory reforms aimed at increasing the power of monitoring subjects (namely, the supervisory authorities and the external auditors) could bring the inherent risk to induce opportunistic behaviours in market-oriented BMs. This issue deserves adequate consideration especially in the light of the introduction of Directive 537/2014 on audits of public interest entities.

The main limitations to the study derive from the indirect test of the effect of country-level factors, performed through indirect proxies and from the exclusion of issues arising from mechanisms of internal governance, which could represent an area of interest for further research.

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