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*Title Page (with authors and affiliations)

Does Basel II affect the Market Valuation of Discretionary Loan Loss Provisions?

Malika Hamadi[¶]
Andréas Heinen[‡]
Stefan Linder[§]
Vlad-Andrei Porumb [‖**]

February 10, 2016

Abstract

We use a sample of banks from 24 European countries to investigate whether the adoption of the Basel II Capital Accord in 2008 affects the market valuation of discretionary loan loss provisions (DLLPs). While Basel II lowers the incentives of Internal Ratings Based (IRB) banks to recognize income-increasing DLLPs in an opportunistic manner, it has no such impact on the remaining banks, which adopt the Standardized methodology. We use this setup in a difference in differences (DiD) design, where Standardized banks act as a control group. Our evidence supports the three hypotheses that, for IRB relative to Standardized banks, Basel II is associated with (i) less income-increasing DLLPs, and (ii) less income-smoothing via DLLPs, which enhances the informational content of DLLPs about future loan losses, and leads to (iii) higher market valuation of DLLPs. Our findings are timely and offer policy implications for future regulatory developments in the banking industry.

Keywords: Basel II, market valuation, income smoothing, loan loss provisions, regulatory capital, banks, Europe.

JEL Classification: *G21; G14; M41; G28*

[¶]School of Management, University of Leicester, LE1 7RH Leicester, UK.
[‡]THEMA, Université de Cergy-Pontoise. Address: 33 Boulevard du Port, 95011 Cergy-Pontoise, France. Email: Andreas.Heinen@u-cergy.fr
[§]ESSEC Business School. Address: Avenue Bernard Hirsch, BP 50105, 95021 Cergy-Pontoise, France. Email: linder@essec.fr
[‖]THEMA, Université de Cergy-Pontoise. Address: 33 Boulevard du Port, 95011 Cergy-Pontoise, France. Email: vladandrei.porumb@essec.edu
[**]Corresponding author. Tel: +31 503634671

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February 8, 2016

Abstract

We use a sample of banks from 24 European countries to investigate whether the adoption of the Basel II Capital Accord in 2008 affects the market valuation of discretionary loan loss provisions (DLLPs). While Basel II lowers the incentives of Internal Ratings Based (IRB) banks to recognize income-increasing DLLPs in an opportunistic manner, it has no such impact on the remaining banks, which adopt the Standardized methodology. We use this setup in a difference in differences (DiD) design, where Standardized banks act as a control group. Our evidence supports the three hypotheses that, for IRB relative to Standardized banks, Basel II is associated with (i) less income-increasing DLLPs, and (ii) less income-smoothing via DLLPs, which enhances the informational content of DLLPs about future loan losses, and leads to (iii) higher market valuation of DLLPs. Our findings are timely and offer policy implications for future regulatory developments in the banking industry.

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1 Introduction

Loan loss provisions (LLPs) are banks' main accrual, over which managers have considerable discretion. Managers can use this discretion either opportunistically to smooth income (i.e. manage earnings) or to convey private information to investors (Beatty, Ke & Petroni 2002, Kanagaretnam, Lobo & Mathieu 2003, Kanagaretnam, Lobo & Yang 2004, Kanagaretnam, Lim & Lobo 2010). Under Basel I, reducing LLPs allows managers to increase earnings, regulatory capital, and thereby the market valuation of the bank (Kim & Kross 1998). The Basel II Capital Accord, effective since 2008, introduces a countervailing link between LLPs and regulatory capital. In this paper we investigate whether this new regulation affects the market valuation of the discretionary part of LLPs.

Basel II has sparked substantial debate and scholarly interest in recent years regarding, among others, internal risk rating systems (Jacobson, Lindé & Roszbach 2006), the potential pro-cyclical effect of the regulation on lending cycles (Gordy & Howells 2006, Heid 2007), proposals for forward-looking modeling of default probabilities (Pederzoli & Torricelli 2005), or country-specific differences in the implementation of the new regulation (Barth, Caprio & Levine 2008, Herring 2007). In contrast, the effect of Basel II on banks' provisioning practices has not received attention so far. As documented in the extant literature, changes in banking or accounting regulation affecting banks' provisioning practices have an impact also on the informativeness of banks' discretionary loan loss provisions (DLLPs) and their market valuation. For example, Moyer (2006) finds evidence that banks make accounting adjustments in order to follow capital adequacy guidelines. Consistent with this, Kim & Kross (1998) find that Basel I introduces an incentive for banks to reduce LLPs in order to increase both net income and regulatory capital. In turn, Ahmed, Takeda & Thomas (1999) find that after the adoption of Basel I, banks use LLPs to manage capital but not earnings. Likewise, Kilic, Lobo, Ranasinghe & Sivaramakrishnan (2013) demonstrate that the change in accounting regulation implied by the introduction of Statement of Financial Accounting Standards (SFAS) 133 increases the reliance on DLLPs for income smoothing

and therefore reduces their market valuation.

Basel II aims to have a significant impact on banks' provisioning practices. It differentiates banks according to their approach to minimum capital requirements into Internal Ratings Based (IRB) and Standardized banks. It also makes it less attractive for the prior ones to use the discretion in provisioning implied by International Financial Reporting Standards (IFRS) in order to smooth income via income-increasing (negative) discretionary loan loss provisions (DLLPs). While under Basel I, a decrease in banks' LLPs resulted for all banks in both an increase in earnings and capital ratio[1], the adoption of Basel II requires IRB banks to compute a forward-looking measure of expected loss on their loan portfolio and to deduct the difference between this expected measure and the actual (accounting) LLPs from their regulatory capital (Basel Committee on Banking Supervision 2004). Thus, whereas the incentive to smooth income for Standardized banks does not change with the adoption of Basel II, every additional Euro of income-increasing DLLPs reduces the regulatory capital of IRB banks by *(1- tax rate) (1-d)* Euros, where *d* is the dividend payout ratio. By introducing a direct relation between LLPs and the level of regulatory capital, Basel II aims at strengthening IRB banks' capital solvency, as it lowers their incentive for income smoothing through an opportunistic use of income-increasing DLLPs. Therefore, with the adoption of Basel II, IRB banks should rely less on DLLPs for the purpose of smoothing income as this makes compliance with the solvency requirements difficult. Thus the DLPs of IRB banks should exhibit a heightened informational content for financial market participants.

Extant evidence suggests that the less opportunistic DLLPs are, the higher is their market valuation (Wahlen 1994). For instance, Kanagaretnam, Krishnan & Lobo (2009) find that the valuation of DLLPs depends on auditor reputation, which is inversely related to the opportunistic use of DLLPs. Hence, Basel II should lead to an increase in the market

[1]More precisely, the 1990 Basel I Capital Accord defines General loan loss provisions (GLLPs) as provisions set aside to cover expected "but not yet incurred" losses. These GLLPs thus contain forward-looking information on a bank's future credit losses (Gebhardt & Novotny-Farkas 2011)). According to Basel I, they are not part of Tier 1 capital and they can only be included directly in Tier 2 capital up to a proportion of 1.25 percent of risk-weighted capital. Therefore, for banks whose GLLPs exceed this threshold, a decrease in LLPs results in an increase in both earnings and capital ratio.

valuation of IRB banks' DLLPs.

We draw on a sample of 103 listed banks from 24 European countries for the years 2006 to 2011 and use a difference-in-difference (DiD) research design to test our hypotheses. Since many of the variables necessary to study the impact of Basel II on the valuation of DLLPs are not available from public databases, such as BVD Bankscope, we hand-collect much of our data. This results in a unique data set that allows us to test our hypotheses using empirical models which so far have only been used for U.S. samples, where data is more readily available than in Europe.

In order to investigate whether the adoption of Basel II has affected the market valuation of IRB banks' DLLPs, we perform the following three tests. We first estimate DLLPs as the residuals of a regression of LLPs on all their normal determinants (as in Wahlen 1994, Adams, Carow & Perry 2009, Kanagaretnam et al. 2009). Further, we follow Cohen, Dey & Lys (2008) and split DLLPs into income-increasing and income-decreasing ones. In line with our expectations, after the adoption of Basel II, income-increasing DLLPs are lower for IRB relative to Standardized banks. Since Standardized banks are not affected by the new prudential regulations, they can serve as a control group in our difference-in-difference design. This finding raises the question whether the reduction in income-increasing DLLPs translates into a lower level of opportunistic reporting, proxied by income smoothing behavior.

Therefore, in a second step, we test the effect of the adoption of Basel II on the association between LLPs and earnings before provisions and taxes (EBPT) for IRB and Standardized banks. Consistent with our prediction, the level of income smoothing through DLLPs is significantly lower in the post- than in the pre-Basel II period for IRB relative to Standardized banks. This suggests that Basel II discourages managers of IRB banks to recognize opportunistic DLLPs, which is in line with banking regulators' objective of ensuring the long-term financial stability of banks (Borio, Furfine & Lowe 2001, Laeven & Majnoni 2003).

The economic climate prevailing in the year of adoption of Basel II represents a notable

challenge for the empirical test of our hypotheses. Fudenberg & Tirole (1995) and DeFond & Park (1997) argue that in times of economic hardship, income-increasing activities are more prevalent, due to concerns about job security and management credibility. Thus, given the economic crisis we should find that all banks engage in more income-increasing activities following the outbreak of the financial crisis in 2007.[2] Indeed we find that Standardized banks recognize more income-increasing DLLPs, and smooth income more after the adoption of Basel II, which is a normal response to economic turmoil (as documented in Liu & Ryan 2006). Unlike Standardized banks, IRB banks need to comply with Basel II, which curbs their ability to smooth income through income-increasing DLLPs in the post-Basel II period. As expected, our results confirm that IRB banks do not increase their opportunistic reporting after 2008. This indicates that our results are attributable to the change in banking regulation rather than to the economic crisis.

In a third step, we regress stock returns on DLLPs to investigate whether DLLPs are valued more by the market, given the impact of Basel II on both income-increasing DLLPs and income smoothing. We find that the post-adoption DiD coefficient of DLLPs is positive and significant, suggesting that the market assigns a higher valuation to the DLLPs of IRB banks after the adoption of Basel II. The positive association between the returns and IRB banks' DLLPs in the post-Basel II period sends a two-fold message to financial market participants. First, DLLPs contain more information regarding future expected losses, which is incorporated in stock prices by the market, consistent with previous literature (such as Wahlen 1994, Beaver & Engel 1996). Second, the lesser reliance on DLLPs for income-smoothing purposes also tells investors that in times of financial distress IRB banks are more likely to maintain capital solvency, which is positively valued by investors (Huizinga & Laeven 2012).

We perform a number of robustness tests on our results. First, in our estimations we control for the impact of macroeconomic variables on loan loss provisions. We check the robustness of our findings to the use of different time windows. A set of placebo tests

[2]The beginning of the economic crisis is often associated with the rapid rise in interbank interest rates in the U.S. on August 9, 2007.

confirm that the effect we find is due to the new regulation and not to possible confounding factors. Finally, we check the robustness of our results to the use of an alternative control group, composed of U.S. commercial banks instead of Standardized banks.

Our findings contribute to the banking literature and provide policy implications for banking and accounting regulators. In particular, we show that a change in prudential regulation aiming at furthering financial stability has a significant impact on IRB banks' provisioning practices and heightens the informational content and the market valuation of the DLLPs of IRB banks. The results of our study inform the debate about the effects and merits of Basel II and the potential implications of Basel III. Moreover, these results are relevant for accounting regulators and practitioners in the context of the introduction of IFRS 9 in 2018. This new accounting standard introduces a one year horizon forward-looking expected credit loss model, which conforms to the requirements of Basel II. Therefore, we offer accounting regulators early evidence about the relevance of IFRS 9 from the perspective of investors.

The rest of the paper is structured as follows. In Section 2 we describe our hypotheses. We present our empirical methodology in Section 3, and our data in Section 4. Section 5 discusses our results and Section 6 our robustness tests. Finally, Section 7 presents our conclusions.

2 Hypotheses

General loan loss provisions (GLLPs) are provisions set aside to cover expected "but not yet incurred" losses. By construction, they contain forward-looking information on a bank's future credit losses (Gebhardt & Novotny-Farkas 2011). According to the 1990 Basel I Capital Accord, GLLPs are not part of Tier 1 capital and they can only be included directly in Tier 2 capital up to a proportion of 1.25 percent of risk-weighted capital. Therefore, for banks whose GLLPs exceed this threshold, a decrease in LLPs results in an increase in both earnings and capital ratio. More specifically, a reduction in LLPs of *1 Euro* leads to

an increase in earnings of (1-*tax rate*) Euros. This has an indirect effect of *(1- tax rate) (1-d)* Euros on Tier 1 capital, where *d* is the dividend payout ratio, through the channel of retained earnings.[3] Hence, under Basel I, banks have an incentive to engage in income-increasing activities and reduce LLPs, since this achieves the double objective of increasing net income and regulatory capital (Kim & Kross 1998).

This incentive to understate LLPs under Basel I is further strengthened by the accounting regulation in place in Europe. IFRS, through IAS 39 *Financial Instruments* prohibits the recognition of GLLPs altogether, so banks cannot include GLLPs in Tier 2 capital, the channel through which provisioning could directly influence the level of regulatory capital. Basel I also prohibits inclusion of any other types of provisions other than GLLPs , even if they were allowed by accounting regulations. Thus, by prohibiting GLLPs, IFRS cut the only link recognized under Basel I from LLPs to regulatory capital.

Under IFRS banks can exercise their discretion in provisioning by recognizing *collective* LLPs. Collective provisions are set for "incurred but not yet reported (not yet observed)" losses (PriceWaterhouseCooper's 2012), which are similar to provisions recognized for the "expected but not yet incurred" losses (GLLPs) that IFRS prohibits (PriceWaterhouseCooper's 2004). Banks have the possibility to use their discretion and recognize *collective* LLPs, but according to Basel I, only provisions created for losses not yet identified may be included in Tier 2 capital. Specific and collective provisions cannot be included in Tier 2 capital, because they do not cover "not-incurred" losses.[4] Thus, in the pre-Basel II period, banks have no incentive to increase their provisions, because this would decrease their earnings and concurrently decrease their Tier 1 capital. Instead, banks have an incentive to register

[3]Banks include their retained earnings in Tier 1 capital. Specifically, Tier 1 capital consists of common stock, retained earnings, capital reserves and capital surplus. Tier 2 capital consists of revaluation reserves, preferred undisclosed reserves, subordinated debt, GLLPs (under Basel I) and hybrid capital instruments.

[4]"General provisions or general loan-loss reserves are created against the possibility of losses not yet identified. Where they do not reflect a known deterioration in the valuation of particular assets, these reserves qualify for inclusion in Tier 2 capital. Where, however, provisions or reserves have been created against identified losses or in respect of an identified deterioration in the value of any asset or group of subsets of assets, they are not freely available to meet unidentified losses which may subsequently arise elsewhere in the portfolio and do not possess an essential characteristic of capital. Such provisions or reserves should therefore not be included in the capital base." (Basel Committee on Banking Supervision 1991, paragraph 18, p. 5)

income-increasing (negative) DLLPs, in order to keep their LLPs small.

In contrast, Basel II allows for collective provisions to be used for the purpose of increasing regulatory capital for banks that adopt the IRB approach. Basel II differs from Basel I in that it divides banks according to their internal risk management systems into IRB and Standardized ones, and it adjusts their capital requirements accordingly. The IRB approach is characterized by internally determined risk measurement and high differentiation in required capital between riskier and safer credits.[5] The Standardized approach is implemented by banks with less developed internal risk management systems. Their credit risk and the size of their capital requirements are measured based on external credit assessments from ratings agencies.

The IRB approach generally results in a lower capital charge, and thus banks have strong incentives to adopt it. In order to become IRB, banks need to apply to their national regulators and show that they have the technical capacity to accurately measure the credit risk of their portfolio in-house. The costs of setting up such a sophisticated IRB risk management system are extremely high. This means that in practice, banks segment naturally into large banks that adopt the IRB approach and smaller banks that stay with the Standardized approach (see e.g. Hakenes & Schnabel 2011). To alleviate potential concerns of endogeneity due to the choice between Standardized and IRB banks, we include bank fixed effects and control for size in our empirical work.[6]

For Standardized banks, Basel II does not change the regulatory treatment of LLPs. Nonetheless, the post-2008 period is marked by increased economic turmoil due to the onset of the financial crisis. According to previous studies, managers are more likely to perform income-increasing activities and smooth earnings during economic downturns (Fudenberg & Tirole 1995, DeFond & Park 1997). Given this incentive and the fact that the provisioning

[5]Basel II divides IRB banks even further into Foundation IRB and Advanced IRB. However, these two options do not differ with respect to the computation of capital requirements. For simplicity, we therefore refer to both options in the following as IRB.

[6]Bank fixed effects will address the potential effect of all unobserved time-invariant variables on the choice between the status of Standardized and IRB banks. As these determinants do not vary much over time, given that the choice of becoming IRB is unlikely to get reverted, we believe this addresses most of the selection issue.

of Standardized banks is not affected by the adoption of Basel II, we expect that they will engage in more income-increasing activities after 2008. Whereas IRB banks are subjected to similar incentives due to macroeconomic conditions, their income-increasing activities are constrained by the adoption of Basel II. According to the new Capital Accord, they are required to cover all expected losses with specific and/or collective LLPs (Basel Committee on Banking Supervision 2004). Regulatory capital under Basel II is only supposed to cover *unexpected losses*. Any difference between provisions and expected losses has to be covered with regulatory capital. More specifically, IRB banks need to compute expected losses on a one year horizon and to compare this amount with actual (accounting) LLPs. The difference has to be covered with 50 percent Tier 1 and 50 percent Tier 2 capital. Thus, when performing income-increasing activities, IRB banks face the risk of suffering capital pressures.

Like Cohen et al. (2008), we decompose DLLPs into income-increasing (negative) and income-decreasing (positive) DLLPs and separately analyze the effect of the change in regulation on each component. Separating negative from positive DLLPs is important to understand how reporting responds to regulatory requirements. Basel II introduces an incentive to narrow the gap between actual LLPs and expected losses, which can be reduced either by decreasing negative DLLPs (in absolute terms) or by increasing positive DLLPs. As documented by Kanagaretnam, Krishnan & Lobo (2010), due to their positive impact on earnings, income-increasing DLLPs are more likely to be driven by opportunistic motives (earnings management) than income-decreasing DLLPs. In order to close the gap between LLPs and expected losses and avoid a reduction in regulatory capital, banks have an incentive to reduce their opportunistic DLLPs, as a result of the new regulation. Since the new capital requirements apply only to the banks following the IRB approach, we expect a decrease in the absolute value of income-increasing DLLPs for these banks relative to the Standardized banks. This leads to our first hypothesis:

Hypothesis 1.A. *Income-increasing DLLPs decrease after the adoption of Basel II for IRB relative to Standardized banks.*

According to Hypothesis 1.A, we expect that Basel II will lead IRB banks to narrow the gap between actual LLPs and expected losses by reducing income-increasing DLLPs relative to Standardized banks. In principle, they could achieve the same result by recognizing more income-decreasing DLLPs. However, if banks choose to strategically increase positive DLLPs and build up "cookie-jar" reserves, they will have to revert them in future periods by recognizing income-increasing DLLPs. They will then incur high regulatory capital costs. Thus, at best, this is only a short-term solution and it will not close the gap between actual LLPs and expected losses in the long run. This option becomes even less likely in the light of Hypothesis 1.A, which already predicts a reduction in income-increasing DLLPs. The mechanical relationship between income-increasing and income-decreasing DLLPs in the long run implies that any discretionary reporting based on accruals needs to be reverted in future periods.[7] Thus, we expect that given the strong incentive to reduce income-increasing DLLPs under Basel II, in the long run IRB banks will also reduce their income-decreasing DLLPs, relative to Standardized banks. Given our short-term window of analysis, we have a mild expectation to find support for the following hypothesis:

Hypothesis 1.B. *Income-decreasing DLLPs decrease after the adoption of Basel II for IRB relative to Standardized banks.*

According to Hypotheses 1.A and 1.B, Basel II produces incentives to lower income-increasing and income-decreasing DLLPs for IRB banks. Hypothesis 2 relates the pre- to post-adoption difference in DLLPs between IRB and Standardized banks to a lesser reliance on DLLPs for the purpose of earnings management, proxied by income smoothing. According to Liu & Ryan (1995) and Liu & Ryan (2006), all else equal, banks prefer smoother earnings.

Nonetheless, extant research suggests that banks adjust their income smoothing behavior to regulatory pressure. For instance, Gebhardt & Novotny-Farkas (2011) find that the adoption of IFRS lowers banks' incentives to use discretion in provisioning, leading to an understatement of LLPs and reduced levels of income smoothing. We expect a similar effect

[7] We are grateful to an anonymous referee for pointing this out.

for Basel II. As already outlined, the adoption of Basel II provides IRB banks with a strong incentive to fill the gap between incurred and expected losses. As a reaction to the capital pressure imposed on them under Basel II, banks no longer have incentives to use their discretion over the recognition of collective provisions in order to understate DLLPs. This may affect the level of income smoothing via DLLPs.

Two possible takes on this impact are plausible. On the one hand, given Basel II's capital pressure, banks may recognize more positive DLLPs and simply "mechanically" smooth their income by incorporating future expected losses into earnings, see Gebhardt & Novotny-Farkas (2011) for a related discussion on LLPs and IFRS. On the other hand, under the threat of decreasing their regulatory capital by the gap in provisioning, IRB banks may rely less on the mostly opportunistic income-increasing DLLPs for income smoothing purposes. This is because in terms of regulatory capital income smoothing through DLLPs becomes more "expensive" after the adoption of Basel II. Table 1 summarizes the regulatory changes and their implications. Hence, for IRB banks, the opportunistic recognition of income-increasing DLLPs for income smoothing purposes should be *less prevalent* after the adoption of Basel II.

However, after 2008, banks' incentives to smooth earnings are further affected by the onset of the financial crisis. According to previous research, banks smooth their earnings more in times of economic turmoil (Liu & Ryan 1995). Therefore, both Standardized and IRB banks have an incentive to smooth their earnings in the post-adoption period. Since the regulatory pressure introduced by the new Capital Accord does not apply to the provisioning of Standardized banks (Gebhardt & Novotny-Farkas 2011), their recognition of income-increasing DLLPs for income smoothing purposes is solely driven by the effect of the economic crisis. Thus, given the asymmetric impact of Basel II on the two groups, only the Standardized are expected to manage their earnings more in the post-adoption period. Therefore, relative to these banks, the income smoothing of IRB banks via DLLPs should decrease with the adoption of Basel II, which leads us to our second hypothesis:

Hypothesis 2. *Income smoothing through DLLPs decreases after the adoption of Basel II*

for IRB relative to Standardized banks.

Accruals in general and DLLPs in particular, contain both an informational and a non-informational component. Since LLPs represent banks' main accruals, by construction DLLPs should reflect information about future loan defaults (Beaver & Engel 1996, Wahlen 1994, Kilic et al. 2013). Consequently, their market valuation will be low if they are perceived as driven by opportunistic motives (Kanagaretnam et al. 2009, Lennox & Park 2006, Dechow, Hutton, Kim & Sloan 2012). Through the incurred loss approach of International Accounting Standard (IAS) 39, IFRS discourages managers to incorporate their private information regarding expected loan losses into DLLPs (Gebhardt & Novotny-Farkas 2011). As a result, managers are prevented from disclosing their expectations regarding foreseeable losses, and they are likely to end up communicating less information to the market through DLLPs. Nonetheless, they can make use of collective provisions to increase the variability in DLLPs. This can be done either to enhance the informational component of banks' DLLPs or to attain opportunistic objectives by inflating the non-informational component of DLLPs. Basel II provides IRB banks with an incentive to avoid understating DLLPs through income-increasing activities. The incentive to reduce the largely opportunistic income-increasing DLLPs (Kanagaretnam et al. 2009) should lead to increased valuation of DLLPs after the adoption of Basel II.

Moreover, according to Huizinga & Laeven (2012), in times of financial distress, such as the one that prevailed in 2008, when Basel II was implemented, investors positively value regulations that encourage banks to maintain capital solvency. In line with this effect, if IRB banks comply with the requirements of Basel II and avoid understating DLLPs they will not suffer regulatory capital losses. In contrast, if Standardized banks understate their DLLPs, this will not have a direct impact on their regulatory capital. Provided that IRB banks do not increase the level of income-smoothing through DLLPs, a positive market valuation of DLLPs is due to their enhanced informational content regarding future losses and regarding the banks' ability to meet capital solvency requirements. Given that Basel II applies only to IRB banks, we expect to find a change in the market valuation of IRB

relative to Standardized banks. Based on the extant literature we therefore formulate our third hypothesis:

Hypothesis 3. *The market valuation of DLLPs increases after the adoption of Basel II for IRB relative to Standardized banks.*

3 Empirical models

We test our hypotheses using a panel data method with firm fixed effects in order to control for the possible effect of time-invariant unobserved heterogeneity at bank-level, which could otherwise lead to omitted variable bias and cause endogeneity problems in pooled ordinary least squares (OLS) estimation. Failing to control for bank fixed effects can result in biased coefficients and misleading conclusions. It should be noted that country fixed effects are subsumed by bank fixed effects, which are a much stronger control, as they account not only for differences at the level of the country but also at the level of the individual bank. Given that our main concern is to shield our estimations from potential endogeneity concerns, we chose to use firm fixed effects for all models throughout the paper, which is the more conservative option. In the following subsections we provide a detailed explanation of the specific models that we estimate to test each one of our hypotheses.

3.1 Income-increasing and income-decreasing DLLPs

In order to determine the impact of Basel II on the level of income-increasing and income-decreasing DLLPs we use a two-stage approach. In the first stage we follow previous literature (Wahlen 1994, Kanagaretnam et al. 2004, Kanagaretnam et al. 2009) and estimate the non-discretionary component of LLPs as the residual of the following OLS regression of LLPs on their normal determinants:

$$\mathrm{LLP}_{ict} = \theta_0 + \theta_1 \mathrm{NPL}_{ict} + \theta_2 \Delta\mathrm{NPL}_{ict} + \theta_3 \mathrm{Loan}_{ict} + \theta_4 \Delta\mathrm{Loan}_{ict} + \theta_5 \mathrm{NCO}_{ict} + \varepsilon_{ict} \quad (1)$$

where, for bank i, year t, and country c, LLP_{ict} stands for loan loss provisions scaled by beginning total assets, NPL_{ict} and ΔNPL_{ict} are, respectively, non-performing loans and their differences scaled by beginning total assets, Loan_{ict} and ΔLoan_{ict}, stand for, respectively, outstanding loans and their differences scaled by beginning total assets, NCO_{ict} is net charge-offs scaled by beginning total assets, and ε_{ict} is a residual. While there are a number of possible loan loss provision models (for a detailed discussion, see Beatty & Liao 2014), our choice is limited by our use of a cross-country sample. Moreover, we refrain from using specifications that include leads and lags, as this might interfere with our research design and obscure the comparison of the pre- and post-Basel II periods. We consider as normal determinants of LLPs the level and change of loans and nonperforming loans (NPLs), as well as net charge-offs (NCO). Banks are expected to determine the level of LLPs according to the level of lending. Given the uncertainty regarding the quality of loans, the effect of change in loans on LLPs is ambiguous (Kanagaretnam et al. 2004). In contrast, LLPs should increase with NPLs, which are an objective measure of portfolio risk (Wahlen 1994). As changes in NPLs are likely to be serially correlated (Wahlen 1994), they constitute a good predictor of future losses. We further expect that provisions increase with NCOs, as the two variables are mechanically related (Kanagaretnam et al. 2004). Since our aim is to control for normal determinants of LLPs, we choose not to include control variables such as bank size and Tier 1 ratio that do not qualify as normal determinants of LLPs, but are more likely connected to the discretionary part of LLPs, such as Tier 1 and Size (Ahmed et al. 1999, Fonseca & Gonzalez 2008).

Table 2 provides further details about our variables. The estimated residual from Equation (1) is the discretionary part of LLPs, $\text{DLLP}_{ict} \equiv \hat{\varepsilon}_{ict}$ (Wahlen 1994, Kanagaretnam et al. 2004, Kanagaretnam et al. 2009). In the second stage we split DLLPs into income-increasing (negative) and income-decreasing (positive) DLLPs. We further use a DiD design to test whether IRB banks use their discretion to recognize more or less income-increasing and income-decreasing DLLPs, relative to Standardized banks, subsequent to the adoption of Basel II. We build on Ashbaugh, LaFond & Mayhew (2003), Kanagaretnam et al. (2009),

and the cross-country study of Kanagaretnam, Krishnan & Lobo (2010). In addition, we also include bank fixed effects in our model. This allows us to control for unobserved time-invariant bank-level heterogeneity. We estimate the following equation to control for the determinants of DLLPs:

$$\begin{aligned} \text{DLLP}_{ict} =& \theta_0 + \theta_1 \text{Basel}_t + \theta_2 \text{IRB}_i + \theta_3 \text{Basel}_t \cdot \text{IRB}_i \\ &+ \theta_4 \text{LLP}_{ic,t-1} + \theta_5 \text{EBPT}_{ict} + \theta_6 \text{Loss}_{ict} + \theta_7 \text{Size}_{ict} \\ &+ \theta_8 \text{Growth}_{ict} + \theta_9 \text{Tier1}_{ict} + \theta_{10} \text{GDP Growth}_{ct} \\ &+ \theta_{11} \Delta \text{Unemployment}_{ct} + \gamma_t + \delta_i + \varepsilon_{ict}, \end{aligned} \tag{2}$$

where Basel_t is a dummy for the post-Basel II adoption period, IRB_i is a dummy for banks that employ the IRB methodology after the adoption of Basel II, $\text{LLP}_{ic,t-1}$ is lagged LLPs scaled by beginning total assets, EBPT_{ict} is earnings before provisions and taxes scaled by beginning total assets, Loss_{ict} is an indicator variable set equal to 1 if net income < 0, and 0 otherwise, Size_{ict} is bank size, measured as the log of beginning total assets, Growth_{ict} is the growth rate of total assets, Tier1_{ict} is Tier 1 capital scaled by beginning total assets, GDP Growth_{ct} is the annual change in country-specific Gross Domestic Product, $\Delta\text{Unemployment}_{ct}$ is the annual change in country-specific unemployment, γ_t is a year dummy, δ_i is a bank fixed effect, and ε_{ict} is a residual. Note that in Equation (2) and in the following, we include $Basel_t$ and IRB_i for completeness of the DiD effect, but the θ_1 and θ_2 parameters are subsumed, respectively, by bank fixed effects and year dummies in the estimations that include them. Our controls include variables that do not qualify as normal determinants of LLPs, but are more likely connected to the *discretionary* part of LLPs, such as Tier 1 and Size. Due to the incentives for opportunistic reporting that Tier 1 introduces, it can be considered as one of the main determinants of DLLPs (see Ahmed et al. 1999, Fonseca & Gonzalez 2008). As for Size, the same explanation holds. Banks of different size are likely to be subject to different levels of regulatory scrutiny (Beatty & Liao 2014), which

will result in differences in the level of discretion over provisioning. We also include a Loss indicator, which accounts for the fact that banks are more likely to manipulate provisions when their income is negative (see Brown 2001, Frankel, Johnson & Nelson 2002). We further include a control for growth in assets, which is associated with abnormal accruals, as documented in prior research (see Ashbaugh et al. 2003, Kanagaretnam, Lim & Lobo 2010). Finally, we control for the effect of the business cycle on provisioning by including GDP growth (following Fonseca & Gonzalez 2008, Perez, Salas-Fuma & Saurina 2008, Bushman & Williams 2012, Kanagaretnam, Lobo & Wang 2015) and growth in unemployment (following Beck & Narayanamoorthy 2013).[8]

We estimate Equation (2) in turn with the absolute value of income-increasing and income-decreasing DLLPs as dependent variables. Income-decreasing (positive) DLLPs are defined as $\max(\text{DLLP}_{ict}, 0)$, whereas income-decreasing (negative) DLLPs are defined as $-\min(\text{DLLP}_{ict}, 0)$. Note that, according to this convention, both components are positive so that a *decrease* in both positive and negative DLLPs implies an overall *decrease* in discretionary reporting. Another way to think about this is that the share of LLPs that is discretionary decreases, or DLLPs become less volatile. Thus a negative DiD coefficient θ_3 in Equation (2) means that, after the adoption of Basel II, IRB banks recognize less income-increasing and income-decreasing DLLPs relative to Standardized banks.

3.2 Income smoothing through LLPs

Building on previous literature (Kanagaretnam et al. 2004, Liu & Ryan 2006, Fonseca & Gonzalez 2008, Gebhardt & Novotny-Farkas 2011, Kilic et al. 2013), we estimate income smoothing as the coefficient relating LLPs to earnings before provisions and taxes (EBPT), after controlling for differences in the amount and type of loans, non-performing loans, bank size, time dummies, and bank fixed effects. While our interest lies in the effect of Basel II on DLLPs, which involves regressing the residuals of Equation (1) on the Basel II dummy, such a two-step approach may lead to an attenuation bias in the second stage

[8] We thank an anonymous referee for suggesting this.

coefficients. Therefore, we follow Kanagaretnam et al. (2004) and, in a single step, regress LLPs simultaneously on their normal determinants and the Basel II dummy. Like Gebhardt & Novotny-Farkas (2011) we refrain from including taxes as a determinant of discretion in LLPs. Since in most European countries income taxes are based on individual (statutory) financial statements and individual tax effects cancel out for consolidated accounts, we do not expect tax incentives to play a major role.

Hypothesis 2 predicts that the adoption of Basel II is associated with a decrease in the level of income smoothing. In order to determine whether IRB banks smooth income less, we focus on the relationship between LLPs and EBPT. If banks engage in income smoothing, they will lower LLPs when EBPT are low and increase them when EBPT are high (Ahmed et al. 1999, Liu & Ryan 2006). Consequently, a positive association between these variables is an indicator that banks are smoothing income. We control for the normal determinants of LLPs in order to test whether the *discretionary part of LLPs* is associated with EBPT. We test Hypothesis 2 in the following regression, inspired by Kim & Kross (1998), Ahmed et al. (1999), Liu & Ryan (2006), and Kilic et al. (2013):

$$\begin{aligned}
\text{LLP}_{ict} =& \theta_0 + \theta_1 \text{Basel}_t + \theta_2 \text{IRB}_i + \theta_3 \text{Basel}_t \cdot \text{IRB}_i \\
&+ \theta_4 \text{EBPT}_{ict} + \theta_5 \text{Basel}_t \cdot EBPT_{ict} + \theta_6 \text{IRB}_i \cdot \text{EBPT}_{ict} + \theta_7 \text{Basel}_t \cdot \text{IRB}_i \cdot \text{EBPT}_{ict} \\
&+ \theta_8 \text{NPL}_{ict} + \theta_9 \Delta\text{NPL}_{ict} + \theta_{10} \text{Loan}_{ict} + \theta_{11} \Delta\text{Loan}_{ict} + \theta_{12} \text{NCO}_{ict} \\
&+ \theta_{13} \text{Tier1}_{ict} + \theta_{14} \text{Size}_{ict} + \theta_{15} \text{GDP Growth}_{ct} \\
&+ \theta_{16} \Delta\text{Unemployment}_{ct} + \theta_{17} \text{HPI}_{ct} + \theta_{17} \text{Term Spread}_{ct} + \gamma_t + \delta_i + \varepsilon_{ict}.
\end{aligned} \tag{3}$$

where HPI_{ct} is the country-specific House Price Index (HPI) return and Term Spread_{ct} is the country-specific difference between short-term and long-term interest rates.

The θ_4 coefficient represents the association between LLPs and EBPT, and if positive and significant, it shows that banks smooth income. θ_5 is the incremental effect after

the adoption of Basel II. If the requirements of Basel II make banks rely less on LLPs to smooth their income, then θ_5 should be negative and significant. Hypothesis 2 implies that the DiD coefficient θ_7, which measures the incremental effect of the Basel II adoption on the extent to which IRB banks smooth income, is negative. As in Equation (2), we use NPL, ΔNPL, Loan, ΔLoan, NCO and Size to control for the normal determinants (non-discretionary part) of LLPs. We expect a positive coefficient for Loan, since the larger the amount of loans held as assets by a bank, the more LLPs it will have. The change in total loans outstanding can be positively or negatively related to the level of LLPs, depending on the riskiness of the loans. Regarding the level of non-performing loans (NPL) and their change (ΔNPL), we expect a positive relation with LLPs, because more non-performing loans require higher provisioning. We include controls for Tier 1 and Size and with GDP Growth, ΔUnemployment, House Price Index returns and Term Spread, we account for the potential impact of the business cycle on loan loss provisioning. Our use of year dummies and bank fixed effects is consistent with the cross-country studies of Fonseca & Gonzalez (2008) and Gebhardt & Novotny-Farkas (2011).

3.3 Market Valuation of DLLPs

Following Kilic et al. (2013), we measure the market valuation of DLLPs as the coefficient in a regression of annual stock returns on DLLPs. Like prior literature dealing with the information content of reported numbers (Tucker & Zarowin 2006), our study assumes market efficiency. We test Hypothesis 3 using bank fixed effect and year dummies in a DiD design. Our interest lies in analysing how the association between market returns and DLLPs changes before and after the adoption of Basel II for IRB versus Standardized banks. We also allow for a DiD in the effect of EBPT on stock returns in order to make sure that the adoption of Basel II specifically impacts the valuation of DLLPs and that our results are not driven by the influence of other confounding effects at the time of the adoption. In order to test Hypothesis 3, we estimate the following regression model:

$$
\begin{aligned}
\mathrm{R}_{ict} =& \theta_0 + \theta_1 \mathrm{Basel}_t + \theta_2 \mathrm{IRB}_i + \theta_3 \mathrm{Basel}_t \cdot \mathrm{IRB}_i \\
&+ \theta_4 \mathrm{DLLP}_{ict} + \theta_5 \mathrm{Basel}_t \cdot \mathrm{DLLP}_{ict} + \theta_6 \mathrm{IRB}_i \cdot \mathrm{DLLP}_{ict} + \theta_7 \mathrm{Basel}_t \cdot \mathrm{IRB}_i \cdot \mathrm{DLLP}_{ict} \\
&+ \theta_8 \mathrm{EBPT}_{ict} + \theta_9 \mathrm{Basel}_t \cdot \mathrm{EBTP}_{ict} + \theta_{10} \mathrm{IRB}_i \cdot \mathrm{EBTP}_{ict} + \theta_{11} \mathrm{Basel}_t \cdot \mathrm{IRB}_i \cdot \mathrm{EBTP}_{ict} \\
&+ \theta_{12} \Delta\mathrm{NPL}_{ict} + \theta_{13} \mathrm{NCO}_{ict} + \gamma_t + \delta_i + \varepsilon_{ict},
\end{aligned}
\tag{4}
$$

where R_{ict} is the yearly stock return, computed from the end of the first quarter. Note that for this estimation, EBTP_{ict}, $\Delta\mathrm{NPL}_{ict}$ and NCO_{ict} are scaled by beginning market value of total equity (market capitalization). Our choice of controls is based on the idea that the market reacts more to the disclosure of bad relative to good news (see Mendenhall & Nichols 1988, Basu 1997). Non-performing loans (NPL) and net charge-offs (NCO) are considered bad news for banks and prices are likely to respond to changes in their level. While Equation (4) builds on the U.S.-based studies of Kilic et al. (2013) and Kanagaretnam, Lim & Lobo (2010), in addition to year dummies, we also include bank fixed effects in order to deal with the endogeneity issues, raised by the possible presence of unobserved bank-level heterogeneity given that we rely on a sample of banks from 24 countries.

If the adoption of Basel II discourages IRB banks from relying on DLLPs to smooth income, then the reported provisions should become more informative for investors. Moreover, if IRB banks incorporate more forward-looking information regarding expected losses through the discretionary part of reported LLPs, then the association between returns and DLLPs should be positive and significant. Specifically, we expect that the DiD coefficient θ_7, which represents the incremental impact of Basel II on IRB banks, is positive and significant. If the market valuation of LLPs changes after 2008 due to other confounding effects and not to the impact of Basel II on DLLPs, then θ_5 will become significant.

4 Data description

We test our hypotheses for a broad sample of listed banks in the European Union. We choose listed banks in the EU as they had to apply Basel II in 2008. This provides us with a common adoption point to test the impact of Basel II. Second, as all listed banks in the EU had to adopt IFRS in 2005, we also have a homogeneous pre-Basel II adoption sample (from 2005 onwards). This homogeneous setting provides a unique opportunity to study the effect of Basel II relative to the previous banking regulation.

The core financial data stems from the BVD Bankscope database. Given the large number of missing observations, like Gebhardt & Novotny-Farkas (2011), we complete the data with hand-collected loan loss provisions (LLPs), non-performing loans (NPL), net charge-offs (NCO), net income, total assets, EBPT and Tier 1, from banks' annual reports published on their websites. We start from an initial sample of 284 listed banks in the EU, available in Bankscope. After eliminating banks with missing financial data that could not be manually collected with reasonable efforts, we further exclude banks that underwent mergers or that are subsidiaries of other banks. Finally, we are left with 103 listed banks from 24 EU countries. This results in 618 bank-year observations. Nonetheless, we loose 80 observations due to missing values for Net Charge-Offs (NCO), the most difficult variable to collect. In contrast to Kim & Kross (1998), we do not need to exclude voluntary adopters to avoid biasing our findings, because, to the best of our knowledge, no bank in the sample adopted the IRB approach of Basel II earlier than 2008. We further obtain stock returns and market value of equity data from Datastream.

Following Kilic et al. (2013), we restrict our sample in order to focus on the changes around the adoption year and to avoid the confounding effect of other events. Thus, we construct a Basel II dummy variable, which takes value 0 in the pre-Basel II period before 2008, and 1 thereafter.[9]

In order to classify the banks based on the extent to which they are affected by the adoption of Basel II, we distinguish the 63 banks that follow the IRB approach from the

[9]We also run our estimations with years 2009-2010 as post-Basel II sample, see Section 4.

40 banks that apply the Standardized approach. Since Basel II changes incentives for IRB banks regarding the use of DLLPs, but leaves them unchanged for the banks following the Standardized approach, we use the latter ones as a control group in testing our hypotheses. Having such a control group helps us distinguish between the effect of Basel II that affect only IRB banks and any other factors that could affect all banks during that period. This is particularly important during times of economic turbulence, which render pre-post comparisons challenging to implement without a control group.

In our sample there are 7 banks (out of 103) that switch from Standardized to IRB after the adoption of Basel II. In order to mitigate potential identification issues, we keep the late switchers in the Standardized group during the Basel II adoption period, *until the actual year of their switch to IRB*. Thus, if Standardized and IRB banks are structurally different and our results are driven by effects other than the adoption of Basel II, grouping switchers with Standardized banks would likely weaken our results by reducing our DiD coefficients. Thus, our results are robust to this potential identification issue, and our coefficients can be viewed as lower bounds, since we are considering the case that is least favorable in terms of finding significant results.[10]

Table 3 provides summary statistics. The key characteristics of our sample are similar to those of comparable European samples used in extant literature. Given the differences in the underlying samples, the mean value for LLPs and NPLs of 0.006 (0.023) for IRB and 0.007 (0.037) for Standardized banks is in line with the mean value of 0.006 for the subsample of European banks in the study of Fonseca & Gonzalez (2008) and the 0.007 in the sample of Gebhardt & Novotny-Farkas (2011). Moreover, the size of change in Loans in our sample (0.051 for IRB and 0.072 for Standardized banks) seems to correspond well with the values of 0.045 in Fonseca & Gonzalez (2008) and of 0.100 in Gebhardt & Novotny-Farkas (2011).

Table 4 shows the Pearson correlations of our main variables. As in previous literature, LLPs exhibit significant correlations with EBPT, NPL, and Loans (Kim & Kross 1998, Fonseca & Gonzalez 2008).

[10]We also check the robustness of our results by considering late adopters as Standardized during the whole sample period, see Section 6.

5 Results

In the following subsections, we analyze the results of the tests of our three hypotheses, and we discuss further robustness checks.

5.1 Income-increasing and income-decreasing DLLPs

Table 5 shows the results of the first-step regression of LLPs on their normal determinants, as per Equation (1). We perform this estimation first for the full sample in Column (1), and also for a reduced sample in Column (2), which excludes 2008, the adoption year of Basel II, as well as 2011. We do this in order to eliminate potential implementation issues with respect to the year of adoption of Basel II. Also, since 2008 coincides with a period of economic crisis in Europe, we want to test whether our results are robust to the exclusion of a year of high economic turmoil that might have had an impact on banks' reported numbers. Like Kilic et al. (2013) we want to avoid having our analysis biased by confounding events when using a larger post-adoption window. Moreover, we further exclude 2011 from our sample, to have a shorter (two-year) and symmetric pre-and post-adoption window. The residuals of this estimation are the discretionary LLPs, i.e. the part of LLPs that cannot be attributed to normal determinants. The results from both samples are nearly identical, and they imply that about 56 percent of the variation in LLPs is due to normal determinants, while the rest is discretionary.

Further, we split the sample between positive (income-decreasing) and negative (income-increasing) DLLPs and use Equation (2) to determine whether the Basel II adoption changes the way IRB and Standardized banks recognize the two types of DLLPs. In Equation (2) the main coefficient of interest is the interaction between Basel and IRB (θ_3). This coefficient shows whether after the adoption of Basel II, IRB banks recognize incrementally more or less DLLPs relative to Standardized ones. Table 6 shows the results of the regression of income-increasing (Columns (1), (3), (5), (7)) and income-decreasing DLLPs (Columns (2), (4), (6), (8)) on the Basel II dummy, as per Equation (2).

We perform this estimation with and without time dummies for the full sample and for the sample that excludes years 2008 and 2011. Using income-increasing DLLPs as dependent variable, we obtain a negative θ_3 coefficient, which is significant at the 5 percent level. The coefficients in Columns (1), (3), (5) and (7) imply that, relative to the pre-adoption period, the magnitude of income-increasing DLLPs of IRB banks becomes 78% of a standard deviation smaller than that of Standardized banks after Basel II.[11]

Moreover, the results are remarkably stable across all four estimations, both in the value of the coefficient and its level of significance. This means that IRB banks reduce the level of income-increasing DLLPs after the adoption of Basel II, relative to Standardized banks. Taken together, these results confirm Hypothesis 1.A, as Basel II introduces an incentive for banks to reduce their income-increasing DLLPs. Specifically, due to the connection between DLLPs and regulatory capital, IRB banks are likely to rely less on income-increasing DLLPs for opportunistic reasons in the post-adoption relative to the pre-adoption period. Given that the regulatory pressure is targeted at IRB banks, finding an incremental impact of Basel II adoption for these banks confirms our expectations.

With income-decreasing DLLPs θ_3 is negative and of the same magnitude as with income-increasing DLLPs for the whole sample, but it is not significant. This lack of significance is potentially due to the reduced sample size[12] or to the reduced post-Basel II adoption window in our sample. The reduction in the magnitude of income-decreasing DLLPs corresponds to 38% of the standard deviation of positive DLLPs, about half the effect we obtain for negative DLLPs.[13] Overall, we thus find very weak support for Hypothesis 1.B.

Regarding the control variables, their coefficients are in line with previous literature. Lagged LLPs, Size and Tier 1 are positively (negatively) associated with the absolute value of negative (positive) DLLPs. The coefficient of the Loss variable suggests that when they suffer losses, banks tend to increase both types of DLLPs. Growth is positively (nega-

[11] Since the coefficients are based on a fixed-effect estimation, we use the within firm standard deviation of income-increasing DLLPs, based on an analysis of variance (ANOVA) with firm effects as only factors. The result is 0.0014 for income-increasing DLLPs.

[12] We are grateful to an anonymous referee for suggesting this.

[13] The within firm standard deviation of income-decreasing DLLPs is 0.0029.

tively) associated with the absolute value of positive (negative) DLLPs. GDP growth is negatively and significantly related only to income-decreasing DLLPs, while the change in unemployment is negative but insignificant for both positive and negative DLLPs.

Our next hypothesis will allow us to determine whether the overall reduction in income-increasing DLLPs leads to an incremental reduction in the level of opportunistic reporting in IRB banks, proxied by income smoothing through LLPs.

5.2 Income smoothing through LLPs

Table 7 reports results for the income smoothing regressions of LLPs on EBPT, for the whole sample in Columns (1), (2) and (3), and for the reduced sample excluding 2008 and 2011 in Columns (4), (5) and and (6). As in the previous subsection, we do this in order to check the robustness of our results to a shorter post-adoption time window. In this subsection, we are interested in measuring the effect of Basel II adoption on the discretionary part of LLPs, which we obtain as the residual of the regression of LLPs on their normal determinants, as per Equation (1). However, regressing DLLPs on the Basel II dummies and interactions involves a two-step approach, where the residuals of the first equation are used as dependent variable in a second stage regression. In order to avoid an attenuation bias on the coefficients of the second stage, we follow Kanagaretnam et al. (2004) and regress LLPs simultaneously on their normal determinants and on the Basel II variables, as in Equation (3). Thus, by controlling for the normal determinants of LLPs, we actually assess the association between DLLPs and EBPT without the econometric problems posed by a two-stage regression.

Hypothesis 2 deals with the impact of Basel II adoption on the level of opportunistic reporting, as proxied by income smoothing through DLLPs. The association between DLLPs and EBPT indicates that banks use DLLPs to reach their income smoothing objectives. The coefficient of interest is θ_7 in Equation (3), as it measures the *incremental* impact of Basel II on income smoothing behavior of IRB relative to Standardized banks. If Basel II reduces the opportunistic use of income-increasing DLLPs for IRB relative to Standardized banks, then we should find that the level of income smoothing for the former is significantly lower

relative to the latter sample.

The coefficient θ_7 of the interaction of Basel IRB and EBPT is negative and statistically significant at the 5 percent level in all specified models, which confirms Hypothesis 2. Again, our coefficient is remarkably stable across different time periods and is unaffected by the inclusion of year dummies. The magnitudes of the effects imply that a one standard deviation change in EBPT leads to a reduction of about 20% of a standard deviation in LLPs in IRB compared to Standardized banks after Basel II adoption.[14]

The coefficient on the interaction between IRB and EBPT, θ_6 is not significant in any of our estimations. This lack of statistical significance suggests that there are no pre-intervention differences between the IRB and Standardized banks, which lends support to our choice of the control sample. However, the coefficient of the interaction between Basel and EBPT, θ_5, is positive and significant in all specifications. This suggests that, after 2008, as a reaction to the economic turmoil due to the onset of the financial crisis, banks smooth earnings more. This is consistent with the theoretical prediction of Fudenberg & Tirole (1995) and the empirical findings of DeFond & Park (1997), Liu & Ryan (1995) and Liu & Ryan (2006), that managers are more likely to smooth earnings in times of economic hardship. While Standardized banks smooth income significantly more after 2008, IRB banks refrain from doing so, given the link introduced by Basel II between income smoothing and regulatory capital. While it decreases in all specifications, an F-test of the null hypothesis that $\theta_5 + \theta_7 = 0$ reveals that the level of income-smoothing of IRB banks does not change significantly after the implementation of Basel II. The signs of our control variables are consistent with our expectations and with previous research. As far as the non-discretionary determinants of LLPs are concerned, Loans are positively and significantly associated with LLPs in the whole sample, while the change in loans is negatively and significantly associated with provisions in all estimations. Both the level and change in NPL are positively associated with LLPs (Kilic et al. 2013) and they are significant (Gebhardt & Novotny-Farkas 2011). As far as discretionary determinants of LLPs are concerned, Size

[14]The within firm standard deviation is 0.0053 for EBPT and 0.0052 for LLPs, and the effect varies between 20% in Column (3) and 22% in Column (4).

and Tier 1 do not seem to have a significant impact on LLPs. Our results suggest that LLPs increase when the macroeconomic situation deteriorates: LLPs are higher when GDP growth is low, when unemployment increases, and when the term spread, which is a predictor of recessions (Estrella & Mishkin 1998), increases. House price Index returns do not seem to be systematically related to LLPs in our sample.[15]

5.3 Market valuation of DLLPs

Hypothesis 3 deals with the impact of Basel II adoption on the market valuation of DLLPs. We expect that after the adoption of Basel II, there is an incremental increase in the level of market valuation of IRB relative to Standardized banks via their DLLPs. Table 8 provides results of the regression of stock returns on DLLPs. Unlike our previous hypotheses, this estimation assumes market efficiency (Tucker & Zarowin 2006), as it relies on market prices. We can faithfully assess the information content of reported numbers only if market prices are reliable, which is unlikely to be the case in 2008, given the impact of the worldwide financial crisis. Thus, for this test, we choose to exclude 2008 from the sample. Column (1) shows our base result, while in Column (2) we include year dummies for robustness. Consistent with previous literature we find DLLPs positively associated with returns. The coefficient θ_7 of the Basel*IRB*DLLP triple interaction is positive and significant at the 1 percent level in Column (1) and at the 5 percent level in Column (2). This indicates that investors infer additional information regarding future cash-flows from the DLLPs of IRB banks (Wahlen 1994, Liu & Ryan 2006). In Column (3), as in previous sections, we eliminate both 2008 and 2011 to check the robustness of our results to a shorter post-Basel II window. As before, coefficient θ_7 of the triple interaction is positive and significant at the 5 percent level. While its magnitude is hard to interpret, it implies that a one standard deviation increase in DLLPs leads to an increase of 28%, 16% and 21% of the standard deviation of returns, respectively for Columns (1), (2) and (3).[16]

[15] Our results are robust to interacting macroeconomic variables with an IRB dummy to allow for a differential impact of the business cycle on IRB and Standardized banks. The results of these estimations (not reported in the interest of space) are available upon request.

[16] The within firm standard deviation is 0.0044 for DLLPs and 0.48 for returns.

Moreover, the coefficient of the IRB*DLLP interaction is not significant in any of our models, indicating that there are no pre-Basel II adoption differences between the IRB and Standardized groups. Our results also show that the Basel*DLLP interaction is not significant, suggesting that there is no change in the valuation of DLLPs in the control group after Basel II. Following Kilic et al. (2013) we also include double and triple interactions of EBPT to make sure that the change in the valuation of DLLPs after Basel II is not driven by other confounding effects. In principle, the relation between EBPT and returns should not be influenced by the adoption of Basel II. However, if both the market valuation of IRB banks' EBPT and DLLPs increase, this could suggest that overall, there has been an increase in the informativeness of IRB banks' reported numbers, independently of the implementation of Basel II. Our results show a negative and significant Basel*EBPT interaction, suggesting that the market decreases the valuation of EBPT in the post-Basel II period. This is consistent with less informative earnings in periods of economic turmoil. In contrast, the positive and significant Basel*IRB*DLLP coefficient suggests that the valuation of DLLPs increases in the post-Basel II period. Since both variables change in opposite directions, this makes it very unlikely that the increase in the valuation of DLLPs is due to factors other than the implementation of Basel II. Moreover, an F-test shows that the DLLPs of IRB banks increase significantly after the adoption of Basel II, whereas the market valuation of EBPT decreases significantly only in Column (3) of Table 8.

Overall, our test of Hypothesis 3 confirms that investors view the DLLPs of IRB banks as more informative after the adoption of Basel II. The positive association between returns and the DLLPs of IRB banks in the post-2008 period indicates that Basel II sends a two-fold message to financial market participants. Specifically, DLLPs of IRB banks contain more information regarding future expected losses and about the banks' ability to meet capital solvency requirements, which is incorporated in stock prices by the market. For Standardized banks, whose provisioning is not affected by the requirements of Basel II, we find no significant change in the valuation of their DLLPs.

6 Robustness

In the previous section we show that our results are robust to the exclusion of 2008 and 2011 from our sample. We further discuss the robustness of our results to (1) the issue of selection into IRB and Standardized, (2) the use of 2007 as a placebo adoption year and (3) the use of an alternative control sample of listed U.S. commercial banks.

6.1 Selection

We further check the robustness of our results to a modification of the way we handle the small group of banks that did not adopt IRB from the very beginning, but change status in the years following the adoption of Basel II. So far we treated late adopters as Standardized banks up until the actual year of their switch to IRB. We run our tests again, by considering the banks that switch from the Standardized to the IRB group after the Basel II adoption as Standardized for the full sample period, even after they switch to IRB. This helps us mitigate potential identification issues and make sure that our results are not due to differences in the underlying characteristics and structure of the banks in the two groups. Grouping switchers with Standardized banks is likely to weaken our results by reducing our DiD coefficients. The coefficients can be viewed as lower bounds, since we are considering the case that is least favorable in terms of finding significant results. Our results are robust to the use of this different definition of IRB banks, which indicates that the change in the market valuation of the DLLPs of IRB banks is due to the adoption of Basel II.[17]

6.2 Placebo

The validity of differences in differences (DiD) estimations relies on the parallel trends assumption for the IRB and Standardized groups. While it is difficult to test this assumption directly, we build on Schnabl (2012), Srivastava (2014) and Chodorow-Reich (2014) and perform a series of placebo tests. The tests consists in re-estimating our models, but with

[17] These results are not reported to save space, but they are available upon request.

an intervention that takes place in 2007, one year before the adoption of Basel II.[18] To confirm our results are due to the impact of Basel II, we expect that in all placebo estimations our main coefficients of interest will be insignificant. The results for our three tests (available upon request) mostly confirm our findings. With the 2007 placebo, we find no significant effect for either income-increasing or income-decreasing DLLPs. As far as income-smoothing is concerned, we find no significant Placebo*IRB*EBPT interaction in any of the specifications. There are significant pre-placebo intervention differences between the two groups only in the reduced sample, which is possibly due to the fact that there is only one year left in the pre-adoption period. Moreover, we find a significant change in income-smoothing in 2007 for Standardized banks in the whole sample, which confirms that Standardized banks increase the level of income-smoothing as a response to the crisis, one year before the implementation of Basel II.[19] Finally, in the market valuation tests, we find no significant effect of any of our DLLP interactions, which confirms our main results.

6.3 U.S. control sample

To further check the robustness of our results, we construct a second control sample composed of 63 listed U.S. commercial banks, obtained from BVD Bankscope. In the U.S., banks were not required to implement Basel II, but continued to apply Basel I throughout our sample period, like Standardized banks. (see e.g. Dugan & Xi 2011, Getter 2012). Moreover, compared to the EU, we expect a lower level of income smoothing in the U.S., where the incurred loss model has been strictly applied for decades (Gebhardt & Novotny-Farkas 2011). Thus, even if the financial crisis provides them with similar incentives, U.S. banks would likely smooth their earnings less in the post-Basel II period relative to Standardized banks. This makes it more difficult for us to find significant results in the comparison of IRB with U.S. banks. Nevertheless, a significant difference between the behavior of IRB and U.S. banks strengthens the validity of our results. In contrast, if we find that the IRB and U.S.

[18] Unfortunately, we have only two years in the pre-adoption period, which leaves us with only that one year as a possible placebo and a one-year pre-intervention period.

[19] The beginning of the economic crisis is often associated with the rapid rise in interbank interest rates in the U.S. on August 9, 2007.

banks are similarly affected by the post-2008 period, this casts doubt on our main results and makes it more difficult to attribute the observed effects to the adoption of Basel II. The last two columns of Table 3 shows descriptive statistics on the U.S. sample. Consistent with Gebhardt & Novotny-Farkas (2011), banks in our U.S. control sample are smaller than the European ones.

Table 9 shows the results of our three main estimations obtained with the U.S. control group. Overall, in all model specifications the direction and significance of our main coefficients of interest are similar to the ones in our results with Standardized banks. Columns (1) and (2) of Table 9 show the effect of Basel II on income-increasing and income-decreasing DLLPs. The magnitude of the effect of Basel on income-increasing DLLPs is very similar to the one obtained with Standardized banks: a decrease of -0.0016 vs. -0.0011 for the EU sample, significant at the 5% level in both cases. Like in the EU sample, there is no significant effect of Basel II on income-decreasing DLLPs for IRB relative to U.S. banks. Columns (3) and (4) of Table 9 show the effect of Basel II on banks' income smoothing. There is a significantly lower pre-intervention level of income-smoothing for US banks, which is likely due to the stricter implementation of the incurred loss model in the U.S. (Gebhardt & Novotny-Farkas 2011). The Basel*EBPT interaction is insignificant in both models, which means that there is no change in the level of income smoothing of U.S. banks after the implementation of Basel II. However, the Basel*IRB*EBPT interaction is negative and significant at the 5% level in both specifications, and the coefficients are larger than for the Standardized control group (-0.3 vs. -0.2). Finally, for the market valuation of DLLPs, while the Basel*IRB*DLLP triple interaction is not significant, in terms of sign and magnitude, the coefficients are quite similar to the ones we find with the Standardized sample (15 and 23 vs. 30 and 17). Overall, the use of U.S. sample as a control group confirms our results with the Standardized control group.

7 Conclusion

We contribute first evidence on the impact of Basel II on the market valuation of DLLPs. Relative to Standardized, IRB banks reduce their opportunistic reporting as they recognize less income-increasing DLLPs and rely less on DLLPs to smooth their income. This makes the DLLPs of IRB banks more informative regarding future losses and banks' ability to meet capital solvency requirements and leads to a higher market valuation of DLLPs after the adoption of Basel II. For Standardized banks, whose provisioning is not affected by Basel II, we do not find a significant change in the market valuation of DLLPs.

Our study contributes to the literature in a number of ways. First, we perform an empirical analysis of the implications of Basel II adoption on the market valuation of DLLPs. To the best of our knowledge, we are the first to do so and our findings underscore the impact of banking regulators' requirements on the provisioning of banks (Moyer 2006). We contribute to the literature analyzing the impact of changes in banking or accounting regulation on the informativeness and market valuation of banks' DLLPs (e.g. Ahmed et al. 1999, Beatty, Chamberlain & Magliolo 1995, Kim & Kross 1998, Kilic et al. 2013). Second, our findings add to the literature that analyzes the role of discretion in provisioning for financial reporting outcomes (e.g. Bushman & Williams 2012, Perez et al. 2008). Our results show that the market values the use of non-opportunistic discretion in provisioning. This finding adds to the debate regarding the need to improve the incurred loss approach of IAS 39 (PriceWaterhouseCooper's 2012).

Our findings are relevant for banking regulators, since our results suggest a need to examine how the new IFRS 9 (effective as of 2018) will interact with their own changes in the regulation - namely, the move from Basel II to Basel III in 2019.[20] In fact, our study highlights a strong need for banking and accounting standard setters to coordinate their efforts. To a certain extent, both may have diverging objectives and their respective regulations can impair the other party's ability to reach its goals. We find evidence for

[20]Capital Requirements Directive IV (CRD IV) represents the first step in the implementation of Basel III in the EU. This regulation was adopted by the EU in 2013. CRD IV applies as of 1 January 2014. Part of the provisions will be phased-in between 2014 to 2019. (European Parliament 2011)

just such an effect. Whereas the IFRS – due to the incurred loss approach of IAS 39 – in combination with the capital regulations of Basel I create an incentive to use opportunistic income-increasing DLLPs, this incentive disappears with the adoption of Basel II for IRB banks. The adoption of Basel II thus introduces a counter-acting incentive for IRB banks to decrease the use of income-increasing DLLPs, typically seen as particularly opportunistic. Recognizing less income-increasing DLLPs shields the IRB banks from suffering regulatory capital reductions. This, in turn, contributes to the financial stability of IRB banks in line with banking regulators' objectives. Yet, the incentive for using income-increasing DLLPs still persists for Standardized banks - an aspect recently criticized in the literature (Rossignolo, Fethi & Shaban 2013). Given the worldwide financial consequences of banking crises, it is important to provide harmonized regulations and avoid conflicting signals, which might otherwise lead to high economic ans societal costs.

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Table 1: Effect of LLPs on earnings and regulatory capital under different regulatory regimes for IRB banks

			Basel I & IFRS 2005-2008	Basel II & IFRS 2008-present
Main changes in regulation			Banks can only include GLLPs in Tier 2, not other LLPs	The shortfall between expected loss and LLPs is to be deducted 50% from Tier 1 and 50% from Tier 2
Effect of ΔLLP on earnings			-ΔLLP(1-tax rate)	-ΔLLP(1-tax rate)
Effect of ΔLLP on regulatory capital	Through retained earnings (indirect effect)	Tier 1	-ΔLLP(1-tax rate)(1-d)	-ΔLLP(1-tax rate)(1-d)
		Tier 2	0	0
	Through regulatory requirements (direct effect)	Tier 1	0	+ΔLLP/2
		Tier 2	0	+ΔLLP/2
	Total effect (Tier 1 + Tier 2)		-ΔLLP(1-tax rate)(1-d)	+ΔLLP(1-(1-tax rate)(1-d))
Overal effect			LLPs decrease earnings and total regulatory capital	LLPs decrease earnings but increase total regulatory capital

This figure shows that the effect of a ΔLLP change in LLPs impacts earnings by its after-tax amount, -ΔLLP(1-tax rate). Further, this change impacts Tier 1 capital by the after-tax and after-dividend amount, -ΔLLP(1-tax rate)(1-d), where d is the dividend payout rate. In the pre-Basel II period, banks have little incentive to recognize positive (income-decreasing) LLPs, since this will have an adverse impact both on earnings, of -ΔLLP(1-tax rate), and on regulatory capital, of -ΔLLP(1-tax rate)(1-d). Basel II modifies the effect of LLPs on regulatory capital by introducing a direct link between LLPs and both Tier 1 and Tier 2 capital of ΔLLP/2 each. This makes the net effect of LLPs on regulatory capital positive with magnitude +ΔLLP(1-(1-tax rate)(1-d)) in the post-Basel II period, thus providing banks with an incentive to increase LLPs, as a result of the new regulation. The overall effect of the Basel II adoption on the effect of LLPs and regulatory capital is ΔLLP, which depends neither on the tax rate nor on the dividend payout ratio.

Table 2: Variable definition

Variable name	Explanation
LLP_{ict}	Loan loss provisions (LLPs) scaled by beginning total assets
DLLP_{ict}	Absolute value of negative/positive discretionary loan loss provisions (DLLPs). DLLPs are the residuals of the regression of LLPs on their normal determinants, as per Equation (1): $\text{DLLP}_{ict} \equiv \hat{\varepsilon}_{ict}$, where $\hat{\varepsilon}_{ict}$ is the estimated residual of Equation (1)
EBPT_{ict}	Earnings before provisions and taxes scaled by beginning of the year total assets in Equations (2) and (3), and scaled by beginning market value of equity (market capitalization), obtained from Datastream, in Equation (4)
Loan_{ict}	Beginning total loans outstanding scaled by beginning total assets
ΔLoan_{ict}	Change in total loans outstanding scaled by beginning total assets
NPL_{ict}	Beginning non-performing scaled by beginning total assets
ΔNPL_{ict}	Change in non-performing loans loans scaled by beginning of the year total assets in Equations (2) and (3), and scaled by beginning market value of equity (market capitalization), obtained from Datastream, in Equation (4)
Size_{ict}	Natural logarithm of beginning total assets
Growth_{ict}	Growth in total assets from the beginning to the end of year t
Tier1_{ict}	Ratio of beginning regulatory capital (Tier 1 capital) before loan loss reserves to the minimum required regulatory capital
Basel_t	Dummy variable that equals 1 for the period after the bank adopted Basel II and 0 otherwise
IRB_{ic}	Dummy variable that equals 1 for IRB banks and 0 for the Standardized ones
NCO_{ict}	Net charge offs scaled by beginning of the year total assets in Equations (2) and (3), and scaled by beginning market value of equity (market capitalization), obtained from Datastream, in Equation (4)
Loss_{ict}	Indicator variable set equal to 1 if net income < 0, and 0 otherwise
R_{ict}	Annual stock return measured from April 1 of year t to March 31 of year $t+1$, obtained from Datastream
GDP Growth_{ct}	Annual rate of change in country-specific Gross Domestic Product
$\Delta\text{Unemployment}_{ct}$	Annual change in country-specific unemployment
HPI_{ct}	Country-specific House Price Index (HPI) return obtained from the European Central Bank (ECB) for the EU, and Case Shiller Index for the U.S.
Term Spread_{ct}	Country-specific difference between short-term and long-term interest rates, obtained from the European Central Bank (ECB)

In the entire table, i stands for bank, c for country and t for year.

Table 3: Descriptive Statistics

Bank level variables	Standardized banks (N. Obs=191)		IRB banks (N. Obs=347)		U.S. sample (N. Obs=311)	
	Mean	Std	Mean	Std	Mean	Std
LLP	0.007	0.009	0.006	0.007	0.008	0.012
EBPT	0.017	0.010	0.013	0.010	0.009	0.014
Loan	0.600	0.152	0.551	0.159	0.692	0.137
ΔLoan	0.072	0.091	0.051	0.077	0.048	0.117
NPL	0.037	0.032	0.023	0.023	0.017	0.025
ΔNPL	0.007	0.023	0.006	0.013	0.007	0.029
Loss	0.089	0.285	0.121	0.327	0.299	0.459
Size	9.109	1.301	11.476	1.915	5.083	0.940
Growth	0.091	0.162	0.073	0.152	0.085	0.181
Tier 1	10.606	3.094	9.363	2.526	13.622	3.034
NCO	0.001	0.005	0.001	0.004	0.007	0.012
	Obtained from Equation (1)					
DLLP	-0.000	0.007	0.000	0.004	-0.000	0.006
Positive DLLP	0.004	0.008	0.003	0.004	0.004	0.005
Negative DLLP	-0.004	0.004	-0.002	0.002	-0.003	0.005
	Scaled by market capitalization for Equation (4)					
	(N. Obs=190)		(N. Obs=312)		(N. Obs=311)	
R	-0.186	0.628	-0.159	0.702	-0.163	0.386
EBPT	0.164	0.150	0.188	0.163	0.070	0.159
NPL	0.493	0.770	0.425	0.645	0.207	0.488
ΔNPL	0.115	0.305	0.121	0.291	0.064	0.357
NCO	0.009	0.078	0.017	0.074	0.070	0.175
Country level variables						
GDP Growth	0.879	2.759				
ΔUnemployment	0.095	0.223				
House Price Index	-1.651	6.416				
Term Spread	1.545	2.318				

LLP is defined as loan loss provisions scaled by beginning total assets; EBPT is earnings before taxes and loan loss provisions scaled by beginning total assets; Loan is loans scaled by beginning total assets; ΔLoan is change in loans scaled by beginning total assets; NPL is non-performing loans scaled by beginning total assets; ΔNPL is change in non-performing loans scaled by beginning total assets; Loss is an indicator variable set equal to 1 if net income < 0, and 0 otherwise; Size is the natural logarithm of beginning total assets; Growth is the growth in total assets from the beginning to the end of year t; Tier 1 is the ratio of regulatory capital (Tier 1 capital) before loan loss reserves to the minimum required regulatory capital; NCO is net charge-offs scaled by beginning total assets; R is the annual return from April 1st to March 31st from Datastream. DLLP are the discretionary loan loss provisions, computed as the residuals of the regression of LLPs on their normal determinants, as per Equation (1). We further distinguish between positive (income-decreasing) and negative (income-decreasing) DLLPs, that we use as dependent variables in Equation (2); GDP Growth is the annual rate of change in country-specific Gross Domestic Product; ΔUnemployment is annual change in country-specific unemployment; House Price Index is country-specific House Price Index (HPI) return obtained from the European Central Bank (ECB) for the EU, and Case Shiller Index for the U.S.; Term Spread is the country-specific difference between short-term and long-term interest rates, obtained from the European Central Bank (ECB).

Table 4: Correlation matrix

	LLP	EBPT	Loan	ΔLoan	NPL	ΔNPL	Loss	Size	Growth	Tier 1	Basel	IRB	NCO
LLP													
EBPT	0.1263												
Loan	0.2948	0.1315											
ΔLoan	−0.2357	0.3862	0.0194										
NPL	0.4633	0.0083	0.2368	−0.0555									
ΔNPL	0.6147	0.0750	0.2020	−0.1539	0.1476								
Loss	0.4084	−0.4116	0.0262	−0.2678	0.2949	0.2605							
Size	−0.1630	−0.2853	−0.2668	−0.2130	−0.3910	−0.1322	−0.0341						
Growth	−0.0782	0.3081	0.0248	0.6547	−0.0929	−0.0207	−0.1826	−0.1019					
Tier 1	0.0124	0.2934	−0.2307	−0.0521	0.0797	−0.0489	0.0026	−0.3187	0.0345				
Basel	0.2675	−0.2773	0.1182	−0.4750	0.1632	0.2036	0.2067	−0.0042	−0.4007	0.1050			
IRB	−0.0600	−0.1590	−0.1482	−0.1221	−0.2468	−0.0322	0.0491	0.5502	−0.0555	−0.2124	0.0374		
NCO	0.0997	0.0844	−0.0202	−0.0197	0.0205	−0.0396	0.0177	0.1325	0.0441	0.1277	−0.0416	0.0151	
R	−0.0749	0.1812	−0.0949	−0.0793	−0.0747	0.0169	−0.1955	0.0039	−0.0240	0.0788	−0.1140	0.0292	0.0169

LLP is defined as loan loss provisions scaled by beginning total assets; EBPT is earnings before taxes and loan loss provisions scaled by beginning total assets; Loan is loans scaled by beginning total assets; ΔLoan is change in loans scaled by beginning total assets; NPL is non-performing loans scaled by beginning total assets; ΔNPL is change in non-performing loans scaled by beginning total assets; Loss is an indicator variable set equal to 1 if net income < 0, and 0 otherwise; Size is the natural logarithm of beginning total assets; Growth is the growth in total assets from the beginning to the end of year t; Tier 1 is the ratio of regulatory capital (Tier 1 capital) before loan loss reserves to the minimum required regulatory capital; Basel is a dummy variable that equals 1 for the period after the bank adopted Basel II and 0 otherwise; IRB is a a dummy variable that equals 1 for the IRB banks and 0 for the Standardized ones; NCO is net charge-offs scaled by beginning total assets; R is the annual return from April 1st to March 31st from Datastream.

Table 5: Estimation of the non-discretionary component of LLPs

	Loan Loss Provisions	
	Whole sample	Years 2008 & 2011 excluded
	(1)	(2)
NPL	0.1009**	0.0979**
	(0.020)	(0.031)
ΔNPL	0.2411**	0.1904**
	(0.061)	(0.051)
Loans	0.0056**	0.0056**
	(0.002)	(0.002)
ΔLoans	-0.0130**	-0.0122**
	(0.004)	(0.004)
NCO	0.2187*	0.1349
	(0.110)	(0.071)
Constant	-0.0012	-0.0009
	(0.001)	(0.001)
Observations	538	362
R-squared	0.560	0.565

Robust standard errors in parentheses: ** p<0.01, * p<0.05.
The regression model is:

$$\text{LLP}_{ict} = \theta_0 + \theta_1 \text{NPL}_{ict} + \theta_2 \Delta\text{NPL}_{ict} + \theta_3 \text{Loan}_{ict} + \theta_4 \Delta\text{Loan}_{ict} + \theta_5 \text{NCO}_{ict} + \varepsilon_{ict} \quad (1)$$

where, for bank i, year t, and country c, LLP_{ict} stands for loan loss provisions scaled by beginning total assets, NPL_{ict} and ΔNPL_{ict} are non-performing loans and their first difference, respectively scaled by beginning total assets, Loan_{ict} and ΔLoan_{ict}, are loans and their first difference, respectively scaled by beginning total assets, NCO_{ict} is net charge-offs scaled by beginning total assets, and ε_{ict} is a residual.

Table 6: The impact of Basel II on banks' income-increasing and income-decreasing DLLPs.

	Whole sample				Year 2008 & 2011 excluded			
	Negative DLLP	Positive DLLP	Negative DLLP	Positive DLLP	Negative DLLP	Positive DLLP	Negative DLLP	Positive DLLP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Basel	0.0014**	0.0005			0.0010	0.0000		
	(0.000)	(0.001)			(0.001)	(0.002)		
Basel*IRB	-0.0011*	-0.0011	-0.0011*	-0.0010	-0.0011*	-0.0004	-0.0011*	-0.0004
	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
LLP (lagged)	-0.1154**	0.2349**	-0.0619	0.2008*	-0.0334	0.3749**	-0.0465	0.3734**
	(0.042)	(0.065)	(0.046)	(0.079)	(0.054)	(0.082)	(0.056)	(0.093)
EBPT	0.0848**	0.1244	0.0936**	0.1544	0.1866**	0.1366	0.1850**	0.1297
	(0.032)	(0.077)	(0.032)	(0.079)	(0.043)	(0.073)	(0.043)	(0.072)
Loss	0.0011*	0.0055**	0.0010	0.0050**	0.0019*	0.0005	0.0018*	0.0007
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Size	0.0009	-0.0027	0.0016	-0.0050	0.0014	-0.0020	0.0013	-0.0045
	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)
Growth	0.0028*	0.0001	0.0029*	-0.0012	0.0027*	-0.0029	0.0029*	-0.0037
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Tier1	-0.0001	0.0001	-0.0000	0.0000	-0.0001	-0.0002	-0.0002	-0.0002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP Growth	-0.0000	-0.0003*	-0.0001	-0.0005**	-0.0000	-0.0003	-0.0001	-0.0003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ΔUnemployment	0.0003	0.0009	0.0014	0.0034	0.0016	-0.0005	0.0014	0.0004
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Constant	-0.0127	0.0271	-0.0205	0.0516	-0.0184	0.0219	-0.0166	0.0482*
	(0.010)	(0.025)	(0.011)	(0.029)	(0.013)	(0.022)	(0.014)	(0.024)
Year dummies	No	No	Yes	Yes	No	No	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	305	233	305	233	203	159	203	159
R-squared	0.161	0.284	0.206	0.317	0.259	0.398	0.276	0.438

Robust standard errors in parentheses: ** p<0.01, * p<0.05. The regression model is:

$$\begin{aligned} \text{DLLP}_{ict} =& \theta_0 + \theta_1 \text{Basel}_t + \theta_2 \text{IRB}_i + \theta_3 \text{Basel}_t \cdot \text{IRB}_i \\ &+ \theta_4 \text{LLP}_{ic,t-1} + \theta_5 \text{EBPT}_{ict} + \theta_6 \text{Loss}_{ict} + \theta_7 \text{Size}_{ict} \\ &+ \theta_8 \text{Growth}_{ict} + \theta_9 \text{Tier1}_{ict} + \theta_{10} \text{GDP Growth}_{ct} \\ &+ \theta_{11} \Delta\text{Unemployment}_{ct} + \gamma_t + \delta_i + \varepsilon_{ict}, \end{aligned} \tag{2}$$

where, for bank i, year t, and country c, DLLP_{ict} are discretionary loan loss provisions, obtained as the residual of Equation (1), Basel_t is a dummy for the post-Basel II adoption period, IRB_i is a dummy for banks that employ the IRB methodology after the adoption of Basel II, $\text{LLP}_{ic,t-1}$ is lagged LLP scaled by beginning total assets, EBPT_{ict} is lagged earnings before provisions and taxes scaled by beginning total assets, Loss_{ict} is an indicator variable set equal to 1 if net income < 0, and 0 otherwise, Size_{ict} is bank size, measured as the log of beginning total assets, Growth_{ict} is the growth rate of total assets, Tier1_{ict} is Tier 1 capital scaled by beginning total assets, GDP Growth_{ct} is the annual change in country-specific Gross Domestic Product, $\Delta\text{Unemployment}_{ct}$ is the annual change in country-specific unemployment, γ_t is a time effect, δ_i is a bank fixed effect, and ε_{ict} is a residual. Basel_t and IRB_i are included in the equation for completeness of the DiD effect, but the θ_1 and θ_2 parameters are subsumed, respectively, by bank fixed effects, and year dummies in the estimations that include them.

Table 7: Impact of Basel II on Income Smoothing

	Loan Loss Provisions					
	Whole sample			Years 2008 & 2011 excluded		
	(1)	(2)	(3)	(4)	(5)	(6)
Basel*IRB	0.0014	0.0014	0.0014	0.0023	0.0022	0.0022
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
EBPT	0.0715	0.0705	0.0694	0.0803	0.0550	0.0715
	(0.071)	(0.071)	(0.072)	(0.069)	(0.069)	(0.070)
Basel*EBPT	0.1482*	0.1492*	0.1502*	0.1569*	0.1891**	0.1648*
	(0.071)	(0.071)	(0.072)	(0.071)	(0.070)	(0.071)
IRB*EBPT	0.1150	0.1146	0.1148	0.1084	0.1091	0.1090
	(0.064)	(0.064)	(0.064)	(0.061)	(0.062)	(0.061)
Basel*IRB*EBPT	-0.1922*	-0.1921*	-0.1917*	-0.2153*	-0.2070*	-0.2049*
	(0.085)	(0.085)	(0.086)	(0.086)	(0.087)	(0.086)
Loans	0.0082*	0.0081*	0.0081*	-0.0056	-0.0043	-0.0061
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
ΔLoans	-0.0081*	-0.0080*	-0.0080*	-0.0105**	-0.0093*	-0.0100**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
NPL	0.2212**	0.2209**	0.2210**	0.2174**	0.2154**	0.2151**
	(0.015)	(0.015)	(0.015)	(0.018)	(0.018)	(0.018)
ΔNPL	0.1985**	0.1985**	0.1985**	0.1493**	0.1493**	0.1481**
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Size		-0.0003	-0.0003		-0.0014	-0.0015
		(0.002)	(0.002)		(0.002)	(0.002)
Tier1	0.0000		0.0000	-0.0002		-0.0002
	(0.000)		(0.000)	(0.000)		(0.000)
GDP Growth	-0.0004*	-0.0004*	-0.0004*	-0.0001	-0.0001	-0.0001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ΔUnemployment	0.0054**	0.0054**	0.0054**	0.0058**	0.0059**	0.0058**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
HPI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Term Spread	0.0006**	0.0006**	0.0006**	0.0003	0.0003	0.0003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.0077**	-0.0038	-0.0041	0.0022	0.0137	0.0184
	(0.003)	(0.018)	(0.018)	(0.003)	(0.017)	(0.017)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	538	538	538	362	362	362
R-squared	0.643	0.644	0.644	0.682	0.679	0.683
Basel*EBPT + Basel*IRB*EBPT=0	0.567	0.529	0.477	1.105	0.0963	0.468
P-value	0.452	0.467	0.490	0.294	0.757	0.495

Robust standard errors in parentheses: ** p<0.01, * p<0.05.
The regression model is:

$$\begin{aligned}\text{LLP}_{ict} =& \theta_0 + \theta_1 \text{Basel}_t + \theta_2 \text{IRB}_i + \theta_3 \text{Basel}_t \cdot \text{IRB}_i \\ &+ \theta_4 \text{EBPT}_{ict} + \theta_5 \text{Basel}_t \cdot EBPT_{ict} + \theta_6 \text{IRB}_i \cdot \text{EBPT}_{ict} + \theta_7 \text{Basel}_t \cdot \text{IRB}_i \cdot \text{EBPT}_{ict} \\ &+ \theta_8 \text{NPL}_{ict} + \theta_9 \Delta\text{NPL}_{ict} + \theta_{10} \text{Loan}_{ict} + \theta_{11} \Delta\text{Loan}_{ict} + \theta_{12} \text{NCO}_{ict} \\ &+ \theta_{13} \text{Tier1}_{ict} + \theta_{14} \text{Size}_{ict} + \theta_{15} \text{GDP Growth}_{ct} \\ &+ \theta_{16} \Delta\text{Unemployment}_{ct} + \theta_{17} \text{HPI}_{ct} + \theta_{17} \text{Term Spread}_{ct} + \gamma_t + \delta_i + \varepsilon_{ict}.\end{aligned} \tag{3}$$

where, for bank i, year t, and country c, LLP_{ict} stands for loan loss provisions scaled by beginning total assets, Basel_t is a dummy for the post-Basel II adoption period, IRB_i is a dummy for banks that employ the IRB methodology after the adoption of Basel II, EBPT_{ict} is earnings before provisions and taxes scaled by beginning total assets, NPL_{ict} and ΔNPL_{ict} are non-performing loans and their first difference, respectively scaled by beginning total assets, Loan_{ict} and ΔLoan_{ict}, are loans and their first difference, respectively scaled by beginning total assets, NCO_{ict} is net charge-offs scaled by beginning total assets, Tier1_{ict} is Tier 1 capital scaled by beginning total assets, Size_{ict} is bank size, measured as the log of beginning total assets, GDP Growth_{ct} is the annual change in country-specific Gross Domestic Product, $\Delta\text{Unemployment}_{ct}$ is the annual change in country-specific unemployment, HPI_{ct} is the country-specific House Price Index (HPI) return obtained from the European Central Bank, Term Spread_{ct} is the country-specific difference between short-term and long-term interest rates, γ_t is a time effect, δ_i is a bank fixed effect, and ε_{ict} is a residual. Basel_t and IRB_i are included in the equation for completeness of the DiD effect, but the θ_1 and θ_2 parameters are subsumed, respectively, by bank fixed effects, and year dummies.

Table 8: The association between DLLPs and returns

	Returns		
	Year 2008 excluded		Years 2008 & 2011 excluded
	(1)	(2)	(3)
Basel	0.2146		0.4382**
	(0.130)		(0.136)
Basel*IRB	0.0260	-0.0064	0.0640
	(0.155)	(0.107)	(0.167)
DLLP	0.7379	-2.7807	5.5756
	(4.009)	(2.770)	(4.296)
Basel*DLLP	0.6403	1.5738	2.3792
	(3.416)	(2.354)	(3.466)
IRB*DLLP	4.8257	-4.9095	-5.2080
	(12.611)	(8.725)	(12.268)
Basel*IRB*DLLP	30.5661**	17.5741*	22.7863*
	(11.770)	(8.145)	(10.993)
EBPT	3.3878**	1.8507**	3.2537**
	(0.579)	(0.410)	(0.620)
Basel*EBPT	-1.5427*	-1.0232*	-2.0892**
	(0.629)	(0.438)	(0.638)
IRB*EBPT	-1.0972	-0.9840	-0.9736
	(0.730)	(0.511)	(0.776)
Basel*IRB*EBPT	0.6095	0.8120	0.6208
	(0.819)	(0.572)	(0.833)
ΔNPL	0.0064	-0.1633*	0.1004
	(0.098)	(0.069)	(0.103)
EBPT	3.3878**	1.8507**	3.2537**
	(0.579)	(0.410)	(0.620)
NCO	-0.9379*	-0.3262	-0.0078
	(0.443)	(0.308)	(0.494)
Constant	-0.4748**	-0.0040	-0.4562**
	(0.092)	(0.078)	(0.090)
Year dummies	No	Yes	No
Bank fixed effects	Yes	Yes	Yes
Observations	415	415	333
R-squared	0.297	0.670	0.361
F-test: Basel*DLLP+Basel*IRB*DLLP=0	7.53	5.93	5.7
P-value	0.0064	0.0155	0.0178
F-test: Basel*EBPT+Basel*IRB*EBPT=0	1.73	0.17	4.52
P-value	0.1899	0.6808	0.0346

Robust standard errors in parentheses: ** p<0.01, * p<0.05.
The regression model is:

$$\begin{aligned} \mathrm{R}_{ict} =& \theta_0 + \theta_1 \mathrm{Basel}_t + \theta_2 \mathrm{IRB}_i + \theta_3 \mathrm{Basel}_t \cdot \mathrm{IRB}_i \\ &+ \theta_4 \mathrm{DLLP}_{ict} + \theta_5 \mathrm{Basel}_t \cdot \mathrm{DLLP}_{ict} + \theta_6 \mathrm{IRB}_i \cdot \mathrm{DLLP}_{ict} + \theta_7 \mathrm{Basel}_t \cdot \mathrm{IRB}_i \cdot \mathrm{DLLP}_{ict} \\ &+ \theta_8 \mathrm{EBPT}_{ict} + \theta_9 \mathrm{Basel}_t \cdot \mathrm{EBTP}_{ict} + \theta_{10} \mathrm{IRB}_i \cdot \mathrm{EBTP}_{ict} + \theta_{11} \mathrm{Basel}_t \cdot \mathrm{IRB}_i \cdot \mathrm{EBTP}_{ict} \\ &+ \theta_{12} \Delta\mathrm{NPL}_{ict} + \theta_{13} \mathrm{NCO}_{ict} + \gamma_t + \delta_i + \varepsilon_{ict}, \end{aligned} \tag{4}$$

where, for bank i, year t, and country c, R_{ict} is the annual stock return measured from April 1 of year t to March 31 of year $t+1$, Basel_t is a dummy for the post-Basel II adoption period, IRB_i is a dummy for banks that employ the IRB methodology after the adoption of Basel II, DLLP_{ict} are discretionary loan loss provisions, obtained as the residual of of the LLP equation, EBPT_{ict} is earnings before provisions and taxes scaled by market value of total equity (market capitalization), $\Delta\mathrm{NPL}_{ict}$ is non-performing loans scaled by market value of total equity (market capitalization), NCO_{ict} is net charge-offs scaled by market value of total equity (market capitalization), γ_t is a time effect, δ_i is a bank fixed effect, and ε_{ict} is a residual. Basel_t and IRB_i are included in the equation for completeness of the DiD effect, but the θ_1 and θ_2 parameters are subsumed, respectively, by bank fixed effects, and year dummies in the estimations that include them.

Table 9: All estimations with U.S. control group

	DLLPs		Income Smoothing Loan Loss Provision		Market Valuation Returns	
	Negative	Positive				
	(1)	(2)	(3)	(4)	(5)	(6)
Basel					0.2912**	
					(0.0627)	
Basel*IRB	-0.0016*	-0.0077	0.0011	0.0005	-0.0106	-0.0796
	(0.0007)	(0.0040)	(0.0026)	(0.0027)	(0.1318)	(0.1191)
EBPT	0.0858*	-0.0222	-0.1837	-0.1817	0.2472	0.5333
	(0.0347)	(0.1084)	(0.1173)	(0.1174)	(0.7397)	(0.6512)
Basel*EBPT			0.2190	0.2122	0.0951	0.0383
			(0.1205)	(0.1211)	(0.7186)	(0.6317)
IRB*EBPT			0.3528*	0.3438*	3.3189**	1.5319
			(0.1601)	(0.1609)	(0.9883)	(0.8884)
Basel*IRB*EBPT			-0.3191*	-0.3043*	-1.8499	-0.8040
			(0.1524)	(0.1544)	(0.9774)	(0.8756)
LLP (lagged)	0.0094	-0.3057**				
	(0.0275)	(0.0984)				
Loss	0.0005	0.0049				
	(0.0007)	(0.0026)				
Loans			0.0024	0.0027		
			(0.0056)	(0.0056)		
ΔLoans			-0.0160**	-0.0165**		
			(0.0036)	(0.0037)		
NPL			0.2401**	0.2408**		
			(0.0213)	(0.0214)		
ΔNPL			0.1511**	0.1515**	0.0661	0.0577
			(0.0148)	(0.0148)	(0.0668)	(0.0598)
Tier 1	0.0001	0.0003		0.0001		
	(0.0001)	(0.0004)		(0.0002)		
Size	0.0022	-0.0094	0.0026	0.0026		
	(0.0013)	(0.0048)	(0.0019)	(0.0019)		
Growth	0.0012	-0.0062				
	(0.0016)	(0.0046)				
DLLP					0.1808	-3.4607
					(18.0733)	(15.8906)
Basel*DLLP					-2.0398	-9.1184
					(18.3893)	(16.2031)
IRB*DLLP					-17.6488	-16.7954
					(22.9434)	(20.1685)
Basel*IRB*DLLP					15.0839	23.0112
					(23.9671)	(21.0843)
NCO					-0.8486**	-0.8408**
					(0.1622)	(0.1430)
GDP Growth	-0.0001	-0.0007	0.0000	0.0000		
	(0.0001)	(0.0006)	(0.0002)	(0.0002)		
ΔUnemployment	-0.0001	-0.0014	0.0039	0.0033		
	(0.0013)	(0.0067)	(0.0027)	(0.0029)		
HPI			-0.0001	-0.0001		
			(0.0001)	(0.0001)		
Constant	-0.0242*	0.0807*	-0.0212	-0.0228	-0.4494**	0.1371
	(0.0113)	(0.0397)	(0.0165)	(0.0167)	(0.0600)	(0.0714)
Year dummies	Yes	Yes	Yes	Yes	No	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	333	213	658	658	512	512
R^2	0.329	0.193	0.396	0.396	0.317	0.477

Robust standard errors in parentheses: ** p<0.01, * p<0.05. This table shows estimation results for Equations (2), (3), and (4) when we use U.S. commercial banks as a control group. In Columns (1) and (2), the dependent variables are respectively income-increasing and income-decreasing DLLPs. Income smoothing results are shown in Columns (3) and (4), where LLPs are the dependent variable, and Columns (5) and (6) show market valuation results where the dependent variable is the annual stock return measured from April 1 of year t to March 31 of year $t+1$. Basel is a dummy for the post-Basel II adoption period, IRB is a dummy for banks that employ the IRB methodology after the adoption of Basel II, EBPT is earnings before provisions and taxes scaled by beginning total assets in Columns (3) and (4) and by market value of total equity (market capitalization) in Columns (5) and (6), LLP (lagged) are lagged loan loss provisions, scaled by beginning total assets in Columns (3) and (4) and by market value of total equity (market capitalization) in Columns (5) and (6), Loss is an indicator variable set equal to 1 if net income < 0, and 0 otherwise, Loan and ΔLoan, are loans and their first difference, respectively scaled by beginning total assets, NPL is non-performing loans scaled by beginning total assets, ΔNPL is change in non-performing loans scaled by market value of total equity (market capitalization), Tier 1 is Tier 1 capital scaled by beginning total assets, Size is bank size, measured as the log of beginning total assets, Growth is the growth rate of total assets, DLLP are discretionary loan loss provisions, obtained as the residual of Equation (1), NCO is net charge-offs scaled by market value of total equity (market capitalization), GDP Growth is the annual change in country-specific Gross Domestic Product, ΔUnemployment is the annual change in country-specific unemployment.