



# Profit shifting and tax response of multinational banks



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## ABSTRACT

This paper analyzes multinational banks' response to taxation. For the empirical analysis we use firm-level bank data from the Bankscope database. We find significant tax effects on reported profits of bank subsidiaries. The magnitude for the tax response of reported profits doubles the effects found in previous studies for non-financial MNCs. Additional analysis reveals that the response to tax incentives differs across business types. The tax elasticity of revenues generated by interest-bearing activities is less responsive compared to other activities. Results also reveal significant tax effects on loan loss provisions.

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## 1. Introduction

When G20 leaders met in Pittsburgh in 2009 to discuss the still ongoing financial crisis they requested the IMF to investigate "...how the financial sector could make a fair and substantial contribution toward paying for any burden associated with government interventions to repair the banking system" (IMF, 2010). Thereafter, various tax measures to improve regulation of capital structure as well as possibilities to shift part of the crisis related costs from taxpayers to the financial sector have been discussed.

Recently, a public debate on what the OECD (2013) denotes "base erosion and profit shifting" (BEPS) has been stirred up by aggressive tax planning of some very prominent companies mainly from the IT and retail sector. Interestingly, the financial sector is not at the heart of this recent discussion. One reason might be the scarce empirical evidence on banks' tax response. We therefore aim at evaluating the status quo of banks' response to international taxation.

Taxable profits are separately determined for each subsidiary of a multinational bank and subject to tax in a subsidiary's country of residence. Therefore, the international differences in tax rates

provide an incentive to adopt strategies that are associated with profit shifting from high-taxed to low-taxed subsidiaries. Shifting taxable profits into low-tax jurisdictions minimizes the overall tax payments. Profit shifting means some redistribution of the profits among the subsidiaries of a multinational firm by reallocating certain functions and risks as well as manipulating intra-firm transactions.

Profit-shifting activities of multinational corporations (MNCs) have long been subject to extensive research. The literature provides striking evidence for profit shifting (cf. Hines and Rice 1994; Huizinga and Laeven 2008) and tax effects on capital structures (cf. Desai et al., 2004; Huizinga et al., 2008). However, the financial sector has been left out in all of these studies. We therefore investigate the profit response of multinational banks to taxes. To the best of our knowledge we have only limited evidence for profit shifting within banks. Demirgüç-Kunt and Huizinga (1999, 2001) conclude that foreign banks pay lower taxes in several developed countries and therefore suspect them to engage in profit shifting. Huizinga et al. (2014) consider tax rates of host and parent countries. While they also find some evidence for profit shifting, their focus is on the pricing and quantity effects of international double taxation as reflected in interest margins and FDI of banks.

We focus on the tax response of bank subsidiaries. Our study particularly contributes to the literature by considering how bank regulation, anti-tax avoidance rules and different business models of banks affect the intensity of profit shifting. Moreover, we

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investigate a potential shifting channel of banks and analyze the influence of tax incentives on the discretionary component of loan loss provisioning.

For our empirical analysis we use subsidiary-level bank data from the international bank database Bankscope in 131 countries from 2001 until 2012. In accordance with previous literature that has analyzed non-financial firms we analyze banks' tax elasticity of subsidiary profits. While profits of a subsidiary are determined by several factors, a systematic impact of tax incentives on reported profits can be interpreted as indirect evidence for profit shifting. Our results suggest that reported earnings of multinational bank subsidiaries significantly respond to host country tax incentives. However, our results also show that the profit response to taxes is significantly restricted by anti-tax avoidance legislation. Moreover, we find weak evidence that the tax response was reduced during the financial crisis in 2008–2011.

The magnitude of the tax sensitivity of reported profits is more than twice as big as effects found in previous studies for MNCs outside the financial sector. Therefore, our results suggest that banks have enhanced tax planning opportunities.

In additional analyses we investigate the intensity of profit shifting across different business models of banks and identify possible shifting channels. First, we consider the response of revenues from certain profit components to taxes. Our analysis reveals that the tax elasticity of profits differs across business models. The tax elasticity of revenues generated by interest-bearing activities is less responsive compared to other activities. In particular, trading gains are highly tax sensitive.

Second, we focus on loan loss provisioning as one potentially important shifting tool. Considerable studies have analyzed the discretionary component of loan loss provisions (LLPs) used for income smoothing (Greenawalt and Sinkey, 1988; Beatty et al., 1995; Collins et al., 1995). Although LLPs value as an indicator for future deduction from taxable base, the potential tax response of LLPs has not yet been analyzed empirically. Making LLPs can reduce taxable income in most countries. However, even in the case where LLPs are not tax deductible, they serve as a proxy for the allocation of credit risks and bad debt in high-tax countries. Therefore, we expect that LLPs are tax sensitive. Our results, in fact, suggest significant positive effects of host country taxes on the level of loan loss provisions.

The remainder of the paper is organized as follows. In Section 2, a discussion of the tax incentives to shift profits is provided. Section 3 explains the empirical approach and describes the data. Empirical results are presented in Section 4. Section 5 concludes.

## 2. Profit-shifting activities

Each subsidiary and permanent establishment of a multinational bank is subject to tax in its country of residence. Taxable profits are separately determined for each subsidiary. Therefore, international differences in tax rates provide an incentive to adopt strategies that are associated with profit shifting from high-taxed to low-taxed subsidiaries.

### 2.1. Profit shifting of multinational banks

International tax principles are applied to all types of multinational firms including banks. However, the intensity and the shifting mechanisms used might differ for banks. While profit-shifting activities are often associated with intangible assets and manipulation of transfer prices for firm-specific goods, profit-shifting activities of banks rely on additional strategies.

Profit shifting is conducted either by allocating certain functions and risks or by manipulating intra-firm transactions. In

particular, profit margins are influenced by the functions performed and the risks taken by a subsidiary. Thus, the profit allocation within a multinational bank depends on the allocation of functions like credit management, investment analysis, and the underwriting function. In particular, the latter is associated with an allocation of default risks. Moreover, profits of a subsidiary are affected by intrafirm guarantees that transfer credit risks. Furthermore, the allocation of interest and liquidity risks as well as the hedging of exchange rate risks and market risks influences the distribution of taxable profits across subsidiaries.

Banks can manipulate transfer prices for intra-firm financial transactions like interest margins or service fees. Shifting strategies of banks could also consider allocation of certain business activities like trading or asset management that is potentially highly mobile. Furthermore, credit risks can be allocated to a subsidiary in a high-tax country by contracting out the liability of a loan. As a consequence, loan loss provisioning or credit default reduce earnings subject to a high-tax rate while profits of the low-taxed subsidiary that has contracted out the liability increase.

Moreover, the choice between debt and equity financing affects taxable profits of subsidiaries and can be used to shift taxable profits. Interest expenses reduce taxable profits of the borrowing subsidiary while equity financing is not associated with a comparable deduction. Therefore, a multinational bank has an incentive to allocate debt finance in high-tax countries. In addition, internal capital markets can be used to substitute equity capital of subsidiaries in high-tax jurisdictions by intra-firm debt financing. While banks' capital structures are also affected by regulatory requirements, Keen and de Mooij (2012) and de Mooij and Heckemeyer (2013) find similar tax effects on capital structures of banks compared to the non-financial sector.

Profit-shifting techniques are associated with significant costs of restructuring organizational and financial structures. Tax legislation also restricts the extensive use of shifting techniques by implementing anti-avoidance regulations. Therefore, tax aggressive firms suffer the risk that transfer prices are adjusted in the course of tax audits. While financial institutions have so far not been at the center of transfer-pricing discussion, transfer pricing regulation also affects banks. The OECD (2010) report on the attribution of profits to permanent establishments dedicates a special section to banks' profit allocation. Moreover, court cases dealing with transfer pricing in financial firms are well-documented.<sup>2</sup> We will therefore test whether higher host country taxes are associated with less reported earnings of bank subsidiaries and attempt to identify tax responses of loan loss provisioning.

Particularly, tax authorities scrutinize intra-group transactions including the transfer of certain functions or risks by means of transfer-pricing rules. Transfer prices are assessed and adjusted if they do not correspond to the arm's length principle. The key practical issue with applying the arm's length principle is the comparability of intra-group transactions with transactions between unrelated parties. Identification of comparable transactions requires data that is often hard to collect or insufficient (see e.g. Durst and Culbertson 2003). Tax authorities have implemented transfer-pricing regulations, but tightness, enforcement and documentation obligations of these rules vary across countries. Lohse and Riedel (2013) find for MNCs outside the banking sector that additional documentation obligations related to transfer pricing can effectively restrict the tax response of reported profits. Since transfer-pricing rules are also applied to interest margins or the

<sup>2</sup> Court cases are documented, for example, in Canada: HSBC Bank Canada v. The Queen, 2011 TCC 37, <http://www.canlii.org/en/ca/tcc/doc/2011/2011tcc37/2011tcc37.html>; General Electric Capital Canada Inc. v. The Queen, 2009 TCC 563, <http://www.canlii.org/en/ca/tcc/doc/2009/2009tcc563/2009tcc563.html>.

transfer of risks between bank subsidiaries, we test whether the tightness of regulation affects banks' profit shifting accordingly.

## 2.2. Effects of capital regulation and the financial crisis

An additional constraint banks face is capital regulation. According to the Basel III principle, as enforced in most countries, banks must provide certain amounts of equity. Therefore, capital-tight banks might have differing decision incentives. Taking into account banks' capitalization we are able to test effects of regulatory constraints on profit shifting. We expect less tax response of capital-tight banks, especially in terms of loan loss provisioning.

Moreover, our sample period provides insights into banks' behavioral adjustments during the financial crisis. With refinancing becoming increasingly difficult we expect banks to face different priorities concerning their earnings. Rather than shifting their profits to minimize taxes, we expect a focus on maintaining liquidity, fulfilling capital requirements and adjusting their business model to changing economic environments. In addition, the public debate on aggressive profit maximization and bank bailouts might have prevented bank managers from aggressive tax minimization in the aftermath of the Lehman shock in 2008. Profit during the crisis could therefore show less sensitivity to tax incentives.

## 2.3. Tax responsiveness of income from different business models

We suspect opportunities to allocate taxable revenues to differ across banks' business models because access to shifting techniques varies for different business types. Some business models allow transactions being carried out regardless of the distance between banks and customers. Moreover, some business models might be more flexible in reorganizing their business structures due to the business not requesting a certain infrastructure. Most likely we expect different tax responses in lending activities, trading business as well as net fees and commissions accrual.

As for interest bearing business, adjusting interest margins in order to accrue revenues in low tax jurisdictions is only possible within a certain range due to transfer-pricing rules. Another possibility lies in reallocating lending activity to entities in favorable destinations. We expect enhanced flexibility for earnings generated by consulting and investment banking. Since transactions are much more firm-specific, the arm's length principle to assess transfer prices is difficult to apply. Within transfer-pricing restrictions, contract design should be able to channel some revenue to preferred destinations. We therefore expect pronounced tax elasticity for fees and commissions.

Business activities in multiple countries offer multinational banks possibilities to allocate their trading business in tax favorable locations. Previous studies focused on the introduction of a securities transaction tax in Sweden. Studies find shifts between products and a significant migration of trading volume to the UK (Campbell and Froot, 1993; Umlauf, 1993). More recently Chou and Wang (2006) find similar evidence for trading volume shifted from Singapore to Taiwan. In addition, there might be some discretion where to realize certain gains. We therefore expect trading gains to be rather sensitive to tax considerations.

## 2.4. Tax effects on loan loss provisions

A number of accounting studies have analyzed loan loss provisions as a managerial tool in the banking industry. Management incentives influencing the discretionary component of LLPs can be grouped in two categories. Some studies find evidence that LLPs are used to smooth earnings over time. Incentives to smooth income can differ with managers' strategies. Well known examples include so called "big bath" strategies, showing less volatility

towards investors and managerial self-interest such as earnings based compensation packages (Fonseca and González, 2008; Balboa et al., 2013). A second group of studies finds capital management to be a driver of loan loss provisioning, as LLPs can be partly used to fulfill capital requirements (Beatty et al., 1995; Ahmed et al., 1999; Laeven and Majnoni, 2003).

However, the potential tax response of LLPs has not been analyzed empirically. Tax treatment for LLPs varies among countries. Whereas a few jurisdictions, such as the United States, do not allow taxable deduction, other jurisdictions, for example Japan, France and Germany, allow deduction under specific conditions.<sup>3</sup> However, all countries have in common that a deduction for tax purposes is possible at the time of default. Therefore, we assume a strong incentive to place high-risk debt in high tax jurisdictions. We take the amount of LLPs as proxy for banks' attempt to allocate loans with a high default risk in locations with a high statutory tax rate. Hence, we test if banks disclose additional LLPs in high tax jurisdictions to benefit from tax deductibility. In additional tests, we will also consider that LLPs are not tax deductible in a few countries.

## 3. Methodology and data

### 3.1. Empirical approach

In our empirical analysis of profit-shifting behavior in the banking industry, we analyze subsidiary-level data of multinational banks. Since previous studies have investigated profit-shifting activities of non-financial MNCs, we can refer to these well-known empirical identification strategies.

The idea is that reported earnings before taxes  $EBT_i^r$  of subsidiary  $i$  are equal to the sum of unobserved true earnings before taxes and those profits that are shifted. Previous literature dealing with profit shifting of non-financial firms has considered determinants of true economic profit like total assets employed, payroll or host country characteristics. We apply this approach used by previous literature to bank subsidiaries. However, the measurement of bank input and output is not as straightforward (e.g. Humphrey, 1992; Berger and Mester, 2003). One view is that banks use – similar to non-financial firms – labor and fixed assets to produce in particular deposit and loan accounts (Gilligan et al., 1984). However, a more prevalent view recognizes banks as financial intermediaries. Consequently, all forms of earning assets are considered as output and labor as well as total capital including deposits should be treated as input (Sealey and Lindley, 1977).

We therefore include total assets as well as payroll in a vector  $X$  of potential factors influencing economic profit of a bank subsidiary. Moreover, we include earning assets as output measure that also determines bank profits. Furthermore, we consider additional factors that might influence subsidiary profits. In particular, we add off-balance-sheet (OBS) items because modern banks are also involved in OBS activities like derivatives and guarantees that generate fee income. Finally, we consider additional bank and host country characteristics that might also affect economic profits in the absence of profit shifting.

We estimate the following equation for reported earnings before taxes of bank subsidiary  $i$  in year  $t$ :

$$\ln EBT_{i,t}^r = \alpha_1 + \alpha_2 X_{i,t} + \gamma \tau_{i,t} + \delta_j + \mu_k + \theta_t + v_{i,t} \quad (1)$$

<sup>3</sup> LLPs are regulated by IAS No. 39 and therefore subject to the incurred loss model. This requires that a loss event occurs before a provision can be made and was introduced to avoid so-called 'big bath' general provisions that distorted the accurate reporting of financial performance to investors. Bankscope's data item "Loan loss provisions" includes general and specific provisions for bad debt.

The scale of profit shifting should depend on the level of host country taxes,  $\tau$ . Thus, a negative sign for  $\gamma$  is expected if profits are shifted into other locations when the local tax rate is rising. Due to the log-level specification, the coefficient  $\gamma$  is a tax semi-elasticity of reported profits. Moreover, we control for heterogeneity across banks by a parent-specific effect  $\delta_j$  and an effect  $\mu_k$  for the bank type.<sup>4</sup> We do not control for host country or subsidiary effects because the profit shifting incentives described in our paper are based on tax differences between countries. The inclusion of country-level or even subsidiary fixed effects would generate a situation where the tax effects are estimated based on within-country variation rather than between-country variation.

Amel et al. (2004) suggest that bank efficiency increased over time due to technical changes. Moreover, common economic shocks affect bank profitability. We therefore consider year fixed effects  $\theta_t$ .

In additional analyses we will consider different profit measures as dependent variables including only revenues from certain business models of banks. These additional tests can detect potential asymmetries in the response to taxes between business models. Moreover, we follow up on loan loss provisioning as a potentially important profit-shifting technique. Since loan loss provisioning is associated with less profits, we expect a positive effect of host country taxes.

### 3.2. Bank data

We obtain comprehensive bank data from all over the world from Bankscope Database compiled by Bureau Van Dijk. The database provides balance sheets and income statements for banks based on annual reports, as well as information on their worldwide affiliates.

For our study, we use a dataset on multinational banks from 2001 to 2012. Accordingly, we consider only bank groups with at least one subsidiary in a foreign country. We consider a subsidiary if at least 50 percent of its shares are owned by the respective parent bank. Moreover, we eliminate Central Banks, Governmental Credit Institution and Micro-Finance Institutions from our sample, as their incentives might differ largely from other banks. Banks with a negative equity value are also eliminated. The sample selection limits our sample to 2136 multinational bank groups. Table 1 depicts the sample selection.

Since each subsidiary is subject to tax in the respective host country, the empirical analysis considers unconsolidated accounts of both parent firms and subsidiaries; consolidated accounts are removed.<sup>5</sup> Accordingly, data reflects responsiveness on national tax rates and country-specific regulations. Unfortunately, financial data of subsidiaries are only available in Bankscope if the subsidiary is also a bank. This leaves us with a sample of 18,929 subsidiary-year observations of 2868 subsidiaries. On average, our sample includes about 6.5 observations of a bank subsidiary; the average number of subsidiaries per multinational bank is about 1.5. The total number of subsidiaries of a multinational bank is however much higher because most of the bank subsidiaries do not have a bank license. Thus, bank subsidiaries included in our sample have a variety of profit shifting opportunities.

**Table 1**  
Sample selection.

Bank groups listed in Bankscope database 2001–2012	3221
Exclusion of Central banks, Specialized Governmental Credit Institution and Micro-Finance Institutions	–35
Exclusion of banks with no sufficient tax information	–91
Exclusion of banks with negative equity	–4
Exclusion of banks with no sufficient balance sheet information	–959
Final sample of bank groups	2136

Our sample includes bank-subsidaries in 131 host countries. While the average number of subsidiaries per host country is 21, more than 80 percent of the subsidiaries are located in 30 host countries. However, observations are neither concentrated in high nor in low tax countries.

### 3.3. Bank-level variables

In our basic set of estimations, we use earnings before taxes (EBT, in logs) of each subsidiary as our dependent variable.<sup>6</sup> To test differences in the tax response across different business models, we also use net interest revenue and non-interest operating income as well as trading gains and revenue from net fees and commissions as additional dependent variables. In additional analyses we also refer to the amount of loan loss provisioning accrued in the respective year (LLP (ln)).

As aforementioned we control for several bank characteristics as determinants of subsidiaries' 'true' economic profit in the absence of profit-shifting incentives. First of all, we include banks' total assets (TA) and capture banks' activities that are not included in the balance sheet by off-balance sheet items (OBS). As an additional proxy for the scale of affiliate production, we use total personnel expenses (PAYROLL). Moreover, we consider the share of earning assets (EA) that generate interest or dividend income. Additionally, we consider a measure of collateral (COLLATERAL) following a definition by Gropp and Heider (2010) because financing conditions might affect profitability of banks. Furthermore, we consider subsidiary growth (GROWTH). In additional robustness checks, we also consider CUSTOMER DEPOSITS, TOTAL ACCRUALS and a dummy LCF that indicates subsidiaries with a loss carryforward.

Regarding capital regulation of banks, we control for capital-tight banks. CAP is a dummy variable equaling one for firms with limited capitalization and zero otherwise. Since Bankscope does not provide sufficient information to compute precise risk-adjusted capital thresholds, we define the 25%-percentile of banks with the lowest capitalization ratio as capital tight. In our sample the threshold equals banks with a capitalization of 12.4% and less. In additional analyses of the tax response of loan loss provisioning, we use pre-impairment operating profits (PIOP) to control for profitability before loan loss provisioning.

Summary statistics of all variables are provided in Table 2. Correlation matrices including all variables are provided in Tables 7–9 in an Appendix.

### 3.4. Tax variables and additional controls

Regarding tax incentives to shift taxable profits within the multinational bank, we consider the statutory corporate tax rate (STR) of the subsidiary's host country. The statutory corporate tax rate includes state taxes as well as local surcharges. This can be challenging for federal countries like the US, where states apply additional taxes. For this reason we use an average tax rate for

<sup>4</sup> We do not control for country or subsidiary effects because they would eliminate much of the tax rate variation between different host countries. However, the profit shifting incentives described in our paper are based on tax differences between countries.

<sup>5</sup> Banks are known to use permanent establishments (PE) due to various non-tax reasons such as bank licensing. Unfortunately, balance sheet data does not allow detecting profits allocated to a foreign PE. We therefore must assume that our analysis captures not the full extent of bank's tax planning activities and can therefore be seen as the lower bound of bank's profit shifting.

<sup>6</sup> Tests with EBT divided by total assets produced similar results.



**Table 2**  
Summary statistics.

	No. of Obs.	Mean	Std. Dev.
<i>Dependent variables</i>			
EBT (ln)	18,929	3.689	2.881
LLP (ln)	15,592	3.106	2.681
NET FEES AND COMMISSIONS (ln)	18,929	3.526	2.559
NET GAINS AND TRADING (ln)	5,907	3.236	3.121
NET INTEREST REVENUE (ln)	20,944	4.550	2.655
NON-INTEREST OPERATING INCOME (ln)	20,355	3.896	2.692
<i>Explanatory variables</i>			
ATR	18,929	0.314	0.063
CAP	18,929	0.129	0.336
COLLATERAL	18,929	0.261	0.171
CRISIS	18,929	0.377	0.484
CUSTOMER DEPOSITS	18,268	0.074	0.131
EA	18,929	0.916	0.098
ETR	18,635	0.315	0.023
GROWTH	18,929	0.012	0.030
INFLATION	18,929	0.031	0.035
LCF	18,929	0.031	0.175
LEVERAGE	18,929	0.896	0.104
MINTR	18,929	0.252	0.131
OBS (ln)	18,929	6.032	3.118
PAYROLL (ln)	18,929	3.967	2.486
PIOP (ln)	15,592	4.325	2.793
RULE OF LAW	18,929	1.091	0.862
STR	18,929	0.326	0.083
TA (ln)	18,929	8.504	2.606
TOTAL ACCRUALS	18,547	0.013	0.062
TP	15,270	0.311	0.462

Notes: Bank data is derived from Bankscope provided by Bureau van Dijk. EBT is earnings before taxes; LLP is the total amount of loan loss provisioning accrued; CAP is a dummy variable for banks' limited capitalization. COLLATERAL is a tangibility measure following [Gropp and Heider \(2010\)](#) including total securities, treasury bills, other bills, bonds, CDs, cash and due from banks, land and buildings and other tangible assets divided by book value of assets; CRISIS is an indicator for years before and after the financial crisis; CUSTOMER DEPOSITS is customer deposits over total assets; EA are earning assets over total assets; ETR is tax expenses divided by EBT; GROWTH is the annual growth of total assets; LCF is a dummy indicating if a subsidiary reported negative EBT in the previous year; LEVERAGE is total debt over total assets; OBS measures off-balance sheet items; PAYROLL is total personnel expenses; PIOP is pre-impairment operating profit; TA are total assets; TOTAL ACCRUAL is (EBT + LLP + net charge offs – net cash receipts)/TA.

Tax information is derived from the IBFD Tax Handbooks and the Worldwide Corporate Tax Guides by Ernst & Young and PricewaterhouseCoopers. STR is the statutory tax rate of the corporate income tax augmented with the country average of state or local income taxes. MINTR is the minimum STR; ATR the average STR available within the multinational bank. TP is a transfer-pricing indicator taken from [Lohse et al. \(2012\)](#).

INFLATION and RULE OF LAW stem from the World Bank's Development Indicators (2012). INFLATION is the annual change in consumer price index. RULE OF LAW measures the perception of the extent to which rules of society are respected. A high score indicates a strong rule of law.

countries with a significant local variation in corporate taxes (Canada, Germany, Italy, Japan, Luxembourg, Switzerland, and the US). To support our results we conduct additional analyses using the corporate tax rate of the respective financial centers.<sup>7</sup>

Our sample covers tax rates for 131 countries over 12 years from 2001 until 2012. There is considerable variation within the data. In 2001 the mean tax rate over all countries considered was 35%. During the sample period, our sample includes 238 tax rate changes. Over time a decline in worldwide tax rates can be witnessed. The sample mean of the tax rate decreases to a mean of 26% in 2012. While we can also use this variation in tax rates over time, the profit shifting incentive is mainly caused by the significant cross-country tax rate variation. Whereas some countries such as the Cayman Islands do not impose any corporate tax, one of the highest tax rates is levied in the United States. For each sample

period, we can use significant cross-country tax rate variation. The standard variation of the statutory tax rate ranges between 0.07 and 0.08 for our sample periods.

The shifted profit amount is also subject to tax at the level of the receiving entity within the same firm. In additional regressions, we consider additional tax measures to expand our analysis from banks' own tax incentives to incentives within the group structure. ATR is the average tax rate within the multinational banking group, excluding the tax rate of the affiliate in question.<sup>8</sup> MINSTR is the minimum tax rate found within the group.

In an additional test, we consider the effective tax rate (ETR) which is defined as tax expense over EBT. While the ETR is an ex post measure of the effective tax payments, it is also affected by differences in the determination of the tax base or special tax treatment of certain types of income.

The indicator TP considers a country's strictness and enforcement of transfer-pricing rules. We use a dummy variable which equals one for strict and zero for rather loose transfer-pricing regulation. The data is provided by [Lohse et al. \(2012\)](#).<sup>9</sup> In practice, difficulties in compliance with transfer-pricing regulation might differ among industries. While manufacturing firms aim to allocate their personnel most efficiently to exploit transfer prices, banks' focus is set on risk allocation. However, as our index is based on general conditions such as documentation, enforcement and disclosure requirements, we are confident that our indicator serves as a proxy for the strictness of tax audits and can be applied to the financial industry.

We expect banks to be less responsive to tax effects after 2008 due to ongoing recapitalization difficulties throughout the industry. We include a CRISIS dummy to separate effects before and after the Lehman shock. Our dummy equals 1 for the years 2008–2011. Due to our international sample we control for inflation rate (INFLATION) and, in additional analysis, for RULE OF LAW measuring the perception of the extent to which rules of society are respected.

## 4. Results

In this section, we present the regression results for the tax impact on reported profits of bank subsidiaries as well as the tax response of loan loss provisioning and capital choices.

### 4.1. Tax effects on reported profits

We start with an analysis of reported profits with results shown in [Table 3](#). The dependent variable is (ln) EBT. Regressions follow Eq. (1) as described in Section 3. Some of the tax variables which are important for our identification only vary within country-year cells. [Moulton \(1990\)](#) and [Bertrand et al. \(2004\)](#) show that the presence of a common random effect at the country-year level has to be taken into account. Thus, we use a variance-covariance matrix allowing for random group effects by clustering in country-year cells. We consider parent-specific effects to control for the heterogeneity among bank groups. Moreover, we consider a full set of year effects and bank-type effects which capture differences in the financial conditions among 13 different bank types shown in our sample.

All specifications consider a basic set of control variables to explain true economic profits generated by subsidiaries in the absence of any profit shifting. In particular, we can confirm that

<sup>8</sup> Please note that we consider the total universe of bank subsidiaries documented in Bankscope. That means for the construction of the mean tax rate we also consider subsidiaries without full financial data.

<sup>9</sup> We classify transfer-pricing rules as strict if the original score according to [Lohse et al. \(2012\)](#) is four or five. Transfer-pricing rules are considered as loose if original scores range between zero and three.

<sup>7</sup> We consider the tax level of Toronto (Canada), Frankfurt (Germany), Milano (Italy), Tokyo (Japan), Zurich (Switzerland), Luxembourg and New York City (US).

**Table 3**  
Banks' profit shifting.

	(1)	(2)	(3)	(4)	(5)
STR	−2.378*** (0.249)	−3.200*** (0.263)	−2.432*** (0.249)	−2.542*** (0.249)	−3.366*** (0.259)
TP × STR		3.729*** (0.687)			4.034*** (0.687)
CAP × STR			0.379 (0.426)	0.437 (0.434)	0.461 (0.481)
CRISIS × STR				0.778** (0.352)	0.499 (0.492)
TA (ln)	0.680*** (0.022)	0.694*** (0.025)	0.681*** (0.022)	0.683*** (0.022)	0.697*** (0.025)
OBS (ln)	0.027*** (0.009)	0.028*** (0.010)	0.028*** (0.009)	0.027*** (0.009)	0.028*** (0.010)
PAYROLL (ln)	0.252*** (0.020)	0.223*** (0.022)	0.250*** (0.020)	0.249*** (0.020)	0.220*** (0.023)
GROWTH	−0.832*** (0.262)	−1.106*** (0.284)	−0.824*** (0.261)	−0.868*** (0.261)	−1.119*** (0.282)
EA	0.341** (0.144)	0.251 (0.174)	0.359** (0.144)	0.339** (0.143)	0.266 (0.172)
COLLATERAL	0.439*** (0.084)	0.216** (0.098)	0.434*** (0.084)	0.439*** (0.084)	0.198** (0.099)
INF (ln)	0.095*** (0.022)	0.067** (0.026)	0.095*** (0.022)	0.098*** (0.021)	0.066*** (0.024)
TP		−0.729*** (0.200)			−0.798*** (0.205)
CAP			−0.176 (0.129)	−0.191 (0.131)	0.045 (0.151)
CRISIS				−0.503*** (0.119)	−0.138 (0.159)
R <sup>2</sup>	0.95	0.95	0.95	0.95	0.95
N	18,929	15,270	18,929	18,929	15,270

Notes: The dependent variable is earnings before taxes EBT (ln). Explanatory variables are described in Section 3. Year dummies, bank-type effects and parent-firm effects are included but not reported. Robust standard errors, clustered on a country-year level, are shown in parentheses. \*, \*\* and \*\*\* indicate significance at the level of 10%, 5% and 1% respectively.

the stock of invested capital and payroll exert significant positive effects on the profit amount. Furthermore, we find a positive influence of the off-balance sheet items.

Regarding the tax incentive, we find a negative and highly significant effect of the host country tax rate on reported profits. Subsidiaries with higher host country tax levels have significantly smaller pre-tax profits. This finding confirms the expectation that reported profits of multinational banks respond to host country taxes. Considering Column (1) of Table 3, the coefficient of −2.378 suggests that a one percentage point higher host country tax rate is associated with about 2.4 percent less reported profits of a bank subsidiary.

Compared with results from studies that consider data from non-financial MNCs, the semi-elasticity of −2.378 is large in absolute terms. A recent meta-study of 25 previous studies by Heckemeyer and Overesch (2013) suggests as a consensus estimate a tax semi-elasticity of subsidiary profits of about −0.8 for non-financial MNCs. Banks seem to be more flexible in terms of shifting their profits compared to the non-banking sector.

Regarding restrictions of profit shifting, we account for the level of transfer-pricing regulation and enforcement in host countries. The positive effect of the interaction term between the tax rate and the transfer-pricing indicator in Columns (2) and (5) provides evidence that stricter transfer-pricing regulation is associated with an adverse effect on the profit response to taxes. Taking into account the point estimates for the plain tax rate and the interaction term with the transfer-pricing indicator, our findings suggest that the tax response of bank profits is completely eliminated by strict transfer-pricing regulation.

In additional regressions in Columns (3)–(5) of Table 3, we test whether bank regulation and the financial crisis affect

profit-shifting behavior of multinational banks. We consider an indicator for banks' actual capitalization. A value of one indicates that the respective bank is in the lower 25%-percentile concerning total capital ratio. Our results do not confirm that bank regulation does affect the responsiveness of total profit to tax incentives.

Considering that our panel includes the financial crisis as a period with exceptional challenges for banks, we include an interaction between the tax rate and a dummy for years between 2008 and 2011. Column (4) suggests that banks did less profit shifting during the financial crisis. This coincides with the general assumption that banks had other preferences in their behavior during the crisis. However, the interaction is not statistically significant if we also control for transfer pricing restrictions in Column (5).

The crisis exerts a fundamental shock for banks and bank activities declined substantially. Buch et al. (2013) state that the crisis lowered banks' engagement in international assets. Withdrawal from foreign markets can be associated with less tax planning possibilities. Thus, the reduced tax response might be associated with fundamental changes in financial activities that have been used to shift profits between subsidiaries. Therefore, the results for the tax response during the financial crisis should be interpreted with some caution.

#### 4.2. Additional analyses

In Table 4 we provide several robustness checks. The first set of additional tests in Columns (1)–(5) of Table 4 is concerned with the approximation of the marginal tax incentive to shift profits. In our baseline regressions we consider the host country's statutory corporate tax rate as the marginal incentive to shift one additional dollar of subsidiary profit. Basically, shifting of an additional dollar avoids tax payments as imposed by the statutory tax rate. However, the statutory tax rate can overstate the marginal tax incentive to reduce reported earnings by additional profit shifting in some cases. Thus, we might underestimate the tax response of reported profits if we do not control for significantly smaller tax incentive of some subsidiaries.

While we are unable to consider the exact marginal tax incentive, because information about the tax status of each subsidiary is not available, in Column (1) we identify those subsidiaries that are likely to carry forward losses from previous fiscal years. Since a tax loss carryforward can offset current profits, at least some part of the current earnings is not associated with tax payments. Therefore, the tax incentive to avoid taxes through profit shifting is reduced. The interaction term between the tax rate and the dummy indicating loss firms suggests a somewhat smaller effect for the statutory tax rate for loss firms but the interaction is statistically insignificant. The plain tax effect for all firms is unchanged compared with results in Table 3.

In Column (2) of Table 4 we consider the effective tax rate (ETR) as an alternative tax measure. ETRs are computed as the ratio between tax expenses and pre-tax income taken from the financial accounts. They also consider the effects of tax allowances or special tax rates for certain income types like capital gains. Our regression result depicts a significant negative effect on reported profits. In absolute terms, the magnitude of the tax effect is however small compared with the estimates for the statutory tax rate. This finding might be attributed to a downward biased effect because ETRs are directly influenced by profit-shifting activities. Thus, ETRs are a problematic proxy for the marginal shifting incentive. If a subsidiary avoids almost all taxes through extensive profit shifting, the subsidiary will report a small ETR although the firm has strong incentives to shift profits because the host country imposes a high statutory tax rate.

Since shifted profits are subject to tax at other locations of the multinational bank, the shifting incentive is also affected by the

**Table 4**  
Robustness tests.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STR	−2.310*** (0.243)		−2.999*** (0.285)	−2.753*** (0.247)	−2.241*** (0.217)	−1.501*** (0.259)	−2.022*** (0.248)	−1.868*** (0.247)	−0.331 (0.383)	−1.472 (0.992)
ETR		−0.232** (0.093)								
STR × LCF	0.783 (0.645)									
ATR			2.321*** (0.815)							
MINSTR				1.307*** (0.494)						
EBT <sub>t-1</sub>						0.311*** (0.018)				
TA (ln)	0.679*** (0.021)	0.667*** (0.023)	0.680*** (0.021)	0.680*** (0.021)	0.678*** (0.021)	0.483*** (0.025)	0.768*** (0.0223)	0.788*** (0.0228)	0.698*** (0.039)	0.627*** (0.063)
OBS (ln)	0.024*** (0.009)	0.033*** (0.009)	0.028*** (0.009)	0.027*** (0.009)	0.027*** (0.009)	0.009 (0.009)	0.0361*** (0.00982)	0.0401*** (0.0101)	0.551*** (0.145)	0.021** (0.010)
PAYROLL (ln)	0.255*** (0.020)	0.251*** (0.021)	0.252*** (0.020)	0.252*** (0.020)	0.253*** (0.020)	0.192*** (0.019)	0.202*** (0.0170)	0.166*** (0.0177)	0.294*** (0.042)	0.297*** (0.054)
GROWTH	−0.786*** (0.258)	−0.489* (0.272)	−0.831*** (0.263)	−0.818*** (0.261)	−0.844*** (0.262)	−0.881 (0.555)	−0.565** (0.284)	−0.472 (0.300)	0.254 (0.327)	0.100 (0.541)
EA	0.303** (0.140)	0.334** (0.137)	0.393*** (0.145)	0.381*** (0.145)	0.331** (0.144)	0.350** (0.167)	0.410*** (0.134)	0.302* (0.162)	−0.016 (0.014)	1.196*** (0.225)
COLLATERAL	0.468*** (0.083)	0.416*** (0.085)	0.440*** (0.084)	0.440*** (0.083)	0.440*** (0.083)	0.397*** (0.102)	0.248*** (0.0769)	0.248*** (0.0777)	0.098 (0.101)	0.087 (0.132)
INF (ln)	0.094*** (0.022)	0.090*** (0.023)	0.094*** (0.022)	0.095*** (0.022)	0.092*** (0.022)	0.161*** (0.026)	0.0772*** (0.0202)	0.0368* (0.0203)	0.023 (0.022)	−0.075** (0.037)
LCF	−0.806*** (0.223)									
LEVERAGE							−3.612*** (0.182)	−3.492*** (0.194)		
CUSTOMER							0.109 (0.108)	0.149 (0.107)		
DEPOSITS								0.887*** (0.307)		
TOTAL								−0.193*** (0.0300)		
ACCRUALS										
RULE OF LAW										
R <sup>2</sup>	0.95	0.95	0.95	0.95	0.95	0.90	0.96	0.96	0.98	0.96
N	18,929	18,632	18,929	18,929	18,929	14,958	17,999	17,999	25,065	17,197

Notes: The dependent variable is earnings before taxes EBT (ln). Explanatory variables are described in Section 3. All columns except for Column (6) include a full set of year dummies, parent-firm effects and bank-type effects; Column (6) includes parent-year effects and bank-type effects. Column (5) considers tax rates of financial centers if tax rates vary within a host country. Columns (1)–(8) consider the sample of multinational bank subsidiaries as described in Section 3; Column (9) uses domestic banks reported in Bankscope and Column (10) considers consolidated financial accounts of multinational banks. Robust standard errors, clustered on a country-year level, are shown in parentheses. \*, \*\* and \*\*\* indicate significance at the level of 10%, 5% and 1% respectively.

tax level of other locations. In Columns (3) and (4) of Table 4 we therefore include an average tax rate of all other locations and the minimum tax rate available within the multinational banking group. Since the average tax rate and the available minimum tax rate proxy for the tax effectively imposed if profits are shifted within the multinational group, an adverse effect on the remaining profits of a subsidiary is expected. As expected both control variables show a significantly positive effect, indicating less profit shifting if the tax level in other jurisdiction increases. The coefficients for the host country tax rate are however robust.

Fiscal heterogeneities within a host country are another concern with our tax measure. Some countries like the US apply not only a federal corporate tax but also state or regional taxes. While our tax variable in the baseline regressions reflects the country average of these regional and state taxes, in Column (5) of Table 4 we consider the tax rates imposed in the most important financial centers of countries with a significant local variation in corporate taxes.<sup>10</sup> Column (5) depicts that the coefficient for the tax response is only slightly affected by these adjustments of the tax measure.

Additional regressions in Columns (6) and (7) are carried out to test the robustness of the results if alternative specifications for the

profit generating process are considered. In Column (6) we choose a dynamic specification and consider lagged EBT. We slightly deviate from our base modeling and consider parent-year fixed effects. Thus, the demeaning process to eliminate the parent-year effect involves exclusively covariates of the current period. In Columns (7) we consider differences in liabilities and take into account total leverage and customer deposits respectively. Across all specifications, the negative tax effects are robust and statistically significant.<sup>11</sup>

By adding subsidiary's leverage in Column (7), we control for debt shifting as one potentially important shifting mechanism. As expected, the estimated tax effect is smaller in the presence of a control for differences in debt share. The remaining tax effect is still significant and of a noticeable magnitude. We conclude that debt financing might not be the most important profit-shifting mechanism within multinational banks. However, the effect of leverage on reported profits should be interpreted with some caution because leverage is potentially endogenous in a regression of reported profits.

<sup>10</sup> We consider the tax level of Toronto (Canada), Frankfurt (Germany), Milano (Italy), Tokyo (Japan), Zurich (Switzerland), Luxembourg, and New York City (US).

<sup>11</sup> The tax coefficient of about −1.501 in Column (6) of Table 4 reflects only the short-run tax response. The dynamic specification also allows the computation of a long-run tax semi-elasticity of about −2.179 (−1.501/(1 − 0.311)) which does not significantly differ from the tax effects found in our baseline regressions.

**Table 5**  
Income from different business models.

	(1) Net interest revenue	(2) Non-interest operating income	(3) Trading gains	(4) Net fees and commissions
STR	−0.551*** (0.139)	−0.820*** (0.190)	−3.401*** (0.463)	−0.719*** (0.173)
TA (ln)	0.631*** (0.017)	0.260*** (0.020)	0.592*** (0.051)	0.175*** (0.019)
OBS (ln)	0.005 (0.006)	0.024*** (0.007)	−0.025 (0.023)	0.036*** (0.008)
PAYROLL (ln)	0.366*** (0.016)	0.708*** (0.018)	0.379*** (0.049)	0.751*** (0.017)
GROWTH	−1.072*** (0.169)	−0.500*** (0.162)	0.109 (0.633)	−0.182 (0.177)
EA	0.408*** (0.105)	−0.603*** (0.100)	0.018 (0.324)	−0.278*** (0.107)
COLLATERAL	0.047 (0.055)	−0.067 (0.062)	1.023*** (0.218)	−0.450*** (0.052)
INFLATION (ln)	0.103*** (0.015)	0.030 (0.020)	0.154*** (0.043)	−0.016 (0.014)
R <sup>2</sup>	0.98	0.97	0.93	0.97
N	20,944	20,355	5,907	18,929

Notes: Dependent variables: (1) NET INTEREST REVENUE (ln); (2) NON-INTEREST OPERATING INCOME (ln); (3) TRADING GAINS (ln); (4) NET FEES AND COMMISSIONS (ln). Explanatory variables are described in Section 3. Year dummies, bank-type effects and parent-firm effects are included but not reported. Robust standard errors, clustered on a country-year level, are shown in parentheses. \*, \*\* and \*\*\* indicate significance at the level of 10%, 5% and 1% respectively.

Column (8) of Table 5 considers additional incentives to manage reported earnings because bonuses of managers depend on this figure. The accounting literature provides evidence that the discretionary component of accrual accounting is associated with earnings management. We therefore consider total accruals as an additional control variable. Our results confirm a positive effect of total accruals on reported earnings. The coefficient for the tax response is however almost unaffected by this additional control. Moreover, we consider a measure for the rule of law. Dyreng et al. (2012) find that the rule of law has an influence on managers' decisions to smooth earnings. We find that a strong rule of law is associated with smaller profits. This effect suggests that subsidiaries of multinational banks benefit from competition with domestic banks resident in a country with a lax institutional environment.

Finally, Columns (9) and (10) provide some type of falsification test. In Columns (9) we consider only domestic banks, i.e. banks included in the Bankscope database that do not report any foreign subsidiaries. We expect no significant negative tax effect because banks without any foreign subsidiaries are unable to reduce reported earnings through profit shifting. Results presented in Column (9) clearly confirm this expectation. No economic and statistical significant tax effect is found.

In Column (10) we consider a third sample including consolidated financial statements of multinational banks instead of unconsolidated financial statements of their subsidiaries. Again, we find no significant effect of taxes (i.e. the tax rate of the parent firm) on consolidated earnings. We argue that this finding further supports the profit-shifting mechanism. Since unconsolidated profits of each subsidiary are subject to taxes in the respective host countries, host country taxes should matter for subsidiary profits. Profit shifting between subsidiaries, for example, by intra-bank lending is of course eliminated in the consolidated financial accounts of the bank group. Therefore, consolidated accounts should not respond to tax incentives.

#### 4.3. Income from different business models

In our analysis in Table 3, we referred to EBT as our profit measure. By choosing this rather broad measure, we capture the overall response to taxes. In order to corroborate our main results, we conduct a series of additional tests. Regressions in Table 5 focus on

potential differences in the tax response of profits generated by different business models of multinational banks.

We take the specification (1) from Table 3 as a starting point but choose different revenue measures as dependent variables. Column (1) of Table 5 considers net interest revenue as dependent variable. In Column (2) of Table 5 we focus on the non-interest revenues. The significant negative coefficients in both specifications support our assumption that revenues are allocated to low tax subsidiaries. However, comparing the point estimates for the tax response, revenues from interest bearing business are less flexible with regard to profit shifting. Our results suggest that revenues from other types of business are particularly mobile.

Columns (3) and (4) provide additional insight into the tax response and take into account certain types of non-interest income. We consider trading gains as well as net fees and commissions as dependent variables. The results again support the view that different business types are asymmetrically responsive to tax incentives. Comparing our results we find a rather large semi-elasticity for trading gains compared to net fees and commissions or net interest revenue.<sup>12</sup> The findings suggest that trading gains are particularly mobile and shifting to low tax subsidiaries seems to be rather easy. However, taking into account the absolute size of business models net interest revenue proofs to be still an important channel. Although the measured tax semi-elasticity is rather small, the absolute amount of shifted income is still larger for interest bearing business than the shifting amount due to tax-optimal allocation of trading gains.

Coefficients for our control variables support the validity of our results. More earning assets are associated with an increase in interest revenue. An adverse effect is found for non-interest operating income as well as fees and commissions. This is expected because a higher share in earning assets indicates a focus on interest-generating activities as opposed to fee-generating activities.

#### 4.4. Loan loss provisioning

The literature suggests that loan loss provisioning is an item with a discretionary component depending to some extent on

<sup>12</sup> To consider potential sample biases we also tested all specifications with the smaller sample used in the Trading gains regression and gained similar results.



**Table 6**  
Loan loss provisioning.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
STR	2.355*** (0.444)	2.830*** (0.445)	2.908*** (0.440)	3.240*** (0.435)	3.221*** (0.410)	1.852*** (0.337)	3.251*** (0.419)
CAP × STR			−1.329*** (0.504)	−1.334*** (0.514)	−1.156** (0.479)	−0.932* (0.482)	−0.281 (0.427)
CRISIS × STR				−1.294** (0.585)	−1.144** (0.541)	−0.552 (0.601)	−2.177*** (0.532)
LCF × STR					−2.736*** (0.557)	−2.405*** (0.588)	−3.186*** (0.498)
TA (ln)	0.510*** (0.034)	0.273*** (0.038)	0.275*** (0.038)	0.271*** (0.0384)	0.248*** (0.0377)	0.253*** (0.0385)	0.217*** (0.0408)
OBS (ln)	0.010 (0.016)	−0.004 (0.015)	−0.006 (0.015)	−0.00361 (0.0154)	0.00288 (0.0150)	0.00965 (0.0151)	0.00960 (0.0163)
PAYROLL (ln)	0.435*** (0.031)	0.344*** (0.031)	0.344*** (0.031)	0.347*** (0.0305)	0.321*** (0.0303)	0.312*** (0.0308)	0.335*** (0.0361)
GROWTH	−2.640*** (0.452)	−2.257*** (0.456)	−2.261*** (0.456)	−2.116*** (0.450)	−1.888*** (0.446)	−2.120*** (0.461)	−1.614*** (0.459)
COLLATERAL	−0.689*** (0.114)	−0.699*** (0.113)	−0.695*** (0.113)	−0.703*** (0.112)	−0.738*** (0.112)	−0.698*** (0.116)	−0.652*** (0.121)
INFLATION (ln)	0.136*** (0.033)	0.099*** (0.030)	0.098*** (0.030)	0.0894*** (0.0291)	0.0820*** (0.0273)	0.0830*** (0.0304)	0.0830*** (0.0293)
PIOP (ln)		0.347*** (0.026)	0.347*** (0.026)	0.347*** (0.0261)	0.395*** (0.0246)	0.382*** (0.0253)	0.408*** (0.0260)
CAP			0.414*** (0.155)	0.423*** (0.156)	0.366** (0.147)	0.283* (0.147)	0.134 (0.140)
CRISIS				0.440** (0.203)	0.382** (0.188)	0.0942 (0.203)	0.694*** (0.188)
LCF					1.482*** (0.189)	1.387*** (0.196)	1.585*** (0.181)
R <sup>2</sup>	0.92	0.93	0.93	0.93	0.93	0.93	0.93
N	15,592	15,592	15,592	15,592	15,592	15,592	14,150

Notes: Dependent variable is loan loss provisioning LLP (ln). Explanatory variables are described in Section 3. Year dummies, bank-type effects and parent-firm effects are included but not reported. In Column (6) the statutory tax rate is replaced with zero if LLP is not tax deductible; in Column (7) observations from those countries are excluded that do not allow a tax deduction of LLP. Robust standard errors, clustered on a country-year level, are shown in parentheses. \*, \*\* and \*\*\* indicate significance at the level of 10%, 5% and 1% respectively.

decision makers' strategies. We therefore investigate the relationship between LLPs and the statutory tax rate within the multinational bank. We expect a positive correlation between STR and the amount of LLPs.<sup>13</sup>

We find a significant positive tax effect on LLPs for all specifications in Table 6. Due to the log-level specification, the point estimate in Column (2) indicates an increase in LLPs of 2.83 percent for a one percentage point higher host country tax rate. The magnitude of the tax response confirms the relevance of loan loss provisioning as a profit shifting device. Evaluated for the median subsidiary of our samples, our results suggest that loan loss provisioning is responsible for about half of the tax response of EBT.<sup>14</sup>

To isolate the tax effect we consider controls for banks' profitability and capitalization. In accordance with findings in the accounting literature we find a positive impact of pre-impairment operating profits (PIOP) on loan loss provisioning. Banks with a higher PIOP might build up LLPs for future losses as well as a means to reduce their tax base, Column (2).

As accounting literature is suggesting we expect capital-tight banks to be less interested in income smoothing. Additional LLPs might not contribute to regulatory (Tier I) capital but decrease the possibility to retain earnings. Since high leverage and capital tightness come usually as a result of low earnings or losses in

previous periods, it can be argued that banks in a tough financial situation would rather increase their earnings than engage in aggressive tax planning. Column (3) supports our prediction. The interaction term between the indicator variable for capital-tight banks and the tax rate is negative and statistically significant.

In Column (4) of Table 6, we again investigate the effect of the financial crisis. As expected, we find evidence that LLPs are built up during the crisis years. Considering the two coefficients of the plain tax variable and the interaction term, our finding suggests a smaller tax effect on LLPs during the financial crisis. The economic situation during the crisis seems to mitigate the discretionary component of LLPs. As aforementioned the results regarding the financial crisis should be interpreted with some caution due to the substantial changes affecting banks' balance sheets.

In Column (5) we consider bank subsidiaries that have a loss carryforward (LCF = 1) and can therefore offset current earnings with previous losses. The interaction term between the loss carryforward dummy and the tax rate suggests an adverse effect if a subsidiary has a loss carryforward and therefore no tax incentive to reduce current earnings by additional loan loss provisioning.

In Columns (6) and (7) we take into account that a few host countries do not allow a tax deduction of LLPs. While most countries allow a tax deduction of specific LLPs, a few countries including the US and a few other countries like Australia, Malaysia or the Philippines do not allow a tax deduction of LLPs.<sup>15</sup> A tax deduction

<sup>13</sup> For an overview cf. World Bank (2002).

<sup>14</sup> For the median firm of our samples, LLP is about 12 million US\$ and EBT is about 22 million US\$. Considering the point estimate of 2.83 we compute 0.34 million US\$ additional loan loss provisioning for the median firm if the tax rate increases by one percentage point while reported EBT falls by 0.52 million US\$ taking into account the point estimate of 2.378 (Column (1) of Table 3).

<sup>15</sup> An overview on the tax treatment of LLPs is provided in World Bank (2002). Moreover, we carefully checked several international tax surveys provided by PWC and Ernst&Young as well as by the Worldbank to identify countries that do not allow a tax deduction of LLPs.

for bad debt is only allowed in the event of default. We simulate a zero incentive by replacing the statutory tax rate with zero for those host countries (see Column (6) of Table 6). In addition, we exclude observations from host countries that do not allow a tax deduction of LLPs (see Column (7) of Table 6). Both analyses suggest that our main finding of a positive tax response of LLPs is robust. The adverse tax effects during the crisis and for capital tight firms are not always statistically significant.

## 5. Conclusion

We have analyzed multinational banks' response to taxation. For the empirical analysis we have employed the international bank dataset Bankscope. First, we find that reported earnings of multinational banks' subsidiaries significantly respond to host country tax incentives. This finding is robust across several additional tests including different measures to approximate the marginal tax incentive, a dynamic specification and additional control variables. Insignificant tax effects found in alternative samples of domestic banks as well as of consolidated financial accounts further support the profit-shifting mechanism.

The magnitude of the tax sensitivity of reported profits is significantly larger compared to effects found in previous studies for non-financial MNCs. Thus, our findings suggest that banks have enhanced tax-planning opportunities similar to firms from the IT industry or the retailing sector. With regard to anti-tax avoidance legislations, our findings suggest that strict enforcement of transfer-pricing rules is associated with less profit-shifting activities.

In additional analyses, we have analyzed whether the tax response differs across different business models in the banking sector. We find that the tax elasticity of revenues generated by interest-bearing activities is less tax responsive compared to other activities. In particular trading gains are highly tax sensitive. Moreover, we follow up on evidence in accounting literature and consider loan loss provisioning as a potential shifting channel. Our results suggest that discretionary accrual of loan loss provisions is, in fact, driven by tax incentives. We also find that bank regulation tends to limit tax planning via loan loss provisions.

We find only weak evidence that profit shifting was reduced in the aftermath of the financial crisis in 2008. Our results however suggest that the financial crisis seems to diminish incentives to use loan loss provisioning as a mean to allocate taxable profits. However, the results for the tax response during the financial crisis should be interpreted with some caution because the crisis exerts a fundamental shock for banks and bank activities declined substantially.

Our results provide insight into the status quo of bank taxation. Interestingly, we find that the general tax response of reported profitability seems to be more pronounced than found for MNCs from other industries. It seems to be a challenging task for future research to provide more evidence whether only the location of reported profits or the location of certain bank activities is affected by taxation.

## Appendix A

See Tables 7–9.

**Table 7**  
Correlation matrix – Banks' profit shifting.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
EBT (ln)	1.000																			
STR	-0.219	1.000																		
ETR	-0.197	0.198	1.000																	
ATR	-0.213	0.825	0.187	1.000																
MINSTR	-0.319	0.552	0.220	0.654	1.000															
TA (ln)	0.932	-0.154	-0.134	-0.172	-0.290	1.000														
OBS (ln)	0.889	-0.158	-0.150	-0.165	-0.292	0.912	1.000													
PAYROLL (ln)	0.924	-0.146	-0.123	-0.158	-0.245	0.953	0.880	1.000												
GROWTH	0.021	-0.070	-0.068	-0.045	-0.058	-0.016	-0.001	-0.022	1.000											
EA	-0.195	0.215	0.147	0.207	0.214	-0.114	-0.136	-0.176	-0.093	1.000										
COLLATERAL	0.065	0.018	0.002	-0.001	0.005	0.066	0.035	0.075	-0.003	-0.304	1.000									
INF (ln)	0.285	-0.047	-0.128	-0.098	-0.107	0.237	0.270	0.254	0.156	-0.174	0.060	1.000								
TP	0.402	-0.125	-0.123	-0.095	-0.133	0.330	0.366	0.335	0.084	-0.242	0.111	0.310	1.000							
CAP	0.035	-0.023	0.002	0.033	0.022	0.039	0.075	0.027	0.059	0.019	-0.060	0.077	0.262	1.000						
CRISIS	0.017	-0.358	0.018	-0.321	-0.167	0.061	0.045	0.041	-0.050	-0.005	-0.001	-0.081	0.055	0.025	1.000					
LCF	-0.007	-0.026	-0.052	-0.047	-0.071	0.025	0.021	0.019	0.007	-0.057	0.053	-0.024	0.052	-0.018	0.069	1.000				
LEVERAGE	-0.095	0.259	0.171	0.223	0.172	0.080	0.021	0.011	-0.036	0.241	-0.051	-0.093	-0.153	0.108	0.003	-0.054	1.000			
CUSTOMER	-0.359	0.055	-0.031	0.076	0.124	-0.443	-0.412	-0.377	0.028	-0.034	-0.011	-0.080	-0.114	-0.035	-0.063	-0.020	-0.199	1.000		
DEPOSITS																				
TOTAL	0.076	0.018	-0.046	0.010	-0.016	-0.014	0.003	0.020	-0.135	0.191	-0.077	0.028	0.053	-0.019	-0.033	0.011	-0.203	0.067	1.000	
ACCRUALS																				
RULE OF LAW	-0.535	0.191	0.124	0.172	0.233	-0.458	-0.473	-0.496	-0.148	0.305	-0.114	-0.513	-0.539	-0.132	-0.035	-0.029	0.174	0.149	-0.059	1.000

Notes: Pairwise correlations. Correlation matrix corresponds to the set of variables considered in Tables 3 and 4.

**Table 8**

Correlation matrix – Different business models.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
NET FEES AND COMMISSIONS (ln)	(1)	1.000											
NET GAINS AND TRADING (ln)	(2)	0.880	1.000										
NET INTEREST REVENUE (ln)	(3)	0.913	0.856	1.000									
NON-INTEREST OPERATING INCOME (ln)	(4)	0.972	0.916	0.920	1.000								
STR	(5)	−0.221	−0.045	−0.156	−0.224	1.000							
TA (ln)	(6)	0.919	0.868	0.965	0.928	−0.164	1.000						
OBS (ln)	(7)	0.861	0.804	0.889	0.864	−0.169	0.902	1.000					
PAYROLL (ln)	(8)	0.956	0.885	0.955	0.959	−0.153	0.946	0.869	1.000				
GROWTH	(9)	0.013	0.0114	−0.002	0.013	−0.086	−0.011	0.002	−0.014	1.000			
EA	(10)	−0.219	−0.157	−0.138	−0.238	0.220	−0.104	−0.123	−0.173	−0.084	1.000		
COLLATERAL	(11)	0.083	0.264	0.074	0.111	−0.005	0.076	0.039	0.094	−0.008	−0.0292	1.000	
INF (ln)	(12)	0.317	0.385	0.346	0.342	−0.132	0.278	0.301	0.313	0.172	−0.200	0.096	1.000

Notes: Pairwise correlations. Correlation matrix corresponds to the set of variables considered in Table 5.

**Table 9**

Correlation matrix – Loan loss provisioning.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
LLP (ln)	(1)	1.000											
STR	(2)	−0.210	1.000										
TA (ln)	(3)	0.909	−0.238	1.000									
OBS (ln)	(4)	0.850	−0.252	0.916	1.000								
PAYROLL (ln)	(5)	0.909	−0.223	0.958	0.894	1.000							
GROWTH	(6)	−0.005	−0.096	0.000	0.019	−0.001	1.000						
COLLATERAL	(7)	0.062	0.002	0.091	0.067	0.104	0.004	1.000					
INF (ln)	(8)	0.336	−0.185	0.292	0.315	0.333	0.201	0.110	1.000				
PIOP	(9)	0.919	−0.277	0.962	0.905	0.953	0.029	0.097	0.365	1.000			
CAP	(10)	0.100	−0.390	0.093	0.074	0.075	−0.035	0.007	−0.021	0.081	1.000		
CRISIS	(11)	0.028	−0.060	0.037	0.071	0.019	0.053	−0.007	0.062	0.032	0.042	1.000	
LCF	(12)	0.060	−0.075	−0.005	−0.009	−0.001	−0.019	0.003	0.007	−0.031	0.063	−0.004	1.000

Notes: Pairwise correlations. Correlation matrix corresponds to the set of variables considered in Table 6.

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