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BANK LEVERAGE AND RETURN ON EQUITY TARGETING: INTRINSIC PROCYCLICALITY OF SHORT-TERM CHOICES

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ABSTRACT

We find evidence that banks target return on equity (RoE) and make active use of leverage to affect the speed of adjustment towards RoE targets. That holds for both the pre- and post-2007 periods and especially for banks that tend to operate with above median leverage among their peer group. As a result, RoE targeting could affect leverage dynamics and amplify cyclical fluctuations as banks take on more leverage to achieve high returns when risk premia are low, while ‘rush for the exit’ and delever to contain losses when the cycle turns. Therefore, recent proposals that aim to align executive pay with long-term performance by restricting the use of profitability metrics such as RoE from remuneration schemes seem to be in the right direction.

Keywords: Banks; Return on Equity; Target; Leverage; Procyclicality

JEL classification: G21; G28; G32; G38

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1. Introduction

Return-on-equity (RoE) targeting is a common strategy in the banking industry and is usually publicized in bank strategy statements. Although RoE is considered to be a partial indicator of bank performance, not taking into account any risk assessment, it is still broadly used in the form of a target often reaching unrealistic and unsustainable values. In a sense RoE is more a communication tool (simple, easy to access and use for comparisons), than a proper performance benchmark (ECB 2010). Still, management remuneration is often linked to it.

Since $\text{RoE} = \text{RoA} \times \text{Leverage}$, when return-on-assets (RoA) is not satisfactory, an alternative way to increase RoE is by increasing leverage, where leverage is the ratio of total assets to equity. In that sense, leverage can be thought of as an equity multiplier of managerial skill to extract revenue from assets. According to a Bank of England report,¹ if leverage in UK banks had been kept constant at the average 1990s level of around 25 times equity capital, they would have achieved their stated RoE targets in fewer than half of the past 30 years and not even once since 2004.

In this paper we provide new evidence of active use of leverage by banks to attain RoE targets. The results suggest that RoE targeting is a short-sighted strategy that encourages bank managers to “reach for yield” by taking on more leverage in good times when risk premia are low and RoE competition is high. That could increase the likelihood of bank failure when the expansionary phase of the cycle reaches an end (Berger and Bouwman 2013). We also show that RoE targeting makes bank leverage decisions more procyclical. That could have deeper repercussions for systemic risk by amplifying cyclical fluctuations in asset prices (Kiyotaki and Moore 1997 and Bernanke et al. 1999), affecting the dynamics of the business cycle (Gertler and Kiyotaki 2010 and Gertler and Karadi 2011) and the transmission of monetary policy (Adrian and Shin 2010).

Interestingly, there is evidence that the market requires a higher expected return on bank equity the higher the leverage, which implies that targeting RoE via leverage ignores market discipline and indicates a misalignment between managerial and shareholder incentives. In line with Modigliani-Miller, Kashyap, Stein, and Hansen (2010) show that equity risk of large US banks increases with leverage. Miles et al.

¹ Bank of England Financial Stability Report, June 2011, chart 3.11

(2013) also find a strong positive relationship between equity betas and leverage of UK banks showing that reducing bank leverage by half would reduce the required return on bank equity from 14.7% to 11%. Given that debt is generally cheaper than equity financing, the average cost of bank funds – i.e. the weighted average cost of capital (WACC) – would increase by 8bps, roughly a quarter than if shareholders were totally unaware of the risk reduction due to lower leverage. Relaxing the assumption of riskless bank debt due to deposit guarantee, the increase in WACC would be even smaller. Therefore, adjusting leverage to meet RoE targets is hard to justify, both on grounds of maximizing shareholder value and the value of the bank as a whole.

Nevertheless, RoE targeting appears in bank strategy statements irrespective of capital structure considerations. That often leads to confusion about the effects of stricter capital standards on shareholder value and funding costs, without taking into account the ensuing risk moderation (Yang and Tsatsaronis 2012). It also leads to fallacious claims about the impact of capital regulation on bank funding costs that infiltrated the policy debate and elicit regulatory concessions (Admati et al. 2013). For example, the latest reform of capital adequacy standards by the Basel Committee on Banking Supervision (Basel III) sets the ultimate limit of bank leverage at 33.3, much higher than the limit of 20 originally envisaged at the beginning of the reform debate.

The post-crisis policy response aims to discourage short-termism on the part of bank management and encourage appreciation of longer-term, sustainable targets. Recent proposals address potential distortions of incentives within banks that arise from the use of profitability metrics in remuneration schemes. RoE was singled out as a particular metric that could induce banks to become over-leveraged, especially when risk premia are low (Haldane 2009). As a result, the Bank of England Prudential Regulation Authority published a Consultation Paper in July 2014 suggesting changes to the Remuneration Code that restrict the use of RoE as a metric for setting variable remuneration. That echoed an earlier report by the Parliamentary Commission on Banking Standards (PCBS) expressing concerns that bank remuneration schemes rely excessively on a limited set of profitability metrics, particularly RoE. In the US, the Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd–Frank), along with new provisions by the Securities Exchange Commission, aim to align executive pay with long-term performance initiating, among other things, a “say-on-pay” vote

for shareholder approval of executive compensation. In the EU a new set of rules (CRR and CRD IV effective from 2014) aim at curbing speculative risk-taking by encouraging bankers to take a long-term view.

In this paper we provide empirical support to conventional and regulatory wisdom that RoE targeting interacts with leverage decisions in a procyclical fashion. We are motivated by Haldane (2009) who discusses RoE competition in the pre-crisis period and the use of leverage by banks to boost returns in a low risk-premia environment. We use a dynamic panel specification of the classic partial adjustment equation to demonstrate that banks actually adjust towards RoE targets by making active use of leverage. That way RoE targeting may have an impact on leverage cycles and contribute to their amplification with negative effects on systemic stability. The model is estimated using an unbalanced panel of annual observations from approximately one thousand bank holding companies from 23 countries, including the Eurozone, UK, US, Switzerland, Nordics and Canada, for the period 2001-2013. To the best of our knowledge, this is the first study that addresses this issue in a systematic way.

The analysis contributes to a broader strand of literature about system procyclicality and the use of leverage in financial markets. To mention but a few notable examples, Geanakoplos (2010) shows how leverage tends to interact with asset prices due to collateral and margin requirements that amplify cyclical variations. Fostel and Geanakoplos (2008) demonstrate how leverage cycles can cause contagion between completely unrelated asset classes. Adrian and Shin (2010) find that leverage is strongly procyclical because of active balance sheet management by banking institutions. Similarly, Kalemli-Ozcan et al (2012) find evidence of leverage procyclicality for large US banks, but not that much for European banks.

The paper is structured as follows. Section 2 motivates the analysis by presenting summary statistics that show a persistent negative relationship between RoA and leverage, indicating some use of leverage to boost RoE. Section 3 formalizes our empirical approach and presents the model specification. Section 4 describes the data and the variables included in our estimations. Section 5 discusses robustness checks and Section 6 concludes.

2. RoE, RoA and leverage: preliminary evidence

We make a preliminary empirical test of the hypotheses that a) banks do have return on equity targets, and b) return on assets is negatively correlated with leverage. We produce Tables I.A and I.B based on our panel sample of commercial banks and bank holding companies (a detailed description of the dataset follows in Section 4). Our panel is divided in two parts, corresponding to the pre- (2003-2006) and post-crisis (2008-2013) periods. We consider 2007 to be a transition year and therefore excluded from our estimations. For each period and each economic region we report the mean return on equity and mean return on assets of our sample per five leverage categories: banks below the 20th percentile by leverage ratio; banks between the 20th and 40th percentiles; banks between the 40th and 60th percentiles; banks between the 60th and 80th percentiles; and banks above the 80th percentile.

TABLE I.A RETURN-ON-EQUITY AND RETURN-ON-ASSETS PER LEVERAGE PERCENTILE, FOR THE PRE-CRISIS PERIOD (2003-2006)

Table I.A presents the results for the pre-crisis period (2003-2006) (see also Figure 1.A_for illustration purposes). Clearly, as we move from the lower to the upper leverage percentiles, we can see that the mean return on assets decreases. At the same time, the mean return on equity increases. Therefore, our findings indicate that in the pre-crisis period there is negative correlation between return on assets and leverage and support our intuition that banks with low return on assets adjusted their leverage towards their return on equity targets. Specifically, the negative correlation between return on assets and leverage is obvious in all economic regions, except for the US where mean return on assets remains quite stable throughout the leverage percentiles. Mean return on equity increases as leverage increases in the cases of Eurozone, the US and the Nordics; in the UK and Canada, the mean return on equity remains quite stable, whereas in Switzerland it almost seems to decrease as leverage increases.

TABLE I.B: RETURN-ON-EQUITY AND RETURN-ON-ASSETS PER LEVERAGE PERCENTILE, FOR THE POST-CRISIS PERIOD (2008-2013)

Table I.B presents our findings for the post-crisis period (2008-2013) (see also Figure 1.B). The impact of the crisis is obvious since the levels of mean return on equity and mean return on assets are now much lower and even negative in some cases. The mean return on assets continues to exhibit a negative correlation with leverage. On the

other hand, the mean return on equity, in contrast to the pre-crisis period, becomes negatively correlated with leverage. This, however, does not indicate that the Haldane conjecture is not valid in the post-crisis period – on the contrary, it implies that deleveraging was most probably used to boost return on equity which would have otherwise fallen to extremely low levels. So, we still have return on equity targeting behavior but in a different manner from the pre-crisis period: what before the crisis was an effort to keep up with the peers, became after the crisis an effort to survive among peers. More specifically, the return on assets is negatively correlated with leverage in all economic regions, with the exception of Canada and the Nordics where the mean return on assets remains quite stable throughout the leverage percentiles. The mean return on equity clearly decreases as leverage rises in Eurozone and the US; in the UK and Switzerland it decreases too but not in a constant way throughout the leverage percentiles. On the contrary, in Canada and the Nordics, the mean return on equity continues to increase as leverage increases, as in the pre-crisis period.

In Section 5, the econometric analysis investigates further our preliminary findings, and focuses on the adjustment process towards return on equity targets exhibited by banks as well as on the role that leverage plays in this process.

3. Model specification

We use a dynamic panel specification of the RoE-adjustment process², where one lag of the dependent variable RoE_{it} is included as a covariate in the model:

$$RoE_{it} - RoE_{it-1} = \lambda(RoE_{it}^* - RoE_{it-1}) + v_i + \tilde{u}_{it} \quad (1)$$

where, v_i are bank-specific fixed or random effects, λ is the average speed of adjustment towards the desired RoE_{it}^* and RoE_{it}^* is the unobserved target that may differ across banks and depends on a vector of bank-specific and macro variables X_{it-1} with loading vector β as follows:

² Partial adjustment models have been broadly used in corporate finance theory as a tool for examining capital structure targeting. See for example Flannery and Rangan (2006), Berger et al (2008), Gropp and Heider (2010), Berrospide and Edge (2010), Gropp and Kashyap (2010), Hovakimian and Li (2011), Faulkender et al (2012), Fier et al (2013).

$$RoE_{it}^* = \beta X_{it-1} \quad (2)$$

Rearranging (2) and substituting (3) we derive a model where bank managers aim to adjust RoE_{it} towards βX_{it} by closing the existing distance from that target by a proportion $\lambda \leq 1$ per year:

$$RoE_{it} = (1 - \lambda)RoE_{it-1} + (\lambda\beta)X_{it-1} + v_i + \tilde{u}_{it} \quad (3)$$

First-differencing equation (4) eliminates the bank-specific effects v_i , thus eliminates a possible estimation bias in the estimation due to omitted variables:

$$\Delta RoE_{it} = (1 - \lambda)\Delta RoE_{it-1} + (\lambda\beta)\Delta X_{it-1} + \tilde{w}_{it} \quad (4)$$

where, $\tilde{w}_{it} = \tilde{u}_{it} - \tilde{u}_{it-1}$.

But first-differencing makes ΔRoE_{it-1} endogenous in (5) because it is correlated – due to RoE_{it-1} part of the difference – with \tilde{u}_{it-1} , thus with $\tilde{w}_{it} = \tilde{u}_{it} - \tilde{u}_{it-1}$ as well. If such an endogeneity problem is ignored, it could lead to inconsistent estimators of the coefficient of ΔRoE_{it-1} and its interactions with leverage, therefore to inconsistent estimators of λ . We address this problem using the difference and system generalized method-of-moments (GMM) of Arellano and Bover (1995) and the command `xtabond2` in Stata that was developed by Roodman (2006). Such estimation is appropriate for dynamic panel with large cross-section and small time dimension, similar to our dataset.

Given that $RoE = RoA \times Leverage$, a bank could affect the speed of RoE adjustment towards RoE^* by adjusting its leverage from an initial (lagged) level. The extent to which a bank may use leverage to speed-up RoE adjustments λ could depend on the bank's tendency to operate under high or low leverage, as well as on broader developments in the economic and leverage cycle.

For example, as the bonanza of an economic upturn goes on for another period, a bank may feel safe enough to increase leverage even further and boost RoE when high RoA is difficult to generate due to low risk premia. In contrast, when the cycle turns and risks crystalize, the bank may try to delever quickly to preserve shareholder

value and avoid a small negative RoA dragging RoE away from its target, deep into negative territory.

Yet, both in the upturn and the downturn, the speed of RoE adjustment may also depend on a bank's initial leverage level. For example, there may be banks that tend to operate under low leverage, either by choice, e.g. due to low risk appetite or business model, or by force, e.g. due to liquidity, regulatory and other constraints that prevent them from actively using leverage as a financial policy tool. Such banks may be less willing, or less able, to actively use leverage to steer RoE towards a target. In that case, the impact of leverage on the RoE speed of adjustment λ would not be economically and, possibly, not statistically significant. In contrast, banks that usually operate under high leverage relative to their peer group may actively use leverage to steer RoE towards a target, thus affecting its speed of adjustment λ in (5).

Therefore, in addition to covariates ΔRoE_{it-1} and ΔX_{it-1} in (5), we also consider interactions of ΔRoE_{it-1} with leverage to control for its impact on λ . Notice that leverage interactions with ΔRoE_{it-1} help identifying any impact on λ given that ΔRoE_{it-1} is the only variable whose coefficient $(1-\lambda)$ depends exclusively on λ , while other coefficients are mixtures of λ and long-term impacts β on RoE .

We also define four dummy variables $speed^{jk}$, $j,k=1,2$, that take the value 1 for the respective events and 0 otherwise: (low leverage, pre-2007), (low leverage, post-2007), (high leverage, pre-2007), (high leverage, post-2007). Then we control for banks that operate under high or low leverage relative to their peer group, as well as for banks that operate amidst broad deleveraging in the economy, such as post-2007, by considering interaction effects of dummies $speed^{jk}$ with ΔRoE_{it-1} times leverage. In order to avoid the dummy trap, we include only 3 of these dummies in the model, using $speed^{22}$ as reference (ie high leverage, post-2007). That leads to the following model to be estimated:

$$\begin{aligned}
\Delta RoE_{it} = & (1 - \lambda) \Delta RoE_{it-1} + \\
& + (1 - \lambda) \gamma \Delta RoE_{it-1} \ln(lev_{it-1}) + \\
& + \sum_{jk} (1 - \lambda) \delta_{jk} \Delta RoE_{it-1} \ln(lev_{it-1}) speed_{it}^{jk} + \\
& + (\lambda \beta) \Delta X_{it-1} + \tilde{w}_{it}
\end{aligned} \tag{5}$$

We define “high” and “low” leverage, which determine index j in $speed^{jk}$, in terms of median bank leverage at a given region the previous year. Alternatively, we could determine leverage cut-offs using cross-sectional regressions of leverage on bank-specific variables for each region, in line with the idea of leverage targets in Flannery and Rangan (2006).

4. Data and variables

Our dataset consists of annual data from consolidated balance sheets and income statements of commercial banks in the Eurozone, the United Kingdom, Switzerland, the Nordics, the US and Canada for the period from 2001 to 2013. The sample comes from the Bankscope database of the Bureau van Dijk. Information about country level economic data over the period 1970-2012 is obtained from World Development Indicators (WDI), the World Bank’s database. A composite indicator of macroeconomic risk is sourced from the International Country Risk Guide and covers the period from 1984 to 2013. Our main variables, return on equity and leverage, are winsorized at the 1st and 99th percentiles per year and per region in order to reduce the impact of outliers on our estimations. The resulting sample comprises 6,180 bank-year observations from 1,009 commercial banks and bank holding companies. The final number of observations used for our empirical analysis is less, as we use first-differences and lagged first-differences in our econometric model (see Section 4). We also consider 2007 to be a transition year, so we exclude it from our estimations in order to avoid contemporaneous effects. This is done by defining dummy variables $speed^{jk}$, $j, k=1, 2$, in terms of pre- or post-2007, but not inclusive. Therefore, $speed^{jk}$ takes no value for 2007, thus excluded from the estimation. However, we include 2007 in our dataset for purposes of calculating first differences and lagged first differences. Together these filters leave 2,844 data points for our base estimation.

Table II_ presents the number of banks and bank-year observations in our sample per country and Table III_ shows the number of bank observations split by year.

The variables we use for our estimations are the following:

- The return on equity, RoE_{it} , is defined as the ratio of net income to tangible equity³, where tangible equity equals total assets minus total liabilities minus intangible assets such as goodwill. The dependent variable, ΔRoE_{it} , is the first difference of RoE_{it} , and ΔRoE_{it-1} is the dependent variable lagged by one period.
- The return on assets, RoA_{it} , is computed as the ratio of net income to tangible total assets.
- The target return on equity RoE_{it}^* is the unobserved target that may differ across banks and depends on a vector of bank-specific and macro variables (see Section 4).
- Leverage is computed as the ratio of tangible total assets to tangible equity. We interact leverage in logs ($\ln lev$) with changes in RoE_{it} whose coefficient gives the estimated (one minus) speed of adjustment. The more negative the interaction coefficient, the higher the impact of leverage on the speed of adjustment of RoE . We also include lagged log leverage among the variables that determine the target RoE^* .
- $Speed^{jk}$, where $j, k=1, 2$. These are dummy variables to control for initial (lagged) leverage of a bank relative to its peer group ($j=1$ for low leverage and $j=2$ for high leverage) and for pre- or post-2007 ($k=1$ and $k=2$ respectively). High or low leverage is defined in terms of median bank leverage in a region in a given year.

We assume that targeted RoE^* depends on bank- and country-specific variables that we discuss next.

4.1 Bank-specific variables

The existing literature provides numerous factors that are found to affect significantly bank profitability. In terms of bank-specific variables, leverage is

³ Tangible equity and tangible total assets are in book values.

suggested to positively determine bank profitability (Demirgüç-Kunt and Huizinga 1999, Eichengreen and Gibson 2001, Gibson 2005, Athanasoglou et al. 2006). The same applies for capital ratios (Molyneux and Thornton 1992, Berger 1995, Demirgüç-Kunt and Huizinga 2000, Gibson 2005, Dietrich and Wanzenried 2010, Bertay et al. 2013, Apergis 2014). Bank profitability is also related positively to absolute bank size (Athanasoglou et al. 2006), although it declines with systemic importance, possibly as a result of moral hazard due to “too-big-to-fail” (Bertay et al. 2013). Operating expenses are found to have a negative effect on profitability (Athanasoglou et al. 2008; Dietrich and Wanzenried 2010), while empirical results for staff expenses are mixed (Molyneux and Thornton 1992, Eichengreen and Gibson 2001, Gibson 2005). Liquidity holdings have mixed effects too; they are found to have a weak negative relationship with bank profitability (Molyneux and Thornton 1992), no relationship at all (Athanasoglou et al. 2006), or a positive effect (Eichengreen and Gibson 2001, Apergis 2014). Short-term funding as well as credit risk are reported to have a negative impact (Demirgüç-Kunt and Huizinga 1999, Athanasoglou et al. 2006 & 2008). The effect of diversification into non-traditional banking activities is also mixed, with Apergis (2014) documenting a positive relationship, while Stiroh and Rumble (2006) find a negative effect on bank performance.

Therefore, in terms of bank-specific determinants of the RoE^* target we consider the following variables:

- Leverage, in logs (lnlev): Based on our preliminary empirical evidence, leverage is expected to have a positive effect on targeted RoE^* .
- Net interest income ratio, in logs (lnnii): This is the ratio of net interest income to total income. Net interest income is considered the main and most stable source of income for banks. Thus we would expect it to positively affect targeted RoE^* .
- The deposit ratio, in logs (lncdep): This is a ratio of customer deposits to tangible total assets. Customer deposits are usually considered a relatively stable funding source, but a high deposit ratio could imply a conservative funding strategy, increased supervisory and regulatory burden (e.g. due to deposit insurance) and low diversification of funding sources, especially for small banks

that may have limited access to wholesale funding markets due to asymmetric information, adverse selection and other frictions. Thus the deposit ratio may correlate negatively or positively with targeted RoE^* .

- Number of employees, in logs ($\ln emp$): It represents the business model of the bank (retail or not). A high number of employees is indicative of banks engaged more in retail banking operations, which are traditionally characterized by lower profit levels. We therefore expect a negative impact on targeted RoE^* .⁴
- Problem loan ratio, in logs ($\ln pl$): This is the ratio of problem loans to total assets. Banks with high levels of non-performing loans may adjust their expectations about future profitability downwards, thus we expect a negative impact on targeted RoE^* .
- Tobin's Q, in logs ($\ln tobq$): This is the ratio of market value of assets (ie book value of debt plus market capitalization of equity) divided by the book value of assets (book value of debt plus book value of equity). It aims to capture expectations about future growth opportunities available to the bank and is expected to correlate positively with the targeted RoE^* . When we include Tobin's Q, the sample covers the period 2003-2013.

4.2 Country-specific variables

Bank profitability is also found to be procyclical, moving positively with variables such as output gap (Demirguc-Kunt and Huizinga 2000, Bikker and Hu 2002). This effect may be asymmetric, i.e. significant only in the upper phase of the cycle (Athanasoglou et al. 2006), or during severe recessions due to high loan loss provisioning (Bolt et al. 2012). We follow Borio and Lowe (2002) to control for cyclical fluctuations in the bank profitability target RoE^* using country-specific gap variables, i.e. deviations of variables from a trend.

- The real effective exchange rate ($rfer_gap$): Its deviation from trend controls for differences in the level of competitiveness across countries that may affect trade, the volume of banking business and, as a result, bank profits. We expect a positive relationship with targeted RoE^* .

⁴ Personnel expense ratio, defined as the ratio of personnel expenses to total income, is dropped because it is highly positively correlated with ΔRoE_{it-1} .

- Domestic credit to the private sector (crpr_gap): The deviation of domestic credit to the private sector from its trend controls for the cyclical component of credit supply. That could be due to general factors affecting the country's banking sector, such as changes in general asset quality, increased loan write-offs and provisioning and regulatory capital constraints at a country level. We also expect a positive relationship with targeted RoE^* .
- Household final consumption expenditure (hcon_gap): We use the deviation of consumption expenditure from its trend to control for the level of confidence in the economy and expectations about economic developments going forward, general risk perceptions and possible effects on the demand for credit as well as on the ability of households to repay loans. We therefore expect a positive impact on targeted RoE^* .
- A composite risk rating dummy (hprs): It controls for economic, financial and political risk based on the index of Composite Political, Financial, Economic Risk Rating of a country (CPREF): it is equal 1 if CPREF is above the year-median across sample countries and 0 otherwise. Economic, financial and political developments may affect financial intermediation, in particular credit expansion and deposit growth. As a result, changes in bank profitability may be affected by catching-up effects and the transition to a more advanced stage of financial and institutional development.

Table IV.A provides descriptive statistics for the variables during our sample period as well as their predicted effects on targeted RoE^* . Table IV.B provides descriptive statistics for the pre- and post-crisis period respectively. Also Tables IV.C and IV.D show descriptive statistics for the pre- and post-crisis period per region. Table V shows the correlations among the main variables we use for estimating equation (5).

TABLE IV.A: DESCRIPTIVE STATISTICS (2001-2013)

TABLE IV.B: DESCRIPTIVE STATISTICS FOR THE PRE- AND POST-CRISIS PERIOD

TABLE IV.C: DESCRIPTIVE STATISTICS BY REGION, FOR THE PRE-CRISIS PERIOD (2001-2006)

TABLE IV.D: DESCRIPTIVE STATISTICS BY REGION, FOR THE POST-CRISIS PERIOD (2008-2013)

TABLE V: CORRELATION MATRIX OF CHANGES IN COVARIATES OF PROFITABILITY TARGET

5. Estimation results

5.1 Baseline

Table VI presents the estimation results of our baseline equation (5). In the first column we estimate our baseline model by using only bank-specific variables for the targeted RoE^* and in columns (2) to (4) we gradually add country-specific variables.

From the bank-specific variables that comprise our targeted RoE^* , leverage, the number of employees and the problem loan ratio are found to significantly affect the change in return on equity in line with our expectations: leverage has a positive effect, while number of employees and the problem loan ratio are estimated to lower bank profitability (column 1). Tobin's Q is found to be statistically significant only in the estimation presented in the fourth column; its coefficient is positive, which is also in line with our expectations. Net interest income and deposit ratios are surprisingly not found to have a significant effect on the change in the return on equity; we can see though that the coefficient of the deposit ratio is positive, implying the positive effect of deposits as a stable source of funding. The net interest income ratio, however, has a negative coefficient which was not expected.

Next, we turn to the country-specific variables. The coefficient of the composite risk rating dummy (column 2) is not found to be statistically significant, most probably because our sample comprises of financially developed and politically stable countries. Its sign, however, is positive, indicating that the higher the composite risk, the higher the change in bank profitability. The coefficient of the deviation of the real effective exchange rate from its trend is positive and statistically significant at the one percent level (columns 3,4) which indicates, as expected, that higher competitiveness has a positive effect on changes in return on equity. The coefficient on the deviation from trend of domestic credit to the private sector (column 3) is found to be positive and statistically significant at the one percent level, indicating that change in return on equity depends positively on credit cycle fluctuations. The cyclical component of household final consumption expenditure (column 4) is also found to affect positively and significantly the return on equity. These covariates both increase significantly the fit of our panel regression, as indicated by the Wald test. However, they are highly correlated (the correlation is 0.439), so we continue by using only household final consumption expenditure.

Focusing on the fourth column of Table VI we are able to test our joint hypothesis that banks target RoE and, in addition, they use leverage to attain their RoE target. The coefficient on the lagged dependent variable is not statistically significant probably as a result of the interactions we have included in the model. The interaction between lagged leverage and ΔRoE_{it-1} turns out to be negative (-0.311) and statistically significant at the one percent level. This result indicates an active use of leverage to speed-up RoE adjustments towards a target. We also consider the impact of leverage on the speed of RoE adjustment when we control for the magnitude of bank leverage relative to peer group (i.e. high or low) and for the period pre- or post-2007.

For both high- and low-leveraged banks in the pre-2007 period, the joint interaction effects between lagged leverage, ΔRoE_{it-1} and the respective dummies $speed^{21}$ and $speed^{11}$ are not statistically significant. But controlling for low-leveraged banks in the post-2007 period, the interaction of lagged leverage with ΔRoE_{it-1} increases by a positive amount (0.217) that is statistically significant at the one percent level. That almost offsets the negative coefficient (-0.311) of the interaction between lagged leverage and ΔRoE_{it-1} .

Therefore, banks that operate with low leverage in the post-2007 period turn out to adjust leverage the least to meet RoE targets, compared to the pre-crisis period or relative to banks that operate with high leverage. This is expected in a period of broad deleveraging where banks with already low leverage may have limited scope to reduce it further in order to contain shareholder losses and target RoE. In contrast, banks that tend to operate with high leverage tend to adjust it the most, both pre- and post-2007, in order to meet RoE targets.

Summarizing, the results indicate active use of leverage by banks to meet RoE targets both before and after the crisis, with the exception of low-leverage banks post-2007. Therefore, RoE targeting could amplify cyclical fluctuations as banks take high leverage to achieve high returns when risk premia are low, while “rush for the exit” when the cycle turns, reducing leverage to contain shareholder losses.

5.2 Robustness tests

We break our sample firstly by total assets size and then by economic regions in order to distinguish more clearly what drives our results. Overall, the results hold for both the US and the EU and seem to be driven by big banks. The results are also robust to an alternative estimation procedure using two-step GMM and the finite sample correction of Windmeijer (2005).

5.2.1 *Big – Small*

TABLE VII: ROE TARGETING AND LEVERAGE FOR BIG AND SMALL BANKS

We categorize banks into big and small by total assets, relative to the year-median of the respective economic region (i.e. Eurozone, the UK, Switzerland, the Nordics, the US or Canada). We then estimate our baseline equation (5) using the same covariates as the fourth column of Table VI. We only drop Tobin's Q in the case of small banks, as it significantly reduces our sample.

The estimates for big banks show that only low leveraged banks in the post-2007 period (*speed*¹²) do not use leverage to speed up RoE adjustment, which is in line with our previous analysis. This, however, is not the case for small banks, where the coefficient of the interaction of ΔRoE_{it-1} with leverage is not found to be statistically significant (see Table VII).

Leverage, the deposit ratio and the number of employees are found to significantly affect the change in return on equity in the case of small banks: leverage has a positive effect, while the deposit ratio and the number of employees are estimated to lower small banks' profitability. Net interest income and problem loan ratios are found to affect negatively and significantly only big banks. Tobin's Q has a positive coefficient and becomes statistically significant at the one percent level for big banks. Country-specific variables are statistically significant only in the case of small banks, suggesting that big banks are not significantly affected by exogenous macro variables in their RoE targeting process (see Table VII).

5.2.2 *US – EU*

TABLE VIII: ROE TARGETING AND LEVERAGE IN US VS EU

Now we present results separately for the US and EU, which includes the Eurozone, the UK and the Nordics. We drop Tobin's Q for both categories, again due

to sample size constraints. We also drop the number of employees for banks in the EU for the same reason. For the US the fit of our model increases significantly and the estimations clearly support our hypotheses. The coefficients of the bank-specific variables that comprise our targeted RoE* are all found to be statistically significant except for the net interest income ratio. The country-specific variables – i.e. the cyclical components of the real effective exchange rate and household final consumption are also found to have a significant effect on the change in the return on equity. The coefficient of the lagged dependent variable is statistically significant at the five percent level indicating a speed of adjustment (λ) equal to 25.9%. The interaction of ΔRoE_{it-1} with leverage is found to be statistically significant at the one percent level with the same sign as in Table VI; the same applies for the interaction coefficient of ΔRoE_{it-1} times leverage times $speed^{l2}$ (low leverage, post-2007).

In the case of the EU, the only coefficients that are found to be statistically significant are the coefficient of the lagged dependent variable at the five percent level, indicating a speed of adjustment (λ) equal to 17.7%, and the coefficient of the interaction of ΔRoE_{it-1} with leverage at the one percent level. This finding implies that leverage is actively used by banks to affect the speed of adjustment towards the targeted RoE*. However, the interaction effects of dummies $speed^{jk}$, $j,k=1,2$, with ΔRoE_{it-1} times leverage are not found to be statistically significant. We therefore find no evidence that banks in the EU are affected by their initial leverage level or by the economic cycle when deciding to use leverage to speed up RoE adjustment.

5.2.3 Two-step Model with Finite Sample Correction

TABLE IX: TWO-STEP MODEL WITH FINITE SAMPLE CORRECTION

We also obtain as a robustness check two-step estimates using the finite sample correction of Windmeijer (2005). The results are shown in Table IX, suggesting that our findings are robust to this estimation method as well. The interaction of ΔRoE_{it-1} with leverage remains statistically significant (at the ten percent level) and the same (at the five percent level) applies for the coefficient on the interaction of ΔRoE_{it-1} , leverage and $speed^{l2}$ (low leverage, post-2007). The number of employees, the problem loan ratio and the cyclical component of the real effective exchange rate

index continue to be robust and affect significantly the change in return on equity in line with our expectations.

6. Conclusions

Motivated by Haldane (2009) we examine the return on equity targeting behavior of banks based on a sample of 6,180 bank-year observations from consolidated balance sheets and income statements of 1,009 commercial banks and bank holding companies from the Eurozone, the United Kingdom, Switzerland, the Nordics, the US and Canada, for the period 2001-2013. We use a dynamic panel specification of the classic partial adjustment equation to examine if banks target return on equity and use leverage in order to meet their targets.

We find that banks exhibit return on equity targeting behavior and that leverage is indeed actively used to affect the speed of adjustment towards the return on equity target. This result holds both for the pre- and post-2007 period and especially for banks that tend to operate with leverage above that of the median of their peer group. The active use of leverage for the purpose of targeting the return on equity is particularly evident among big banks, it is consistent across regions – especially the US and the EU – and survives an alternative estimation procedure of two-step GMM with finite sample correction.

Overall, the results suggest that return on equity targeting could amplify cyclical fluctuations as banks take on high leverage to achieve high returns when risk premia are low, while “rush for the exit” when the cycle turns and reduce leverage to contain losses. This leads to a market failure where bank managers chase the short-term return on equity without internalizing the longer-term consequences of leverage on the riskiness of the bank. That behavior could impose a negative externality on the economy as a whole by affecting leverage dynamics and amplifying cyclical variations. Therefore, recent proposals that aim to align executive pay with long-term performance by restricting the use of short-sighted profitability measures, such as the RoE, from remuneration schemes, are in the right direction.

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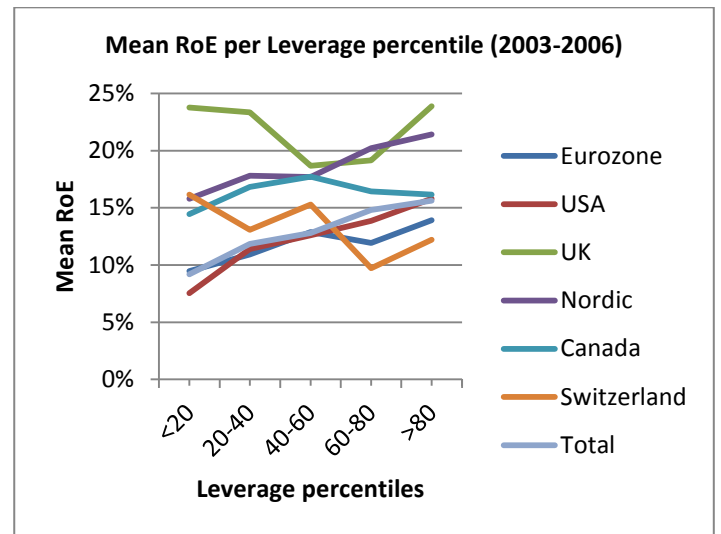
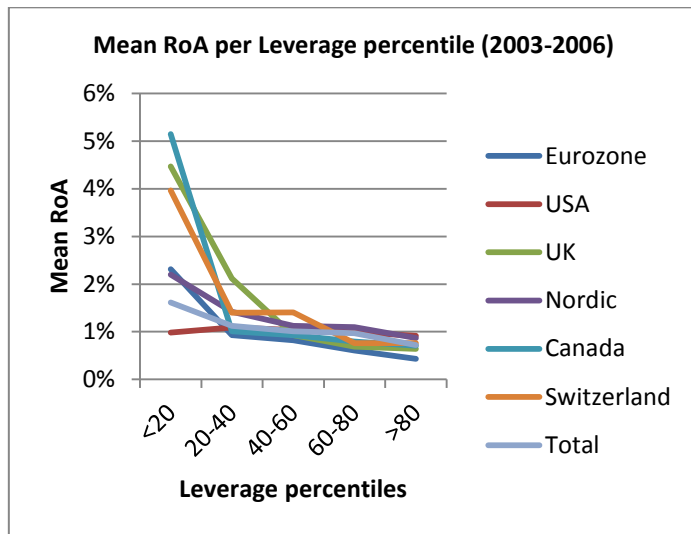
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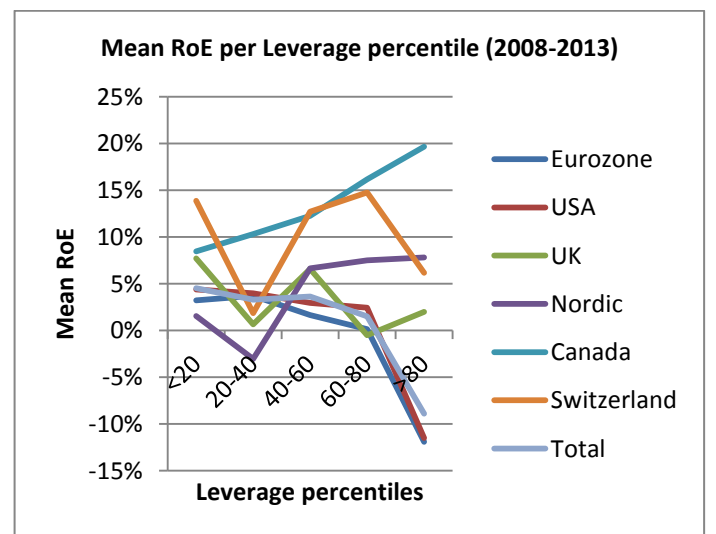
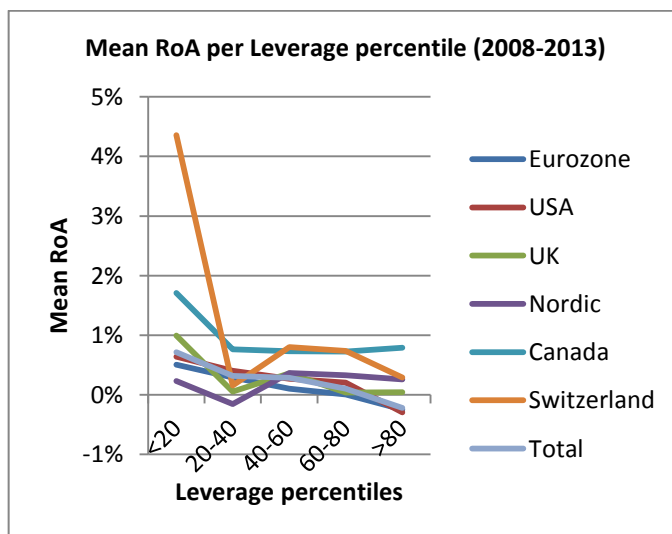
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FIGURES AND TABLES

Figures 1.A



Figures 1.B



**TABLE I.A: RETURN-ON- EQUITY AND RETURN-ON-ASSETS PER LEVERAGE
PERCENTILE, FOR THE PRE-CRISIS PERIOD (2003-2006)**

LEVERAGE PERCENTILES BY ECONOMIC REGION	Below 20th percentile	Between 20th and 40th percentile	Between 40th and 60th percentile	Between 60th and 80th percentile	Above 80th percentile
EUROZONE					
Number of bank observations	86	85	84	85	83
Average yearly cut-off	8.26	14.02	17.20	23.08	-
Mean RoE	9.45%	10.94%	12.87%	11.92%	13.93%
Mean RoA	2.31%	0.93%	0.82%	0.61%	0.43%
US					
Number of bank observations	267	266	266	266	265
Average yearly cut-off	9.51	11.36	12.94	15.18	-
Mean RoE	7.54%	11.41%	12.61%	13.86%	15.80%
Mean RoA	0.98%	1.09%	1.04%	0.99%	0.91%
UNITED KINGDOM					
Number of bank observations	11	9	9	9	9
Average yearly cut-off	8.85	15.79	22.99	30.88	-
Mean RoE	23.77%	23.35%	18.67%	19.17%	23.88%
Mean RoA	4.47%	2.12%	0.93%	0.68%	0.64%
NORDICS					
Number of bank observations	25	23	24	23	22
Average yearly cut-off	9.36	14.71	16.49	19.50	-
Mean RoE	15.79%	17.81%	17.71%	20.23%	21.433%
Mean RoA	2.20%	1.42%	1.12%	1.10%	0.87%
CANADA					
Number of bank observations	8	8	7	8	5
Average yearly cut-off	9.45	17.51	19.87	21.59	-
Mean RoE	14.47%	16.83%	17.74%	16.44%	16.16%
Mean RoA	5.15%	1.01%	0.93%	0.79%	0.71%
SWITZERLAND					
Number of bank observations	15	12	14	12	12
Average yearly cut-off	7.66	9.73	11.88	13.81	-
Mean RoE	16.17%	13.07%	15.29%	9.71%	12.22%
Mean RoA	3.97%	1.40%	1.40%	0.76%	0.76%
TOTAL SAMPLE					
Number of bank observations	406	403	403	403	403
Average yearly cut-off	9.22	11.75	13.85	16.89	-
Mean RoE	9.19%	11.85%	12.80%	14.81%	15.62%
Mean RoA	1.62%	1.12%	1.01%	0.97%	0.72%

Source: Bankscope, own calculations

Note: Return on equity and leverage are winsorized at the 1st and 99th percentiles.

**TABLE I.B: RETURN-ON- EQUITY AND RETURN-ON-ASSETS PER LEVERAGE
PERCENTILE, FOR THE POST-CRISIS PERIOD (2008-2013)**

LEVERAGE PERCENTILES BY ECONOMIC REGION	Below 20th percentile	Between 20th and 40th percentile	Between 40th and 60th percentile	Between 60th and 80th percentile	Above 80th percentile
EUROZONE					
Number of bank observations	192	191	187	191	187
Average yearly cut-off	11.10	15.20	19.90	27.20	-
Mean RoE	3.21%	3.69%	1.65%	0.13%	-11.90%
Mean RoA	0.50%	0.29%	0.10%	0.01%	-0.24%
US					
Number of bank observations	311	308	308	308	306
Average yearly cut-off	9.70	11.20	12.60	15.10	-
Mean RoE	4.40%	3.97%	2.96%	2.45%	-11.51%
Mean RoA	0.64%	0.40%	0.27%	0.21%	-0.29%
UNITED KINGDOM					
Number of bank observations	40	37	37	37	35
Average yearly cut-off	11.20	16.75	21.73	31.68	-
Mean RoE	7.73%	0.64%	6.58%	-0.50%	1.99%
Mean RoA	0.99%	0.05%	0.36%	0.040%	0.04%
NORDICS					
Number of bank observations	31	29	28	29	26
Average yearly cut-off	11.64	16.69	19.86	26.20	-
Mean RoE	1.56%	-3.05%	6.64%	7.51%	7.80%
Mean RoA	0.23%	-0.15%	0.36%	0.33%	0.26%
CANADA					
Number of bank observations	13	9	10	9	7
Average yearly cut-off	9.71	13.10	18.53	21.83	-
Mean RoE	8.45%	10.32%	12.26%	16.18%	19.68%
Mean RoA	1.71%	0.76%	0.73%	0.73%	0.79%
SWITZERLAND					
Number of bank observations	10	8	9	8	7
Average yearly cut-off	5.32	12.23	16.94	22.89	-
Mean RoE	13.88%	1.86%	12.72%	14.76%	6.17%
Mean RoA	4.35%	0.16%	0.80%	0.74%	0.29%
TOTAL SAMPLE					
Number of bank observations	584	582	581	582	579
Average yearly cut-off	10.11	12.06	15.08	20.74	-
Mean RoE	4.53%	3.28%	3.65%	1.52%	-8.91%
Mean RoA	0.72%	0.32%	0.29%	0.10%	-0.22%

Source: Bankscope, own calculations

Note: Return on equity and leverage are winsorized at the 1st and 99th percentiles.

TABLE II
NUMBER OF BANKS AND BANK OBSERVATIONS ACROSS COUNTRIES,
FOR THE PERIOD 2001-2013

COUNTRY NAME:	BANKS	OBSERVATIONS	% OBSERVATIONS
US	503	3737	60.47
UNITED KINGDOM	61	259	4.19
SWITZERLAND	29	132	2.14
SWEDEN	14	72	1.17
SPAIN	28	151	2.44
SLOVENIA	8	45	0.73
SLOVAKIA	9	43	0.70
PORTUGAL	18	94	1.52
NORWAY	22	100	1.62
NETHERLANDS	28	139	2.25
MALTA	5	27	0.44
LUXEMBOURG	13	61	0.99
ITALY	43	229	3.71
IRELAND	10	51	0.83
GREECE	19	119	1.93
GERMANY	27	128	2.07
FRANCE	52	261	4.22
FINLAND	15	64	1.04
DENMARK	25	151	2.44
CYPRUS	9	24	0.39
CANADA	31	110	1.78
BELGIUM	17	73	1.18
AUSTRIA	23	110	1.78
TOTAL	1,009	6,180	100.00

Source: Bankscope, own calculations

TABLE III
NUMBER OF BANK OBSERVATIONS PER YEAR,
FOR THE PERIOD 2001-2013

YEAR:	OBSERVATIONS
2001	397
2002	468
2003	495
2004	511
2005	511
2006	501
2007	389
2008	542
2009	573
2010	583
2011	585
2012	271
2013	354
TOTAL	6,180

Source: Bankscope, own calculations

TABLE IV.A: DESCRIPTIVE STATISTICS (2001-2013)

Variable	<i>Number of obs.</i>	<i>Mean</i>	<i>Median</i>	<i>Std.Dev.</i>	<i>Min.</i>	<i>Max.</i>	<i>Predicted effects on RoE_{it}[*]</i>
Return on equity	6,180	0.070	0.098	0.206	-4.758	0.571	
Change in return on equity	5,416	-0.012	-0.002	0.264	-4.735	6.600	
Leverage (in logs)	6,180	2.589	2.561	0.488	0.294	4.727	+
Tobins'Q (in logs)	4,487	0.039	0.024	0.154	-0.703	6.142	+
Net Interest Income ratio (in logs)	6,108	-0.483	-0.344	0.561	-6.116	5.975	+
Deposit ratio (in logs)	6,107	-0.573	-0.352	0.700	-9.447	-0.045	-/+
Number of employees (in logs)	5,222	6.937	6.647	1.931	1.609	12.835	-
Problem loan ratio (in logs)	5,284	-4.907	-4.824	1.469	-14.622	4.755	-
Real effective exchange rate index gap	6,180	2.833	1.433	5.741	-20.118	16.289	+
Household final consumption expenditure gap	6,180	2.426	1.926	3.345	-18.180	18.488	+

Source: Bankscope / Note: Return on equity and leverage are winsorized at the 1st and 99th percentiles.

TABLE IV.B: DESCRIPTIVE STATISTICS FOR THE PRE- AND POST-CRISIS PERIOD

Variable	PRE-CRISIS PERIOD (2001-2006)						POST-CRISIS PERIOD (2008-2013)					
	<i>Number of obs.</i>	<i>Mean</i>	<i>Median</i>	<i>Std.Dev.</i>	<i>Min.</i>	<i>Max.</i>	<i>Number of obs.</i>	<i>Mean</i>	<i>Median</i>	<i>Std.Dev.</i>	<i>Min.</i>	<i>Max.</i>
Return on equity	2,883	0.125	0.123	0.069	-0.387	0.543	2,908	0.008	0.065	0.277	-4.758	0.571
Change in return on equity	2,530	0.006	0.002	0.084	-1.025	2.236	2,584	-0.030	-0.008	0.372	-4.735	6.600
Leverage (in logs)	2,883	2.522	2.527	0.438	0.294	4.024	2,908	2.643	2.585	0.525	0.340	4.703
Tobins'Q (in logs)	2,375	0.066	0.057	0.092	-0.263	0.985	1,731	-0.002	-0.015	0.133	-0.703	2.969
Net Interest Income ratio (in logs)	2,862	-0.468	-0.335	0.514	-6.116	0.717	2,861	-0.507	-0.356	0.620	-5.889	5.975
Deposit ratio (in logs)	2,883	-0.575	-0.364	0.718	-8.954	-0.056	2,837	-0.582	-0.340	0.700	-9.447	-0.045
Number of employees (in logs)	2,429	6.688	6.404	1.864	1.946	12.802	2,459	7.199	6.880	1.953	1.609	12.711
Problem loan ratio (in logs)	2,360	-5.608	-5.567	1.335	-14.622	-1.338	2,559	-4.210	-4.051	1.288	-13.087	4.755
Real effective exchange rate index gap	2,883	5.310	5.096	6.601	-20.118	15.344	2,908	0.533	0.234	3.799	-12.172	16.289
Household final consumption expenditure gap	2,883	3.259	2.844	2.494	-4.513	13.617	2,908	1.055	0.872	3.444	-18.180	16.057

Source: Bankscope / Note: Return on equity and leverage are winsorized at the 1st and 99th percentiles.

TABLE IV.C: DESCRIPTIVE STATISTICS BY REGION, FOR THE PRE-CRISIS PERIOD (2001-2006)

Variable	EUROZONE		US		UK		SWITZERLAND		CANADA		NORDICS	
	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>
Return on equity	0.113	0.071	0.122	0.062	0.210	0.068	0.112	0.092	0.152	0.040	0.160	0.092
Change in return on equity	0.006	0.086	0.004	0.075	-0.002	0.063	0.032	0.148	0.013	0.058	0.008	0.130
Leverage (in logs)	2.683	0.631	2.458	0.287	2.760	0.692	2.307	0.540	2.609	0.773	2.665	0.451
Tobins'Q (in logs)	0.035	0.110	0.071	0.074	0.126	0.135	0.073	0.168	0.072	0.146	0.059	0.100
Net Interest Income ratio (in logs)	-0.692	0.575	-0.322	0.267	-0.967	0.786	-1.193	1.107	-0.852	1.003	-0.671	0.742
Deposit ratio (in logs)	-1.140	1.172	-0.339	0.254	-0.855	1.007	-0.709	0.686	-1.432	1.005	-0.799	0.434
Number of employees (in logs)	7.784	1.874	6.251	1.665	8.903	1.983	6.731	0.821	9.858	1.507	6.645	1.666
Problem loan ratio (in logs)	-4.207	1.175	-5.912	1.185	-4.492	0.751	-4.488	2.079	-5.524	0.962	-4.888	1.018
Real effective exchange rate index gap	-1.581	3.554	8.740	4.412	7.050	2.143	-2.937	2.099	-8.101	9.508	-1.337	3.239
Household final consumption expenditure gap	2.122	2.637	4.011	1.777	6.463	1.648	-0.187	0.478	-0.313	2.318	0.374	3.101

Source: Bankscope / Note: Return on equity and leverage are winsorized at the 1st and 99th percentiles.

TABLE IV.D: DESCRIPTIVE STATISTICS BY REGION, FOR THE POST-CRISIS PERIOD (2008-2013)

	EUROZONE		US		UK		SWITZERLAND		CANADA		NORDICS	
Variable	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>	<i>Mean</i>	<i>St.Dev.</i>
Return on equity	-0.006	0.319	0.005	0.274	0.034	0.185	0.102	0.125	0.127	0.072	0.040	0.133
Change in return on equity	-0.031	0.498	-0.031	0.294	-0.014	0.221	-0.036	0.574	-0.002	0.026	-0.027	0.156
Leverage (in logs)	2.832	0.630	2.483	0.352	2.895	0.580	2.411	0.901	2.577	0.630	2.871	0.413
Tobins'Q (in logs)	-0.018	0.081	0.001	0.148	0.029	0.095	-0.013	0.158	0.035	0.054	0.004	0.101
Net Interest Income ratio (in logs)	-0.603	0.668	-0.374	0.448	-0.865	0.978	-1.745	0.950	-0.671	0.520	-0.439	0.494
Deposit ratio (in logs)	-0.962	0.925	-0.278	0.173	-0.893	0.913	-0.603	0.863	-0.726	0.816	-0.891	0.569
Number of employees (in logs)	7.785	1.957	6.707	1.679	8.408	2.719	7.321	2.063	9.548	1.840	7.171	1.733
Problem loan ratio (in logs)	-3.894	1.390	-4.284	1.172	-4.061	1.146	-6.667	1.939	-5.489	0.542	-4.497	1.148
Real effective exchange rate index gap	1.615	3.514	0.397	2.106	-6.611	4.546	2.457	6.469	9.843	5.223	0.423	3.413
Household final consumption expenditure gap	-0.244	4.778	1.543	1.465	0.112	3.184	1.751	0.975	6.636	3.252	3.544	4.288

Source: Bankscope / Note: Return on equity and leverage are winsorized at the 1st and 99th percentiles.

TABLE V: CORRELATION MATRIX OF CHANGES IN COVARIATES OF PROFITABILITY TARGET, FOR THE PERIOD 2001-2013

	ΔRoE_{it}	ΔRoE_{it-1}	$\Delta \ln lev_{it-1}$	$\Delta \ln tobq_{it-1}$	$\Delta \ln nni_{it-1}$	$\Delta \ln cdep_{it-1}$	$\Delta \ln emp_{it-1}$	$\Delta \ln pl_{it-1}$	$\Delta rfer_gap_{t-1}$	$\Delta hcon_gap_{t-1}$	$\Delta crpr_gap_{t-1}$	$\Delta hprs_{t-1}$
ΔRoE_{it}	1.000											
ΔRoE_{it-1}	-0.145	1.000										
$\Delta \ln lev_{it-1}$	0.040	-0.262	1.000									
$\Delta \ln tobq_{it-1}$	0.073	0.067	0.027	1.000								
$\Delta \ln nni_{it-1}$	-0.002	-0.175	0.101	-0.010	1.000							
$\Delta \ln cdep_{it-1}$	0.000	-0.011	-0.021	0.021	0.021	1.000						
$\Delta \ln emp_{it-1}$	-0.013	0.024	0.132	-0.036	-0.026	-0.005	1.000					
$\Delta \ln pl_{it-1}$	-0.137	-0.159	-0.014	-0.105	0.050	0.052	-0.063	1.000				
$\Delta rfer_gap_{t-1}$	0.065	-0.059	-0.083	-0.078	-0.004	0.094	-0.003	0.043	1.000			
$\Delta hcon_gap_{t-1}$	0.122	0.103	0.050	0.083	-0.021	0.003	0.069	-0.115	-0.159	1.000		
$\Delta crpr_gap_{t-1}$	0.107	0.091	0.157	0.117	-0.005	-0.025	0.055	-0.189	-0.086	0.439	1.000	
$\Delta hprs_{t-1}$	0.039	-0.001	0.055	0.001	-0.005	0.046	0.023	-0.058	0.077	0.058	-0.026	1.000

TABLE VI: RoE TARGETING AND LEVERAGE
(ONE-STEP DIFFERENCE GMM DYNAMIC PANEL-DATA ESTIMATION)

Dependent variable: ΔRoE_{it}	(1)	(2)	(3)	(4)
ΔRoE_{it-1}	0.427 (0.341)	0.383 (0.344)	0.389 (0.338)	0.369 (0.339)
$\Delta RoE_{it-1} \times \ln lev_{it-1}$	-0.330*** (0.108)	-0.316*** (0.109)	-0.314*** (0.107)	-0.311*** (0.107)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{11}$	0.116 (0.187)	0.117 (0.187)	0.089 (0.185)	0.107 (0.186)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{12}$	0.223*** (0.047)	0.226*** (0.047)	0.213*** (0.047)	0.217*** (0.047)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{21}$	0.043 (0.142)	0.046 (0.142)	0.077 (0.141)	0.044 (0.141)
$\Delta \ln lev_{it-1}$	0.077** (0.037)	0.075** (0.037)	0.062* (0.038)	0.066* (0.039)
$\Delta \ln tobq_{it-1}$	0.136 (0.090)	0.136 (0.090)	0.141 (0.089)	0.149* (0.090)
$\Delta \ln nii_{it-1}$	-0.009 (0.023)	-0.010 (0.023)	-0.008 (0.023)	-0.011 (0.023)
$\Delta \ln cdep_{it-1}$	0.031 (0.045)	0.029 (0.045)	0.012 (0.044)	0.011 (0.044)
$\Delta \ln emp_{it-1}$	-0.120** (0.061)	-0.125** (0.061)	-0.123** (0.060)	-0.139** (0.060)
$\Delta \ln pl_{it-1}$	-0.028*** (0.009)	-0.028*** (0.009)	-0.026*** (0.009)	-0.020*** (0.009)
$\Delta rfer_gap_{t-1}$			0.006*** (0.002)	0.008*** (0.002)
$\Delta hcon_gap_{t-1}$				0.016*** (0.005)
$\Delta crpr_gap_{t-1}$			0.003*** (0.001)	
$\Delta hprs_{t-1}$		0.067 (0.049)		
Number of obs	1,348	1,348	1,348	1,348
Wald test	$\chi^2(11) = 170$	$\chi^2(12) = 172$	$\chi^2(13) = 194$	$\chi^2(13) = 189$
Sargan-test ^a	$\chi^2(196) = 340$	$\chi^2(196) = 343$	$\chi^2(196) = 336$	$\chi^2(196) = 340$
AR (1) ^b	z = -14.74 p-value = 0.000	z = -14.81 p-value = 0.000	z = -14.41 p-value = 0.000	z = -14.38 p-value = 0.000
AR (2) ^c	z = -2.08 p-value = 0.038	z = -2.02 p-value = 0.043	z = -1.42 p-value = 0.155	z = -1.82 p-value = 0.069

Standard errors, adjusted for clustering at the bank level, are reported in parentheses. Statistical significance at 1%, 5% and 10% level is denoted by ***, ** and * respectively.

^a Sargan test for overidentifying restrictions in GMM dynamic model estimation.

^b Arellano–Bond test for AR (1) in first-differences

^c Arellano–Bond test for AR (2) in first-differences

TABLE VII: RoE TARGETING AND LEVERAGE FOR BIG AND SMALL BANKS
(ONE-STEP DIFFERENCE GMM DYNAMIC PANEL-DATA ESTIMATION)

Dependent variable: ΔRoE_{it}	BIG	SMALL
ΔRoE_{it-1}	0.212 (0.336)	-0.395 (0.484)
$\Delta RoE_{it-1} \times \ln lev_{it-1}$	-0.307*** (0.104)	0.027 (0.163)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{11}$	0.308 (0.282)	0.098 (0.094)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{12}$	0.228*** (0.049)	0.219*** (0.064)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{21}$	0.134 (0.111)	-0.336 (0.269)
$\Delta \ln lev_{it-1}$	-0.036 (0.040)	0.188*** (0.048)
$\Delta \ln nii_{it-1}$	-0.141*** (0.048)	0.014 (0.024)
$\Delta \ln cdep_{it-1}$	0.074 (0.105)	-0.078** (0.045)
$\Delta \ln emp_{it-1}$	0.037 (0.070)	-0.224*** (0.075)
$\Delta \ln pl_{it-1}$	-0.024** (0.012)	-0.005 (0.010)
$\Delta \ln tobq_{it-1}$	0.593*** (0.169)	-
$\Delta rfer_gap_{t-1}$	0.002 (0.002)	0.012*** (0.002)
$\Delta hcon_gap_{t-1}$	0.005 (0.006)	0.027*** (0.006)
Number of obs	749	910
Wald test	$\chi^2(13) = 190$	$\chi^2(12) = 85$
Sargan-test ^a	$\chi^2(169) = 262$	$\chi^2(157) = 277$
AR (1) ^b	z = -10.04 p-value = 0.000	z = -10.09 p-value = 0.000
AR (2) ^c	z = -0.36 p-value = 0.722	z = -1.18 p-value = 0.237

Standard errors, adjusted for clustering at the bank level, are reported in parentheses. Statistical significance at 1%, 5% and 10% level is denoted by ***, ** and * respectively.

^a Sargan test for overidentifying restrictions in GMM dynamic model estimation.

^b Arellano–Bond test for AR (1) in first-differences

^c Arellano–Bond test for AR (2) in first-differences

TABLE VIII: RoE TARGETING AND LEVERAGE IN US vs EU
(ONE-STEP DIFFERENCE GMM DYNAMIC PANEL-DATA ESTIMATION)

Dependent variable: ΔRoE_{it}	US	EU
ΔRoE_{it-1}	0.741 ^{**} (0.314)	0,823 ^{**} (0,449)
$\Delta RoE_{it-1} \times \ln lev_{it-1}$	-0.450 ^{***} (0.102)	-0,373 ^{***} (0,123)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{11}$	0.136 (0.163)	0,086 (0,105)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{12}$	0.248 ^{**} (0.041)	-0,039 (0,075)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{21}$	0.009 (0.117)	0,024 (0,142)
$\Delta \ln lev_{it-1}$	0.066 ^{**} (0.033)	-0,021 (0,050)
$\Delta \ln n_{it-1}$	0.010 (0.022)	-0,039 (0,037)
$\Delta \ln cdep_{it-1}$	0.258 ^{***} (0.098)	0,024 (0,037)
$\Delta \ln pl_{it-1}$	-0.023 ^{***} (0.007)	0,027 (0,022)
$\Delta \ln emp_{it-1}$	-0.154 ^{***} (0.054)	-
$\Delta rfer_gap_{t-1}$	0.006 ^{***} (0.001)	0,005 (0,003)
$\Delta hcon_gap_{t-1}$	0.016 ^{***} (0.005)	-0,008 (0,006)
Number of obs	1,602	605
Wald test	$\chi^2 (12) = 267.09$	$\chi^2 (11) = 92.17$
Sargan-test ^a	$\chi^2 (202) = 425.51$	$\chi^2 (202) = 323.14$
AR (1) ^b	z = -16.84 p-value = 0.000	z = -7.05 p-value = 0.000
AR (2) ^c	z = -1.72 p-value = 0.086	z = -3.50 p-value = 0.000

Standard errors, adjusted for clustering at the bank level, are reported in parentheses. Statistical significance at 1%, 5% and 10% level is denoted by ***, ** and * respectively.

^a Sargan test for overidentifying restrictions in GMM dynamic model estimation.

^b Arellano–Bond test for AR (1) in first-differences

^c Arellano–Bond test for AR (2) in first-differences

TABLE IX: TWO-STEP DIFFERENCE GMM DYNAMIC PANEL-DATA ESTIMATION, USING THE FINITE SAMPLE CORRECTION OF WINDMEIJER (2005)

Dependent variable: ΔRoE_{it}	
ΔRoE_{it-1}	0.310 (0.562)
$\Delta RoE_{it-1} \times \ln lev_{it-1}$	-0.292* (0.179)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{11}$	0.076 (0.132)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{12}$	0.214** (0.101)
$\Delta RoE_{it-1} \times \ln lev_{it-1} \times speed_{it}^{21}$	0.062 (0.092)
$\Delta \ln lev_{it-1}$	0.064 (0.049)
$\Delta \ln tobq_{it-1}$	0.136 (0.138)
$\Delta \ln nii_{it-1}$	-0.034 (0.037)
$\Delta \ln cdep_{it-1}$	0.008 (0.008)
$\Delta \ln emp_{it-1}$	-0.130** (0.057)
$\Delta \ln pl_{it-1}$	-0.013** (0.007)
$\Delta rfer_gap_{t-1}$	0.005** (0.002)
$\Delta hcon_gap_{t-1}$	0.009 (0.007)
Number of obs	1,348
Wald test	$\chi^2 (13) = 69.47$
Sargan-test ^a	$\chi^2 (196) = 339.63$
AR (1) ^b	$z = -3.57$ p-value = 0.000
AR (2) ^c	$z = -1.07$ p-value = 0.286

Standard errors, adjusted for clustering at the bank level, are reported in parentheses. Statistical significance at 1%, 5% and 10% level is denoted by ***, ** and * respectively.

^a Sargan test for overidentifying restrictions in GMM dynamic model estimation.

^b Arellano–Bond test for AR (1) in first-differences

^c Arellano–Bond test for AR (2) in first-differences

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