WIFO

ÖSTERREICHISCHES INSTITUT
FÜR WIRTSCHAFTSFORSCHUNG

WORKING PAPERS

The Empirics of Balance Sheet Mechanics

Capital and Leverage in Small-scale Banking

Franz R. Hahn

498/2015

WIFO
ÖSTERREICHISCHES INSTITUT FÜR WIRTSCHAFTSFORSCHUNG
AUSTRIAN INSTITUTE OF ECONOMIC RESEARCH

The Empirics of Balance Sheet Mechanics

Capital and Leverage in Small-scale Banking

Franz R. Hahn

WIFO Working Papers, No. 498

April 2015

Abstract

The prevailing view in the banking industry is that increased bank capital requirements drag down bank lending. This is because capital is assumed to impose higher funding costs on banks than debts. The leading scholarly view in finance maintains the contrary. We are able to present microeconometric evidence in support of the theoretical proposition that the bank capital-bank lending linkage remains positive under a minimum capital requirement regime. Most importantly, the empirical analysis indicates that this finding may hold well in both short and long run.

E-mail address: Franz.Hahn@wifo.ac.at
2015/108/W/0

Medieninhaber (Verleger), Hersteller: Österreichisches Institut für Wirtschaftsforschung • 1030 Wien, Arsenal, Objekt 20 • Tel. (43 1) 798 26 01-0 • Fax (43 1) 798 93 86 • http://www.wifo.ac.at/ • Verlags- und Herstellungsort: Wien

The Empirics of Balance Sheet Mechanics

Capital and Leverage in Small-scale Banking

Franz R. Hahn*

April 15, 2015

The prevailing view in the banking industry is that increased bank capital requirements drag down bank lending. This is because capital is assumed to impose higher funding costs on banks than debts. The leading scholarly view in finance maintains the contrary. We are able to present microeconometric evidence in support of the theoretical proposition that the bank capital-bank lending linkage remains positive under a minimum capital requirement regime. Most importantly, the empirical analysis indicates that this finding may hold well in both short and long run.

JEL Classification: E51, G28, G32
Keywords: Bank capital, Credit crunch, Minimum capital requirement

*Austrian Institute of Economic Research, Arsenal Objekt 20, A-1030 Vienna, Austria, Phone: (+43-1) 798 26 01-255, Fax: (+43-1) 798 93 86, e-mail: Franz.Hahn@wifo.ac.at. Thanks to Christa Magerl for compiling and updating the bank dataset used in the microeconometric analysis.

1 Introduction

The Modigliani-Miller (MM) theorem is most fundamental in modern finance (Modigliani and Miller (1958)). It states that under (rather strong) MM-conditions the financial structure of a firm doesn't matter[1]. Having said that, practitioners overwhelmingly favor a different view on finance primarily due to the fact that MM-anaylsis does so badly under real world conditions.

Notably, bankers use to maintain a different view on a bank's financial structure because, as they hold, banks are different. To begin with, they consider capital as compared to deposits and other bank liabilities the most expensive source of bank funding due to high flotation and underwriting costs involved in raising new capital, particularly for smaller banks. Consequently, bankers argue that increased regulatory equity requirements imposed on banks may likely also impose a social cost on the economy in the form of restricted bank lending and, hence, retarded economic growth.

Yet, in academia the view that MM-theory applies to banks also has never seriously been questioned, particularly not by leading scholars in finance (see for a competent non-technical discussion on the role of bank capital, i.e., Miller (1995)). Most recently, Admati and Hellwig (2013) and Admati et al. (2010) have forcefully argued that MM-analysis of finance does so badly in practice solely because of blunt public subsidizing of debt financing and blunt public penalizing of equity financing, respectively (put differently, due to socially costly violation of core MM-requirements). Both distortions apply to non-financial firms and financial firms alike. Hence, the authors hold that there is no point in arguing that the MM-analysis does not apply to banks because banks are different. They are not.

Remarkably enough, Admati and Hellwig (2013) and Admati et al. (2010) make a strong case for applying MM-analysis to banks in order to underpin their claim for higher capital requirements in banking. They strengthen their argumentation by showing impressively, among other things, that higher capital buffers most likely won't cause banks to categorically cut back on lending (not even on lending to small and medium-sized businesses, we'd like to add). In so doing, they manage to demonstrate mostly by means of simple balance sheet mechanics (that is, in plain language) that asset liquidation and, thus, scaling back the volume of lending is just one, and most likely, neither individually nor socially, the most beneficial response of a bank to increased capital requirements. Rather, recapitalization and, even more so, asset and loan expansion appear to be much better options since both alternatives are likely to be both more profitable for banks and more beneficial for society. Hence, a widely held theoretical supposition shared by Admati et al. (2010) is that only banks with no or only very limited access to equity markets may settle, for lack of better options, for asset liquidation (that is, for loan cuts) in response to higher capital requirements. Banks with access to capital markets instead are likely to choose recapitalization and asset expansion as proper (long-term) responses to higher capital requirements.

This paper targets exclusively at the benchmark-banks with no or only very limited access to equity markets and their 'microeconometrically graspable' response to minimum capital require-

[1] The MM-conditions encompass the presence of a certain market price process (the classical random walk), the absence of taxes, bankruptcy costs, agency costs, and asymmetric information, respectively. Given these assumptions, and the existence of an efficient market, the value of a firm is unaffected by how that firm is financed (that is, the famous MM-irrelevance principle applies).

ments since the mid-1990, that is, since the advent of minimum capital regulation in banking. On the basis of a unique bank dataset drawn from balance sheet and non-consolidated income statement data covering all Austrian small to medium-sized cooperative banks at the bank level since 1995, we are able to present empirical evidence indicating that these banks against all odds have chosen, on average, the socially most beneficial response to increased capital requirements, that is, loan expansion.

The paper is structured in detail as follows: Section 2 briefly introduces balance sheet mechanics and the proposition due to Admati et al. (2010) that is being tested. Section 3 lays out the framework of the econometric analysis, presents the data and introduces the test procedure. Section 4 discusses the empirical findings. Section 6 concludes.

2 Bank Capital Requirements and Balance Sheet Mechanics

The core part of the analysis by Admati and Hellwig (2013) and Admati et al. (2010), respectively is copiously reflected in Figure 1. Therein the authors consider a simple example with the capital requirements of a bank initially set at 10 percent (initial balance sheet) being raised to 20 percent of the balance sheet total. Fixing the value of the bank's current assets the example aims at showing that only two options are available to the bank to restructure its balance sheet in order to meet the higher capital requirement[2].

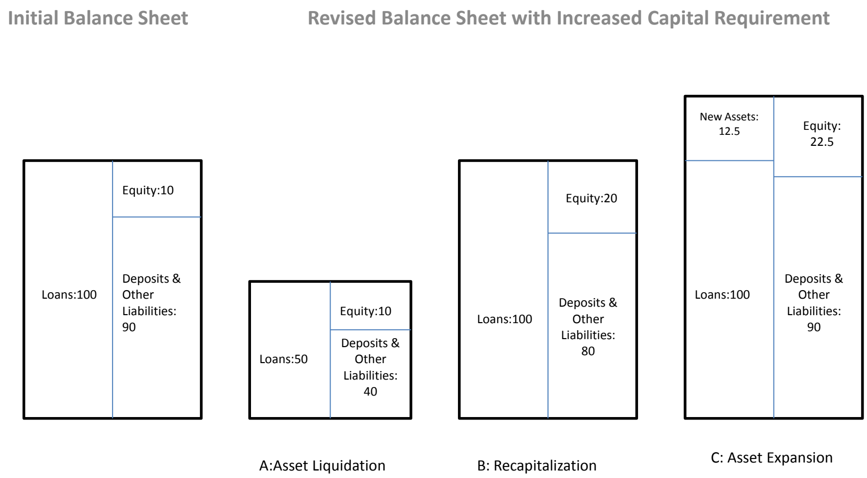
According to Admati et al. (2010) the balance sheet mechanics at work in this example reads as follows (pp.10):

> "Note that only when the bank actually shrinks its balance sheet, as shown in A, is the bank reducing the amount of lending it can undertake. In both B and C the bank can support the same amount of lending as was supported by the original balance sheet. In balance sheet B some liabilities are replaced with equity. Specific types of liabilities, such as deposits, are part of a bank's production function in the sense that their issuance is related to the provision of transactions and other convenience services that the bank provides to its customers. Cutting back on these securities may not be desirable, as the provision of associated services may be both profitable for the bank and beneficial for the economy.That said, it is likely that at least a portion of a bank's liabilities play a pure financing role, and replacing these liabilities with equity will increase bank capital without reducing its productive lending and deposit-taking activity. Balance Sheet C meets the higher capital requirements while keeping both the original assets (e.g. loans) and all of the original liabilities of the bank in place. Additional equity is raised and new assets are acquired. In the short run, these new assets may simply be cash or other marketable securities (e.g. Treasuries) held by the bank. As new, attractive lending opportunities arise, these securities provide a pool of liquidity for the bank to draw upon to expand its lending activity."

[2]Admati et al. (2010) flesh out in footnote 12 that "(i)n this example, we are focusing on the mechanics of how balance sheets can be changed to meet capital requirements. We are intentionally ignoring for now tax shields and implicit government guarantees associated with a bank's debt financing, as well as how changes in a bank's capital structure alter the risk and required return of the bank's debt and equity. We discuss these important issues in detail in subsequent sections."

Note that in the example presented in Figure 1 the bank's leverage ratio defined as deposits and other liabilities divided by equity shrinks from 9 (initial balance sheet) to 4 in all considered responses to the assumed increased equity requirement by a margin of 10 percentage points. This brings home the message that an increase in capital requirements causes, all other things being equal, the leverage ratio of a bank to fall.

Figure 1: Alternative Responses to Increased Equity Requirements



Source: Admati et al. (2010), p. 10

Let us assume for the sake of clarity that, say over the long term, an equity growth of 1 percent will cause, on average, a credit growth by 0.1 percent, and a leverage growth of 1 percent a credit growth of 0.9 percent, respectively. Hence, for the bank opting for loan expansion C as a response to higher equity requirements this would amount, given an increase of equity by a margin of 125 percent while leaving deposits and other liabilities unaltered as assumed in the example, to a credit growth of 12.5 percent somewhere along the line. In other words, the additionally raised equity assumed in the example to be temporarily parked in liquid assets is expected to be eventually used in total for lending expansion.

Needless to say, settling a question like this is not a matter of fanciful balance sheet mechanics or of imaginative thought experiments but rather one of hands-on 'metrics. And the latter is exactly what we are up to in the following section.

3 Frame of the Econometric Analysis

3.1 The Model

The base model of the empirical analysis is built on the structure of an autoregressive distributed lag ($ARDL$) panel model subject to the restriction that both long-run and short-run slopes are equal across banks.

Given data on time period t and bank i the $ARDL$ $(p, q, r_1, r_2, \ldots, r_k)$ under study has the following general form:

$$ln\, y_{i,t} = \sum_{j=1}^{p} \lambda_j ln\, y_{i,t-j} + \sum_{j=0}^{q} \gamma_j ln\, z_{i,t-j} + \sum_{j=0}^{r} \rho_j ln\, v_{i,t-j} + \sum_{j=0}^{s} \delta_j' X_{i,t-j} + \mu_i + \epsilon_{i,t} \tag{1}$$

with $i = 1, 2, \ldots, N$ and $t = 1, 2, \ldots, T$, where $y_{i,t}$ is the dependent variable measuring credit creation of bank i at time t (as measured by the total volume of loans granted to the non-financial sector), $z_{i,t}$ is the prime explanatory variable measuring equity of bank i (defined as loss-absorbing equity), $v_{i,t}$ is the second most important explanatory variable measuring the leverage of bank i (defined as the sum of deposits and total other liabilities), $X_{i,t}$ is a $(k \times 1)$-vector of additional covariates (regressors) for the bank i, μ_i represent the unobserved bank-specific effects, λ_j and γ_j are bank-specific scalars, δ_j are $(k \times 1)$ bank-specific coefficient vectors, respectively. The disturbances $\epsilon_{i,t}$ are independently distributed across i and t, with zero means and variances $\sigma_i^2 > 0$.

Re-parameterization of (1) leads to the following dynamic panel error correction model:

$$\begin{aligned} \Delta ln\, y_{i,t} = \phi\, [ln\, y_{i,t-1} + \alpha\, ln\, z_{i,t} + \beta\, ln\, v_{i,t} + \theta' X_{i,t}] + \sum_{j=1}^{p-1} \lambda_j^* \Delta ln\, y_{i,t-j} + \sum_{j=0}^{q-1} \gamma_j^* \Delta ln\, z_{i,t-j} \\ + \sum_{j=0}^{r-1} \rho_j^* \Delta ln\, v_{i,t-j} + \sum_{j=0}^{s-1} \delta_j'^* \Delta X_{i,t-j} + \mu_i + \epsilon_{i,t} \end{aligned} \tag{2}$$

where $\phi = -(1 - \sum_{j=1}^{p} \lambda_j)$, $\alpha = \sum_{j=0}^{q} \gamma_j / (1 - \sum_{j=1}^{p} \lambda_j)$, $\beta = \sum_{j=0}^{q} \rho_j / (1 - \sum_{j=1}^{p} \lambda_j)$, $\theta = \sum_{j=0}^{r} \delta_j / (1 - \sum_{j=1}^{p} \lambda_j)$ determine the cointegration or long-run dynamics of bank i, and $\lambda_j^* = -\sum_{m=j+1}^{p} \lambda_m$, $j = 1, 2, \ldots, p-1$, $\gamma_j^* = -\sum_{m=j+1}^{q} \gamma_m$, $j = 1, 2, \ldots, q-1$, $\rho_j^* = -\sum_{m=j+1}^{q} \rho_m$, $j = 1, 2, \ldots, r-1$, $\delta_j^* = -\sum_{m=j+1}^{r} \delta_m$, $j = 1, 2, \ldots, s-1$ the short-run dynamics, respectively. The symbol Δ represents the first order difference operator.

A negative coefficient ϕ, termed error correction coefficient, reflects the speed of adjustment or convergence of bank i to its long-run equilibrium (that is, the speed of equilibration), respectively[3].

The homogeneity assumption that the long-run coefficients of the cointegrating vector, the speed of adjustment coefficient and the short-run coefficients are equal across all banks will be

[3]Obviously, $\phi = 0$ indicates that there is no evidence for a long-run relationship.

tested with the familiar Hausman test[4]. In addition, all variables measured in levels are assumed to enter model (2) in log-form.

Hence, given the setup of model (2) the Admati-Hellwig et al. hypothesis as outlined in the previous section straightforwardly requires that the following parameter restrictions hold due to simple balance sheet mechanics:

Bank Capital Requirement Mechanics due to Admati et al. (2010). *Since equity co-determines total liability an increase (decrease) of equity increases (decreases), all other things being equal, almost always the ratio of equity to total liability (sole exception: equity equals total liability). Thus, as to model (2) and Figure 1, C: Asset/Loan Expansion as response to increased capital requirements is supported (a) in the long run if coefficient α is positive and statistically different from zero, and (b) in the short run if $\sum_{j=0}^{q-1}\gamma_j^*$ is positive and statistically different from zero, respectively. If coefficients α and/or $\sum_{j=0}^{q-1}\gamma_j^*$ are statistically indifferent from zero, either A: Asset Liquidation or B: Recapitalization applies, respectively.*

Total liability equals equity plus deposits and other liabilities. Since in model (2) variable v controls for the impact of deposits and other liabilities (in short, leverage) on credit creation y changes in z, representing equity changes, capture changes in capital ratio, the target of capital regulation, accurately in both direction and size (the latter applies only when capital is small relative to leverage, as is common in banking). With that said, the respective parameter restrictions related to A : *Asset Liquidation* and B : *Recapitalization* follow suit.

3.2 Data and Test

3.2.1 The Data

The dataset is unique in that it provides full coverage of the Austrian banking sector at the individual bank level. We will use a specific subset of this dataset for all empirical tests conducted in this paper. The bank data used were extracted from non-consolidated income statement and balance sheet data ranging from 1995 to 2013. The data have been deflated by the GDP deflator (2005=100) and adjusted for inconsistent data-related outliers, respectively. Since the principles of Basel I were embedded in the Austrian Banking Act since 1994, the dataset used encompasses the full time span in which Austrian banks have been exposed to minimum capital requirements. We exclusively focus on local and regional cooperative banks that share the same size and business model and serve similar local markets. That is, the drawing is supposed to encompass small-sized to medium-sized cooperative banks of similar credit risk exposure which are primarily focused on supplying loans to local private households and local small-sized to medium-sized businesses, respectively, and providing liquidity for small local depositors.

As outlined in the introduction the analysis is focused on cooperative banks with no access to the equity market in order to raise capital externally. Further, no bank is allowed to either have been merged with another bank or have taken over another bank since 1990, or have been financially distressed from 1990 onwards. The latter requirements make sure that all banks considered are likely to face approximately the same capital costs environment. Finally, we require that the banks under study meet these requirements throughout the period of investigation.

[4]Under overall homogeneity standard panel estimation techniques can readily be applied with the advantage of gaining efficient estimates due to a minimum loss of degrees of freedom.

Table 1: Descriptive Statistics

Balanced Sample				
Variable		Mean	Stand. dev.	Observations
Total assets	overall	93.428	77.831	7,828
(Mio. EUR)	between		74.170	412
	within		23.856	19
Employees	overall	20.6	17.3	7,828
	between		17.0	412
	within		3.4	19
Loans over	overall	0.569	0.141	7,828
total assets	between		0.127	412
	within		0.061	19
Capital over	overall	0.079	0.031	7,828
total assets	between		0.025	412
	within		0.018	19

As a result, we end up with a balanced sample consisting of 412 small-sized to medium-sized cooperative banks all of which having both a sound capital base and a sound and proper history as a relationship bank since 1990 (that is, no bank has been troubled with financial distress since 1990).

The summary statistics of the balanced sample in Table 1 show that the banks under study are indeed small-sized with staff ranging from 1 to 120 employees. The banks' intermediation accomplishment, as measured by loans over total assets, is ranging from 0.14 to 0.94 and the banks' capital ratio, as measured by loss-absorbing equity over total assets, from 0.02 to 0.27, respectively.

3.2.2 Testing Bank Capital Requirement Mechanics

The model applied to the data is a first-order $ARDL$ panel model. Its error correction form is as follows:

$$\begin{aligned}\Delta lnCRED_{i,t} \ &= \phi \ [\ lnCRED_{i,t-1} + \alpha \ lnEK_{i,t} + \beta \ lnLEVER_{i,t} + \theta_1 \ CIR_{i,t} + \theta_2 \ lnMIT_t \\ &+ \theta_3 \ RINTEX_t + \theta_4 \ GROWTH_{i,t} + \theta_5 \ lnINC_{i,t} \ ] + \gamma_0^* \ \Delta lnEK_{i,t} \\ &+ \rho_0^* \ \Delta lnLEVER_{i,t} + \delta_{01}^* \ \Delta CIR_{i,t} + \delta_{02}^* \ \Delta lnMIT_t + \delta_{03}^* \ \Delta RINTEX_t \\ &+ \delta_{04}^* \ \Delta GROWTH_{i,t} + \delta_{05}^* \ \Delta lnINC_{i,t} + \psi \ CRISIS_t + \mu_i + \epsilon_{i,t}\end{aligned} \tag{3}$$

The design of the model to be estimated is such that in addition to bank-idiosyncratic factors various systemic shocks such as aggregate supply-side and demand-side effects likely to affect bank credit creation are accounted for. The growth rate of production and the gross regional product per head of the region the local i-th bank is headquartered in, denoted $GROWTH_{i,t}$

and $INC_{i,t}$ (in ln-transformation), respectively are used to capture the remaining differences in local market conditions such as the local stage of economic development, the local business environment and local demand shocks, respectively the respective local bank is expected to be exposed to. The interest rate for loans to the private sector at the macro level adjusted for inflationary expectations, denoted $RINTEX_t$, is taken as an indicator for capturing expected overall monetary shocks to future loan pricing. In order to control for the systemic shock caused by the recent financial system turmoil we introduce the binary variable $CRISIS_t$ indicating the categorical effect on loan creation attributed to the financial market crisis from 2007 to 2010.

As motivated in the previous section, the variable to be explained is credit creation to the non-financial sector of bank i at time t as measured by the total volume of loans granted to the non-financial sector at time t of bank i, represented by $CRED_{i,t}$ (in ln-transformation).

The vector of bank-specific explanatory variables $X_{i,t}$ encompasses indicators for cost efficiency, represented by the i-th bank's cost-income ratio (multiplied by -1), denoted $CIR_{i,t}$, the i-th bank's size, represented by the number of employees, denoted $MIT_{i,t}$, the i-th bank's capital base, denoted $EK_{i,t}$, and the i-th bank's leverage, denoted $LEVER_{i,t}$, (the latter three variables in ln-transformation), respectively. Capital base $EK_{i,t}$ is represented by i-th bank's core capital (that is, loss-absorbing equity/common stocks plus disclosed reserves), and leverage $LEVER_{i,t}$ by total liabilities minus core capital, respectively. This implies that changes in $EK_{i,t}$ reflect changes in capital requirement measured by the simple capital ratio defined as core capital over total assets[5].

As to the estimation of model (2) we assume that both $I(1)$ integration with respect to the bank-specific variables and overall-homogeneity (that is, long-run and short-run slopes are identical across banks under consideration) are present. The former assumption is supported by a standard panel unit root test, the latter by a standard Hausman test[6].

The assumption that the panel time-series data are partly non-stationary excludes the application of the standard generalized method of moments (GMM) dynamic estimators developed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998), respectively[7].

As extensively discussed in Pesaran et al. (1999) three econometric techniques are of use to gain efficient estimates for non-stationary dynamic panel models such as equation (1), respectively: mean group (MG), pooled mean group (PMG) and dynamic fixed effects (DFE). The MG estimator imposes no homogeneity restrictions at all, the PMG restricts the long-run coefficients to being the same for all groups, and the DFE requires all the slope coefficients and error variances to be identical. Accordingly, since overall-homogeneity and the presence of individual-specific effects are presumed we are called upon to apply the DFE estimator in order to gain

[5]We choose this measure for three reasons. First. the simple capital ratio can be doctored by a bank's management to a much lesser extent than the risk-weighted capital ratio as defined in the Basel Accords. Second, the line of argumentation forwarded by Admati et al. (2010) and, consequently, our econometric approach only make sense when the focus is on core capital over total assets as prime regulatory target. Third, and most importantly, the simple capital ratio works like a leverage constraint and is, thus, more binding than the Basel concept of minimum capital requirement.

[6]The unit root test results are gained from the Im-Pesaran-Shin test (Im et al. (2003)). These results are not reported (but, of course, made available on request).

[7]In the presence of $I(1)$ variables GMM-based dynamic panel estimators tend to break down as shown in Binder et al. (2005).

efficient estimates for equation (2)[8].

4 Empirical Findings

In order to save space we refrain in the following from commenting on the estimates for those covariates that are not directly relevant in checking whether the hypothesis under study is supported or rejected by our data. This is all the more pardonable since the estimates for these regressors are highly plausible and meet standard expectations.

The core finding of the microeconometric analysis is that the estimates for model (2) reported in Table 2 not only confirm that there is empirical evidence in favor of the existence of cointegration among the variables considered (the error correction coefficient ϕ is significant and negative for the specifications estimated) but also, and most importantly, indicate, against the view held by practitioners, that the cooperative banks under study increase credit creation in response to increased capital requirements. The latter holds in the short run as well as in the long run.

Further, Panel A in Table 2 reports the estimates for a slenderized version of model (2). This is due because the Hausman test applied for checking overall-homogeneity and simultaneous equation bias insignificance requires MG estimates[9]. As proposed by Pesaran and Smith (1995) MG estimates are gained from the unweighted mean of the N individual regression coefficients. That is, regressions of model (2) are run separately for each bank, and a simple arithmetic average of the coefficients is calculated. However, since the time period T of our data equals 18 we have to scale model (2) down to a dimension at which efficient MG estimates can be gained. We consider the specification presented in Panel A as both a suitable reflection of the essence of model (2) as presented in Panel B and enough a parsimonious companion model to allow for 'good enough' MG estimates. This expectation is supported by a comparison of the estimates for either specification.

The calculated Hausman statistic indicates that the simultaneous equation bias due to DFE is most likely minimal for our data[10]. Hence, we conclude that the DFE estimator, the efficient estimator under the null hypothesis, is preferred.

Due to balance sheet mechanics an increase of the capital ratio as defined in this paper is equivalent to a decrease of the leverage ratio as measured by total liabilities minus equity divided by equity. This implies that, in order to stimulate credit growth, the positive impact of an increase of the capital ratio on credit growth must outweigh the negative impact of a decreasing leverage ratio on credit growth, all other things being equal. Since we account for the leverage ratio in model (2) the positive and significant coefficients of the variable $EK_{i,t}$

[8] Pesaran et al. (1999) show in their seminal paper that in the $I(1)$ case the DFE estimator is T-consistent (that is, super-consistent) with respect to the long-run coefficients rather than $\sqrt{T}$-consistent as is the case in the $I(0)$ setting. This implies that the simultaneous equation bias present in our error correction model due to endogeneity between the error term $\epsilon_{i,t}$ and the lagged dependent variable $lnCRED_{i,t-1}$ converges to zero at rate T (Smith (2001).

[9] As discussed in Baltagi and Xiong (2000) the extent of the simultaneous equation bias subject to the endogeneity between the error term and the lagged dependent variable in DFE models can reliably be measured by a Hausman test. The Hausman test also checks if overall-homogeneity applies (see, Blackburne and Frank (2007)) .

[10] The same data set has been used in Hahn (2014) with similar results.

reported in Table 2 reflect exactly that.

Table 2: Dynamic Fixed Effects Regression: Estimated Error Correction Form

Balanced Sample Dep.Var.: $\Delta lnCRED_{i,t}$								
	Panel A Abridged Model				Panel B Unabridged Model			
	Coeff.	p-value	95% conf.interval		Coeff.	p-value	95% conf.interval	
Long run								
$lnEK_{i,t}$	0.096	0.008	0.025	0.167	0.080	0.025	0.010	0.150
$lnLEVER_{i,t}$	0.661	0.000	0.498	0.825	0.778	0.000	0.614	0.941
$lnMIT_{i,t}$					0.072	0.075	- 0.007	0.150
$CIR_{i,t}$					0.321	0.009	0.080	0.562
$RINTEX_t$					-0.063	0.000	-0.084	-0.041
$GROWTH_{i,t}$					0.091	0.000	0.064	0.119
$lnINC_{i,t}$					-0.355	0.002	-0.577	-0.134
$TREND_t$	-0.004	0.123	-0.009	0.001				
Short run								
Error correction								
coefficient ϕ	-0.137	0.000	-0.153	-0.120	-0.142	0.000	-0.160	-0.125
$\Delta lnEK_{i,t}$	0.020	0.034	0.001	0.038	0.018	0.044	0.001	0.036
$\Delta lnLEVER_{i,t}$	0.390	0.000	0.333	0.447	0.400	0.000	0.338	0.453
$\Delta lnMIT_{i,t}$					-0.000	0.923	-0.008	0.007
$\Delta CIR_{i,t}$					0.020	0.113	-0.005	0.044
$\Delta RINTEX_t$					0.007	0.000	0.005	0.010
$\Delta GROWTH_{i,t}$					-0.001	0.000	-0.001	-0.000
$\Delta lnINC_{i,t}$					-1.166	0.000	-1.555	0.778
$CRISIS_t$	-0.001	0.722	-0.005	0.003	0.008	0.008	0.002	0.014
$CONSTANT$	1.292	0.083	-0.169	2.752	0.603	0.000	0.309	0.897
Hausman test :								
MG versus DFE	0.000	1,000						
Number of observations	7,416				7,004			
Number of banks	412				412			
Number of periods	18				17			

In order to make sure that we bring home our message for sure we replace variable $EK_{i,t}$ in model (2) by $(\frac{LEVER}{EK})_{i,t}$ and re-estimate it anew. The estimates are reported in Table 3. Not surprisingly, the coefficients of $EK_{i,t}$ outweigh those of $(\frac{LEVER}{EK})_{i,t}$ by a margin that equals the size of the coefficients of $EK_{i,t}$ reported in Table 2. This is which was to be proven.

Table 3: Dynamic Fixed Effects Regression: Estimated Error Correction Form

Balanced Sample Dep.Var.: $\Delta lnCRED_{i,t}$								
	Panel A Abridged Model				Panel B Unabridged Model			
	Coeff.	p-value	95% conf.interval		Coeff.	p-value	95% conf.interval	
Long run								
$lnEK_{i,t}$	0.757	0.000	0.612	0.903	0.857	0.000	0.709	1.006
$ln(LEVER/EK)_{i,t}$	0.661	0.000	0.498	0.825	0.778	0.000	0.614	0.941
$lnMIT_{i,t}$					0.072	0.075	- 0.007	0.150
$CIR_{i,t}$					0.321	0.009	0.080	0.562
$RINTEX_t$					-0.063	0.000	-0.084	-0.041
$GROWTH_{i,t}$					0.091	0.000	0.064	0.119
$lnINC_{i,t}$					-0.355	0.002	-0.577	-0.134
$TREND_t$	-0.004	0.123	-0.009	0.001				
Short run								
Error correction								
coefficient ϕ	-0.137	0.000	-0.153	-0.120	-0.142	0.000	-0.160	-0.125
$\Delta lnEK_{i,t}$	0.410	0.000	0.343	0.477	0.414	0.000	0.346	0.481
$\Delta ln(LEVER/EK)_{i,t}$	0.390	0.000	0.333	0.447	0.400	0.000	0.338	0.453
$\Delta lnMIT_{i,t}$					-0.000	0.923	-0.008	0.007
$\Delta CIR_{i,t}$					0.020	0.113	-0.005	0.044
$\Delta RINTEX_t$					0.007	0.000	0.005	0.010
$\Delta GROWTH_{i,t}$					-0.001	0.000	-0.001	-0.000
$\Delta lnINC_{i,t}$					-1.166	0.000	-1.555	0.778
$CRISIS_t$	-0.001	0.722	-0.005	0.003	0.008	0.008	0.002	0.014
$CONSTANT$	1.292	0.083	-0.169	2.752	0.603	0.000	0.309	0.897
Hausman test :								
MG versus DFE	0.000	1,000						
Number of observations	7,416				7,004			
Number of banks	412				412			
Number of periods	18				17			

5 Conclusion

Bankers hold that increased capital requirements hinder credit growth. Academics hold the opposite. This paper presents empirical evidence that support the academics' view. The findings presented indicate that increased capital requirements when exposed to cooperative banks that have no access to external equity markets affect credit creation of these banks positively in the short and in the long run.

References

Admati, A., Hellwig, M., 2013. The bankers' new clothes: What's wrong with banking and what to do about it. Princeton University Press.

Admati, A. R., DeMarzo, P. M., Hellwig, M., Pfleiderer, P. C., 2010. Fallacies, irrelevant facts, and myths in the discussion of capital regulation: Why bank equity is not expensive. Tech. rep., Stanford Graduate School of Business Research Paper No.86.

Arellano, M., Bond, S. R., 1991. Some tests of specification for panel data: Monte carlo evidence and an application to employment equartions. Review of Economic Studies 58, 277–297.

Arellano, M., Bover, O., 1995. Another look at the instrumental variable estimation of error-components models. Journal of Econometrics 68, 29–51.

Baltagi, B. H., G. J., Xiong, W., 2000. To pool or not to pool: Homogeneous versus heterogeneous estimators applied to cigarette demand. Review of Economics and Statistics 82, 117–126.

Binder, M., Hsiao, C., Pesaran, M., 2005. Estimation and inference in short panel vector autoregressions with unit roots and cointegration. Econometric Theory 21, 795–837.

Blackburne, E. F., Frank, M., 2007. Estimation of nonstationary heterogeneous panels. The Stata Journal 7, 197–208.

Blundell, R., Bond, S. R., 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics 87, 115–143.

Hahn, F., 2014. Culture, geography, and institutions - Empirical evidence from small-scale banking. Economic Journal 124 (577), 701–886.

Im, K. S., Pesaran, M. H., Shin, Y., 2003. Testing for unit roots in heterogeneous panels. Journal of Econometrics 115, 53–74.

Miller, M. H., 1995. Do the M&M propositions apply to banks? Journal of Banking and Finance 19, 483–489.

Modigliani, F., Miller, M. M., 1958. The cost of capital, corporation finance, and the theory of investment. American Economic Review 48, 261–297.

Pesaran, M. H., Shin, Y., Smith, R. P., 1999. Pooled mean group estimation and dynamic heterogenous panels. Journal of the American Statistical Association 94, 621–634.

Pesaran, M. H., Smith, R. P., 1995. Estimating long-run relationships from dynamic heterogeneous panels. Journal of Econometrics 68, 79–113.

Smith, R. P., 2001. Estimation and inference with non-stationary panel time-series data. Tech. rep., Department of Economics, Birkbeck College, London.