Is Bank Capital Sensitive to a Tax Allowance on Marginal Equity?

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Abstract: The existence of an unequal tax treatment between debt and equity has been identified as an explanatory factor of bank leverage. We examine the impact of the introduction of a tax allowance in Italy, granted to banks (and other firms) increasing their equity from a base year. Interestingly, this mechanism was repealed after two years which allows us to examine what happens once the tax incentive is removed. Using a difference-in-differences setting, we observe a 44 basis points increase in bank capital following the implementation of this reform and a 70 basis points decrease following its repeal. This complements the results of Schepens for Belgium as it reveals the sensitivity of bank capital to a tax allowance on the stock of existing equity, not on new equity. Our results also reveal the absence of a hysteresis effect associated to the tax allowance incentive, contrarily to the observed effect for leverage variations following corporate tax changes. This tends to reveal that tax instability results in higher leverage. We also document a heterogeneous effect for large and small banks, as only smaller banks react to tax incentives.

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1. Introduction

Capital buffers in the banking industry have been documented as important. Higher capital ratios increase the resilience of financial institutions to economic shocks (Berger and Bouwman, 2013), have a positive incidence on their value (Mehran and Thakor, 2011) and help them to attract funds (Holmstrom and Tirole, 1997) and maintain long-term relationship with borrowers (Allen et al., 2011). Also, capital levels have a positive impact on the lending activity (Gambacorta and Shin, 2016) and banks with higher capital buffers tend to take less risks as shareholders have more to lose in case of losses (Admati et al., 2011; Repullo, 2004). However, bank capital is regulated and changes in capital requirements also have negative effects, reducing lending to the economy (Jiménez et al., 2016) and incentivizing banks to take more risks to achieve target levels of return on equity (Gale, 2010). Moreover, in crisis period, increasing capital requirements may lead to a credit crunch amplifying the negative effects of the crisis on the real economy (Cornett et al., 2011; Gambacorta and Marques-Ibañez, 2011).

Given this controversy around capital requirements, it is interesting from a regulatory and economic perspective to test whether there are other policy instruments that give incentives to increase bank capital buffers and how they behave. One source of high leverage in the banking sector is the unequal tax treatment between equity and debt (Admati et al., 2011). Since interest payments are, in general, deductible from the corporate income tax base whereas equity returns are not, banks are more prone to use leverage as a source of financing. This effect has been widely documented in the corporate finance literature (Graham, 1996; Desai et al., 2004; Graham and Tucker, 2006; Arena and Roper, 2010; Feld et al., 2013; Faccio and Xu, 2015; Heider and Ljungqvist, 2015) and in the banking literature (De Mooij and Keen, 2016; Hemmelgarn and Teichmann, 2014; Horváth, 2013; Milonas, 2016; Schandlbauer, 2016). In this paper we have a different focus than the papers just cited. We

intend to show whether bank capital ratios increase when a tax incentive on equity is given and whether this effect survives once the incentive is removed exogenously. These questions allow us to argue about the existence of a hysteresis affecting bank capital, meaning whether it responds in a symmetric or asymmetric manner to exogenous changes in the tax system.

In this paper, we are interested in whether banks react to the implementation of a tax incentive to increase equity and whether this effect is permanent upon an exogenous reversal of the incentive. We exploit an exogenous change of the tax code introduced in Italy in 2000 which grants a tax shield on equity to banks[1], reducing the tax distortion between equity and debt. More precisely, the Italian reform consisted in granting a tax shield on equity increases from a reference year. This mechanism allows firms to apply a reduced tax rate (19% instead of 37%) on a notional return computed on equity increases after the tax change is in place. We find, using a difference-in differences setting, that the introduction of this measure has a positive effect on Italian bank capital ratios. Using Italian banks as treatment group and banks from other euro area countries as control group, we document that Italian banks increase their equity to assets ratios by 44 basis points relative to the control group after the introduction of the equity tax shield. Banks achieved this via book equity increases (notably retained earnings) and not via asset reductions. We do not observe any significant increase in bank risk measures around the tax change, giving us confidence that the change in equity ratio is not driven by risk factors. Our results are robust to a battery of robustness and placebo tests.

Additionally, the Italian case provides the opportunity to test whether there is a hysteresis in bank capital level associated to tax changes. Since the ACE mechanism was withdrawn in 2002, we are able to examine whether the increase in capital ratios is permanent[2]. We document that once the ACE mechanism is no longer applicable, banks readjust their equity

[1] This mechanism is known as Allowance for Corporate Equity (ACE).

[2] This change was adopted by the new government taking office that year which implies that the reform is unlikely to have been anticipated by banks.

ratios downwards by 0.7 percentage points on average relative to banks in the control group. To explain our effects, we rely on standard tradeoff capital structure theory, in which banks balance the tax advantage of debt and its costs. When an ACE is introduced, the debt tax bias is reduced and banks rebalance upwards their capital ratio. However, when the ACE is removed, the debt tax bias increases, and bank capital is adjusted downwards accordingly. This simple theory is consistent with our observations.

Our results reveal that bank capital increases upon the introduction of a tax incentive do not survive a reversal of the measure. This differs from the effect of corporate tax rate changes on leverage documented by Heider and Ljungqvist (2015) for non-financial firms and Milonas (2016) for banks. Both studies reveal that firms respond to increases in corporate tax rate raising their leverage but do not respond symmetrically to subsequent tax cuts. This hysteresis of leverage (ratchet effect) is not observed for bank capital in our case. To our knowledge, we are the first to document a symmetric reaction of banks to an exogenous tax shock affecting their cost of equity.

Additional tests reveal that our results are driven by smaller banks[3]. This result is in line with De Mooij and Keen (2016) and Milonas (2016), who show that capital ratio of larger banks is not sensitive to tax changes. They attribute this effect to the ability of larger banks to exploit international tax differences, given the existence of subsidiaries abroad. Gu et al. (2015) provide evidence that international banks shift debt between countries to exploit differences in the tax codes between their home countries and other countries where they operate their subsidiaries. Our results reveal that, for larger banks in Italy, an equity tax-shield at the local level is insufficient to incentivize a change in their capital level.

[3] Given that the Italian banking sector has a large number of small cooperative banks that have a special status, we also test whether the effect is only triggered by this kind of banks. In table 5 and 7 we remove small cooperatives and do the matching and DID regressions using commercial and savings banks.

From a financial regulation perspective, our results show that eliminating the tax distortion against equity can contribute to create buffers in the upside of the economic cycle. However, its effect on bank capital is likely to be significant for smaller banks only. This implies that tax policy is a less influential mechanism to prevent excessive leverage for larger banks as they are less responsive to tax changes.

The remainder of the paper is structured as follows. Section 2 provides the details of the reform introduced in Italy. Section 3 describes the data and methodology employed in the empirical analysis. Section 4 describes the results as well as the different robustness and falsification tests performed. Section 5 concludes.

2. Background: The Italian Allowance for Corporate Equity tax reform

The identification strategy of this paper is the introduction of an Allowance for Corporate Equity (ACE). A common feature among corporate income tax systems is that the cost of debt is deductible from the taxable basis whereas the cost of equity is not. This lack of neutrality between the tax treatment of equity and debt financing creates economic distortions and leads to higher firms' leverage. To attenuate this bias, Italy introduced an ACE. This scheme, initially proposed by Devereux and Freeman (1991), aims at increasing the neutrality of the tax system by granting an allowance to companies that compensates for the opportunity costs of equity finance. This scheme grants a notional interest deduction against the corporate income tax base computed as a percentage of the qualifying equity.

Starting in 1997, Italy applied an Allowance for Corporate Equity to commercial companies that was extended to banks from 2000 onwards (Howells and Bain, 2008). This reform allowed the computation of a notional interest on the book value of new equity (capital

or reserves) in excess of 1996 year-end level. Rather than being fully deductible, the amount corresponding to the notional interest on new equity became taxable at 19% instead of the ordinary tax rate of 37%. By law, the average tax rate could not be lower than 27% after applying the ACE. Regarding the years during which the reform was applicable to banks, the notional interest was set at 7% in 2000 and 6% in 2001. In order to give stronger incentives for companies to make use of equity, the book value of equity for ACE purposes was raised by 120% in 2000 and 140% in 2001. However, after a new government took office in Italy, this reform was repeal and banks did not longer benefit from it as from 2002. A similar ACE mechanism has been lately introduced in Italy in 2012. However, this period was a troublesome one for banks in Italy as documented by Acharya and Steffen (2015) and Acharya et al. (2016) making complicated to disentangle the effect of other events and the impact of the 2012 reform on bank equity ratios.

The effects of introduction of an ACE on capital structure has been studied in the case of Belgium for commercial companies (Princen, 2012; Panier et al., 2013) and banks (Schepens, 2016). The Italian ACE scheme, however, differs from the Belgian reform of 2006 in two important aspects. First, in Italy the notional interest is computed only on new equity after the reform is in place and not on the existing stock of equity as in the Belgian case. Second, the Italian ACE scheme foresees an anti-avoidance clause that targets transactions between related parties in order to avoid abuses and tax planning (Zangari, 2014). However, in the Belgian case this clause is not included in the legislation which has led to tax planning opportunities by groups with subsidiaries located in different jurisdictions as documented by Hebous and Ruf (2015). Third, as the tax allowance mechanism is withdrawn in 2002, the Italian case allows us to provide evidence of the effects of the repeal of this mechanism on bank equity ratios.

3. Data and methodology

3.1 Data

Throughout this paper we use bank accounting data that is retrieved from Bankscope and macroeconomic data that is obtained from the World Economic Indicators at the World Bank. We collect data on banking institutions that are categorized as commercial, savings and cooperative banks in all EU-27 countries[4]. To avoid double counting and given the fact that we are measuring a tax impact at the country level, we work with unconsolidated accounts following De Mooij and Keen (2016)[5]. We keep all banks with data available on the main variables we use throughout the paper for each year for the periods 1997-2001. For the former period this setting allows us to have data for banks three years before the treatment in 2000 and two years after the treatment[6].

As explained in the next sub-section, we use the difference-in differences methodology for our main analysis. We employ a group of treated banks (Italian banks) and a group of control banks that is not affected by the treatment (banks from other EU member states) as in Schepens (2016). However, for the selection of our control group we take into account other developments that occurred in the same period potentially affecting the quality of other EU banks as a control group. The ACE introduced in 2000 for banks coincides in time with the creation of the euro area. Therefore, in order to have treated and control banks equally affected by this event, we only keep banks from countries that first became euro area member

[4] Croatia is excluded from the sample as it became EU member state in July 2013.
[5] Bankscope distinguishes between consolidated and unconsolidated accounts. We keep those accounts that take the code U1, U2 or U*.
[6] Data is available Bankscope for a wide range of banks as from 1997. Before that year the number of missing variables is significantly higher and many banks are missing. Therefore, we start our period of analysis in 1997. We stop the post-treatment period in 2001 because the ACE mechanism is no longer applicable to banks after that year.

states[7] and Greece that entered the euro area during the period of study. This leads to a sample of 2,089 banks out of it 459 banks are Italian. Finally, we eliminate those banks with negative equity value and those with an annual growth or decrease of total assets higher than 50% to avoid that our results are polluted by merger and acquisitions, spinoffs or similar events. Then, we winsorize all the variables at the 1st and 99th percentiles to avoid the impact of outliers.

The main dependent variables of our analysis are the ratio of equity to total assets. We use determinants of bank capital structure as control variables. We use the logarithm of assets (as a measure of size)[8], the loan to assets ratio (as a measure of assets diversification), the return on assets (as a measure of profitability), the non-interest income ratio (as a measure of income diversification). We subsequently add to our regressions other variables to control for risk[9]. These variables are the ratio non-performing loans over total loans and the loan growth rate. The reason why we use the latter variable is that a rapid growth of bank lending tend to be associated with less monitoring and lower quality of loan portfolios (Laeven and Majnoni, 2003). Loan loss provisioning has also been used in the literature as a proxy for risk (Barry et al., 2011; Garel and Petit Romec, 2016; Iannotta et al., 2007) so we also include the ratio loan loss provision over total assets in our regressions. To capture the effect of macroeconomic differences at the country level we include the growth of GDP per capita, the logarithm of the GDP per capita and the annual inflation rate. The construction of the variables is described in table A.3. in the appendix.

[7] These countries are Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.

[8] Before computing the logarithm, the variable total assets have been converted into U.S. Dollar at the rates provided by Bankscope as at 31 December 2012

[9] We employ two different measures of risk due to the fact that the ratio of non-performing loans over total loans present many missing variables in the sample 1997-2001. However, using one or the other does not lead to qualitative changes in the interpretation of our results.

3.2 Empirical methodology

The empirical methodology in this section seeks to identify the causal impact of the introduction of an incremental ACE in Italy on the equity ratios of Italian banks.

Ideally, the impact of a policy change is assessed using a random experiment. Since the tax reform is an exogenous event affecting a specific group of banks, we can determine a treatment group (Italian banks) and a control group (banks from other euro area countries) and assume a quasi-natural experiment to test causality.

In order to establish causality on the use of new equity financing by Italian banks after the ACE tax reforms we employ a difference-in-differences (DID) approach. This approach allows us to assess the behavior of capital structures before and after the reform. Because treated banks (Italian) and non-treated banks (from other EU countries) may differ along some characteristics, we need to find a group of non-treated banks to perform our analysis that is as similar as possible to our treated group. The main assumption of the DID methodology is that prior to the treatment the dependent variable follows a parallel trend for both control and treatment group (Roberts and Whited, 2013). In the absence of "treatment", the average change of the dependent variable should be the same for both treated and non-treated groups. As a result, any relevant difference in the two groups after the treatment can be then attributable to the introduction of the equity tax shield.

In order to obtain a comparable sample of banks before the treatment we do a propensity score matching. This procedure is done using a nearest neighbor matching of propensity scores (Rosenbaum and Rubin, 1983). A propensity score tends to balance the observed covariates of both treated and non-treated banks. The steps of the propensity score matching are the following: First, we run probit regression for the sample of EU banks and the Italian banks in 1999. The dependent variable in this regression is a dummy that takes the value one

if a bank is located in Italy and zero otherwise. We use as independent variables the two years growth of the equity to assets ratio (to make more likely that the equity to assets ratio evolves similarly before the law change) and the present equity ratio. We also include size, profitability, the ratio of loans over total assets and the ratio of the non-interest income over total income. After running the probit regression, we predict the results (based on the coefficients obtained from the probit regression) in order to obtain a propensity score for each bank. Secondly, following Rosenbaum and Rubin (1985a) we match every treated bank using the 3 nearest available matching based on the propensity score obtained from the probit regression for the year 1999. The matching is done with replacement. This means that a non-Italian bank that is matched with an Italian bank can be matched with other Italian banks too. Those banks that are not matched are removed from the sample. Table 1 provides descriptive statistics of the matched sample of Italian and the control group of EU banks for the period used in the main regressions.

In table 2 we investigate the characteristics of the treatment and control group in the absence of treatment. We compare each variable for the pre-treatment period, reporting the means for the treated (column 1) and control (column 2) groups and the significance of the difference of their means using a t-test (column 3).

In panel A of both tables we observe that before the matching the difference in means of the annual change of the key dependent variables is significantly different between the control and treatment groups[10]. Therefore, the results show that the dependent variable in the pretreatment period violated the parallel trend assumption. However, this difference in means

[10] Roberts and Whited (2013) highlight that the key assumption for the consistency of a DID estimator is the zero correlation assumption of the dependent variable. This condition means that in the absence of treatment, the average change in the dependent variable (equity to assets ratio in our case) would have been the same in both the treatment and control group. Therefore, we have to verify that before the treatment the average change of our dependent variable follows a similar trend for both control and treatment group (parallel trend). Figure A.1. shows that once we find a suitable matching for banks in the control group and treated group, the mean of the equity ratio follow a similar trend before the introduction of the equity tax shield in 2000 for both groups.

is insignificant after the matching is done, making both groups more comparable as now the dependent variables used throughout the paper follow a parallel trend for both control and treatment groups. Furthermore, Figure A.1. shows that after doing the matching for the sample 1997-2001, the difference on the mean annual change of the equity to assets ratio for the treated and control groups is not significant before the treatment. The p- value of the difference in the mean annual change of the equity ratio between treated and control group is 0.26 in 1998 and 0.36 in 1999.

Although the DID methodology mainly requires that the dependent variable follows a parallel trend in the pre-treatment period for both groups (Roberts and Whited, 2013), we also test whether after matching the difference in means of the rest of bank variables we use in our regressions is statistically significant before the treatment. In Table 2 our test shows that after matching, banks in the 1998-2001 sample are comparable (for the pre-treatment period) in terms of return on assets, loan ratio, and loan loss provisioning as the difference of their means shown in column 3 is statistically insignificant. There are still some differences in terms of size [11] and non-interest income ratio. However, the DID methodology does not require that banks are similar over all dimensions.

Once we find a satisfactory control group, we set up the econometric model as in equation 1.

$$y_{i,t} = \alpha + \beta_1 ACE_t + \beta_2 X_{i,t-1} + \beta_3 Z_{i,t-1} + \beta_4 post + c_i + \varepsilon_{i,t} \quad (1)$$

$y_{i,t}$ is either the equity to assets ratio ($\frac{equity_t}{total\ assets_t}$) or the equity over non-equity liabilities ($\frac{equity_t}{liabilities_t}$), measured by their book value. $X_{i,t-1}$ is a subset of time-varying lagged bank control variables. These variables are size and profitability[12] that have been identified by the

[11] We address this issue on our robustness tests in section 4.4.

[12] We use as a proxy for these variables the natural logarithm of total assets and the return on assets.

existing literature as bank capital structure determinants (Berger et al., 2008; Gropp and Heider, 2010; De Jonghe and Öztekin, 2015). This literature identifies the market to book ratio as a determinant of bank capital structure, however, our sample contains listed and non-listed banks so this variable is missing for a large number of banks. Additionally, we add the loan to assets ratio and the ratio of non-interest income over total gross income. To control for risk, we include the variable non-performing loans over total loans. However, this variable presents several missing values for the period 1997-2001. As a result, we use an alternative variable to capture the effect of risk in the loan portfolio on the equity ratio, the annual growth rate of loans and the ratio of loan loss provisions over total assets. $Z_{i,t-1}$ represents the lagged value of GDP per capita growth, the inflation rate and the natural logarithm of the GDP per capita. The inclusion of these macroeconomic variables is motivated by the existing work on the impact of taxes on bank capital structure at cross-country level (Devereux et al., 2015; Hemmelgarn and Teichmann, 2014; Schepens, 2016) and aims at controlling for differences in the level of countries' development. Our variable of interest is the treatment variable *ACE*[13]. This is a dummy variable that takes the value one for Italian banks the years after the reform is implemented and 0 otherwise. The remaining variables are *post* which is a dummy variable that takes the value one the years after the reform is implemented and zero otherwise and c_i that stands for bank fixed effects.

In this specification the estimated β_1 represents the causal effect on $y_{i,t}$ of a given bank located in Italy in the period after the implementation of the tax reform relative to a bank located in another EU country in the same period. A positive and significant coefficient should be interpreted as an unusual increase in equity financing relative to what it would have been in the absence of the reform. One potential concern of the DID approach is that bank capital could change due to a shock in bank characteristics. However, adding bank-specific

[13] This variable results from the interaction of the dummy *treat* taking the value one if the banks is Italian and zero otherwise and *post* that takes the value one in the years after the reform and zero otherwise.

determinants of capital structure should control for this aspect. Moreover, another concern is that other economic shocks different from the tax change could affect the equity ratios. However, controlling for macroeconomic country-specific variables in the regressions should neutralize this concern.

4. Results

4.1 Baseline results

Table 3 presents the baseline results of our DID analysis after matching treated and control banks. All regressions are based on equation 1. The variable *post* is a dummy that takes the value one for the years after the ACE becomes applicable to banks and zero otherwise. The treatment variable *ACE* is a dummy variable that takes the value one for Italian banks for the years 2000 and 2001, and zero otherwise. We use in all cases bank fixed effects regressions including bank and macroeconomic control variables and robust standard errors. In columns 1 to 5 our dependent variable is the ratio of equity over total assets. In column 1 we regress the equity ratio on a subset of bank control variables (no control for risk is included) and macroeconomic variables. We observe that the treatment variable is positive and statistically significant. The coefficient of 0.44 indicates that the equity ratio increases by 0.44 percentage points after the ACE is applicable to banks relative to what it would have been in the absence of tax change. This represents an increase of 3.5% in the equity ratio for the average Italian bank in the sample once we control for bank covariates and macroeconomic variables. In column 2 we do the same regression as in column 1 clustering the standard errors at the country level. Given that we observe a treatment at the country level, it is advisable to test whether the significance of the result holds when we cluster standard errors at this level. The treatment coefficient is still significant at 1% level. In columns 3, 4 and 5 we control for risk using the non-performing loans ratio, the annual growth rate of loans and the loan loss

provision ratio, respectively. We do specific regressions including these variables due to the fact that they present missing values for some banks. Controlling for risk does not change the interpretation of the results, however, the coefficients vary with respect to columns 1 and 2. When we add the NPL ratio the coefficient increases to 0.85 and is significant at 1% level. When we add the growth rate of loans the coefficient drops to 0.29 and is significant at 10% level. When we use the loan loss provisions ratio as a proxy for risk the treatment coefficient is equal to 0.4 and significant at 1% level. The main take-away from these three columns is that we still find a significant coefficient for the treatment variable when controlling for risk. In column 6 we use the natural logarithm of the equity to assets ratio that allows us to interpret the treatment coefficient as percentage change on the ratio. The coefficient of the *ACE* variable is 0.027 and is significant at 10% level. This means that after controlling for bank-specific and macroeconomic variables, Italian banks increase their equity ratios by roughly 3% relative to the banks in the control group[14]. In column 7 we use the natural logarithm of the common equity to assess to what extent the effect that we observe on the equity ratio comes from an increase in the numerator of the ratio. The treatment coefficient is equal to 0.32 and statistically significant, meaning that the increase in the equity ratio is driven by a higher use of equity by Italian banks. In column 8 we follow the approach suggested by Bertrand et al. (2004) and collapse the data into the pre-treatment (1998 and 1999) and the post-treatment (2000-2001) period averages at bank level. The dependent variable is the collapsed value of the equity ratio. We do the fixed effect regressions using the data collapsed. This approach should correct for potential correlations in the error term and bad estimations of the standard errors. However, clustered standard errors given the large number of groups that we have should also take care of this problem. The coefficient of the

[14] As the variable *ACE* is a dummy variable and the dependent variable is a natural logarithm, we should compute the effect on the ratio using the following formula; $\widehat{pct} = 100 * (\exp\left[\hat{c} - \frac{1}{2} * \hat{V}(\widehat{c})\right] - 1$ where $\widehat{pct}$ indicates the percentage change of the dependent when the dummy *ACE* is equal to one, $\hat{c}$ is the estimated coefficient and $\hat{V}(\widehat{c})$ is the estimated variance of the coefficient of the dummy.

treatment variable remains positive and significant (at 5% level) and slightly higher than in column 1.

4.2 Other balance sheet subcomponents and risk characteristics

In Table 4 we test for the evolution of other balance sheet subcomponents and risk characteristics of banks around the tax change. In column 1 the dependent variable is the natural logarithm of Total Assets. The coefficient of the treatment variable is not significantly different from zero which means that the effect observed in the equity ratio is not triggered by a change in the denominator of the ratio after the treatment takes place. In column 2 we test for the evolution of retained earnings using the natural logarithm of the retained earnings as a dependent variable. The ACE mechanism gives an incentive to retain more profits so we should observe a positive effect on retained earnings. The number of data points for this variable for banks in the control group is very low (33 in the year with the highest number of non-missing values). As a consequence, we analyze how this variable evolves before and after the law change for the treatment group. In this regression all banks in the control group are removed so the coefficient of interest is *post*. The coefficient is 0.88 and is statistically significant. Although this setting does not allow us to say how this variable would have evolved in the absence of treatment, it provides evidence that Italian banks increased their retained earnings after the introduction of the ACE.

In columns 3, 4, 5 and 6 we analyze the evolution of some risk variables. As risk is an important determinant of banks capital structure (Berg and Gider, 2016), we want to analyze to what extent the higher use of capital that we observe after the reform can be attributed to higher risk. In column 3 we use the ratio of non-performing loans over total loans as a measure of credit-risk. For this variable we have a similar problem than in column three as the variable is rather scarce for banks in the control group but available for the majority of Italian

banks. Therefore, we run a regression on the sample of Italian banks in which the variable *post* will tell us whether there is a difference in the evolution of this variable before and after the treatment for these banks. The coefficient is negative and highly significant which means that credit risk did not increase for Italian banks after the introduction of the ACE. In column 4 we use the natural logarithm of the standard deviation (computed over three years) of the return on assets as a dependent variable. This is a measure of earnings volatility and is used as a determinant of capital structure in the corporate finance literature (Graham and Leary, 2011) and banking literature (Berger et al., 2008). In this case we use a standard DID regression. The treatment coefficient is negative but not statistically significant which means that there is no change in the volatility of earnings around the tax change. In column 5 we use the natural logarithm of the Z-score as a dependent variable. This is a measure of bank stability and is computed as the ratio of the sum of the equity ratio and the return on assets divided by the standard deviation of the return on assets. Following Laeven and Levine (2009) we take the natural logarithm of this variable. We do a standard DID regression without bank covariates and we find that the coefficient of the treatment variable is positive and insignificant. This means that bank stability did not change around the tax change for banks in the treated group. Finally, in column 6 we use the ratio of loan loss provisions as a dependent variable. This variable is widely used in the literature as a proxy for credit risk. Again we do not observe an increase of this variable (but rather a significant decrease relative to the control group) around the tax change giving us confidence on the fact that bank risk factors are not causing the increase in the equity ratio observed in table 1.

4.3 Heterogeneous effects

In table 5 we test whether the response to the introduction of the ACE is heterogeneous. We consider potential differences in the reaction between banks of different size and different levels of capitalization. The motivation for this test is the fact that the literature on the effect

of taxes on bank capital structure find that larger and smaller banks react differently to tax changes (De Mooij and Keen, 2016) and that lower capitalized banks may be less sensitive to specific taxes (Devereux et al., 2015). Following Schandlbauer (2016) we partition the sample into two groups based on the median value before the treatment of the variable of reference. We divide the sample of banks into better-capitalized or larger banks (Top group) and worse-capitalized or smaller banks (Bottom group) using the median of the equity over total assets ratio or the total assets, respectively. This classification is made in 1997 and kept constant thereafter. We then create control variables for banks in each group and combine with the treatment variable *ACE*. In column 1, we observe that both better and worse capitalized banks react similarly to the tax change. Treated banks in both groups experience a positive and significant increase in the equity ratio after the introduction of the ACE being the coefficients very close to each other. In column 2 we test to what extent larger and smaller banks react differently to the reform. We find that smaller banks react significantly to the reform. The coefficient of 0.65 indicates that smaller banks increase by around 0.65 percentage points their equity ratio after the ACE is applicable to banks. However, larger banks do not seem to react significantly to the ACE. The coefficient for this group is positive but not statistically significant at 10% level. This result shows that there is some heterogeneity in the response to the ACE. In column 3 we retreat our sample by removing all Italian banks that have a value equal to zero for the variable tax expense in Bankscope every year between 1997 and 2001. The idea behind this treatment is that banks that have not been paying taxes during this time due to accumulated losses or specific tax rebates are, in principle, not sensitive to a tax change. Therefore, removing these banks allows us to test how robust the observed heterogeneous response is. Once these banks are removed we redo the matching as described is section 3. The result in column 3 shows that the result we find in previous column is not "polluted" by the presence of banks not subject to taxation in the sample. The coefficient for

larger banks is not statistically significant while the one for smaller banks is positive and statistically significant at 5% level of confidence. We then do an additional test in columns 4 and 5 regarding the different type of banks populating the Italian banking sector. In our sample of Italian banks we find a large portion of banks that are credit cooperatives (305 out of 459 banks). Most of these banks are small banks[15] and are subject to some product, investments and territorial restrictions as well as some tax rebates (even though they remain taxable entities for corporate income tax purposes). Therefore, in order to test whether the effect that we find comes from a specific type of bank we split the sample of Italian banks between credit cooperatives and other commercial banks using the list of banks that are classified as credit cooperatives available on the website of the Bank of Italy[16]. In column 4 and 5 we exclude all banks that are not classified as credit cooperatives. In order to test the existence of a different reaction between larger and smaller commercial banks we run two different regressions. In column 4 we keep all commercial banks with total assets below or equal to €1 billion and redo the matching as described in section 3. This treatment left us with 45 commercial (non-cooperative) banks. The threshold of €1 billion of total assets is in line with the threshold used in the literature to distinguish between small banks and mid/large size banks (Berger and Bouwman, 2013; Köhler, 2015)[17]. The result of the DID regression shows that the treatment coefficient is equal to 0.64 and statistically significant at 5% level. This number is very close to the coefficient found for smaller banks in the regression in column 2. In column 5 we only keep Italian banks that are not credit cooperatives with total assets above €1 billion and redo the matching as described in section 3. We end up with 109 banks in the control group. The results of our DID regressions for these banks show that larger commercial banks did not respond similarly to the reform. The coefficient of the variable *ACE* in the DID

[15] With the exception of Banca di Credito Cooperativo di Roma and the Instituto Centrale del Credito Cooperativo, none of these banks exceeded the €1 billion in assets in the period 1997-2001.
[16] https://infostat.bancaditalia.it/giava-inquiry-public/flex/Giava/GIAVAFEInquiry.html#
[17] The threshold is commonly $1 billion for papers dealing with US banks data.

regression is not statistically significant. These results reassure us on the fact that the effect we find for smaller banks is not driven by a group of credit-cooperatives banks contaminating our results due to their specific features.

4.4 Robustness tests

In table 6 we test the robustness of our results. The ratio of equity over total assets is the dependent variable in all regressions. In columns 1 and 2 we test whether our results are driven by the choice of our matching. In column 1 we redo the matching for the pre-treatment period using one matched bank (neighbor) instead of three. We use the same variables and procedure that we describe in the previous section. Then we run a regression of the equity ratio on the treatment variable and a subset of bank-specific and macroeconomic variables. As before we use bank fixed effects and bank clustered robust standard errors. The coefficient of the treatment variable is positive and significant at 1% level. In column 2 we do the same exercise but using 5 matched banks. Again, the results of the regression show that treatment variable has a positive and significant coefficient. These results reveal that our conclusions are not driven by the number of matched banks. In column 3 we remove the Italian banks that are above the 95^{th} percentile in terms of the difference of the equity to assets ratio between the last pre-treatment year (1999) and the first post-treatment year (2000). After doing this, we run the fixed effects regressions and observe that the treatment variable has a coefficient that is positive and significant at 10% level. In column 4 we remove all banks in the control group that are below the 5^{th} percentile in terms of the difference of the equity to assets ratio between the last pre-treatment year and the first post-treatment year. Again, the fixed effects regression gives a positive and significant coefficient for the treatment variable. This gives us confidence that the effect that we observe is not triggered by a specific group of Italian banks increasing drastically their equity or by a group of banks in the control group that have experienced a large drop in their equity ratio. Finally, as shown in table 2, banks still differ in

terms of size after doing the matching. As size is an important determinant of capital structure (Gropp and Heider, 2010; Lemmon et al., 2008) we address this potential bias by matching on total assets. We use a nearest neighbor matching method as described in section 3.2 but using total assets as the only variable to compute the propensity score. We match each Italian bank with the bank that has the closest propensity score in the control group. We do the matching with replacement. Banks that are not matched are removed. After this treatment, we are left with 281 banks in the control group. Banks in the treatment group have an average size before the treatment of $ 2.15 billion and banks in the control group $ 2.96 billion. We do a t-test to test for the statistical significance of this difference. The p-value of this test is 0.15 which allows us to reject that both samples statistically differ in terms of size. In column 5 we run the regression using the matched sample. The treatment coefficient remains positive and statistically significant at 5% level of confidence which reassures us on the fact that the difference in size that we find in table 2 does not change our interpretation of the results.

4.5 Reversal of the ACE

After the general elections in 2001 the new government taking office in Italy decided to undertake a tax reform and repeal the ACE. The ACE was not longer applicable to banks as from the fiscal year 2002. In Table 7 we provide some evidence on the response of Italian banks to the repeal in terms of their equity ratios. For this analysis we keep the sample of matched banks used in Table 3 and redo the baseline regressions. The regressions in this table cover the period 2000-2003. The treatment variable *ACE rev.* takes the value one for Italian banks after the ACE is repealed (2002 and 2003) and zero otherwise. In columns 1 to 5 the dependent variable is the equity to assets ratio. In column 1 we run a fixed effect regression of the equity ratio on the same subset of bank-specific and macroeconomic variables that we use before. The variable *post* is a dummy that takes the value one for the years 2002 and 2003 and zero otherwise. The coefficient of interest (*ACE rev.)* gives us a negative and significant

coefficient equal to 0.7. This coefficient indicates that Italian banks reduce their equity ratio relative to the control group by 70 basis points after the ACE is repealed. These results provide evidence that the positive effect of the ACE on bank equity ratio reverses once the incentive that originated that increase is removed. Bank capital is adjusted downwards providing empirical evidence of the absence of a hysteresis in bank capital. In column 2 we run the same regression than in column one but clustering the standard errors at country level. We obtain the same significance for the treatment variable's coefficient that we get in column 1.

In columns 3, 4 and 5 we control for risk adding the non-performing loans ratio, the annual growth of lending and the loan loss provision ratio as control variables. The results remain in line with the ones in prior columns. In column 6 we use the logarithm of the equity ratio as dependent variable to interpret the coefficient as a percentage change in the ratio after the ACE is repealed. This result tells us that the ratio decreases 4.4% percent from its prior level relative to the control group. In column 7 we use the natural logarithm of common equity as dependent variable. The coefficient of the treatment variable is non-significant and very close to zero. This provides evidence that banks became more reluctant to use more equity financing once the ACE is removed. The reversal of the equity ratio is then due to the fact that banks increased debt after the ACE was withdrawn. In column 8 we show that collapsing the variables on the average gives similar negative and significant treatment coefficient in line with previous columns.

4.6 Heterogeneous effects after the repeal of the ACE

If the heterogeneity in the response to the introduction of the ACE is true, then we should observe the same heterogeneous effect once it is repealed. To be consistent with what we do in table 5, in table 8 we split the sample of Italian banks between larger (top group) and

smaller (bottom group) using the median of total assets in 1997. We use a dummy for banks in each group. Then we use an interaction term with the treatment variable and each group variables.

In columns one, two and three we regress the equity ratio on those interaction terms plus a subset of control variables. In column 1 we split the sample between better and worse capitalized banks using the equity to assets ratio in 1997. These treatment coefficients show distinct results. Better capitalized banks reduce their equity ratios downwards while the coefficient *ACE rev x Bottom* is not statistically significant. This distinct result should not be interpreted as if our results in table 5 are not robust. In fact, observing a downward reaction only from better capitalized banks is in line with the fact that worse capitalized banks cannot easily adjust their capital ratios downwards since they are closer to the binding minimum regulatory level after a tax change (Schandlbauer, 2016). In column 2 we split the sample between larger and smaller banks using the total size of each bank in 1997. The treatment coefficients are negative and highly significant for both larger and smaller Italian banks. However, we observe that the coefficient for smaller banks (-0.92) almost doubles the one for larger banks (-0.49) being this difference statistically significant at 1% level. This is consistent with our previous findings. In table 5 we show that mainly smaller banks' equity ratios react to the introduction of the ACE. Now, we see a much stronger negative reaction from smaller banks once the ACE is repealed. Indeed, in column 3 once we retreat our sample by removing all Italian banks that have a value equal to zero for the variable tax expense in Bankscope every year between 1997 and 2001, we find that the treatment coefficient is only significant for smaller banks.

In order to be consistent with our analysis in table 5, in columns 4 and 5 we test whether the response after the repeal of the ACE is driven by a group of credit-cooperatives banks contaminating our results. We observe that it is not the case as once we remove credit

cooperatives, the results are still significant for smaller commercial banks. In column 4 proceed as in column 4 of table 5 keeping the same Italian commercial banks with total assets below or equal to €1 billion and the matched euro area banks. The treatment coefficient is equal to -0.96 and highly significant. This number is very close to the coefficient found for smaller banks in the regression in column 2. In column 5 we proceed as in column 5 of table 5 keeping the same Italian commercial banks with total assets above €1 billion and the matched euro area banks. As expected, the result shows that larger commercial banks did not respond to the repeal of the reform. The coefficient of the variable *ACE rev* in the DID regression is not statistically significant.

This set of results reassures us on the fact that only smaller banks reacted to both the implementation and withdrawal of the ACE mechanism as the results in table 5 and 8 are qualitatively similar for all regressions.

4.7 Falsification test

In table 8 we check the internal validity of our model estimating the treatment effect on a placebo treatment variable. We run the placebo test using the period 2004-2007. In these regressions we assume that the ACE reform took place in 2006 instead of 2000. The treatment variable *ACE placebo* takes the value one for Italian banks in 2006 and 2007 and zero otherwise. The variable *post* takes the value one for 2006 and 2007 and zero otherwise. Our placebo pre-treatment period is 2004-2005 and the post-treatment period is 2006-2007. In column one we run a fixed effects regression of the equity ratio on the usual bank-specific and macroeconomic variables. As the treatment did not occurred in 2006 the *ACE placebo* variable is not statistically significant in any of the regressions.

This result gives us some confidence on the validity of our prior results. Not only because the placebo tests gives further support to the validity of the DID test, but also because it

removes the possibility that changes in interest rates are driving our results on the equity ratio. Between April 1999 and October 2000 the ECB gradually increased its benchmark interest rate from 2.5% to 4.75%. A similar increase took place between December 2005 and December 2006 when the ECB benchmark interest rate was increased from 2% to 3.50%. The fact that we do not find a significant change in equity ratios of Italian banks in another period with a drastic increase in interest rates indicates that the observed changes in equity ratios, both upwards and downwards are unlikely to be driven by changes in monetary policy. Nonetheless, in table A.1 of the appendix we run the regressions in column 1 of tables 3 and 7 adding the lagged value of short term interest rates as a control variable[18]. Adding this variable does not change our previous results.

5. Conclusions

The existence of an unequal tax treatment of debt and equity has been identified as one of the factors explaining leverage in the banking sector. Recent empirical evidence reveals that this tax distortion affects bank capital structure. Our paper contributes to this literature on by exploiting an exogenous variation in the Italian corporate tax system where a tax shield on incremental equity was introduced for banks in 2000. This reform reduces the tax distortion between equity and debt financing which should make banks more prone to increase bank capital.

Using a difference-in-difference set-up we reveal that the introduction of a tax shield on incremental equity leads to an increase in capital ratios for Italian banks. We document that Italian banks increase their equity to assets ratios by 44 basis points relative to the control group after the introduction of the equity tax shield. Moreover, we show that when this measure is withdrawn equity ratios fall significantly. Once the ACE mechanism is no longer

[18] Adding the contemporary value of the variable short term interest rates does not change our previous results either.

applicable, banks readjust their equity ratios downwards by 0.7 percentage points (on average) relative to banks in the control group.

Our results provide evidence of the absence of hysteresis in bank capital. The increase in capital ratios that we observe upon the introduction of a tax incentive does not survive a reversal of the measure. This differs from the effect of corporate tax rate changes on leverage for non-financial firms (Heider and Ljungqvist, 2015) and banks (Milonas, 2016).

The results of our paper also complement the results of Schepens (2016) for Belgium. However, as the implementation of the ACE scheme in Italy differs significantly from the one in Belgium, the size of the impact is difficult to compare. Nonetheless, as Schepens shows we observe that eliminating the tax distortion against equity can contribute to create buffers in the upside of the economic cycle.

Additional tests reveal that merely smaller banks react to the introduction of the equity tax shield**.** This heterogeneous effect can be explained by the ability of larger banks to exploit international tax differences, given the existence of subsidiaries abroad. Therefore, a tax change at a local level seems to be insufficient to incentivize a change in larger banks' capital level.

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Table 1: Summary statistics after matching for the 2000 ACE

This table shows the summary statistics for the sample period 1998-2001 after matching. The matched sample includes 740 banks. 459 are Italian banks and 281 are banks form other euro area countries.

98-2001	Variables	N	mean	sd	P1	P50	P99
Matched sample	Equity/Assets	2960	11.46	5.23	3.32	10.59	28.37
	Ln(Total Assets)	2960	6.31	1.82	3.57	5.98	10.82
	Ln(Equity)	2960	4.03	1.61	1.33	3.77	7.85
	RoA	2960	0.76	0.69	-0.77	0.67	2.63
	Loan ratio	2960	54.60	18.25	4.68	56.32	91.92
	Nii ratio	2960	26.00	14.22	-6.20	25.00	74.78
	NPL ratio	1196	3.22	3.35	0.10	2.01	17.58
	LLP ratio	2905	0.33	0.45	-0.35	0.24	2.16
	Loan Growth	2941	11.01	13.11	-35.18	11.15	48.81
	Ln(Sd RoA)	2446	-2.63	2.26	-9.21	-2.22	0.37
	Ln(Z-Score)	2444	4.80	1.72	1.74	4.53	9.48
	Ln((Retained Earnings)	1566	1.26	1.20	0.23	0.93	5.12
	GDPpc growth	2960	2.36	1.01	0.96	1.72	4.41
	Inflation	2960	2.02	0.74	0.53	1.96	3.59
	Ln(GDPpc)	2960	10.33	0.13	9.83	10.34	10.59

Table 2: Matching: Propensity score test results for the 2000 ACE

This table compares the features between the matched and unmatched sample before the treatment. Unmatched sample is the sample of banks before applying the matching and matched sample after the matching is done. Column 1 is the mean of each variable for Italian banks (treated group). Column 2 is the mean of the variables for non-Italian banks (control group). Column 3 shows the p-values for the significance of the difference in means. The parallel trend test (A) covers the period '97-'99. The panel at the bottom (B) compares pair wise the means of each variable before the treatment (1999). Nearest-neighbor matching is done with replacement using the propensity score for each bank in the control group. Each treated bank is matched with the 3 closest banks in the control group using the propensity score matching. Non-matched banks are removed.

Number of banks	Unmatched Matched	N=459 N=459	N=1630 N=281	
Variable		**Mean Treated Group**	**Mean Control Group**	**Difference p-value**
		(1)	**(2)**	**(3)**
A) Parallel trend test				
ΔEquity/Total Assets	Unmatched	0.21	0.07	0
	Matched	0.21	0.18	0.53
B) Pair wise mean comparison				
Ln (Total Assets)	Unmatched	5.8	6.85	0
	Matched	5.8	7.03	0
RoA	Unmatched	0.64	0.35	0
	Matched	0.64	0.71	0.26
Loan ratio	Unmatched	54.02	57.57	0
	Matched	54.02	54.76	0.63
Nii ratio	Unmatched	23.30	25.68	0
	Matched	23.30	27.33	0
LLP ratio	Unmatched	0.28	0.31	0.16
	Matched	0.28	0.31	0.36

Table 3: Baseline regressions for the 2000 ACE

This table documents the change of banks' capital structure after the introduction of the equity tax shield in 2000. These are the results of estimating equation 1. In columns 1 to 5 the dependent variable is the equity to assets ratio. In column 6 the dependent variable is the natural log of the equity to assets ratio, in column 7 we use the logarithm of common equity. In column 8 we compare the average of the equity over assets ratio over the pre-treatment period (1998-1999) and over the post-treatment period (2000-2001) between the treatment and control groups. The sample period is 1998-2001 (2000 and 2001 are the post-treatment years). The variable of interest is ACE that is dummy taking the value 1 for Italian banks after 1999 and zero otherwise. All regressions are done using the sample of matched banks. Bank and year fixed effects as well as the cluster level of standard errors are indicated in the table.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Equity/Assets	Equity/Assets	Equity/Assets	Equity/Assets	Equity/Assets	Ln(Equity/Assets)	ln(Equity)	Average(Equity/Assets)
ACE (treat x post)	**0.443*** **	**0.443*** **	**0.854*** **	**0.289***	**0.399*** **	**0.027***	**0.032*** **	**0.565*** **
	(0.148)	**(0.128)**	**(0.281)**	**(0.173)**	**(0.143)**	**(0.015)**	**(0.013)**	**(0.278)**
Ln (Total Assets)	-2.261***	-2.261***	-3.188***	-2.243***	-2.276***	-0.167***	0.439***	-4.777***
	(0.581)	(0.551)	(0.879)	(0.667)	(0.605)	(0.048)	(0.051)	(0.682)
RoA	0.109	0.109	-0.074	0.107	0.125*	0.008	0.026***	0.432**
	(0.076)	(0.094)	(0.111)	(0.096)	(0.072)	(0.008)	(0.007)	(0.179)
Loan ratio	-0.022**	-0.022***	-0.026**	-0.019	-0.025***	-0.002*	0.002**	0.003
	(0.010)	(0.005)	(0.010)	(0.012)	(0.010)	(0.001)	(0.001)	(0.012)
Nii ratio	0.003	0.003	-0.017**	0.001	0.001	0.000	0.000	0.009
	(0.005)	(0.005)	(0.008)	(0.005)	(0.005)	(0.000)	(0.000)	(0.010)
NPL ratio			-0.013					
			(0.038)					
Loan growth				-0.005				
				(0.005)				
LLP ratio					-0.003			
					(0.141)			
GDPpc growth	-0.429***	-0.429***	-0.349***	-0.411***	-0.437***	-0.038***	-0.022***	-0.692***
	(0.055)	(0.084)	(0.102)	(0.060)	(0.054)	(0.006)	(0.006)	(0.217)
Inflation	-0.166**	-0.166	-0.325	-0.127	-0.175**	-0.028***	-0.028***	-1.294***
	(0.080)	(0.131)	(0.209)	(0.086)	(0.080)	(0.009)	(0.009)	(0.393)
Ln(GDPpc)	15.011***	15.011**	21.354***	12.914**	16.070***	1.539***	2.254***	10.908
	(4.395)	(5.647)	(4.740)	(5.162)	(4.429)	(0.417)	(0.420)	(10.431)
post	-0.254	-0.254	-1.019***	-0.130	-0.241	-0.024	-0.021	1.337**
	(0.164)	(0.187)	(0.286)	(0.188)	(0.166)	(0.017)	(0.017)	(0.527)
Constant	-126.826***	-126.826**	-183.236***	-105.403**	-137.484***	-12.293***	-21.954***	-68.416
	(42.231)	(55.076)	(45.100)	(49.555)	(42.455)	(4.084)	(4.108)	(104.908)
Observations	2,960	2,960	1,036	2,698	2,895	2,960	2,960	1,480
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster SE	Bank	Country	Bank	Bank	Bank	Bank	Bank	Bank
Adj. R-squared	0.079	0.079	0.118	0.086	0.084	0.047	0.395	0.227

Robust standard errors in parentheses clustered as indicated *** p<0.01, ** p<0.05, * p<0.1

Table 4: Other balance sheet subcomponents and risk

This table analyzes different balance sheet components (columns 1 and 2) and risk characteristics (columns 3 to 6) around the tax change in 2000. In column one we test the change in total assets before and after the introduction of the ACE. In column 2 the dependent variable is the natural logarithm of the retained earnings. As data for this variable is available for the majority of banks in the treatment group but only for 33 banks in the control group we only analyze the evolution of retained earnings before and after the treatment for the Italian banks (in this case the treatment variable is post). In columns 3 to 6 we analyze the evolution of some risk characteristics around the tax change. We proceed in column 3 as in column 2 and we analyze how the Non-Performing loans ratio evolves before and after the tax change for Italian banks. The data for the NPL ratio is scarce for banks in the control group but is available for most of the Italian banks. The dependent variable used in column 4 is the natural logarithm of the standard deviation of the RoA (as a measure of the earnings volatility) and in column 5 is the natural logarithm of the z-score (as a measure of bank stability). In column 6 we use the ratio of Loan Loss Provisions over total assets (as another measure of credit risk). Bank fixed effects as well as the cluster level of standard errors are indicated in the table.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Ln(Total Assets)	Ln(Retained Earnings)	NPL ratio	Ln(Sd-RoA)	Ln(Z-score)	LLP ratio
	Other B/S subcomponents			Risk characteristics		
ACE	**0.015**			**-0.104**	**0.072**	**-0.090*** **
	(0.011)			**(0.159)**	**(0.129)**	**(0.029)**
Post	0.127***	**0.088*** **	**-0.953*** **	0.051	-0.040	0.075***
	(0.010)	**(0.024)**	**(0.111)**	(0.128)	(0.102)	(0.024)
Constant	6.247***	1.091***	3.769***	-2.619***	4.800***	0.318***
	(0.003)	(0.012)	(0.064)	(0.046)	(0.038)	(0.007)
Observations	2,960	1,429	1,196	2,446	2,444	2,905
Bank FE	YES	YES	YES	YES	YES	YES
Cluster SE	Bank	Bank	Bank	Bank	Bank	Bank
Sample	Matched	Only Italian banks	Only Italian banks	Matched	Matched	Matched
Adj. R-squared	0.342	0.012	0.121	0.000	-0.001	0.007

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5: Heterogeneous effects

This table analyzes the existence of heterogeneous reactions around the tax change in 2000. In columns 1 (and 2) we test for the existence of heterogeneous responses to the introduction of the ACE between better and worse-capitalized banks (and large and small banks). We split the sample using the median of the equity ratio (total assets) in 1997. Those above the median are in the Top group and those below are in the Bottom group. We create an interaction term between our treatment variable, ACE and a dummy taking the value one for banks in the Bottom or Top group. In column 3 we remove from the sample all Italian banks that have a value equal to zero for the variable tax expense in bankscope every year between 1997 and 2001 and redo the matching using this sample. In column 4 we remove all Italian banks that are credit cooperatives and keep all Italian commercial (non-cooperative) banks with a maximum value of total assets below €1 billion and redo the matching. In column 5 we remove all Italian banks that are credit cooperatives and keep all Italian commercial (non-cooperative) banks with a maximum value of total assets above €1 billion. Then we redo the matching. Bank fixed effects as well as the cluster level of standard errors are indicated in the table.

VARIABLES	(1)	(2)	(3)	(4)	(5)
			Dep. Var. Equity/Assets		
Split :	By Equity/Assets	By Total Assets	By Total Assets	Commercial Banks (<€1 bill TA)	Commercial Banks(>€1 bill TA)
ACE x Bottom	**0.434*** **	**0.655*** **	**0.433** **		
	(0.153)	**(0.160)**	**(0.190)**		
ACE x Top	**0.455*** **	**0.258**	**-0.111**		
	(0.171)	**(0.160)**	**(0.172)**		
ACE				**0.640** **	**-0.240**
				(0.326)	**(0.183)**
Ln (Total Assets)	-2.260***	-2.241***	-2.471***	-3.824***	-1.924***
	(0.582)	(0.580)	(0.464)	(1.205)	(0.489)
RoA	0.111	0.140*	0.335**	0.398	0.143
	(0.078)	(0.077)	(0.155)	(0.423)	(0.129)
Loan ratio	-0.022**	-0.023**	-0.028**	-0.048**	-0.019
	(0.010)	(0.010)	(0.013)	(0.024)	(0.013)
Nii ratio	0.003	0.003	0.004	0.006	-0.002
	(0.005)	(0.005)	(0.007)	(0.017)	(0.007)
GDPpc growth	-0.429***	-0.431***	-0.326***	-0.389**	-0.188***
	(0.055)	(0.055)	(0.063)	(0.167)	(0.072)
Inflation	-0.166**	-0.166**	-0.208***	-0.192	-0.023
	(0.080)	(0.079)	(0.077)	(0.134)	(0.069)
Ln(GDPpc)	15.015***	15.024***	15.935***	21.378***	11.022***
	(4.396)	(4.392)	(3.313)	(6.100)	(3.559)
Post	-0.254	-0.255	-0.135	-0.572**	-0.044
	(0.164)	(0.164)	(0.135)	(0.234)	(0.148)
Constant	-126.870***	-127.084***	-134.193***	-183.814***	-87.942**
	(42.251)	(42.205)	(32.325)	(60.238)	(34.756)
Observations	2,960	2,960	2,072	588	1,336
Bank FE	YES	YES	YES	YES	YES
Cluster SE	Bank	Bank	Bank	Bank	Bank
Sample	Matched	Matched	Tax >0	Commercial <1billion TA+Control	Commercial>1 billion TA+Control
Adj. R-squared	0.079	0.084	0.094	0.098	0.063

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6: Robustness tests

This table shows the robustness tests for the previous results. In column 1we redo the matching (for the pre-treatment period) using 1 matched bank (neighbor) instead of 3 and the same variables that we use in table 2 for the computation of the propensity score. In column 2 we redo the matching (for the pre-treatment period) using 5 matched banks (neighbors) instead of 3 and the same variables that we use in table 2 for the computation of the propensity score. In column 3 we remove all banks in the Italian group whose equity ratio growth between the last pre-treatment year and the first post-treatment year is above the 95th percentile. In column 4 we remove all banks in the control group whose equity ratio growth between the last pre-treatment year and the first post-treatment year is below the 5th percentile. In column 5 we match on size using the banks with the closest propensity score. Bank fixed effects as well as the cluster level of standard errors are indicated in the table. All control variables are lagged one period.

VARIABLES	(1) Equity/Assets	(2) Equity/Assets	(3) Equity/Assets	(4) Equity/Assets	(5) Equity/Assets
	1 neighbor	5 neighbors	Remove treated banks if ratio growth >p 95	Remove control banks if ratio growth <p 5	Matching on Total Assets
ACE (treat x post)	**0.639*** **	**0.396*** **	**0.283***	**0.273** **	**0.277** **
	(0.199)	**(0.134)**	**(0.148)**	**(0.139)**	**(0.121)**
Ln (Total Assets)	-2.632***	-2.182***	-2.379***	-2.005***	-1.950***
	(0.691)	(0.541)	(0.601)	(0.606)	(0.407)
RoA	0.113	0.107	0.063	0.124	0.125
	(0.079)	(0.075)	(0.080)	(0.077)	(0.086)
Loan ratio	-0.028**	-0.020**	-0.018*	-0.022**	-0.022**
	(0.011)	(0.009)	(0.010)	(0.010)	(0.010)
Nii ratio	0.004	0.003	0.006	0.001	0.001
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
GDPpc growth	-0.436***	-0.414***	-0.433***	-0.415***	-0.402***
	(0.066)	(0.051)	(0.056)	(0.054)	(0.052)
Inflation	-0.248**	-0.160**	-0.170**	-0.206***	-0.207***
	(0.119)	(0.068)	(0.081)	(0.078)	(0.050)
Ln(GDPpc)	17.654***	13.792***	15.178***	14.743***	15.098***
	(5.942)	(3.965)	(4.489)	(4.527)	(2.914)
Post	-0.452*	-0.196	-0.263	-0.111	-0.142
	(0.234)	(0.142)	(0.166)	(0.159)	(0.093)
Constant	-151.082***	-115.224***	-128.096***	-125.683***	-131.975***
	(57.364)	(38.036)	(43.083)	(43.353)	(28.996)
Observations	2,512	3,196	2,868	2,900	2,960
Bank FE	YES	YES	YES	YES	YES
Cluster SE	Bank	Bank	Bank	Bank	Bank
Adj. R-squared	0.093	0.076	0.087	0.082	0.092

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7: Reversal of the ACE in 2002

This table documents the change of banks' capital structure after the ACE scheme is repealed in 2002. These are the results of estimating equation 1 for the sample period 2000-2003. In columns 1 to 5 the dependent variable is the equity to assets ratio. In column 6 the dependent variable is the natural log of the ratio equity to assets and in column 7 we use the logarithm of common equity. In column 8 we compare the average of the equity to assets ratio between the treatment and control groups over the period during which the ACE is applicable (2000-2001) and after the ACE is repealed (2002-2003). The variable of interest is *ACE rev*. that is dummy taking the value 1 for Italian banks in 2002 and 2003, and zero otherwise. We do these regressions using the matched sample of banks (as in table 3). All regressions are done using the sample of matched banks. Bank and year fixed effects as well as the cluster level of standard errors are indicated in the table.

VARIABLES	(1) Equity/Assets	(2) Equity/Assets	(3) Equity/Assets	(4) Equity/Assets	(5) Equity/Assets	(6) Ln(Equity/Assets)	(7) Ln(Equity)	(8) Average(Equity/Assets)
ACE rev.	**-0.708*** **	**-0.708*** **	**-0.697*** **	**-0.722*** **	**-0.687*** **	**-0.044*** **	**-0.001**	**-0.696*** **
	(0.142)	**(0.080)**	**(0.183)**	**(0.142)**	**(0.140)**	**(0.014)**	**(0.013)**	**(0.255)**
Ln (Total Assets)	-3.023***	-3.023***	-3.678***	-2.945***	-3.172***	-0.299***	0.294***	-3.192***
	(0.521)	(0.436)	(0.730)	(0.580)	(0.527)	(0.052)	(0.043)	(1.087)
RoA	0.375***	0.375***	0.280*	0.381***	0.336***	0.033***	0.050***	0.537***
	(0.096)	(0.107)	(0.154)	(0.098)	(0.087)	(0.008)	(0.008)	(0.168)
Loan ratio	-0.026***	-0.026**	-0.040***	-0.022**	-0.026***	-0.003***	0.000	-0.032*
	(0.008)	(0.009)	(0.010)	(0.010)	(0.008)	(0.001)	(0.001)	(0.017)
Nii ratio	-0.001	-0.001	-0.007	-0.001	-0.001	-0.000	-0.000	-0.009
	(0.006)	(0.003)	(0.007)	(0.006)	(0.006)	(0.001)	(0.000)	(0.027)
NPL ratio			-0.061					
			(0.048)					
Loan growth				-0.004				
				(0.005)				
LLP ratio					-0.144			
					(0.166)			
GDPpc growth	-0.304***	-0.304***	-0.202***	-0.306***	-0.302***	-0.032***	-0.031***	-0.146
	(0.042)	(0.054)	(0.070)	(0.042)	(0.043)	(0.005)	(0.005)	(0.219)
Inflation	0.367***	0.367	0.133	0.375***	0.361***	0.037***	0.013	0.104
	(0.131)	(0.211)	(0.244)	(0.133)	(0.135)	(0.012)	(0.011)	(0.389)
Ln(GDPpc)	-4.014	-4.014	1.808	-4.769	-3.325	-0.134	1.798***	-2.923
	(3.676)	(3.171)	(6.137)	(4.333)	(3.753)	(0.359)	(0.364)	(8.353)
post	-0.068	-0.068	0.247	-0.067	-0.075	-0.025*	-0.053***	0.276
	(0.146)	(0.154)	(0.228)	(0.146)	(0.149)	(0.015)	(0.016)	(0.603)
Constant	73.359**	73.359**	18.881	80.442*	67.151*	5.756*	-16.309***	63.852
	(35.474)	(31.678)	(59.450)	(41.588)	(36.238)	(3.457)	(3.548)	(83.581)
Observations	2,801	2,801	1,298	2,785	2,753	2,801	2,801	1,436
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Cluster SE	Bank	Country	Bank	Bank	Bank	Bank	Bank	Bank
Adj. R-squared	0.206	0.206	0.273	0.207	0.204	0.152	0.323	0.261

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 8: Heterogeneous effects - Reversal of the ACE in 2002

This table analyzes the existence of heterogeneous reactions around the repeal of the ACE scheme in 2002. In columns 1 (and 2) we test for the existence of heterogeneous responses to the repeal of the ACE between better and worse-capitalized banks (and large and small banks). We split the sample using the median of the equity ratio (total assets) in 1997. Those above the median are in the Top group and those below are in the Bottom group. We create an interaction term between our treatment variable, *ACE rev* and a dummy taking the value one for banks in the Bottom or Top group. In column 3 we remove from the sample all Italian banks that have a value equal to zero for the variable tax expense in bankscope every year between 1997 and 2001 and redo the matching using this sample. In column 4 we remove all Italian banks that are credit cooperatives and keep all Italian commercial (non-cooperative) banks with a maximum value of total assets below €1 billion and redo the matching. In column 5 we remove all Italian banks that are credit cooperatives and keep all Italian commercial (non-cooperative) banks with a maximum value of total assets above €1 billion. Then we redo the matching. Bank fixed effects as well as the cluster level of standard errors are indicated in the table

VARIABLES	(1)	(2)	(3)	(4)	(5)
			Dep. Var. Equity/Assets		
Split :	By Equity/Assets	By Total Assets	By Total Assets	Commercial Banks (<€1 bill TA)	Commercial Banks(>€1 bill TA)
ACE rev x Bottom	**-0.210**	**-0.922*** **	**-1.158*** **		
	(0.165)	**(0.138)**	**(0.159)**		
ACE rev x Top	**-1.181*** **	**-0.493*** **	**-0.049**		
	(0.137)	**(0.170)**	**(0.214)**		
ACE rev				**-0.959*** **	**-0.023**
				(0.230)	**(0.234)**
Ln (Total Assets)	-3.047***	-2.970***	-2.592***	-3.999***	-1.306**
	(0.514)	(0.514)	(0.572)	(1.037)	(0.610)
RoA	0.334***	0.366***	0.465**	-0.005	0.744***
	(0.095)	(0.095)	(0.193)	(0.251)	(0.250)
Loan ratio	-0.025***	-0.027***	-0.021**	-0.036**	-0.009
	(0.008)	(0.008)	(0.010)	(0.018)	(0.012)
Nii ratio	-0.000	-0.001	0.001	-0.000	-0.002
	(0.006)	(0.006)	(0.008)	(0.015)	(0.008)
GDPpc growth	-0.302***	-0.302***	-0.263***	-0.302***	-0.266***
	(0.041)	(0.041)	(0.050)	(0.102)	(0.064)
Inflation	0.369***	0.368***	0.355**	0.239	0.364***
	(0.131)	(0.131)	(0.159)	(0.309)	(0.137)
Ln(GDPpc)	-4.089	-4.175	-4.094	3.392	-1.921
	(3.640)	(3.648)	(4.428)	(10.284)	(4.597)
Post	-0.062	-0.065	-0.018	0.025	-0.157
	(0.145)	(0.145)	(0.161)	(0.252)	(0.202)
Constant	74.209**	74.686**	72.072*	2.214	39.405
	(35.161)	(35.227)	(42.657)	(102.176)	(44.638)
Observations	2,801	2,801	1,943	507	1,267
Bank FE	YES	YES	YES	YES	YES
Cluster SE	Bank	Bank	Bank	Bank	Bank
Sample	Matched	Matched	Tax >0	Commercial <1billion TA+Control	Commercial>1 billion TA+Control
Adj. R-squared	0.232	0.211	0.163	0.145	0.106

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 9: Placebo test

This table depicts the results of the falsification tests. We assume that the treatment took place in 2006 instead of 2000. We consider the matched sample of other EU banks and Italian for this analysis used in table 5 for which there is information available between 2003 and 2007. The variable *ACE placebo* takes the value 1 if the bank is Italian and the years 2006 and 2007 and 0 otherwise. *Post* takes the value 1 after 2005 and zero otherwise. Control variables are lagged 1 year.

VARIABLES	(1) Equity/Assets
ACE placebo (treat x post)	**0.089**
	(0.140)
Ln (Total Assets)	-1.892***
	(0.369)
RoA	0.347***
	(0.073)
Loan ratio	-0.006
	(0.007)
Nii ratio	0.004
	(0.004)
GDPpc growth	0.180***
	(0.065)
Inflation	-0.181
	(0.111)
Ln(GDPpc)	-8.707
	(5.658)
post	0.287**
	(0.133)
Constant	113.727**
	(57.654)
Observations	2,357
Bank FE	YES
Cluster SE	Bank
Sample	Placebo
Adj. R-squared	0.083

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix A

Figure 1. Evolution of the equity ratio before and after the reform in 2000 and its repeal in 2002

Each bar represents the mean annual changes in the equity ratio around the tax reform in 2000 and its repeal in 2002. The figure plots the difference of the mean annual change of the equity ratio between the treatment and the control group. The sample used is the matched sample of banks. Positive values mean that on average the equity ratio of Italian banks grows more than the control group relative to the year before. Negative values mean that on average the equity ratio of Italian banks grows less (or decreases more) than the control group relative to the year before. The significance of the difference in means of the year-on-year growth of the equity ratio between the treatment and control group is shown right below or above each bar. 2000 is the first year in which the equity tax shield is applicable to banks in Italy and 2002 is the first year in which the reform is no longer applicable to banks.

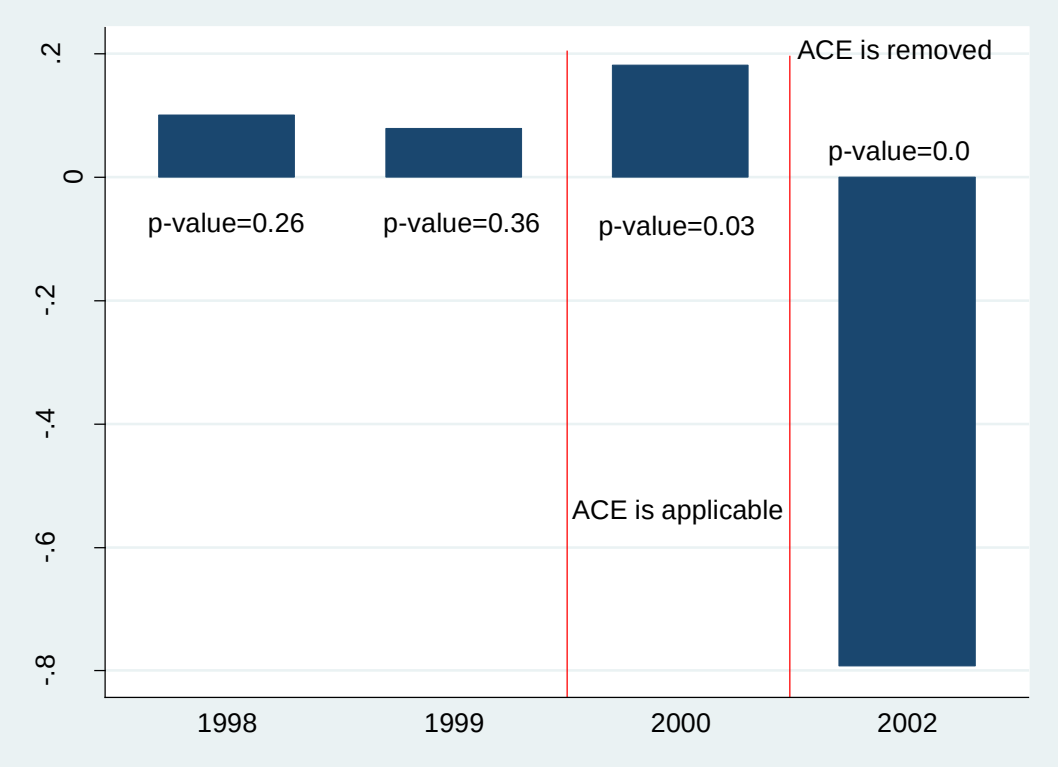

Figure 2. Evolution of the equity ratio for Italian banks between 1997 and 2003.

The blue line represents the evolution of the mean equity ratio for whole sample of Italian banks available in Bankscope between 1997 and 2003. The period between the two red lines the ACE scheme was applicable (in 2000 and 2001) and after the second red line, the ACE scheme is no longer applicable (2002 and 2003). The number of banks each year is: 594 in 1997, 588 in 1998, 642 in 1999, 626 in 2000,661 in 2001, 632 in 2002 and 622 in 2003. The equity to total assets ratio is winsorized at the 1 and 99 percent levels.

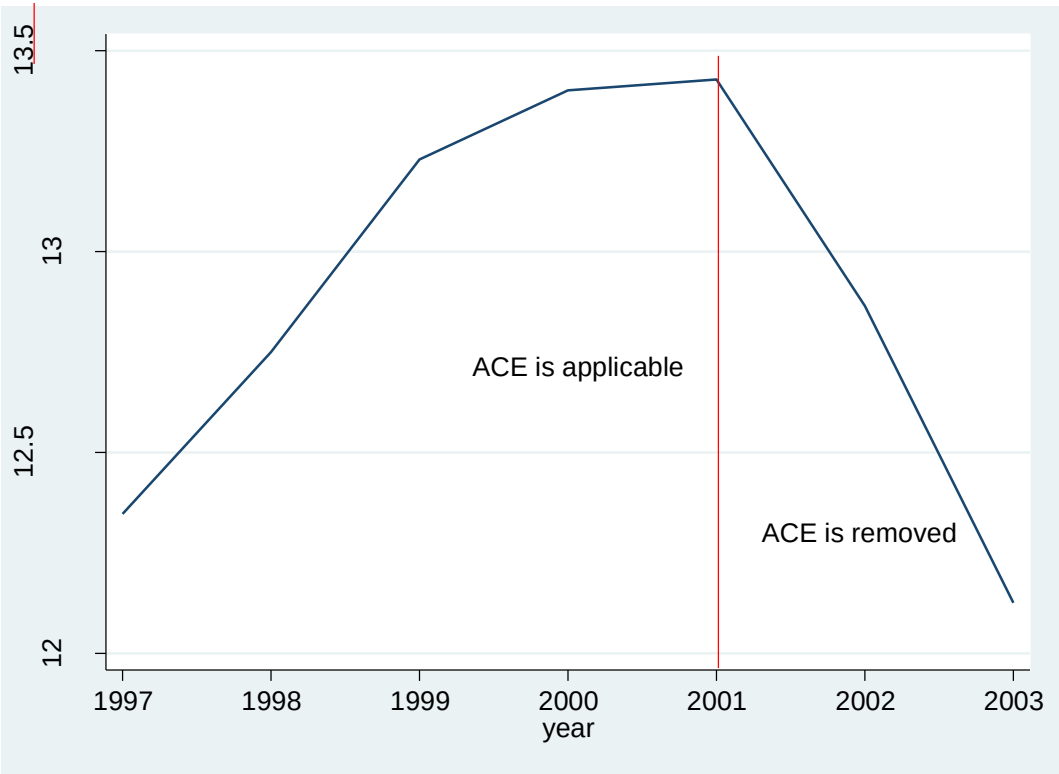

Table A.1: Including short term interest rates

This table depicts the results for the same regressions that we do in column 1 of tables 3 and 7 including the lagged annualized short term interest rate as an additional control variable.

VARIABLES	(1) Equity/Assets	(2) Equity/Assets
ACE (treat x post)	**0.410****	**-0.716*****
	(0.163)	**(0.142)**
Ln (Total Assets)	-2.690***	-3.013***
	(0.432)	(0.524)
RoA	0.110	0.371***
	(0.076)	(0.098)
Loan ratio	-0.024**	-0.026***
	(0.010)	(0.008)
Nii ratio	0.002	-0.002
	(0.005)	(0.006)
GDPpc growth	-0.422***	-0.318***
	(0.069)	(0.055)
Inflation	-0.174*	0.297*
	(0.092)	(0.169)
Ln(GDPpc)	17.157***	-3.895
	(3.345)	(3.634)
ST interest rate	**-0.024**	**0.062**
	(0.046)	**(0.128)**
post	-0.311**	-0.061
	(0.130)	(0.144)
Constant	-145.983***	71.995**
	(33.400)	(34.990)
Observations	2,948	2,801
Bank FE	YES	YES
Cluster SE	Bank	Bank
Sample	Matched	Matched
Adj. R-squared	0.093	0.206

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A.2: Number of banks per country in the matched sample

Country	Number of banks
AUSTRIA	26
BELGIUM	9
FRANCE	75
GERMANY	95
GREECE	5
ITALY	459
LUXEMBOURG	6
NETHERLANDS	4
PORTUGAL	5
SPAIN	56
Total	740

Table A.3: Variable definitions and data sources

The table shows the description, unit of measure and source of the variables used throughout the paper.

Variable name	Description	Source
Equity/Assets	Ratio of equity over total assets	Bankscope
Ln(Total Assets)	Natural logarithm of total assets	Bankscope
Ln(Equity)	Natural logarithm of common equity	Bankscope
RoA	Net income over total assets	Bankscope
Loan ratio	Total loans over total assets	Bankscope
Nii ratio	Non-interest income over total revenues	Bankscope
NPL ratio	Non –performing loans over total loans	Bankscope
LLP ratio	Loan loss provision over total assets	Bankscope
Loan Growth	100 multiplied by the natural log of the ratio loans to loans lagged one year	Bankscope
Ln(Sd RoA)	Natural logarithm of the standard deviation of the RoA over 3 years	Bankscope
Ln(Z-Score)	Natural logarithm of the Z-score. The Z-score is computed as follows: (Equity/Assets + RoA)/ Sd RoA)	Bankscope
Ln((Retained Earnings)	Natural logarithm of the retained earnings	Bankscope
GDPpc growth	Annual growth of the GDP per capita	WDI – World Bank
Inflation	Annual growth of the CPI index	WDI – World Bank
Ln(GDPpc)	Natural logarithm of the GDP per capita	WDI – World Bank
ST interest rate	Annualized short term interest rate for each country	OECD statistics