Hidden Effects Of Bank Recapitalizations

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Abstract

The aim of this paper is to investigate the effects of bank recapitalization on profitability (ROE, ROA, net interest income), specialization in the traditional banking activity (loans, loss reserves, write-offs on loans) and the degree of interconnectedness with the banking system (systemic risk). For a sample of SEO operations conducted by European banks between January 2002 and December 2014, we find that recapitalizations improve the precautionary interventions put in place by banks against losses in the credit portfolio but at the same time reduce the degree of profitability and the specialization in the traditional activity. Interestingly, recapitalizations have a strong and positive effect in the degree of interconnectedness with the financial system.

JEL classification code: G21, G34

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1. Introduction

After the recent financial crisis, regulators as well as governments believe that higher capitalization make banks sounder and more resilient (Basel Committee on Banking Supervision, 2009, 2010) and accordingly Basel III imposes higher capital requirements. Corporate finance theory tells us that a bank has disincentives to raise equity in the stock market (Jensen and Meckling, 1976; Myers, 1977; Kashyap et al., 2008), but bank regulators believe that, by having higher capital levels, a bank may be able to reduce its insolvency risk (i.e. enhancement of banks' survival probabilities) and to increase its loss absorbance capacity (Berger et al., 2012; and Berger et al., 2013). However the empirical literature on the effects of recapitalizations on other bank performance dimensions (including profitability, business model and systemic risk) is very limited. As a result, the net impact of recapitalizations remains ambiguous. Therefore, we investigate the existence of hidden effects associated with bank recapitalizations, if any.

A large and growing banking literature is devoted to bank capital, along three different streams: the market effects of bank recapitalizations, the effect of capital regulation on performance, and the determinants of bank recapitalization and its effect on profitability.

In the first stream, that is the most extensive, several studies investigate the market reaction to bank recapitalizations (Owens et al., 1999; Krishnan et al., 2010; Beltratti and Stulz, 2012; Elyasiani et al., 2014; Khan and Vyas, 2015). Owens et al. (1999) investigate bank privatizations that use public security offerings as the divestment mechanism. For 58 initial unseasoned and 34 seasoned offerings involving 65 banks from 12 high information economies and 13 emerging economies, they document significant positive average initial returns of 30.5% for investors, but find that seasoned issues are not significantly underpriced. Moreover, they document limited improvements in bank profitability, operating efficiency, leverage and non-interest revenue after privatization. Krishnan et al. (2010) study seasoned equity offerings (SEOs) by US banks over a period (1983-2005) in which monitoring and capital regulation have changed substantially, with the adoption of FDICIA being one important breakpoint. They find that SEOs by both undercapitalized and well-capitalized banks are fully discretionary, even before FDICIA, and determine similar and significantly negative stock price reactions. Elyasiani et al. (2014), for a sample of U.S. financial institutions over 2000-2009, examine the market effects of bank recapitalizations (SEOs as well as injections of government capital under the Troubled Asset Relief Program). They find that investors reacted negatively to the news of private market SEOs, but positively to TARP injections.

In the second stream, the focus is on the effects of higher capital requirements on bank performance and risk-taking behavior (Besanko and Kanatas, 1994; Acharya and Shin, 2009; Francis and Osborne, 2009; Kashyap et al., 2010; King, 2010; Admati and Pfleiderer, 2010;

Albertazzi and Marchetti, 2010; Admati et al., 2011; Angelini et al., 2011; Martynova, 2015). Nonetheless there are at least three ways to meet higher capital requirements: increasing equity, reducing the assets side and reducing lending to risky borrowers (in order to reduce RWA). This implies that such studies do not necessarily investigate the effects of bank recapitalizations, but instead capture the effects of the changes on the asset and lending side.

In the third stream, studies investigate the determinants of bank recapitalization (Khan and Vyas, 2015; Dinger and Vallascas, 2015) and their effects on profitability (Hutchison and Cox, 2007; Osborne et al., 2012). Khan and Vyas (2015) find that SEOs are disproportionately conducted by Capital Purchase Program (CPP) recipients and this is not explained by CPP recipients' economic and regulatory capital needs. They study all SEOs conducted by US banks between 1994 and 2010 and they find that, controlling for economic and regulatory capital determinants of SEOs, CPP recipients were more likely than non-recipients to have a SEO within four quarters subsequent to CPP receipt. SEO proceeds were used to repay CPP receipts without jeopardizing loan growth. Dinger and Vallascas (2015), for a sample of SEO issued by banks operating in G20 countries over 1993-2011, evaluate the role of bank undercapitalization on the decision to issue equity and find that the likelihood of issuing an SEO is generally higher in low capitalized banks. They also document that market mechanisms rather than capital regulation are the primary key driver of the decision to issue by low capitalized banks. As far as we know, scarce is the literature studying the effects of increasing equity on bank's performance. Hutchison and Cox (2007) examine the relationship between capital structure and profitability (ROE and ROA). For US banks over the relatively less regulated 1983–1989 period as well as the more highly regulated 1996–2002 period, the lower the level of capitalization with respect to debt, the higher the ROE. Also, the higher the level of capitalization, the higher the ROA. Osborne et al. (2012) examine the effect of capital ratios on bank profitability over economic cycles using data from the US banking sector from the late 1970s to the recent financial crisis of 2008-10. They show that the relationship is time-varying and heterogeneous across banks, depending on banks' actual capital ratios and how these relate to their optimal (i.e., profit-maximizing) capital ratios. Whilst the average relationship across banks is negative for most banks in most years, it turns less negative or positive under distressed market conditions. Banks with a surplus of capital relative to target exhibit a strongly negative relationship between capital and profitability, both in stressed and non-stressed conditions, implying that reducing capital may be the optimal strategy for these banks. They conclude that counter-cyclical variations in capital requirements envisaged under Basel III will need to be large in order to achieve macroprudential aims of smoothing credit cycles.

We contribute to the ongoing capital debate by assessing whether individual banks had improved their performance and had received hidden benefits through recapitalizations in the run up to the crisis and during the crisis period. The aim is to establish at the individual bank level whether recapitalization enhances bank performance and provides hidden benefits. To this end, in this paper, we estimate the effects of recapitalizations on a number of bank performance indicators, including: (i) profitability measures (*ROA, ROE and Net Interest Income*), (ii) business model (*Loans, Loan Reserves, Write Offs on Loans*), and (iii) systemic risk (*Systemic R.*).

An important issue that arises when attempting to estimate the effect of recapitalization on bank performance is that the choice to issue SEOs is endogenous; that is, banks determine whether they want to recapitalize and when. To address the self-selection issue regarding the endogeneity of the decision to recapitalize, two approaches commonly used are instrumental variables (IVs) and Heckman selection estimators. However, both approaches suffer from a number of issues[1]. Therefore we apply the propensity score matching (PSM) approach, in addition to IVs, to address the self-selection issue. To our knowledge, the latter has not been employed for SEOs in the past, and thus represents the key methodological contribution of our paper. Specifically, we estimate the recapitalization effect on the change in the performance of banks measured as the difference in outcomes before and after SEOs. Such a difference-in-differences matching strategy consists of a first difference removing the unobserved heterogeneity in trends and restoring conditional independence, and of a second difference producing the impact estimate of SEOs.

Our results suggest that SEOs reduce profitability (*ROA*, *ROE* and *Net Interest Income*) and lending activity, and increase loan reserves, and systemic risk in the year following the recapitalization. This evidence is validated across all model specifications for ROE, lending activity, loan reserves and systemic risk; with the propensity score matching for net interest income; and across all models, with the only exception of the IV specification, for ROA. Decreases in profitability (in all three specifications) and increases in loan write-offs and systemic risk persist over a period of three years following recapitalization events. The decrease in loan activity in the first year after a recapitalization is however followed by increases in the second and third years.

The decrease in ROE is consistent with both the debt-overhang and risk-shifting hypotheses (Acharya et al., 2011; Admati et al. 2012; Elyasiani et al. 2014; Gornall and Strebulaev, 2013). The decrease in loan activity in the year following recapitalizations implies that banks do not use the full

[1] The IV method requires the existence of at least one IV that determines the treatment and is unrelated to unobserved heterogeneity, but the choice of this instrument might create potential issues. While the Heckman selection estimator is more robust than the IVs estimator, it is more demanding on the assumptions about the structure of the model (Blundell and Dias 2000).

proceeds to provide loans. Alternative uses of the proceeds hence prevail in the short term. One alternative use for the proceeds is an increase in loan reserves which is confirmed by our empirical evidence: banks need to raise capital to be able to put aside higher loan reserves to be used to offset the write-off of bad loans. This may explain the unexpected decrease in ROA in the first year after the SEO that may be caused by larger write-offs made possible by the higher loan reserves created thanks to the proceeds of the recapitalizations. The unexpected decrease in ROA in the second and third years after the SEO may be caused by the reduction in the proportion of net income generated by the traditional banking activity with respect to all profitable assets. Interestingly, the fact that recapitalizations increase the contribution of banks to systemic risk implies that banks engaging in SEOs become not only the biggest losers in a crisis but also the biggest contributors to the crisis. One possible explanation is related to the acquisition of the SIFI (systemically important financial institution) status via recapitalizations: by raising more capital, banks increase their size and hence can get the hidden benefit of reaching a size that guarantees state protection especially during crisis (Laeven et al., 2014). This negative externality of recapitalizations presumably may not be fully taken into account by regulators when imposing tougher capital requirements.

Section 2 describes the sample and the data sources. Section 3 explains the methodology. Section 4 provides the empirical evidence. Finally section 5 provides a conclusion.

2. Dataset and sample

The cross-country panel dataset used in this analysis is obtained by combining four sources: Thomson One Banker for information on SEO (Seasoned Equity Offerings) operations, Bankscope (Bureau Van Dijk) for information on balance-sheet and profit and loss data (consolidated statement at the end of the year), Datastream for market variables and V-Lab for systemic risk measures. Financial statement variables are winsorized at the top and bottom 5% of the distribution of each variable.

We investigate SEO operations conducted from European banks that occurred between January 2002 and December 2014 and we distinguish two sub-periods (no-crisis: 2002-2006 and 2011-2014; and crisis-period 2007-2010). SEO, as provided by Thomson One, constitutes our treatment variable. SEO is defined as a common stock issue at the pricing date of the issue; all the offers that meet Thomson Reuters' standard inclusion criteria are included. We first use "New Issue" database to generate the initial sample of fully-marketed SEOs over the 2002-2014 period. The initial screen excludes offers below €25 billion. We exclude offers by financial firms, right offers, pure-secondary offers, Rule 144 (Private Placement) and unit offerings. We include

institutions where the Primary SIC code description is made up by banks and credit institutions. Table 1 reports the distribution of the 306 SEO in our sample. The control sample consists of banks that have never engaged in any SEO operation over the life span of this study and consists of 6,155 observations over the period under investigation.

To investigate the effects of recapitalizations, we use several alternative dependent variables, which can be grouped in three categories: profitability measures (*ROE, ROA* and *Net Interest Income*), business model (*Loans, Loan Reserves, Write Offs on Loans*), and systemic risk (*Systemic R.*). *ROA*, defined as Net income after taxes and extraordinary items (annualized) as a percentage of average total assets, measures the efficiency of the business in using its assets to generate net income. *ROE*, defined as the ratio between net profits to shareholders' equity, measures of how well a bank uses shareholders' funds to generate profits. *Net Interest Income*, defined as net interest income over average earning assets, measures the proportion of income generated by the traditional lending activity with respect to all profitable assets. *Loans*, defined as the ratio between Total Loans and Total Assets, measures the degree of specialization in the traditional lending activity of the bank. *Loan Reserves*, defined as the ratio of Loan Loss Reserves over Total Loans, gives a proxy for the magnitude of precautionary measures taken by a bank for its loan portfolio's credit risk. *Write Offs on Loans* are defined as impairment losses incurred on lending to costumers plus provisions for losses expected on loans and advances. *Systemic risk*, as in Acharya et al. (2012), is computed weekly by the NYU Stern Volatility Lab, which provides systemic risk measures for US and global financial firms. The measure also captures in one fell swoop many of the characteristics considered important for systemic risk such as size, leverage, concentration and interconnectedness, all of which serve to increase the expected capital shortfall in a crisis. Systemic risk is the propensity of a firm to be under-capitalized when the financial system as a whole is under-capitalized, i.e., in case of a new financial crisis. A bank is said to be under-capitalized (or in financial stress) if its equity falls below a given fraction θ of its assets. The parameter θ is defined as a prudential ratio, typically set by the regulator.[2]

We control for several bank-specific, market- and macro- variables. Variable definition and summary statistics of the full set of control variables are reported in Table 2 (Panel B) and Table 3 (Panel B). The set of control variables is selected to take into account dimensions considered to be relevant in prior literature for profitability, business model and systemic risk, and the same set is

[2] According to Acharya et al. (2012), $Srisk\%_{i,t}$ is the contribution to aggregate Srisk by any bank. To calculate systemic risk, the procedure first evaluates the losses that an equity holder would face if there is a crisis (i.e. whenever the broad index falls by 40% over the next six months). For crisis scenarios, the expected loss of equity value of firm *i* is called the Long Run Marginal Expected Shortfall (LRMES), that is the average of the fractional returns of the firm's equity. The capital shortfall can be directly computed by recognizing that the book value of debt remains relatively unchanged during this six-month period while equity values fall by LRMES.

used for all the dependent variable specifications. First, we control for bank-specific accounting variables (*Size, Equity, Liquidity*, *NIM* and *CTI*). Size is measured as the log transformation of bank total assets in millions of US dollars (*Size*).

Bank size, via economies of scale, is extensively considered to affect bank profitability, typically in a positive way (Smirlock, 1985; Goddard et al., 2004). Also, size is expected to positively affect systemic risk because large banks may respond to too-big-to-fail subsidies and may suffer from bad corporate governance (Black et al., 2013; Laeven et al., 2014). In what concerns the relation between size and the traditional lending activity, the literature documents a negative association; this is so because larger banks are more devoted to ancillary activities than smaller banks due to their ability to amortize costs of being involved in different activities (Berrospide and Edge, 2010).

The risk taking of the banks is tested by insolvency risk (proxied by the amount of tangible equity over total assets, *Equity*; here higher values of equity imply lower insolvency risk). As for equity, the effect on bank profitability is a priori ambiguous: on the one hand, the conventional risk-return hypothesis would imply a negative relationship (the higher the bank's capitalization and its solvency, the safer the bank, the lower the expected return); on the other hand, a higher capital, and thus lower risk, should increase a bank's creditworthiness and reduce its funding cost (Dietrich et al., 2014; Iannotta et al., 2007). The effect of equity on systemic risk is expected to be positive (Black et al., 2013), a possible explanation being the risk-taking incentives (as in Perotti et al. 2011); that is, more capitalized banks, potentially through regulatory requirements, have incentives to take on tail-risks leading to an increased systemic contribution when these risks are realized. Little evidence exists on the effect of a bank's capital ratio on its lending activity, but such an effect tends to be negative (Lown and Morgan, 2006).

Liquidity is defined as the ratio of short-term securities and short-term loans to total assets. It represents the percentage of total investment which is promptly convertible into cash. As for liquidity, some studies find a negative relation with profitability (Molyneux and Thornton, 1992), whilst others either report a positive relation (Bourke, 1989) or no relation (Iannotta et al., 2007). We expect a negative relation between systemic risk and liquid assets: this is so because the higher the liquid resources of a bank the greater the probability to cope with losses in the short-term. The effect of liquid assets on bank's loans is well documented by Kashyap and Stein (2000), who report a negative relationship between the presence of short term assets and loans provided by the bank.

The efficiency in the management of the bank is tested by the profitability of the traditional banking activities (*NIM*) and the cost-to-income ratio (*CTI*). *NIM* is the net interest income for the year as a percentage of average interest earning assets, and represents a measure of the profitability

of the traditional lending activity. Margins in lending are usually higher than margins from investments in securities, therefore we expect banks with a higher net interest margin to their total loans to be more profitable. This is due, for example, to the higher bargaining power of banks (with respect to the market) in providing loans (Holmstrom and Tirole, 1997). However, recent empirical evidence finds the opposite relation (Dietrich et al., 2014). It thus remains to be empirically answered whether banks with an income diversification strategy are more or less profitable. Concerning the relation between *NIM* and the specialization in the traditional lending activity we expect a positive coefficient (Demirguc-Kunt and Hiuzinga, 1999). Empirical evidence on systemic risk instead documents a positive relationship with market-based activities (and thus a negative relationship with NIM): banks contribute more to systemic risk when they engage more in market-based activities, and thus are more diversified (Laeven et al., 2014). *CTI* is given by operating expenses as a percentage of net revenues, and provides a measure of how efficiently a bank is being run and the lower it is, the better. An extensive banking literature (Bourke, 1989; Molyneux and Thornton, 1992) finds a positive relationship between better-quality management and profitability. As documented by Pastor and Serrano (2006) cost inefficiency is positively related with specialization in the lending activity.

Second, we control for bank-specific market variables (*PB ratio, Price Volatility, Tenure*). The first variable is the relative price to book ratio (*PB ratio*), constructed as market value of the bank relative to the book value of equity. This measure can be interpreted as capturing the value of banks' rents in the banking market (Dinger and Vallascas, 2015), thus we expect the *PB ratio* to be positively correlated with profitability. As far as we know, the relationship between the specialization in the banking activity and the PB ratio is not deeply investigated; Strahan (1999) proved that lines of credit increase when there is an increase in the Market-to-Book asset ratio. The expected relation between PB ratio and systemic risk is documented to fluctuate over time (Black et al., 2013): the relation is expected to be positive when the traditional corporate finance risk-return view prevails, whilst it is expected to be negative if negative market expectations determine a reduction in share prices and thus higher systemic risk. Price volatility (*Price Vol.*) is a market-based measure of the risk of the bank, proxied by the volatility of stock returns in a given year. Prior evidence referring to the overall market volatility documents a positive relation with ROE (Albertazzi and Gambacorta, 2009) and with systemic risk (Laeven et al., 2014). The third variable aims at capturing the life cycle effects on the decision to issue equity, proxied by the number of days a bank is listed in the stock market (*Tenure*). Given that younger banks tend to rely more on equity issues in order to support their growing investment opportunities (De Angelo et al., 2010), and that we have no unambiguous prediction about the relation between equity an profitability, we

do not have an *a priori* expectation for tenure. At the same time, there is no expectation concerning the link between specialization in the banking activity or systemic risk and number of days the bank is listed in the stock market.

Third, we control for macro-economic variables (*GDP growth and Reg. Quality*). Specifically, we select regulatory quality (*REG_Q*) of the country where each bank operates (as done for profitability in Demirgiic-Kunt and Huizinga, 1999), and the level of GDP growth (*GDPG*) of each country (as done for profitability in Goddard et al., 2011; and Dietrich and Wanzenried, 2014).

3. Methodology

3.1 A preliminary regression analysis

To estimate the effect of a binary treatment (*SEO*) on a continuous outcome where the treatment is represented by being recapitalized, we conduct a preliminary regression analysis by using OLS, that is:

$$\Delta Y_{i,t+1} = \propto + \gamma(SEO_{i,t}) + \beta(\boldsymbol{X_{i,t}}) + \mathcal{E}_{i,t} \quad (1)$$

where $\Delta Y_{i,t+1}$ is the outcome variables (respectively profitability measures, business model proxy and riskiness indicator for bank *i* in period *t+1*), SEO is the treatment variable indicating recapitalization activity and taking a value equal to one if bank *i* conducts a recapitalization in period *t* , and $\boldsymbol{X_{i,t}}$ is the vector of covariates grouped into business-specific variables (size, equity, liquidity, net interest margin, and cost-to-income for bank *i* at time *t*), market-variables (price-to-book ratio, price volatility, and tenure for bank *i* at time *t*) and macro-economic variables (growth at the country level and regulatory quality).

To take into account that variance is not homogenous in the sample, in presence of within-subject variability, we use a fixed-effect model, where sub-samples are identified as country, business model specialization and year. In symbols:

$$\Delta Y_{i,t+1} = \propto_i + \gamma(SEO_{i,t}) + \beta(\boldsymbol{X_{i,t}}) + \mathcal{E}_{i,t} \quad (2)$$

Finally, to take into account that the recapitalization decision is not random, we use an instrumental variable approach. Being recapitalized is endogenous and for this reason we need to use the instrumental variable estimator. If there is endogenous selection the difference on the performance variable estimated using standard OLS can be interpreted as the average difference between banks involved and not involved, but it cannot interpreted as the causal effect of being recapitalized. Self-selection is usually corrected with the instrumental variable (IV) estimator.

Having the simple regression model as in equation (1), if SEO is correlated with $\mathcal{E}_i$,we have a bias. Suppose we have a natural experiment (the instrumental variable) *Z* such that: Cov(Z, SEO) ≠0 and Cov(Z, $\mathcal{E}_i$) = 0 we can consistently estimate $E\{\Delta Y_{i,t+1}\}$ as Cov(Y, Z)/Cov(SEO, Z). Hence, IV attempts to eliminate endogenous selection using variables excluded from the outcome equation but determinant for the choice of the treatment to induce exogenous variation in the treatment.

The variables we use to proxy the recapitalization decision are the amount of off-balance items and the autoregressive terms of the dependent variable. The Sargan test of instrument validity rejects the null hypothesis at the 10% level confirming that the validity of the instruments employed is appropriate. The set of estimated regressions becomes:

$$Z_{i,t} = \alpha + \gamma_1 \Delta Y_{i,t-2} + \gamma_2 \Delta Y_{i,t-3} + \gamma_3 obs_{i,t-1} + \mathcal{E}_{i,t} \quad (3)$$

$$\Delta Y_{i,t+1} = \propto + \gamma(\hat{Z}_{i,t}) + \beta(\boldsymbol{X_{i,t}}) + \mathcal{E}_{i,t} \quad (4)$$

3.2 Propensity score matching

To investigate how and to what extent does the treatment (being recapitalized) change the average outcome variable (profitability, business model and riskiness) for the banks who were actually treated (ATT), we need to know what would have happened to the performance of recapitalized banks had they not recapitalized. The effect of recapitalization on the performance of bank *i*, known in the evaluation literature as the average treatment effect on the treated, can be expressed as:

$$ATT = E\{\Delta y^1_{i,t+1} | SEO_i = 1\}1 - E\{\Delta y^0_{i,t+1} | SEO_i = 1\} \quad (5)$$

where SEO_{it} is a variable indicating recapitalization activity and taking a value equal to one if bank *i* conducts a recapitalization in period *t*, $\Delta y^1_{i,t+1}$ is the performance change of bank *i* at time *t+1* after being recapitalized in period *t*, and $\Delta y^0_{i,t+1}$ is the hypothetical performance change of the same bank *i* at the same time *t+1* had it not recapitalized in period *t* (where $\Delta y_{i,t+1} = y_{i,t+1} - y_{i,t-1}$).

The selection problem is of great concern because there is no direct estimate of the counterfactual mean analogous to the one based on randomization. To overcome this problem, we need to find a proxy for this counterfactual mean. Using the mean outcome for recapitalized banks, that is, $E\{\Delta y^0_{i,t+1} | SEO_i = 0\}$ as a proxy for the counterfactual mean, equation (5) becomes:

$$ATT = E\{\Delta y^1_{i,t+1} | SEO_i = 1\}1 - E\{\Delta y^0_{i,t+1} | SEO_i = 0\} \quad (6)$$

Matching methods are useful when no good instruments are available with non-randomized groups. Specifically, the use of matching methods is appropriate if there are many potential controls, so that we can control for a rich set of **X** variables.

There are several assumptions that should be satisfied with matching models. First, the common support condition needs to be satisfied: for every bank there is a positive probability of non-participation. The assumption ensures that for each value of covariate (*x*) there are both treated and untreated subsamples (for each treated individual there is another matched untreated with similar *X*):

$$0 < Pr[SEO_{it} = 1|\boldsymbol{X}] < 1 \tag{7}$$

Second, the conditional independence assumption (CIA), also known as un-confoundedness assumption: conditional on covariates, the outcomes are independent of the treatment. This means that conditional on covariates, the outcome of the non-treated is independent of treatment (necessary for identification of ATT), that is:

$$F(\Delta y^{j}_{i,t+1}|X, SEO = 1) = F(\Delta y^{j}_{i,t+1}|X, SEO = 0) = F(\Delta y^{j}_{i,t+1}|X) \qquad j = 0,1 \tag{8}$$

In other words, the participation decision does not affect the distribution of potential outcome:

$$\Delta y_{i,t+1} = \alpha + \gamma SEO_{i,t} + \beta \boldsymbol{X_{i,t}} + \varepsilon_{i,t} \tag{9}$$

As for the implementation of the matching, the treatment participation is not by random assignment, but depends stochastically on a vector of observable variables. In such a situation, the propensity score matching (PSM) is useful to reduce dimensionality of the **X** vector. The PSM takes its derivation from Rosenbaum & Rubin (1983) who proved that if $\Delta y^{1}_{i,t+1}, \Delta y^{0}_{i,t+1} \perp SEO|\boldsymbol{X}$, $then \ \Delta y^{1}_{i,t+1}, \Delta y^{0}_{i,t+1} \perp SEO|p(X)$. P(x) is the propensity score, i.e. the conditional probability of receiving the treatment given the pre-treatment variables. The propensity score ***p(X)*** is the conditional probability measure of treatment participation, given **X**:

$$p(X) = Pr[SEO = 1|X = x] \tag{10}$$

The basic intuition of the propensity score is, if for any treated observation, we can find a non-treated one, which is as much as similar as possible in terms of observable characteristics, then the difference in the outcome between the treated and the matched control should be due to the treatment itself. That is, once these variables are taken into account, the assignment to treatment is random. The propensity score matching is a two stage semi-parametric procedure where in the first stage we estimate the probability of being treated (using probit/logit regression) on the basis of pre-treatment observables X; in the second stage we match treated and untreated with the same p(X), we calculate the difference in the outcomes and we average it out.

An important assumption of the propensity score is the balancing condition; that is, for banks with the same propensity score, the assignment to treatment is random and should look identical in terms of their **X**. That is, conditioning of propensity score we can eliminate the correlation between X and SEO.

In the second stage, to calculate the difference in the outcomes, we take the treated and untreated based on the same propensity score, and we compute the mean of the differences. The untreated sample can be identified via the Kernel matching procedure. Let W_{ji} denote the weight given to the j-th case in making the comparison with the i-th treated case (where $0< W_{ji} <1$), then:

$$ATT_{PSM} = \frac{1}{N}\sum_{i\in N}\left\{ \Delta y^{1}_{i,t+1} - \sum_{j\in C} W_{ij}\, \Delta y^{0}_{i,t+1}\right\} \qquad (11)$$

4. Empirical results

In a preliminary analysis of the effects of recapitalizations on bank performance, business model and systemic risk, we perform an investigation of the differences between recapitalized and non-recapitalized banks, during normal and crisis periods, and their intersection for both dependent variables and controls variables (Table 3).

As for dependent variables (Panel A), before the SEO taking place, recapitalized banks compared to non-recapitalized peers have lower profitability (ROE and ROA), net interest income, liquidity and loan reserves, whereas they are more involved in the traditional lending activity and contribute more to systemic risk. After the SEO, recapitalized banks continue to have lower profitability and continue to be more involved in lending and to contribute more to systemic risk.

During the crisis period as opposed to the normal period (Panel B), prior to the recapitalization, SEOs have higher performance (ROE) and higher loans compared with their peers. In contrast, after SEOs, banks experience lower profitability (ROA and ROE). Focusing on the crisis period, SEOs are associated with a decrease in profitability (ROA) and an increase in the loan reserve. The evidence for the no-crisis period widely differs: SEOs are associated with an increase in profitability (ROE and ROA). Furthermore, during both the crisis and the no-crisis periods, recapitalized banks show no such a different net interest income with respect to non-recapitalized banks.

As for control variables (Panel C), recapitalized banks are larger, more undercapitalized, less cost efficient, less liquid, and have lower margins, higher price volatility, longer market tenure, and operate in countries with lower growth and lower regulatory quality. During the crisis as opposed to a normal period (Panel D), recapitalized banks are larger, more undercapitalized, less

liquid, more cost efficient, trade on higher price-to-book ratios, have higher price volatility and operate in countries with lower growth and higher regulatory quality.

Our preliminary regression analysis based on different specifications (OLS, fixed effects, and instrumental variables) for different dependent variables (Table 4, Panels A-G) shows that SEOs are found to reduce profitability (ROE and ROA), net interest income, and lending activity, and increase loan reserves and systemic risk in the year following the recapitalization[3]. This evidence is validated across the three regression specifications for ROE, lending activity, loan reserves and systemic risk. For ROA, it is confirmed in the OLS and fixed effects regressions, whereas for net interest income it is confirmed in the IV regression[4]. The decrease in ROE is expected, being consistent with the debt-overhang hypothesis suggesting that recapitalizations may lead to ex-post transfers to debtholders from equityholders as the latter especially benefit from recapitalizations when equity capital is low (Acharya et al., 2011; Admati et al. 2012; Elyasiani et al. 2014). It is also consistent with the risk-shifting hypothesis suggesting that recapitalizations may lead to decreases in ex-post transfers from debtholders to equityholders as a result of a decrease in risk-shifting opportunities: a recapitalization reduces gains from risk-shifting resulting from government support when banks are unable to repay their debtholders (Gornall and Strebulaev, 2013). The decrease in lending implies that banks do not use the full proceeds from recapitalizations to provide loans (presumably due to the time needed to process loan requests). Alternative uses of the proceeds hence prevail in the short term. One alternative use for the proceeds is an increase in loan reserves which is confirmed by our empirical evidence: banks need to raise capital to be able to put aside higher loan reserves to be used to offset the write-off of bad loans. The unexpected decrease in ROA may hence be caused by larger write-offs made possible by the higher loan reserved created thanks to the proceeds of the recapitalizations. Furthermore, the decrease in ROA may be explained by the income component deriving from the specialization in the traditional lending activity that decreases in the year following SEOs (margins in lending are usually higher than margins from investments in securities). Interestingly, recapitalizations increase

[3] For all of our specifications we perform VIF (Variance Inflation Factor) diagnostic analysis to exclude multicollinearity; multicollinearity occurs when there are high correlations among predictor variables leading to unreliable and unstable estimates of regression coefficients. It is called variance inflation factor because it estimates how much of the variance of the coefficient is inflated because of linear dependence with other predictors. Since all of our coefficients have a VIF value lower than 2.5 we can exclude multicollinearity between control variables. Moreover, the variable of interest SEO has always a value which approximates 1. The high VIF for LnTA (about 2.3) is due to the fact that it is included as standardization of Loans and other variables of interest.

[4] The presence of NIM as explanatory variable and net interest income as dependent variable could be the reason for which SEO is not statistically significant in OLS and FE regression.

the contribution of banks to systemic risk: this implies that when bank conduct SEOs, they become not only the biggest losers in a crisis but also become the biggest contributors to the crisis. One possible explanation is related to the acquisition of the SIFI (systemically important financial institution) status via recapitalizations: by raising more capital, banks increase their size and hence can get the hidden benefit of reaching a size that guarantees state protection especially during crisis (Laeven et al., 2014). This negative externality of recapitalizations presumably may not be fully taken into account by regulators when imposing tougher capital requirements.

As for control variables (Table 4, Panel A-G), size affects positively profitability (ROE, ROA, as shown in prior studies such as Smirlock, 1985; Goddard et al., 2004; Berrospide et al., 2010) and systemic risk (in line with prior literature such as Black et al., 2013; Laeven et al., 2014), and negatively the lending activity (as documented in Berrospide and Edge, 2010) and the loan reserves. Equity affects positively ROA (that is, a higher capital and therefore a lower risk should increase a bank's creditworthiness and reduce its funding costs as previously documented by Dietrich et al., 2014; and Iannotta et al., 2007) and net interest income in the FE specification. Equity however affects negatively the lending activity as shown in Lown and Morgan, 2006. Liquidity increases profitability (as previously documented by Bourke, 1989) and systemic risk, and decreases loans over total assets (accordingly to Kashyap and Stein, 2000). Net interest margin increases profitability (in all the specifications: ROE, ROA and net interest income) suggesting that banks better able to extract margins from traditional banking activity show better profitability probably due to their bargaining power (as suggested by Holmstrom and Tirole, 1997). Moreover net interest margin increases loans over total assets (accordingly to the evidence in Demirguc-Kunt and Hiuzinga, 1999) and loan reserves, and decreases systemic risk (banks contribute more to systemic risk when they engage more in market-based activities as documented in Laeven et al., 2014). Operating efficiency (CTI) increases profitability (in line with prior empirical evidence from Bourke, 1989; Molyneux and Thornton, 1992) and lending (as in Pastor and Serrano, 2006), and decreases loan reserves. It is worth noting how the coefficient associated with CTI changes sign depending on the regression specification: the fixed effect estimation reports that inefficiency increases net interest income but, when we control for endogeneity using instrument variables, the coefficient becomes negative suggesting that more efficient banks have higher returns from the traditional banking activity (according to ROA and ROE output). Price-to-book increases profitability (ROA and ROE) and decreases systemic risk. Price volatility decreases profitability but increases returns from the traditional lending activity, loans, and loan reserves. Tenure increases profitability and decreases loans and loan reserves. Growth at the country level increases profitability, loans, systemic risk, and decreases loan reserves. Regulatory quality adversely affects

profitability, loans, loan reserves, and positively affects systemic risk. Crisis negatively affects profitability (in all of the specifications), loan reserves, and positively affects loans.

The results from our preliminary regression analysis are confirmed when using the propensity score matching technology (Table 5, Panel B), not only one year after the SEO but also in a longer time interval (two and three years after the SEO). SEOs are shown to experience a larger decline in profitability (ROE, ROA and net interest income) in the three years following the seasoned equity offering than their non-issuing peers. The gap in profitability between issuing and non-issuing banks is furthermore getting stronger when considering changes in profitability over longer time intervals (two to three years following the recapitalization compared with the year prior to the event). SEOs are also shown to decrease their lending more than their peers in the year following the seasoned equity offering. They however increase their lending by more than their non-issuing peers in the subsequent two years. Furthermore, SEOs increase their loan reserves by more than their peers in the first year following the recapitalization and report higher increases in loan write offs in each of the three years following the event. If we combine the results from profitability and the specialization in the traditional banking activity we could motivate the steeper reduction in ROA with, at least, two components: on one hand, the increase in write-offs and, on the other hand, the reduction of the interest spread from the lending activity. The reason for which net interest income is reduced, in turn, may be explained by the reduction in loans granted one-year after the SEO and by a lower interest spread on lending (in the second and third year after the SEO). Finally, SEOs increase their contribution to systemic risk by more than their non-issuing peers in each of the three years following the recapitalization. For information, the probability of going through an SEO is increasing in the bank's size, operating efficiency (CTI), price volatility, and decreasing in the bank's equity, and tenure (Table 5, Panel A).

5. Conclusions

After the recent financial crisis, regulators as well as governments believe that higher capitalization make banks sounder and more resilient and accordingly Basel III imposes higher capital requirements. Corporate finance theory tells us that a bank has disincentives to raise equity in the stock market but bank regulators believe that, by having higher capital levels, a bank may be able to reduce its insolvency risk and to increase its loss absorbance capacity. The empirical literature on the effects of recapitalizations on other bank performance dimensions, including profitability, business model and systemic risk, is however very limited. This paper hence contributes to the ongoing capital debate by investigating the effects of bank recapitalization (secondary equity offerings) on profitability, specialization in the traditional banking activity, and the degree of

interconnectedness with the banking system, for European banks between January 2002 and December 2014.

Our results suggest that secondary equity offerings reduce profitability and lending activity, and increase loan reserves, and systemic risk in the year following the recapitalization. Decreases in profitability and increases in loan write-offs and systemic risk are shown to persist over a period of three years following recapitalization events. The decrease in loan activity in the first year after a recapitalization is however followed by increases in the second and third years.

The decrease in ROE is consistent with both the debt-overhang and risk-shifting hypotheses. The decrease in loan activity in the year following recapitalizations implies that banks do not use the full proceeds to provide loans. Alternative uses of the proceeds hence prevail in the short term. One alternative use for the proceeds is an increase in loan reserves which is confirmed by our empirical evidence: banks need to raise capital to be able to put aside higher loan reserves to be used to offset the write-off of bad loans. This may explain the unexpected decrease in ROA in the first year after a secondary equity offering that may be caused by larger write-offs made possible by the higher loan reserves created thanks to the proceeds of the recapitalizations. The unexpected decrease in ROA in the second and third years after the secondary equity offering may be caused by the reduction in the proportion of net income generated by the traditional banking activity with respect to all profitable assets. Interestingly, the fact that recapitalizations increase the contribution of banks to systemic risk implies that banks engaging in secondary equity offerings become not only the biggest losers in a crisis but also the biggest contributors to the crisis. One possible explanation is related to the acquisition of the SIFI (systemically important financial institution) status via recapitalizations: by raising more capital, banks increase their size and hence can get the hidden benefit of reaching a size that guarantees state protection especially during crisis. This negative externality of recapitalizations presumably may not be fully taken into account by regulators when imposing tougher capital requirements.

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Table 1: Recapitalization by country and year and control sample

Panel A: number of observations

	Year													
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Control Sample	485	479	483	476	484	481	464	455	469	466	472	473	468	6155
SEO banks	12	18	14	21	13	16	33	42	28	31	25	24	29	306
Total	497	497	497	497	497	497	497	497	497	497	497	497	497	6461

Panel B: Countries

SEO by country and year

	No crisis					Crisis					No crisis			
Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Austria	0	1	1	0	0	0	0	1	0	0	0	0	1	4
Belgium	0	1	0	0	1	0	1	1	0	0	0	0	0	4
Cyprus	0	0	0	0	1	0	0	0	1	1	2	0	0	5
Denmark	0	1	0	0	0	0	0	5	5	2	6	0	0	19
Finland	0	0	0	0	0	0	0	1	1	2	0	0	0	4
France	0	1	0	1	1	1	3	1	0	1	1	2	2	14
Germany	0	3	1	4	0	0	3	3	2	2	1	2	1	22
Greece	0	3	1	2	1	2	0	4	1	3	0	2	2	21
Hungary	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Ireland	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Italy	3	2	3	4	3	2	7	4	4	7	2	2	7	50
Latvia	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Lithuania	0	0	0	0	0	1	0	1	0	0	0	0	0	2
Malta	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Netherland	0	0	0	0	0	2	0	0	0	0	0	0	0	2
Poland	0	1	0	2	3	0	0	6	3	1	2	5	3	26
Portugal	5	2	2	1	1	2	5	3	2	1	3	1	3	31
Romania	0	0	0	0	0	0	2	0	1	0	0	1	0	4
Slovenia	0	0	0	0	0	0	1	0	0	1	1	0	0	3
Spain	1	1	3	4	1	3	4	5	4	8	5	4	3	46
Sweden	0	0	0	0	0	0	0	1	1	2	0	2	1	7
Uk	3	1	3	2	1	2	7	6	3	0	2	3	5	38
Total	12	18	14	21	13	16	33	42	28	31	25	24	29	306
	156					130					156			

Table 2: Takeover/recapitalization likelihood hypotheses and independent variables

Hypothesis	**Variable**	**Variable name**	**Variable proxy**	**Expected sign SEO**
Panel A: Dependent Variables				
Profitability measures	Operating Profitability	*ROA*	Operating income /Total assets	-
	Return on shareholders' investment	*ROE*	Net Income/Average shareholders' Equity	-
	Profitability of the traditional activity	*NetIntInc*	Net Interest Income /Avg Earning Assets	-
Traditional Activity	Percentage of total assets invested in loans	*Loans*	Loans/ Total Assets	-
	Precautionary reserves against credit losses	*Loans Reserves*	Loans Loss Reserves / Total Loans	+
		Write Offs		+
Systemic Risk	Degree of interconnectedness with the other banks	*Systemic R.*	Systemic Risk percentage measure	+
Panel B: Control Variables				
Hp 1. Bank specific variables	Size	*LnTA*	Ln (Total assets)	+/-
	Capital strength	*Equity*	Total Equity/Total Assets	
	Liquidity risk	*Liquidity*	Liquid assets / Total assets	
	Net Interest Margin	*NIM*	[Interest Income - Interest Expense]/Loans	
	Cost To Income	*CTI*	Operating costs/Intermediation margin	
Hp 2. Market variables	Price to Book ratio Price Volatility	*PB Ratio* *Price Vol.*	 Standard deviation of the share price during the year	- +
	Tenure	*Tenure*	Total number of days during which the bank is listed	
Hp 3. Macro-variables	Regulatory quality	REG_Q	Ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development [World Bank]	+/-
	GDP growth	GDPG	Growth in the GDP of the country where the bank is listed	+

Table 3: Descriptive statistics

Dependent Variables										
Panel A: SEO vs. control banks										
	SEO=0					SEO=1				Diff
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	
ROA Before	3999	1.527	3.561	-4.567	12.002	263	0.205	1.579	-4.566	8.065	1.321***
ROA After	3910	1.606	3.542	-4.017	12.156	218	0.099	1.415	-4.017	4.672	1.506***
ROE Before	3999	7.128	13.659	-30.36	28.699	263	4.061	15.25	-30.36	28.699	3.066***
ROE After	3910	7.383	13.459	-29.49	28.869	218	2.872	14.47	-29.49	28.868	4.512***
Loans Before	3408	0.541	0.238	0.034	0.849	260	0.585	0.182	0.034	0.849	-0.044***
Loans After	3332	0.544	0.238	0.033	0.850	217	0.578	0.177	0.033	0.850	-0.034***
Loan Res. Before	2664	4.724	6.230	0	77.626	244	4.122	3.316	0.26	19.353	0.601**
Loan Res. After	2620	4.608	6.032	0	77.626	205	4.802	5.623	0.219	43.75	-0.194
Systemic R. Before	1441	0.463	1.444	0	11.17	202	1.329	2.445	0	13.34	-0.866***
Systemic R. After	1504	0.473	1.490	0	13.34	183	1.274	2.164	0	11.54	-0.801***
Write Offs Before	3129	0.018	0.394	-11.89	8.177	255	0.0131	0.0144	-0.0035	0.1174	0.0051
Write Offs After	3062	0.015	0.415	-12.02	8.162	214	0.016	0.0270	-0.0123	0.2130	-0.001***
InterestInc. Before	3710	2.473	16.77	-547.62	331.08	232	2.09	1.241	-4.58	7.47	0.3793*
InterestInc. After	3580	2.458	17.06	-547.62	331.08	194	2.03	1.087	0	6.47	0.3658
Panel B: Crisis vs. no-crisis period										
	No crisis					Crisis				Diff
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	St. Dev.	Min	Max	
ROA Before	2599	1.439	3.515	-4.567	12.001	1663	1.456	3.440	-4.568	12.002	-0.0169
ROA After	2488	1.924	3.510	-4.017	12.156	1640	0.924	3.343	-4.0171	12.155	1.00***
Diff		0.485***					-0.53**				
ROE Before	2599	6.197	13.433	-30.364	28.699	1663	8.097	14.232	-30.364	28.699	-1.90***
ROE After	2488	9.667	12.513	-29.492	28.869	1640	3.319	14.158	-29.492	28.868	6.348***
Diff		3.470***					-4.778				
Loans Before	2231	0.532	.0231	0.034	0.849	1437	0.563	0.238	0.034	0.849	-0.03***
Loans After	2152	0.537	0.233	0.033	0.850	1397	0.560	0.237	0.033	0.850	-0.023***
Diff		0.005*					0.563				
Loan Res Before	1795	5.561	6.973	0	77.626	1113	0.560	3.696	.0006	47.196	2.32***
Loan Res. After	1641	4.765	6.408	0	77.626	1184	4.424	5.389	0.023	64.757	0.34
Diff		-0.796					3.864***				
SystemicR. Before	1054	0.579	1.568	0	10.28	589	0.554	1.725	0	13.34	0.025
Systemic R. After	1074	0.571	1.706	0	13.34	613	0.541	1.383	0	8.46	0.029
Diff		-0.008					-0.013				
Write Offs Before	2040	0.002	0.339	-12.000	2.000	1344	0.042	0.431	-1.500	8.167	-0.040***
Write Offs After	1958	-0.002	0.362	-12.000	2.750	1318	0.043	0.452	-5.477	8.167	-0.045***
Diff		-0.004					0.0001				
Interest Inc. Before	2367	2.547	17.87	-547.62	331.08	1575	2.306	13.522	-358.51	108.48	0.2410
Interest Inc. After	2231	2.604	14.72	-547.62	300	1561	2.201	18.923	-358.51	331.08	0.4035
Diff		-0.1158					-0.1676				

Table 3: Descriptive statistics

Control Variables											
Panel C: SEO vs. control banks											
	SEO=0					SEO=1					Diff.
Variable	Obs	Mean	St. Dev.	Min	Max	Obs	Mean	St. Dev.	Min	Max	
Size	3951	15.14	2.44	10.99	19.89	263	17.58	2.26	10.99	19.89	-2.44***
Equity	4015	0.22	0.27	0.03	0.92	264	0.073	0.08	0.03	0.92	0.1503***
Liquidity	3962	0.214	0.182	0.016	0.705	263	0.175	0.123	0.016	0.71	0.038***
NIM	3918	2.337	1.754	-.666	6.189	261	2.157	1.186	-.666	6.189	0.181**
CTI	3764	61.236	23.871	9.091	111.01	259	63.567	16.38	27.393	111.016	-2.33**
PB Ratio	2653	1.405	1.509	0.103	19.89	234	1.243	1.529	0.132	19.89	0.161
Price Vol.	1950	24.68	10.919	2.5	82.21	232	29.014	8.938	7.07	59.53	-4.34***
Tenure	3562	4507.98	2798.99	1	13126	260	6000.86	3105.81	166	13126	-1492.8**
GDP growth	5670	1.314	2.915	-17.95	12.23	294	0.856	2.835	-8.27	12.233	0.457***
Reg. Quality	5646	1.325	0.419	-0.072	1.924	294	1.228	0.386	0.498	1.911	0.096***
Panel D: crisis vs. no-crisis period											
	No Crisis					Crisis					Diff
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	
Size	2578	15.155	2.509	10.996	19.892	1636	15.509	2.462	10.996	19.892	-0.353***
Equity	2616	0.219	.272	0.026	0.917	1663	0.203	0.264	0.0262	0.917	0.015*
Liquidity	2577	0.218	.186	0.016	0.705	1648	0.201	0.168	0.016	0.705	0.018**
NIM	2550	2.312	1.758	-0.665	6.189	1629	2.346	1.671	-0.666	6.189	-0.034
CTI	2463	62.161	24.162	9.091	111.016	1560	60.162	22.279	9.091	111.016	1.998***
PB Ratio	1674	1.242	1.426	0.103	19.89	1213	1.599	1.599	0.104	19.89	-0.356***
Price Vol.	1500	24.755	11.153	2.89	82.21	682	25.977	9.96	2.5	72.18	-1.22***
Tenure	2646	4609.5	2845.594	1	13126	1176	4609.53	2846.267	1	13126	
GDP growth	3976	1.549	2.187	-8.863	10.601	1988	0.775	3.937	-17.95	12.23	0.774***
Reg. Quality	3960	1.306	0.420	-0.072	1.912	1980	1.349	0.414	0.381	1.924	-0.043***

Table 4: Results

	Panel A: Dependent Variable ROA						
	OLS				*Fixed Effect*		*IV*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	
SEO	-1.506***	-0.196**	-0.177*	-0.117	-0.149	-0.209**	-0.958
	(0.111)	(0.102)	(0.105)	(0.106)	(0.106)	(0.101)	(1.394)
Size		0.118***	0.132***	0.144***	0.119***	0.136***	0.191***
		(0.029)	(0.029)	(0.026)	(0.026)	(0.023)	(0.055)
Equity		2.400	2.624	1.988***	4.391***	3.354***	4.493***
		(1.718)	(1.785)	(0.739)	(0.865)	(0.713)	(1.627)
Liquidity		0.788**	0.689**	0.474	1.036***	0.429	0.840**
		(0.316)	(0.306)	(0.305)	(0.318)	(0.293)	(0.366)
NIM		0.298***	0.285***	0.299***	0.227***	0.233***	0.258***
		(0.047)	(0.047)	(0.044)	(0.038)	(0.035)	(0.045)
CTI		-0.012***	-0.012***	-0.012***	-0.010***	-0.013***	-0.005
		(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
PB Ratio		0.127***	0.188***	0.185***	0.222***	0.192***	0.184***
		(0.045)	(0.048)	(0.042)	(0.043)	(0.042)	(0.051)
Price Vol.		-0.039***	-0.039***	-0.032***	-0.035***	-0.036***	-0.046***
		(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
Tenure		0.001**	0.001**	0.0006***	0.00002	0.00003**	0.001*
		(0.001)	(0.0001)	(0.0001)	(0.000016)	(0.00001)	(0.00058)
GDP growth		0.06***	0.042***	0.005	0.037***	0.092***	0.0329**
		(0.014)	(0.015)	(0.013)	(0.012)	(0. 017)	(0.014)
Reg. Quality		-0.217*	-0.179	-0.802**	-0.075	-0.195**	-0.056
		(0.116)	(0.115)	(0.365)	(0.103)	(0.089)	(0.112)
Crisis			-0.436***	-0.471***	-0.456***	-	-0.379***
			(0.074)	(0.069)	(0.069)		(0.102)
Constant	1.606***	-1.116	-1.206*	-0.698	-1.307**	-1.438**	-2.535***
	(0.056)	(0.702)	(0.715)	(0.758)	(0.628)	(0.554)	(0.914)
Country fixed effect	-	-	-	*Yes*	-	-	-
Specialization fixed effect	-	-	-	-	*Yes*	-	-
Year fixed effect	-	-	-	-	-	*Yes*	-
N	4128	1116	1116	1116	1116	1116	932
R-squared	0.009	0.267	0.287	0.2317	0.278	0.248	-
F-test	183.59***	28.75***	32.08***	28.18***	35.22***	31.66***	352.16***
Rho	-	-	-	0.478	0.493	0.18	-

Table 4: Results

	Panel B: Dependent Variable ROE						
	OLS			*Fixed Effect*			*IV*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	
SEO	-4.512***	-2.35**	-2.134*	-1.610	-1.845*	-2.509**	-20.362*
	(1.001)	(1.089)	(1.125)	(1.081)	(1.044)	(1.003)	(10.894)
Size		1.184***	1.351***	1.379***	1.338***	1.397***	2.256***
		(0. 248)	(0.247)	(0.269)	(0.259)	(0.225)	(0.474)
Equity		1.080	3.847	2.292	13.363	11.486	-15.319
		(6.805)	(6.152)	(7.499)	(8.549)	(7.026)	(16.598)
Liquidity		13.513***	12.287***	10.953***	10.703***	9.622***	8.826**
		(3.483)	(3.306)	(3.091)	(3.141)	(2.893)	(4.297)
NIM		2.140***	1.980***	2.138***	1.627***	1.461***	2.397***
		(0.337)	(0.327)	(0.451)	(0.373)	(0.348)	(0.504)
CTI		-0.116***	-0.108***	-0.105***	-0.099***	-0.121***	-0.043
		(0.028)	(0.028)	(0.026)	(0.026)	(0.024)	(0.035)
PB Ratio		1.521***	2.274***	2.048***	2.535***	2.261***	1.804***
		(0.391)	(0.399)	(0.424)	(0.423)	(0.410)	(0.556)
Price Vol.		-0.396***	-.392***	-0.384***	-0.378***	-0.345***	-0.477***
		(0.047)	(0.046)	(0.049)	(0.040)	(0.039)	(0.054)
Tenure		0.0004***	0.0004***	0.0007***	0.0001	.0004***	0.0003*
		(0.0001)	(0. 0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
GDP growth		0.484***	.259*	-0.047	0.239**	0.690***	0.179
		(0.143)	(0.147)	(0.130)	(0.121)	(0.164)	(0.157)
Reg. Quality		-3.024***	-2.563**	-9.594**	-1.353	-2.765***	-2.181*
		(1.057)	(1.022)	(3.704)	(1.013)	(0.886)	(1.259)
Crisis			-5.386***	-5.382***	-5.481***	-	-2.868***
			(0. 727)	(0.706)	(0.689)	-	(1.051)
Constant	7.383***	-6.543	-7.645	-0.453	-8.196	-10.33**	-21.728**
	(0.215)	(5.818)	(5.779)	(7.699)	(6.203)	(5.446)	(9.004)
Country fixed effect	-	-	-	*Yes*	-	-	-
Specialization fixed effect	-	-	-	-	*Yes*	-	-
Year fixed effect	-	-	-	-	-	*Yes*	-
N	4128	1116	1116	1116	1116	1116	838
R-squared	0.005	0.225	0.265	0.2141	0.261	0.2122	-
F-test	20.30***	27.59***	33.61***	27.70***	31.05***	26.77***	204.46***
Rho	-	-	-	0.381	0.308	0.209	-

Table 4: Results

	Panel C: Dependent Variable Loans						
		OLS			*Fixed Effect*		*IV*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	
SEO	0.0342***	-0.019**	-0.021**	-0.021**	-0.029***	-0.018*	-0.633**
	(0.013)	(0.009)	(0.009)	(0.011)	(0.010)	(0.010)	(0.295)
Size		-0.016***	-0.017***	-0.022***	-0.023***	-0.017***	0.002
		(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.011)
Equity		-0.338***	-0.387	-0.704***	-0.728***	-0.397***	-1.078***
		(0.124)	(0.123)	(0.101)	(0.095)	(0.09)	(0.331)
Liquidity		-0.874***	-0.867***	-0.821***	-0.761***	-0.872***	-0.883***
		(0.031)	(0.032)	(0.030)	(0.029)	(0.03)	(0.072)
NIM		0.006	0.007*	0.016***	0.005	0.008**	0.013
		(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.009)
CTI		-0.002***	-0.002***	-0.002**	-0.002***	-0.002***	-0.002***
		(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0006)
PB Ratio		0.008**	0.003	0.003	0.005	-0.003	-0.008
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.009)
Price Vol.		-0.002***	-0.002***	-0.001*	-0.001**	-0.001**	-0.001
		(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0009)
Tenure		-0.001***	-0.001**	-0.001***	-0.001	-0.002	-0.005
		(0.0003)	(-0.0005)	(0.0003)	(0.024)	(0.039)	(0.067)
GDP growth		0.001	0.003**	0.004***	0.002**	0.0005	0.003
		(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Reg. Quality		-0.050***	-0.054***	-0.063*	-0.056***	-0.054***	-0.071***
		(0.010)	(0.010)	(0.036)	(0.009)	(0.009)	(0.022)
Crisis			0.037***	0.037***	0.032***		0.064***
			(0.007)	(0.007)	(0.006)		(0.020)
Constant	0.544***	1.283***	1.299***	1.368***	1.392***	1.314***	1.101***
	(0.004)	(0.064)	(0.063)	(0.076)	(0.059)	(0.059)	(0.185)
Country fixed effect	-	-	-	*Yes*	-	-	-
Specialization fixed effect	-	-	-	-	*Yes*	-	-
Year fixed effect	-	-	-	-	-	*Yes*	-
N	3549	1114	1114	1114	1114	1114	932
R-squared	0.001	0.548	0.559	0546	0.547	0.542	-
F-test	7.31***	127.44***	120.60***	109.9***	100.64***	128.11***	274.04***
Rho	-	-	-	0.278	0.532	0.069	-
	Panel D: Dependent Variable Loan Reserves						
		OLS			*Fixed Effect*		*IV*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	
SEO	0.194	1.340***	1.382***	1.261***	1.158***	1.392***	23.179**
	(0.409)	(0.505)	(0.503)	(0.364)	(0.346)	(0.356)	(10.872)
Size		-0.491***	-0.466***	-0.585***	-0.298***	-0.454***	-1.289***
		(0.118)	(0.116)	(0.103)	(0.093)	(0.088)	(0.452)
Equity		-1.436	-0.178	7.024*	0.954	-1.854	15.271
		(7.782)	(7.761)	(3.693)	(3.617)	(3.593)	(16.193)
Liquidity		-0.621	-0.715	0.064	-3.207***	-0.108	-3.220
		(1.756)	(1.762)	(1.180)	(1.123)	(1.129)	(3.007)
NIM		0.4012**	0.377*	-0.062	0.491***	0.441***	0.356
		(0.201)	(0.202)	(0.164)	(0.130)	(0.134)	(0.380)
CTI		0.029**	0.031**	0.035***	.033***	0.031***	0.016
		(0.012)	(0.012)	(0.009)	(0.009)	(0.009)	(0.025)
PB Ratio		-0.296*	-0.175	-0.208	-0.263*	-0.153	0.314
		(0.158)	(0.166)	(0.148)	(0.144)	(0.150)	(0.469)
Price Vol.		0.174***	0.173***	.168***	0.148***	0.169***	0.186
		(0.023)	(0.022)	(0.017)	(0.014)	(0.014)	(0.036)
Tenure		-0.0001*	-.0001*	-0.0001***	-0.00006	-0.0001***	-0.0002
		(0.00006)	(0.00006)	(0.00005)	(0.00005)	(0.00005)	(0.0002)
GDP growth		-0.22***	-0.255***	-0.242***	-0.229***	-0.415***	-0.213*
		(0.055)	(0.057)	(0.045)	(0.041)	(0.059)	(0.111)
Reg. Quality		-1.342***	-1.221***	-3.957***	-1.487***	-1.258***	-0.604
		(0.427)	(0.417)	(1.300)	(0.344)	(0.332)	(1.032)
Crisis			-0.813***	-0.626**	-0.836***	0	-2.129***
			(0.246)	(0.245)	(0.240)		(0.878)
Constant	4.607***	8.499***	8.205***	14.126***	6.065***	7.884***	18.144**
	(0.117)	(2.701)	(2.674)	(2.866)	(2.287)	(2.213)	(7.086)
Country fixed effect	-	-	-	*Yes*	-	-	-
Specialization fixed effect	-	-	-	-	*Yes*	-	-
Year fixed effect	-	-	-	-	-	*Yes*	-
N	2825	980	980	980	980	980	757
R-squared	0.001	0.344	0.351	0.3028	0.341	0.333	-
F-test	0.23	18.32***	17.13***	26.67***	37.34***	40.31***	93.80***
Rho	-	-	-	0.506	0.857	0.069	-

Panel E: Dependent Variable Write Offs

	OLS			*Fixed Effect*			*IV*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	
SEO	0.00025	0.0041	0.0038	0.0025	0.0389**	0.0228	0.118***
	(0.007)	(0.0029)	(0.003)	(0.003)	(0.016)	(0.017)	(0.0449)
Size		-0.0018***	-0.002***	-0.0015**	0.0278***	0.023***	-0.0045***
		(0.0006)	(0.0006)	(0.0007)	(0.004)	(0.0038)	(0.0017)
Equity		-0.069**	-0.078**	-0.023	3.095***	2.992***	0.055
		(0.038)	(0.04)	(0.029)	(0.136)	(0.137)	(0.054)
Liquidity		0.0061	0.007	0.0229**	-0.092*	-0.0769	-0.0079
		(0.0168)	(0.016)	(0.009)	(0.05)	(0.051)	(0.0115)
NIM		0.0014*	0.0017**	-0.0004	-0.023***	-0.027***	0.002
		(0.0008)	(0.0008)	(0.0013)	(0.0058)	(0.006)	(0.0014)
CTI		-0.000193	-0.0002	-0.00017**	0.0228***	0.0027***	-0.00013
		(0.0001)	(0.00015)	(0.00007)	(0.007)	(0.0004)	(0.00009)
PB Ratio		-0.0017**	-0.002***	-0.0035***	0.0024***	0.028***	-0.0005
		(0.0009)	(0.0009)	(0.001)	(0.0006)	(0.0073)	(0.0017)
Price Vol.		0.0008***	0.0007***	0.0004***	0.107***	0.0029***	0.00057***
		(0.0001)	(0.00015)	(0.0001)	(0.015)	(0.0006)	(0.00015)
Tenure		-0.0002	-0.0001	-0.00007	-0.001	-0.00001***	-0.0003
		(0.0004)	(0.0005)	(0.0004)	(0.001)	(0.000005)	(0.0002)
GDP growth		0.00254	0.0018	0.027***	0.003***	0.0866***	0.0023
		(0.0036)	(0.004)	(0.01)	(0.0004)	(0.0149)	(0.003)
Reg. Quality		-0.0002	0.00002	0.0002	-0.0001***	-0.0037	-0.001**
		(0.0002)	(0.0003)	(0.0003)	(0.00002)	(0.0028)	(0.00045)
Crisis			0.0065***	0.006***	-0.0005	-	-0.0055
			(0.002)	(0.002)	(0.011)	-	(0.0034)
Constant	0.015**	0.0363*	0.039*	0.0079	-0.983***	-0.865***	0.0557**
	(0.007)	(0.0216)	(0.022)	(0.022)	(0.096)	(0.0937)	(0.028)
Country fixed effect	-	-	-	*Yes*	-	-	-
Specialization fixed effect	-	-	-	-	*Yes*	-	-
Year fixed effect	-	-	-	-	-	*Yes*	-
N	3276	1087	1087	1087	1087	1087	1084
R-squared	0.002	0.064	0.073	0.045	0.289	0.291	-
F-test	1.01	8.83***	9.06***	4.10***	8.55***	47.03***	68.44***
rho	-	-	-	0.604	0.486	0.018	-

Panel F: Dependent Variable Systemic risk

	OLS			*Fixed Effect*			*IV*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	
SEO	0.801***	0.445***	0.443***	0.417***	0.429***	0.475***	11.980***
	(0.164)	(0.165)	(0.165)	(0.130)	(0.135)	(0.139)	(2.742)
Size		0.464***	0.463***	0.385***	0.395***	0.454***	-0.446
		(0.043)	(0.041)	(0.052)	(0.049)	(0.047)	(0.290)
Equity		1.307	1.279	-4.985**	-1.317	0.141	8.747
		(1.361)	(1.363)	(2.425)	(2.246)	(2.279)	(9.303)
Liquidity		4.258***	4.259***	3.502***	4.827***	4.242***	7.649***
		(0.662)	(0.661)	(0.467)	(0.461)	(0.457)	(1.965)
NIM		-0.081**	-0.08*	-0.167**	-0.076	-0.057	0.084
		(0.043)	(0.043)	(0.083)	(0.064)	(0.066)	(0.268)
CTI		0.005	0.006	-0.009**	0.002	.0059659	0.003
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.017)
PB Ratio		-0.255***	-0.262***	-0.079	-0.260***	-0.311***	-0.318
		(0.062)	(0.062)	(0.076)	(0.076)	(0.083)	(0.309)
Price Vol.		0.007	0.007	0.029***	0.008	0.007	0.029
		(0.005)	(0.004)	(0.007)	(0.005)	(0.005)	(0.025)
Tenure		0.00003	0.00003	0.00008***	0.00005	0.00003*	0.0001
		(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00008)
GDP growth		0.039**	0.041**	0.019	0.039**	0.071***	0.025
		(0.017)	(0.016)	(0.018)	(0.018)	(0.026)	(0.074)
Reg. Quality		0.291**	0.285**	0.018	-0.017	0.259	0.797
		(0.132)	(0.131)	(0.464)	(0.170)	(0.161)	(0.663)
Crisis			0.045	0.002	0.021		-0.869*
			(0.105)	(0.097)	(0.103)		(0.481)
Constant	0.473***	-9.218***	-9.219***	-6.849***	-7.485***	-8.981***	1.952
	(0.038)	(0.960)	(0.959)	(1.244)	(1.120)	(1.075)	(5.122)
Country fixed effect	-	-	-	*Yes*	-	-	-
Specialization fixed effect	-	-	-	-	*Yes*	-	-
Year fixed effect	-	-	-	-	-	*Yes*	-
N	1687	673	673	673	673	673	514
R-squared	0.0242	0.425	0.425	0.379	0.417	0.422	-
F-test	23.8***	22.55***	21.05***	34.15***	35.56***	44.05***	55.75***
Rho	-	-	-	0.366	0.234	0.015	-

Table 4: Results

Panel G: Dependent Variable Net Interest Income							
		OLS			*Fixed Effect*		*IV*
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	
SEO	-0.3794	0.0045	0.0025	-0.001	0.006	0.004	-1.196*
	(0.287)	(0.0329)	(0.032)	(0.003)	(0.039)	(0.039)	(0.744)
Size		0.0096	0.0086	0.004	0.0145	0.0069	0.049*
		(0.0119)	(0.012)	(0.0098)	(0.0095)	(0.0086)	(0.028)
Equity		0.358	0.345	0.508**	0.746***	0.300	-0.139
		(0.334)	(0.307)	(0.242)	(0.284)	(0.241)	(0.809)
Liquidity		-0.2009	-0.192	-0.231**	-0.163	-0.205**	-0.195
		(0.126)	(0.126)	(0.113)	(0.1178)	(0.111)	(0.167)
NIM		0.941***	0.941***	0.857***	0.9302***	0.941***	0.947***
		(0.023)	(0.023)	(0.016)	(0.0058)	(0.001)	(0.021)
CTI		0.001	0.0017	-0.0001	0.0027	0.002**	-0.003**
		(0.0012)	(0.0012)	(0.0009)	(0.0009)	(0.0009)	(0.0014)
PB Ratio		0.045***	0.0399**	0.039**	0.044***	0.0425**	-0.0226
		(0.017)	(0.0187)	(0.016)	(0.016)	(0.0165)	(0.025)
Price Vol.		0.0008	0.0008	0.0012	0.008	0.0009	0.0038*
		(0.001)	(0.001)	(0.0017)	(0.01)	(0.0014)	(0.0023)
Tenure		-0.0002	-0.0001	0.0003	-0.001	0.00001	-0.0003
		(0.0004)	(0.0005)	(0.002)	(0.006)	(0.005)	(0.0002)
GDP growth		0.007	0.008	-0.006	0.007*	0.023***	0.014**
		(0.005)	(0.005)	(0.004)	(0.0045)	(0.0063)	(0.0067)
Reg. Quality		0.045	0.041	0.162	0.0748**	0.0037	0.056
		(0.035)	(0.035)	(0.133)	(0.0362)	(0.0335)	(0.0488)
Crisis			0.0379	0.033	0.0365	-	0.124**
			(0.027)	(0.0263)	(0.0261)	-	(0.0526)
Constant	2.473**	0.0363*	-0.333	-0.182	-0.527**	-0.304	-0.98**
	(0.275)	(0.0216)	(0.288)	(0.276)	(0.224)	(0.207)	(0.472)
Country fixed effect	-	-	-	*Yes*	-	-	-
Specialization fixed effect	-	-	-	-	*Yes*	-	-
Year fixed effect	-	-	-	-	-	*Yes*	-
N	3942	1299	1299	1299	1299	1299	1105
R-squared	0.002	0.8915	0.8917	0.8892	0.8913	0.8902	-
F-test	1.75	908.56***	844.29***	6.11***	710.38***	888.79***	5314.13***
Rho	-	-	-	0.5166	0.2154	0.026	-

Table 5: Propensity Score Matching

Panel A: Probit regression		*Panel B: Average Treatment on the Treated (ATT)*			
Variable	Coeff.	*Outcome variable*	*1 year*	*2 years*	*3 years*
Size	0.198***	ROA	-0.130*	-1.385***	-1.366***
	(0.031)		(0.085)	(0.162)	(0.146)
Equity	-6.530***	*Treated vs. Control*	186 vs. 1096	186 vs. 1096	186 vs. 1096
	(1.903)	ROE	-1.647**	-3.305***	-3.511***
Liquidity	-0.496		(0.733)	(0.831)	(0.795)
	(0.407)	*Treated vs. Control*	186 vs. 1096	186 vs. 1096	186 vs. 1096
		Loans	-0.018**	0.029**	0.019*
NIM	0.086		(0.012)	(0.015)	(0.016)
	(0.057)	*Treated vs. Control*	186 vs. 1096	186 vs. 1096	186 vs. 1096
CTI	0.007**	Loan Res.	0.949*	0.590	0.630
	(0.003)		(0.696)	(0.692)	(0.423)
PB Ratio	-0.017	*Treated vs. Control*	186 vs. 1096	186 vs. 1096	186 vs. 1096
	(0.062)	Write Offs	0.009***	0.004**	0.003*
Price Vol.	0.009**		(0.002)	(0.002)	(0.002)
	(0.005)	*Treated vs. Control*	186 vs. 1096	186 vs. 1096	186 vs. 1096
Tenure	-0.00003*	Systemic R.	0.835***	0.765***	0.622***
	(0.00001)		(0.273)	(0.180)	(0.255)
GDP growth	-0.0102812	*Treated vs. Control*	186 vs. 1096	186 vs. 1096	186 vs. 1096
	(0.016)	Net Interest Income	-0.084***	-0.089**	-0.153***
Reg. Quality	-0.016		(0.041)	(0.049)	(0.089)
	(0.125)	*Treated vs. Control*	186 vs. 1096	186 vs. 1096	186 vs. 1096
Crisis	0.131				
	(0.095)				
Constant	-4.657***				
	(0.784)				