

## **Bank Capital Structure Responses to the Post-Crisis European Bank Levies**

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*Application for the EPRN, October 2012*

### **Motivation and Policy Relevance**

Excessive leverage in financial institutions is widely regarded as the main reason why the collapse of Lehman Brothers in August 2008 triggered a global financial crisis. Losses quickly wiped out the equity of many banks and uncertainty about the solvency of counterparts caused interbank markets to freeze. To avoid a collapse of the entire financial system, many banks were recapitalized with public funds at a staggering cost. An important post-crisis policy objective is to ensure that banks are in a better position to absorb adverse shocks in the future.

On 17 June 2010, the European Council agreed that “EU member states should introduce systems of levies and taxes on financial institutions...” with the dual aim of raising revenue from the financial sector and incentivizing banks to move towards less risky capital structures. Currently, 13 EU countries including the UK, Germany, Netherlands and Sweden have implemented bank levies. The design varies across countries but the levies typically fall on bank liabilities with different rates applying to different types of liabilities according to their riskiness.

Denmark has still not implemented a bank levy, but may, as bank levies become increasingly common in the EU, face strong economic and political incentives to do so. Any decision about the adoption of a bank levy and about its specific design should ideally be informed by a thorough evaluation of other countries’ experiences with this novel policy instrument. At this point, however, there is no factual knowledge about the effect of the European bank levies.

The main aim of this research project is to determine whether and to what extent bank levies induce banks to move towards less risky capital structures, for instance by relying more on equity financing and less on short-term borrowing. The question is interesting, firstly, because a more robust financial sector is an important objective of current reforms of financial sector taxation and regulation and, secondly, because there are surprisingly few existing studies of the effect of taxation on financial choices of banks. While there is a vast amount of research on the role of taxes in shaping the capital structure of non-banks (Auerbach, 2002) and a considerable number of papers on non-tax determinants of the capital structure of banks (Gropp and Heider, 2010), the tax determinants of bank capital structure have largely been neglected except for a recent study by Keen and de Mooij (2012) considering the effect of corporate income taxes on the leverage of banks.

The empirical methodology of the project exploits that 13 EU countries have implemented bank taxes with different rates and different tax base definitions whereas the remaining 14 EU countries still do not employ such taxes. This represents a rich natural experiment where within-country as well as between-country variation in tax rates and tax bases can be exploited to identify the effect on bank capital structure.

### The bank levies

The following 13 European countries had implemented bank levies by June 2012: Austria, Belgium, Cyprus, France, Germany, Hungary, Portugal, Romania, Slovakia, Slovenia, Sweden, Netherlands and the UK. Both rates and bases of the bank levies vary considerable across countries (KPMG, 2012). To illustrate the similarities and differences between the bank levies, we present key parameters, for 4 of these countries:

- The UK taxes total liabilities net of liabilities covered by the UK deposit insurance scheme (i.e. retail deposits), liabilities backed by safe assets and a basic deduction of £20 billion of taxable liabilities. The tax rate is 0.088% on short-term liabilities (maturity<1 year) and 0.044% on long-term liabilities (maturity>1 year).
- Germany exempts both customer deposits and other liabilities toward non-banks and apply progressive rates 0.02% up to €10 billion of relevant liabilities; 0.03% between € 10billion and €100 billion; and 0.04% above €100 billion.
- Sweden applies a flat rate of 0.036% while exempting subordinated debt and liabilities covered by the Swedish deposit insurance scheme
- The Netherlands taxes total liabilities net of liabilities covered by the Dutch deposit insurance scheme and a basic deduction of €20 billion of taxable liabilities. The tax rate is 0.044% on short-term liabilities (maturity<1 year) and 0.022% on long-term liabilities (maturity>1 year).

### Empirical methodology

The rich policy variation allows us to estimate the responsiveness of bank leverage with respect to the bank levy using several distinct sources of variation.

First, in the important case of the U.K., it can be estimated by comparing the change in the leverage of large banks (taxable liabilities>£20 billion) since the introduction of the bank levy to the change in the leverage of small banks (taxable liabilities<£20 billion), which are effectively exempt from the tax. The idea is that the observed change in the capital structure of small banks, which were not hit by the bank levy, provides information about how the capital structure of large banks, which were hit by the bank levy, would have changed in the absence of the bank levy.

Second, the tax responsiveness of bank leverage can be estimated by comparing the change in the leverage of banks located in countries that have implemented a bank levy (e.g. UK, Germany, Sweden), to the change in the leverage of comparable banks located in countries that have not implemented a bank levy (e.g. US, Italy, Denmark). The idea is similar to the one outlined above except that inference about how the capital structure of banks, which were hit by a bank levy, would have changed in the absence of a bank levy now derives from information about the capital structure of banks, which were not hit by a bank levy due to their geographical location rather than their size.

These are both *difference-in-differences* estimators where a “treatment group” of banks, which have become subject to a new tax treatment, are compared to a “control group” of banks, which have not become subject to a new tax treatment. The within-country comparison of differently sized banks is more suitable in the presence of other important country-specific shocks to capital structure over the sample

period. The between-country comparison of similarly sized banks is more suitable in the presence of other important bank-size-specific shocks to capital structure over the sample period.

Combining the two types of variation, one may construct a *difference-in-difference-in-differences* estimator. This estimator effectively compares the difference between the change in the leverage of large UK banks and the change in the leverage of small UK banks to the difference between the change in the leverage of large, say, US banks and the change in the leverage of small US banks. This estimator is robust to both country-specific and bank-size-specific shocks to capital structure over the sample period but becomes invalid in the presence of shocks specific to certain bank sizes in certain countries, e.g. confounding factors that reduced the leverage of small US banks but had no impact on the leverage of large US banks and small UK banks.

Finally, there is variation in the tax rates applied in the different countries that have implemented a bank levy. An empirical strategy that simultaneously exploits all available sources of variation would be a panel equation of the following form:

$$\text{leverage}_{it} = \alpha + \beta \text{taxrate}_{it} + \delta_i + \gamma_t + \varepsilon_{it}$$

where  $i$  refers to individual banks and  $t$  refers to the time period. This model may be augmented with the lagged dependent variable to account for sluggishness in the capital structure responses to tax changes. Moreover, the tax effect can be identified conditional on country-time fixed effects  $\mu_{ct}$  and bank-size-time fixed effects  $\lambda_{st}$  where  $c$  refers to individual countries and  $s$  refers to an interval of bank sizes. The tax rate is endogenous to bank responses in countries with progressive rates, but may be instrumented with the tax rate that would have applied absent behavioral responses to the tax following standard techniques in the public finance literature (Gruber and Saez, 2002).

## Data

The Bankscope database maintained by the Bureau Van Dijk comprises financial data for the 8,000 largest European banks. The financial data includes useful decompositions of the various balance sheet items. For instance, liabilities are broken down on maturity (long term vs short term) and on the sector of the counterpart (retail vs. interbank); total capital is broken down on equity, debt and hybrid instruments; total debt is broken down on maturity (short-term debt vs. long-term); and total assets are broken down on interbank loans, other loans, derivatives and securities.

The database allows us to construct various measures of leverage as well as measures of the (marginal) tax rate on different types of borrowing (long term vs. short term).

The data are proprietary but my collaborators at Oxford University have acquired an online access for the year 2012. The proposed budget allows for a repurchase of the online access for the year 2013.

## Research Team

The research project is joint with *Michael Devereux*, Director of the Oxford University Centre for Business Taxation and of Business Taxation; and *John Vella*, Senior Research Fellow at the Oxford University Centre for Business Taxation.

### **Publication strategy**

There are four reasons why we expect the research project to have considerable publication potential. First, the general research topic, the efficacy of policies aiming to prevent future financial crisis, is very high on the policy agenda. Second, the more specific topic, the effect of taxes on bank capital structure is severely underresearched. Third, the research team comprises a unique combination of researchers in the two relevant fields, economics and law. Finally, the simultaneous policy reforms in many different countries provides a very rich natural experiment allowing for a relatively clean identification of the tax effect on bank capital structure.

In this light, it is our aim that the research project results in a paper that is suitable for submission to a top journal such as the *Journal of Finance* or a top-field journal such as the *Journal of Public Economics* or the *Journal of Money, Credit and Banking*.

### **References**

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