Working Paper Series

No 53 / August 2017

Two big distortions: bank incentives for debt financing

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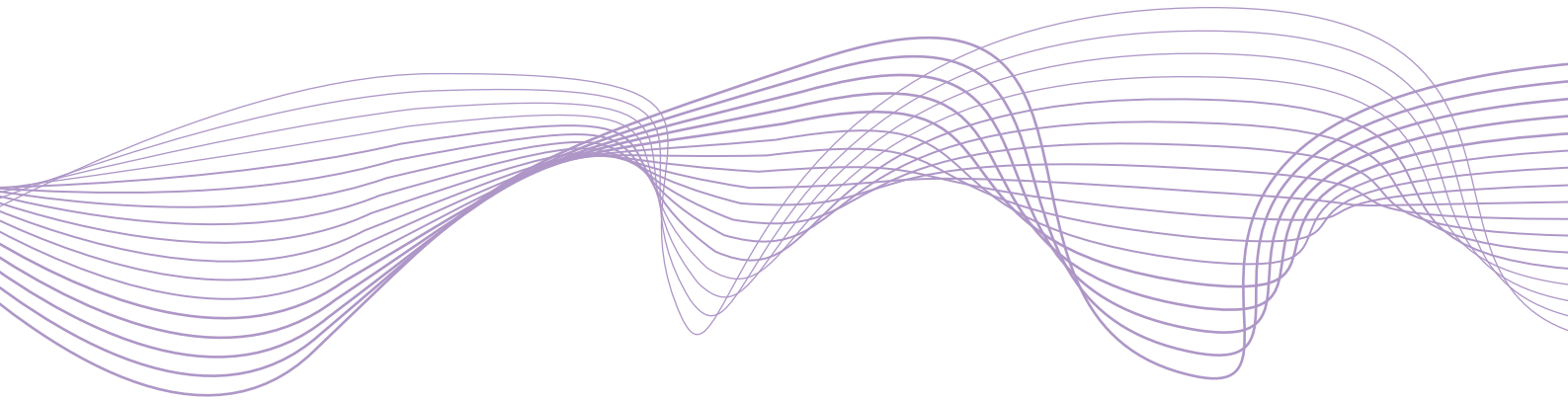

ESRB
European Systemic Risk Board
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ABSTRACT

Systemically important banks are subject to at least two departures from the neutrality of debt versus equity financing: the tax deductibility of interest payments and implicit funding subsidies. This paper fills a gap in the literature by comparing their mechanism and interaction within a common analytical framework. Findings indicate that both the tax shield and implicit funding subsidy remain large, in the order of up to 1 percent of GDP, despite decreases in recent years. But the underlying mechanisms differ. The tax shield incentivises debt financing as it reduces tax payments to the government. The implicit funding subsidy incentivises debt financing as it lowers private bankruptcy costs. This funding subsidy is passed on to other bank stakeholders. It therefore provides incentives for increases in balance sheet size and risk taking. This, in turn, increases the value of the tax shield. Overall, these results help to explain why systemically important banks are highly leveraged.

JEL codes: G21, G32, H25
Keywords: taxation, subsidies, debt, leverage.

1 Introduction

Every standard textbook in corporate finance covers Modigliani-Miller proposition 1 (MM-1): capital structure does not influence firm value. And it will explain how tax deductibility of interest payments leads to a departure from MM-1: more debt financing generally increases firm value. In the past, many estimates have been made of the size of this so-called 'tax shield'. More recent empirical research shows that higher corporate income tax rates lead to more debt financing, both for banks and for the corporate sector as a whole (e.g. de Mooij and Keen, 2016). Insofar as banks are affected, this increases the likelihood of financial crises (de Mooij et al., 2014).

Banks differ from other firms in that they are subject to an additional departure from the neutrality of debt versus equity financing: implicit funding subsidies for banks that are considered too-big-to-fail. The literature includes empirical estimations of funding advantages, e.g. of up to 100 basis points (IMF, 2014) and discussions of possible effects on balance sheet structures (Morrison, 2011).

Until now, the literature has focused almost exclusively on these incentives for debt financing in isolation. But the overall incentive effect for banks will be determined by the interaction of different taxes and subsidies together; they may reinforce or offset each other depending on their size, direction and base. This study aims to fill this gap in the literature. We analyse the sizes, mechanism and interactions of the tax shield and the implicit subsidy in a common analytical framework.

Our main findings are the following. First, we find that the sizes of the tax shield and implicit funding subsidy are large and have the potential to influence bank behaviour. The size of the tax shield lies in the order of 1 to 2 percent of GDP in 2009-2010 and between 0.3 and 0.9 percent of GDP more recently, as interest rates have declined. The implicit subsidy for too big to fail banks has also been substantial, peaking around 2009 and 2012, and still amounts to nearly 1 percent of GDP in some countries in recent years.

Second, the tax shield and implicit subsidy can both be integrated in standard trade-off theory. Theory predicts that these incentives increase debt financing, respectively by increasing the value of the tax shield and by lowering private bankruptcy costs. Debt financing increases firm value as it reduces the amount of tax a bank pays to the government. The implicit subsidy provides an incentive for debt financing given that bondholders demand a lower risk premium, as part of the default risk is shifted to the government. This subsidy can be passed on to other debt holders (i.e. expanding debt capacity), to asset holders (i.e. expanding the asset side; taking on riskier assets) or equity holders (i.e. directly

increasing return on equity). The two incentives also interact: as the implicit subsidy stimulates debt financing, it further increases the value of the tax shield. As a result, both effects help to explain why systemically important banks have an incentive to grow in size and remain highly leveraged.

Our paper builds on the (separate) strands in the literature on the role of taxation in banking and the implicit subsidy on debt financing. To start with the former, the consensus is that corporate taxation, and specifically the tax deductibility of interest payments, influences the financing decisions of corporations.[1] In recent years, research has looked at the effects of taxation on the capital structure of financial firms (Gropp and Heider, 2009). Such firms were previously excluded from studies on corporate taxation and capital structure because their financing decisions were assumed to depend mainly on mandatory capital buffers and not on tax incentives. However, several recent empirical studies suggest that taxation does affect bank leverage. Keen and de Mooij (2012), Heckemeyer and de Mooij (2013), Langedijk et al. (2014), Hemmelgarn and Teichmann (2014) and Luca and Tieman (2016) all find substantial effects of taxation on the financing structure of banks.

The literature finds that the implicit subsidy is also an important driver of banks' decisions about their capital structure. IMF (2014) and Morrison (2011) analyze the incentive effects for banks that are too big to fail. They stress that the price of debt becomes relatively risk insensitive, due to the implicit guarantee to debt holders. Banks therefore have an incentive to take on higher levels of cheap debt, and invest it in riskier assets that benefit shareholders. In sum, IMF (2014) argues that too-big-to fail funding subsidies reflect cheaper debt, and therefore lead to more leverage, more risk-taking, a larger balance sheet, and more systemic risk to society as a result. Implicit subsidies on debt are also cited as a major reason why banks are much more leveraged than regular, non-financial companies, although both have the same theoretical financial benefits from the tax shield. Admati et al. (2015) argue that implicit subsidies on debt soften creditors' incentive to restrict leverage through covenants or high interest rates. Moreover, once debt is in place, bringing back debt makes the remaining debt safer, and therefore represents a transfer of wealth from shareholders to the government or debt holders. Existing shareholders will therefore resist decreasing leverage once it is in place. Aside from taxes and explicit and implicit guarantees, agency distortions can also play a role in incentivizing banks toward using more debt financing (Admati and Hellwig, 2013).

[1] For an overview of the literature, see Auerbach (2002) or Graham (2006).

The remainder of this paper is organized as follows. Section 2 looks at the size of the tax shield and implicit funding subsidy, using a common denominator by expressing them as a percentage of GDP. Section 3 compares the underlying mechanisms by which the tax shield and the implicit subsidy affect finance structures. Section 4 puts our findings in a broader perspective.

2 Size

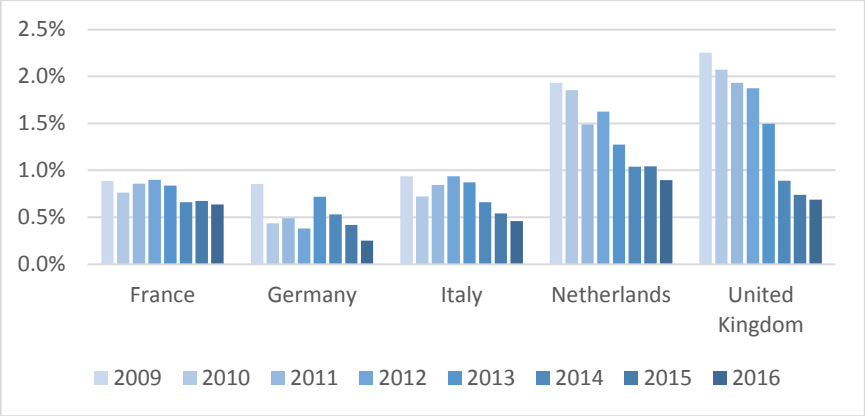
The tax shield can be measured as the increase in yearly cash flow due to tax advantages from debt financing, relative to an unlevered firm.[2] It should not be interpreted as a direct transfer of resources. If the bank is profitable, it still pays taxes to the government, but the tax shield indicates that it reduces its tax bill by using debt financing.[3] Moreover, the tax shield does not measure the overall tax pressure in a more complete framework. This would have to take into account the tax treatment of interest payments on the receiving side as well. There are some studies which show that higher personal income tax rates on interest relative to dividends and capital gains reduce leverage ratios (Lin and Flannery, 2013). But a significant share of investments is sheltered from personal income taxes, such as those by institutional investors who are tax exempt (IMF, 2016). Moreover, investors can find ways to escape taxes through international tax arbitrage. In practice, the largest share of bank wholesale funding is held by institutional investors.

The tax shield can be calculated by multiplying interest payments on debt with the applicable corporate income tax rate. As an illustration, we do this for the banking sector as a whole of five countries: France, Germany, Italy, the Netherlands and the United Kingdom (UK). Our sample spans the period 2009-2016. The results are in Figure 1. See Box 1 for further information on data sources and our calculation method.

[2] By calculating the net present value of all future cash flows, it can also be expressed in terms of firm value.

[3] On the other hand, if a bank is not profitable, it does not pay corporate income tax and hence it also does not benefit from the tax shield.

Figure 1. Size of the tax shield per banking sector (as a percentage of GDP)

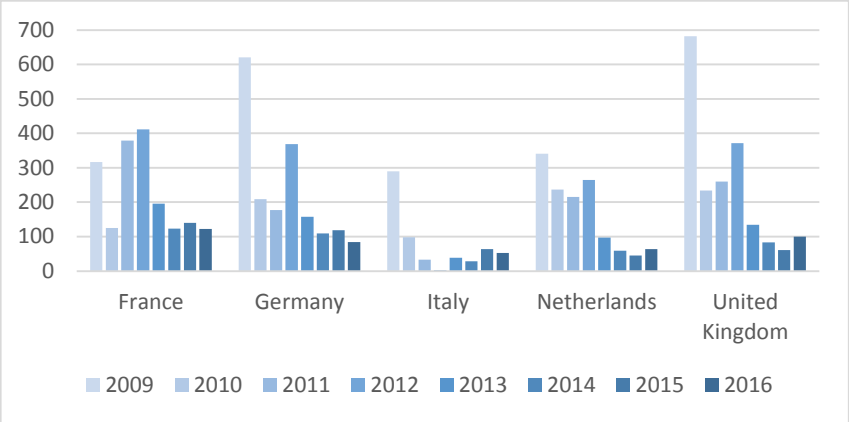


Results indicate that the tax shield ranged from roughly 0.3 percent of GDP in Germany in 2016 to over two percent of GDP in the United Kingdom in 2009. These results are broadly in line with estimations by The Economist (2015), which arrives at an estimate of 0.7 percent of GDP for the financial sector in the euro area. As expected, our results show that the size of the tax shield has declined over the past few years due to lower interest rates and decreases in the size of banks.[4] But its remains large, providing a substantial stimulus for debt financing.

The implicit funding subsidy is the decrease in funding costs due to an implicit guarantee from the government. The funding cost reduction follows from the expectation that the government would provide support to the bank in case of a possible bankruptcy, due to the externalities of such an event to the rest of the financial system. We use the same sample of countries for estimating the size of the implicit subsidy, considering the period 2009-2016. Figure 2 shows substantial effects of the implicit subsidy in terms of basis points. See Box 2 for further information on the data and the estimation method.

[4] To assign the tax shield to the proper country, we use interest payment data from the BIS locational banking statistics (See also Box 1). Since these are interest payments data, it is difficult to say whether the decline in the tax shield is due to lower rates or smaller balance sheets.

Figure 2. Size of implicit funding subsidy per banking sector (in basis points)

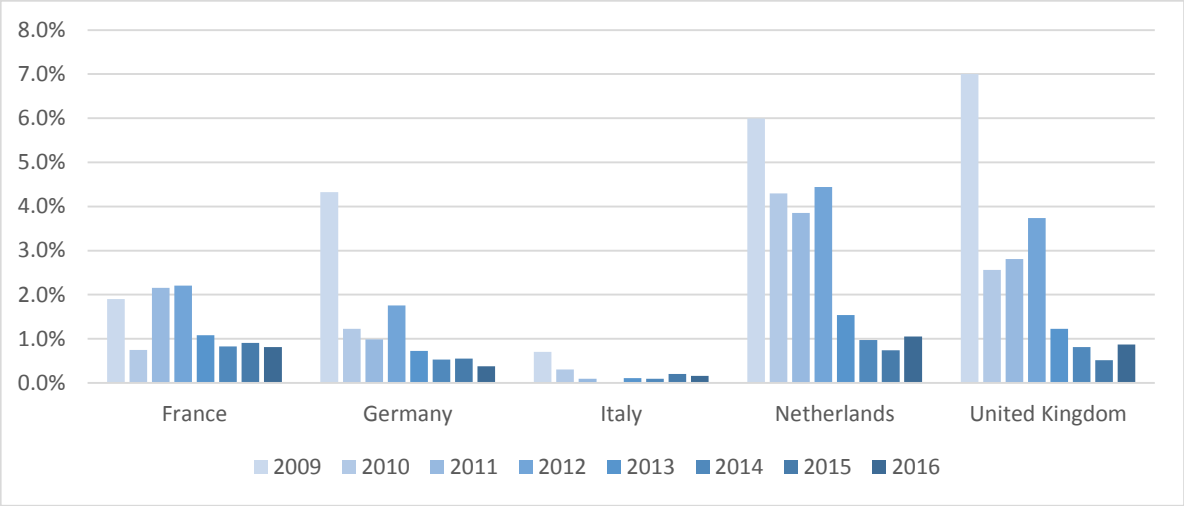


A first peak appears in 2009. At that time, market sentiment was rather risk-averse, leading to exploding implied yields for bonds with low investment ratings. A few banks in our sample were perceived by markets as on the brink of insolvency in 2009. These banks were strongly supported (or de facto nationalized) by their sovereigns. Thus, especially for this year, a significant gap emerged between the stand-alone rating and the support rating. Moreover, we observe a second peak in 2012, at the height of the sovereign debt crisis. This is followed be a strong decline in recent years, as systemic risk has receded and possibly also due to the introduction of bail-in regimes.

Values for recent years generally match the values found in the literature on the implicit subsidy. IMF (2014) estimates the funding advantage to be approximately 60-90 basis points in 2014. Germany and France generally have slightly higher values than the Netherlands and the United Kingdom. The funding advantage for Italian banks is relatively small due to the relatively low credit rating of the sovereign, which mechanically translates into a low funding advantage. The implicit funding advantage of Italian banks is therefore also low.

Finally, we calculate the size of the implicit subsidy as a percentage of GDP. See Figure 3. Calculation details are again in Box 2.

Figure 3. Size of implicit subsidy per banking sector (as a percentage of GDP)



Results as presented in Figure 3 show broadly the same time pattern as in Figure 2, and the same relative differences across countries. By 2016, the estimated size of the implicit subsidy remains large, as it ranges between 0.4 and 1% of GDP in most countries. Its size is of the same order of magnitude as the tax shield estimates in Figure 1, confirming its relevance for affecting bank behaviour.

Box 1. Data sources and calculation method – Tax shield

For calculating the tax shield, we use consolidated banking data from the ECB, supplemented with data on interest payments from BIS locational banking statistics. Data on CIT rates are from the OECD tax database. Interest payments are usually reported at the consolidated level but are deductible against taxes paid nationally, which poses a challenge. To illustrate this issue, consider a bank with headquarters in country A that has a subsidiary in country B. While the bank's interest payments are reported as consolidated in country A, taxes on the foreign subsidiary are levied by the foreign authorities in country B at the level of this entity. Interest payments by this subsidiary, therefore, are deductible against taxes paid in country B and should be attributed to the tax advantage that country B provides to its banking sector.

As a result, the size of the tax subsidy should be calculated by taking the geographic orientation of the banking system in each country into account. We solve this issue by using interest payments data from BIS locational banking statistics that are at the entity level.

Box 2. Data sources and calculation method – implicit subsidy

The implicit funding subsidy cannot be observed directly, but needs to be estimated. Different methods have been used in the literature for doing so, which all have their pros and cons (Kroszner, 2013; see Schich and Lindh, 2012, and Ueda and Weder di Mauro, 2013, for different approaches).

In our approach, we compare the 'standalone ratings' for a sample of large banks for which ratings are available with the 'support ratings' that include the expected government support. For our calculations of the implicit funding subsidy, we use Moody's Long Term Issuer Credit Ratings and Baseline Credit Assessment (BCA) Ratings from SNL Financial.

Subtracting the spread associated with the Long Term Issuer Credit Rating (support rating) from the spread associated with Moody's Baseline Credit Assessment Rating (standalone rating) in a given year yields the funding cost advantage for a given bank in that year. We average the yearly funding cost advantages for large banks in each country to arrive at annual estimates of the implicit funding subsidy per country. We do this for a representative sample of 18 major banks in the aforementioned five European countries for which ratings are available. We derive the average annual funding costs for those ratings by using Merrill Lynch bond spread indices from Bloomberg. As rating agencies started providing separate stand-alone and support ratings a few years ago, our sample spans the years since 2009.

We also have to estimate the ratings-sensitive funding base of large banks. As also mentioned by Noss and Sowerbutts (2012), some judgement is involved in determining which part of the debt base can be considered as ratings-sensitive. As stated above, it is commonly understood that debt at shorter maturities will be less sensitive than longer term debt. For our estimation, we include 50 percent of deposit funding (as about 50 percent of deposits are guaranteed under the deposit guarantee system) and 85 percent of regular securities issued (as about 15 percent of securities has a maturity shorter than one year). Moreover, we adjust for the share of the five largest banks in each country, as a proxy for systemically important banks. By multiplying this funding base with the average annual funding cost advantage per country we arrive at an estimate in euros of the implicit subsidy, which can be compared with the nominal size of GDP for the countries in our sample.

3 Mechanism

According to the trade-off theory of capital structure, firms weigh the present value of interest tax shields against the costs of financial distress, which both increase with debt financing (Myers, 1984):

Value of firm=value if all equity financed + PV(tax shield) - PV(costs of financial distress)

Implicit funding subsidies for too-big-to fail banks reflect risk shifting to the government, as reflected in the funding subsidy, and hence lower private bankruptcy costs. This predicts that systemically important banks will use a high degree of debt financing, and more debt financing than banks that are not systemically important. The European Systemic Risk Board (2015, p. 19) provides anecdotic evidence for both points. On average globally systemically important banks operated at 96.3 per cent debt financing at the end of 2013, somewhat higher than 95.5 per cent of average debt financing for banks that are not systemically important.[5]

In studying the underlying incentive mechanisms, we start from the standard assumption that firms maximise their overall value, and hence their cash flows, which are assumed to be perpetual for simplicity. We also assume perfect information and efficient markets, and no agency costs. The starting point is a neutral benchmark, in which interest payments are non-deductible, and no implicit subsidy exists.

Setup

We start with the most basic balance sheet, where *A* is total assets, *E* is equity, D^{st} is short-term debt and D^{lt} is long-term debt, see Table 1. Short-term debt has a maturity of less than one year and long-term debt has a maturity of more than one year. We assume that the funding cost advantage does not apply to short-term debt. The probability of default in a period of one year or less is very low, and thus independent of the systemic relevance of the bank (Bijlsma and Mocking, 2013).

[5] ESRB (2015) recommends higher leverage constraints for systemically important banks, as the negative externalities from their distress or failure are more severe than for other banks.

Table 1. Basic bank balance sheet

Assets	Liabilities
A	*E*
	D^{st}
	D^{lt}

Assume a bank's gross earnings on its assets *A* (i.e. before interest and taxes) are *x*. The interest rate on short-term and long-term debt funding is r_{st}^d and r_{lt}^d respectively, where $r_{st}^d < r_{lt}^d$, and the corporate tax rate on earnings is *t*. Under a neutral tax regime, earnings, or *x*, would be taxed in their entirety first and then redistributed to the holders of *E*, D^{st} and D^{lt}.

The cash flow to the bank's financiers then consists of these parts:

- To debt holders: $r_{st}^d D^{st}$ and $r_{lt}^d D^{lt}$
- To shareholders, as residual claimants: $(1-t)x - r_{st}^d D^{st} - r_{lt}^d D^{lt}$

Total after-tax earnings can be calculated by adding up the different parts of the cash flow. They are:

$$(1-t)x \qquad [1]$$

The bank cannot increase the total cash flow to its financiers by changing the debt equity mix in the funding structure.

Deductibility of interest payments

We now assume that interest payments can be deducted from earnings before corporate income tax is levied. This implies that the tax base will decrease when more debt is used instead of equity. The cash flows to a bank's financiers are:

- To debt holders: $r_{st}^d D^{st}$ and $r_{lt}^d D^{lt}$
- To shareholders *E*: $(1-t)(x - r_{st}^d D^{st} - r_{lt}^d D^{lt})$

As before, adding up these parts gives the after-tax earnings:

$$(1-t)\left(x - r_{st}^d D^{st} - r_{lt}^d D^{lt}\right) + r_{st}^d D^{st} + r_{lt}^d D^{lt}$$

$$= (1-t)x + t r_{st}^d D^{st} + t r_{lt}^d D^{lt} \qquad [2]$$

Compare this expression to after-tax earnings in the absence of interest payment deductibility, see equation [1]. The last two, additional, terms are the tax shield, or reduction in taxable income for an individual bank. Given that debt *D* is a choice variable, the bank can reduce its tax payments, and increase its after-tax earnings, by increasing *D*. In sum, taxes take away the irrelevance of capital structure and a firm benefits from increasing leverage.

Implicit subsidy

The implicit subsidy works differently. Funding costs are lower, as bondholders require a lower risk premium due to risk shifting to the government. If the bank would not react, equity holders would benefit by getting a higher return. As a result, given gross earnings would be distributed differently: less to bondholders and more to equity holders. Given that these flows cancel out, there would be no effect on overall cash flows. However, this result would differ if returns on equity are taxed, as in our previous case. The overall cash flow would now be lower, as a shift in return from bondholders to equity holders increases the tax bill.

The bank therefore has an incentive to use the funding subsidy in a different manner. It can use part of this funding advantage to increase the return to debt holders, increase debt funding and thereby expand its balance sheet. Likewise, the bank can also pass on part of the subsidy to its customers, cheapening the cost of mortgages, other bank loans or trading activities relative to its competitors, and thereby attracting more business. Both effects would imply a debt-funded increase of the total balance sheet.

We now include these effects in the same framework as before. As indicated, the implicit subsidy is assumed to apply only to long-term debt. We denote the implicit subsidy (effectively a rate reduction on long-term bank debt) by r^s. This implicit subsidy gives systemically important banks a funding advantage over banks that are not systemically important, i.e. the required return on long-term debt is lower.

The banks can choose to pass on the funding advantage to different stakeholders. The implicit subsidy is used to increase the return to short-term debt (with a share of α_1), long-term debt (α_2), or decrease the rates charged on assets (α_3). Equity holders get the residual share α_4, with $\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 = 1$. Subscripts *s* indicate that the subsidized bank will have more assets, more debt and hence higher gross earnings, apart from the special case in which all the funding subsidy would be distributed immediately to shareholders (i.e. $\alpha_1 = \alpha_2 = \alpha_3 = 0$).

The cash flow to the bank's creditors is now:

- To short-term debt holders: $r_{st}^d D_s^{st} + \alpha_1 r^s D_s^{lt}$
- To long-term debt holders: $r_{lt}^d D_s^{lt} - r^s D_s^{lt} + \alpha_2 r^s D_s^{lt}$
- To asset holders $\alpha_3 r^s D_s^{lt}$
- To shareholders: $(1-t)(x_s - r_{st}^d D_s^{st} - r_{lt}^d D_s^{lt} + \alpha_4 r^s D_s^{lt})$

After tax earnings are:

$$(1-t)x_s + t r_{st}^d D_s^{st} + t r_{lt}^d D_s^{lt} - t\alpha_4 r^s D_s^{lt}$$

This result, a larger balance sheet and therefore higher after-tax earnings, is in line with IMF (2014) and Morrison (2011) who argue that that the overall effect of the implicit funding subsidy will be an increase in the size of the balance sheet, and thereby an increase in gross earnings x_s. The final term is a secondary effect: insofar the funding subsidy is passed on to equity holders it will be subject to taxation. As indicated already, this provides an incentive to pass on the funding subsidy to debt and asset holders, thereby enlarging the balance sheet. Moreover, as the bank holds more debt, the size of the tax shield will also be larger. As a result, the implicit funding subsidy increases the size of the tax shield.

4 Conclusion

This paper has investigated the size of the tax shield and implicit subsidy, and their incentive effects. We find that the sizes of the tax shield and implicit funding subsidy are large, and hence their potential to influence bank behaviour is also large. The size of the tax shield lies in the order of 1 to 2 percent of GDP in 2009-2010 and between 0.3 and 0.9 percent of GDP recently, as interest rates have declined. The implicit subsidy for too big to fail banks has also been substantial, peaking around 2009 and 2012, and still amounts to nearly 1 percent of GDP in some countries in recent years. Moreover, while both effects provide an incentive for debt financing the underlying mechanisms differ.

The tax shield provides an incentive for debt financing since it reduces the amount of tax the bank pays to the government. And the implicit subsidy provides an incentive for debt financing given that bond holders demand a lower risk premium, as part of the default risk is shifted to the government. This subsidy can be passed on to the other debt holders (i.e. expanding debt capacity), to asset holders (i.e. expanding the asset side; taking on riskier assets) or equity holders (i.e. directly increasing return on equity). As the implicit subsidy stimulates debt financing, it further increases the value of the tax shield.

As a result, both effects help to explain why systemically important banks have an incentive to grow in size and remain highly leveraged.

There are several options for future research. Our paper has focused on the private costs and benefits of debt financing only. One avenue for follow-up research would be to integrate these in a social perspective. Excessive debt financing by banks produces negative external effects: e.g. increased vulnerability to bank runs and amplification of asset price shocks. A social perspective would take these broader, external costs into account.

Another option for future research is to integrate more debt incentives into a common framework. Our research has started with the assertion that the overall incentive effects for debt financing follows from the interaction of the individual taxes and subsidies. We have made a first attempt at an integrated approach, but there are other incentives that we have not included. For example, we have focused on the liabilities side only, ignoring asset-side taxation distortions such as those related to mortgage debt and income tax on dividend payments. We also did not include the costs and benefits of bank levies, deposit guarantee systems (DGS) and resolution funds.

A final avenue for research would be to explore policy options for neutralizing the debt bias, as capital regulation and the incentives as discussed in this paper go in opposite directions. The options for a more equal fiscal treatment of debt and equity financing are well-known (Bond, 2000; de Mooij and Devereux, 2011). In addition, governments have instituted bank taxes in recent times to specifically target bank leverage (Devereux et al., 2013). And different policies, including bail-in, have been implemented to limit the implicit subsidy (FSB, 2011; DNB, 2015). An integrated view on the different debt incentives requires an integrated policy approach, however. This would assure that key factors affecting the financing choices of banks work in the same direction.

References

Admati, A.R. and M. Hellwig. 2013. The Banker's New Clothes: What's Wrong with Banking and What to do About it. Princeton University Press.

Admati, A.R., P.M. DeMarzo, M. Hellwig and P. Pfleiderer. 2015. The Leverage Ratchet Effect. Stanford Business School of Graduate Working paper 3029.

Auerbach, A.J. (2002). Taxation and Corporate Financial Policy. Handbook of Public Economics.

Bijlsma, M.J. and R.J.M. Mocking. (2013). The Private Value of Too-big-to-fail Guarantees. CPB Discussion Paper 240.

Bond, S.R. 2000. Levelling Up or Levelling Down? Some Reflections on the ACE and CBIT Proposals, and the Future of the Corporate Tax Base. in *Taxing Capital Income in the European Union*, S. Cnossen (ed.), Oxford: Oxford University Press.

Devereux, M.P., N. Johanessen and J. Vella. 2013. Can Taxes Tame the Banks? Evidence from the European bank levies. Oxford University Centre for Business Taxaxtion Working Paper 13/25.

DNB. 2015. Overview of Financial Stability, Spring 2015, Chapter 3: Ending Too-big-to Fail? De Nederlandsche Bank, Amsterdam.

ESRB. 2015. The ESRB Handbook on Operationalising Macroprudential Policy in the Banking Sector. Addendum: Macroprudential Leverage Ratios. European Systemic Risk Board, Frankfurt.

FSB. 2011. Policy Measures to Address Systemically Important Financial Institutions. Financial Stability Board, Basel.

Graham, J.R. 2006. A Review of Taxes and Corporate Finance. *Foundations and Trends in Finance* 1(7): 573-691.

Gropp, R. and F. Heider. 2009. The Determinants of Bank Capital Structure. *Review of Finance* 14(4): 587-622.

Heckemeyer, J. And R. de Mooij, R. 2013. Taxation and Corporate Debt: Are Banks any Different? IMF Working Paper 13/221.

Hemmelgarn, T. & Teichmann, D. 2014. Tax Reforms and the Capital Structure of Banks. *International Tax and Public Finance* 21(4): 645-693.

IMF. 2014. Global Financial Stability Report, April, Chapter 3: How big is the Implicit Subsidy for Banks Considered Too Important to fail? International Monetary Fund, Washington.

IMF. 2016. Tax Policy, Leverage and Macroeconomic Stability, IMF Staff Paper.

Kroszner, R. 2013. A Review of Bank Funding Cost Differentials. Published at Booth School of Business, University of Chicago.

Langedijk, S., G. Nicodeme, A. Pagano, and A. Rossi. 2014. Debt Bias in Corporate Taxation and the Costs of Banking Crises in the EU. European Commission Taxation Papers 50.

Lin and Flannery. 2013. Do personal taxes affect capital structure? Evidence from the 2003 tax cut. Journal of Financial Economics. 109(2): 549-565.

Luca and Tieman. 2016. Financial Sector Debt Bias. IMF Working paper 16/217.

Mooij, R. de and M. Keen, 2016. Debt, Taxes and Banks. *Journal of Money, Credit and Banking* 48(1), 5-33.

Mooij, R de and M.P. Devereux. 2011. An Applied Analysis of ACE and CBIT reforms in the EU. *International Tax and Public Finance* 18(1): 93-120.

Mooij, R. de, M. Keen and M. Orihare. 2014. Taxation, Bank Leverage and Financial Crises, Chapter 11 in *Taxation and Regulation of the Financial Sector*, de Mooij and Nicodeme (ed), MIT Press.)

Morrison, A. 2011. Systemic risks and the 'Too-big-to-fail' Problem. *Oxford Review of Economic Policy* 27(3): 498-516.

Myers, S.C. 1984. The Capital Structure Puzzle. *Journal of Finance* 39(3): 575-592.

Noss, J. and R. Sowerbutts. 2012. The Implicit Subsidy of Banks. Financial Stability Paper 15.

Schich, S. and S. Lindh, S. 2012. Implicit Guarantees for Bank Debt: Where do we Stand? OECD Journal: Financial Market Trends 1.

The Economist. 2015. Tax-free debt: The great distortion.

Ueda, K. and B. Weder di Mauro. 2013. Quantifying Structural Subsidy Values for Systemically Important Financial Institutions. *Journal of Banking and Finance* 37(10):3830-3842.

Imprint and acknowlegements

We thank, without implicating them, Jack Bekooij, Paul Hilbers, Mark Mink, Robert Mosch, Dirk Schoenmaker, two anonymous referees and participants at seminars at the Netherlands Economists Day, the Dutch Ministry of Finance and De Nederlandsche Bank. The usual disclaimer applies.

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ISSN	2467-0677 (online)
ISBN	978-92-95210-40-0 (online)
DOI	10.2849/49060 (online)
EU catalogue No	DT-AD-17-020-EN-N (online)