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Tax Biases to Debt Finance: Assessing the Problem, Finding Solutions

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EXECUTIVE SUMMARY

Most tax systems today contain a "debt bias," offering a tax advantage for corporations to finance their investments by debt. This has grown increasingly hard to justify. One cannot compellingly argue for giving tax preferences to debt based on legal, administrative, or economic considerations. The evidence shows, rather, that debt bias creates significant inequities, complexities, and economic distortions. For instance, it has led to inefficiently high debt-to-equity ratios in corporations. It discriminates against innovative growth firms, impeding stronger economic growth. Debt bias also threatens public revenues, because it enables companies to reduce tax liabilities by using hybrid financial instruments as well as by restructuring their finances internally, moving debt between affiliates.

These traditional distortions of debt bias have long been recognized. Yet, recent developments suggest that its costs to public welfare are larger—possibly much larger—than previously thought. Companies appear to be responding to the incentives of debt bias more over time, so the associated cost to public welfare has been rising. The economic crisis has also made clear the harmful economic effects of excessive levels of debt in the banking sector, especially due to the systemic effects of bank failure. These insights make it more urgent to tackle debt bias by means of tax policy reform.

What can be done to mitigate debt bias in the tax code? In a nutshell, it will require either reducing the tax deductibility of interest or introducing similar deductions for equity returns. A number of countries have already opted to reduce interest deductibility. But such restrictions on deductions do not eliminate debt bias altogether, and they bring considerable new complexities and opportunities for tax avoidance. Abolishing interest deductibility would indeed eliminate debt bias, but it would also introduce new distortions into investment, and implementing it would be very difficult. For these reasons, no country has moved toward eliminating the deduction.

The second option, introducing a deduction for corporate equity, has better prospects. This involves, for example, granting firms a deduction for the normal return on equity equal to the rate of government bonds. Apart from eliminating debt bias, such an allowance would bring other important economic benefits, such as increased investment, higher wages, and higher economic growth. The main obstacle is probably its cost to public revenues, estimated at around 0.5 percent of GDP for an average developed country. This cost could be reduced in the short run by granting the allowance only to new investment. In the long term, the budgetary cost is expected to be significantly smaller, since the favorable economic effects of the policy change would broaden the overall tax base. And in fact, a number of countries have successfully introduced variants of the allowance for corporate equity, suggesting that it is not only conceptually desirable but also practically feasible.

I. INTRODUCTION

Tax systems typically favor corporate debt over equity, especially because interest payments are deductible for corporate income tax purposes while equity returns are not. This leads to a tax-induced bias toward debt finance. While tax specialists have long recognized this "debt bias," its economic costs might be larger than previously thought for a number of reasons. First, debt bias has acquired more urgency in light of the economic crisis. The general view of experts has been that the bias was not a major cause of the financial crisis (see e.g., Slemrod, 2009; Lloyd, 2009; Keen and others, 2010; Hemmelgarn and Nicodeme, 2010). Yet, by contributing to the excessive leverage of firms, it might well have deepened the crisis.

Second, debt bias erodes corporate tax bases. This concern has grown with the development of hybrid financial instruments and the increasing importance of multinationals engaging in international tax planning. Third, concerns of debt bias in the financial sector have grown. In its report to the G-20 on financial sector taxation, the IMF noted that the deep-rooted debt bias in G-20 countries may have resulted in financial firms taking on too much risk and made the banking sector inefficiently large (IMF, 2010; Claessens and others, 2010). These concerns have put debt bias on the policy agenda of many developed countries.

There are several policy options to mitigate the debt bias of taxation. A number of countries have imposed restrictions on the tax deductibility of interest, e.g., through thin-capitalization rules. These measures, however, have not eliminated debt bias and considerably complicate corporate tax regimes. More comprehensive reforms involve either a system that disallows the exemption of interest, or a system with an allowance for corporate equity, granting firms a deduction for the normal return on equity equal to the rate of government bonds. Recently, Belgium and Latvia have moved in this latter direction.

This note presents the latest analysis and insights into the distortions of debt bias. It also elaborates on the properties of reforms to address them. In discussing debt bias, we consider the impact on different types of firms, such as non-financial firms, multinationals, and financial institutions, each with different welfare implications. We primarily discuss the issue in developed countries where debt bias is most debated and to which almost all empirical work refers. This is not to say that debt bias is irrelevant for less developed countries. However, it is less well understood in the context of underdeveloped capital markets.

The rest of this note is organized as follows. Section II outlines the distortionary impact of tax systems on the choice between debt and equity. Section III reviews recent empirical evidence on debt bias. Section IV discusses potential rationales, while Section V demonstrates its likely welfare costs. Section VI discusses policy options before Section VII concludes.

II. THE BIAS TOWARD DEBT IN CURRENT TAX SYSTEMS

Income tax systems almost always contain a bias toward debt. Corporate income taxes (CIT) generally allow a deduction of interest payments when determining taxable profits.

The return on equity—whether dividends paid to shareholders or capital gains on shares—is typically not deductible. For domestic investors who are subject to personal income tax (PIT) on their capital income, taxes on interest mitigate this tax advantage of debt. Taxes on capital gains and dividends magnify debt bias.[2] On balance, debt usually remains tax favored, both for PIT-exempt and for PIT-taxed investors. Table 1 presents calculations of the cost of capital—the required pre-tax return on an investment that just breaks even after-tax— for investments financed by debt, retained earnings, and new equity for 2007 in the U.S., Japan and the EU-27 (unweighted average and range between lowest and highest). In the absence of taxation, the cost of capital is assumed to be 5 percent. Taxes will generally raise the cost of capital above this level.[3] The table contains three important messages.

- **In all three regions, the cost of equity-financed investment is higher than that of debt-financed investment.** This holds for both PIT-exempt and PIT-taxed investors. The difference is especially large in Japan, where CIT rates are high[4] and the PIT does not mitigate the tax advantage of debt.

- **The bias toward debt is generally smaller for PIT-taxed investors than for PIT-exempt investors, but it is significant for both.**[5] The difference between investors is especially large in the US, where PIT rates on dividends and capital gains are substantially lower than PIT rates on interest income. In Japan, dividends are taxed at a higher rate than interest so that the opposite holds.[6]

- **In the EU and the US, debt is subsidized at the margin.** Indeed, the pre-tax return necessary to make a debt-financed investment just profitable is lower than the assumed post-tax return of 5 percent. One reason for this marginal subsidy is accelerated depreciation for tax purposes—i.e., faster than economic depreciation—

[2] Other aspects of the tax code matter in the bias toward debt. For instance, non-debt tax shields, such as fiscal depreciation allowances and loss-offset rules, can reduce the value of the interest deduction since firms may run into taxable losses. Moreover, imputation systems (applied in e.g., Canada and Australia) mitigate the double taxation of dividends by providing a credit in the PIT for the CIT already paid.

[3] The cost of capital on equity is generally lower for PIT-taxed investors than for PIT-exempt investors. The reason is that the investment is compared to risk-free government bonds, which are subject to PIT on interest. For that reason, we also observe that the cost of capital on debt does not differ between PIT-exempt and PIT-taxed investors.

[4] As of January 2011, Japan has cut its CIT rate from 40 to 35 percent.

[5] In many countries, the relevance of the PIT is small because the lion's share of investment is financed by foreign investors and PIT-exempt investors, such as pension funds or charitable foundations. If the marginal provider of funds is PIT-exempt, the relevant indicator for corporate finance decisions is based on CIT alone.

[6] Some individuals in some countries have a tax preference for equity as top PIT rates on interest are high relative to those on dividends and capital gains. This holds, for instance, in Spain where interest is taxed at 45 percent while capital gains are taxed at 15 percent.

because this increases the present value of such allowances. Another is that nominal rather than real interest costs are deductible for the CIT.[7]

Table 1. Cost of Capital for Alternative Sources of Finance[1/]

	PIT-exempt investor			PIT-taxed investor at top rate		
	Retained earnings	New equity	Debt	Retained earnings	New equity	Debt
USA	9.2	9.2	4.8	5.8	6.5	4.9
Japan	10.4	10.4	5.6	9.5	15.4	5.6
EU-27 average [2]	6.8	6.9	4.6	5.6	6.4	4.7
<range>	<5.0 ; 9.0>	<5.6 ; 9.0>	<3.9 ; 5.3>	<3.5 ; 6.9>	<3.0 ; 9.3>	<4.0 ; 5.6>

Source: ZEW and OUCBT (2008); and staff calculations.

1/ The post-tax return is assumed to be 5 percent and inflation 2 percent. The numbers are unweighted averages of calculations for five different assets featuring different depreciation rates: intangibles, buildings, machinery, financial assets, and inventories. Data refer to 2007.
2/ Unweighted average.

Interest deductibility, combined with international differences in statutory CIT rates, creates opportunities for debt shifting within multinational firms. Headquarters or holdings investing in subsidiaries abroad can generally choose between debt and equity finance. To minimize its tax liability, a parent will prefer debt finance for subsidiaries located in high-tax countries (to deduct interest at a high rate) and equity finance for subsidiaries located in low-tax countries (to have income taxed at a low rate).[8] These choices are driven by differences in statutory CIT rates, which are large (see Figure 1). In Europe, the average CIT rate is 23.2 percent, while in the U.S. it approaches 40 percent. Within Europe, rates vary between 9 and 35 percent. Rates in Latin America and East Asia are higher on average, but the variation is large.

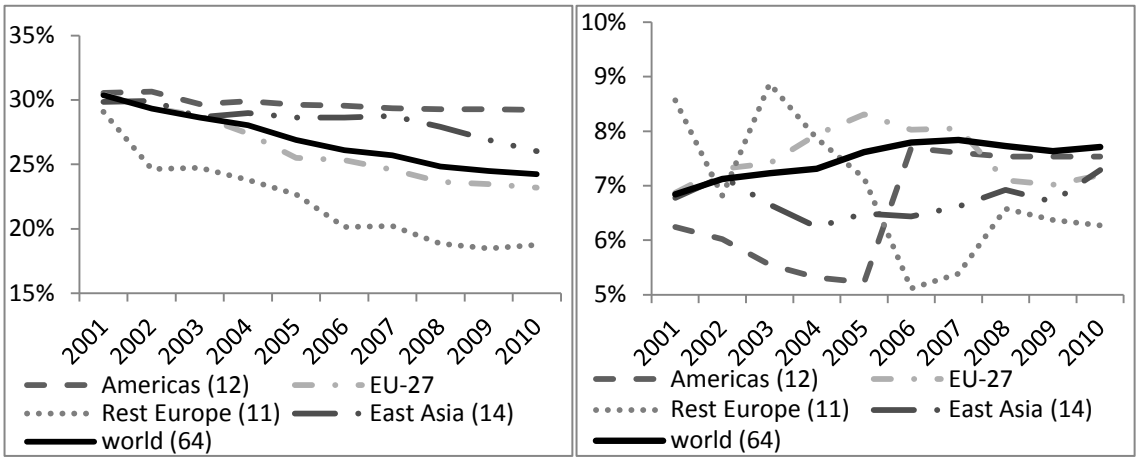
Declining CIT rates and measures restricting interest deductibility might have reduced debt bias to some degree. The bias toward debt increases in the CIT rate because more tax is

[7] Although subsidized *at the margin*, profitable investments financed by debt can still be taxed *on average*. Hence, debt-financed investment may still yield revenue for the government.

[8] Incentives are especially strong in countries that exempt foreign dividends from domestic tax. Some countries (including the U.S.) tax income on a worldwide basis and provide a credit for foreign tax paid. The incentives for debt shifting to low-tax countries may be smaller under this credit system because the tax rate of the parent country ultimately applies to foreign income. However, credit systems generally allow deferral until repatriation of dividends, and credits are not provided for taxes that exceed the host tax. This brings credit regimes closer to exemption and also makes debt shifting important for credit countries. Japan and the U.K. have recently moved from credit to exemption systems. A number of high-tax countries also apply controlled-foreign-corporation (CFC) rules to mitigate debt shifting to low-tax jurisdictions, e.g., by denying exemptions or tax deferral for some types of foreign income, such as passive income.

saved at higher rates. The left panel of Figure 1 shows that CIT rates fell across the board between 2001 and 2010, most notably in Europe. The lower CIT rates have generally reduced the cost of equity relative to debt. For instance, in the EU-25 between 1998 and 2007, the cost of capital on retained earnings fell from 7.7 to 6.9 percent, while that on debt rose from 4.3 to 4.6 percent (ZEW and OUCBT, 2008). Several countries have also introduced thin capitalization rules that deny the interest deductibility beyond a certain threshold for the debt-to-equity ratio. Buetner and others (2006) report that, between 1996 and 2004, the share of OECD countries applying such rules grew from less than 50 to more than 75 percent.

Figure 1 Regional Trends in CIT Rates [1/]
(L: means; R: standard deviations)



Source: KPMG's corporate and indirect tax survey 2010; ZEW and OUCBT, 2008; and IMF staff calculations.

1/ Statutory tax rates include surcharges and local taxes.

Debt bias may have also increased due to divergence of CIT rates across countries and in light of market developments. The right panel of Figure 1 shows that the standard deviation of CIT rates among 64 countries between 2001 and 2010 increased from 6.8 to 7.7 percent. This has increased incentives for multinationals to shift debt into high-tax countries. Moreover, innovation in financial instruments has increasingly blurred the distinction between debt and equity and might have opened new options for tax avoidance. Also, the growth of international capital flows during the past decades, driven by the expansion of multinationals, might have increased the opportunities for tax avoidance.

III. EVIDENCE ON DEBT BIAS

The literature offers ample evidence for the debt bias of taxation. Empirical corporate finance literature has long struggled to identify the impact of taxes on corporate financial

structures. A boom in studies since the late 1990s offers ample support for debt bias.[9] Several of these studies estimate by how much corporate debt ratios rise due to the tax advantage of debt. An accompanying IMF Working Paper reviews this literature and derives consensus estimates using a meta-analysis based on 267 estimates from 19 different studies (De Mooij, 2011). The "consensus estimate" regarding the impact of the CIT rate on the debt-asset ratio lies somewhere between 0.17 for narrow and 0.28 for broad measures of financial leverage.[10] A coefficient of 0.28 would mean that a 10 percent-point lower CIT rate, e.g., from 40 to 30 percent, reduces the debt-asset ratio by 2.8 percent, e.g., from 50 to 47.2 percent. A country with a CIT rate of 36 percent that would fully eliminate the corporate tax advantage of debt would see the average corporate debt-asset ratio fall by 10 percent, e.g., from 50 to 40 percent. These effects are significant, though not huge.

Elasticities have become systematically larger over time. Using outcomes of the meta-regressions, the Working Paper shows that studies using data with an average sample year of 1992 yield a typical tax impact of 0.19. Those using data for 2011 would produce an expected tax impact of 0.30, i.e., approximately 50 percent larger. Despite the increasing use of restrictions on interest deductibility, this suggests that debt bias has become more important. The growing concern by governments about the welfare costs of debt bias therefore seems justified.[11]

Excessive leverage by banks is of particular concern in light of their systemic importance. Existing empirical studies on the impact of CIT rates on corporate financial structures focus either on non-financial firms or make no distinction by sector. We are not aware of studies specifically analyzing financial companies. As with non-financial firms, debt bias may induce banks to increase their leverage ratios and rearrange intracompany capital structures to shift profits to low-tax jurisdictions. However, banks differ from non-financial firms in a number of ways. For instance, banks face regulatory capital requirements that can make them less responsive to tax. At the same time, banks have ample opportunities to use hybrid financial structures, which could make them more responsive to tax. Evidence by Flannery and Rangan (2008), Berger and others (2008), and Gropp and Heider (2010) suggests, however, that bank capital structures are determined by the same factors as those for non-financial firms and that specific factors for banks are only of secondary importance. As a presumption, therefore, we may expect that banks respond similarly to debt bias as non-financial firms.

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[9] Existing studies have established these results only for CIT. The impact of PIT on corporate finance depends on who is the marginal investor (PIT-exempt or PIT-taxed), which has been difficult to identify. The impact of PIT is therefore largely an open empirical issue (Graham, 2008).

[10] Broad leverage includes non-debt liabilities, such as accounts payable to creditors, reserves, insurance, and non-interest bearing liabilities. The difference with debt is large, see e.g., Rajan and Zingales (1995). For instance, the average debt-asset ratio is 0.26 while the average leverage-asset ratio is 0.57 in the studies reviewed.

[11] Some caution is required here, since data and estimation techniques may have improved over time, leading to more precise and perhaps larger estimates.

Debt shifting within multinationals might be particularly important. Several econometric studies discussed in the Working Paper report that elasticities of intracompany debt by multinationals are larger than those of third-party debt, although this difference is not sustained in the between-study variation in the meta-regressions. Distortions in intracompany capital structure are of a different nature than that of total leverage because they reflect a form of tax arbitrage.

IV. Rationale for Debt Bias

What exactly distinguishes debt from equity in tax laws and is there a justification for this? We explore, respectively, legal/administrative and economic arguments.

A. Legal Basis

Tax laws generally use the following properties to distinguish debt from equity.

- Debt holders have a legal right to receive a return that is fixed in advance, whatever the financial position of the borrower. Equity holders receive a return that is variable and based on the performance of the firm.

- Debt holders have a prior claim to the firm's assets if it is insolvent. Suppliers of equity receive any residual claims after debt has been repaid.

- Suppliers of debt have no control rights over the firm; suppliers of equity do.

These features of debt and equity still leave considerable scope for interpretation and tax laws have become very complex as a result. This is especially due to the presence of hybrid financial instruments that have some characteristics of debt but others of equity. For instance, preference shares pay a fixed rate of return, but do not entitle the holder to a return if there are insufficient resources. Also convertible debt, junk bonds, subordinated debt, warrants, and indexed securities blur the traditional distinction between debt and equity. Hybrids—particularly used by financial institutions—have made tax laws increasingly complex because rules are required to determine whether payments are deductible for CIT or not. Moreover, hybrids effectively allow investors to decide whether they wish to be taxed at the CIT rate by investing in equity or at their individual PIT rate by investing in debt (Shaviro, 2009). Legislators in different countries have also come up with their own definitions of what debt is, which further opens the door to tax arbitrage (Schon, 2009).

Intracompany debt within multinationals is even more difficult to define. A parent that fully owns a subsidiary has control over the firm and receives the residual claims in case of default. Still, the parent may supply a large share of its capital through intracompany debt. One reason for using debt might be genuine corporate governance motives, e.g., if the parent uses debt as an instrument to control the free cash flow available to the management of the subsidiary. However, the option to use intracompany debt creates opportunities for international firms to exploit cross-country tax arbitrage by adjusting capital structures. Moreover, it is difficult to determine the appropriate interest rate—especially the risk

premium—for intracompany debt since prior and residual claims are held in the same hands. Firms can thus shift profits by manipulating the transfer price of interest charged on intracompany debt.

The original rationale to allow a deduction for only debt—namely, that interest is a cost of doing business and equity returns reflect business income—makes no sense economically. That idea is also reflected in international accounting principles, which view interest but not equity returns as a cost to the firm. In economic terms, both payments represent a return to capital and there is no a priori reason to tax one differently from the other.

Administrative concerns also call for more neutrality in the taxation of debt and equity. It is sometimes argued that the deductibility of interest facilitates administrative convenience. The CIT withholds tax from equity income that is retained within the company. That would be difficult to tax at the individual level and would give rise to liquidity problems. Interest payments by companies are in cash and can be more easily observed and taxed at the individual level. Consequently, interest need not be taxed at the corporate level. However, returns on debt not only originate from cash receipts, but also from changes in the value of corporate bonds. And returns on equity may take the form of cash dividend distributions. Hence, the administrative argument is flawed. In fact, the high administrative costs associated with current CIT systems offer an argument for more neutrality instead of discrimination.

B. Economic Rationale

In theory, discrimination between debt and equity for tax purposes could be desirable in the presence of market imperfections. In case of complete markets and perfect information, a company's choice between debt and equity would be socially efficient. There is no unique optimal debt-equity choice of firms, and the value of the firm would not depend on its financial structure (Modigliani and Miller, 1958). A change in debt ratios in response to taxes would thus have no welfare effect. Real world capital markets, however, suffer from informational imperfections among stakeholders such as managers, shareholders, and creditors. In such a second-best world, market forces would lead to a choice of capital structure that is not socially efficient. Changes in the debt-equity ratio due to taxation can then either mitigate or exacerbate pre-existing distortions.

Corporate finance theories do not offer clear guidance on whether debt levels chosen by non-financial firms are too high or too low. One problem with these theories—summarized in Box 1—is that they have been rejected in explaining various aspects of corporate finance behavior. In fact, the withering borderline between debt and equity raises doubt on the relevance of theories that focus on this traditional distinction. One might argue that it would be more relevant to develop theories of optimal contract design instead of optimal debt-equity ratios. Moreover, firms are very heterogeneous, which makes it impossible to explain behavior by one single theory. Another problem is that different theories yield different outcomes on the distortions in corporate finance structures. For instance, Gordon (2010) states that asymmetric information between investors and managers offers a potential rationale for debt bias. If debt issuance would signal bad health, borrowing by healthy firms

will be too low. The government could improve efficient decision making of firms if it could encourage borrowing by these firms. This can be done by subsidizing borrowing of firms that do well and taxing borrowing of firms that do poorly. The tax advantage of debt deductibility does exactly this, since the benefit is larger for firms making a profit than for firms making a loss. However, empirical evidence is inconclusive on the signaling effect of debt. If debt issuance would signal good health, the opposite effect on debt bias would be achieved.

Box 1. Optimal Capital Structure in Corporate Finance Models

Corporate finance theory has developed at least four models describing the optimal financial structure in the presence of informational imperfections. Thereby, firms choose their optimal debt-equity ratio by trading off any benefits of debt finance, including its tax shield, against any non-tax cost of debt. The character of the non-tax aspects differs between models:

Bankruptcy costs. Higher debt makes firms more vulnerable to shocks and increases the risk of bankruptcy. Creditors will demand a higher interest rate, which reflects a private cost. Firms thus face a trade-off between the tax shield of debt and the cost of financial distress.

Agency costs (1). Due to asymmetric information, there can be a conflict of interest between managers and shareholders (Easterbrook, 1984; Jensen, 1986). Managers aiming to build an empire use free cash flow for spending on investment, including wasteful projects that are not in the interests of shareholders. Issuing debt constrains the use of free cash flow and protects shareholders against this opportunistic behavior of managers. Debt may thus improve managerial decisions.

Agency costs (2). A conflict of interest may occur between shareholders and debt holders. By persuading management to take excessive levels of debt, shareholders can shift part of the bankruptcy risk to bondholders. In good times, shareholders incur the profit; in bad times they are only liable for the invested sum and bondholders share in the risk of default.

Signaling costs. Debt issuance may be seen as a signal to outside investors that the firm is confident in its ability to service its debt in the future (Ross, 1977). Inefficiently high levels of debt will then be issued, reflecting signaling costs. However, debt may also signal the opposite effect. Myers and Majluf (1984) argue that external financing can be interpreted by investors as a signal of bad health, e.g., due to a lack of liquidity. In that case, firms will be reluctant to engage in external financing. This causes adverse selection in debt markets and the result is underinvestment and too little borrowing.[1] Empirical studies are inconclusive, however, on the signaling effect. Smith (1986) summarizes research showing that almost all leverage-increasing transactions drive up stock prices and thus signal good news about the firms' health. Gordon (2010) cites studies showing the opposite.

1/ According to Myers and Majluf (1984), debt is favored over new equity as a source of external finance. The reason is that management will not issue new shares if the firm is undervalued, so issuance of new shares is a signal of overvaluation. This gives rise to adverse selection. It leads to the pecking order in corporate finance: (1) internal finance, (2) debt, and (3) external equity.

Debt bias is also not generally justified by credit constraints. Some theories emphasize that information asymmetry between firms and banks causes credit rationing in debt markets: the inability to verify the behavior of borrowers makes banks reluctant to supply credit, which leads to adverse selection (Stiglitz and Weiss, 1981). This causes underinvestment and too low levels of debt.[12] In principle, tax relief for debt could improve efficiency by raising investment and stimulating borrowing. However, debt relief raises two problems. First, rationing may not be restricted to debt markets, but may equally apply to equity markets. De Meza and Webb (1987) developed a model with information asymmetry in both debt and equity markets to show that this may lead to excessive debt finance. Debt bias of taxation would then exacerbate preexisting distortions. Second, general debt relief is a blunt instrument to mitigate distortions. Indeed, credit constraints are concentrated among certain firms, most likely small and innovative growth companies with relatively few own assets and large investment opportunities (Tirole, 2006; Keuschnigg and Ribi, 2010). A general deduction for interest will not benefit those firms, but firms that already have access to external debt. Hence, it will lead to too much investment by mature firms and too little by startups and growth firms. Debt bias will thus reduce firm dynamics and hamper long-term economic growth.

The international mobility of debt may be larger than that of equity, although empirical support for this is thin. Different supply elasticities would offer a rationale for a different tax treatment, with a lower tax burden on debt. The underlying reason for differences in mobility is the different character of the information asymmetries between equity and debt markets. Indeed, foreign equity investors may be particularly reluctant to acquire a firm in another country because they might be overcharged by domestic owners who have better information about the future prospects of the firm. Information asymmetry is perhaps smaller in bond markets due to the different risk characteristics of debt (Gordon and Bovenberg, 1996). Debt could thus be more mobile internationally than equity, and therefore harder to tax at source. However, home bias in debt and equity portfolios in integrated areas such as the EU and the U.S. appear to be equally important (Fidora and others, 2006). This puts doubt on whether the mobility of debt versus equity offers an argument for lower taxation of debt.

Overall, second-best considerations do not provide any compelling reason for a systematic tax preference for debt.

V. Welfare Cost of Debt Bias

If corporate finance structures of non-financial firms would be efficient in the absence of tax, debt bias would create a deadweight loss. Private investors consider only the marginal non-tax cost of debt, and the sum of the non-tax and tax costs of equity. At the margin, decisions are inefficient since debt levels are inefficiently high. The size of the

[12] For instance, empirical studies report significant positive effects of a firms' cash flow on investment (Hubbard, 1997), which is consistent with credit rationing of firms.

marginal welfare loss depends on the wedge between the cost of debt and equity and on the tax elasticity of the debt ratio. Using a stylized equation with a convex function of the non-tax cost of debt—reflecting either bankruptcy or agency cost—and a marginal impact of tax on the debt-asset ratio between 0.14 and 0.46, Weichenrieder and Klautke (2008) estimate the marginal deadweight loss of the tax distortion between 0.05 percent and 0.15 percent of the capital stock—equal to between 0.08 and 0.23 percent of GDP for a capital stock of 1.5 times GDP. These estimates suggest that the aggregate welfare cost of debt bias is fairly modest.

The welfare costs of debt bias are probably larger, and possibly much larger, in the financial sector due to negative externalities from the use of debt. The studies discussed in the previous paragraph ignore externalities and other preexisting distortions in financial structures. Hence, debt levels in the no-tax outcome are assumed to be efficient. However, debt levels may be too high, even without taxation. This will magnify the welfare cost of debt bias. Banks especially have a tendency to choose too high levels of debt. For instance, depositors usually enjoy deposit insurance and banks themselves generally receive implicit or explicit guarantees from government. This creates a moral hazard and results in excessive risk taking. Moreover, there are adverse externalities from a bank failure due to systematic risk: since an individual bank does not take into account the impact of its own failure on other banks, it will choose capital ratios that are lower than is socially desirable. The debt bias of taxation exacerbates these preexisting distortions in the capital structure of banks, thus magnifying welfare losses.[13]

By raising the probability of default, high levels of debt may bring a social cost by exacerbating business cycle fluctuations. Excessive debt levels may result from several sources, of which the debt bias of tax is one. Bianchi (2010) quantitatively assesses the impact of excessive leverage in light of several capital market imperfections using a Dynamic Stochastic General Equilibrium model. Overborrowing increases the probability of a financial crisis considerably, while it magnifies the depth of the crisis. The precise welfare cost of this increased volatility is hard to quantify. Yet, the recent financial crisis suggests that these costs can be substantial.

Debt bias creates arbitrage opportunities that come along with high costs of administration and compliance and that seriously threaten CIT revenue. In principle, tax arbitrage opportunities can mitigate the welfare cost of debt bias as it relaxes the real distortions between debt and equity. However, tax arbitrage generally comes along with a substantial cost of administration and compliance. Moreover, arbitrage erodes the CIT base and, by reducing scarce fiscal revenue, magnifies welfare losses in the presence of preexisting tax distortions. Two types of tax arbitrage are particularly relevant. The first is hybrid financial instruments, which are mostly used in the financial sector. The second is debt shifting within multinationals. Especially high-tax countries forego substantial revenue and thus experience welfare losses from international arbitrage, while low-tax countries

[13] To the extent that debt bias creates larger welfare costs in the banking sector than in other sectors, this warrants attention for special banking taxes (Claessens and others, 2010).

experience a gain from the inflow of taxable income. While primarily a distributional issue, there can be real global distortions, too. Indeed, the reallocation of taxable income may intensify tax competition as countries compete for fiscal revenue by reducing their CIT rates or by designing special tax incentives. Tax competition can ultimately make all countries worse off by making it more costly for governments to raise public funds.

Summing up: the welfare costs of debt bias are probably substantial. They exceed traditional deadweight loss calculations, which ignore externalities in the financial sector, the impact on the business cycle, and the costs associated with tax arbitrage. The social cost of debt bias calls for policies that reduce or eliminate it. For financial institutions, externalities even offer an argument for a tax penalty on the debt of banks rather than a tax preference of debt.

VI. Possible Policy Responses

There are several reforms that reduce or eliminate the preferential tax treatment of debt. For instance, many governments restrict or regulate interest deductibility. Full neutrality can be achieved by a comprehensive reform in either of two directions. One is to disallow the deduction for interest, the so-called CBIT system. Measures restricting the tax deductibility of interest go in this direction. The other is to introduce an allowance for corporate equity (ACE). While both reforms eliminate tax discrimination between debt and equity, they have different economic properties otherwise. For instance, CBIT is consistent with a Schanz-Haig-Simons comprehensive income tax system where all capital returns are taxed. ACE is consistent with a consumption-based tax system that exempts the normal return to capital. The economic implications of these reforms are markedly different.

A. Restricting Interest Deductibility

Measures that put a cap on interest deductibility have had some effect on debt ratios, but create new complexities and problems. Thin capitalization rules, introduced in several countries, seem to have reduced debt ratios (Overesch and Wamser, 2006; Weichenrieder and Windischbauer, 2008)—most likely the levels of intracompany debt to which many of these rules apply. Yet, they seem to have also reduced investment (Buettner et al., 2006). Moreover, these rules are only imperfect solutions to the problem of debt bias and come along with other costs. In fact, they are usually ad-hoc, not well targeted, and are often avoided by firms that can exploit hybrid instruments and international differences in definitions of debt and equity. Closing loopholes generally leads to refinements and complexities of tax laws.

An alternative way of restricting interest deductibility is by imposing a limit to the interest rate to which deductions are granted. For instance, governments may impose a cap on the interest rate for tax deductions. Moreover, governments could correct for inflation and allow only a deduction for real instead of nominal interest expenses. A natural complement would beto index depreciation allowances and losses and correct interest receipts for inflation. The downside of this is that it would bring more complexity.

Full neutrality can be achieved by a comprehensive business income tax (CBIT), which denies interest deductibility by firms. CBIT thus treats debt as current CIT regimes treat equity.[14] It is consistent with a broad, source-based tax on capital income, withheld at the level of the firm. Since all capital income is taxed at the firm level, CBIT can be accompanied by an abolition of PIT on interest, dividends, and capital gains.

CBIT eliminates distortions in corporate financial structures, but raises the cost of capital on investments financed by debt. The latter will reduce investment. At the same time, CBIT broadens the CIT base, which allows the statutory CIT rate to be reduced as part of a revenue-neutral reform. This reduces the tax burden on profitable equity-financed investment. A lower CIT rate will also make a country more attractive as a location for profits of multinationals and for discrete profitable investment projects from abroad. Indeed, CBIT combined with a lower CIT rate shifts the tax burden away from economic rents toward marginal investments. If rents are mobile and multinational profit shifting is important relative to marginal investment, CBIT in combination with a lower CIT rate might yield macroeconomic benefits for a country (Bond, 2000). However, if marginal investment distortions are relatively important, CBIT may incur macroeconomic costs. Model simulations by de Mooij and Devereux (2011) for Europe suggest that CBIT can yield a net macroeconomic benefit for an individual country, but only if it reduces its CIT rate and other countries do not pursue the same policy. In that case, the benefits for the CBIT country come through inward profit shifting and increased mobile rents at the expense of other countries' welfare. The benefits disappear when all countries pursue the same policy.

A CBIT will lead to undertaxation of banks and international distortions in lending markets if not coordinated across countries. Under CBIT, banks are disallowed a deduction for interest expenses, but are not taxed on interest income received on outstanding loans to CBIT firms. The margin between the lending rate and the borrowing rate is exactly the income earned by primary banking activities. CBIT thus effectively exempts traditional banking from taxation. Instead, CBIT shifts the tax burden to non-financial companies that pay tax on the full borrowing rate, including the bank's margin. The lower tax burden on banks will likely reduce the interest margin of banks. However, if there is imperfect competition, banks earn rents and the government foregoes revenues from taxing them. Moreover, in an open economy the interest rate is determined by world markets. Only domestic banks pay no tax on the interest received from CBIT firms and they thus can charge more competitive rates to domestic CBIT firms than foreign banks who are taxed in their home country on the interest received. Introducing a CBIT in a single country will therefore distort international banking.

[14] CBIT, as it was originally proposed by the U.S. Treasury in 1992, makes a distinction between two types of firms: CBIT entities and non-CBIT entities. Most firms, including non-corporate ones, will be CBIT entities, only very small firms will not. The CBIT entities are disallowed interest deductibility. To avoid double taxation, interest that firms receive from other CBIT entities is exempt or credited. However, interest that firms (or banks) receive from non-CBIT entities is subject to tax, including interest from households and government bonds. Interest received from abroad will be subject to tax, although an exemption or credit can be applied if this interest comes from a foreign CBIT entity, i.e., if other countries also introduce a CBIT.

There are no real-world examples of CBIT systems and its implementation will meet practical obstacles and transitional difficulties. For instance, CBIT creates difficulties in dealing with pre-existing debt. Hence, it can only be implemented gradually over a fairly long time horizon. In the short run, CBIT also risks amplifying financial distress.

A partial CBIT applied to intracompany debt is potentially promising to in mitigating debt shifting by multinationals, but requires coordination. Governments would then treat all intracompany financial flows as equity and tax their returns accordingly. Multinationals would thus no longer have an opportunity to shift their profits across jurisdictions through debt. However, a unilateral policy could exacerbate international debt shifting because firms would no longer finance investment in such a country with debt (since intracompany interest cannot be deducted), and finance investment in all other countries with debt originating from such a country (since interest receipts go untaxed). Moreover, it may cause double taxation if countries deny foreign tax credits or exemptions for interest from CBIT countries.

B. Allowance for Corporate Equity

The allowance for corporate equity (ACE) supplements interest deductibility with a deduction for the notional return on equity and has attractive neutrality properties besides the debt-equity choice.[15][16] First, the ACE is neutral with respect to marginal investment decisions. By allowing a deduction for both interest and the normal rate of return on equity, the ACE system charges no tax on projects with a return that matches the cost of capital. It thus transforms the CIT into a tax on economic rents. Such a tax would in principle not distort the scale of investment. A second and related property of the ACE is that it offsets investment distortions induced by differences between economic depreciation and depreciation for tax purposes. In particular, an increase in accelerated depreciation for tax purposes will reduce the book value of assets in the tax accounts, thereby also reducing the ACE in later years. This exactly offsets the benefits from earlier depreciation in present value terms. Hence, the present value of the sum of the depreciation allowance and the ACE allowance is independent of the rate at which firms write down their assets in the tax accounts. Neutrality of an ACE with respect to investment therefore holds, irrespective of the depreciation allowances in the tax system.

[15] The ACE system was originally proposed by the Capital Taxes Committee of the Institute for Fiscal Studies (IFS, 1991; Devereux and Freeman, 1991). Since the tax advantage associated with the deduction for equity is certain, the appropriate notional return of the ACE is the risk-free nominal interest rate, e.g., the rate on government bonds (Bond and Devereux, 1995). This rule for the ACE rate is derived under specific assumptions, but carries the advantage of simplicity because one does not have to differentiate risks across companies. The base of the ACE would be equal to the book value of equity, minus equity participations in other firms.

[16] In present value terms (not year by year), the revenue impact is equivalent to that of a cash flow tax, which allows investment to be deducted immediately instead of depreciated. The Meade report in 1978 discussed two versions of the cash-flow tax. The R-base would eliminate interest deductions and the taxation of interest income (as under CBIT), while the R+F base would preserve these and add net borrowing to it. The main difference between the two is the treatment of banks (which would go untaxed under the former). The cash-flow tax is not discussed further, since it would involve large transitional difficulties which make its implementation problematic in countries that already have a CIT system in place.

Even more neutral, theoretically, is the allowance for corporate capital (ACC). Under ACE, debt relief still applies to true interest payments while the equity allowance applies to a notional return. Thus, ACE reduces, but does not eliminate, tax distortions in corporate finance. Under the ACC, the interest deduction is abolished and replaced by a deduction for the notional risk-free return on all capital, irrespective of whether it is financed by debt or equity (Boadway and Bruce, 1984). The ACC obtains full neutrality between debt and equity finance and avoids problems with the appropriate transfer price on intracompany loans. Moreover, applying the notional risk-free rate ensures that the neutrality properties regarding investment and depreciation are maintained.[17]

Several countries have experimented with variants of an ACE. Around the millennium change, Croatia, Austria, and Italy applied variants of an ACE. Although they have subsequently been terminated, it was not because of technical or administrative difficulties (Keen and King, 2002). Instead, the abolishment of ACE was generally part of a reform aimed at reducing CIT rates. Evaluations suggest that these ACE reforms have actually been associated with reduced debt-equity ratios (Klemm 2007). Today, Brazil, Latvia, and Belgium apply variants of ACE.

- Belgium allows a notional deduction to the value of equity at the rate on 10-year government bonds (between 3 and 4 percent in recent years). The allowance applies to the book value of net equity and is corrected for the net value of equity participations.[18] In 2008, estimated allowances added up to approximately 6 billion euro and reduced the corporate tax yield by slightly more than 10 percent.

- Brazil introduced a notional interest deduction on equity in 1996. This Brazilian variant of the ACE applies only to distributed profit, not to retained earnings. In principle, this would not matter if firms could claim the full allowance by distributing profit and issuing new shares to cover remaining financial needs. However, capital market imperfections may cause differences compared to a full ACE. Klemm (2007) finds that the Brazilian ACE reform has primarily affected dividend payout ratios, with only small effects on investment and financial structure.

- In 2010, Latvia introduced a notional interest deduction on retained earnings. The rate equals the annual weighted average rate of interest on loans to non-financial businesses.

[17] The ACC raises a question, however, about the tax treatment of interest income received, similar to the taxation of banks under CBIT. Indeed, this may need to be modified to avoid double taxation of interest.

[18] This is necessary to avoid double tax relief, reminiscent of participation exemptions necessary to avoid double taxation. Indeed, an ACE frees the normal return on an equity participation from tax. If the parent would be granted an ACE on all equity, including that used to finance participations in related entities, it would receive an allowance for returns that are untaxed.

Recently, an ACE has been advocated by the Mirrlees Review for the U.K. (Mirrlees and others, 2011). That report emphasizes that a British ACE could bring important economic benefits. A recent tax committee of the Dutch government has also proposed an ACE (Ministry of Finance, 2010).

Base narrowing through an ACE has a direct estimated revenue cost of approximately 15 percent of CIT revenue, or 0.5 percent of GDP, but this cost can be reduced significantly by accompanying measures. The fiscal cost of ACE depends on the choice of the ACE rate and the definition of the base for the allowance. The appendix to this note estimates the direct fiscal cost of an ACE for 15 developed countries. The narrowing of the CIT base ranges from 7 percent in Norway to almost 20 percent in Australia. This comes down to a direct fiscal cost of between 0.25 and 1.0 percent of GDP. However, this cost can be substantially reduced by taking other measures.

- The short-run fiscal cost can be smaller if the government would apply the ACE only to new investment. In fact, for existing capital the ACE is simply a windfall gain that does not produce economic benefits.

- Externalities associated with excessive debt by financial companies justify special taxation of debt in that sector. The revenue of such taxes can be used to offset the revenue loss from the ACE. The reform would then encourage investment and discourage debt in the banking sector.

- ACE can be designed as part of an income tax system. For instance, Kleinbard (2007) proposes a Business Enterprise Income Tax (BEIT) which contains a uniform cost of capital allowance applied to the firm's total assets, combined with a uniform tax on the normal return at the level of the investor similar to the Dutch presumptive tax on capital income at a normal rate of return.

- ACE can alternatively be part of an expenditure tax system. Raising the VAT rate would then be a natural candidate to recover the cost of the ACE. Favorable behavioral responses of such a reform can substantially broaden the tax base and reduce the long-term budgetary cost. Simulations results with three different applied general equilibrium models, presented in Table 2, illustrate this for the EU, Switzerland, and Germany. The ACE is financed by a higher VAT rate to close the government budget. In all simulations, we see that investment expands and employment and GDP rise. De Mooij and Devereux (2011) report that approximately three-quarters of the initial fiscal cost of the ACE can be recovered in the long run.

The economic benefits of an ACE will likely accrue primarily to employees. The return on capital after source taxes is determined by the world market since investors can move their assets freely across borders. Removing the tax on the normal return through an ACE will thus attract an inflow of capital, which boosts labor productivity and raises wages. Recent empirical evidence by Hassett and Mathur (2006) and Arulampalam and others (2010) suggests indeed that workers bear the lion's share of the tax incidence of CIT, although the exact incidence remains subject to debate (see e.g., Gravelle, 2010). If so, employees rather than firm owners will most likely benefit from an ACE.

Table 2. Simulated Economic Effects of ACE Reforms in Three Different Models [1/]

	Mooij-Devereux	Keuschnigg-Dietz	Radulescu-Stimmelmayr
Debt-asset ratio (absolute change)	– 4.7	– 3.8	n.a.
Investment (percentage change)	5.9	7.8	20.5
Employment (percentage change)	0.4	0.4	1.7
GDP (percentage change)	1.9	2.6	9.1

1/ Effect of introducing ACE, accompanied with by higher VAT rate to close the government budget. de Mooij and Devereux (2011) for the EU; Keuschnigg and Dietz (2007) for Switzerland; Radulescu and Stimmelmayr (2007) for Germany.

VII. TOWARD MORE NEUTRALITY

Legal, administrative, and economic considerations offer no compelling ground to systematically favor debt over equity finance. Tax-induced debt bias nevertheless exists in many countries. Distortions have long been recognized. This note argues that the welfare costs are probably larger, perhaps much larger, than has been previously thought. For instance, there seem to be large spillover effects from excessive debt in financial firms towards the rest of the economy. This magnifies the overall welfare costs of debt bias. In addition, internationalization of companies and innovations in financial instruments make tax administration increasingly difficult, thus causing more and more tax avoidance. These concerns justify increased policy attention for debt bias.

The debt bias of taxation could be phased out by pursuing comprehensive reforms. Disallowing the deduction for interest for the corporate income tax would eliminate debt bias, but has a number of drawbacks. A partial denial of interest deductibility, only applied to intracompany interest, might effectively mitigate debt shifting by multinationals, but would require international cooperation.

The most promising reform is the introduction of an allowance for corporate equity. Its direct fiscal cost—estimated at around 0.5 percent of GDP on average—can be reduced in the short run by restricting the allowance to new investment alone. The long-run fiscal costs would be lower to the extent that the allowance induces favorable behavioral responses, leading to higher investment and employment. The main beneficiaries of the allowance for corporate equity are likely to be employees who see their wages increased.

There are arguments for going beyond neutrality and penalizing debt financing by taxing it. These include the adverse spillover effects that debt creates through systemic failure and contagion effects. Hence, a welfare improving tax reform may contain two main pillars. First, an allowance for corporate equity to obtain neutrality; second, a higher tax on the use of debt in sectors where externalities are most relevant, such as the financial sector. These two pillars together are also attractive from budgetary and political perspectives since they combine a lower tax burden for firms that invest in new assets with a higher tax burden for firms that feature excessive levels of debt. The budgetary cost of the reform can thus remain limited and the tax burden shifted from desirable to harmful behavior.

Appendix. Estimated Direct Revenue Impact of an ACE in a Variety of Countries

Calculations are based on Worldscope, a Thomson Database containing balance sheet and income statements of firms across the globe. The data include both financial and non-financial firms, and both publicly traded and non-traded firms. We use data for the years 2005–07. The number of firms per country is shown in the first column of Table 3. The ACE allowance per company is computed as follows. From the balance sheet of the firm, we take the value of equity (common and preferred stock) and deduct the stock value of unconsolidated subsidiaries. We multiply this by the 10-year government bond yield in the country (average for 2005–07 shown in the second column of the Table). For loss-making firms, we assume that the ACE is only half the value (based on Altshuler and Auerbach, 1990), since losses are carried forward without interest and might expire after time. We aggregate all ACE allowances per country and express this as a percentage of the respective total before-tax profit. The outcome is shown in the third column of the Table. It approximates the reduction of the business income tax base due to the introduction of the ACE. Given a flat CIT rate structure in most countries, this also approximates the reduction in CIT revenue. The last column of the Table multiplies the reduction in business tax revenue by the CIT-to-GDP ratio to obtain the loss in revenue from the ACE as a percentage of GDP.

Table 3. Estimated Direct Revenue Effect of an ACE [1/ 2/]

	Sample	Average ACE Rate	Company Tax Base	Revenue (In percent GDP)
UK	4703	4.6	− 17.4	− 0.56
France	1502	3.9	− 15.1	− 0.48
Canada	2695	4.3	− 19.3	− 0.48
Australia	4018	5.6	− 20.5	− 0.95
Belgium	293	3.9	− 16.7	− 0.60
Netherlands	360	3.8	− 9.8	− 0.34
Norway	397	4.0	− 7.0	− 0.28
Sweden	827	3.8	− 12.8	− 0.51
Denmark	389	3.8	− 12.9	− 0.52
Finland	305	3.8	− 13.5	− 0.53
Italy	733	4.0	− 12.6	− 0.40
Spain	362	3.8	− 10.6	− 0.51
Germany	1729	3.8	− 16.1	− 0.40
U.S.	11833	4.6	− 17.5	− 0.43
Japan	7004	1.6	− 9.4	− 0.38
Average		**4.0**	**− 14.1**	**− 0.49**

1/ The true cost of ACE may differ, e.g., because equity in tax accounts differs from commercial accounts or because our sample is not representative of the true population of firms in a country. For instance, the true cost of the ACE in Belgium is about 10 percent of CIT revenue, while our estimate suggests 16 percent.

2/ The ACE may apply to both corporate and non-corporate firms. To the extent that ACE narrows the base of the PIT of non-corporate firms, our numbers as a percentage of GDP underestimate the cost of the ACE. For Germany, we use a modified number for the CIT-to-GDP ratio to correct for the low degree of incorporation.

References

Altshuler, R., and A.J. Auerbach, 1990, "The Significance of Tax Law Asymmetries: An Empirical Investigation," *Quarterly Journal of Economics* Vol. 105 pp. 61–86.

Arulampalam, W., M.P. Devereux, and G. Maffini, 2010, "The Direct Incidence of Corporate Income Tax on Wages," IZA Discussion Paper 5293 Bonn.

Auerbach, A.J., 2002, "Taxation and Corporate Financial Policy," in: *Handbook of Public Economics*, ed. by Alan J. Auerbach and Martin Feldstein, Vol. 3, pp. 1251–92 (Amsterdam: Elsevier North-Holland).

Berger A., R. DeYoung, M. Flannery, D. Lee, and O. Oztekin, 2008, "How Do Large Banking Organizations Manage Their Capital Ratios?," *Journal of Financial Services Research*, Vol. 34, pp. 123–49.

Bianchi, J., 2010, "Overborrowing and Systemic Externalities in the Business Cycle," unpublished, College Park: University of Maryland.

Boadway, R., and N. Bruce, 1984, "A General Proposition on the Design of a Neutral Business Tax," *Journal of Public Economics*, Vol. 24, pp. 231–39.

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*, ed. by S. Cnossen (Oxford: Oxford University Press).

Bond, S.R., and M.P. Devereux, 1995, "On the Design of a Neutral Business Tax Under Uncertainty," *Journal of Public Economics*, Vol. 58, pp. 57–71.

Buettner, T., M. Overesch, U. Schreiber, and G. Wamser, 2006, *The Impact of Thin-Capitalization Rules of Multinationals' Financing and Investment Decisions*, CESifo Working Paper 1817 (Munich: University of Munich).

Claessens, S., M. Keen, and C. Pazarbasioglu, 2010, "Financial Sector Taxation: The IMF's Report to the G-20 and Background Material," (Washington: International Monetary Fund).

De Meza, D., and D. Webb, 1987, "Too Much Investment: A Problem of Asymmetric Information," *Quarterly Journal of Economics*, Vol. 102, pp. 281–92.

de Mooij, R.A., 2011, "The Tax Elasticity of Corporate Debt: A Synthesis of Size and Variations," Working Paper (Washington: International Monetary Fund)

———, and M.P. Devereux, 2011, "An Applied Analysis of ACE and CBIT Reforms in the EU," *International Tax and Public Finance*, Vol. 18, No. 1, pp. 93–120.

Devereux, M.P., and H. Freeman, 1991, "A General Neutral Profits Tax," *Fiscal Studies,* Vol. 12, pp. 1–15.

Easterbrook, F.H., 1984, "Two Agency-Cost Explanations of Dividends," *American Economic Review,* Vol. 74, No. 4, pp. 650–59.

Fidora, M., M. Fratzscher, and C. Thimann, 2006, "Home Bias in Global Bond and Equity Markets: The Role of Real Exchange Rate Volatility," ECB Working Paper 685 (Frankfurt: European Central Bank).

Flannery M., and K. Rangan, 2008, "What Caused the Bank Capital Build-Up of the 1990s?" *Review of Finance,* Vol. 12, pp. 391–429.

Gordon, R.H., and A.L. Bovenberg, 1996, "Why is Capital So Immobile Internationally? Possible Explanations and Implications for Capital Income Taxation," *American Economic Review,* Vol. 86, pp. 1057–75.

———, 2010, "Taxation and Corporate Use of Debt: Implications for Tax Policy," *National Tax Journal,* Vol. 63, pp. 151–74.

Graham, J.R., 2008, "Taxes and Corporate Finance," in *Handbook of Empirical Corporate Finance,* ed. by B. Espen Eckbo, Vol. 2, Elsevier.

Gravelle, J.C., 2010, "Corporate Tax Incidence: Review of General Equilibrium Estimates and Analysis," Congressional Budget Office Working Paper 2010-03, Washington DC.

Gropp, R., and F. Heider, 2010, "The Determinants of Bank Capital Structure," *Review of Finance*, first published online March 30, 2010 http://rof.oxfordjournals.org/content/early/recent

Hassett, K. A., and Mathur, A., 2006, "Taxes and Wages," American Enterprise Institute, unpublished, Washington, DC.

Hemmelgarn, T., and G. Nicodème, 2010, "The 2008 Financial Crisis and Tax Policy," Working Paper 20, European Commission Directorate-General for Taxation and Customs Union, Brussels.

Hubbard, R.G., 1997, "Capital-market Imperfections and Investment," NBER Working Paper 5996 (Cambridge, Massachusetts: National Bureau of Economic Research).

International Monetary Fund, 2009, "Debt Bias and Other Distortions: Crisis-related Issues in Tax Policy" (Washington: International Monetary Fund).

———, 2010, "A Fair and Substantial Contribution by the Financial Sector: Final Report for the G-20," Staff Paper (Washington: International Monetary Fund).

Institute for Fiscal Studies, 1991, "Equity for Companies: A Corporation Tax for the 1990s," (London).

Jensen, M.C., 1986, "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers," *American Economic Review*, Vol. 76, pp. 323–29.

Keen, M., and J. King, 2002, "The Croatian Profit Tax: An ACE in Practice," *Fiscal Studies*, Vol. 23, pp. 401–18.

———, A. Klemm, and V. Perry, 2010, "Tax and the Crisis," *Fiscal Studies*, Vol. 31, pp. 43–79.

Keuschnigg, C., and M.D. Dietz, 2007, "A Growth Oriented Dual Income Tax," *International Tax and Public Finance*, Vol. 14, pp. 191–221.

———, E. Ribi, 2010, "Business Taxation, Corporate Finance and Economic Performance," (unpublished, University of St. Gallen, Switzerland).

Kleinbard, E., 2007, "Designing an Income Tax on Capital," in *Taxing Capital Income*, ed. by H.J. Aaron, L. Burman, and E. Steuerle (Washington: Urban Institute Press).

Klemm, A., 2007, "Allowances for Corporate Equity in Practice," *CESifo Economic Studies* Vol. 53, pp. 229–62.

Lloyd, G., 2009, "Moving Beyond the Crisis: Using Tax Policy of Support Financial Stability," (unpublished, Paris: OECD).

Meade, J., 1978, "The Structure and Reform of Direct Taxation" (London: Institute for Fiscal Studies).

Ministry of Finance of the Netherlands, 2010, "Continuity and Renewal, Report of the Studygroup on Tax Reform" (Netherlands: The Hague).

Mirrlees, J.A., S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles, and J. Poterba, 2011, *Tax by design* (London: Institute for Fiscal Studies).

Modigliani, F., and M. Miller, 1958, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, Vol. 48, No. 3, pp. 261–97.

Myers, S.C., and N.S. Majluf, 1984, "Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have," *Journal of Financial Economics*, Vol. 13, pp. 187–221.

Overesch, M., and G. Wamser, 2006, "German Inbound Investment, Corporate Tax Planning, and Thin-Capitalization Rules—A Difference-in-Differences Approach," CESifo Working Paper 37 (Munich: University of Munich).

Radulescu, D.M., and M. Stimmelmayr, 2007, "ACE versus CBIT: Which is Better for Investment and Welfare?," *CESifo Economic Studies*, Vol. 53, pp. 294–328.

Rajan, R.G., and L. Zingales, 1995, "What Do We Know About Capital Structure? Some Evidence from International Data," *Journal of Finance*, Vol. 50, pp. 1421–60.

Ross, S.A., 1977, "The Determinants of Financial Structure: the Incentive-signaling Approach," *Bell Journal of Economics*, Vol. 8, pp. 23–40.

Schön, W., 2009, "Debt and Equity: What's the Difference? A Comparative View," Competition and Tax Law Research Paper 09-09 (Munich: Max Planck Institute for Intellectual Property).

Shaviro, D.N., 2009, *Decoding the U.S. Corporate Tax* (Washington: Urban Institute).

Slemrod, J., 2009, "Lessons for Tax Policy in the Great Recession," *National Tax Journal*, Vol. 62, pp. 387–97.

Smith, C.W., 1986, "Investment Banking and the Capital Acquisition Process," *Journal of Financial Economics*, Vol. 15, pp. 3–29.

Stiglitz, J., and A. Weiss, 1981, "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, Vol. 71, pp. 393–410.

Tirole, J., 2006, *The Theory of Corporate Finance* (Princeton: Princeton University Press).

U.S. Department of Treasury, 1992, "Integration of the Individual and Corporate Tax System: Taxing Business Income Once" (Washington: U.S. Government Printing Office).

Weichenrieder, A., and T. Klautke, 2008, "Taxes and the Efficiency Costs of Capital Distortions," CESifo Working Paper 2431 (Munich: University of Munich).

——— and H. Windischbauer, 2008. "Thin-Capitalization Rules and Company Responses Experience from German Legislation," CESifo Working Paper 2456 (Munich: University of Munich).

ZEW and Oxford University Centre for Business Taxation, 2008, "Effective Tax Rates on Investments in the EU, 1998–2007," Report for the European Commission.