Taxation & Dimensions of Sustainability

Essays on Evaluating and Designing Tax Policies for Individuals and Companies

Short summary of the dissertation
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To my grandfather.

Overview and Summary

> "*Sustainable development is the pathway to the future we want for all. It offers a framework to generate economic growth, achieve social justice, exercise environmental stewardship and strengthen governance.*" (Ban Ki-Moon)

Ban Ki-Moon, former secretary of the United Nations (UN), was one of many public figures who emphasized that developing a sustainable way of living and doing business is one of the biggest challenges in the 21st century. The term 'sustainability' traces back to the so-called Brundtland Report from 1987. In this report, the World Commission on Environment and Development describes sustainability as a behavior that addresses present needs without limiting opportunities for future generations (World Commission on Environment and Development, 1988). This balance of present and future needs and resources translates into three pillars: the environmental, the economic, and the social pillar. Thus, our social coexistence should be ecologically sustainable, economically efficient, and socially just (see, e.g., Elkington, 2013).

Especially in the last two decades, it became apparent that we overuse natural resources and that present and future needs are significantly unbalanced. Reacting to this observation, intergovernmental associations like the UN, the European Union, and national governments worldwide made sustainability a key target of policymaking. In 2015, the UN transformed and specified the three pillars of sustainability into 17 goals as part of the 2030 Agenda for Sustainable Development (United Nations, 2015b), depicted in Figure I. The European Union made sustainable development a core principle and committed to the 17 goals proposed by the UN (European Commission, 2016). On a domestic level, national governments all over the world have already implemented many policies addressing sustainability. Regarding the environmental pillar, e.g., the OECD (2022) outlines policies addressing climate change like carbon prices or energy taxes for 71 OECD countries. The report documents an increasing awareness and effort to fight for environmental protection. Therefore, governments worldwide have given a clear mandate to act towards more sustainability.

In realizing policy goals, tax policy is an essential policy instrument in governments' toolkits. Taxation can, therefore, play an essential role in achieving sustainability goals for at least two reasons: First, tax policy can incentivize desired behavior and disincentivize undesired behavior both of firms and individuals. Second, an efficient tax policy can generate government revenue that allows the financing of necessary investments for sustainable

Figure I: Sustainable Development Goals

Source: United Nations (2022).

transformations. Historical data on the scope of tax revenue stresses the potential contribution of tax policy in accomplishing sustainability goals. In Europe, tax revenue accounted for about 20% of the gross domestic product (GDP) between 2012 and 2020 (World Bank, 2022). The available investment amount and the arising potential for influencing behavior are substantial.

Taxation can support sustainable development in all three dimensions. Addressing the environmental pillar, governments can, e.g., discourage consumption and production that contribute to environmental pollution and climate change. To support the economic pillar, policymakers can, e.g., establish policies that contribute to long-term fiscal sustainability. Finally, addressing the social pillar of sustainability, governments and governmental associations can, e.g., engage in combatting tax avoidance and tax evasion (Schratzenstaller, 2015). While conceptual work on taxation and sustainability is limited,[1] many tax studies address these topics of green taxation, fiscal stimuli for economic growth, or tax avoidance and evasion and, thereby, relate to one of the three pillars or one of the 17 goals of sustainability. However, the link to sustainability is mostly not explicitly mentioned. Due to the importance of sustainability as a policy goal worldwide, it is essential to expand the literature on how tax policy can effectively and efficiently support sustainability goals and explicitly link specific tax policies to sustainability goals. Engaging more in the link between taxation and sustainability and reflecting this interplay more conceptually can help exploit tax policy's full potential in this context.

[1]Exceptions are Schratzenstaller (2015) and Nerudová et al. (2019).

This thesis is composed of four essays that evaluate different tax policy reforms or tax policies in general with respect to the three pillars of sustainability.[2] The essays add to the literature that elaborates on taxation and sustainability while explicitly linking tax policies – both national and international – to concrete sustainability dimensions and goals. More specifically, I link tax policies to the environmental dimension, including Goal 13 of the UN on "Climate Action" (Chapter 1), the economic dimensions, including Goal 8 of the UN on "Decent Work and Economic Growth" (Chapter 2), and the social dimension, including Goal 16 of the UN on "Peace, Justice and Strong Institutions" (Chapters 3 and 4). Figure II depicts how the different chapters contribute to the different dimensions and goals of sustainability.[3]

Figure II: Placement of Essays into Dimensions of Sustainability

Pillar	**Environmental**	**Economic**	**Social**
UN Sustainability Goal	• Goal 6: Clean Water & Sanitation • Goal 7: Affordable & Clean Energy • Goal 12: Responsible Consumption & Production • **Goal 13:** Climate Action • Goal 14: Life below Water • Goal 15: Life on Land	• Goal 1: No Poverty • Goal 2: Zero Hunger • Goal 3: Good Health & Well-being • **Goal 8:** Decent Work & Economic Growth • Goal 9: Industry, Innovation & Infrastructure	• Goal 4: Quality Education • Goal 5: Gender Equality • Goal 10: Reduced Inequalities • Goal 11: Sustainable Cities & Communities • **Goal 16:** Peace, Justice & Strong Institutions • Goal 17: Partnerships for the Goals
Chapter	**Chapter 1:** Towards Green Driving - Income Tax Incentives for Plug-in Hybrids	**Chapter 2:** Corporate Taxation and Firm Performance	**Chapter 3:** Tax Avoidance Using Hybrid Financial Instruments Among European Countries **Chapter 4:** Avoiding Taxes: Banks' Use of Internal Debt

The first chapter in this thesis relates to the environmental dimension, more specifically to Goal 13 on "Climate Action" of the UN's agenda for Sustainable Development. One subgoal of Goal 13 is to "integrate climate change measures into national policies, strategies and planning" (United Nations, 2015b) with one of the relevant indicators to monitor the progress of climate action being greenhouse gas emissions. Goal 13 is, thus, closely related to the climate goal codified in the Paris Agreement of limiting global warming to two degrees (United Nations, 2015a). To reach this two-degree target, governments worldwide implement various tax and non-tax measures to incentivize eco-friendlier behavior within society. Previous literature has summarized and evaluated how tax policy can foster the transformation toward ecological awareness. There is literature that conceptually considers the role of politics, including tax policy, in environmental policymaking (see, e.g., Ciocirlan and Yandle, 2003;

[2]All chapters are based on stand-alone papers and can be read separately. Chapters 1, 2, and 4 are based on co-authored papers. In these chapters, I have kept the pronoun "we" in the text (as it is used in the published and working paper versions) to clarify that their basis is joint work.

[3]For assigning the 17 sustainability goals of the UN to the three general pillars of sustainability, see, e.g., Kostoska and Kocarev (2019).

Bovenberg and Goulder, 2002). Other papers evaluate more specific tax policy instruments, like carbon taxes (see, e.g., Harper, 2007). Finally, previous studies have also evaluated the justification of using tax expenditures to reach energy policy goals (see, e.g., Metcalf, 2008) and estimated external costs of environmental pollution and the extent to which these costs are internalized in European taxation (see European Commission, 2021).

Chapter 1 of this thesis evaluates a specific German tax reform aimed at reducing greenhouse gas emissions in the transportation sector by fostering green driving. The transportation sector is a key driver of greenhouse gas emissions. In Europe, it accounts for around 20% of total emissions (European Environment Agency, 2017). Since electric and hybrid vehicles have the potential to impose a much lower climate footprint than regular cars (see, e.g., Orsi et al., 2016), governments take various tax and non-tax actions to increase e-mobility. I investigate a tax policy reform that was implemented in 2019 and grants an income tax benefit for specifically eco-friendly plug-in hybrid company cars. The essay in Chapter 1 investigates both whether this preferential tax treatment was effective in fostering green driving and whether it was cost-efficient.

To examine the effectiveness of the policy reform, I apply a (triple-) difference-in-differences research design. Using administrative data on new car registrations in Germany and Austria, I analyze the German car market separately in a first step and compare the German with the Austrian car market in a second step. While the Austrian car market is highly comparable to the German car market, Austria did not implement a preferential tax treatment for hybrid business cars during my observation period. To investigate the efficiency of the preferential tax treatment, I use a cost-benefit analysis and compare the estimated lost income tax revenue with the estimated reduction in carbon dioxide emissions induced by the reform. The results suggest that introducing the tax reform effectively fostered green driving in Germany. However, the reform was rather cost-inefficient.

The contribution of this essay is twofold: First, the study provides recent evidence for the effectiveness of an income tax incentive on new registrations of eco-friendly cars, taking into account the substantial increase in environmental awareness in recent years (see Pew Research Center, 2020; Umweltbundesamt, 2021). Second, since the taxation of company cars in most European countries hampers eco-friendly cars (Berggren and Kågeson, 2017; Mandell, 2009; PricewaterhouseCoopers, 2007; Wesseling et al., 2015), the focus on company cars provides valuable insights for possible reform options. Chapter 1 is based on unpublished joint work with Henning Giese (Paderborn University).

The second chapter of this thesis relates to the economic dimension, more specifically to Goal 8 on "Decent Work and Economic Growth" of the UN's agenda for Sustainable Development. As one subgoal of Goal 8, the UN defines reaching economic growth as well as higher levels of productivity (United Nations, 2015b). Especially in the current times of economic crises, ensuring sound economic growth becomes increasingly important for policymakers. Previous literature has very generally evaluated the potential role of tax policy in supporting economic growth by investigating the relationship between taxation and firm performance, which is an essential driver of economic growth (see, e.g., Åsa et al., 2010; Lazăr and Istrate, 2018; Chauvet and Ferry, 2021). Additionally, previous literature has also focused on crises and investigated the role of tax policy in stabilizing companies and, therefore, firm performance during economic crises (see, e.g., Keen et al., 2010; Slemrod and Wilson, 2009; Hemmelgarn and Nicodème, 2010).

Chapter 2 of this thesis contributes to the question of how tax policy can foster firm performance. I investigate the relationship between firm performance and corporate taxation and take into account firm heterogeneity by analyzing the whole performance distribution. As tax policy is an essential instrument for reaching political goals like boosting the economy in crises, this essay may provide valuable insights for policymakers. The main measure of firm performance in this essay is Total Factor Productivity (TFP), which is, however, complemented by three alternative firm performance measures.

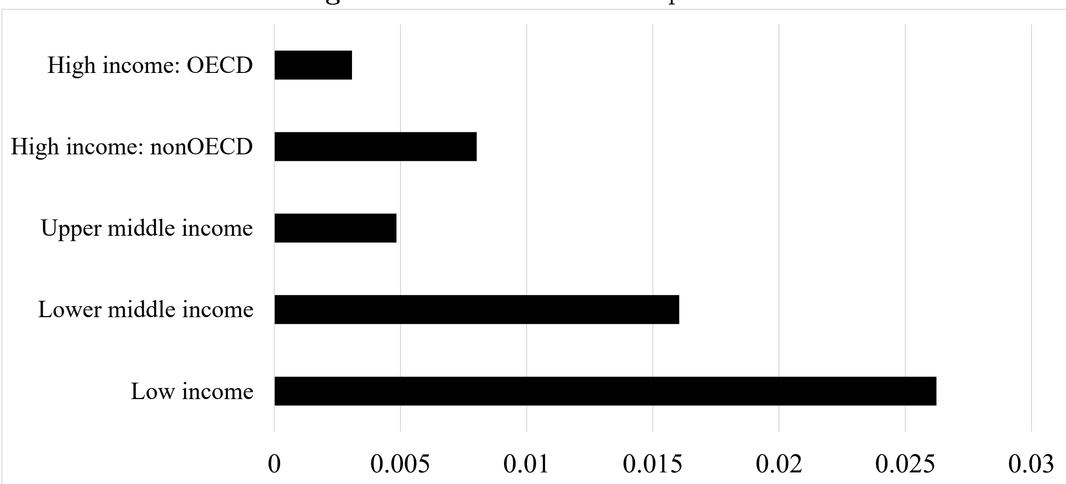
The first part of this essay aims at gaining an overall impression on the relationship between corporate tax burden and firm performance. To incorporate firm heterogeneity, I use recentered influence function (RIF) regressions, which allow to investigate whether the relationship between taxes and performance differs across quantiles of the firm performance distribution. The findings suggest that higher taxes may drive the least productive firms out of the market, making the remaining firms more productive. The second part of the essay focuses on the individual firm level and investigates how corporate taxation relates to the probability of a firm climbing up the performance distribution over time. Applying a logit regression approach, I find that a higher tax burden and especially higher statutory tax rates are associated with a decrease in the probability of improving performance over time.

The contribution of this essay to the existing literature is twofold: First, this study is among the first to investigate the relationship between corporate taxation and firm performance over the whole performance distribution. Therefore, I can take into account the heterogeneity in firm responses to taxation. Second, due to the large scope of the underlying databases, the essay can provide a comprehensive overview of firm productivity developments over time in the context of corporate taxation. Chapter 2 is based on unpublished joint work with Dominika Langenmayr (Catholic University of Eichstätt-Ingolstadt, CESifo, WU Vienna), Valeria Merlo, and Georg Wamser (both University of Tübingen and RSIT).

The third and fourth chapters of this thesis relate to the social dimension, more specifically to Goal 16 on "Peace, Justice, and Strong Institutions" of the UN's agenda for Sustainable Development. One of the subgoals of Goal 16 is to develop transparent and accountable institutions and strengthen institutions through international cooperation (United Nations, 2015b). With respect to taxation, the global challenge of multinational firms engaging in tax avoidance made international cooperation in tax policy essential in the last decade.

The problem of tax avoidance has emerged as globalization has increased the local scope of companies now operating worldwide in numerous different tax jurisdictions. Since firm structures are complex and national tax rules differ, multinational corporations came up with several - legal but unintended - ways to reduce their tax burden and avoid taxes. These tax avoidance activities substantially reduce tax revenue all over the world. For the US, e.g., estimates for tax revenue losses induced by tax avoidance range from 14% (Zucman, 2014) to around 20% (Clausing, 2016; Beer et al., 2020) of corporate income tax revenue. Literature shows that primarily low-income countries suffer the most (see Figure III depicting average tax revenue losses per GDP (Cobham and Janský, 2018, p. 220)). Therefore, tax avoidance not only makes a case for stronger international cooperation but also contradicts other sustainability goals as it hampers a level playing field among national and international firms, prevents fair and sustainable tax competition, and reprives governments of substantial amounts of tax revenue which is particularly problematic in developing countries. In an unprecedented initiative on "Base Erosion and Profit Shifting" (BEPS), the Organisation for Economic Co-operation and Development (OECD) and G20 are trying to fight tax avoidance (OECD, 2013).

Figure III: Tax Revenue Loss per GDP



Average tax revenue losses per GDP by income (Cobham and Janský, 2018, p. 220). For income definitions, see Cobham and Janský (2018).

Previous literature has identified the main channels of tax avoidance (Dharmapala, 2014; Beer et al., 2020). Apart from channels like the strategic use of transfer pricing among affiliated companies (e.g., Clausing, 2006; Cristea and Nguyen, 2016; Liu et al., 2020) or the strategic location of intellectual property in low-tax countries (e.g., Grubert, 2003; Desai et al., 2006; Dischinger and Riedel, 2011; Karkinsky and Riedel, 2012), multinational companies can strategically exploit differences in tax law among countries to avoid taxes. Every country has the right to design its own tax law. As a result, national tax codes differ substantially, resulting in situations where countries may classify the same entity, transaction, or financial instrument differently. With respect to financial instruments, multinational corporations can use so-called hybrid financial instruments (HFIs) within a corporate group to generate income that is not taxed at all.

HFIs are financial instruments that combine characteristics of both debt and equity. So-called demarcation rules determine whether a financial instrument qualifies as debt or equity for tax purposes in a country. A qualification conflict or mismatch between two countries may arise if the same financial instrument qualifies as equity in one country and debt in another. Multinational corporations exploit these mismatches to avoid taxes. Anecdotal evidence indicates that HFIs are widely used to avoid taxes: the OECD has, e.g., recognized that hybrid mismatches are among the most important tax avoidance channels (OECD and G20, 2015). However, it is hard to detect tax avoidance with HFIs since financial statements do not disclose the tax treatment of financial instruments (see Johannesen, 2014). Since even revealing qualification conflicts that allow tax avoidance with HFIs requires a detailed understanding of the involved national tax codes, only a few studies cover tax avoidance with HFIs (see Johannesen, 2014; Kahlenberg and Kopec, 2016) and even fewer studies empirically investigate this tax avoidance channel (an exemption is Hardeck and Wittenstein, 2018).

Chapter 3 investigates two issues on the tax avoidance channel using HFIs. First, I analyze the demarcation rules of five representative EU Member States: Germany, France, the UK, the Netherlands, and Luxembourg. I compare the national tax laws of these countries and detect qualification conflicts for selected HFIs. Second, I investigate which of the revealed qualification conflicts allow tax avoidance for multinational corporations. Thereby, I incorporate how linking rules, the central anti-avoidance measure recommended by the OECD, affect the revealed tax avoidance opportunities. Thus, the essay anecdotally assesses the effectiveness of linking rules and detects tax avoidance opportunities that arise from using HFIs.

I find that national demarcation rules differ significantly between the considered EU Member States. The emerging qualification conflicts allow tax avoidance with HIFs for several country combinations. However, implementing linking rules in national tax laws has significantly reduced tax avoidance opportunities over time. As a result, tax avoidance with HFIs has not been possible for multinational corporations in the considered countries since 2016. Chapter 3 is single-authored and was published in the British Tax Review (Holtmann, 2020).

Previous literature has detected a further tax avoidance channel: the strategic use of debt within a corporate group. This tax avoidance channel builds on the tax treatment of debt: if a corporation pays interest, these interest payments are tax-deductible, i.e., they reduce the tax base and, therefore, the tax payment of the paying company. Multinational corporations can use this tax treatment of debt to shift income from high-tax to low-tax countries. Empirical literature on this channel has confirmed the strategic use of intracompany loans for avoiding taxes (e.g., Mintz and Weichenrieder, 2010; Buettner and Wamser, 2013; Huizinga et al., 2008). Most of this empirical literature, however, excludes the financial sector.

Chapter 4 of this thesis contributes to this research gap and evaluates profit shifting with intragroup debt finance specifically for banks. I use administrative data provided by the German central bank and show that banks indeed use internal debt to shift profits to low-tax countries. The data contains information on bilateral financial flows between German multinational banks' foreign subsidiaries and branches. Using panel regressions, I find that a ten percentage points higher corporate tax rate increases the internal debt-to-assets ratio by about 5.1 percentage points. This absolute response is much stronger than the effect found for non-banks in comparable settings. Therefore, this essay suggests that banks use this tax avoidance channel more aggressively than non-financial firms.

Additionally, the essay makes a methodological contribution regarding the use of conduit entities. Conduit entities are affiliates who pass through internal loans but do not shift profits away from themselves. Despite these pass-through loans, the literature on internal debt shifting uses internal gross liabilities as a proxy for the volume of internal debt shifting. If the location of the conduit entities correlates with tax rates, this proxy, however, systematically underestimates the true amount of debt shifting. The essay shows that conduit entities are indeed systematically located in low-tax countries and proposes a new variable to control for the arising bias.

The results of this paper show that profit shifting in the financial sector is substantial, implying a sizeable revenue loss. At the same time, the current anti-tax avoidance rules either do not apply to or are ineffective in the financial sector. Therefore, the paper argues in favor of specific anti-tax avoidance rules in the financial sector, e.g., rules that limit the deductibility of internal interest payments. Chapter 4 is based on joint work with Franz Reiter (University of Munich) and Dominika Langenmayr (Catholic University of Eichstätt-Ingolstadt, CESifo, WU Vienna) that was published in International Tax and Public Finance (Reiter et al., 2021).

To sum up, the essays in this dissertation link to the three pillars of sustainability and three different goals proposed by the UN as part of the 2030 Agenda for Sustainable Development. Chapter 1 evaluates a national tax policy and contributes to the question of how tax policy can help to incentivize eco-friendlier behavior within a society. Therefore, the essay links taxation to the environmental pillar and sustainability Goal 13 on "Climate Action" in the mobility sector. Evaluating a preferential tax policy for specifically eco-friendly hybrid cars shows that a policy may be effective but still cost-inefficient. While Chapter 1 focuses on a national policy reform, Chapters 2 to 4 evaluate tax policies in an international context. Chapter 2 sheds light on the relationship between corporate taxation and firm performance. Since firm performance is an important driver for long-term economic growth, this essay links taxation to the economic pillar and sustainability Goal 8 on "Decent Work and Economic Growth". The revealed relationships between firm performance and different corporate tax system characteristics may help policymakers design tax policy to support a positive development of firm performance and consequently foster economic growth. Finally, Chapters 3 and 4 study two different channels of tax avoidance. Since tax avoidance distorts competition between purely domestic and multinational firms and results in substantial tax revenue losses, Chapters 3 and 4 link taxation to the social pillar and Goal 16 on "Peace, Justice, and Strong Institutions". Chapter 3 evaluates tax avoidance with HFIs and shows that international cooperation and coordinated tax policy have the power to combat distortive and revenue-undermining behavior by multinationals effectively. Chapter 4 investigates tax avoidance with internal debt for the banking sector. The result that banks use this tax avoidance channel even more aggressively than non-financial corporations addresses the need for a higher level of international cooperation and for strengthening national institutions to adopt more anti-tax avoidance rules.

Abstracts

Chapter 1: Towards Green Driving - Income Tax Incentives for Plug-in Hybrids

Unpublished joint work with Henning Giese (Paderborn University)

Fostering green driving has the potential to reduce high CO2 emissions in the transportation sector. We investigate a German policy reform in 2019 that implemented a preferential tax treatment for hybrid company cars and evaluate the effectiveness and efficiency of the reform. Using a difference-in-differences design, we find that the tax benefit increases the number of newly registered eligible hybrid cars compared to non-eligible cars in Germany and pseudo-eligible hybrid cars in Austria. We find additional evidence for the effectiveness of the reform by comparing the German and the Austrian car market in a triple-difference-in-differences setting. While the reform was an effective policy tool to foster green driving, it was rather cost-inefficient compared to other policy measures aiming to reduce carbon dioxide emissions. Conducting a cost-benefit analysis, we find that the cost per saved ton of carbon dioxide is 682 €.

Keywords: green taxes, e-mobility, tax incentives

JEL Classification: H24, Q53, R41

Chapter 2: Corporate Taxation and Firm Performance

Unpublished joint work with Dominika Langenmayr (Catholic University of Eichstätt-Ingolstadt, CESifo, WU Vienna), Valeria Merlo, and Georg Wamser (both University of Tübingen and RSIT)

This paper provides novel evidence on the relationship between corporate taxation and different measures of firm performance. Existing theoretical literature suggests several channels through which taxes can affect firm performance. Nevertheless, empirical evidence is scarce. We investigate (1) the relationship between corporate taxation and the firm performance distribution as well as (2) how different tax system characteristics affect the development of a firm's performance. Our findings suggest that (1) high taxes may drive the least productive firms out of the market and that (2) high tax rates, as well as anti-tax-avoidance rules, decrease the probability of firm performance growth.

Keywords: corporate taxation, performance, total factor productivity, RIF-regressions

JEL Classification: D24, H25, O32

Chapter 3: Tax Avoidance Using Hybrid Financial Instruments Among European Countries

Single-authored and published in the British Tax Review (Holtmann, 2020)

Multinational companies can use hybrid financial instruments to reduce their tax burden. To achieve such a reduction corporations can exploit the differences that exist between countries in respect of their national tax laws. By evaluating the rules governing demarcation between equity and debt in Germany, France, the UK, the Netherlands, and Luxembourg, the author finds that there are various qualification conflicts, which give rise to tax avoidance opportunities in these countries. The implementation of linking rules, a central anti-avoidance mechanism recommended by the OECD, has reduced the revealed tax avoidance opportunities over time. Considering ATAD I and ATAD II, the author analyses former, current, and future tax avoidance opportunities resulting from the use of HFIs.

Keywords: tax avoidance, hybrid financial instruments, ATAD, BEPS

JEL Classification: H26, G23

Chapter 4: Avoiding Taxes: Banks' Use of Internal Debt

Joint work with Franz Reiter (University of Munich) and Dominika Langenmayr (Catholic University of Eichstätt-Ingolstadt, CESifo, WU Vienna) published in International Tax and Public Finance (Reiter et al., 2021)

This paper investigates how multinational banks use internal debt to shift profits to low-taxed affiliates. Using regulatory data on multinational banks headquartered in Germany, we show that banks use this tax avoidance channel more aggressively than non-financial multinationals do. We find that a ten percentage points higher corporate tax rate increases the internal net debt ratio by 5.7 percentage points, corresponding to a 20% increase at the mean. Our study also takes into account the existence of conduit entities, which simply pass through financial flows. If conduit entities are systematically located in low-tax countries, previous studies may have underestimated the extent of debt shifting.

Keywords: proft shifting, internal debt, multinational banks, taxation

JEL Classification: H25, G21, F23

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