wiiw

IMK
Macroeconomic Policy Institute

JUNE 2021

Working Paper 201

Do Corporate Tax Cuts Boost Economic Growth?

Sebastian Gechert and Philipp Heimberger

The Vienna Institute for International Economic Studies
Wiener Institut für Internationale Wirtschaftsvergleiche

Do Corporate Tax Cuts Boost Economic Growth?

SEBASTIAN GECHERT
PHILIPP HEIMBERGER

Sebastian Gechert is Head of Unit for Macroeconomics of Income Distribution at the Macroeconomic Policy Institute (IMK), Düsseldorf and Private lecturer at the Institute of Economics at the University of Bamberg. Philipp Heimberger is Economist at The Vienna Institute for International Economic Studies (wiiw).

All remaining errors are ours. Heimberger gratefully acknowledges financial support from the Hans-Böckler-Foundation.

Data and replication codes are available at https://github.com/heimbergecon/corptax-growth. We thank Dominika Ehrenbergerova, Tomas Havranek, Zuzana Irsova, Maximilian Kasy, Christoph Paetz and Tom Stanley for helpful discussions.

Abstract

The empirical literature on the impact of corporate taxes on economic growth reaches ambiguous conclusions: corporate tax cuts increase, reduce, or do not significantly affect growth. We apply meta-regression methods to a novel dataset with 441 estimates from 42 primary studies. There is evidence for publication selectivity in favour of reporting growth-enhancing effects of corporate tax cuts. Correcting for this bias, we cannot reject the hypothesis of a zero effect of corporate taxes on growth. Several factors influence reported estimates, including researcher choices concerning the measurement of growth and corporate taxes, and controlling for other budgetary components.

Keywords: Corporate income taxes; economic growth; meta-analysis

JEL classification: E60; H25; O40

CONTENTS

TABLES AND FIGURES

Appendix

1 Introduction

For decades, the economic growth effects of changes in corporate income taxation[1] have stirred debate in both academic and policy circles. Those in favour of corporate tax cuts have argued that lower tax rates would boost growth. Others have raised doubts that substantial growth-enhancing impacts of corporate tax reductions would materialise. Indeed, the past four decades have seen falling corporate tax rates and a rise in corporate tax bases around the globe, yet to various extents across countries (e.g. Devereux et al., 2008; Asen, 2020; Heimberger, 2021). Empirical studies have examined the growth effects of corporate taxation in different country groups and periods, utilising various data sets and econometric methods. A careful reading suggests that the reported findings vary considerably: While some studies find substantial and robust positive growth effects of corporate tax cuts (e.g. Arnold et al., 2011; Lee and Gordon, 2005; Mertens and Ravn, 2013), other studies report significantly negative, insignificant or at least mixed results (e.g. Angelopoulos et al., 2007; Widmalm, 2001; Gale et al., 2015; Kate and Milionis, 2019). Researchers and policymakers interested in learning about the cumulative quantitative evidence on the corporate tax and economic growth nexus may therefore find it challenging to draw valid conclusions from the literature.

This paper contributes to this literature by providing the first comprehensive quantitative survey of the existing econometric literature concerning the impact of corporate taxation on economic growth. In doing so, we compile and analyse a novel data set consisting of 441 estimates from 42 primary studies. We answer two main research questions: First, what can we learn from the econometric evidence about the average effect size if we consider each relevant estimate as one piece of information that fits into a larger statistical picture? Second, what factors contribute to explaining variation in reported effects of corporate taxes on economic growth? In addressing these questions simultaneously, the paper uses the toolbox of meta-analysis and meta-regression methods (e.g. Stanley and Doucouliagos, 2012), allowing us to make model-based predictions about the growth effects of corporate taxes given different data and specification choices.[2]

[1] In what follows, we use the term "corporate taxes" for brevity.

[2] There is a large set of meta analyses related to fiscal policy issues: Heimberger (2021), Feld and Heckemeyer (2011) and de Mooij, Ruud A. and Ederveen (2003) analyse relations of corporate tax competition and FDI. Knaisch and Pöschel (2021) study the incidence of corporate taxes on wages. Phillips and Goss (1995) (1995)

According to the unweighted average of all estimates in our dataset, a cut in the corporate tax rate by one percentage point would moderately, but statistically significantly increase annual GDP growth rates by about 0.02 percentage points. However, we find evidence for publication selectivity in favour of reporting growth-enhancing effects of corporate tax cuts. Correcting for this bias, we cannot reject the hypothesis that the effect of corporate taxes on growth is zero. We show that this finding holds when we account for potential endogeneity issues between corporate taxes and growth.

Several factors influence the reported effect size, including the measurement of corporate tax rates (e.g. statutory vs. effective average tax rates) and the economic growth variable (in per capita terms or not), the time horizon of the GDP response (short-term vs. long-term effects), accounting for other budgetary components (government spending and other taxes), and also publication characteristics. While studies using effective average tax rates more often find growth-enhancing effects of corporate tax cuts, they tend to be outliers as compared to the rest of the literature using effective marginal tax rates, corporate tax shares in GDP or statutory tax rates, and the result is not entirely robust to using different meta-regression approaches. Focussing on a short-term horizon of the GDP response makes corporate tax cuts even less growth-enhancing. In line with theoretical arguments (Aghion et al., 2013; Jones et al., 1993), when government spending and other taxes are fixed, a corporate tax hike has more negative growth effects, which implies that using the additional revenues from corporate taxes for spending increases or cuts to other taxes instead of consolidation would be more beneficial to growth. Interestingly, more recent studies tend to find less growth-enhancing effects of corporate tax cuts.

The rest of the paper is structured as follows. Section 2 discusses theoretical channels of the impact of corporate taxes on economic growth and highlights essential characteristics of the empirical literature by providing a qualitative review. Section 3 explains how we constructed the data set. Section 4 investigates the question of whether reported findings are influenced by publication selection bias. Section 5 presents the meta-regression analysis, which allows us to

---

focus on the effects of state and local taxes on economic development. Gechert (2015) and Gechert and Rannenberg (2018) compare fiscal multiplier effects of several tax and spending measures, while Nijkamp and Poot (2004) consider the long-run effects in comparison, and Bom and Ligthart (2014) focus on the productivity of public capital.

make statistical inferences about factors that contribute to explaining why different studies have not always reported conclusive results. The final section provides a discussion of our findings and concludes.

2 Theory and empirical approaches

2.1 Theoretical literature

An in-depth treatment of the theoretical literature concerning the corporate tax and economic growth nexus would be beyond the scope of this paper. In what follows, we present a broad outline of theoretical arguments that have motivated and guided large parts of the relevant empirical literature.

In the neoclassical setting of the Solow (1970) model, economic growth depends on the accumulation of the production factors labour and capital. Any given tax structure generates an equilibrium of the capital-labour ratio, and further growth in GDP per capita results from exogenous technical change. In this setting, there should be no long-run effect of tax policy on economic growth, because the extent of potential misallocations generated by the tax structure does not matter for the steady state growth rate. There can, however, be detrimental transitory effects of capital income taxation on growth and the steady-state level of income per capita, and transition periods from one equilibrium to another may take years or even decades.

More recently, endogenous growth theory has linked various choices by individual economic actors (e.g. regarding education or R&D spending) to aggregate economic growth, and these choices may be influenced by economic policy decisions (Aghion and Howitt, 2008). When it comes to tax policy, a main theoretical concern that has guided hypothesis testing in the empirical literature is that corporate taxes can distort incentives (e.g. Ferede and Dahlby, 2012; Shevlin et al., 2019). As taxes raise the cost of capital and reduce after-tax returns, higher tax rates may discourage investment (in innovative activities) and, thereby, economic growth. Another channel through which corporate taxes can affect growth is through their impact on Total Factor Productivity (TFP), where taxes distort factor prices and lead to efficiency losses in the allocation of resources. Efficiency losses may reduce TFP. Furthermore, higher taxes may adversely affect entrepreneurial activities, thereby also curbing TFP (e.g. Djankov et al., 2010).

Large parts of the literature on how capital taxation affects growth originate from Judd (1985) and Chamley (1986), who demonstrate within a standard optimal growth model that taxation of capital has substantial negative effects on the accumulation of capital and ultimately output. The traditional literature on optimal taxation has therefore come to the conclusion that the corporate tax rate should be zero (Atkeson et al., 1999).

However, more recent models consider channels by which the optimal corporate tax rate is not zero, and where higher corporate taxation may even increase economic growth. Aghion et al. (2013) use an innovation-based growth model to show that capital taxation can promote economic growth by shifting the tax burden away from labour taxation. Jones et al. (1993) demonstrate that capital taxation may spur growth if tax revenues are used for higher productive public expenditures. As a mirror image, if tax cuts "starve the beast" (Fuest et al., 2019), they may eventually lead to lower provision of productive public capital.

The literature also suggests that the type of taxation matters. Peretto (2003), for example, suggests that corporate income taxation can enhance economic growth, but asset income taxation reduces growth. Moreover, as governments can influence both the rate and the base of corporate taxation, and both may affect investment and location incentives of firms (Devereux et al., 2008), measurement of corporate tax changes is a relevant factor in determining its impact on economic growth. While statutory tax rates reflect pure rate changes, effective average tax rates consider rate and base changes relevant for location decisions, and effective marginal tax rates are relevant for incremental investment decisions.

In summary, various model setups in the endogenous growth literature may lead to different conclusions regarding the aggregate growth impact of corporate taxation, but the dominant theoretical prediction that has guided large parts of empirical testing is that increased corporate taxes reduce growth and, vice versa, corporate tax cuts may help spur growth through various channels. This theoretical literature survey, however, has also suggested: a) that it can be useful to distinguish between short-run and long-run growth effects; b) that the growth effects may at least partly depend on how corporate taxes are measured; and c) how corporate tax changes affect other revenue components and public spending decisions. In our meta-analytical assessment of the relevant econometric literature, we will come back to these important theoretical considerations.

2.2 Empirical literature

This section provides a qualitative overview of the econometric evidence by highlighting some important data and study dimensions. In a seminal paper, Lee and Gordon (2005) assess how tax policy affects economic growth by using cross-sectional data for a group of 70 advanced and developing countries over the time period 1970-1997. The authors focus on the link between (corporate) tax rates and growth over a longer period because they argue that this allows for averaging out short-run effects. Their preferred estimation method is Ordinary Least Squares (OLS), but they also point out that corporate tax rates might be endogenous to economic growth, i.e. changes in corporate taxes may not fully capture exogenous variation in tax policy but may depend on the growth process itself or third factors that affect both. Therefore, some of their robustness checks use the weighted average of corporate tax rates in other countries as an instrument for domestic corporate taxes. Lee and Gordon (2005) report that statutory corporate tax rates are significantly negatively related to cross-sectional differences in economic growth rates while controlling for other determinants.

In another often-cited paper, Arnold et al. (2011) conclude that an increase in corporate income taxes has a stronger negative impact on economic growth than a similar increase in personal income taxes. For the estimations, Arnold et al. (2011) use a dynamic panel data model and a Pooled Mean Group estimator based on annual data for 21 OECD countries from 1971 to 2004. They measure corporate taxes as the share of corporate income tax revenues in total tax revenues. Employing the same definition of the corporate tax variable as in Arnold et al. (2011), the results reported by Widmalm (2001) – who uses panel data for 23 OECD countries over 1965-1990 – are nonetheless quite different: "[c]ontrary to what would be expected, taxes on corporate income as a share of total taxation has a positive, though fragile, correlation with economic growth" (Widmalm, 2001, p.209). Similar results are reported by Angelopoulos et al. (2007) who estimate panel data models for 23 OECD countries over 1970-2000.

The empirical literature related to Arnold et al. (2011), which stresses the role of tax structures, points out that corporate tax changes may not be considered in isolation, but should be viewed with respect to changes in other tax components or government spending through the budget constraint. If total tax revenues are controlled for in the underlying regression, a corporate tax cut is assumed to be counterbalanced by tax hikes in other categories. If government spending is controlled for, a corporate tax cut is assumed not to be accompanied by spending changes.

As a related aspect, several studies consider differences between advanced and developing economies. According to Kate and Milionis (2019), higher corporate taxes may foster growth in advanced economies at the technology frontier since higher corporate taxes may incentivise private innovation activities and may raise revenues for productive public spending. On the other hand, lagging economies that are more focused on technology imitation may face a more negative relation between corporate tax rates and growth because they need to attract foreign capital by lower tax wedges.

All the papers surveyed above use data sets for groups of several countries, albeit with partly different country compositions. Other studies, however, use intra-national instead of international data, suggesting that the identification of growth effects of corporate taxation may be less polluted by institutional or geographical influences when using data variation across states within the same country. Most of the intra-national studies use data for US states; but like the inter-national studies, they reach heterogeneous conclusions concerning the impact of corporate taxes on economic growth. Alm and Rogers (2011) base their estimates on data for 48 US states from 1959 to 1997; they find evidence for a positive association between corporate taxation and state economic growth, but also report that results are sensitive to choices regarding the set of control variables and the time period. Prillaman and Meier (2014) exploit panel data for 50 US states over 1977 to 2005 and a large set of tax, expenditure and political control variables. However, they find that corporate tax cuts have little to no positive impact on state economic growth. Suárez Serrato and Zidar (2018) consider data over the period 1980-2010 and report a negative association between corporate taxation and state level economic growth – which does, however, lack statistical significance.

In summary, the existing empirical literature reports inconclusive findings on the impact of corporate taxation on economic growth. The heterogeneity in results may, however, at least partly be driven by different data and method choices as well as publication characteristics. The underlying country sample, the publication year of the paper (which influences data availability), choices in measuring the corporate tax variable as well as different approaches in dealing with potential endogeneity and reverse causality issues may have a significant impact on the reported results, respectively. Against this background, cherry-picking some results from the literature may be viewed as problematic. Therefore, we will now turn to systematically synthesising and exploring the literature on corporate taxes and economic growth in quantitative terms.

3 Constructing the data set

3.1 Data collection

Our search strategies, the process of collecting the data, and the approach to reporting the results meet the guidelines for conducting meta-analyses (Havránek et al., 2020). A list of studies is provided in Appendix A. Details concerning the criteria for the search process and for including primary studies in the database can be found in Appendix B. As a central condition for being included in our data set, papers used a measure of economic growth as the dependent variable and a measure of corporate taxes as an explanatory variable. To be included, studies had to report results from some variant of the following generic econometric model (note that we ignore subscripts for brevity):

$$g = \alpha_0 + \alpha_1 T + \alpha_3 Z + u \tag{1}$$

where the dependent variable g is a measure of economic growth, T measures corporate taxes, Z is a vector of other explanatory variables, and u is the error term.

The primary studies in our dataset use various scales of the growth and corporate tax variables, so that reported effect sizes are often not directly comparable. We transformed estimates where necessary such that the coefficient of interest α_1 is standardised to reflect that a one percentage point increase in the (statutory) corporate tax rate is associated with an x percentage point change in the rate of economic growth. Details of the standardisation process can also be found in Appendix B. We will denote the standardised version of α_1 as SC in the following.

To check whether our results are affected by our choice for standardising effect sizes, we will use the partial correlation coefficient (PCC) as an alternative standardised effect size. Partial correlations can be directly calculated from the regression results reported in primary studies based solely on the t-statistics and degrees of freedom of the respective estimate. It is calculated as

$$PCC = \frac{t}{\sqrt{t^2 + df}} \tag{2}$$

where t is the t-statistic of the coefficient of interest and df are the degrees of freedom of the regression. The partial correlation coefficient is a dimensionless measure bounded between -1 and 1, signalling the strength of the statistical significance of the coefficient of interest (Stanley and Doucouliagos, 2012). A major drawback is that the partial correlation does not allow for an economically intuitive and meaningful interpretation regarding the effect size. That is why the standardised estimates as described above serve as our preferred estimates, which can be directly compared across different primary studies. The obtained standardised estimates also inform about the economic significance of the coefficient of interest.

3.2 Variables in the meta-regression data set

In what follows, we introduce the meta-regression variables obtained from the 42 primary studies. Table 1 gives an overview of all variables, including their sample mean and standard deviation. Many of the reported variables are categorical dummy variables that mutually belong to a certain group like the different measures of the corporate tax variables. For dummy variables, the mean can be interpreted as the share of observations belonging to a certain characteristic in such a group.

Our central variable of interest is the standardised coefficient SC. To test for publication selection, we also collect the standard error of this coefficient. As explained above, alternatively, we consider the partial correlation coefficient PCC (together with its standard error).

Measures of the corporate tax variable: The empirical literature typically uses five different approaches to measure tax changes. We account for differences in the corporate tax variable by distinguishing estimates that use the statutory tax rate (STR); the effective average tax rate (EATR), which provides a proxy for the average tax burden on investment; the effective marginal tax rate (EMTR), which measures the wedge between pre- and post-tax returns on a marginal investment project that does not yield an economic rent (Devereux et al., 2008); the

Table 1: Variables used in the meta-regression analysis

Variable name	**Description**	**Mean** ($N = 441$)	**S.D.**
SC	Standardised coefficient based on taking the steps explained in section 3.2; interpretation: a 1 percentage point increase in corporate taxes is associated with an x percentage point change in economic growth	-0.019	0.077
SE	Standard error of SC	0.045	0.07
PCC	Partial correlation coefficient of economic growth with corporate tax rates	-0.05	0.202
SEPCC	Standard error of PCC	0.082	0.054
Corporate tax variables			
STR (reference)	BD=1: Statutory Tax Rate	0.463	0.5
EATR	BD=1: Effective Average Tax Rate	0.082	0.274
EMTR	BD=1: Effective Marginal Tax Rate	0.104	0.306
ATR	BD=1: Average tax rate	0.17	0.376
CTTR	BD=1: Corporate tax revenues in % of total tax revenues	0.182	0.386
Country composition			
OECDcountries (reference)	BD=1: Only OECD countries included in the data	0.667	0.472
NonOECDcountries	BD=1: Only non-OECD countries included in the data	0.068	0.252
MixofCountries	BD=1: Mix of OECD and non-OECD countries included in the data	0.265	0.442
Data and estimation details			
LongRunExplicit	BD=1: Estimate explicitly looks at long-run effects of tax changes on growth. E.g. via ECM/PMG models or multi-year averages	0.605	0.489
ShortRunExplicit	BD=1: Estimate explicitly looks at short-run effects of tax changes on growth. E.g. via ECM/PMG models or ARDL models	0.075	0.263
HorizonOther(reference)	BD=1: Study does not clearly state the horizon of the underlying estimate or horizon remains ambiguous	0.32	0.467
TotalTaxRevenues	BD=1: total tax revenues is included as control	0.331	0.471
GovernmentSpending	BD=1: Government spending variable is included as control	0.327	0.469
NoOtherTaxVar	BD=1: no other tax variable (e.g. sales taxes, property taxes, personal income taxes) is used as control	0.51	0.5
CrossSection	BD=1: Cross sectional data used	0.041	0.198
IntraNational	BD=1: Data only includes one country	0.2	0.4
USAonly	BD=1: Data are only based on US observations	0.163	0.37
GrowthMeasure	BD=1: Dependent variable (economic growth) not in per capita terms	0.306	0.459
CountryFixedEffects	BD=1: Country fixed-effects included	0.56	0.497
OLS (reference)	BD=1: Ordinary Least Squares estimation used	0.585	0.493
PMG	BD=1: Pooled Mean Group estimation used	0.098	0.297
SURE	BD=1: Seemingly Unrelated Regression estimation used	0.025	0.156
GMM	BD=1: Generalised Method of Moments estimation used	0.043	0.203
IV	BD=1: Instrumental Variable estimation used	0.079	0.271
OtherEstimator	BD=1: Estimator other than OLS, PMG, SURE, GMM or IV used	0.17	0.376
TacklingEndogeneity	BD=1: Econometric approach tries to address endogeneity issues	0.141	0.348
Publication characteristics			
YearofPublication	The publication year of the study minus the average publication year of all studies	-0.038	4.532
Citations	Logarithm of the number of citations	3.053	1.542
JournalImpactFactor	Journal impact factor normalised to a range between 0 and 1	0.226	0.277
AuthorOECDaffiliation	BD=1: At least one author is affiliated with the OECD	0.104	0.306
Preferred	Categorical variable capturing whether an estimate is preferred (= 1), inferior (= -1) or other (= 0).	0.168	0.494

Notes: Notes: BD = binary dummy, which takes the value of 1 if the condition is fulfilled and 0 otherwise.

average tax rate (ATR), which represents taxes paid by firms divided by a measure of operating surplus; and the share of corporate tax revenues in total tax revenues (CTTR). Nearly half of all estimates (46.3%) use the statutory corporate income tax rate (STR); EATR, EMTR, ATR and CTTR account for 8.2%, 10.4%, 17.0% and 18.1%, respectively.

Country composition: The impact of corporate taxes on economic growth could be influenced by the underlying country sample. We thus control for whether an estimate uses a data sample of OECD countries, non-OECD countries or a mix of countries. The underlying country sample serves as a proxy for the level of economic development, with OECD countries mostly consisting of advanced countries. Non-OECD countries comprise mostly developing countries, and the mixed country group combine advanced and developing countries.

Data and estimation details: As a central characteristic, we categorise the time horizon of the estimates. Did the study clearly state whether the reported estimate implies a long-run or short-run effect? To answer this question, we code three exclusive but mutually exhaustive dummy variables: LongRunExplicit refers to reported long-run effects of corporate taxes on growth (e.g. via long-run coefficients in Error Correction models or Pooled Mean Group models or by using multi-year averages of the data to filter out short-run fluctuations); ShortRunExplicit is about short-run effects (e.g. via short-run coefficients in dynamic models); and HorizonOther covers estimates that are unspecific concerning the time horizon (which we use as our agnostic reference value).

As explained above, controlling for total tax revenues and government spending could have an impact on the estimated effect of corporate taxes on growth via the budget constraint. We therefore code dummy variables that take the value of one when total tax revenues or government spending are controlled for, respectively. The literature has further suggested that controlling for other tax variables (e.g. personal income taxes or sales taxes) in addition to corporate taxes can make a difference for the obtained regression results (e.g. Myles, 2009). Therefore, we code a dummy variable that takes the value of one if no other tax variable was included.

We consider whether a study used cross-sectional data instead of panel data, which is the case for only 4% of the estimates. We also check whether data from only one country were used, so that the focus of the empirical analysis was intra-national instead of inter-national. The reason for considering this aspect is that some studies have argued that it may be easier to identify effects of corporate taxes on growth because states within a country are more similar than different countries (e.g. Gale et al., 2015). We also code a dummy variable that is set to one if only US data are used – which we find to be the case for 16.8% of all estimates – since discussions in the literature about the growth effects of corporate taxation have been particularly intense in the US (e.g. Alm and Rogers, 2011; Prillaman and Meier, 2014; Suárez Serrato and Zidar, 2018). We check whether the dependent variable (GDP growth) was not used in per capita terms, since measurement of the dependent variable could make a difference.

In addition to these data characteristics, we cover details of the estimation approach. We consider the use of different estimators by checking whether the reported coefficient in our data set is based on applying OLS, PMG, SURE, GMM, IV or some other estimator. Moreover, we code a variable that is set to one if the econometric approach in the respective study accounts for potential endogeneity issues.

Publication characteristics: We account for various dimensions of the publication process. This includes the year in which the paper was published to see whether estimates have changed over time; the number of citations; the impact factor of the journal in which the paper was published[3]; whether one or more of the authors are affiliated with the OECD, since there is a cluster of OECD-related publications in our sample; and whether the authors of the primary studies consider an estimate in their study as preferred or inferior.

4 Testing for publication selection bias

This section investigates whether the literature on the impact of corporate taxes on economic growth is fraught with publication selection bias. Publication selection is a process where results are chosen for their statistical significance or for their consistency with theoretical predictions or previous findings (e.g. Andrews and Kasy, 2019). Both authors and journal editors may have a preference for reporting and publishing mostly those results that show statistical significance; researchers may be more willing to accept the presence of a statistically significant effect in line with theoretical predictions; and there may be a general predisposition for treating statistically significant results more favourably than 'insignificant' evidence. All of this can lead to a biased

[3]For studies that have not been published in a peer-reviewed journal, we code a value of 0.01.

picture of the empirical relationship of interest. A central scope of meta analysis, therefore, is the detection and correction of such publication selection bias.

Figure 1 shows information concerning the distribution of the estimates obtained from the primary literature. This "funnel plot" (Stanley and Doucouliagos, 2012) consists of all standardised econometric estimates of the corporate tax-economic growth relationship that we included in the data set (on the horizontal axis) and the precision of these estimates, where precision is calculated as the inverse of the standard errors of the coefficients (on the vertical axis).[4]

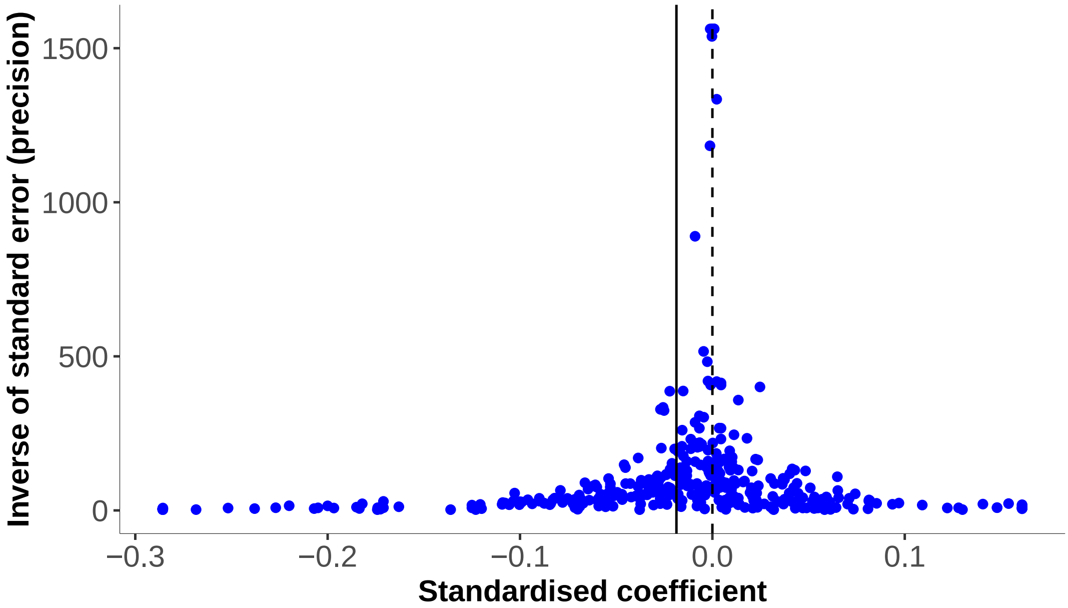
Econometric theory holds that under standard assumptions, (i) point estimates with smaller standard errors should be closer to the true underlying effect, (ii) less precise estimates should be dispersed more widely and (iii) point estimates of coefficients and their standard errors should be essentially uncorrelated. This implies that the funnel plot should ideally be A-shaped and symmetric around the most precise estimates. Publication selection can lead to asymmetric funnels when insignificant or theory-inconsistent results are underreported (see for example the Monte-Carlo simulation exercise in Gechert et al. (2021).

The unweighted sample mean of all standardised coefficients amounts to -0.02. Figure 1, however, reveals that there is considerable dispersion in the results: the minimum standardised coefficient is -0.29 and the maximum is 0.16; the standard deviation is 0.08. The funnel has a familiar shape, often found in the literature: the most precise estimates, which can be seen at the top of the funnel plot, are close to the vertical zero effect line. Moreover, the bottom of the funnel is somewhat asymmetric with a stronger mass of imprecise estimates located on the left side (representing the common-sense growth-enhancing effects of corporate tax cuts), which could be an indication for publication selection bias.

Visual inspection of funnel asymmetry can be misleading. Thus, in the following we employ formal tests for detecting publication selection bias, based on investigating the relationship between the estimated standardised coefficients and their standard errors. Table 2 shows the results of various testing procedures for publication selection bias. To set the stage for these tests column (1) presents a t-test of the unweighted mean of the coefficient against zero. Such a naïve vote counting results in a statistically significant positive effect of corporate tax cuts on

[4]Note that we winsorised the collected estimates and their standard errors at the 2nd and 98th percentile to reduce the impact of potentially spurious outliers (Zigraiova et al., 2021). Our main findings, however, are not affected by the choice of winsorising as we will show by conducting various robustness checks in later sections.

Figure 1: Funnel plot of effect size and precision of estimates



Notes: The figure plots estimates (N = 441, winsorised at the 2nd and 98th percentiles) of the standardised coefficient of the corporate-tax-growth nexus against the inverse of the corresponding standard error. Without publication bias the figure should resemble an inverted symmetrical funnel around the most precise estimates. The dotted vertical line is the zero effect line. The solid vertical line shows the unweighted mean of the standardised coefficient.

economic growth, implying that a one percentage point reduction in corporate taxes is associated with an increase in growth by 0.02 percentage points. Overall, the unweighted mean supports the main theoretical predictions discussed in Section 2.

Column (2) performs the Funnel-Asymmetry Precision-Effect test (FAT-PET), which allows us to formally assess the presence of publication selection bias (e.g. Stanley and Jarrell, 2005). We run the following model:

$$SC_{ij} = \beta_0 + \beta_1 SE_{ij} + v_{ij} \tag{3}$$

where SC_{ij} is the estimated standardised coefficient i from study j, SE_{ij} is its standard error, and v_{ij} is a random sampling error. The term $\beta_1 SE_{ij}$ controls for publication selection bias. The hypothesis test of $H_0 : \beta_1 = 0$ is called the Funnel Asymmetry Test (FAT) (Stanley and Doucouliagos, 2012). If $\beta_1 = 0$, we could conclude that there is no evidence for publication selection bias. At the same time, investigating the hypothesis that $\beta_0 = 0$ (referred to as the

Table 2: Linear funnel asymmetry and precision effect tests

	(1) Unw. avg.	(2) WLS base	(3) median	(4) IV	(5) PCC
β_1 [publication bias]	–	-0.665^{**}	-1.268^{***}	-0.541^{*}	-1.197^{**}
	–	(0.325)	(0.414)	(0.296)	(0.498)
β_0 [mean beyond bias]	-0.019^{**}	0.0001	0.0002	-0.002	0.033
	(0.010)	(0.0004)	(0.001)	(0.012)	(0.029)
N	441	441	42	441	446
Adjusted R^2	0.077	0.061	0.148	0.203	0.059

Notes: The table reports several test results for publication selection bias and underlying effects beyond such a bias, referring to Equation 3. β_1 tests for the presence of publication selection bias. β_0 estimates the average effect of corporate taxes on economic growth after correcting for publication selection bias. In columns (1)-(4), the dependent variable is the standardised coefficient of the effect of corporate taxes on economic growth rates. All results except for column (1) were obtained by using Weighted Least Squares (weights based on the inverse of the variances). Column (1) serves as a comparison and shows the unweighted average (Unw. Avg) of the standardised coefficient, tested against zero. Column (2) refers to the baseline WLS results according to Equation 3. In column (3), we used the median estimates of the 42 underlying primary studies. Column (4) refers to instrumental variable estimation (using the inverse of the square root of the degrees of freedom as an instrument for the standard error). Column (5) uses the PCC of Equation 2 as the dependent variable. Standard errors (clustered at the study level) in parentheses. *p<0.1; **p<0.05; ***p<0.01

Precision-Effect Test, PET) allows us to test whether there remains an empirical effect after accounting for publication selection.[5]

Column (2) of Table 2 provides first evidence for the presence of publication selection bias: the association between the standardised coefficients and their standard errors is negative and statistically significant at the 5% level. This implies a bias in favour of reporting growth-enhancing effects of reductions in corporate taxes. In other words: researchers report positive and/or insignificant estimates less often than one would expect from econometric theory. The PET results in column (2) suggest that the effect of corporate taxes on economic growth cannot be distinguished from zero once we correct for publication selectivity.

Columns (3) to (5) of Table 2 then report results from various robustness checks. Column (3) considers a vastly reduced sample, focussing only on the median estimate from each study. Column (4) addresses the potential endogeneity problem that the standard error could be corre-

[5] The reported empirical estimates were derived from different data sets with various sources of heteroskedasticity. To address this issue, equation (3) is estimated by Weighted Least Squares (WLS) with the inverse of the coefficient variances as weights. Stanley and Doucouliagos (2017) show that WLS is preferable in comparison with other meta-regression estimators, since the estimates of interest do not have equal variances. It is also important to assign more weight to those estimates that come with higher precision, because the information provided by more precise estimates is arguably more valuable. The inverse of the variances of the standardised coefficients are the optimal weights (Cooper and Hedges, 1994). One additional complication arises because of the presence of multiple estimates per study. It is too restrictive to assume that pairs of standardised coefficients and their corresponding standard errors are independent within studies. We account for potential within-study dependence by clustering the standard errors at the study level.

lated with the error term via the choice of estimation techniques in the primary studies, leading to a biased estimate of β_1. We tackle this by an IV estimation, exploiting that studies based on larger datasets tend to be more precise than those based on smaller samples, while the number of observations should be rather uncorrelated with methodological choices. In particular, we calculate the inverse of the square root of the number of degrees of freedom, an estimate that is proportional to the standard error (Havránek, 2015) and use this as an instrument for the standard error. Column (5) reports FAT-PET results when we use an alternative standardised effect size, namely the partial correlation coefficient (PCC).[6] Here, the quantities of the coefficients are not directly comparable to columns (1)-(5), but the signs and notions of statistical significance have a similar interpretation.

To check the robust of the linear tests for publication selection bias, Table 3 reports results based on applying various recently developed non-linear methods. Again, column (1) repeats the unweighted average already shown in Table 2 to facilitate comparison. Column (2) of Table 3 provides an alternative estimate of the mean beyond publication selection bias from the non-parametric approach of Andrews and Kasy (2019). Essentially, the method calculates conditional publication probabilities for conventional critical limits of the p-value of the estimates in the primary studies and points to irregular heaps of results just below the typical thresholds. Applying the method to our sample, we conclude that reporting a negative and statistically significant growth effect of a corporate tax hike (at the 5 or 10% level of the p-value) is about four to five times more likely than reporting an insignificant effect, and about three times more likely than reporting a positive and statistically significant effect. The details can be found in Appendix C. Correcting for this irregularity would result in a small and insignificant negative coefficient.

Column (3) of Table 3 is based on the method developed in Bom and Rachinger (2019), who introduce an "endogenous kink" technique that detects increased publication probabilities beyond an endogenously determined threshold. The findings are again very much in line with our traditional parametric FAT-PET estimates. Furthermore, column (4) shows non-parametric

[6]Note that we can include one additional study (Suarez Serrato and Zidar 2018) and 5 additional observations when we use the partial correlation coefficient; therefore, our PCC sample includes 446 observations from 43 primary studies compared to 441 observations from 42 primary studies when using the preferred standardised coefficient.

Table 3: Non-linear tests of publication selection bias

	(1) Unw. avg.	(2) Andrews-Kasy	(3) Bom-Rachinger	(4) Furukawa	(5) Ioannidis et al.
Mean beyond bias	-0.019^{**}	-0.001	-0.001	0.001	-0.001
	(0.010)	(0.001)	(0.001)	(0.002)	(0.001)
N	441	441	441	21	48

Notes: The table reports the resulting mean beyond bias of several non-linear approaches to detecting publication bias. The dependent variable is the standardised coefficient of the effect of corporate taxes on economic growth rates. Column (1) serves as a comparison and shows the unweighted average (Unw. Avg) of the standardised coefficient, tested against zero. Column (2) refers to the estimates of the bias-corrected mean effect based on the non-parametric test for publication selection introduced by Andrews and Kasy (2019). Column (3) refers to the "endogenous kink" method developed in Bom and Rachinger (2019). Column (4) employs the "stem" method proposed in Furukawa (2019). Column (5) focuses on the top 10% of observations with the smallest standard error as suggested by Ioannidis et al. (2017). Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01

results that are robust to various assumptions regarding the functional form of publication selection bias and the underlying distribution of the true effect of corporate taxes on growth. They are based on Furukawa (2019), who uses only a sub-sample of the most precise estimates – the so-called stem of the funnel plot. This sub-sample is determined by minimising the trade-off between variance and publication bias. Likewise, column (5) uses an approach suggested by Ioannidis et al. (2017), focussing only on the top 10% of estimates with the smallest standard error and reporting the weighted average from this subsample.

The results from all the tests discussed above point to publication bias in favour of reporting a significant growth-enhancing impact of corporate tax cuts. Once we account for publication bias, we are unable to detect an average effect of corporate taxes on growth that is statistically different from zero. The simple bivariate tests, however, do not tell us whether method and data choices might be correlated with the magnitude of publication selection bias or with the underlying effect. This question will be addressed in Section 5.

5 Explaining heterogeneity in reported results

This section addresses the question: what factors contribute to explaining the heterogeneity in the reported results on the corporate tax and economic growth relationship?

In line with standard meta-regression analysis, we make the assumption that the i-th estimate of the standardised tax-growth coefficient from study j, denoted SC_{ij}, is not only influenced by sampling error v_{ij}, but by a vector of variables X_{ij} consisting of study characteristics (such as data, model specification and estimation approach) that capture differences in the underlying impact of corporate taxes on economic growth. The meta-regression model can thus be written as follows:

$$SC_{ij} = \beta_0 + \beta_1 SE_{ij} + \beta_3 X_{ij} + v_{ij} \quad (4)$$

By estimating Equation 4, we can simultaneously account for publication selection bias and control for factors that might explain excess heterogeneity. In line with the bivariate case in Equation 3, we estimate Equation 4 via WLS with the inverse of the variances as optimal weights and with standard errors clustered at the study level. The moderator variables included in vector X were already introduced in Table 1.

Before we present the multivariate meta-regression results, some notes are in order. The meta-regression models always omit one category (as the reference category) from each group of mutually exclusive and jointly exhaustive dummy variables (corporate tax variables, composition of the country sample, estimator used, and time horizon of the effect) due to perfect multicollinearity. This implies, however, that the constant β_0 cannot be interpreted as the 'true' effect of corporate taxes on economic growth, because it depends on the choice of reference groups. Reference categories are chosen based on standard choices and best practices in the literature or reflect a middle-of-the-road choice when there is no clear favourite. Our reference specification is an estimate of the impact of statutory corporate taxes on economic growth for an average of OECD countries and when the primary study does not clearly specify whether the coefficient refers to a long-run or short-run effect of corporate taxes on growth. Notably, our choice of the omitted dummy variable does not influence any of the other estimated coefficients; it only shifts the reference value of the constant β_0 (Heimberger, 2020).

Table 4 shows the meta-regression results based on Equation 4. Our preferred specification is column (1), which focuses on the main factors that have been discussed in the related literature in terms of having an impact on the effect of corporate taxes on growth. These include the way corporate tax rates are measured, the state of economic development of the countries under investigation, the time horizon of the considered growth effects and the recognition of other budgetary components.

Table 4: Multivariate meta regression: main results

	(1) base	(2) +data +est	(3) pub. char.	(4) median	(5) PCC
Constant	0.001	−0.0001	0.006	0.005	−0.028
	(0.001)	(0.003)	(0.005)	(0.007)	(0.023)
SE	−0.238	−0.436*	−0.330	−0.366	−0.261
	(0.279)	(0.250)	(0.247)	(0.410)	(0.373)
EATR	−0.033***	−0.036***	−0.025***	−0.031***	−0.088*
	(0.005)	(0.008)	(0.005)	(0.006)	(0.045)
EMTR	−0.004	−0.001	0.019***	0.020	0.002
	(0.004)	(0.003)	(0.006)	(0.012)	(0.039)
ATR	0.002	0.014***	0.003	−0.003	0.094***
	(0.002)	(0.002)	(0.002)	(0.007)	(0.021)
CTTR	0.003	0.011	0.019**	0.005	0.083**
	(0.007)	(0.010)	(0.008)	(0.010)	(0.036)
NonOECDcountries	0.005	−0.004	−0.003	0.030***	0.002
	(0.006)	(0.006)	(0.007)	(0.010)	(0.040)
MixofCountries	−0.005	−0.006	−0.008	0.007	0.007
	(0.008)	(0.008)	(0.006)	(0.017)	(0.039)
LongRunExplicit	−0.001	−0.001**	−0.002*	−0.005	−0.028
	(0.001)	(0.001)	(0.001)	(0.007)	(0.030)
ShortRunExplicit	0.055***	0.054***	0.054***	0.026	0.024
	(0.009)	(0.011)	(0.019)	(0.016)	(0.035)
TotalTaxRevenues	−0.007	−0.008	−0.007	−0.027**	−0.012
	(0.006)	(0.006)	(0.006)	(0.012)	(0.023)
GovernmentSpending	−0.010***	−0.014***	−0.007***	−0.010	−0.040*
	(0.004)	(0.003)	(0.002)	(0.006)	(0.020)
PMG		−0.002			
		(0.002)			
SURE		0.011			
		(0.007)			
GMM		0.023***			
		(0.008)			
IV		0.004			
		(0.006)			
OtherEstimator		−0.0002			
		(0.001)			
TacklingEndogeneity		−0.009			
		(0.008)			
CountryFixedEffects		−0.0001			
		(0.001)			
CrossSection		−0.011**			
		(0.004)			
USAonly		−0.0002			
		(0.0003)			
IntraNational		−0.002			
		(0.002)			
NoOtherTaxVar		0.003			
		(0.003)			
GrowthMeasure		0.016***			
		(0.003)			
YearofPublication			0.001***		
			(0.0003)		
Citations			−0.001		
			(0.001)		
JournalImpactFactor			−0.016*		
			(0.009)		
AuthorOECDaffiliation			−0.028***		
			(0.008)		
Observations	441	441	441	42	446
Adjusted R^2	0.245	0.317	0.380	0.296	0.209

Notes: The table reports results from various specifications of Equation 4. See Table 1 for description of variables. All results were obtained by using Weighted Least Squares (weights based on the inverse of the variances). In columns (1)-(4), the dependent variable is the standardised coefficient. Column (1) shows our preferred baseline specification (base). Column (2) additionally controls for estimation and data details. Column (3) controls for publication characteristics. Column (4) considers a subsample of only the median estimate from the 42 primary studies. Column (5) uses the partial correlation coefficient (PCC) as the alternative effect size. Standard errors (clustered at the study level) in parentheses. *p<0.1; **p<0.05; ***p<0.01

Some central robust findings stand out: (i) irrespective of the inclusion of the explanatory factors X, the reference specification represented by the constant – based on best practices as described above – again points to a zero effect of corporate taxes on growth in line with Table 2 and 3. The standard error still has a negative sign but is not robustly statistically significant any more when accounting for heterogeneous study characteristics. Regarding the different approaches to measure corporate tax rates, only the EATR coefficient is highly statistically significant with a negative coefficient of -0.03. This indicates that – compared to estimates that use statutory corporate income tax rates (excluded as the reference category in the group of corporate tax variables) – estimates that measure corporate taxes as the EATR report more growth-enhancing effects of corporate tax cuts. However, it should be noted that the EATR results tend to be outliers compared to the rest of the literature measuring corporate taxation as effective marginal tax rates (EMTR), corporate tax revenue shares (ATR and CTTR) or statutory corporate income tax rates (STR), respectively: using any of the latter measures suggests that we cannot reject the hypothesis of a zero effect of corporate taxes on growth.

The results in the baseline specification of column (1) further indicate that, on average, the impact of corporate taxes in OECD countries is not significantly different from the effect in non-OECD countries or mixed country groups. While this result invites caution in making claims that corporate taxes in developing countries have very different impacts compared to developed countries, this does obviously still not rule out that there might be differences in the growth impact across individual countries. The results in column (1) further suggest that the short-run response of GDP to a cut in corporate taxes is even less growth enhancing than for estimates that do not explicitly identify the time horizon. At the same time, we do not find that the long-run growth impact of corporate tax cuts is significantly more positive than for the unspecific reference category. Finally, our baseline results show that when government spending is held constant (i.e. when the underlying primary study controls for public expenditures), a corporate tax cut has more positive growth effects. This finding is consistent with endogenous growth theory where using revenues from corporate income taxation for boosting (productive) government spending can have positive effects on growth (Jones et al., 1993) and with the empirical literature that finds positive productivity effects of expanding the public capital stock (Bom and Ligthart, 2014).

Column (2) of Table 4 includes additional moderator variables capturing estimation and data details that could explain further heterogeneity in reported results. By adding these variables, we confirm the robustness of the baseline meta-regression findings discussed above. Furthermore, we find that using GMM instead of OLS as the preferred estimation approach leads to less positive growth effects of corporate tax cuts. At the same time, the variable TacklingEndogeneity is not significant. This suggests that our finding that the hypothesis of a zero effect of corporate taxes on growth cannot be rejected is not driven by a failure to account for potential endogeneity between corporate taxes and growth. We do find, however, that using cross-sectional data (instead of panel data) delivers slightly more growth enhancing effects of cuts in corporate taxes. It should be noted, however, that only 4.1% of all our estimates are based on cross-sectional data, and the growth enhancing effect is still small when we add the -0.011 CrossSection coefficient to the constant. Interestingly, using intra-national instead of inter-national data does not yield statistically different results. If one is willing to accept the argument that the identification of growth effects of corporate taxation is more valid when using data variation across states within the same country – as these states are more similar than different countries – this finding further reinforces our main result that it is difficult to establish a non-zero impact of corporate taxes on growth. We do find, however, that the measurement of the growth variable matters: primary studies that do not measure growth in per capita terms report significantly less favourable growth impacts of cuts in corporate taxation.

Column (3) in Table 4 reports further extensions to the baseline model by including various publication characteristics. We find that the publication year is positively associated with the reported results, implying that the growth enhancing effects of cuts in corporate taxation reported in the literature have declined over time. We also find some (weakly statistically significant) evidence that papers published in journals with a higher impact factor report more favourable growth effects of corporate taxes, which can be seen as an alternative indication for publication selectivity (e.g. Andrews and Kasy, 2019). Finally, our results suggest that the growth effects of corporate tax cuts are reported to be significantly more positive when at least one author is affiliated with the OECD. While controlling for other potential sources of heterogeneity, our findings suggest that accounting for this affiliation is important, which could be due to publication selection bias in favour of "common-sense" corporate tax-economic growth results.

Table 4 provides two additional robustness checks for the baseline results. Column (4) shows meta-regression results when we restrict our sample to only the median estimates from the 42 primary studies. By this we can test whether our main results are driven by giving an undue weight to studies with many estimates. Given that the number of observations is now less than one tenth of the full sample, it is reassuring that the estimated coefficients of the moderator variables are quite robust in terms of their size, sign and significance. Finally, column (5) uses the partial correlation coefficient as an alternative effect size compared to the standardised coefficient in our preferred specifications. While using the partial correlation coefficient does not lend itself to an interpretation of the economic significance of the coefficients, column (5) broadly confirms our main qualitative findings: a statistically insignificant underlying effect, a statistical relevance of the choice of the corporate tax variable and that holding government spending constant leads to more positive growth effects of cuts in corporate taxes.

We estimated a broad set of additional model specifications to test the robustness of our main meta-regression findings. Detailed results are available in Appendix D. In particular, we present results without winsorising the most extreme values, and we use different cut-offs for the winsorising. The baseline results reported in column (1) of Table 4 remain very robust in qualitative and quantitative terms.

In addition, we introduce a categorical variable for estimates that are preferred by authors of the respective primary studies in our baseline specification, considered as inferior or seen as neither preferred nor inferior. We estimate a model with preferred estimates only; and we drop estimates that are deemed inferior in the original studies. All these separate robustness checks are about testing whether preferred estimates yield findings that are more in line with the dominant theoretical expectation of growth enhancing effects of corporate tax cuts. However, we do not find evidence that distinguishing between preferred and other estimates matters for the overall results, which prove strikingly robust.

Furthermore, we confirm the robustness of our baseline findings when we exclude the moderator variable capturing whether the underlying model specification controls for total tax revenues. As additional robustness checks, we include study fixed effects or random effects respectively, and the results are again remarkably similar to our baseline WLS findings. In the random effects estimation, we find that the negative coefficient of the effective average tax rate is no longer significant, while the coefficient of the average tax rate turns positive and significant.

Finally, we estimate our baseline model by using OLS instead of WLS, and the results again suggest that EATR loses significance, while other corporate tax type variables turn positive and significant. This suggests that the finding about more growth enhancing effects of corporate tax cuts when primary studies use EATR is not entirely robust to variations in the meta-regression estimation technique. The overall finding of an insignificant effect of corporate tax cuts on growth is supported by all robustness checks reported in Appendix D.

6 Discussion and conclusions

This paper has addressed the question as to whether corporate taxes affect economic growth. In doing so, we have applied meta-regression methods to a novel data set consisting of 441 relevant estimates from 42 primary studies. The evidence leads us to two central conclusions:

1. The literature on corporate taxes and growth is characterised by publication selection bias, favouring results according to which corporate tax cuts increase growth rates.

2. After correcting for this bias and taking heterogeneity across studies into account, corporate tax changes have no economically relevant or statistically significant effect on economic growth. This result is confirmed after accounting for potential endogeneity issues between corporate taxes and growth.

When analysing the heterogeneity of reported effects across studies in more detail, we obtain the following main results: First, considering a short time horizon, corporate tax cuts are even less growth friendly. Second, considering both rate and base changes by looking at an effective average corporate tax rate may lead to slightly more positive growth rates in response to tax cuts. However, this is an outlier as compared to the rest of the literature using effective marginal tax rates, corporate tax shares in GDP or statutory tax rates, and the result is also not entirely robust to variations in the meta-regression estimator. Third, there does not seem to be a substantial difference between OECD and non-OECD countries regarding the growth effects of corporate tax changes. Fourth, more recent studies tend to find less growth enhancing effects of corporate tax cuts. Finally, it matters what happens to other budgetary components in conjunction with a corporate tax change: if government spending is held fixed, a corporate tax hike will be slightly more detrimental to growth, implying that using the additional revenues for government spending instead of fiscal consolidation may foster growth, in line with theoretical arguments from endogenous growth models (Jones et al., 1993) and empirical evidence on substantial productivity of public capital (Bom and Ligthart, 2014).

In light of our results, the attention that corporate taxation has received in debates on structural economic reforms as a source of economic growth seems by and large exaggerated. Corporate tax cuts may have stimulated international tax competition (Devereux et al., 2008; Heimberger, 2021) but they do not seem to have significantly promoted economic growth.

References

Aghion, P., U. Akcigit, and J. Fernandez-Villaverde (2013). Optimal capital versus labor taxation with innovation-led growth. NBER working paper 19086.

Aghion, P. and P. Howitt (2008). *The economics of growth.* Cambridge and MA: MIT Press.

Alm, J. and J. Rogers (2011). Do state fiscal policies affect state economic growth? *Public Finance Review 39*(4), 483–526.

Andrews, I. and M. Kasy (2019). Identification of and Correction for Publication Bias. *American Economic Review 109*(8), 2766–2794.

Angelopoulos, K., G. Economides, and P. Kammas (2007). Tax-spending policies and economic growth: Theoretical predictions and evidence from the OECD. *European Journal of Political Economy 23*(4), 885–902.

Arnold, J. M., B. Brys, C. Heady, Å. Johansson, C. Schwellnus, and L. Vartia (2011). Tax Policy for Economic Recovery and Growth. *The Economic Journal 121*(550), F59–F80.

Asen, E. (2020). Corporate tax rates around the world. Tax Foundation Fiscal Fact 735.

Atkeson, A., V. V. Chari, and P. J. Kehoe (1999). Taxing Capital Income: A Bad Idea. *Federal Reserve Bank of Minneapolis Quarterly Review 23*(3), 3–17.

Bom, P. R. and J. E. Ligthart (2014). What Have We Learned From Three Decades Of Research On The Productivity Of Public Capital? *Journal of Economic Surveys 28*(5), 889–916.

Bom, P. R. D. and H. Rachinger (2019). A kinked meta–regression model for publication bias correction. *Research Synthesis Methods 10*(4), 497–514.

Cazachevici, A., T. Havranek, and R. Horvath (2020). Remittances and economic growth: A meta-analysis. *World Development 134*(8), 105021.

Chamley, C. (1986). Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives. *Econometrica 54*(3), 607.

Cooper, H. and L. V. Hedges (1994). *The Handbook of Research Synthesis.* New York: Russell Sage Foundation.

de Mooij, Ruud A. and S. Ederveen (2003). Taxation and Foreign Direct Investment: A Synthesis of Empirical Research. *International Tax and Public Finance 10*(6), 673–693.

Devereux, M. B., B. Lockwood, and M. Redoano (2008). Do countries compete over corporate tax rates? *Journal of Public Economics 92*, 1210–1235.

Djankov, S., T. Ganser, C. McLiesh, R. Ramalho, and A. Shleifer (2010). The Effect of Corporate Taxes on Investment and Entrepreneurship. *American Economic Journal: Macroeconomics 2*(3), 31–64.

Feld, L. P. and J. H. Heckemeyer (2011). FDI and Taxation: A Meta-Study. *Journal of Economic Surveys 25*(2), 233–272.

Ferede, E. and B. Dahlby (2012). The impact of tax cuts on economic growth: evidence from the Canadian provinces. *National Tax Journal 65*(3), 563–594.

Fuest, C., F. Neumeier, and D. Stöhlker (2019). Tax Cuts Starve the Beast! Evidence from Germany. CESifo working paper 8009.

Furukawa, C. (2019). Publication Bias under Aggregation Frictions: Theory, Evidence, and a New Correction Method. Technical report, MIT.

Gale, W. G., A. Krupkin, and K. Rueben (2015). The relationship between taxes and growth at the state level: new evidence. *National Tax Journal 68*(4), 919–941.

Gechert, S. (2015). What fiscal policy is most effective? A meta-regression analysis. *Oxford Economic Papers 67*(3), 553–580.

Gechert, S., T. Havránek, Z. Irsova, and D. Kolcunova (2021). Measuring Capital-Labor Substitution: The Importance of Method Choices and Publication Bias. CEPR Discussion Papers 15687.

Gechert, S. and A. Rannenberg (2018). Which fiscal multipliers are regime-dependent? A meta-regression analysis. *Journal of Economic Surveys 32*(4), 1160–1182.

Havránek, T. (2015). Measuring Intertemporal Substitution: The importance of method choices and selective reporting. *Journal of the European Economic Association 13*(6), 1180–1204.

Havránek, T., T. D. Stanley, H. Doucouliagos, P. R. Bom, J. Geyer-Klingeberg, I. Iwasaki, W. R. Reed, K. Rost, and Aert, R. C. M. (2020). Reporting guidelines for meta-analysis in economics. *Journal of Economic Surveys 34*(3), 469–475.

Heimberger, P. (2020). Does economic globalisation affect income inequality? A meta–analysis. *The World Economy 43*(11), 2960–2982.

Heimberger, P. (2021). Corporate tax competition: A meta-analysis. *European Journal of Political Economy 133*(3), 102002.

Ioannidis, J. P. A., T. D. Stanley, and H. Doucouliagos (2017). The Power of Bias in Economics Research. *Economic Journal 127*(605), 236–265.

Jones, L. E., R. E. Manuelli, and P. E. Rossi (1993). Optimal Taxation in Models of Endogenous Growth. *Journal of Political Economy 101*(3), 485–517.

Judd, K. L. (1985). Redistributive taxation in a simple perfect foresight model. *Journal of Public Economics 28*(1), 59–83.

Kate, F. t. and P. Milionis (2019). Is capital taxation always harmful for economic growth? *International Tax and Public Finance 26*(4), 758–805.

Knaisch, J. and C. Pöschel (2021). Corporate income tax and wages: A meta-regression analysis. arqus Discussion Paper 262.

Lee, Y. and R. H. Gordon (2005). Tax structure and economic growth. *Journal of Public Economics 89*(5-6), 1027–1043.

Mertens, K. and M. O. Ravn (2013). The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States. *American Economic Review 103*(4), 1212–1247.

Moher, D., A. Liberati, J. Tetzlaff, and D. G. Altman (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ 339*(jul21 1), b2535.

Myles, G. (2009). Economic growth and the role of taxation - disaggregate data. OECD Economics Department Working Papers 715.

Nijkamp, P. and J. Poot (2004). Meta-Analysis of the Effect of Fiscal Policies on Long-Run Growth. *European Journal of Political Economy 20*, 91–124.

Peretto, P. F. (2003). Fiscal Policy and Long-run Growth in R&D-based Models with Endogenous Market Structure. *Journal of Economic Growth 8*(3), 325–347.

Phillips, J. M. and E. P. Goss (1995). The Effect of State and Local Taxes on Economic Development: A Meta-Analysis. *Southern Economic Journal 62*(2), 320.

Prillaman, S. A. and K. J. Meier (2014). Taxes, Incentives, and Economic Growth: Assessing the Impact of Pro-business Taxes on U.S. State Economies. *The Journal of Politics 76*(2), 364–379.

Shevlin, T., L. Shivakumar, and O. Urcan (2019). Macroeconomic effects of corporate tax policy. *Journal of Accounting and Economics 68*(1), 101233.

Solow, R. M. (1970). *Growth theory: an exposition.* New York: Oxford University Press.

Stanley, T. D. and H. Doucouliagos (2012). *Meta Regression Analysis in Economics and Business.* New York: Routledge.

Stanley, T. D. and H. Doucouliagos (2017). Neither fixed nor random: weighted least squares meta-regression. *Research Synthesis Methods 8*(1), 19–42.

Stanley, T. D. and S. B. Jarrell (2005). Meta-regression Analysis: A Quantitative Method of Literature Surveys. *Journal of Economic Surveys 19*(3), 299–308.

Suárez Serrato, J. C. and O. Zidar (2018). The structure of state corporate taxation and its impact on state tax revenues and economic activity. *Journal of Public Economics 167*(12), 158–176.

Widmalm, F. (2001). Tax structure and growth: Are some taxes better than others? *Public Choice 107*(3/4), 199–219.

Zigraiova, D., T. Havranek, Z. Irsova, and J. Novak (2021). How puzzling is the forward premium puzzle? A meta-analysis. *European Economic Review 134*(5), 103714.

Appendix A Primary studies included in the meta-analysis

1) Acosta-Ormaechea, S., Yoo, J. (2012): Tax composition and growth: a broad cross-country perspective, IMF Working Paper No. 12/257.

2) Akgun, O., Cournede, B., Fournier, J. (2017): The effects of the tax mix on inequality and growth, OECD Economics Department Working Paper No. 1447.

3) Alm, J., Rogers, J. (2011): Do state fiscal policies affect state economic growth?, Public Finance Review, 39(4), 483-526.

4) Angelopoulos, K., Economides, G., Kammas, P. (2007): Tax-spending policies and economic growth: Theoretical predictions and evidence from the OECD, European Journal of Political Economy, 23(4), 885-902.

5) Arnold, J. (2008): Do tax structures affect aggregate economic growth? Empirical evidence from a panel of OECD countries, OECD Economics Department Working Papers No. 643.

6) Arnold, J., Brys, B., Heady, C., Johansson, A., Schwellnus, C., Vartia, L. (2011): Tax policy for economic recovery and growth, Economic Journal, 121(550), F59-F80.

7) Bakija, J., Narasimhan, T. (2015): Effects of the level and structure of taxes on long-run economic growth: what can we learn from panel time-series techniques?, Proceedings. Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association, 108, 1-57.

8) Blanco, F., Delgado, F. (2019): Taxation and economic growth in the European Union: A quantile approach, Revista de Economia Mundial, 51, 79-100.

9) Bretschger, L. (2010): Taxes, mobile capital, and economic dynamics in a globalizing world, Journal of Macroeconomics, 32(2), 594-605.

10) Dackehag, M., Hansson, A. (2012): Taxation of income and economic growth: an empirical analysis of 25 rich OECD countries, Lund University Department of Economics Working Paper No. 2012/6.

11) Denaux, Z., Walden, M. (2004): Complete State and Local Fiscal Policy: Impacts on Local Economic Growth, The Southern Business and Economic Journal, 27, 154–71.

12) Denaux, Z. (2007): Endogenous growth, taxes and government spending: theory and evidence, Review of Development Economics, 11(1), 124-138.

13) Drucker, L., Krill, Z., Geva, A. (2017): The Impact of Tax Composition on Income Inequality and Economic Growth, mimeo.

14) Durusu-Ciftci, D., Gokmenoglu, K., Yetkiner, H. (2018): The heterogeneous impact of taxation on economic development: new insights from a panel cointegration approach, Economic Systems, 42(3), 503-513.

15) Ferede, E., Dahlby, B. (2012): The impact of tax cuts on economic growth: evidence from the Canadian provinces, National Tax Journal, 65(3), 563-594.

16) Forbin, E. (2011): Effects of corporate taxes on economic growth: the case of Sweden, Jönkoping University.

17) Gale, W., Krupkin, A., Rueben, K. (2015): The relationship between taxes and growth at the state level: new evidence, National Tax Journal, 68(4), 919-942.

18) Gemmell, N., Kneller, R., Sanz, I. (2014): The growth effects of tax rates in the OECD, Canadian Journal of Economics, 47(4), 1217-1255.

19) Goetz, S., Partridge, M., Rickman, M., Rickman, D., Majumdar, S. (2011): Sharing the gains of local economic growth: race-to-the-top versus race-to-the-bottom economic development, Environment and Planning C: Government and Policy, 29, 428-456.

20) Goff, B., Lebedinsky, A., Lile, S. (2012): A matched pairs analysis of state growth differences, Contemporary Economic Policy, 30(2), 293-305.

21) Grdinic, M., Drezgic, S., Blazic, H. (2017): An empirical analysis of the relationship between tax structures and economic growth in CEE countries, Ekonomicky casopis, 65(5), 426-447.

22) Hunady, J., Orviska, M. (2015): The non-linear effect of corporate taxes on economic growth, Timisoara Journal of Economics and Business, 8(1), 14-31

23) Hungerford, T. (2013): Corporate tax rates and economic growth since 1947, Economic Policy Institute Issue Brief No. 364.

24) Hungerford, T. (2018): Latest tax cuts: history belies promise of growth, Challenge, 61(2), 109-119.

25) Lee, Y., Gordon, R. (2005): Tax structure and economic growth, Journal of Public Economics, 89(5-6), 1027-1043.

26) Liu, Y., Martinez-Vazquez, J. (2015): Growth-inequality tradeoff in the design of tax structure: evidence from a large panel of countries, Pacific Economic Review, 20(2), 323-345.

27) Macek, R. (2014): The impact of taxation on economic growth: case study of OECD countries, Review of Economic Perspectives, 14(4), 309-328.

28) Martinez-Vazquez, J., Vulovic, V. (2014): Tax structure in Latin America: its impact on the real economy, Revista de Economia Mundial, 37, 41-73.

29) McNabb, K., LeMay-Boucher, P. (2014): Tax Structures, Economic Growth and Development, ICTD Working Paper, No. 22.

30) McNabb, K. (2018): Tax structures and economic growth: new evidence from the government revenue dataset, Journal of International Development, 30(2), 173-205.

31) Milasi, S., Waldmann, R. (2018): Top marginal taxation and economic growth, Applied Economics, 50(19), 2156-2170.

32) Miller, S., Russek, F. (1997): Fiscal structures and economic growth: international evidence, Economic Inquiry, 35, 603-613.

33) Moore, R., Bruce, D. (2014): Corporate income tax systems and state economic activity, Advances in Taxation, 21, 73-105.

34) Ojede, A., Yamarik, S. (2012): Tax policy and state economic growth: the long-run and short-run of it, Economics Letters, 116(2), 161-165.

35) Pjesky, R. (2016): The impact of state corporate tax rate changes on state economic performance, Southwestern Economic Review, 43, 103-115.

36) Prillaman, S., Meier, K. (2014): Taxes, incentives, and economic growth: assessing the impact of pro-business taxes on U.S. state economies, Journal of Politics, 76(2), 364-379.

37) Sanchez, A., Gori, F. (2016): Can reforms promoting growth increase financial fragility? An empirical assessment, OECD Economics Department Working Papers No. 1340.

38) Shevlin, T., Shivakumar, L., Urcan, O. (2019): Macroeconomic effects of corporate tax policy, Journal of Accounting and Economics, 68(1), 101233.

39)* Suarez Serrato, J., Zidar, O. (2018): The structure of state corporate taxation and its impact on state tax revenues and economic activity, Journal of Public Economics, 167(C), 158-176.

40) Ten Kate, F., Milionis, P. (2019): Is capital taxation always harmful for economic growth?, International Tax and Public Finance, 26(4), 758-805.

41) Tomljanovich, M. (2004): The role of state fiscal policy in state economic growth, Contemporary Economic Policy, 22(3), 318-330.

42) Widmalm, F. (2001): Tax structure and growth: Are some taxes better than others?, Public Choice, 107(3-4), 199-219.

43) Xing, J. (2012): Tax structure and growth: How robust is the empirical evidence?, Economics Letters, 117(1), 379-382.

* Note that the study by Suárez Serrato and Zidar (2018) is only included in the PCC sample as the information are insufficient to calculate standardized effect sizes.

Appendix B Data Collection and Standardisation

B.1 Search strategy and data collection

Our starting point was to conduct a systematic search and review of the literature identifying all relevant primary studies concerning the impact of corporate taxes on economic growth. In constructing the data set, we took the following steps. To search for papers, we first used (i) Google Scholar and (ii) the EconLit database. We chose the following keywords in the search process: "Corporate tax + growth"; and "business tax + growth". Furthermore, we used primary studies from the keyword search to screen their reference lists for further relevant papers. The criteria for inclusion in the meta-analytical data set are as follows:

Economic growth as the dependent variable and corporate taxes as an explanatory variable: As a condition for being included in our data set, papers used a measure of economic growth as the dependent variable and a measure of corporate taxes as an explanatory variable. To be included, studies had to report results from some variant of the following generic econometric model (note that we ignore subscripts for brevity):

$$g = \alpha_0 + \alpha_1 T + \alpha_3 Z + u \tag{5}$$

where the dependent variable g is a measure of economic growth, T measures corporate taxes, Z is a vector of other explanatory variables, and u is the error term.

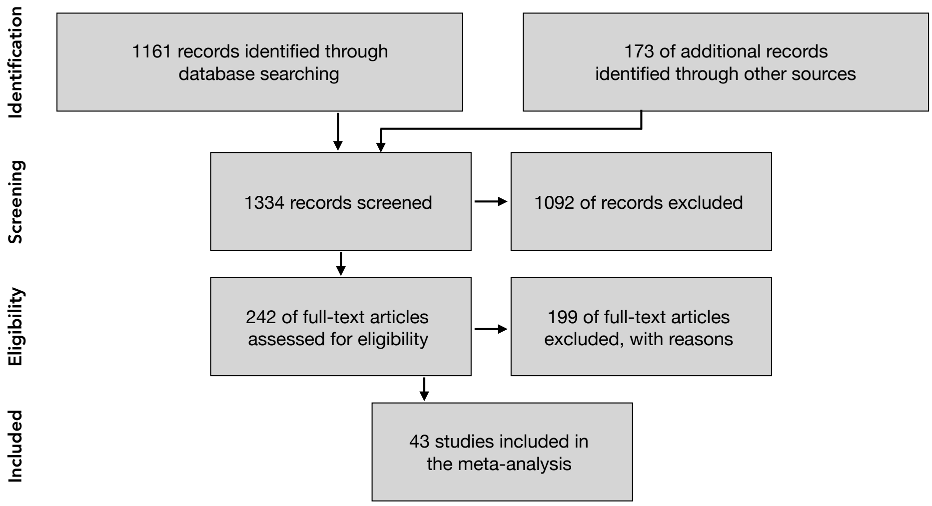
Reported econometric estimates: Only those empirical studies that presented regression results were considered. This restriction excludes papers that only present theoretical analysis, descriptive statistics or qualitative surveys concerning the literature on the link between corporate taxes and growth.

Time and language restriction: We only included estimates published prior to January 2021 in English language.

Offered relevant statistics: A paper had to meet certain reporting standards in order to be included in the data set. The basic requirement was that the paper must have offered regression output (correlation coefficients and standard errors or t-statistics) from which standardised measures of the impact of corporate taxes on growth could be computed.

In sum, 42 papers were compatible with these criteria. We included all estimates from these papers that met the criteria of inclusion explained above, yielding a total of 441 estimates for the meta-study data set. Figure B1 presents the PRISMA flow chart (Moher et al., 2009) for conducting the search and coding of the literature concerning the impact of corporate taxes on economic growth.

Figure B1: PRISMA flow chart: Flow of information through the different phases of the systematic review of the literature on the corporate tax-economic growth nexus



B.2 Standardisation

To make the size of coefficients comparable, we performed corrections and standardisations in three steps. First, our reference point for the dimension of the reported regression coefficient is that a one percentage point increase in corporate tax rates is associated with an x percentage point change in the GDP growth rate (as in Lee and Gordon, 2005). All divergent dimensions of regression coefficients were transformed into this structure. For example, when the GDP growth rate and the corporate tax rate entered the regression in logs (e.g. Macek 2014), we multiplied the reported coefficient by the sample average GDP growth rate divided by the sample average corporate tax rate based on the descriptive statistics reported in the underlying paper. When a study (e.g. Arnold et al., 2011) calculates an effect of corporate tax changes on the long-run level of GDP (instead of the growth rate), we transformed this value into a growth rate effect by assuming a conservative 10-year transition period to the new steady state, thus dividing the reported percentage change by a factor of 10. When a study (e.g. Gale et al., 2015) reports the cumulative growth effect over a multi-year average, we calculate the annual growth rate by dividing by the number of years that form the average.

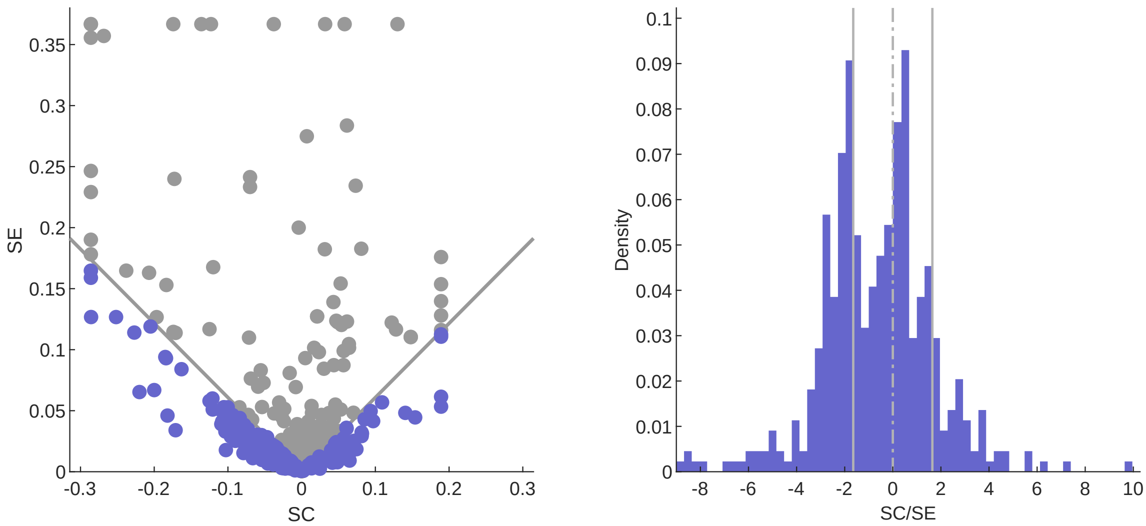
In a second step, we corrected for different measures of corporate tax rates. We account for differences in the corporate tax variable by distinguishing estimates that use the statutory corporate income tax rate (STR); the Effective Average Tax Rate (EATR), which provides a proxy for the average tax burden on investment; the Effective Marginal Tax Rate (EMTR), which measures the wedge between pre- and post-tax returns on a marginal investment project that does not yield an economic rent (Devereux et al., 2008); the Average Tax Rate (ATR), which represents taxes paid by firms divided by a measure of operating surplus; and the share of corporate tax revenues in total tax revenues (CTTR). For example, reported figures on statutory corporate tax rates (STR) are typically an order of magnitude larger than figures of corporate tax revenues in % of GDP (ATR). Coefficients based on statutory corporate tax rates served as the benchmark, because the majority of estimates are based on statutory corporate tax rates and they allow for a straightforward interpretation of the coefficient of interest. For example, we calculated the ratio of STR/EATR when an estimate is based on using the EATR to measure corporate tax rates and correct the size of the reported coefficient based on this ratio. We use equivalent procedures for EMTR, ATR and CTTR measures. Primarily, we used data from the descriptive statistics of the respective studies to perform the transformations. When relevant information was missing we used statistics from papers with similar datasets. For corporate income to GDP ratios we referred to Penn World Tables version 10.0.

The third step concerned addressing interaction terms or squared terms related to corporate tax rates in the underlying model specification. If such terms were included, we calculated the average marginal effect of corporate tax rates on growth and used the delta method to approximate the respective standard errors (e.g. Cazachevici et al., 2020). This third step increases comparability of studies that only consider a linear relationship between growth and corporate tax rates with studies that include a nonlinear relationship (by considering a squared term) or interactions of corporate tax rates with other factors.

Appendix C Andrews-Kasy approach of detecting publication selection

In this appendix we report the details of our analysis of publication selection bias via the non-parametric method of Andrews and Kasy (2019). The method calculates publication probabilities as a step function that detects jumps at conventional critical thresholds of p-values or z-scores. Applying this approach to our data, we find that the probability of publishing a negative and significant coefficient of a corporate tax increase on economic growth is much higher.

Figure C1: Inverted funnel plot and histogram according to the Andrews-Kasy approach



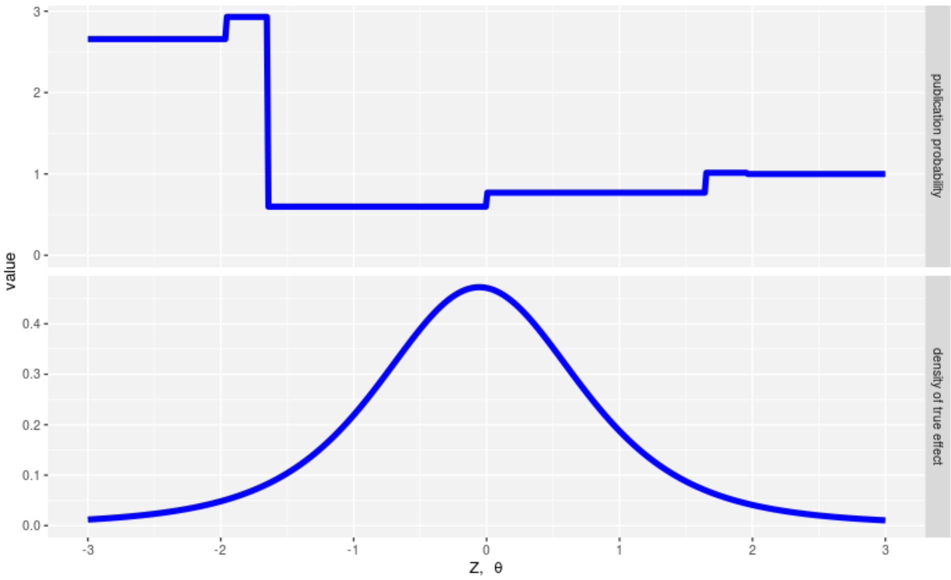
Notes: The *left panel* plots estimates of the coefficient of interest (SC) against its standard error (SE). Grey rays show the 10% statistical significance thresholds. Blue dots are significant estimates and grey dots insignificant ones.
The *right panel* plots a histogram of the estimates according to the z statistic (SC/SE). The grey vertical lines show the 10% statistical significance thresholds.

The left panel of Figure C1 displays an inverted funnel plot where the rays mark relations of the coefficient of interest (SC) and its standard error (SE) that correspond to 10% significance thresholds. The dots show the distribution of estimates and mark in blue the significant ones and in grey the insignificant ones. Remarkably, there is a visible cluster of estimates just along the negative significant borderline.

The right panel of Figure C1 displays a histogram of results according to the z-statistic, where the grey vertical lines show 10% significance thresholds. It is clearly visible that there is a jump of the density of reported results for estimates that are negative and at least 10% statistically significant while such estimates are "missing" on the right side of this threshold. This points to selective reporting of negative and statistically significant results.

Figure C2 shows relative publication probabilities (top panel) and the distribution of the true underlying effect after correcting for publication bias (bottom panel). Publication probabilities can only be identified up to scale, that is, there needs to be a benchmark range of p-values and we chose a positive and significant (at the 5% level) as the reference with a publication probability normalized to one. According to this relation, it is about 2.7 to 3 times more likely to publish a result that is negative and statistically significant at the 5% or 10% critical value than a positive and statistically significant result. Moreover, it is 3.5 to 5 times more likely to publish a result that is negative and statistically significant at the 5% or 10% critical value than an insignificant negative or positive result. Correcting for the resulting bias in the estimates gives a standardized coefficient of -0.00055 with a standard error of 0.00123.

Figure C2: Publication probabilities according to the Andrews-Kasy approach



Notes: The *top panel* reports relative publication probabilities according to the results' z-statistic. A student-t distribution is assumed and critical values corresponding to 5% and 10% statistical significance are chosen as thresholds. Results with a z-statistic above +1.96 (positive and statistically significant at the 5% level) are chosen as the reference with a publication probability of 1. Publishing a result with a z-score in the range of [1.65, 1.96] is just slightly more likely. Publishing a positive but insignificant result is 0.8 times as likely and a negative insignificant result is 0.6 times as likely. It is, however, about 2.9 times as likely to publish a negative result with a z-score in the range of [-1.96, -1.65] and 2.7 times as likely to publish a result with a z-score below -1.96.
The *bottom panel* shows density distributions of the true underlying effect after correcting for publication bias. Note that underlying effects are multiplied by 100 for visualization purposes.

Appendix D Meta-regression results: Robustness checks

In what follows, we report robustness checks concerning our meta-regression results, which are discussed at the end of Section 5 in the main text. Table D1 shows further robustness checks regarding sample selection. Column (1) repeats the baseline specification from Table 3 in the main text to foster comparison. Column (2) reports the same specification, but abstains from winsorising the data. Column (3) winsorises effect sizes and standard errors at the 5th and 95th percentiles. Column (4) includes a variable that controls for results that are preferred or deemed inferior by the study authors. Column (5) uses a subsample only based on these preferred estimates. Column (6) on the other hand excludes results that were deemed as inferior by the authors of the primary studies (and are often only reported for reasons of comparison).

Table D2 includes further mixed robustness tests. Again column (1) reports the baseline estimate from Table 3 for comparison. Column (2) excludes the TotalTaxRevenue dummy to check whether the coefficient of GovernmentSpending might hinge on this choice. Column (3) uses a specification with fixed effects for each study. Column (4) is based on a random effects estimate. Finally, column (5) uses a simple OLS specification of Equation 4 in the main text instead of the baseline WLS.

Table D1: Multivariate meta regression: robustness regarding sample choices

	(1) base	(2) no wins.	(3) wins. 5p95p	(4) preference	(5) only pref.	(6) no inferior
Constant	0.001	0.001	0.002	0.001	0.003*	0.001
	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.002)
SE	−0.238	−0.146	−0.324	−0.239	0.106	−0.287
	(0.279)	(0.301)	(0.258)	(0.280)	(0.235)	(0.290)
EATR	−0.033***	−0.034***	−0.033***	−0.033***	−0.065***	−0.032***
	(0.005)	(0.005)	(0.006)	(0.005)	(0.012)	(0.005)
EMTR	−0.004	−0.005	−0.004	−0.004	−0.017***	−0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.002)	(0.004)
ATR	0.002	0.00004	0.009*	0.002	0.010*	0.002
	(0.002)	(0.001)	(0.005)	(0.002)	(0.005)	(0.002)
CTTR	0.003	0.003	0.004	0.003	0.002	0.004
	(0.007)	(0.007)	(0.008)	(0.007)	(0.003)	(0.007)
NonOECDcountries	0.005	0.006	−0.003	0.005	0.015	0.005
	(0.006)	(0.006)	(0.007)	(0.006)	(0.009)	(0.006)
MixofCountries	−0.005	−0.006	−0.005	−0.005	0.008	−0.006
	(0.008)	(0.008)	(0.008)	(0.008)	(0.010)	(0.008)
LongRunExplicit	−0.001	−0.001	−0.002	−0.001	−0.003**	−0.001
	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.001)
ShortRunExplicit	0.055***	0.054***	0.055***	0.055***	0.036**	0.063***
	(0.009)	(0.010)	(0.008)	(0.009)	(0.014)	(0.010)
TotalTaxRevenues	−0.007	−0.006	−0.007	−0.006	−0.026***	−0.007
	(0.006)	(0.006)	(0.006)	(0.006)	(0.008)	(0.006)
GovernmentSpending	−0.010***	−0.010**	−0.014***	−0.010***	−0.014**	−0.010***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.004)
Preferred				0.0001		
				(0.0003)		
Observations	441	441	441	441	97	418
Adjusted R^2	0.245	0.232	0.252	0.243	0.179	0.239

Notes: The table reports results from various specifications of Equation 4. See Table 1 in the main text for description of variables. All results were obtained by using Weighted Least Squares (weights based on the inverse of the variances). Column (1) repeats the baseline results from Table 4 with winsorising at the 2nd and 98th percentile. Column (2) abstains from winsorising. Column (3) winsorises at the 5th and 95th percentile. Column (4) includes a variable that controls for results that are preferred or deemed inferior by the study authors. Column (5) uses a subsample only based on these preferred estimates. Column (6) excludes results that were deemed as inferior by the authors of the primary studies. Standard errors (clustered at the study level) in parentheses. *p<0.1; **p<0.05; ***p<0.01

Table D2: Multivariate meta regression: further robustness checks

	(1) base	(2) −tax. rev.	(3) study FE	(4) RE	(5) OLS
Constant	0.001	0.001		0.004	0.009
	(0.001)	(0.002)		(0.026)	(0.021)
SE	−0.238	−0.247	−0.580	−0.317**	−0.267**
	(0.279)	(0.289)	(0.376)	(0.145)	(0.107)
EATR	−0.033***	−0.033***	−0.049***	−0.037	−0.030
	(0.005)	(0.005)	(0.002)	(0.041)	(0.026)
EMTR	−0.004	−0.007***	0.020***	0.019*	0.025**
	(0.004)	(0.002)	(0.006)	(0.011)	(0.011)
ATR	0.002	0.001	0.001	0.055**	0.050**
	(0.002)	(0.002)	(0.022)	(0.021)	(0.019)
CTTR	0.003	−0.001	0.008	0.038**	0.059**
	(0.007)	(0.010)	(0.017)	(0.016)	(0.022)
NonOECDcountries	0.005	−0.002	−0.032***	−0.025**	−0.009
	(0.006)	(0.002)	(0.006)	(0.011)	(0.014)
MixofCountries	−0.005	−0.006	−0.015***	−0.010	−0.004
	(0.008)	(0.007)	(0.005)	(0.010)	(0.013)
LongRunExplicit	−0.001	−0.001	−0.002***	−0.020	−0.024
	(0.001)	(0.001)	(0.0001)	(0.036)	(0.019)
ShortRunExplicit	0.055***	0.056***	0.019***	0.002	0.036
	(0.009)	(0.010)	(0.006)	(0.035)	(0.025)
TotalTaxRevenues	−0.007		−0.003	−0.018	−0.032
	(0.006)		(0.003)	(0.015)	(0.019)
GovernmentSpending	−0.010***	−0.010***	−0.008	−0.016**	−0.032***
	(0.004)	(0.004)	(0.007)	(0.007)	(0.010)
Observations	441	441	441	441	441
Adjusted R^2	0.245	0.239	0.582	0.115	0.248

Notes: The table reports results from various specifications of Equation 4. See Table 1 in the main text for description of variables. Column (1), repeats the baseline results from Table 4. Column (2) excludes the TotalTaxRevenue dummy. Column (3) uses a specification with fixed effects for each study and column (4) is based on random effects estimation. Finally, column (5) uses a simple OLS specification of Equation 4 in the main text instead of the baseline WLS. Standard errors (clustered at the study level) in parentheses. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

IMPRESSUM

Herausgeber, Verleger, Eigentümer und Hersteller:
Verein „Wiener Institut für Internationale Wirtschaftsvergleiche“ (wiiw),
Wien 6, Rahlgasse 3

ZVR-Zahl: 329995655

Postanschrift: A 1060 Wien, Rahlgasse 3, Tel: [+431] 533 66 10, Telefax: [+431] 533 66 10 50
Internet Homepage: www.wiiw.ac.at

Offenlegung nach § 25 Mediengesetz: Medieninhaber (Verleger): Verein "Wiener Institut für Internationale Wirtschaftsvergleiche", A 1060 Wien, Rahlgasse 3. Vereinszweck: Analyse der wirtschaftlichen Entwicklung der zentral- und osteuropäischen Länder sowie anderer Transformationswirtschaften sowohl mittels empirischer als auch theoretischer Studien und ihre Veröffentlichung; Erbringung von Beratungsleistungen für Regierungs- und Verwaltungsstellen, Firmen und Institutionen.

wiiw

wiiw.ac.at

https://wiiw.ac.at/p-5821.html