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Abstract

This contribution provides evidence for the hypothesis that trade increases growth through its curbing effect on capital taxes. The analysed trade-growth channel includes a negative impact of openness on corporate taxes and a negative effect of taxes on growth. The paper explores the two steps theoretically and empirically, taking into account the critical points of recent studies in this field. Estimations with panel data for a sample of 12 OECD countries in the period 1965-1999 confirm a significant and robust impact of trade on growth through corporate taxes.

Keywords: Trade and Growth, Tax Competition, Capital Taxes and Mobility, OECD Countries

JEL Classification: F43, 040, H71

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1 Introduction

Capital is internationally mobile and, at the same time, crucial for economic dynamics. More mobility does not necessarily result in more growth, however. The growth rate depends on accumulation incentives, which can increase or decrease with globalisation, see Grossman/Helpman (1991). But goods and factor trade may entail additional mechanisms which unambiguously enhance the accumulation of new capital. According to theory, productivity, competition, market size, and resource reallocation mechanisms can be considered, see Ventura (2004). In the empirical work, various additional channels of government policies and technology diffusion have been tested by Wacziarg (2001). This paper argues that one of the prominent but largely neglected channels is the effect operating through capital taxes. Tax competition theory predicts that increasing globalisation forces governments to reduce taxes on more mobile assets, which - under fairly general conditions - increases growth. Thus the connection is readily given: the pressure on exactly those taxes that seem to be crucial for the growth rate is able to provide a direct link between trade and growth.

The underlying model for the capital tax mechanism can be derived from first principles. Tax competition theory argues that, in equilibrium, marginal benefits of public activities correspond to marginal costs of taxation. In an open economy, any increase in the tax rate of capital causes a capital outflow to other economies, which is a fiscal externality. Costs for capital holders to shift capital abroad fall with lower capital trade restrictions and/or with increasing openness of the economy, see Bucovetsky (1991) and Wilson (1991). Thus rising openness increases the externality and decreases capital tax rates. The impact from capital taxes on growth is given by the effect on the private return on investment. Easterly and Rebelo (1993) point out that "it is hard to think of an influence on the private rate of return and on the growth rate that is more direct than that of income taxes. If these do not affect the rate of growth, what does?"

The search for robust channels in the trade-growth relationship makes a contribution to a central but controversial issue in the current macroeconomic debate. Michaely (1977), Dollar (1992), Sachs and Warner (1995) and Edwards (1992) find a positive impact of trade and open trade policies on the growth rate, while recent papers do not come to unanimous conclusions. Edwards (1998) confirms the earlier results but Rodriguez and Rodrik (2001) remain very skeptical regarding the general validity of the positive connection. Levine and Renelt (1992) and Temple (1999) emphasise that various traditional cross-country studies suffer from methodological problems. Wacziarg and Welch (2003) confirm the low robustness of the nexus for cross-sectional studies but find new evidence when focusing on within-country growth. Frankel and Romer (1999) comment that, in

their opinion, trade is a "very noisy proxy for income-promoting interactions". Reconsidering several important studies, Rodriguez and Rodrik (2001) conclude that open trade policies are not significantly associated with economic growth, once other relevant country characteristics are controlled for. They suspect that the relationship between trade and growth depends on additional characteristics and argue that "scrutinizing the channels through which trade policies influence economic performance is likely to be more productive" before they conclude that "the challenge of identifying the connections between trade policy and economic growth" is crucial for any further research in this field.

This paper adds to the literature in several respects. First, taking the critique of Rodriguez and Rodrik (2001) seriously, it identifies and explores the trade-tax-growth channel both theoretically and empirically. Second, empirical estimations take recently discussed econometric problems into account. By concentrating on OECD countries the contribution avoids estimation problems of large cross-country samples. The 12 leading OECD countries considered are quite similar, e.g. regarding factor endowments, market structures, and institutions, so that the aim of identifying and separating the tax effects seems to be promising. The time period under study covers a sufficiently long horizon and the use of five-year intervals helps to minimise business cycle effects. Third, the paper sheds a specific light on the relationship between institutions and growth, with the tax-setting government in a globalising world as institutional actor. In particular, it adds specific knowledge on developed countries, while many other studies concentrate on less developed economies or mixed samples. Finally, for the empirical estimation of the tax channel, the paper applies the method of Tavares and Wacziarg (2001) and Wacziarg (2001) to the tax competition literature. We estimate the two estimation equations jointly using three-stage least squares, so that consistency is achieved by instrumentation and efficiency is reached by appropriate weighting using the covariance matrix from the second stage of the procedure.

The two relationships of the tax channel mechanism appear to be very intuitive. Nevertheless, both links have been questioned in the literature, which is an additional challenge for the present study. Regarding tax competition, early empirical studies such as Garrett (1995), Quinn (1997) and Swank (1998) do not find that increasing globalisation decreases the tax rates. Concerning the dynamic impact of taxes, Uhlig and Yanagawa (1996) show that, in an overlapping generations economy, lower capital taxes can in fact decrease the growth rate. This may happen because taxing capital relieves the tax burden on the young generation which enables it to save more. We argue that the empirical doubts about the validity of tax competition theory can be cleared up once we use appropriate data and estimation models. In addition, the theoretical result of Uhlig and Yanagawa does not materialise in our data sample. On the contrary, the empirical results show

that, for developed countries, the hypothesis of capital taxes as a link between trade and growth can be confirmed. Finally, it has been argued by Rodrik (2005) that the interpretation of growth regressions with purposeful policies as explanatory variables is problematic. Given the tax competition set-up, however, we do not assume purposeful tax changes, but policies that are enforced by globalisation, i.e. by outside forces.

Of course, the specific channel between trade and growth in this paper has to be seen as a complement to other possible links like scale, accumulation and productivity effects, treated in Rivera-Batiz and Romer (1991), Eaton and Kortum (2001), Keller (2002), Baldwin (2003), Lee, Ricci, and Rigobon (2004), and Alcala and Ciccone (2004); related policy and institutional issues are dealt with in Kneller, Bleany and Gemmell (1999), Tavares and Wacziarg (2001), Dollar and Kraay (2003), Yanikkaya (2003), Dalgaard, Hansen, and Tarp (2004), and Winters (2004), who convincingly argues that openness is not a substitute for a comprehensive development strategy.

The remainder of the paper is organised as follows. Section 2 presents a simple model which is the basis for empirical estimations. In Section 3, the estimation method and the data are discussed. Section 4 provides empirical evidence for the capital tax channel in OECD countries. Finally, section 5 concludes.

2 The theoretical framework

Following the causal chain from trade to capital taxes to growth, the theoretical approach presented here necessarily includes the formulation of two relationships: the first is the impact of trade and trade policy on capital taxes, the second the effect of capital taxes on growth. Let us present a simple approach to formalise the basic idea. For simplicity, we assume that the government levies a proportional capital income tax with a proportional tax rate τ to finance a public consumption good. In a closed economy without distortions, the government chooses an optimal tax rate τ^* such that the marginal benefit of the public good MB equals the marginal costs MC (Samuelson rule), see Bucovetsky (1991) and Wilson (1991). MB depends on individual utility of public services and the ideological preferences of the government, the parliament, and the electorate. It is normally postulated that conservative governments favour a lower level of public activities and a lower capital taxation, while leftist governments favour redistribution and a higher capital taxation. In an open economy, MC contains two parts. On the one hand, it reflects marginal individual costs of taxation MC^{priv}. On the other hand, an increase in τ leads to a capital outflow, decreasing the home tax base and increasing marginal cost of taxation by MC^{outfl}. The more open the economy the larger is

the capital outflow. Accordingly, we may write for the open economy:

$$MB = MC^{priv} + MC^{outfl} \tag{1}$$

$$with\ \tau < \tau^*,\ MB = MB(gov),\ MC^{outfl} = MC^{outfl}(open)$$

gov denotes the preferences of political actors and *open* is a measure of the openness of the economy. Thus, capital taxes are predicted to be lower, the more open is the economy and/or the lower are restrictions on international capital markets, once the preferences of the government are controlled for.

Using a neo-classical production function $Y = AK^{\alpha}L^{1-\alpha}$ with Y, A, K,and L denoting output, total factor productivity, capital, and labour, and assuming $0 < \alpha < 1$, we obtain the private marginal product of capital MPK_P as:

$$MPK_p = (1-\tau)\alpha A^{\frac{1}{\alpha}} y^{\frac{\alpha-1}{\alpha}} \tag{2}$$

where y is per capita income. Inserting (2) into the Keynes-Ramsey rule for intertemporal optimisation of infinitely lived households yields the per capita growth rate g according to:

$$g = \frac{1}{\eta}\left[(1-\tau)\alpha A^{\frac{1}{\alpha}} y^{\frac{\alpha-1}{\alpha}} - (\delta + g_L + g_A)\right] \tag{3}$$

where $1/\eta$ is the intertemporal elasticity of substitution, δ the depreciation rate, g_L population growth, and g_A technical progress.

From (1) we obtain the first and from (3) the second estimation equation, according to:

$$\tau_i = \beta_0 + \beta_1 open_i + \beta_2 gov_i + \beta_3 Z_i' + \epsilon_{i\tau} \tag{4}$$

$$g_i = \gamma_0 + \gamma_1 \tau_i + \gamma_2\ ln\ y_{i0} + \gamma_3 X_i' + \epsilon_{ig} \tag{5}$$

i is a country index while Z' and X' are vectors of control variables; ϵ_τ and ϵ_g denote the error terms. $\beta_1$and β_2 as well as γ_1 and γ_2 are expected to have a negative sign. Equation (4) describes the impact of globalisation on the channel variable which is the capital tax rate, equation (5) reflects the effect of the channel variable on economic growth.

According to (4) and (5), the endogenous variables of the system are the tax rate and the per capita growth rate. As right-hand variables we introduce openness captured by trade measures and qualitative indices for capital and current account restrictions, the country area, the log of initial income, initial human capital, the investment share, population growth and the country size; for an endogenous treatment of country size see Alesina, Spolaore, and Wacziarg (2004).

3 Estimation Method and Data

3.1 Econometric issues

In cross-country studies on trade and growth, econometric problems such as simultaneity, parameter heterogeneity and missing variables have especially to be considered, see Temple (1999). Simultaneity arises because "countries whose incomes are high for reasons other than trade may trade more" (Frankel and Romer 1999, p. 379). These authors use geographical variables for the construction of appropriate instruments to correct for this bias. In a similar way, we will also introduce geographical instruments in the regressions. However, we will emphasise the growth and not the level effects of income, as done in Hall and Jones (1999) and Frankel and Romer (1999). According to Baldwin (1989, 1992) in his response to the EU-common-market studies, the distinction between level and growth effects of trade is a crucial issue. Consequently, the problem of simultaneity is also distinct in the two cases. A one-shot (unilateral) increase in productivity can plausibly alter a country's specialization and trade position. But a change in continuous productivity growth is normally due to improvements in mainly domestically oriented sectors such as research and education. Hence, a higher growth rate is not directly tied to higher trade volumes or trade shares. Accordingly, direct empirical observations on the impact of growth on trade shares remain inconclusive. For example, in the period 1993-2000, the US economy showed strong growth, which is commonly attributed to domestic factors such as a favourable macroeconomic environment and the widespread use of new information technologies. However, in the same period the export share increased only slightly from around 10 to 11 percent. In Japan, growth was much weaker in the same period; nevertheless, the export share rose more, from 9 to 11 percent. The difference to Germany is even more striking: there, growth was relatively modest in this time period but the export share increased from 22 to 34 percent!

A second econometric problem is the pervasive parameter heterogeneity, which arises from the use of large samples including very different countries. On the one hand, problems of data quality and outliers are well known and can be addressed with appropriate sensitivity tests. But there are good reasons to suggest that the mechanisms transmitting the impact of trade on growth vary when we compare different countries, notably LDCs and leading economies. Whereas for developing countries, the strengthening of market forces might be a main channel in the trade-growth nexus at work, this effect seems to be less important for industrialised countries. In addition, the growth effects of trade depend on comparative advantage, see Grossman and Helpman (1991), which varies strongly between very different countries. If theory is richer than is expressed in the current empir-

ical studies, the problem of omitted variables is also a serious obstacle for good estimation results.

By restricting our analysis to only 12 highly developed economies with similar factor endowments and institutional background, using appropriate instruments and adopting a simultaneous estimation approach we aim to reduce as far as possible the econometric problems raised.

3.2 Estimation procedure

In the present paper, the system consisting of equations (4) and (5) is estimated jointly using three-stage least squares. The procedure follows Tavares and Wacziarg (2001) and Wacziarg (2001). In the first step, for each of the two equations, a reduced-form coefficient matrix is estimated using OLS. In the second step, 2SLS is adopted to estimate the structural model. Finally, in the third step, the estimated covariance matrix from step 2 and the fitted values of the endogenous variables of step 1 are used for an IV-GLS estimation applied to the stacked structural model. By applying this estimation procedure, consistency is achieved by instrumentation while efficiency is reached by appropriate weighting when using the covariance matrix from the second stage. As in Tavares and Wacziarg (2001) we restrict all non-contemporary coefficients to zero.

By using a sufficient number of exogenous variables and instruments we aim at reducing the scope for omitted variable bias. As instruments we use a variety of predetermined economic and geographic variables as well as country and time period dummies. Specifically, we introduce in all equations the square of the log of initial income, the logarithm of population, the average distance to trade partners, the land area, dummies for all the countries with the exception of the UK and for all time periods except 1995-99.

3.3 The data

To measure trade and the openness of an economy, a common variable used in empirical studies is the sum of imports and exports as a percentage of GDP. For financial market liberalisation, most studies use a qualitative measure constructed by analysing inward and outward capital and current account restrictions and by regarding international legal agreements that constrain a nation's ability to restrict exchange and capital flows. The series of Quinn (1997) contain indices for capital and goods market restrictions. By including both types of variables below we acknowledge the fact that openness for goods and for capital are, although linked by the balance of payments, not necessarily identical. It will turn out, however, that the quantitative trade variable performs much better than the indices

in our sample. The reason seems to be that, for OECD countries, the variation of the indices is comparatively low.

Effective tax burden of firms is determined not only by the statutory tax rate but also by the determination of the legal tax base, which differs due to complex national differences in tax-credits, tax-exemptions and tax-deductions for identical operating surpluses. Capital tax revenue as a share of GDP was used by Garrett (1995), Quinn (1997) and Swank (1998). But since capital tax revenue as a percent of GDP equals capital tax rates times the capital base divided by total income, the observed relationship is not necessarily incompatible with greater openness reducing the tax rate. If, at the same time, openness raises the capital/output ratio and, especially, if it does so by means of lower tax rates, a positive impact of globalisation on tax revenue can be expected, according to theory.

Table 1: Data

Used variables and sources

Variable	Description	Source
corptax	corporate tax rate	OECD (1998a,b), (2005)
open	exports+imports/GDP	PWT 6.1
capital	restrictions on payments and receipts of capital	Quinn (1997)
openness	capital and current account restrictions	Quinn (1997)
growth	real per capita GDP growth, const. prices, chain series	PWT 6.1
gov	Center of political gravity :government, cabinet, and electorate	Cusack (1997), Cusack and Engelhardt (2002)
area	land area	Barro/Lee (1994)
logincome	log of initial GDP per capita	PWT 6.1
human	initial years of average schooling	Barro/Lee (2000)
invest	average investment share	PWT 6.1
popgrowth	population growth	PWT 6.1
size	GDP per capita x population	PWT 6.1

Therefore, effective tax rates are used for the estimations below. These rates are calculated by dividing total tax revenues from corporate taxation by the operating surplus of corporate enterprises, according to the methodology proposed in Mendoza, Razin and Tesar (1994). As effective capital tax rates incorporate taxes on immovable properties with a very inelastic tax base, corporate taxes are better suited to testing the theoretical predictions of the tax competition model. Furthermore, a large share of corporate capital belongs to multinational firms and is thus especially mobile. The quality of the tax competition results in this paper is

compatible with the outcome in Rodrik (1997) and Bretschger and Hettich (2002), where, however, annual data are used for single equation estimations, which does not allow the channel and the endogenous growth perspective taken here.

Effective corporate tax rates are calculated with OECD tax data as the sum of tax revenues of corparate taxation plus tax revenues on companies' assets, both taken from the revenue statistics (OECD 1998a), divided by net operating surplus of corporations, taken from the national accounts (OECD 1998b). Data for 1997-99 are calculated by using OECD (2002). The other data sources are described in table 1. PWT 6.1 refers to the Penn Word Table, see Heston, Summers and Aten (2002).

The sample covers the 12 OECD countries with adequate tax data (Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, UK and USA) and range from 1965 to 1999, divided into five year periods as follows: 1965-69, 1970-74, 1975-79, 1980-84, 1985-1989, 1990-94 and 1995-99. For some countries, tax data are not available from the beginning, so that the panel is unbalanced. The summarising description of the series is given in table 2.

Table 2: Description of variables

Variable	Obs.	Mean	Std.dev.	Min	Max
corptax	70	36.88	14.02	13.20	78.19
gov	84	9.28	1.06	7.14	11.09
capital	84	3.30	0.73	1.5	4
openness	84	11.81	2.00	6.8	14
popgrowth	83	0.005	0.004	-0.002	0.017
invest	83	26.05	5.01	16.99	37.87
open	83	57.84	30.15	10.11	141.73
growth	83	2.43	1.61	-1.61	10.44
logincome	84	9.71	0.28	8.83	10.25
area	84	1830	3535	31	9976
dist	84	3.19	2.14	1.27	8.79
size	83	104.78	152.03	3.95	810.02
human	84	8.43	1.82	3.31	11.89

4 Empirical Evidence for OECD Countries

The two equations derived from theory are used directly for the empirical estimation of the tax channel mechanism. The results are presented in several steps. In all cases we depart from the core model for the tax and the growth equation given by equations (4) and (5). The first equation gives the impact of trade on the channel variable *corptax* which appears as an explanatory variable of the growth regression yielding the effect of the channel on the growth rate of the economy.

In table 3, several control variables are added in the trade-tax relationship. Additional control variables for the tax-growth relationship are introduced in table 4. This provides information about the robustness of the central trade-tax-growth nexus under various specification conditions. In tables 5 and 6, the same equations are presented using SUR estimates to check the sensitivity of the results regarding the estimation method. Finally, table 7 reports the results of further sensitivity analysis with respect to geography, time periods and estimation procedure.

In table 3, we see that the variable *open* measuring trade openness is significant at the 1 % level and has the predicted negative impact on the corporate tax rate throughout. The estimated parameter values vary between -0.144 and -0.2 in the different equations. The impact of the political variable *gov* is also highly significant, confirming that more right wing governments and voters have strong preferences for lower capital taxes. As larger countries tend to have a lower dependence on other countries, the geographical variable *area* shows in equations (2)-(4) a negative and significant impact on the tax rate. The qualitative variables for trade and trade policy of Quinn (1997) are not successful for the OECD countries. The index *capital*, a measure of international capital market restrictions, and *openness*, which represents capital and current account restrictions for the different countries, are not significant in equations (3) and (4), respectively. In the standard growth regression given in the lower part of the table, the right-hand variables appear as predicted. The log of initial income *logincome* is highly significant and negative, as expected in this kind of regression. The variable for corporate taxation *corptax* is also significant at the 1 % level and negative as derived from theory. The estimated parameter value shows little variation.

Table 4 extends the specification of the growth equation, leaving the three significant variables in the tax regression equation. Still, the variable *open* behaves as predicted and is highly significant. Interestingly, the parameter value shows less variation and lies around -0.18. Also, *gov* and *area* have the effects as in the previous table. In the growth regression, the impact of *logincome* and *corptax* remain under the various specifications. The estimated parameter value for the tax rate remains at the same level as in the first table. The impact of initial

human capital *human* is only significant at the 10 % level while the investment rate *invest* is not significant here. However, the size of the economy *size* has a positive and significant effect on growth as seen in specifications (7) and (8). In the last column, population growth is added but it is not significant. This is not too surprising for a data set including the leading OECD countries only.

Specification (7) can be seen as the most successful regarding the explanatory power, it may thus be labelled the "benchmark" estimation. Calculating the elasticities related to the mean for the estimated parameter values, we obtain an elasticity of -0.293 for the impact of trade openness on the corporate tax rate, -0.577 for the effect of the corporate tax rate on growth, and, finally, a value of 0.17 for the impact of openness on growth via the tax channel. Although highly significant according to the estimations, this effect can be seen as not exorbitantly high in terms of the elasticity. This is certainly true, but it might be that, in the longer run, the quantitative effect is stronger, as investors seem to need a certain time to adjust to a new tax environment to carry out new projects. It has also been emphasised in the introduction that the tax channel is not the only operating channel in this field so that the size of the elasticity appears to be reasonable.

Tables (5) and (6) present the results using the alternative estimation technique of seemingly unrelated regressions (SUR). Specifications (9) through (16) have the same structure as in (1) to (8). When running the model without instrumenting for the endogenous variables, inconsistent estimates might be the result. Nevertheless, it is worthwhile to see whether large differences in results are observed when adopting the SUR procedure. One can easily see that this is not the case here. The general quality of the regressions remain unchanged and the signs and the significance of the key variables remain the same. The impact of trade openness on the tax rate is of the same size, while the effect of the tax on growth is a bit lower than for the 3SLS estimations.

Table 7 provides additional information concerning the robustness of the results. It is based on the "benchmark" specification. In equations (17) and (18), respectively, a special dummy for non-European countries is introduced to capture the specific impact of European policies. One can see that this dummy is not significant in either equation.

Since the panel is relatively short in time dimension, equation (19) reports the results of the alternative estimation method of panel corrected standard errors, which was designed exactly for panels like the present. Of course, the procedure is applied to the two equations separately. It is very instructive to see that the results are very similar to the other estimation procedures, the standard errors are even smaller in this case making the estimated parameter coefficients even more significant. The last three columns (20)-(22) report the results of the benchmark model for the different time periods 1970-99, 1975-99 and 1965-90. When omitting

the first or the first two time periods there are no major changes compared to the full time range; when leaving out the second half of the 1990s it is interesting to see that the impact of trade openness on corporate taxes and of corporate taxes on growth are somewhat smaller.

Table 3: Estimation results I
Endogenous variables: corptax and growth; 3SLS (IV-GLS)

Variable	(1)	(2)	(3)	(4)
corptax				
const	97.65***	84.66***	81.72***	97.74***
	(15.77)	(14.66)	(14.84)	(16.42)
open	- 0.144***	- 0.178***	- 0.200***	- 0.149***
	(0.051)	(0.048)	(0.050)	(0.053)
gov	-5.68***	-3.71**	-4.07***	-5.71***
	(1.52)	(1.47)	(1.49)	(1.59)
area		-0.002***	-0.002***	-0.002***
		(0.0004)	(0.0004)	(0.0004)
capital			2.34	
			(2.04)	
openness				0.048
				(0.778)
growth				
const	43.43***	44.23***	43.27***	42.78***
	(5.97)	(5.95)	(5.96)	(5.96)
logincome	-4.06***	-4.14***	-4.06***	-4.02***
	(0.60)	(0.60)	(0.60)	(0.60)
corptax	-0.043***	-0.044***	-0.039***	-0.035***
	(0.013)	(0.013)	(0.013)	(0.013)
# of obs.	69	69	69	69
R^2 corptax	0.19	0.19	0.19	0.19
R^2 growth	0.39	0.39	0.39	0.40
χ^2 corptax	15.66	15.66	15.66	15.92
χ^2 growth	50.84	50.84	50.84	48.06

Standard errors in parentheses.
* Significant at the 10 % level
** Significant at the 5 % level
*** Significant at the 1 % level

Table 4: Estimation results II
Endogenous variables: corptax and growth; 3SLS (IV-GLS)

Variable	(5)	(6)	(7)	(8)
corptax				
const	85.41***	84.42***	84.29***	84.57***
	(14.72)	(14.62)	(14.70)	(14.72)
open	- 0.184***	- 0.177***	- 0.187***	- 0.188***
	(0.048)	(0.047)	(0.048)	(0.048)
gov	-3.76**	-3.70**	-3.63**	-3.65**
	(1.1.48)	(1.46)	(1.47)	(1.47)
area	-0.002***	-0.002***	-0.002***	-0.002***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
growth				
const	50.59***	41.16***	49.08***	48.98***
	(6.91)	(6.52)	(5.86)	(6.14)
logincome	-5.04***	-3.93***	-4.69***	-4.69***
	(0.78)	(0.63)	(0.60)	(0.61)
corptax	-0.031***	-0.046***	-0.038***	-0.036**
	(0.014)	(0.013)	(0.013)	(0.016)
human	0.23*			
	(0.12)			
invest		0.044		
		(0.036)		
size			0.003***	0.003***
			(0.0009)	(0.0009)
popgrowth				-5.42
				(45.12)
# of obs.	69	69	69	69
R^2 corptax	0.33	0.33	0.33	0.33
R^2 growth	0.43	0.38	0.46	0.47
χ^2 corptax	33.67	34.12	33.51	33.72
χ^2 growth	57.64	56.72	67.84	66.34

Standard errors in parentheses.

* Significant at the 10 % level

** Significant at the 5 % level

*** Significant at the 1 % level

Table 5: Estimation results, alternative method I
Endogenous variables: corptax and growth; estimation method: SUR

Variable	(9)	(10)	(11)	(12)
corptax				
const	97.99***	85.36***	81.89***	79.78***
	(15.81)	(14.75)	(14.88)	(15.47)
open	- 0.153***	- 0.187***	- 0.206***	- 0.202***
	(0.051)	(0.048)	(0.050)	(0.049)
gov	-5.66***	-3.74**	-4.10***	-4.05***
	(1.53)	(1.48)	(1.49)	(1.49)
area		-0.002***	-0.002***	-0.002***
		(0.0004)	(0.0004)	(0.0004)
capital			2.44	
			(2.04)	
openness				0.80
				(0.73)
growth				
const	42.03***	42.56***	42.32***	42.42***
	(5.93)	(5.93)	(5.93)	(5.93)
logincome	-3.98***	-4.02***	-4.00***	-4.00***
	(0.60)	(0.60)	(0.60)	(0.60)
corptax	-0.026**	-0.030**	-0.029**	-0.030**
	(0.011)	(0.011)	(0.011)	(0.011)
# of obs.	69	69	69	69
R^2 corptax	0.19	0.33	0.34	0.34
R^2 growth	0.40	0.40	0.40	0.40
χ^2 corptax	16.05	34.05	36.17	35.87
χ^2 growth	46.36	48.53	47.73	48.22

Standard errors in parentheses.

* Significant at the 10 % level

** Significant at the 5 % level

*** Significant at the 1 % level

Table 6: Estimation results, alternative method II
Endogenous variables: corptax and growth; estimation method: SUR

Variable	(13)	(14)	(15)	(16)
corptax				
const	85.42***	85.35***	85.24***	84.57***
	(14.76)	(14.74)	(14.76)	(14.72)
open	- 0.189***	- 0.186***	- 0.189***	- 0.189***
	(0.048)	(0.048)	(0.048)	(0.048)
gov	-3.74**	-3.74**	-3.71**	-3.72**
	(1.48)	(1.48)	(1.47)	(1.48)
area	-0.002***	-0.002***	-0.002***	-0.002***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
growth				
const	50.27***	40.73***	47.77***	47.29***
	(6.91)	(6.47)	(5.83)	(6.03)
logincome	-5.01***	-3.89***	-4.61***	-4.57***
	(0.78)	(0.63)	(0.60)	(0.61)
corptax	-0.020*	-0.031***	-0.025**	-0.023*
	(0.011)	(0.011)	(0.011)	(0.012)
human	0.26*			
	(0.12)			
invest		0.026		
		(0.034)		
size			0.003***	0.003***
			(0.0009)	(0.001)
popgrowth				-11.38
				(41.54)
# of obs.	69	69	69	69
R^2 corptax	0.33	0.33	0.33	0.33
R^2 growth	0.44	0.41	0.48	0.48
χ^2 corptax	33.88	34.24	33.92	33.89
χ^2 growth	54.65	50.24	63.50	67.37

Standard errors in parentheses.

* Significant at the 10 % level

** Significant at the 5 % level

*** Significant at the 1 % level

Table 7: Estimation results, sensitivity analysis
Endogenous variables: corptax and growth; estimation methods 3SLS (IV-GLS), PCSE

Variable	(17)	(18)	(19)	(20)	(21)	(22)
			(PCSE)	(1970-99)	(1975-99)	(1965-90)
corptax						
const	83.99***	84.93***	85.35***	86.15***	82.95***	83.72***
	(14.96)	(14.75)	(13.31)	(14.30)	(16.12)	(15.77)
open	- 0.189***	- 0.189***	- 0.189***	- 0.225***	-0.23***	-0.19***
	(0.051)	(0.048)	(0.043)	(0.046)	(0.050)	(0.052)
gov	-3.57**	-3.69**	-3.73***	-3.42**	-2.98*	-3.53**
	(1.55)	(1.48)	(1.23)	(1.44)	(1.63)	(1.60)
area	-0.001***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.0006)	(0.0004)	(0.0002)	(0.0004)	(0.0005)	(0.0004)
dnoneur	-0.64					
	(5.33)					
growth						
const	49.06***	46.94***	47.54***	41.72***	44.30***	59.53***
	(5.86)	(5.88)	(10.68)	(7.13)	(9.45)	(6.29)
logincome	-4.69***	-4.51***	-4.59***	-3.96***	-4.23***	-5.85***
	(0.60)	(0.60)	(1.11)	(0.72)	(0.95)	(0.65)
corptax	-0.038***	-0.030**	-0.024***	-0.032**	-0.030**	-0.024*
	(0.013)	(0.013)	(0.007)	(0.012)	(0.013)	(0.013)
size	0.003***	0.002*	0.003***	0.003***	0.003***	0.004***
	(0.0009)	(0.001)	(0.0008)	(0.0008)	(0.0009)	(0.001)
dnoneur		0.54				
		(0.39)				
# of obs.	69	69	69	64	56	57
R^2 corptax	0.33	0.33	0.33	0.42	0.42	0.35
R^2 growth	0.44	0.49	0.48	0.32	0.26	0.60
χ^2 corptax	33.88	33.52	84.74	46.75	40.98	31.44
χ^2 growth	54.65	69.84	33.45	33.01	22.42	85.06

Standard errors in parentheses.

* Significant at the 10 % level

** Significant at the 5 % level

*** Significant at the 1 % level

5 Conclusions

According to our empirical results, trade fosters growth through its moderating impact on corporate taxes. The concurrence of two crucial attributes, mobility and accumulation capability of one single input factor, which is capital, drives the main result. The outcome is in line with earlier studies finding a positive relationship between an increasingly globalised environment and the development of a single country. The paper adds to our understanding by identifying one significant channel transmitting the impulses from trade to growth. Other channels may strengthen or weaken the overall trade-growth nexus but they have not been the subject of the present contribution.

Of course, the analysed impact on growth is only effective when trade volumes are increasing and/or trade restrictions are decreasing. That means the phenomenon vanishes in the (very) long run, assuming that international integration gradually continues and then comes to an end in the future. But this is not a special attribute of capital taxes; it corresponds to all potential mechanisms like international knowledge transmission, competition and institutional effects.

It would be interesting to know whether globalisation has similar effects on the behaviour of governments in areas where the government affects the levels (not the growth) of activities or income distribution. This could be analysed with a similar methodology as used here and is left for future research.

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