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Taking Two Steps to Climb onto the Stage: Capital Taxes as Link between Trade and Growth

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Abstract

This contribution provides evidence for the hypothesis that trade increases growth through its curbing effect on capital taxes. The analyzed mechanism includes two different steps and considers the critical points of both the theoretical and empirical studies in this field. In particular, the estimation problems of omitted variables and parameter heterogeneity are addressed. Using panel data for a sample of 12 OECD countries in the time period 1967-1996, it is shown that the theoretical predictions can be corroborated by empirical results.

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Taking Two Steps to Climb onto the Stage: Capital Taxes as Link between Trade and Growth

This contribution provides evidence for the hypothesis that trade increases growth through its curbing effect on capital taxes. The analyzed mechanism includes two different steps and considers the critical points of both the theoretical and empirical studies in this field. In particular, the estimation problems of omitted variables and parameter heterogeneity are addressed. Using panel data for a sample of 12 OECD countries in the time period 1967-1996, it is shown that the theoretical predictions can be corroborated by empirical results.

In recent years, new achievements in macroeconomic theory and the intensified debate on the consequences of globalization have revitalized the general interest in the relationship between trade and growth. Whereas earlier empirical contributions such as Michaely (1977), Dollar (1992), Edwards (1992) and Sachs and Warner (1995) find a positive impact of trade and open trade policies on the growth rate, recent papers do not come to unanimous conclusions. Edwards (1998) confirms the earlier results but Rodriguez and Rodrik (1999) remain very skeptical regarding the general validity of the positive connection. However, there is a broad consensus regarding the methodology. It is generally accepted today that econometric problems such as simultaneity, parameter heterogeneity and missing variables, which are immanent in this field, need to be properly addressed, 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 elegantly use geographical variables for the construction of appropriate instruments to correct for this bias. Nevertheless, they find that the results of traditional estimations can be confirmed, so that policy conclusions do not need to be changed. Following Hall and Jones (1999), the study of Frankel and Romer focuses on level effects. However, 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, 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 favorable 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 on the other hand, 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. If theory is richer than is expressed in the current empirical studies, the third econometric issue, which is the problem of omitted variables, comes into play. It seems to be quite bold to determine growth by a trade variable and some minor additional ingredients in one single equation for samples comprising one hundred or even all the countries in the world. In particular, the channels through which impulses from trade on growth are transmitted remain unspecified. Whereas for developing countries the strengthening of market forces might be the main mechanism at work, this effect seems to be less important for industrialized countries. In addition, according to new growth theory of the open economy, see Grossman and Helpman (1991), the growth effects of trade depend on comparative advantage, which varies from country to country. In certain economies, comparative advantage can divert resources away from sectors that drive the growth process.

Finally, trade is not the only impact factor for growth. For instance, the correlation between investment rates and growth appears to be robust, see Levine and Renelt (1992) and Temple (1999). There is also qualified support for the conditional convergence hypothesis, which has dominated the empirical contributions on growth during the last decade, see e.g. Mankiw, Romer and Weil (1992) and Barro (1991). One important effect, which has been less discussed, however, is the role of taxes. 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?" Given the multidimensional relationship between trade and growth, a scatter plot of trade shares and

growth rates yields no clear relationship, see Figure 1 for the panel data used in the empirical estimations below. As can be seen from the figure, the USA and Japan have relatively high growth rates and low trade shares while some European countries have high trade shares and average or below-average growth rates. As a consequence, more variables must be introduced to discover the impact of trade on growth.

*** Figure 1 ***

(about here)

Reconsidering four of the above cited studies, Rodriguez and Rodrik (1999) conclude that open trade policies are not significantly associated with economic growth, once other relevant country characteristics are controlled for. Frankel and Romer (1999) comment that, in their opinion, trade is a "very noisy proxy for income-promoting interactions". In a similar way, Rodriguez and Rodrik (1999, p. 4) suspect that the relationship between trade and growth depends on additional characteristics, and they 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 one that still remains before us" (p. 39).

The identification of a theoretically founded and empirically substantial channel between trade and growth is the purpose of the present contribution. The approach chosen in this paper focuses on a topic which has been treated in several strands of literature but not in the current context of trade and growth: the channel working through capital taxes. According to tax competition theory, increasing globalization forces governments to reduce taxes on more mobile assets such as capital. If lower capital taxes indeed foster investments and economic growth, the required connection is readily given. Thus the pressure on exactly those taxes that are crucial for growth seems to provide a direct link between trade and growth. Following the causal chain from trade to capital taxes and then to growth, the theoretical approach presented here necessarily includes the estimation of two relationships: the first is the impact of trade and trade policy on capital taxes, the second of capital taxes on growth. The advantage of the chosen procedure is that it can build on theories that are derived from microeconomic principles, which contrasts to the above-mentioned gravity models. The focus on one specific channel between trade and growth does not mean that other channels like knowledge spillovers, market efficiency and institutional effects are not relevant, for the role

of technology see e.g. Eaton and Kortum (2001). However, given the present sample, the tax channel is possibly the most promising mechanism for current research.

The empirical equations used below include additional variables which have proven to be robust in this context. Regarding openness, the impact of both trade volumes and trade policy on economic growth is included in the analysis. Given the problems of differences in comparative advantage and of data quality, the sample used for empirical estimations includes 12 OECD countries. Panel data for five year periods in the time-frame 1967-1996 have been constructed to take advantage of the corresponding estimation methods. The empirical results show that, for developed countries, the hypothesis of capital taxes as a link between trade and growth can be confirmed.

The remainder of the paper is organized as follows. In the next section, the different theoretical aspects are condensed into a model showing the impact of trade on taxes and of taxes on growth. In Section 2, the data are described. Section 3 presents the estimation results for 12 OECD countries and Section 4 concludes.

1. Model Specification

The estimation procedure comprises two steps. The first step consists of estimating an equation for the effect of trade and trade policy on capital taxes. The reasoning of tax competition theory is as follows, see Bretschger and Hettich (2000b) for details. In equilibrium, the marginal benefits of public activities correspond to the marginal costs of taxation. In an open economy, any increase in the tax rate of capital causes a capital outflow to other economies. The lower the cost for capital holders to shift capital abroad, which falls with lower capital trade restrictions and/or with increasing openness of the economy, the larger the fiscal externality becomes. Marginal benefits are determined by individual utility of public services and the ideological preferences of the government and the parliament. It is normally postulated that conservative governments favor a lower level of public activities and a lower capital taxation, while leftist governments favor redistribution and a higher capital taxation. To conclude, capital taxes are predicted to be the lower, the more open the economy is and/or the lower restrictions on international capital markets are, once the preferences of the government are controlled for.

Empirical results on international tax competition, see Garrett (1995), Quinn (1997) and Swank (1998), long seemed to contradict theory. However, these authors use capital tax revenue as a percent of GDP as the variable for tax policy. 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 globalization on tax revenue can be expected, according to theory. Therefore, effective tax rates are used for estimation below. The quality of the first results in this paper is compatible with the outcome in Rodrik (1997) and Bretschger and Hettich (2000a), where, however, annual data are used, which does not allow the endogenous growth perspective taken here.

The second step of the estimation procedure concerns dynamics. Capital taxes decrease the real net return on capital investments. Assuming interest rate-dependent savings and constant returns to capital, this lowers the long-term growth rate; with decreasing returns to capital, only the medium-run growth rate is negatively affected. In addition, growth depends on several variables, such as the size of growth-relevant sectors, which are influenced by trade. Regarding the scale effects of internationalization, trade between similar partners is likely to increase the size of the relevant variables such as public knowledge, thereby increasing growth, see Rivera-Batiz and Romer (1991). On the other hand, trade between partners that differ with respect to factor endowments can have either effect on growth depending on resource reallocation between sectors as a consequence of trade. Accordingly, a multi-sector growth model of the open economy does not necessarily predict a positive impact of trade on growth, see Grossman and Helpman (1991) and the example in Rodriguez and Rodrik (1999). Furthermore, trade can have pro-competitive effects. But regarding growth, these effects are not unambiguous either. In R&D growth models, for example, stiffer competition in the research sector fosters growth while increased competition in the differentiated goods sector lowers the growth rate, because profits from differentiated goods provide the compensation for successful innovations. As a consequence of these differences, we only use countries with similar factor endowments and similar market structures for empirical estimation. Right hand variables include, aside from capital taxes, the initial income level and the investment rate. As in the first step, we will control for the preferences of the government.

2. The Data

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. On the other

hand, capital tax revenue as a share of GDP is an inappropriate indicator, as the tax base and income are also affected by trade. For these reasons, effective tax rates are calculated by dividing total tax revenues from corporate taxation by the operating surplus of corporate enterprises, according to the methodology proposed in the seminal paper of Mendoza, Razin and Tesar (1994).[1] 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. To measure trade and the openness of an economy, a common variable used in empirical studies is calculated as the sum of imports and exports as a percentage of GDP. For financial market liberalization, most studies use a qualitative measure constructed by analyzing 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.[2] The growth rate of GDP is measured in PPP-US-dollars. To test whether ideological preferences in the political system influence tax policy, a sum of variables measuring the center of political gravity for electorate, legislature and cabinet, ranging from 3 (far left) to 15 (far right) is used.[3] The initial income level and the investment share are standard measures of the OECD statistics.

Data cover 12 OECD countries[4] and range from 1967 to 1996, divided into five year periods as follows: 1967-71, 1972-76, 1977-81, 1982-86, 1987-1991 and 1992-96.[5] Considering the contribution of Beck and Katz (1995), which shows the possible deficiencies when using GLS estimators for the kinds of panel data used here, the Beck/Katz specification of panel corrected standard errors is adopted by using the corresponding PCSE-option in the Stata software package. Comparing the results to the outcome when using the GLS-random-effects estimator, it turns out that the latter method produces very similar results to the former so that the results of the Beck/Katz procedure are representative in this context.

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[1] The data are described in the appendix.

[2] For a more detailed description of the qualitative index used below, see Quinn (1997).

[3] The data are provided by Cusack (1997).

[4] Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Norway, Sweden. Switzerland, the United Kingdom, and the United States. Unfortunately, for the first years data are not available for all the countries considered.

[5] In the study of Kneller et al. on the impact of fiscal policy on growth, which covers 22 OECD countries, also five year periods are used.

3. Evidence from Panel Data for OECD Countries

To show evidence for the hypotheses of the theoretical approach, we test the core model of tax competition and growth as analyzed in the last section. In the equations (4) to (6) of the first table, lagged endogenous variables are added because of possible policy inertia. Table 1 summarizes the results for the impact of trade and trade policy on capital tax rates. Most importantly, trade measured by trade shares with the variable *open* has a negative impact on corporate taxes throughout the estimations. This result of a negative and significant impact of trade is very robust with respect to changes in specification and sample. The variable for trade policy *capital* is successful in sign; in the first equations, the standard error is too big but significance is given as soon as the lagged endogenous variable is introduced. The variable *gov* for the center of political gravity in the political authorities, with an increasing value from far left to far right, shows the predicted sign; the variable is highly significant in the specifications used, with the exception of (6). The variable *resopen* in (3) is used as an alternative for *open*. As trade shares are influenced by the size of an economy, see Figure 1, *resopen* is the residual of a panel regression of *open* on the size of the economies (*size*). However, the change in the openness variable alters little in the results: the negative and significant impact on corporate taxes remains. To conclude, as soon as effective rates are used to measure corporate taxation, the predictions of the tax competition model can be found in the five year panel data.

*** Table 1 ***
(about here)

In Table 2, the empirical results of the second equation are presented. The effect of corporate taxes on the growth rate is negative throughout, as predicted. Moreover, the estimated coefficients and standard errors are very stable in the different specifications. This is quite an impressive result when we consider the various macroeconomic interactions which are important for the dynamics of an open economy. As in other recent growth regressions, the income level at the beginning of the period *ilevel* is negative and significant, whereas the investment share *invest* is positive and significant in all specifications. The political variables have no impact in this case. Neither the ideological preferences *gov* nor the level of government expenditure *govexp* are able to add to the conclusions. Moreover, scale effects

expressed in the size of the economies (*size*) have no impact on the growth rate according to the estimations.

*** Table 2 ***
(about here)

4. Conclusions

According to our empirical results, trade fosters growth through the negative impact on corporate taxes. This outcome confirms earlier studies which find a positive relationship between an increasingly globalized environment and the development of a single country. The present paper adds to current knowledge by identifying one of the main channels transmitting the impulses from trade to growth. The coincidence of the two crucial attributes of one single input factor being mobility and accumulation capability drives the result. The mechanism applies to physical but not to human capital because of lower mobility and different taxation of skilled labor.

Of course, the analyzed impact on growth is only effective when trade volumes are increasing and/or trade restrictions are decreasing. That means the phenomenon vanishes in the 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. The conclusions of this paper do not aim to completely leave out these other channels of account. It will certainly be rewarding to find similar approaches for other mechanisms at work and to test these empirically as done in this paper.

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Appendix

variable	description	source	mean	standard deviation
corptax	effective average corporate tax rate	Genser et al. (2000)	37.627	13.443
growth	growth rate of GDP measured in PPP-US-dollars	own calculations	2.525	1.499
gov	sum of center of political gravity for electorate, legislature, and cabinet	Cusack (1997)	9.142	1.094
open	(imports + exports) / GDP	own calculations	0.567	0.275
capital	restrictions on payment and receipts of capital	Quinn (1997)	3.169	0.733
size	relative country size: adj. GDP (country) / adj. GDP (average)	own calculations	100	147.958
ilevel	income level	own calculations	14.630	3.577
invest	investment share of GDP	own calculations	22.558	4.205
govexp	government expenditure as a share of GDP	own calculations	13.775	3.731

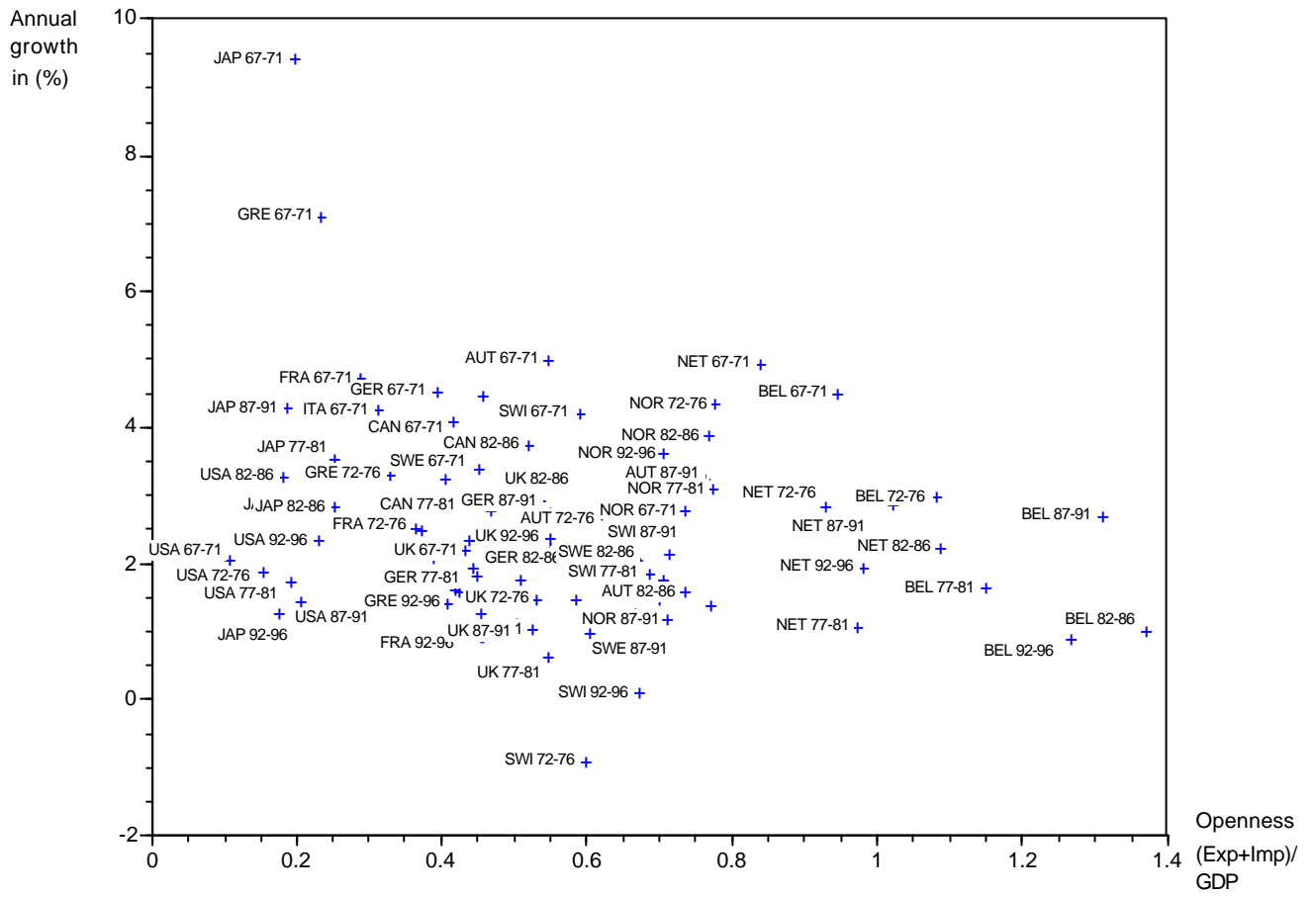If not specifically indicated, data for calculations are taken from OECD (1999).

Figure 1

Endogenous variable: **corptax**

Variable	(1)	(2)	(3)	(4)	(5)	(6)
const	109.52*** (15.70)	110.33*** (15.85)	85.82*** (13.71)	49.22*** (16.82)	28.91*** (16.38)	40.06*** (13.43)
open	-17.34*** (5.32)	-16.95*** (5.44)		-9.50** (4.50)		
capital		-0.75 (2.25)	-0.46 (2.25)		-5.96*** (1.74)	-5.71*** (1.74)
gov	-6.68*** (1.53)	-6.52*** (1.59)	-4.97*** (1.44)	-3.21** (1.44)		-1.14 (1.21)
resopen			-22.68** (7.03)			
corptax(-1)				0.63*** (0.10)	0.76*** (0.08)	0.73*** (0.09)
Nr.obs.	62	62	62	62	62	62
N	12	12	12	12	12	12
c^2	22.00	22.13	22.92	79.13	90.94	93.27

Standard errors in parentheses;
*,**,*** for significance at the 90, 95, 99 % level (two-tailed test)

Table 1

Endogenous variable: **growth**					
Variable	(1)	(2)	(3)	(4)	(5)
const	7.20*** (1.01)	3.04*** (1.26)	2.18*** (1.72)	3.00*** (1.64)	3.17*** (1.24)
corptax	-0.03*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)
ilevel	-0.24*** (0.05)	-0.18*** (0.05)	-0.18*** (0.05)	-0.18*** (0.05)	-0.20*** (0.05)
invest		0.15*** (0.03)	0.15*** (0.03)	0.15*** (0.04)	0.15*** (0.03)
gov			0.10 (0.14)		
govexp				0.001 (0.04)	
size					0.001 (0.001)
Nr.obs. N	62 12	62 12	62 12	62 12	62 12
c^2	23.50	53.80	53.75	52.80	56.85

Standard errors in parentheses;
*,**,*** for significance at the 90, 95, 99 % level (two-tailed test)

Table 2