Internationalization and Business Tax Revenue - Evidence from Germany[1]

by

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Abstract

The ongoing internationalization of business activity fuels concerns that governments may lose their ability to tax business income. By using data on sixteen German states from 1970 to 2005, we estimate the impact of internationalization, measured by trade volumes and stocks of foreign direct investment, on business tax revenues. We control for the impact of internationalization on business profits. Surprisingly, we find strong and robust evidence for a positive impact of internationalization on tax revenue. An increase in the internationalization indicator of 10 percentage points increases tax revenue by 4.4 percentage points. This counterintuitive result may be explained by a higher tax avoidance activity of purely national firms or by legal provisions in the tax law which can be used as tax loopholes in the case of domestic transactions as opposed to cross-border transactions.

JEL Codes: H25, F23

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1 Introduction

The internationalization of business activity is proceeding at a fast pace while tax policy is still a national issue and international tax cooperation is weak. There is the widespread impression among policy-makers and economists that this asymmetry in internationalization undermines the governments‘ ability to tax business income. Theory predicts that this may happen in two ways. Firstly, governments may deliberately lower tax rates in response to the increased mobility of capital and business profits. Secondly, multinational corporations (MNEs) may decrease their effective tax burden themselves, i.e. avoid taxes by profit shifting to low-tax jurisdictions and other instruments.

In this paper, we empirically analyze whether internationalization drives down tax revenues. This is not straight-forward since internationalization can also increase tax revenues via boosting profits. We test this hypothesis using tax revenues data from sixteen German states ("Länder"). We have state-specific data to construct openness or internationalization measures and adequate data to control for countervailing forces that may be generated from international business links.

Surprisingly, we find strong and robust evidence for a positive impact of internationalization on tax revenues. Using the stocks of inbound and outbound FDI as well as exports and imports as measures of internationalization, we find that both indicators are positively correlated with business tax revenues even if profits, state size and per capita income is controlled for.

Following the standard theory on international tax issues this is not what we expected. There are however some possible explanations which we consider after having presented our estimations. Section 2 develops and discusses our main hypothesis and reviews the related literature. In section 3, the data are described. Section 4 provides the estimation approach and the results. Section 5 discusses the implications of our results and concludes.

2 Hypothesis and literature

In this section, we discuss the potential link between the degree of internationalization of the economy in a given jurisdiction and its tax revenues. Furthermore,

we survey the related literature.

2.1 Internationalization and tax revenues

We differentiate between a non-tax channel and a tax channel that relate internationalization to tax revenues. The effect of internationalization on tax revenues through the non-tax channel is ambiguous. An internationally open economy allows for a better factor allocation and helps exploiting advantages resulting from a higher degree of specialization. Thus, internationalization may increase profits. There is extensive empirical evidence for the link between productivity (and/or growth rates) and openness, see e.g. Edwards (1998). Moreover, more profitable firms may self-select into international business. Seen from this perspective, high profits may increase internationalization. In a recent contribution, Helpman, Melitz & Yeaple (2004) develop a model with heterogeneous firms where the most productive firms in the export sector decide to invest abroad. They also find empirical support for their results. Devereux, Griffith & Klemm (2002) provide evidence for a positive correlation between profitability and the probability of producing in more than one country. Further evidence can be found in Barba Navaretti & Venables (2004). However, the competitive pressure from the world market may also drive down profits. With free entry of foreign firms, it is hardly possible to sustain monopoly positions for a long time, see e.g. Levinsohn (1993). Thus, internationalization may decrease profits. Therefore, the total effect of internationlization on profits, and thus on business tax payments, is ambiguous.

The internationalization effect on tax revenues through the tax channel is more straightforward. Firstly, governments may deliberately lower effective tax rates on business income in general. This is what standard tax theory predicts as a reaction to growing capital mobility under tax competition, see Zodrow & Mieszkowski (1986) and Wilson (1986). If capital becomes more mobile, the cost of taxing capital income at source increases. Therefore, governments have the incentive to lower the effective tax on capital income and either increase taxes on less mobile factors or decrease the goverment budget. Indeed, as e.g. Devereux, Griffith & Klemm (2002) show, this happened in nearly all OECD countries in the last twenty years. However, corporate tax revenues did not fall, which is considered a puzzle

and will be discussed later on.

Secondly, governments may open loopholes, reduce their tax enforcement etc. in order to discriminate between mobile firms and less mobile firms with respect to their effective tax burden. The evidence for this kind of policy is more anecdotal due to the nature of the phenomenon, since discriminatory policies take very different forms as reported e.g. by the OECD (1998).[1]

Tax rate cuts and discrimination between mobile and immobile firms (or capital) are policy measures. These will not be in the focus of this paper. We will instead focus on the part of the tax channel which is not policy-related. It is generally assumed that multinational companies have more instruments and opportunities to lower their effective tax burden than purely nationally operating firms have. Therefore, governments may see their revenues go down because MNEs shift their taxable profits to low-tax jurisdictions by means of intra-firm loans and transfer pricing, see e.g. Hines & Rice (1994).[2] This is what Slemrod (2004) calls "corporate tax selfishness". Recent estimates by Egger, Eggert & Winner (2007) suggest that firms save about half of their tax liability simply by being multinational.

It is this autonomous lowering of the effective tax burden that creates the impression that governments lose their ability to tax business income. If this is true, then countries or regions with a higher degree of internationalization or openness should have lower tax revenues even if tax policy and profitability is controlled for. More generally spoken, our paper asks whether the degree of internationalization has predictive power for the level of business tax revenues.

2.2 Previous literature

Our approach can be regarded as part of a literature that tries to identify the determinants of corporate tax revenues. This literature can be divided into two

[1] In the theoretical literature there are approaches that interpret certain tax policy developments, as the tax rate cut cum base broadening policy as a discrimination device in favor of mobile multinational firms, see e.g. Osmundsen, Hagen & Schjelderup (1998) and Becker & Fuest (2007). Hong & Smart (2007) praise tax havens as a means to limit the detrimental effect of tax competition on corporate tax revenue, a view which is criticized e.g. by Slemrod & Wilson (2006) and Bucovetsky & Haufler (forthcoming).

[2] Further contributions in this area are made by Grubert & Mutti (1991), Bartelsmann & Beetsma (2003) and Weichenrieder (2006).

classes. The first class provides evidence in the form of case studies analyzing different periods in a single country and explaining developments in the tax revenues of this country. Here, we survey four examples of this kind of evidence. Auerbach & Poterba (1988) ask why corporate tax revenues in the US declined over the preceding decades. They find that legislative changes are important to explain this downward trend in revenues but they account for less than half of the change. The most important cause of the declining tax base is the reduced profitability of US corporations at that time which considerably reduced the tax base.

Poterba (1992) examines the revenue effects of the tax reform act of 1986. Actual revenues were far beneath the projected revenues that policy-makers expected before the reform. Again, it is the reduced corporate profitability that shrunk the tax base so that the revenues did not reach their expected level. In addition, two other sources of tax base reduction are identified. Firstly, the level of interest payments that can be deducted from the corporate tax base was much higher than before the reform (which could be due to marginal incentive effects of financing). Secondly, there was rapid growth of income reported by Subchapter S corporations which are taxed under the individual income tax.

Devereux, Griffith & Klemm (2004) face the puzzle of extraordinarily high corporate tax revenues in the UK. Although the statutory tax rate was reduced in the preceding years, tax revenues remained high by both international and historic standards. As in former studies, the authors find that legal tax changes, as the broadening of the tax base, can only explain part of the story. On the one hand, there was a considerable increase in the size of the corporate sector and, on the other hand, high profits occured in the financial sector.

Auerbach (2007) reapplies and extends the methodology presented in his 1988 paper with James Poterba. As in the UK, the United States recently saw their tax revenues increase. Auerbach finds that substantial legal restrictions in the use of loss-offsets have raised the effective tax rate of firm profits which might explain a big part of the rising revenues story.

These four contributions present case studies from the US and the UK. What can be learned from these papers? Most importantly, tax law changes explain only approximately half of the observed tax revenues variations. Moreover, it seems that changes in the tax base are more important than changes of the statutory tax rates.

These changes of the tax base can be separated into those due to tax incentive effects, e.g. the higher use of debt, the increase in subchapter S income etc., and those which are (mostly) unrelated to tax considerations, e.g. the volatile profits in some industrial sectors. Finally, the opportunity to shift profits both from the corporate to the individual tax base and from the domestic to some foreign tax base suggests that the determinants of corporate tax revenues should be analyzed in a broader framework.

The second class of papers chooses an estimation approach which is based on a broad sample of OECD countries. Here, we survey three papers of this kind. Gropp & Kostial (2000) ask whether inflows and outflows of foreign direct investment (FDI) have an impact on corporate tax revenues. Their estimations are based on aggregate investment and tax revenues data from a sample of OECD countries for the years 1988-1997. Using instruments for both the FDI data and the corporate profit rates, they find a significant positive (negative) impact of inbound (outbound) FDI on corporate tax revenues.

According to Clausing (2007), OECD countries differ considerably in the extent to which they collect revenues from taxing corporate income. Revenue figures can vary systematically due to differences in (1) the statutory tax rates, (2) the legal definition of the tax base, (3) the profitability of the firm and the size of the corporate sector in the economy. Clausing finds a strong and robust impact of tax rates on corporate tax revenues. This impact seems to be non-linear, though. Low-tax countries gain more tax revenues from increasing their tax rates than high-tax countries do. The non-linearity allows to derive a revenue-maximizing tax rate of approximately 33%. Country size and openness to international exchange of goods and capital also have a significant influence on the tax rate coefficient. Clausing concludes that the tax base in large, less open economies reacts relatively inelastically to tax rate variations while for small open economies the opposite is true.

Devereux (2006) is less convinced that there is a clear link between tax rates and revenues. In his baseline estimation, he finds results which are very similar to those derived in Clausing (2007), including a revenue-maximizing tax rate of around 30%. But, these results do not prove to be robust against the inclusion of time dummies and other control variables. Unfortunately, the arising questions

cannot be answered on the basis of the estimation results reported by Clausing. Moreover, the measures of openness prove to be of insignificant impact. Devereux concludes by stating that seemingly "*there is no systematic relationship between tax rates and revenues across OECD countries*" (p. 25).

The message resulting from this second class of papers is ambiguous. There seems to be evidence that the level of tax revenues is related to specific country characteristics, such as the degree of urbanization, country size etc. Furthermore, there are encouraging hints at a systematic link between the degree of internationalization and business tax revenues although this aspect is not in the center focus of the papers reviewed here.

In this paper, we will concentrate on a specific country characteristic: the degree of internationalization or openness. Our working hypothesis is that internationalization drives down business tax revenues when its effect on overall profits is controlled for. Before we present our estimation approach, we will briefly describe our data set.

3 Data

The German Federal Statistical Office publishes local business tax revenue figures aggregated on the state level. We choose the local business tax ("Gewerbesteuer") instead of the federal corporate tax because the latter is only paid by the incorporated sector ("Kapitalgesellschaften") which is traditionally small in Germany. In contrast, the local business tax is paid by all firms except for freelance professions like lawyers, medical doctors etc. Thus, we circumvent the problems in measuring the size of the corporate sector (see e.g. Clausing (2007)). The local business tax revenues are used to finance a large part of the German municipalities' budgets. In 2005, German municipalities received more than 27 billion € of local business tax revenues whereas the federal corporation tax only amounted to 17 billion €.

The tax rate, for which the Statistical Office publishes weighted averages, is set by each municipality. Each local government chooses a scale factor ("Hebesatz") which is multiplied by the base rate of 5%. For example, a scale factor of 400% leads to an 'effective' rate of $5\% \cdot 400\% = 20\%$.

A working group of the State level Statistical Offices provides data on the gross

operating surplus (GOS). The GOS is not a perfect measure of a firm's profits but it has the obvious advantage of being available. The GOS is a residual value and captures the difference of gross added value and the compensation of workers. Thus, the GOS is all income which is potentially subject to the business local tax, before all kinds of adjustments and manipulations. From this perspective, GOS as a regressor is one extreme on a scale on which the other extreme is the effective taxable income as indicated in the tax accounts. It is important to understand that the latter variable would be of no value for our purpose since the linkage between taxable income and tax revenues is only the tax rate. However, our purpose is to measure the impact of internationalization on the various acts of adjustments (e.g. financial policy) and manipulations (e.g. accounting tricks). Therefore, taking the GOS is the adequate regressor to start with.

The data on foreign direct investment for each state is provided by Deutsche Bundesbank, for both inbound and outbound investment, data on trade, exports and imports, is available from publications of the German Federal Statistical Office. Additional information on data sources is given in the appendix.

Table 1 shows the descriptive statistic of the main variables which are used for estimation. It presents the mean, the standard-deviation, the minimum and the maximum values of each variable's five-year averages which are also used for the baseline regressions. The reason is that both trade and FDI stocks only vary slowly over time, therefore using yearly data might overstate the information contained in the data. For the period before the German reunification in 1990, we have data of 11 states in Western Germany. Afterwards, the data cover all 16 German states.

The revenues from the local business tax remained stable around 2% of GDP in the Seventies before it fell to 1,5% in the Eighties. After reunification, the revenues are around 1% of GDP. In contrast, the tax rate increased steadily over the last 35 years. The scale factor started at an average of around 300% in the first half of the Seventies and climbed up to around 370% in the first half of this decade. The gross operating surplus stayed more or less constant, apart from a temporary fall after reunification.

The two indicators of internationalization, total FDI and total trade, are characterized by a large variance. For example, in the last five-year period, the state with the lowest degree of internationalization (Saxony) had only 2,7% of FDI as

Table 1: Descriptive statistic

	1971-75	1976-80	1981-85	1986-90	1991-95	1996-2000	2001-05
Variable				Tax revenue / GDP			
Obs	11	11	11	11	16	16	16
Mean	**0.0202**	**0.0201**	**0.0154**	**0.0147**	**0.0102**	**0.0111**	**0.0109**
Std. Dev.	0.0037	0.0037	0.0033	0.0031	0.0049	0.0038	0.0028
Min	0.0151	0.0157	0.0090	0.0098	0.0031	0.0057	0.0068
Max	0.0270	0.0270	0.0208	0.0189	0.0166	0.0179	0.0174
Variable				Tax rate			
Obs	11	11	11	11	16	16	16
Mean	**3.071**	**3.309**	**3.442**	**3.586**	**3.597**	**3.778**	**3.792**
Std. Dev.	0.228	0.307	0.557	0.633	0.434	0.440	0.430
Min	2.660	2.800	2.000	2.000	2.800	2.990	3.110
Max	3.382	3.764	4.010	4.230	4.360	4.700	4.700
Variable				Gross operating surplus / GDP			
Obs	11	11	11	11	16	16	16
Mean	**0.3706**	**0.3663**	**0.3761**	**0.3932**	**0.3250**	**0.3608**	**0.3791**
Std. Dev.	0.0342	0.0301	0.0259	0.0258	0.0698	0.0361	0.0320
Min	0.3046	0.3043	0.3199	0.3313	0.2159	0.3145	0.3290
Max	0.4126	0.4018	0.4075	0.4233	0.4076	0.4351	0.4564
Variable				Total FDI / GDP			
Obs	-	11	11	11	16	16	16
Mean	-	**0.0981**	**0.1082**	**0.1191**	**0.1187**	**0.2077**	**0.3331**
Std. Dev.	-	0.0739	0.0763	0.0712	0.1056	0.1860	0.3061
Min	-	0.0283	0.0345	0.0369	0.0074	0.0167	0.0277
Max	-	0.2799	0.2846	0.2501	0.3628	0.6719	0.9765
Variable				Total trade / GDP			
Obs	11	11	11	11	16	16	16
Mean	**0.3740**	**0.4322**	**0.5058**	**0.4765**	**0.3266**	**0.3757**	**0.4652**
Std. Dev.	0.1413	0.1563	0.1867	0.1923	0.2066	0.2220	0.2260
Min	0.1646	0.1824	0.2183	0.2266	0.1046	0.1036	0.1600
Max	0.6213	0.6728	0.8579	0.9619	0.8751	0.8899	0.9104

a fraction of its GDP whereas the most internationalized state (Hesse) had nearly 98%. Furthermore, total FDI as a fraction of GDP increased sharply after reunification whereas total trade (over GDP) does not show a clear trend.

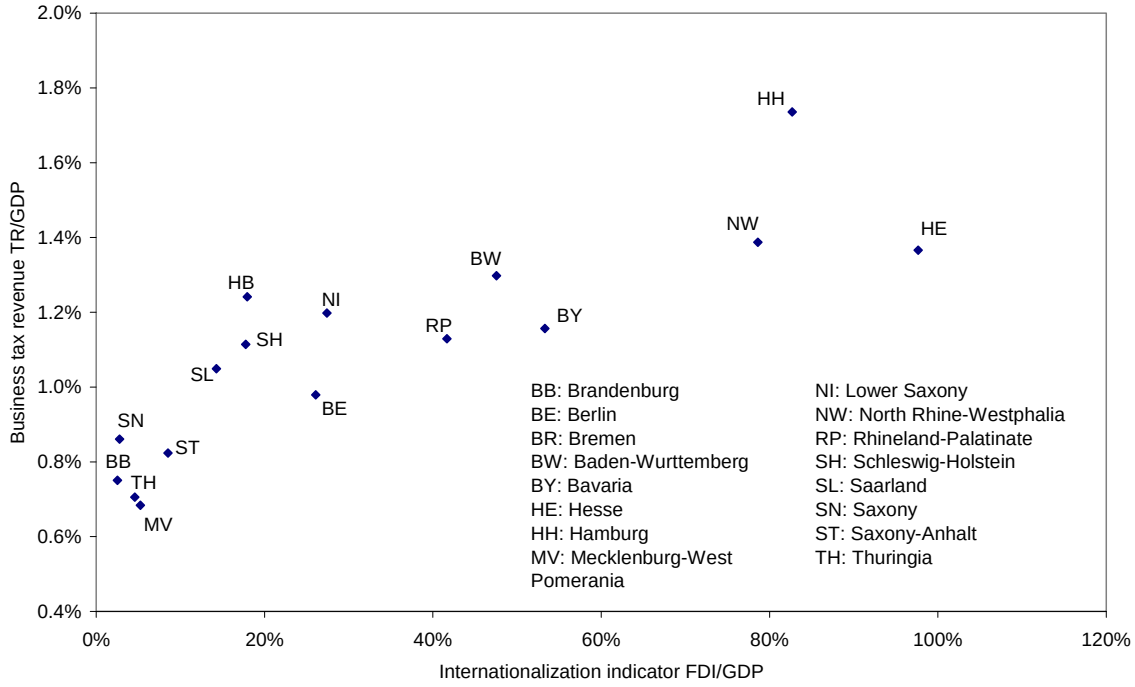

Figure 1: FDI and business tax revenues in 16 German states (average for 2001-2005)

Figure 1 shows the five-year average for the years 2001 to 2005 for business tax revenues (measured as a fraction of GDP) and FDI (divided through GDP). The graph shows a clear positive correlation between the two variables: More internationalized countries raise more business tax revenues. The five states from the East of Germany have the lowest degree of internationalization and the lowest tax revenues. Berlin (BE) is much more internationalized but has only slighty more tax revenues. The highest levels of revenues are measured in Hamburg, North-Rhine-Westphalia and Hesse which are the states with the highest level of internationalization.

4 Estimation strategy and results

In this section, we present our estimation strategy (4.1), report the results of the baseline estimation (4.2) and the robustness checks (4.3).

4.1 Estimation strategy

Figure 2 illustrates the different effects that internationalization can have on tax revenues. As set out in detail in the previous section, internationalization can affect tax revenues through the tax channel (upper box) on the one side and through the non-tax channel (lower box), i.e. by affecting profits, on the other side. Within the tax channel, we can differentiate between the policy-driven effects and firm-driven effects. Policy-driven effects (upper channel) mean tax rate cuts and other measures taken by tax authorities that change tax revenues in response to an increasing degree of internationalization. Firm-driven effects (lower channel) mean all actions undertaken by multinational firms that lower the tax burden, and thus, in aggregate terms, total tax revenues.

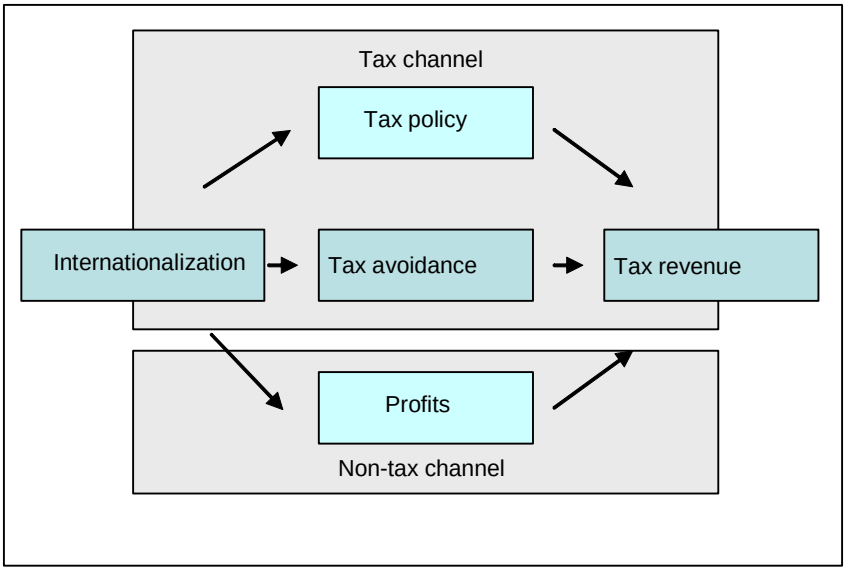

Figure 2: The effect of internationalization on tax revenues.

Our main hypothesis is that business tax revenues fall in the degree of inter-

nationalization when profitability is controlled for. Our estimation strategy is to regress tax revenues on the indicator of internationalization controlling for the non-tax channel (profits) and the policy-driven tax-channel (tax rate). If the regression equation is well specified, it will yield the impact of internationalization on tax revenues through the firm-driven tax channel (the tax avoidance channel in the graph).

Therefore, we will estimate a regression equation of the following form:

$$\textit{Tax revenues} = \alpha_0 + \alpha_1 \cdot \textit{Tax rate} + \alpha_2 \cdot \textit{Profits} + \alpha_3 \cdot \textit{Internationalization}$$

The tax rate should have a positive impact on tax revenues. Impacts affecting the profits, including the effect of internationalization on profits, are captured by the α_2-term which is expected to be positive. Internationalization may affect tax revenues through a third channel. Thus, α_3 measures how tax revenues respond to internationalization holding constant profits and tax rates, i.e. it captures the effect how internationalization weakens or strengthens the linkage between profits and tax revenues.

In operationalized form, the above equation can be expressed as:

$$\frac{TR_{it}}{GDP_{it}} = \beta_0 + \beta_1 \tau_{it} + \beta_2 \frac{GOS_{it}}{GDP_{it}} + \beta_3 \frac{INT_{it}}{GDP_{it}} + \sum_j \beta_j X_{it}^j + \varepsilon_{it}$$

where TR_{it} is the tax revenues of state i in period t, GDP is the gross domestic product for each individual state, τ is the tax rate which is calculated as a weighted average over all municipalities in each state. GOS is the gross operating surplus which is used as a proxy for firm profits. INT is the indicator for the degree for internationalization which is measured by the sum of exports and imports or the sum of inbound and outbound FDI or both. The X^j are control variables which will be discussed when the results are presented.

At this point, it is worth discussing some potential points of criticism concerning our estimation strategy. Firstly, it may be argued that statutory tax rates are a poor measure of the effective tax rate. While this is certainly true for cross-country studies, it should be noted that the legal definition of the tax base is the same for all German states. The only difference between states is the weighted average

of the realized tax base. However, if the tax base varies due to differences in the asset structure, debt-equity ratios etc., this is exactly what we wish to measure by the internationalization indicator. We therefore do think that the statutory tax rates are an adequate regressor.

Secondly, one could raise the point that the GOS is already manipulated to some degree. As indicated above, gross operating surplus is defined as gross value added minus workers' compensation. Accordingly, all kinds of manipulations concerning the value added and the workers' compensation are already included in the GOS measure and therefore are not captured by the internationalization indicator. However, manipulations that do not enter into the GOS measure, like debt shifting, income shifting by transfer pricing designed for tax accounts etc. are correctly measured by the INT measure. That means that the estimator of β_3 is potentially biased. It should be noted, though, that this bias cannot lead to a change in sign.

4.2 Baseline results

We start by estimating pairs of regression equations. The first regression does not include the profit indicator. It measures the overall effect of internationalization through both the non-tax channel and the tax channel. The second adds the profit term. Now, if the degree of internationalization drives up profits, this effect will be completely captured by the β_2 coefficient. Thus, β_3 will therefore only measure the effect that internationalization exerts through the tax channel.

Table 2 presents the baseline estimations. We regress tax revenues, measured as a fraction of GDP on the tax rate, total FDI over GDP (columns 1 and 2) or total trade over GDP (columns 3 and 4) or both (columns 5 and 6), with and without including the gross operating surplus as a proxy for profitability. FDI stocks and trade patterns do not change rapidly from year to year. Since the 36 data points per (West-German) state (covering the years 1970 to 2005) may overstate the information that we have, we use five-year averages of all variables. Later on, when adding additional variables, we will use the whole sample.

First consider the upper part of table 2 which reports the results of the baseline estimations without year-fixed effects. The tax rate shows a negative but mostly

insignificant impact. Whereas total trade has a significantly positive influence, total FDI has no significant impact. Adding the gross operating surplus variable increases the R^2 substantially in all cases.

When year-fixed effects are included (lower part of the table) the picture changes in some important aspects which is not surprising given the strong time trends shown in the descriptive statistic. Now, the tax rate is positive, but only in some cases significant. This mixed evidence with regard to the tax rate is in line with the findings reported in Devereux (2006); it should be noted, though, that his and our data samples are very different.

With regard to the measures of internationalization, both FDI and trade exert significantly positive impacts on the level of business tax revenues. Across the three pairs of estimations, the following pattern can be shown. When the GOS measure is not included the indicator of internationalization has a strong impact on tax revenues. Including GOS, the coefficient of trade and/or FDI becomes weaker but remains significantly positive.

How can these results be interpreted? Take for example the coefficient for total FDI in column (6) including year-fixed effects. The value of 0.0062 means that states with a high degree of internationalization ($\frac{FDI}{GDP} \approx 1$) have 0.6% of GDP more tax revenues than states with a very low degree of internationalization ($\frac{FDI}{GDP} \approx 0$). The sample mean of tax revenues over GDP being at $\frac{TR}{GDP} = 0.014$, this corresponds to 44% of total tax revenues. In other words, an increase in the degree of internationalization by 10 percentage points increases tax revenues by 4.4%.

These results are the exact opposite of what should be expected following the stories outlined above. They suggest that internationalization increases the ability of fiscal authority to raise tax revenues and that it does not erode the domestic tax base. Before we try to find explanations for this counter-intuitive result, we will continue by checking these results for robustness.

4.3 Robustness checks

Table 3 reports estimation results for regressions that modify the baseline estimations in various aspects. Column 1 presents an estimation using all data available

Table 2: Baseline regressions - Five-year averages

	(1)	(2)	(3)	(4)	(5)	(6)
			without year-fixed effects			
		FDI		Trade		Trade and FDI
Tax rate	0.0009	0.0015	-0.0043	-0.0039	-0.0029	-0.0019
	(0.0011)	(0.0010)	(0.0015)*	(0.0018)	(0.0014)	(0.0016)
Total FDI / GDP	0.0055	-0.0003			0.0040	0.0005
	(0.0036)	(0.0022)			(0.0031)	(0.0029)
Total trade / GDP			0.0188	0.0162	0.0167	0.0137
			(0.0046)**	(0.0028)**	(0.0041)**	(0.0027)**
Gross Operating		0.0534		0.0329		0.0349
Surplus / GDP		(0.0117)**		(0.0089)**		(0.0069)**
Constant	0.0088	-0.0116	0.0213	0.0091	0.0161	0.0014
	(0.0039)*	(0.0052)*	(0.0052)**	(0.0067)	(0.0047)**	(0.0062)
No. of obs.	81	81	92	92	81	81
R-squared	0.07	0.28	0.35	0.42	0.39	0.47
			with year-fixed effects			
		FDI		Trade		Trade and FDI
Tax rate	0.0029	0.0031	0.0012	0.0013	0.0005	0.0011
	(0.0010)**	(0.0009)**	(0.0011)	(0.0011)	(0.0010)	(0.0011)
Total FDI / GDP	0.0107	0.0067			0.0095	0.0062
	(0.0024)**	(0.0015)**			(0.0018)**	(0.0014)**
Total trade / GDP			0.0110	0.0094	0.0087	0.0072
			(0.0033)**	(0.0018)**	(0.0019)**	(0.0014)**
Gross Operating		0.0365		0.0345		0.0313
Surplus / GDP		(0.0078)**		(0.0090)**		(0.0062)**
Constant	0.0094	-0.0044	0.0123	-0.0002	0.0136	0.0011
	(0.0023)**	(0.0030)	(0.0027)**	(0.0039)	(0.0027)**	(0.0038)
No. of obs.	81	81	92	92	81	81
R-squared	0.75	0.83	0.76	0.82	0.82	0.87

Notes: Robust standard errors in parentheses, * significant at 5%; ** significant at 1%, cluster-specific heteroskedasticity is controlled for.

from 1991 onwards. We exclude the data before 1991 to keep this estimation (which will be used as reference case) comparable to those in columns 2-5 where data is used which is not available for the Seventies and Eighties. Again, the two measures of internationalization, FDI and trade, have significantly positive coefficients.

In column 2, we use an alternative measure of the gross operating surplus. One might argue that overall GOS could be flawed as a proxy for profitability since it contains all income from freelance professions like medical doctors, lawyers etc. Under the German local business tax law income from these professions is not subject to taxation. This could result in estimation biases of different kinds. To avoid this, we construct an alternative measure of GOS by taking the sum of branch-specific GOS of the following industries: manufacturing, trade, real estate, banking, energy and construction, which account for around 90% of business tax payments in Germany. We believe that this indicator does not include income from freelance professions. Our results remain robust, though. The coefficient of the GOS has a larger coefficient which is not surprising since its values are lower in absolute terms now. The standard errors do not change much, the coefficient for FDI is slightly increased and the coefficient for trade is diminished but both coefficients remain significantly positive.

In column 3, we employ the GOS from different branches. If our results are due to some high profits in branches that simultaneously have a high degree of internationalization, this estimate should clarify this. But, FDI keeps having a significantly positive impact which is only slightly lower than in other specifications. The impact of trade remains stable. With respect to the GOS regressors, the credit and banking sector (GOS credit) shows a large and positively significant impact (similar results are found by Devereux, Griffith & Klemm (2004)).

So far, we used only direct foreign direct investment as a measure of openness. In column 4, we employ the sum of direct and indirect FDI. In comparison to the result reported in column 1, the difference is only marginal.

In column 5, we employ overall investment at the state level and its own lag. The idea behind this is that investment gives rise to tax depreciation allowances. As expected, both terms have a negative sign, but the lag has no significant impact. The FDI coefficient becomes even stronger, and the standard error is marginally

Table 3: Robustness checks

	1991-2004	Alternative measure of GOS	Branch-specific GOS	Alternative FDI measure	Including investment
	(1)	(2)	(3)	(4)	(5)
Tax rate	0.0013	0.0010	0.0008	0.0017	0.0008
	(0.0004)**	(0.0004)*	(0.0004)*	(0.0004)**	(0.0003)*
Total FDI / GDP	0.0044	0.0047	0.0041		0.0052
	(0.0007)**	(0.0007)**	(0.0006)**		(0.0006)**
Alt. total FDI / GDP				0.0044	
				(0.0008)**	
Total trade / GDP	0.0032	0.0023	0.0024	0.0032	0.0024
	(0.0010)**	(0.0009)*	(0.0009)*	(0.0010)**	(0.0009)**
East dummy	-0.0012	-0.0012	-0.0002	-0.0010	-0.0000
	(0.0005)*	(0.0005)*	(0.0004)	(0.0005)	(0.0004)
GOS / GDP	0.0373			0.0401	0.0218
	(0.0035)**			(0.0035)**	(0.0034)**
Alt. GOS / GDP		0.0422			
		(0.0038)**			
GOS Manufacturing			0.0497		
			(0.0063)**		
GOS Trade			-0.0282		
			(0.0161)		
GOS Real estate			-0.0038		
			(0.0138)		
GOS Credit			0.0779		
			(0.0186)**		
GOS Energy			-0.0068		
			(0.0305)		
GOS Construction			-0.0408		
			(0.0192)*		
GOS Services			0.0259		
			(0.0133)		
GOS Transport			0.0434		
			(0.0165)**		
Investment / GDP					-0.0125
					(0.0033)**
Investment(t-1) / GDP					-0.0028
					(0.0032)
Constant	-0.0092	-0.0068	-0.0025	-0.0115	0.0018
	(0.0015)**	(0.0014)**	(0.0022)	(0.0014)**	(0.0018)
Observations	215	215	215	215	215
R-squared	0.84	0.84	0.89	0.84	0.90

Notes: Robust standard errors in parentheses, * significant at 5%; ** significant at 1%. All estimations include year-fixed effects.

lower, compared to column 1.

Seemingly, the puzzle of a positive impact of internationalization on business tax revenues cannot be solved by simple checks for data quality, i.e. employing different measures for GOS and FDI. Still, the internationalization coefficients are significantly positive. In table 4, we report different additional estimations that may help to clarify some aspects of our results.[3]

Column 1 reports estimates using the whole sample.[4] We now include the GDP and the GDP per capita which control for state size and income level, respectively. Both indicators have a significantly positive impact which is not robust over the following set of estimations, though. The internationalization indicators are slightly decreased in their level of impact but remain highly significant.

In column 2, we ask whether the direction of international flows is decisive. With regard to the theory of income shifting and tax avoidance, there is no clear prediction of how FDI inbound stocks should have a different effect from FDI outbound stocks. Accordingly, FDI split into inbound and outbound stocks is not significant. Similar results can be found in specifications using the sum of both stocks and the difference between the two stocks as regressors; the sum is significantly positive while the difference between inbound and outbound has no significant impact.[5] With regard to trade, exports have a significantly negative influence while imports have a strong and significant positive impact.

In column 3, the average firm size (measured as the GOS per firm) and the fraction of urban population (measured as urban population divided by total population) is controlled for. There is a mild progression in the German local business tax system.[6] Therefore, we expect the average firm size to have a positive impact.

[3] We also experimented with the square of the tax rate as do Clausing (2007) and Devereux (2006). The corresponding coefficients do not have a significant impact, though. They do change the other variables' coefficients in qualitative terms, either. Moreover, we checked for the impact of equity financing ratios of which we have yearly averages per state for the years $2002 - 2004$. They proved to be insignificant.

[4] Together with table 2 and column 1 of table 3, we have three different versions of the baseline estimation using five-year averages, the sample from 1991 onwards (including all sixteen states) and the whole sample.

[5] Gropp & Kostial (2000) find that outbound FDI has a negative effect and inbound FDI has a positive effect on tax revenue. They do not control for profits, though.

[6] Up to a level of 48.000 Euros per year, the income of unincorporated firms is taxed at lower rates. In contrast to corporations, unincorporated firms cannot deduct the salary of the owner/manager from the local business tax base. The reduced rates are a compensation for this

But, the coefficient of the GOS per firm has a counter-intuitive sign and is insignificant. The fraction of urban population has a significant and positive coefficient. In this specification, both indicators of internationalization are not significant anymore although they keep their sign and their standard errors virtually constant. A possible explanation is that the fraction of urban population as a measure for agglomeration captures part of what drives FDI. But, since there is no obvious theoretical link between agglomeration and business tax revenues, if profits and firm size is controlled for, it may still be FDI what is at the core of the story.

Tab. 4: Additional control variables

	(1)	(2)	(3)		(4)		(5)	
	Reference case	Direction of int. flows	Size and agglomeration		Policy-related issues		Eastern Germany	
Tax rate	0.0011	0.0008		0.0017		0.0010		-0.0011
	(0.0003)**	(0.0003)**		(0.0004)**		(0.0004)**		(0.0005)*
Total FDI / GDP	0.0025			0.0013		0.0025		0.0050
	(0.0010)**			(0.0009)		(0.0009)**		(0.0010)**
Total trade / GDP	0.0039			0.0012		-0.0003		0.0058
	(0.0014)**			(0.0016)		(0.0019)		(0.0015)**
Gross Operating	0.0109	0.0063		0.0210		0.0164		0.0015
Surplus / GDP	(0.0071)	(0.0062)		(0.0079)**		(0.0077)*		(0.0079)
FDI inbound / GDP		0.0015	GOS per firm	-0.0061	Public	-0.0213	Tax rate	0.0040
		(0.0021)		(0.0067)	cons. / GDP	(0.0093)*	East	(0.0007)**
FDI outbound / GDP		-0.0004	Urban pop.	0.0021	Public tax	-0.1995	Total FDI / GDP	0.0061
		(0.0020)		(0.0008)*	exp. / GDP	(0.2761)	East	(0.0030)*
Exports / GDP		-0.0077			Unemployment	0.0001	Total trade /GDP	0.0043
		(0.0023)**			rate	(0.0001)	East	(0.0041)
Imports / GDP		0.0097					GOS / GDP	0.0272
		(0.0015)**					East	(0.0079)**
Eastern Germany	-0.0010	-0.0025		-0.0021		-0.0012		-0.0246
	(0.0005)	(0.0006)**		(0.0006)**		(0.0015)		(0.0040)**
GDP	0.0000	0.0000		0.0000		0.0000		0.0000
	(0.0000)**	(0.0000)**		(0.0000)**		(0.0000)*		(0.0000)**
GDP per capita	0.1763	0.1404		0.0845		0.0714		0.2078
	(0.0556)**	(0.0504)**		(0.0743)		(0.0648)		(0.0518)**
Constant	-0.0007	0.7730		-0.0041		0.0027		0.0092
	(0.0028)	(0.0931)**		(0.0026)		(0.0045)		(0.0033)**
No. of obs.	380	380		194		160		380
R-squared	0.72	0.77		0.78		0.89		0.77

Notes: Robust standard errors in parentheses, * significant at 5%; ** significant at 1%. All estimations include year-fixed effects.

Column 4 reports estimations that check for policy-related influences. We employ the ratio of public expenditures to GDP, the expenditures for tax administration and the unemployment rate. If public expenditures are assumed to be

disadvantage.

complements to private investment, we would expect a positive impact. But, we find a relatively strong and significantly negative impact. We do not have a good story to explain this, but we can state that the coefficient for FDI stays signicantly positive. The expenditures for tax administration services should have a positive impact, if this is a good proxy for the level and scope of enforcement activity. They do not seem to have any impact, though. In the literature, the unemployment rate is often interpreted as a measure of the business cycle. We should therefore expect it to have a positive impact. It is insignificant, though.

In column 5, we employ interaction terms with the main control variables and the dummy for Eastern Germany. Interestingly, FDI has a much more (nearly double) important impact on tax revenues in the East of Germany, compared to the coefficient that captures the impact for all sixteen states. The same is true for the tax rate and the GOS. The interaction term with trade is not significant.

Finally, we consider potential biases resulting from unobserved effects. Table 5 shows results of generalized least squares (GLS) estimates.

In columns (1) and (2), state-fixed effects and a linear time trend are employed. FDI is strongly and significantly positive, while trade is only significant with random effects. The consistency of random effects cannot be rejected, though, as the Hausman test indicates. In columns (3) and (4), estimations with state- and year-fixed effects are reported. Here, none of the internationalization indicators has a significant coefficient. Probably, too much variation is captured by the fixed effects variables. However, if the subsample from 1991 onwards is considered, the trade coefficient becomes significantly positive. Interestingly, if the sample is split into West-German and East-German states, trade is significantly positive in the West and FDI is signicantly positive in the East.

Thus, we can conclude that the introduction of state-fixed effects yields mixed results, at least if year-fixed effects are simultaneously applied. However, we can state that if any of the internationalization indicators is significant, it has a positive impact on tax revenues.

Tab. 5: GLS estimations with fixed effects (FE) and random effects (RE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FE	RE	FE	RE	FE	RE	FE	FE
	Full Sample		Full Sample		From 1991 on		West	East
Tax rate	0.0011	0.0018	0.0013	0.0012	0.0011	0.0009	0.0006	0.0002
	(0.0005)*	(0.0004)**	(0.0003)**	(0.0004)**	(0.0006)	(0.0006)	(0.0007)	(0.0007)
Total FDI / GDP	0.0041	0.0044	-0.0009	0.0003	-0.0006	-0.0006	0.0010	0.0067
	(0.0011)**	(0.0009)**	(0.0009)	(0.0008)	(0.0011)	(0.0010)	(0.0010)	(0.0030)*
Total trade / GDP	-0.0028	0.0065	-0.0022	-0.0021	0.0055	0.0040	0.0063	0.0006
	(0.0021)	(0.0011)**	(0.0022)	(0.0021)	(0.0026)*	(0.0021)	(0.0028)*	(0.0029)
Gross Operating	0.0261	0.0213	0.0246	0.0249	0.0345	0.0350	0.0126	0.0061
Surplus / GDP	(0.0052)**	(0.0056)**	(0.0061)**	(0.0052)**	(0.0063)**	(0.0058)**	(0.0140)	(0.0053)
GDP	-0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)**	(0.0000)	(0.0000)	(0.0000)	(0.0000)*	(0.0000)**	(0.0000)
GDP per capita	-0.5134	-0.0872	-0.4327	-0.4477	0.0299	-0.1339	0.0384	0.3068
	(0.0752)**	(0.0405)*	(0.0644)**	(0.0402)**	(0.1611)	(0.1431)	(0.1626)	(0.2896)
Time trend	0.0000	-0.0004						
	(0.0001)	(0.0000)**						
Constant	-0.0488	0.7410	0.0002	0.0114	-0.0090	0.0061	0.0023	-0.0019
	(0.1110)	(0.0541)**	(0.0026)	(0.0033)**	(0.0023)**	(0.0038)	(0.0040)	(0.0036)
State-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	380	380	380	380	215	215	154	61
No. of states	16	16	16	16	16	16	11	5
No. of years	29	29	29	29	14	14	14	13
R-squared	0.64	0.55	0.89	0.89	0.95	0.95	0.86	0.81
Hausman		4.56		139.04		5.18		
		(0.6014)		(0.0000)		(0.9996)		

Notes: Robust standard errors in parentheses, * significant at 5%; ** significant at 1%.

5 Discussion

The most important result of our analysis is that we find a positive, rather than a negative, impact of internationalization on business tax revenues. This is diametrically opposed to the widespread view that multinational firms are able to avoid taxes by shifting book profits to low tax countries whereas domestic firms are unable to do so. How can this puzzle be explained?

One possible explanation is that the relative advantage of multinational firms in avoiding taxes is overstated. Domestic firms also have profit shifting opportunities, i.e. they may shift income from the corporate tax sphere to the personal income tax sphere. If this explanation was true, then the story set out in the introduction would be based on a public misperception of the contribution that multinational firms make in form of tax payments. However, recent evidence suggests that multinational firms pay substantially less taxes than purely national business, see Egger, Eggert & Winner (2007).

Another explanation follows the argument that countries have incentives to tax firms more heavily if they are in foreign ownership, see Huizinga & Nielsen (1997). This cannot be done explicitly due to legal constraints on discrimination, e.g. imposed by EU tax law, but there are different ways in which countries may discriminate between domestic and foreign firms.

On the one hand, tax authorities may discriminate by choosing different levels of tax enforcement activity. Standard tax avoidance models tell us that tax payments increase in the probability of being audited. If the state-level tax authorities decided to examine multinationals' tax returns more often and more thoroughly than purely national firms' returns, this would explain our results. Unfortunately, we do not have any data on tax authority resources dedicated to enforcement activities.

On the other hand, many national tax systems include rules which discriminate border crossing transactions relative to national transactions. It is likely that these rules hit foreign owned firms harder than domestically owned firms. Firstly, arrangements for group taxation (Gewerbesteuerliche Organschaft, §2(2) GewStG)) imply that German parent companies may set their losses against domestic profits of their subsidiaries whereas foreign parent companies cannot do

so. There is anecdotal evidence that this has been used extensively by some large German firms in the past.[7] Secondly, the local trade tax allows for a full deduction of rent and leasing payments if and only if these payments are made to a company which is also subject to the local trade tax (§8 Nr 7 GewStG). The consequence is that leasing payments to foreign firms are only partly deductible. Therefore, border crossing leasing payments are not fully deductible.[8] A similar rule applies to interest payments on long term debt.

However, our data suggest that these explanations cannot explain the whole story, since they mainly refer to inbound FDI but not to outbound FDI. But, as the results reported in table 3, column 2, show, it is the sum of FDI which drives up tax revenues, not its inbound or outbound stocks.

Since Germany is a high-tax country, one should be careful in generalizing our results to other countries. In addition, the legal provisions discussed above may be a speciality of German tax law. It would be interesting to check whether the positive correlation between internationalization and business tax revenues holds in alternative cross-jurisdiction samples, e.g. for OECD countries or US states. In so far, our study may be considered as a case study. It is an open question whether the results can be replicated in other environments. However, to the best of our knowledge, this is the first study which explicitly searches for the impact of internationization on business tax revenues, and its results yield a positive impact. Whatever explains our findings, we can state that our results qualify public concerns that the ongoing internationalization undermines the governments' ability to raise taxes.

6 Conclusion

In this paper, we analyze the determinants of business tax revenues in sixteen German states. Our data cover the period from 1970 to 2005. Our main focus is on the impact of the degree of internationalization on business tax revenues. It

[7] For instance, German News reported on October 22nd, 2003, that Daimler Chrysler had not paid any local trade tax for ten years.

[8] This rule was declared incompatible with EC law by the European Court of Justice (C-294/97, Eurowings Case). It is no longer applied to leasing payments within the EU.

is commonly believed that the ongoing internationalization undermines the governments' ability to raise business taxes. One might therefore expect business tax revenues lower in more internationalized jurisdictions if tax rates and profits are controlled for.

Surprisingly, we find that internationalization and business tax revenues correlate positively even though tax rates and profits are controlled for. This result proves to be highly robust against the introduction of additional control variables, modifications in methodology and sample splitting. We show that it is not decisive whether imports or exports, inbound FDI or outbound FDI are considered.

We discuss possible explanations of this counter-intuitive result. In principle, the tax disadvantage of international business can be due to 1) better avoidance opportunities of purely national companies, 2) higher enforcement directed against multinational firms or 3) legal provisions in the tax law that are advantageous for purely national groups.

Since Germany is a high-tax country, even among EU countries, our results cannot be generalized without problems. It would be interesting, though, to see whether our results persist in data sets including OECD countries or subnational jurisdictions in other countries like the United States. We leave this to future research.

7 Data appendix

In this appendix, we give precise information on the sources of data used for estimations in the text.

Tax revenues: Provided by the German Federal Statistical Office. Covers the years 1970-2005 for West-German states (including West-Berlin) and 1991-2005 for East-German states. From 1991 onwards, the data on Berlin covers both parts, West- and East-Berlin.

Tax rates: see Tax revenues for sources and covered periods. Weighted averages for each individual state.

Trade: see Tax revenues for sources and covered periods.

Foreign direct investment: Provided by Deutsche Bundesbank. Stocks of directly held foreign direct investment projects. For one estimation, the sum of directly and indirectly held FDI stocks is used. Stocks are measured at the end of the year. Cover the years 1976-2004 for West-Germany and 1991-2004 for East-Germany.

Gross operating surplus[9]: Provided by the working group of the State level Statistical Offices (Arbeitskreis 'Volkswirtschaftliche Gesamtrechnungen der Länder' - www.vgrdl.de). Covers the years 1970-2005 for West-German states (including West-Berlin) and 1991-2005 for East-German states. Branch-specific GOS figures are available from 1991 on.

Gross domestic product: See GOS.

Others: Public expenditures and investment are provided by the working group of the State level Statistical Offices. The public expenditures for tax administration services, the fraction of urban population, total population, number of firms per state are provided by the German Federal Statistical Office. Unemployment figures are provided by the Federal Employment Agency (Bundesagentur für Arbeit). Equity financing ratios are provided by the IW Consulting GmbH. For most variables, data are available from 1991 onwards. the fraction of urban population and equity financing ratios are only available for five or less years. In these cases, we constructed state-specific averages in order not to lose too many observations of the other variables.

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[9] OECD definition: GOS is the surplus generated by operating activities after the labour factor input has been recompensed. It can be calculated from the value added at factor cost less the personnel costs. It is the balance available to the unit which allows it to recompense the providers of own funds and debt, to pay taxes and eventually to finance all or a part of its investment.

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