

AN ANALYSIS OF THE IMPACT OF TAX REFORMS ON BUSINESS CONFIDENCE: EMPIRICAL EVIDENCE FROM THE EU MEMBER STATES

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Abstract

Bureaucracy is a common problem in most countries, including the Member States of the European Union. This issue impacts all areas of civil services, including the fiscal system through tax collection and tax compliance. This study aims to analyze the impact of tax reforms on the business environment by using different business confidence indicators as an estimation of the expected evolution of the industrial sector, the construction sector, the retail sector and the services sector, as well as the tax burden as a proxy for the tax reforms.

Our research is based on quarterly data collected for the 28 European Union Member States, for a period of 30 years. The conclusions were reached following multiple regression estimations, done for each Member State separately, and followed by a detailed analysis of the results obtained. Thus, focusing on each country individually, the study reveals the influence of reforms in the tax systems on business confidence.

Keywords: tax burden, tax reforms, business confidence, taxation, European Union, industrial confidence index, construction confidence index, retail confidence index, services confidence index.

1. Introduction

Taxation has an undeniable impact on our day to day life. If this statement holds true for people, it is equally true for companies as filling out tax forms and complying with tax requirements is time-consuming and often challenging for business owners. When this process is further complicated by bureaucracy, it takes a toll on overall tax compliance in any industry. As a result, many countries have undergone reforms of their tax systems to make it easier for businesses to comply with tax requirements. However it is still difficult to pinpoint the influence such tax reforms have had on the business environment.

The current study is our attempt to analyze the relationship between the business confidence index and tax reforms reflected by the fiscal pressure. The business confidence index is calculated by the European Union and the OECD based on the answers managers of companies give to questions that are part of the business confidence surveys. The goal is to see what the managers believe is the current state of their company and what their expectations are for the future. The confidence index calculated for a certain sector reflects the expectations of the economic agents that are active in that sector of the activity regarding the evolution of that particular sector. In order to see if the expectations of the managers are influenced by possible changes in the taxation, we have decided to use the tax burden as a quantifiable taxation measure. The tax burden we used is calculated for different categories of taxes. Thus we have taken into account, separately, income taxes, taxes on production, sales and imports, and social security contributions.

The second section of our study deals with the literature review, and it contains an overview of other research previously done on our topic of interest. The third section deals with the research methodology we used throughout the entire research process. The fourth section contains a presentation of the results we obtained as a result of our analysis as well as our interpretation of the research results; this last section is followed by the conclusions of our research. A more extensive presentation of all our results can be found in the tables included in the annexes.

2. Literature review

Previous research regarding business confidence is sparse and most of the existing studies focus more on the theoretical, methodological and descriptive side of calculating various business confidence indices or on the relationship between business confidence and the labor market (Heye, 1993), the stock exchange (Darling, 1955) or the business cycle (Taylor and McNabb, 2007). The main original element of our current research is relating business confidence to taxation by using the tax burden and various business confidence indices. As far as we know, this has not been done previously.

The tax burden has been the focus of financial researchers for many decades. Towards the end of the 1980s, for example, the corporate tax burden was studied in order to determine its impact on corporate economic power and the state (Jacobs, 1988; Quinn, 1989). Different approaches towards measuring the fiscal pressure were pre-

sented in the last half century, amongst others, by Musgrave and Thin (1948), Atkinson (1980), Devarajan, Fullerton and Musgrave (1980), Auerbach and Rosen (1980), Kiefer (1984), Atrostic and Nunns (1991), and Metcalf (2006). While the opinions regarding ways of measuring the tax burden have evolved and expanded, the fiscal burden has remained in the limelight of debates and research studies as a means of evaluating the impact of different fiscal policy decisions on the social and business environment.

Business confidence has also been an issue of great interest amongst researchers. Collins (2001) used the Granger Causality to analyze the relationship between business confidence surveys and stock market performance. His conclusion was that business confidence surveys are not a predictor of stock market performance, but that stock market performance is a predictor of business confidence surveys. One of the main issues of interest regarding business confidence is exactly what business confidence reflects and what does a change in business confidence mean. Silverstone and Mitchell (2005) used panel data analysis at the company level to determine exactly what changes in microeconomic and macroeconomic variables are anticipated by changes in business confidence. Their conclusion was that the variables associated to business confidence change over time and, moreover, business confidence means different things to different companies. Herein lays one of the limitations of using business confidence indicators in any analysis: these indicators are constructed based on answers that reflect the personal view of the manager who answered the survey questions. Therefore, they contain a good dose of subjectivity (Hohnisch *et al.*, 2005). However, this can also be seen as one of the advantages of using business confidence indicators; sometimes a manager's perception can be more important than the actual truth because any decision the manager makes will be based on that perception and not on an absolute truth.

Our study aims to analyze the relationship between taxation and business confidence indices. We will analyze data from the European Union Member States and estimate regression models with different business confidence indices as dependent variables and different types of tax burden as independent variables (different types of tax burdens are seen as proxies for the effect tax reforms have had on the tax systems of each country).

3. Research methodology and database

The database contains quarterly information for the dependent and independent variables we used in our regression models. We collected information for each variable for each of the 28 EU Member States. The initial time period was 1985Q1 to 2014Q3, but not all the Member States provided information for the entire time period, and this is the reason why the number of observations differs from one Member State to the other. We do not believe that the difference in the number of observations has an impact on the relevance of our research results because for many of the newer Member States it is to be expected that the time period will be shorter. For countries

that only became EU Member States in 2004 or later, we can only consider relevant to our research on tax convergence the tax and business confidence information that they provided during the period when they were undergoing negotiations to become part of the European Union. Therefore, a shorter time period actually leads to more relevant results in the case of the Member States that we mentioned above.

The research method we used is regression model estimation. In order to shed some light on the influence that taxation has on business confidence, we estimated a series of regression models based on equation (1):

$$CI = \alpha_0 + \alpha_1 * DTR + \alpha_2 * ITR + \alpha_3 * SSC + \varepsilon \quad (1)$$

where CI is the confidence index, DTR is the direct tax burden, ITR is the indirect tax burden and SSC is the social security burden.

A description of the variables used in the regression models can be found in Table 1. The tax burden is used as a proxy for the fiscal system of a Member State of the European Union. We considered three major types of tax burden, each corresponding to one of the major types of taxes: the direct tax burden (DTR) calculated as direct taxes collected as a percentage of the GDP, the indirect tax burden (ITR) calculated as indirect taxes collected as a percentage of the GDP, and the burden due to social security (SSC) calculated as social security contributions collected as a percentage of the GDP. The database contains information for each of these three major tax groups, on a quarterly basis, for the period between 1985Q1 and 2014Q3. The data was extracted for the Eurostat online database.

Table 1: Description of variables

Independent variables	
Name	Description of variable
DTR	direct tax burden; calculated as direct taxes collected as a percentage of the GDP
ITR	indirect tax burden; calculated as indirect taxes collected as a percentage of the GDP
SSC	burden due to social security; calculated as social security contributions collected as a percentage of the GDP
Dependent variables	
Name	Description of variable
ICI	industrial confidence index; business confidence index calculated on a national level for the industrial sector
CCI	construction confidence index; business confidence index calculated on a national level for the construction sector
RCI	retail confidence index; business confidence index calculated on a national level for the retail sector
SCI	services confidence index; business confidence index calculated on a national level for the services sector

The dependent variables in each regression model are the business confidence indices for different sectors of the economy: the industrial sector (ICI, industrial confidence index), the construction sector (CCI, construction confidence index), the retail sector (RCI, retail confidence index) and the services sector (SCI, services confidence index). These indices are calculated and reported by each Member State on a monthly basis (OECD, 2006) using the OECD (2003) methodology based on business confi-

dence surveys. These surveys contain multiple choice questions that the managers of companies that are active in a certain sector of the economy have to answer. The questions are aimed not only at the current state of the company, but also at what the expectations of the managers are for the future. Many of the questions ask the respondent to anticipate what the evolution of the company or the market will be in the short term (the next few months). One of the limitations of the business confidence indices comes from the fact that, though the general principles and the methodology the surveys are built on are the same, the questions and the answer choices are not standardized. However, the business confidence surveys are considered to be a good way of seeing how those involved in a certain activity anticipate the evolution of their business sector (Collins, 2001).

The data for the four business confidence indicators (ICI, CCI, RCI and SCI) that we used in our analysis was also taken from the Eurostat online database. As the data was provided on a monthly basis, we calculated a simple arithmetic average for each three months to convert the monthly data into quarterly data which could be related with the quarterly information regarding taxation.

We conducted a country based analysis for each of the 28 EU Member States. Therefore, for each Member State, four regression models were estimated using OLS. In other words, we estimated a regression model for each of the four business confidence indicators (ICI, CCI, RCI and SCI). Some of the models were adjusted and validated, others were rejected as inappropriate. A more extensive view on the results of our research is presented in the next section of the paper.

4. Research results

Using the database previously described, we estimated multiple regression models for each Member State of the European Union. For each EU Member State, we estimated four regression models using the same explanatory variables (DTR, ITR and SSC) in each model. But for each estimated model we changed the dependent variable starting with the ICI in the first estimated model, followed by the CCI, RCI and SCI respectively. Thus, we estimated 110¹ regression models in total for the EU Member States but not all the regression models were validated and some were adjusted in order to be validated.

Our research on the impact of taxation on business confidence in the industrial sector in the European Union (please see Annexes, Table 3) resulted in the validation of regression models for 10 of the 28 Member States (the Czech Republic, Greece, Croatia², Italy, Lithuania, Luxembourg, Slovenia, Slovakia, Finland and Sweden). It

1 We only estimated 110 regression models and not 112 because Luxembourg did not provide information for either the retail confidence index (RCI) or the services confidence index (SCI) and, therefore, those regression models could not be estimated.

2 Croatia only provided 10 observations, which greatly limits any conclusions that might be drawn based on the estimation.

should be noted that for some of these countries adjustments were made in order to validate the regression model.

The analysis conducted regarding the impact of the tax burden on business confidence in the construction sector (please see Annexes, Table 4) resulted in the validation of regression models for 8 of the 28 Member States (Bulgaria, Denmark, Germany, Croatia³, Italy, Hungary, Poland and Slovenia). After analyzing the impact of taxation on business confidence in the retail sector (please see Annexes, Table 5) we validated the linear regression models for 7 of the 28 Member States (the Czech Republic, France, Cyprus, Latvia, Slovenia, Slovakia and Finland). For Ireland, Denmark and Malta there were too few observations⁴ for the estimation to have any accuracy. Of all four confidence indicators, for the RCI we found the fewest validated regression models.

As a result of analyzing the impact of taxation on the confidence of companies in the services sector (please see Annexes, Table 6), we validated 8 of the models, those estimated for Denmark, Germany, Latvia, Hungary, Austria, Poland, Slovenia and Slovakia. For Luxembourg we could not estimate the regression model because data for the SCI was not available for this country. Also, there were too few observations⁵ for Denmark and Croatia to be able to give any scientific and economic value to the results of the estimations.

In order to have a more detailed analysis on the impact of the tax burden on business confidence, we will continue with a presentation of the estimation results of the adjusted validated regression models of each Member State. The results are summarized in Table 2.

One result that we expected to find was an indirect relationship between the business confidence indices and the different types of tax burden. Our expectations were fulfilled in the case of most EU Member States for which we validated regression models. However, the results vary from one country to the other; therefore, we will comment on the results obtained for each Member State in turn.

In Bulgaria, the indirect tax policy has a direct and positive impact on business confidence in the construction (CCI). In spite of the small value of the R² coefficient, which was to be expected, we can conclude that an increase in the indirect taxation can lead to an increase in the business confidence in the construction sector. This result can be attributed to the fact that the managers might see an increase in the indirect taxation as a guarantee that direct taxation will not be increased. Also, managers might expect to be able to shift the additional indirect tax burden onto their clients and not be affected by the increase in indirect taxation.

3 Once again, Croatia only provided 10 observations, which greatly limits any conclusions that might be drawn based on the estimation.

4 Only 4 observations for Ireland, 17 for Denmark and 13 for Malta.

5 For Denmark there were only 17 observations available and only 10 for Croatia.

Table 2: Estimation results – adjusted and validated models

	Dependent variable	R ²	Intercept (Prob.)	DTR (Prob.)	ITR (Prob.)	SSC (Prob.)	No. obs.
Bulgaria	CCI	0.101141			2.507036** (0.0117)		50
Czech Rep	ICI	0.072437			43.44398*** (0.094)		50
	RCI	0.201172	0.22917*** (0.0991)			-8.745065* (0.0011)	50
Denmark	CCI	0.080927		7.881702*** (0.081)		-6.201837** (0.0319)	62
	SCI	0.325293		20.35751*** (0.0729)	-22.09295** (0.0308)		17
Germany	CCI	0.15482	-0.947888** (0.0257)	11.10926** (0.0424)		-38.40092* (0.0082)	50
	SCI	0.257678		5.686355** (0.0251)	-18.96483* (0.0034)	-20.133* (0.0029)	50
Greece	ICI	0.153106		4.190587*** (0.0862)	-10.90063*** (0.052)		34
France	RCI	0.046498	-0.22178** (0.0407)			-9.829684** (0.019)	118
Croatia	ICI	0.305652		-5.301283** (0.0435)			10
	CCI	0.578832		-1.025926* (0.0059)			10
Italy	ICI	0.049313				-2.617527*** (0.057)	50
	CCI	0.139498		0.557573* (0.0027)		-1.478483* (0.0077)	50
Cyprus	RCI	0.352879			-64.91096* (0.0000)		49
Latvia	RCI	0.034709			10.43944** (0.0354)		62
	SCI	0.118799			6.881972** (0.0442)	-4.664505*** (0.0902)	50
Lithuania	ICI	0.080647		-5.267237*** (0.0594)			42

Note: * significant at 1%; ** significant at 5%; *** significant at 10%

Source: Authors' calculations

For the Czech Republic, we can conclude that indirect taxation positively influences business confidence in the industrial sector (ICI). The positive value of the coefficient that determines the indirect tax burden is relatively large (43.443), and it is significant at a 10% level. This leads to a considerable influence that the indirect taxation has on business confidence in the industrial sector. Business confidence in the retail sector (RCI) is negatively influenced by the social security policy. An increase in social security contributions would lead to larger tax expenses for the company, which would cause a decrease in the business confidence for the retail sector in the Czech Republic.

In Denmark, the social security policy negatively impacts business confidence in the construction sector (CCI), while direct taxation has a positive impact on the same sector. The result for social security contributions was to be expected, but the outcome of our research for direct taxation is surprising. An increase in direct taxation leads to an increase in business confidence in the construction sector. This positive impact of direct taxation also appears when the services sector is analyzed, but for the business confidence in the services sector we also find a negative impact of indirect taxation. Therefore an increase in direct taxation is seen as favorable by the managers, while an increase in indirect taxation is seen as unfavorable. The explanation for this perception might be due to the fact that Denmark is one of the northern countries of Europe, where most of the tax income comes from direct taxation. Therefore, managers might be used to high direct taxation, but might perceive increases in indirect taxation as bad signs.

Most of the research results for Germany are as we expected: an increase in indirect taxation leads to a decrease in business confidence in the services sector (SCI), while an increase in social security contributions leads to a decrease of business confidence in both the construction sector (CCI) and in the services sector. The conclusion for direct taxation is, however, similar to that presented for Denmark: direct taxation positively influences business confidence in both the construction and in the services sectors. Another noticeable result is the fact that the model for the services sector in Germany is the only one where all three types of tax burden were retained in the final validated model. For the services sector, taxation accounts for almost 26% of the perception of managers regarding the future development for their sector of activity.

The research results for Greece show a positive impact of direct taxation and a negative impact of indirect taxation on business confidence in the industrial sector (ICI). The impact of indirect taxation is almost double that of direct taxation, which is not surprising in a country that relies mostly on indirect tax revenues. However, all conclusions regarding Greece must be considered with caution because for this country only 34 observations were available and this might have a negative impact on our results.

In France, there is a negative impact of the social security policy on business confidence in the retail sector (RCI). For this country, on the one hand we have the largest number of observations for any of the EU Member States (118 observations); on the

other hand, the value of R^2 is only 4.6%, which means that less than 5% of the managers' confidence in the retail sector is based on taxation.

According to our research results, in Croatia, there is a negative impact of direct taxation on business confidence in both the industrial (ICI) and in the construction sectors (CCI). In spite of the high level of the R^2 coefficient for both models, any conclusion for Croatia should be drawn with considerable reservations due to the very small number of observations available for this EU Member States (only 10 observations).

In Italy there is a negative impact of the social security policy on business confidence in both the industrial (ICI) and the construction sectors (CCI). However, the impact is much more pronounced in the industrial sector than it is in the construction sector. What is surprising about the results for Italy is the positive impact of direct taxation on business confidence in the construction sector. This result is similar to the results obtained for the construction sectors in Germany and Denmark. Still, the impact of direct taxation on business confidence in Italy is much less pronounced than in Germany or Denmark.

The research for Cyprus leads to a significantly negative impact of indirect taxation on business confidence in the retail sector (RCI). This means that even the slightest increase in indirect taxes will lead to a severe decrease of business confidence in this sector. The regression model has a R^2 coefficient of 0.35, and the research was conducted on sufficient observations, which lends credibility to the conclusions.

The results for Latvia show a negative impact of the social security policy on business confidence in the services sector (SCI). However, there is also a positive impact of indirect taxation on business confidence in the retail and services sectors (SCI). The explanation for these results might be similar to that previously discussed for Bulgaria. The managers might see this as the lesser of two evils (an increase in indirect taxes is preferable to an increase in direct taxes) and they might think it will be possible to shift the additional tax burden to the end-consumer instead of bearing it themselves.

Direct taxation has a negative impact on business confidence in the industrial sector in Lithuania. Even if the coefficient that determines the direct tax burden is significant at a level of 10%, the value of R^2 is only 8%. This value is acceptable for our study, but it shows that the influence of direct taxation on the perception of managers in the industrial sector is nevertheless limited.

In Luxembourg, our research results showed a strong negative impact of the social security policy on business confidence in the construction sector (ICI). Also, direct taxation has a positive impact on business confidence in the construction sector. This result is similar to those obtained for Denmark and Germany. The value of the R^2 coefficient is 19%, one of the largest for all the validated models, which leads to the conclusion that managers in Luxembourg consider taxation important when making predictions about the future of their company and their business sector.

Our research results for Hungary revealed a negative impact of the direct taxation policy on business confidence in the construction sector (CCI). However, when we

analyzed business confidence in the services sector (SCI), the estimations showed a positive impact of the social security policy. This means that an increase in social security contributions could lead to an increase in business confidence in the services sector in Hungary. This result is even more revealing when linked to the fact that the services sector accounts for more of the Hungarian GDP than any of the other sectors of the economy (Central Intelligence Agency, 2014).

When it comes to the results we obtained for Austria, we could only adjust and validate one regression model. This showed a negative impact of the direct taxation on business confidence in the services sector (SCI) in Austria. Therefore an increase in direct taxes could lead to a decrease of business confidence in this sector of the economy. However, it must also be noted that R^2 is only approximately 5%, which means that direct taxation only accounts for a small part of the variations in business confidence in Austria.

The data for Poland lead us to conclude that an increase in direct taxation could cause a decrease in business confidence in the services sector (SCI). Furthermore, the results also showed a positive impact of the indirect tax policy on business confidence in the construction sector (CCI). This is similar to our findings for Latvia, the Czech Republic and Bulgaria. The explanation might be similar: managers of companies in this sector prefer increases in indirect taxation to those in direct taxation.

Slovenia is the only European Union Member State for which we could reach conclusions for all the four sectors of the economy that we included in our analysis. The social security policy has a negative impact on all the four sectors. Therefore, any increase in social security contributions could lead to a decrease of business confidence in the industrial, construction, retail and services sectors in Slovenia.

The results for Slovakia were somewhat surprising: direct taxation has a negative impact on the confidence of managers in the industrial sector (ICI), but it has a positive impact on business confidence in the retail (RCI) and services sectors (SCI). This type of result underlines the complexity of any tax policy decision. The same tax measure can be seen as a positive signal by the companies in one sector, but it might be perceived as unfavorable by other sectors of the same economy.

The research conducted on data collected from Finland showed a positive impact of indirect taxation on business confidence in the retail sector (RCI). This is a similar result to that presented for Latvia for the same sector of activity. As Finland relies mainly on direct taxation, perhaps managers perceive increases in indirect taxation as a signal that the direct tax burden will diminish in the future because it is being shifted to the indirect taxes.

Business confidence in the industrial sector (ICI) in Sweden is negatively linked to indirect taxation. The data from Greece showed the same connection for the same business sector. The value of the coefficient that determines the indirect tax burden is quite large, but this is outbalanced by the small value of R^2 , less than 5%.

The overall conclusion for the European Union is that, in spite of the fact that changes in the taxation levels clearly impact business confidence, we cannot establish

any rules that would be valid in all the Member States. Each change in the tax burden impacts every Member State in a unique way. The only conclusions that can be drawn are for each Member State individually and not for the EU as a whole.

5. Conclusions

In the current study we tried to establish if managers take tax reforms and tax policy into consideration when anticipating the evolution of their company and of their business sector. In order to answer this research question we used regression model estimation based on business confidence indices for the industrial, construction, retail and services sectors as well as tax burden information for direct taxation, indirect taxation and social security contributions.

The analysis was conducted for all the current 28 Member States of the European Union. However, the results pointed to different conclusions for different countries, therefore we have no single answer for the entire European Union. We can only reach conclusions for certain groups of states and, sometimes, for only one Member State.

In one group of Member States, according to our results, taxation does not influence managers' perception of their business environment. This group includes: Belgium, Estonia, Ireland, Malta, the Netherlands, Portugal, Romania, Spain and the United Kingdom. We believe that there can be two possible explanations for these results: either the tax legislation is very stable, with few changes and little bureaucracy, and therefore it is unlikely to cause any surprising changes in the business environment; or the opposite is true: the tax legislation is very unstable and the changes are so frequent that the managers cannot anticipate them in any way.

For all the other Member States that were not included in the first group we could reach conclusions regarding the influence of tax policy and tax reforms on business confidence for at least one of the sectors that we included in our analysis. In most cases an increase in taxation would lead to a decrease in business confidence: a higher direct tax burden would have a negative impact on business confidence in Croatia, Lithuania, Hungary, Austria, Poland and Slovakia; an increase in indirect taxes would negatively impact business confidence in Denmark, Germany, Greece, Cyprus and Sweden; higher social security contributions could diminish business confidence in the Czech Republic, Denmark, Germany, France, Italy, Latvia, Luxembourg, Slovenia and Finland. As an overall conclusion, the social security tax burden seems to have the greatest impact on business confidence in European countries.

Our research results also showed that in some of the European Union Member States, tax reforms have a positive impact on business confidence in certain sectors of the economy. Our dependent variables (business confidence indices) are based on qualitative data provided by the managers of companies that are active in a certain sector. Therefore, sometimes managers perceive increases in a particular type of tax burden as favorable or perhaps they only consider it to be the lesser of two evils (e.g. the manager would rather have an increase in the indirect taxes that have one in direct taxes).

There is a clear need for more extensive research on the influence of taxation on business confidence, with more clear-cut conclusions and using a variety of research methods. Our study has barely scratched the surface of establishing and describing the relationship between tax reforms, the tax burden and the perception of managers regarding the future evolution of their company and their business sector.

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Annexes

Table 3: The impact of taxation on the ICI

	Country	Intercept	DTR	ITR	SSC	R²	No. obs.
1	Belgium	-0.222826 (0.2733)	-0.30381 (0.5929)	-1.82075 (0.7351)	-1.2716 (0.6703)	0.034	78
2	Bulgaria	-1.840555 (0.3997)	-0.10249 (0.9891)	-15.271 (0.5078)	-13.834 (0.654)	0.029713	50
3	Czech Rep.	0.051785 (0.9611)	3.416475 (0.5861)	44.72895 (0.095)	30.34183 (0.1462)	0.078671	50
4	Denmark	0.320964 (0.3551)	5.071845 (0.5117)	17.28534 (0.1848)	-0.29175 (0.949)	0.054881	62
5	Germany	0.851968 (0.4337)	-9.63508 (0.5275)	-6.21119 (0.8672)	5.467676 (0.8897)	0.039728	50
6	Estonia	0.373092 (0.4913)	1.893929 (0.4092)	2.66339 (0.5899)	3.280239 (0.7547)	0.028299	50
7	Ireland	-0.022556 NA	0.100942 NA	0.802041 NA	14.17996 NA	1	4
8	Greece	0.177484 (0.751)	4.214382 (0.0915)	-10.0102 (0.0816)	6.454285 (0.2875)	0.18926	34
9	Spain	-0.315241 (0.3136)	-0.58225 (0.5698)	-2.22312 (0.2422)	17.94482 (0.0657)	0.07282	50
10	France	-0.141005 (0.6261)	-0.04201 (0.9747)	2.784669 (0.1336)	-19.7534 (0.1816)	0.021988	118
11	Croatia	0.185785 (0.4367)	-4.59025 (0.0809)	5.65715 (0.1181)	6.515901 (0.1585)	0.63583	10
12	Italy	-0.201138 (0.2715)	0.612125 (0.3785)	1.665273 (0.7343)	-3.65498 (0.0909)	0.084763	50
13	Cyprus	0.385712 (0.3013)	-0.2929 (0.7294)	0.794802 (0.7123)	-1.21956 (0.5111)	0.012846	50
14	Latvia	3.15E+15 (0.3537)	3.34E+15 (0.9227)	6.24E+16 (0.271)	1.84E+16 (0.7131)	0.026981	62
15	Lithuania	-0.142275 (0.8317)	-5.7065 (0.0707)	4.802126 (0.6844)	-3.47527 (0.6659)	0.089064	42
16	Luxembourg	-0.610204 (0.348)	10.75823 (0.0397)	-3.02004 (0.8656)	-78.0503 (0.0027)	0.209657	50
17	Hungary	-0.044627 (0.9213)	1.411125 (0.816)	8.402435 (0.263)	7.011352 (0.2872)	0.056162	62
18	Malta	-1.577108 (0.1831)	1.766303 (0.6829)	-8.48909 (0.4081)	4.448305 (0.6819)	0.024181	47
19	Netherlands	-0.591831 (0.2957)	0.232906 (0.9526)	-7.66781 (0.3532)	-4.70253 (0.497)	0.034701	62
20	Austria	-1.06236 (0.2403)	-2.63998 (0.7475)	-29.6281 (0.423)	14.25046 (0.1821)	0.068332	50
21	Poland	-0.177228 (0.2144)	-0.37894 (0.4988)	1.474969 (0.4068)	1.353276 (0.2512)	0.046044	50

	Country	Intercept	DTR	ITR	SSC	R²	No. obs.
22	Portugal	0.120913 (0.8279)	0.883617 (0.5937)	0.163454 (0.9835)	-3.69529 (0.6562)	0.008208	61
23	Romania	-0.794497 (0.2613)	1.061246 (0.6046)	5.592315 (0.2541)	-1.34839 (0.7837)	0.046575	50
24	Slovenia	-0.17836 (0.5558)	-3.25727 (0.2972)	-7.8265 (0.1578)	-12.5901 (0.018)	0.123678	62
25	Slovakia	-0.185509 (0.9398)	-39.4577 (0.0915)	-4.02052 (0.8757)	-23.6758 (0.5393)	0.074958	61
26	Finland	0.751463 (0.4114)	7.141719 (0.1494)	-13.0236 (0.5617)	-44.1103 (0.0481)	0.067994	62
27	Sweden	-0.017408 (0.9799)	27.95147 (0.1175)	-69.7857 (0.0099)	9.586366 (0.4263)	0.160078	62
28	UK	-1.525939 (0.067)	7.660251 (0.137)	39.86942 (0.1802)	1.502851 (0.9419)	0.037196	78

Table 4: The impact of taxation on the CCI

	Country	Intercept	DTR	ITR	SSC	R2	No. obs.
1	Belgium	-0.06759 (0.5923)	-0.04409 (0.9007)	0.603278 (0.857)	-2.43023 (0.1934)	0.040154	78
2	Bulgaria	-0.154513 (0.1222)	0.234888 (0.4917)	3.202597 (0.0034)	-1.86189 (0.1869)	0.17246	50
3	Czech Rep	-0.427752 (0.1516)	2.238074 (0.2024)	0.454308 (0.9506)	-5.17866 (0.36850)	0.06224	50
4	Denmark	-0.334399 (0.1234)	8.923192 (0.0665)	-2.32076 (0.7728)	-6.5854 (0.0231)	0.118473	62
5	Germany	-0.981985 (0.0215)	13.4639 (0.0244)	-14.6219 (0.3057)	-44.1973 (0.005)	0.174081	50
6	Estonia	-0.09894 (0.6837)	1.286172 (0.21380)	-0.02721 (0.9902)	1.982172 (0.674)	0.035656	50
7	Ireland	-0.040314 NA	0.15766 NA	0.43528 NA	4.755222 NA	1	4
8	Greece	-0.947553 (0.1485)	2.455546 (0.3853)	-7.04779 (0.2798)	9.447983 (0.17930)	0.118796	34
9	Spain	0.088447 (0.6462)	-0.2287 (0.718)	0.362923 (0.756)	0.132486 (0.9821)	0.008867	50
10	France	-0.408434 (0.2662)	-0.06181 (0.9706)	-1.12718 (0.6302)	-10.7114 (0.5662)	0.014376	118
11	Croatia	0.006931 (0.8621)	-1.02536 (0.0341)	0.167253 (0.7638)	0.31737 (0.6633)	0.597265	10
12	Italy	-0.106205 (0.0235)	0.648933 (0.0005)	-1.00468 (0.4159)	-1.71211 (0.0023)	0.244702	50
13	Cyprus	-0.947263 (0.075)	0.549423 (0.6424)	0.057459 (0.9846)	0.590239 (0.8215)	0.006064	49
14	Latvia	-0.05103 (0.8114)	3.371046 (0.1257)	-5.0895 (0.1574)	0.438055 (0.8898)	0.097461	62

	Country	Intercept	DTR	ITR	SSC	R2	No. obs.
15	Lithuania	0.500299 (0.4658)	-1.10302 (0.7267)	12.46054 (0.3044)	-7.25222 (0.3793)	0.038286	42
16	Luxembourg	-0.13472 (0.2941)	-0.99144 (0.3278)	-3.99814 (0.2594)	-4.40321 (0.3698)	0.095973	50
17	Hungary	-0.203059 (0.0522)	-2.59834 (0.0639)	0.570092 (0.7377)	-2.3277 (0.123)	0.194419	62
18	Malta	-5.10551 (0.3816)	-15.6409 (0.6229)	-40.2167 (0.4163)	59.18653 (0.2961)	0.059958	25
19	Netherlands	0.084137 (0.723)	-1.43249 (0.3869)	4.023704 (0.2483)	-2.25204 (0.4401)	0.025375	62
20	Austria	-11.1049 (0.4621)	-218.39 (0.1169)	944.683 (0.131)	-0.2127 (0.999)	0.080801	50
21	Poland	-0.082217 (0.2858)	-0.32421 (0.2863)	1.850772 (0.0582)	0.632641 (0.3203)	0.110586	50
22	Portugal	-0.158373 (0.0669)	0.320178 (0.2123)	-0.98556 (0.4192)	-0.10636 (0.9329)	0.027925	62
23	Romania	-0.619482 (0.0664)	0.85128 (0.3798)	1.258289 (0.5843)	-1.67907 (0.4696)	0.018734	50
24	Slovenia	0.181557 (0.3328)	1.207654 (0.5219)	1.112071 (0.7385)	-9.06879 (0.0046)	0.184897	49
25	Slovakia	-0.376208 (0.2551)	-3.86617 (0.2168)	-3.76778 (0.277)	-5.80536 (0.2663)	0.112003	62
26	Finland	0.638644 (0.6572)	11.88243 (0.1285)	-43.7543 (0.2186)	-14.307 (0.6794)	0.095221	62
27	Sweden	-0.60415 (0.3998)	11.63151 (0.5258)	13.36068 (0.624)	3.483852 (0.7797)	0.034527	62
28	UK	-0.516492 (0.2164)	1.485326 (0.5653)	-1.51828 (0.919)	4.823518 (0.6433)	0.033993	78

Table 5: The impact of taxation on the RCI

	Country	Intercept	DTR	ITR	SSC	R2	No. obs.
1	Belgium	-0.924469 (0.4664)	3.766449 (0.2906)	-61.9439 (0.0686)	17.39831 (0.3528)	0.044817	78
2	Bulgaria	0.323901 (0.279)	-0.35283 (0.7312)	-2.91571 (0.3556)	-2.54906 (0.5457)	0.074548	50
3	Czech Rep	0.214222 (0.1321)	0.698951 (0.4009)	1.026266 (0.7688)	-8.19342 (0.0041)	0.214155	50
4	Denmark	1.854971 (0.2262)	-61.9974 (0.2381)	9.034135 (0.8347)	0.884023 (0.9764)	0.107439	17
5	Germany	-0.277201 (0.2218)	4.686928 (0.1423)	-2.32657 (0.7627)	-11.7752 (0.1546)	0.048832	50
6	Estonia	0.031832 (0.81)	0.608662 (0.2799)	1.005886 (0.4067)	-0.68352 (0.7902)	0.074932	50
7	Ireland	0.342793 NA	-1.38032 NA	-3.06327 NA	0.581122 NA	1	4

	Country	Intercept	DTR	ITR	SSC	R2	No. obs.
8	Greece	-2.016177 (0.272)	4.236745 (0.5938)	17.19578 (0.3486)	-8.12686 (0.6779)	0.058475	34
9	Spain	-0.078603 (0.6033)	0.1088 (0.8266)	-0.79615 (0.3868)	-1.35432 (0.7708)	0.038591	50
10	France	-0.242547 (0.0284)	-0.10203 (0.8389)	1.063363 (0.1303)	-15.7388 (0.0055)	0.067184	118
11	Croatia	-0.616212 (0.3735)	-5.63497 (0.4052)	4.874162 (0.6044)	10.64237 (0.3955)	0.21731	10
12	Italy	-0.829316 (0.268)	-2.07899 (0.4589)	13.74985 (0.495)	6.402049 (0.4585)	0.02182	49
13	Cyprus	-1.391891 (0.5507)	2.82284 (0.5924)	-65.7629 (0)	-4.15719 (0.7214)	0.363952	49
14	Latvia	0.402834 (0.1767)	4.271765 (0.1601)	11.38356 (0.0241)	-3.4633 (0.4297)	0.099787	62
15	Lithuania	-0.133777 (0.6356)	1.336067 (0.3076)	-0.52456 (0.9159)	-2.35581 (0.4878)	0.065114	42
16	Luxembourg	NA NA	NA NA	NA NA	NA NA	NA	NA
17	Hungary	-1.101166 (0.2602)	-14.012 (0.2858)	-17.9351 (0.2673)	21.57637 (0.1303)	0.047694	62
18	Malta	-4.171457 (0.2836)	-7.75144 (0.7561)	48.31859 (0.3173)	10.71898 (0.8407)	0.217746	13
19	Netherlands	-0.561892 (0.1286)	2.860694 (0.26)	2.626256 (0.6207)	5.606721 (0.214)	0.060387	61
20	Austria	-0.458039 (0.3338)	-6.40629 (0.1413)	30.79993 (0.1164)	1.019982 (0.8543)	0.066197	50
21	Poland	-0.223403 (0.4298)	-1.57558 (0.1615)	5.750717 (0.1082)	-3.57002 (0.1307)	0.199609	50
22	Portugal	-0.450645 (0.3951)	-0.21549 (0.8916)	-11.7588 (0.123)	4.238503 (0.5888)	0.057313	62
23	Romania	0.762916 (0.1357)	0.23476 (0.8733)	-0.89603 (0.7981)	-3.57712 (0.3138)	0.066722	50
24	Slovenia	0.427103 (0.2055)	3.630665 (0.2944)	0.68305 (0.9107)	-12.7131 (0.0304)	0.10597	62
25	Slovakia	0.814155 (0.0297)	7.532195 (0.0334)	-4.9659 (0.2002)	-7.00041 (0.2302)	0.159666	62
26	Finland	-0.117597 (0.6792)	3.314373 (0.0336)	16.71461 (0.0194)	-1.09309 (0.8729)	0.148372	62
27	Sweden	-0.324177 (0.3705)	5.224881 (0.5718)	-1.84544 (0.8931)	2.531319 (0.687)	0.023013	62
28	UK	-2.451271 (0.3544)	23.62719 (0.1521)	98.96891 (0.298)	9.960381 (0.8802)	0.03665	78

Table 6: The impact of taxation on the SCI

	Country	Intercept	DTR	ITR	SSC	R2	No. obs.
1	Belgium	0.578208 (0.29)	0.847841 (0.5788)	19.82686 (0.1728)	-10.833 (0.1795)	0.050012	78
2	Bulgaria	1.678345 (0.3858)	2.147752 (0.7444)	-5.29193 (0.7932)	-22.9766 (0.3967)	0.030377	49
3	Czech Rep	0.00253 (0.8994)	0.04948 (0.6778)	-0.13903 (0.7796)	0.063727 (0.8686)	0.007043	49
4	Denmark	-0.199071 (0.5622)	22.5251 (0.0718)	-20.9057 (0.051)	-6.70864 (0.3371)	0.3807	17
5	Germany	0.093077 (0.6101)	5.392517 (0.0394)	-18.7105 (0.0042)	-19.4401 (0.005)	0.261908	50
6	Estonia	0.089369 (0.7236)	1.542844 (0.1522)	0.649596 (0.7759)	-0.60719 (0.9002)	0.071425	49
7	Ireland	-0.00112 (0.9222)	0.026244 (0.3322)	0.073925 (0.2412)	-0.00879 (0.9728)	0.039855	50
8	Greece	0.061121 (0.9081)	1.453761 (0.5305)	1.440651 (0.7862)	-5.23398 (0.3615)	0.052887	34
9	Spain	-0.394781 (0.2167)	1.648298 (0.1185)	1.970709 (0.308)	-19.3035 (0.0524)	0.104691	50
10	France	0.279927 (0.4313)	-0.67311 (0.7041)	-2.46266 (0.2718)	-3.38854 (0.8516)	0.025269	106
11	Croatia	-6.681636 (0.1763)	-91.0248 (0.0777)	-16.6712 (0.7926)	-93.2987 (0.2829)	0.577219	10
12	Italy	0.781315 (0.4155)	-3.11033 (0.3949)	-7.35353 (0.7758)	10.52604 (0.3496)	0.025991	50
13	Cyprus	0.073997 (0.703)	0.205449 (0.6398)	-0.15758 (0.8867)	-1.2596 (0.1984)	0.043978	49
14	Latvia	-0.006229 (0.9777)	2.924195 (0.2028)	7.561287 (0.0309)	-6.73027 (0.0377)	0.149716	50
15	Lithuania	-0.371353 (0.3358)	1.51026 (0.3956)	-8.56298 (0.21)	0.834786 (0.8562)	0.06107	42
16	Luxembourg	NA NA	NA NA	NA NA	NA NA	NA	NA
17	Hungary	-0.038181 (0.9519)	-6.94055 (0.4203)	-14.8626 (0.1341)	20.03162 (0.0238)	0.130112	50
18	Malta	1.43857 (0.157)	-1.39292 (0.7179)	-9.06638 (0.2897)	-2.19918 (0.7981)	0.092391	29
19	Netherlands	-0.917782 (0.3013)	4.986688 (0.4186)	0.626037 (0.9613)	2.267285 (0.8344)	0.019701	62

	Country	Intercept	DTR	ITR	SSC	R2	No. obs.
20	Austria	0.396819 (0.0524)	-3.95534 (0.0349)	10.32501 (0.2132)	2.842555 (0.2321)	0.098903	50
21	Poland	0.303096 (0.1621)	-1.55042 (0.0708)	0.970458 (0.7164)	0.490743 (0.7804)	0.090732	46
22	Portugal	-0.616216 (0.2619)	1.940406 (0.2383)	-2.30314 (0.768)	-1.26332 (0.8761)	0.025435	62
23	Romania	0.415277 (0.2754)	-0.282 (0.7959)	0.877468 (0.7354)	0.992305 (0.7057)	0.01732	49
24	Slovenia	-0.17044 (0.4122)	-0.00729 (0.9972)	-1.02231 (0.7822)	-9.19642 (0.0092)	0.141996	49
25	Slovakia	0.103791 (0.6608)	5.516681 (0.0207)	2.483306 (0.3643)	-0.71103 (0.8628)	0.135228	50
26	Finland	0.388351 (0.4221)	1.602946 (0.5376)	-2.52126 (0.8316)	-10.8455 (0.3518)	0.015463	62
27	Sweden	0.491257 (0.1745)	1.864271 (0.8391)	-18.0866 (0.1887)	3.560375 (0.5691)	0.032654	62
28	UK	0.061368 (0.6877)	0.640472 (0.5004)	5.0996 (0.3508)	3.990814 (0.3119)	0.041007	70