Tax Incentives: An Effective Mechanism to Achieve EU Harmonization?

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Abstract: For decades, European Union (EU) wide corporate tax harmonization has been sought to eradicate business relocation for tax reasons. It is hoped that this harmonization will ensure that companies pay taxes in the countries where they operate. One mechanism that countries use to achieve this harmonization is tax incentives. Yet each country establishes its own incentive structure, according to its statutory tax rate. This study analyzes the effective tax burden in the initial 15 EU member states between 2006 and 2014 to identify significant differences that prevent tax harmonization across these countries. The statutory and effective tax rates are used to evaluate the tax burden. The net tax incentives and disincentives are also considered. The analysis shows that between 2006 and 2014, these 15 member states used tax incentives to close the gaps among these countries' tax burdens. Countries with above-average effective tax rates offered greater tax incentives than countries with below-average effective tax rates. However, though these tax policies reduced the gap in the tax burden, harmonization of the effective tax rate was not achieved during the study period.

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1. Introduction

In recent times, the harmonization of the corporate tax rate has troubled governments of economically developed countries. A lack of tax convergence means that companies flock to regions with favorable tax policies. This offshoring and the attendant tax avoidance harm the affected economies.

Repeated attempts to harmonize the tax burden have often proved unsuccessful. This situation has been reflected in numerous studies that provide evidence of the significant differences among the tax burdens in different countries. Studies have examined the tax burden in the US (Dyreng et al., 2017; Kim et al., 2011), Australia (Richardson and Lanis, 2007), and Asia (Suzuki, 2014). Scholars have also compared European and non-European countries (Chennells and Griffith, 1997; Jacobs and Spengel, 2000), and have conducted comparisons of 50 and 83 countries (Abbas and Klemm, 2013; Chen and Mintz, 2011, respectively). Studies of the tax burden in Europe include studies by Buijink et al. (2002), Cuenca-García et al. (2013), Devereux et al. (2008), Marques and Pinho (2014), and Overesch and Rincke (2011).

The desire of European Union member states to reduce tax avoidance has intensified in recent years. Council Directive (EU) 2016/1164 of 12 July 2016, which formalizes rules against tax avoidance practices that directly affect the functioning of the internal market, was recently approved.[1] This directive is based on the BEPS (Base Erosion and Profit Shifting Project) report, which was published by the Organization for Economic Co-operation and Development (OECD).[2] The BEPS report presents recommendations to eradicate tax avoidance and ensure that companies meet their tax obligations in the countries where they operate.

This novel perspective justifies the relevance of our study. We sought evidence of whether significant differences persist in effective taxation across EU member states or whether EU-wide harmonization has been achieved. To do so, we analyzed the effective tax rate (ETR) of the initial 15 EU member states (EU-15). The ETR is the most widely used indicator of tax burden (Armstrong et al., 2012; Fairfield and Jorratt De Luis, 2016; Kaplan, 1975). The primary goal of this study was to measure the intrinsic nature of the difference between the ETR and the statutory tax rate (STR). This difference arises through the tax incentives and disincentives that are implemented under the tax policy of each EU member state.

This study contributes to the literature in several ways. First, it offers a current analysis of the EU-wide convergence or divergence of the tax burden that derives from the tax policies that are applied by different EU member states. Second, it provides evidence of the non-STR tax mechanisms that might lead to this divergence. Third, the number of countries that are covered by this study (i.e., 15) is notably higher than the number of countries that are covered by the majority of prior studies that have compared the tax systems of EU member states. Therefore, this study offers a notably broader perspective of the issue.

The choice of ETR and the difference between ETR and STR in the empirical analysis is based on a meticulous review of the pertinent literature. From a methodological perspective, the choice of sample is justified to avoid biases, which might lead to errors in estimates, and to validate our findings.

Our primary findings are as follows: Countries with above-average STRs offered greater incentives than countries with below-average STRs. Certain countries with below-average STRs even imposed net disincentives. The goal was to reduce the gaps among ETRs and achieve tax harmonization.

This paper is organized as follows: Section 2 presents the theoretical framework, provides a literature review, and states the hypotheses; Section 3 details the empirical method, sample characteristics, and study variables; Section 4 discusses the results; and Section 5 presents the primary conclusions of the study.

2. Literature Review

The fundamental goal of the literature that compares the tax burden in different contexts is to determine whether different countries or regions impose varying tax burdens that may affect a company's decision to relocate. Eminent studies include those by Buijink et al. (2002), Devereux et al. (2002), Chennells and Griffith (1997), Jacobs and Spengel (2000), and Overesch and Rincke (2011).

Chennells and Griffith (1997) compared the ETRs and STRs of 10 countries (Australia, Canada, France, Germany, Ireland, Italy, Japan, Spain, the UK, and the US) between 1985 and 1994. Their study shows that the

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[1] Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016L1164.
[2] Available at: http://www.oecd-ilibrary.org/taxation/oecd-g20-base-erosion-and-profit-shifting-project_23132612.

countries with the biggest spreads between the ETR and STR are Germany, Italy, and Spain. Jacobs and Spengel (2000) compared data on ETRs over 10 years for firms in Germany, France, Netherlands, the UK, and the US. Their findings imply that the tax burden differs by sector within the same country and by country within the same sector. The authors conclude that for the study period, UK firms faced the smallest tax burden, followed by firms in the US and the Netherlands. Firms in Germany and France faced the highest ETRs.

Devereux et al. (2002) analyzed a sample of EU and G7 firms, using data for the 1980s and 1990s. They found that STRs remained stable over this period. However, the STRs of the most profitable investments fell. This finding implies the existence of tax competition to attract profitable investment projects, particularly multinational projects. In a European setting, Overesch and Rincke (2011) studied the ETRs of 32 European countries from 1983 to 2006. They concluded that for these countries, tax competition leads to a decrease in tax rates.

Finally, Buijink et al. (2002) analyzed the tax policies of 15 EU member states from 1990 to 1996. The goal of their study was to determine the existence of significant differences in the tax burden (i.e., the ETR). The work of Buijink et al. (2002) shows that tax incentives differ significantly across countries and lead to greater variation among ETRs than among STRs.

3. Research Design

3.1. Variable Specification and Development of Hypotheses

To gather evidence of tax burden harmonization or divergence across the EU-15 member states between 2004 and 2014, we used the variables country and year. We based our analysis on the ETR and STR. We analyzed the difference in absolute terms between the ETR and the STR (DISAB). Table 1 shows the variables that we employed in this study.

Variable name	Label	Description
Effective tax rate	ETR	$\dfrac{\text{Total income tax expense}}{\text{Financial accounting income before tax}}$
Statutory tax rate	STR	Percentage value of the nominal rate (provided by the European Commission)
Absolute difference between ETR and STR	DISAB	ETR – STR
Country	COUNTRY	European Union -15 member states
Year	YEAR	(2006–2014)

Table 1 Description of variables.

We used the ETR because numerous pertinent studies have employed this indicator to analyze the tax burden (Armstrong et al., 2012; Buijink et al., 2002; Chang et al., 2017; Fullerton, 1984; Kaplan, 1975; Langli and Saudagaran, 2004; Wang, 1991). The ETR is defined as total income tax expense divided by before-tax financial accounting income (Jansen and Buijink, 2000). Like numerous scholars before us (Chen et al., 2016; Gupta and Newberry, 1997), we compared the ETR with the STR. This combination of variables aligns with the recommendation of Omer et al. (1991) to use more than one measure of tax rates in empirical studies.

The variable DISAB was especially useful to calibrate non-STR tax mechanisms (Buijink et al., 2002), namely to measure the tax deductions and permanent differences between accounting income and taxable income. Table 2 shows the components of the non-STR tax mechanisms.

Incentives	Disincentives
Deductions	Positive permanent differences
Negative permanent differences	

Table 2   Components of non-STR tax mechanisms.

Interpreting the sign of the ETR less the STR (DISAB) is important. A negative value of the DISAB indicates that the ETR is lower than the STR because of an incentive (i.e., deductions or negative permanent differences). A positive value of the DISAB indicates that the ETR is higher than the STR because of a disincentive (i.e., positive permanent differences). These possible values for DISAB are summarized in Table 3.

Sign DISAB	Interpretation	Cause
DISAB $(-)$	Tax mechanisms that offer net incentives	Permanent differences $(+)$ < Deductions + Permanent differences $(-)$
DISAB $(+)$	Tax mechanisms that offer net disincentives	Permanent differences $(+)$ > Deductions + Permanent differences $(-)$

Table 3   Interpretation of the sign of the DISAB.

After defining the variables and the goals of our study, we propose the following hypotheses:

Hypothesis 1 (H1). *The mean and median ETR is equal across all EU-15 member states.*

Hypothesis 2 (H2). *The mean and median of the absolute difference between ETR and STR (DISAB) is equal across all EU-15 member states.*

3.1.1. Sample

We drew a sample of firms that are located in the EU-15 member states. These countries have relatively similar economic characteristics. Thus, we excluded the following 13 EU member states that gained accession to the EU after 2003: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak Republic, and Slovenia.

After suitable filters had been applied, the number of sampled firms was 777. All firms were publicly traded companies. The firms belonged to different sectors. Like other scholars (Crabbe and Vandenbussche, 2009; Lisowsky, 2010), we excluded the financial sector from this study because of its specific characteristics.

The study period was 2006 to 2014. This was an interesting time because it spanned the period from immediately prior to the 2008 financial crisis to the start of the economic recovery.

Table 4 presents details of the sample by country and year, showing the number of observations and the percentage of the sample covered by these observations.

The sample consisted of 6249 ETR observations. These observations were gathered from the Orbis database, which is managed by Bureau van Dijk Electronic Publishing (BvD). The STRs of the EU-15 member states were gathered from the Taxation Trends Report, which was published by the European Commission.[3]

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[3] http://ec.europa.eu/taxation_customs/business/economic-analysis-taxation/data-taxation_en.

EU member state	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total obs.	%
Germany	158	156	150	145	158	150	148	144	145	1354	21.7%
Austria	28	27	25	25	27	27	27	26	27	239	3.8%
Belgium	21	22	21	21	20	22	22	22	20	191	3.1%
Denmark	34	33	29	30	35	34	35	34	30	294	4.7%
Spain	26	26	25	27	26	24	22	19	25	220	3.5%
Finland	41	41	40	35	38	38	36	32	37	338	5.4%
France	87	91	87	82	90	87	88	84	87	783	12.5%
Greece	22	23	20	18	17	20	17	10	21	168	2.7%
Netherlands	28	28	24	25	28	27	24	27	24	235	3.8%
Ireland	18	20	20	18	20	19	20	19	18	172	2.8%
Italy	18	18	17	14	19	16	16	14	14	146	2.3%
Luxembourg	6	8	8	8	8	6	8	8	8	68	1.1%
Portugal	3	3	3	3	3	3	3	2	3	26	0.4%
UK	161	163	147	146	152	159	155	153	154	1390	22.2%
Sweden	70	70	69	66	69	72	64	70	75	625	10.0%
Total obs.	721	729	685	663	710	704	685	664	688	6249	100.0%
%	11.5%	11.7%	11.0%	10.6%	11.4%	11.3%	11.0%	10.6%	11.0%	100.0%	

Note: Total obs.—Total number of observations.

Table 4 Number of observations by country and year.

3.1.2. Method

We first performed a descriptive analysis of the primary statistics for each variable. Next, we focused on the variables ETR and DISAB. For each of these variables, we applied parametric ANOVA to test for differences among the n means. We then applied the nonparametric Kruskal–Wallis test to test for differences among the n medians. Both tests were conducted in SPSS. If the results did not support the proposed hypotheses, to evaluate possible divergence, we conducted a robust test of differences among means of the variables for each country with respect to Germany, which we took as the reference country. The aforementioned analyses were designed to provide evidence of harmonization or divergence of the ETR and the characteristics of the divergence in terms of tax incentives or disincentives.

4. Results

4.1. Country Statutory Tax Rates

Table 5 shows the primary descriptive statistics for the country STRs between 2006 and 2014. The countries in bold had STRs that were greater than the mean for the EU-15 over this period.

The data in Table 5 reveal differences among the EU-15 member states in terms of the STR. The mean STR for the EU-15 over the period of 2006 to 2014 was 28.70%. The member states with mean STRs higher than this rate were (in descending order) France, Belgium, Italy, Germany, Spain, Luxembourg, and Portugal. The countries with mean STRs lower than the EU-15 mean were (in descending order) the UK, Sweden, Netherlands, Denmark, Finland, Austria, Greece, and Ireland, which had the lowest STR (12.5%). France had the highest STR (35.17%).

EU member state	Obs.	Mean	Median	SD	Max	Min
Austria	239	0.2500	0.2500	0.0000	0.2500	0.2500
Belgium	191	**0.3400**	0.3400	0.0000	0.3400	0.3400
Denmark	294	0.2530	0.2500	0.0099	0.2800	0.2450
Finland	338	0.2504	0.2600	0.0187	0.2600	0.2000
France	783	**0.3517**	0.3440	0.0122	0.3800	0.3440
Germany	1354	**0.3217**	0.3020	0.0359	0.3870	0.3020
Greece	168	0.2451	0.2500	0.0277	0.2000	0.2000
Ireland	172	0.1250	0.1250	0.0000	0.1250	0.1250
Italy	146	**0.3285**	0.3140	0.0255	0.3730	0.3140
Luxembourg	68	**0.2911**	0.2920	0.0040	0.2960	0.2860
Netherlands	235	0.2575	0.2550	0.0141	0.2960	0.2500
Portugal	26	**0.2873**	0.2950	0.0211	0.3150	0.2650
Spain	220	**0.3089**	0.3000	0.0171	0.3500	0.3000
Sweden	625	0.2587	0.2630	0.0225	0.2800	0.2200
UK	1390	0.2668	0.2800	0.2100	0.3000	0.2100
Mean (EU-15)	6249	0.2870	0.3000	0.0523	0.3870	0.1250

Note: Obs.—Number of observations. * In bold the countries that are above the EU average.

Table 5   Descriptive statistics for STR by country (2006–2014).

4.2. Effective Tax Rate

Table 6 shows the primary descriptive statistics for the ETR between 2006 and 2014. The countries in bold had ETRs that were greater than the mean for the EU-15 over this period.

EU member state	Obs.	Mean	Median	SD	Max	Min
Austria	239	0.2338	0.2375	0.1001	0.5914	0.0054
Belgium	191	0.2306	0.2437	0.1079	0.5543	0.0000
Denmark	294	0.2603	0.2572	0.0970	0.5848	0.0000
Finland	338	0.2307	0.2440	0.0886	0.4664	0.0000
France	783	**0.3039**	0.3068	0.0881	0.5972	0.0163
Germany	1354	**0.2865**	0.2954	0.1007	0.5906	0.0000
Greece	168	0.2533	0.2533	0.1214	0.5745	0.0000
Ireland	172	0.1903	0.1770	0.0954	0.5989	0.0058
Italy	146	**0.3398**	0.3491	0.1135	0.5850	0.0379
Luxembourg	68	0.2596	0.2631	0.0996	0.5966	0.0141
Netherlands	235	0.2172	0.2294	0.0986	0.5975	0.0027
Portugal	26	0.2311	0.1248	0.1043	0.4359	0.0080
Spain	220	0.2385	0.2488	0.1054	0.5469	0.0036
Sweden	625	0.2556	0.2658	0.0863	0.5855	0.0000
UK	1390	0.2530	0.2627	0.0000	0.5842	0.0000
Mean (EU-15)	6249	0.2631	0.2709	0.1018	0.5989	0.0000

Note: Obs.—Number of observations. * In bold the countries that are above the EU average.

Table 6   Descriptive statistics for ETR by country (2006–2014).

The data in Table 6 show that the ETR also differed among EU-15 member states. The mean for the EU-15 over the study period was 26.31%, which was lower than the mean STR (28.70%) over the same period. This difference between the means of the STR and ETR indicates the existence of net tax incentives. Only three countries had ETRs that were greater than the mean. Italy had the highest mean ETR over the study period (33.98%), followed by France (30.39%) and Germany (26.85%). Ireland had the lowest tax burden (ETR = 19.03%).

4.2.1. ANOVA of the ETR

Table 7 presents the results of the ANOVA of the ETR.

Sample: 1396			
Observations: 1396			
Method	Degrees of freedom	Value	Probability
ANOVA F-test	(14, 6315)	55.23249	**0.0000**
Welch F-test	(14, 846.977)	54.04536	0.0000
Source of variation	D.f.	Sum of squares	Mean of squares
Between	14	9.570324	0.683595
Within	6315	78.15871	0.012377
Total	6329	87.72903	0.013861

Table 7   ANOVA of the ETR by country (2006–2014).

The ANOVA supports the findings of the descriptive analysis. The ANOVA yielded a value of 55.23, with a significance of 0% or, equivalently, a degree of confidence of 100%. Thus, the mean ETRs differed significantly among EU-15 member states between 2004 and 2014. Therefore, we reject the first hypothesis (H1).

4.2.2. Kruskal–Wallis Test for ETR

The results of the Kruskal–Wallis test for the ETR appear in Table 8.

Sample: 1396			
Observations: 1396			
Method	D.f.	Value	Probability
Chi-square	14	617.7386	0.0000
Kruskal–Wallis	14	768.1853	0.0000
Van der Waerden	14	741.3179	0.0000

Table 8   Kruskal–Wallis test for ETR (2006–2014).

The Kruskal–Wallis test corroborates the results of the ANOVA and descriptive analysis, with a value of 668.18 and a significance level of 0%. These results support the rejection of the first hypothesis (H1), thereby confirming the significant difference among the mean ETRs of the EU-15 member states.

4.2.3. Robust Test of Differences among Means of the ETR

The results of the ANOVA and the Kruskal–Wallis test led to the rejection of the hypothesis of equal ETRs. However, these analyses failed to identify which countries caused this divergence. Therefore, we conducted a robust test of differences for each country with respect to Germany. The aim was to determine which countries' ETRs differed significantly.

The data in Table 9 show that all countries' mean ETRs differed significantly from Germany's mean ETR. The differences were highly significant. Significance was less than 1% for all countries except Luxembourg, for which significance was less than 5%. These results corroborate and complement the results that we obtained in the other analyses.

EU member state	Mean	Difference (with respect to Germany)
Germany	28.65%	-
Austria	23.38%	*** −5.27%
Belgium	23.06%	*** −5.60%
Denmark	26.03%	*** −2.62%
Finland	23.07%	*** −5.58%
France	30.39%	*** 1.74%
Greece	25.33%	*** −3.32%
Ireland	19.03%	*** −9.62%
Italy	33.98%	*** 5.33%
Luxembourg	25.96%	** −2.69%
Netherlands	21.72%	*** −6.94%
Portugal	23.11%	*** −5.54%
Spain	23.85%	*** −4.80%
Sweden	25.56%	*** −3.09%
UK	25.30%	*** −3.35%

Note: Significance at 1%, 5%, and 10% denoted by ***, **, and *, respectively.

Table 9   Robust country pairwise comparison (with respect to Germany) of mean ETR (2004–2014).

4.3. Absolute Difference between ETR and STR (DISAB)

Table 10 shows the primary descriptive statistics for DISAB (2006–2014) by country. Countries with net tax disincentives appear in italics. Countries with net tax incentives that were above the mean for the EU-15 appear in bold. The remaining countries had net tax incentives that were below the mean for the EU-15.

EU member state	Obs.	Mean	Median	SD	Max	Min
Austria	239	−0.0162	−0.0125	0.1001	0.3414	−0.2446
Belgium	191	**−0.1094**	−0.0963	0.1079	0.2143	−0.3400
Denmark	294	*0.0073*	0.0022	0.0970	0.3348	−0.2500
Finland	338	−0.0197	−0.0059	0.0893	0.2214	−0.2503
France	783	**−0.0478**	−0.0438	0.0881	0.2508	−0.3438
Germany	1354	**−0.0352**	−0.0194	0.1036	0.2886	−0.3836
Greece	168	*0.0083*	0.0082	0.1239	−0.2500	−0.2500
Ireland	172	*0.0653*	0.0520	0.0954	0.4739	−0.1192
Italy	146	*0.0113*	0.0234	0.1127	0.2456	−0.2761
Luxembourg	68	**−0.0314**	−0.0240	0.0992	0.3086	−0.2779
Netherlands	235	**−0.0403**	−0.0273	0.0988	0.3425	−0.2671
Portugal	26	**−0.0562**	−0.1702	0.1046	0.1709	−0.2706
Spain	220	**−0.0703**	−0.0594	0.1073	0.2469	−0.3196
Sweden	625	−0.0031	0.0029	0.0874	0.3408	−0.2800
UK	1390	−0.0138	−0.0079	−0.3000	0.3639	−0.3000
Mean (EU-15)	6249	−0.0239	−0.0137	0.1024	0.4739	−0.3836

Note: Obs.—Number of observations. * In bold the countries that are above the EU average.

Table 10   Descriptive statistics for DISAB by country (2006–2014).

The mean DISAB was negative for 11 countries. The mean DISAB for the EU-15 was also negative. When we considered all EU-15 countries together, the mean ETR was 2.39% lower than the mean STR.

The DISAB reflects the difference between the ETR and STR. A negative DISAB value indicates that the ETR is lower than the STR and therefore denotes that the incentives are greater than the disincentives. Thus, the descriptive analysis shows that most EU-15 member states offered net tax incentives. Belgium offered the greatest incentives, with an ETR that was 11% lower than the STR. Sweden had the smallest net tax incentives, with an ETR that was only 0.31% lower than the STR.

Four countries had net disincentives. Ireland had a mean DISAB of 6.53%. Ireland, which had the lowest STR in the EU-15 (12.5%), applied tax policies that were designed to compensate for this low STR. Thus, the net disincentives meant that the ETR was 6.53% greater than the STR. Ireland's positive DISAB was caused by permanent differences that were greater than the sum of deductible differences and deductions. Nevertheless, Ireland's ETR (19%) was the lowest in the EU-15.

Table 11 shows the mean STR and ETR in ascending order and the mean DISAB in descending order.

	STR		DISAB		ETR		Explanations of notable observations in the ranking by STR
-	IE	0.125	IE	0.065	IE	0.190	Ireland: Minimum ETR explained by lowest STR in the EU-15 (despite having the greatest disincentives in the EU-15)
	EL	0.245	IT	0.011	NL	0.217	Netherlands: Low ETR explained by a below-average STR coupled with above-average incentives (divergent behavior)
	AT	0.250	EL	0.008	BE	0.231	Belgium: Low ETR explained by the highest incentives in the EU-15 despite having the second highest STR in the EU-15
	FI	0.250	DK	0.007	FI	0.231	Finland: Median DISAB
	DK	0.253	SE	−0.003	PT	0.231	Portugal: Below-average ETR explained by the third highest incentives in the EU-15 despite having an above-average STR
	NL	0.257	UK	−0.014	AT	0.234	
	SE	0.259	AT	−0.016	ES	0.239	Spain: Below-average ETR explained by the second highest incentives in the EU-15 despite having an above-average STR
	UK	0.267	FI	−0.020	UK	0.253	UK: Median ETR and STR
	PT	0.287	LU	−0.031	EL	0.253	
	LU	0.291	DE	−0.035	SE	0.256	
	ES	0.309	NL	−0.040	LU	0.260	Luxembourg: Virtually no incentives or disincentives (ETR and STR are very close together)
	DE	0.322	FR	−0.048	DK	0.260	
	IT	0.329	PT	−0.056	DE	0.287	Germany: High ETR explained by the fourth highest STR in the EU-15
	BE	0.340	ES	−0.070	FR	0.304	France: High ETR explained by the highest STR in the EU-15
+	FR	0.352	BE	−0.109	IT	0.340	Italy: Highest ETR explained by the third highest STR in the EU-15 coupled with tax disincentives (divergent behavior)

Note: EU-15 mean denoted by black bar; countries with ETRs below the EU-15 mean denoted by blue; countries with ETRs above the EU-15 mean denoted by purple; Austria (AT), Belgium (BE), Denmark (DK), Finland (FI), France (FR), Germany (DE), Greece (EL), Ireland (IE), Italy (IT), Luxembourg (LU), Netherlands (NL), Portugal (PT), Spain (ES), Sweden (SE), United Kingdom (UK).

Table 11   Mean STR, ETR, and DISAB for each EU-15 member state (2006–2014).

According to the data in Table 11, the most common situation was the correction of STRs through tax mechanisms. Accordingly, an above-average STR was combined with above-average tax incentives. Conversely, a below-average STR was combined with scarce or below-average incentives or with disincentives. The circled figures correspond to two countries—Netherlands and Italy—that had divergent behavior that did not fit this pattern.

4.3.1. ANOVA of the DISAB

The results of the ANOVA of the country DISAB are shown in Table 12.

The ANOVA corroborates the results of the descriptive analysis of the DISAB, with a value of 34.62 and a significance of 0%. Thus, the second hypothesis (H2) of an equal mean DISAB across all EU-15 member states is rejected.

Sample: 1396			
Observations: 1396			
Method	D.f.	Value	Probability
ANOVA F-test	(14, 6321)	34.62204	0.0000
Welch F-test*	(14, 844.869)	32.69806	0.0000
Source of variation	D.f.	Sum of squares	Mean of squares
Between	14	4.858926	0.347066
Within	6321	63.36441	0.010024
Total	6335	68.22334	0.010769

Table 12   ANOVA of DISAB by country (2006–2014).

4.3.2. Kruskal–Wallis Test of the DISAB

Table 13 presents the results of the Kruskal–Wallis test of the differences among median DISABs over the study period.

The Kruskal–Wallis test corroborates the earlier results, with a value of 492.66 and a significance of 0%. Consequently, the second hypothesis (H2) of an equal median DISAB across all EU-15 member states is rejected.

Sample: 1396			
Observations: 1396			
Method	D.f.	Value	Probability
Chi-square	**14**	**435.3033**	**0.0000**
Kruskal–Wallis	14	492.6613	0.0000
Van der Waerden	14	491.1813	0.0000

Table 13   Kruskal–Wallis test for DISAB by country (2006–2014).

4.3.3. Robust Test of Differences among Means

Finally, Table 14 presents the results of the robust test of differences between each country's mean DISAB and Germany's mean DISAB. Countries that appear in bold had mean DISAB values that differed significantly from Germany's mean DISAB.

EU member state	Mean	Difference (with respect to Germany)
Germany	−3.52%	-
Austria	−1.62%	*** 1.90%
Belgium	−10.94%	*** −7.43%
Denmark	0.73%	*** 4.25%
Finland	−1.97%	*** 1.55%
France	−4.78%	*** −1.26%
Greece	0.83%	*** 4.34%
Ireland	6.53%	*** 10.05%
Italy	−1.13%	** 2.39%
Luxembourg	−3.14%	0.37%
Netherlands	−4.03%	−0.51%
Portugal	−5.62%	−2.10%
Spain	−7.03%	*** −3.51%
Sweden	−0.31%	*** 3.21%
UK	−1.38%	** 2.14%

Note: Significance at 1%, 5%, and 10% denoted by ***, **, and *, respectively.

Table 14   Robust country pairwise comparison (with respect to Germany) of mean DISAB (2006–2014).

The data in Table 14 corroborate the conclusions of the descriptive analysis. The results imply that Germany's mean DISAB over the study period differed significantly from most countries' mean DISAB. Significant differences were identified for 11 countries. Nine of these differences were significant at the 1% level, and two were significant at the 5% level. Only three countries had mean DISAB values that did not differ significantly from Germany's mean DISAB. These countries were the Netherlands, Luxembourg, and Portugal.

5. Conclusions

5.1. Conclusions Regarding the ETR

The EU member states' desire to fight tax avoidance is exemplified by the recent approval of Council Directive (EU) 2016/1164 of 12 July 2016. This directive formalizes rules against tax avoidance practices that directly affect the functioning of the internal market.

Building on prior studies, this study addressed EU-wide interest in the harmonization of the tax burden across EU member states. Our primary goal was to provide evidence regarding whether the tax policies that were applied between 2006 and 2014 focused on tax convergence to prevent companies from paying taxes in other regions. Therefore, we compared the ETR for 6249 firms from the 15 EU member states that have similar economic characteristics.

ANOVA and Kruskal–Wallis tests, together with a robust test of differences of means, revealed that each country's mean ETR differed significantly from the ETR of the reference country, Germany, which had a mean ETR of 26.85%. Italy had the greatest tax burden, with a mean ETR of 33.98%. Ireland had the lowest tax burden, with a mean ETR of 19.03%. Consistent with studies by Abbas and Klemm (2013), Buijink et al. (2002), and Marques and Pinho (2014), our findings show a lack of tax harmonization across the EU-15 member states between 2006 and 2014.

5.2. Conclusions Regarding the Difference between the ERT and STR

We analyzed the nature of the ETR divergence that prevents EU-wide harmonization. To do so, we defined DISAB as the absolute difference between the ETR and STR. A nonzero value of DISAB is due to net incentives, namely deductions and positive or negative permanent differences. This analysis is of great interest because the structure of a country's tax incentives depends on the tax policy. In the EU, these policies should target harmonization to avoid offshoring and tax avoidance.

We studied the DISAB by following the same procedure as that used for the study of the ETR. The results show that, with the exception of Italy, countries with an STR that was above the mean for the EU-15 (28.70%) offered higher tax incentives to compensate for high taxation.

With the exception of the Netherlands, countries with STRs that were below the EU-15 mean offered lower incentives (or, in some cases, disincentives) to compensate for low taxation. Despite having an STR of 25.75%, which was below the mean for the EU-15, the Netherlands had an ETR of 21.72% and therefore a DISAB of −4.03%. The Netherlands had the closest tax burden to that of Ireland, whose ETR was 19.03%.

Table 15 shows the mean ETR for each country with respect to the mean for the EU-15. Table 15 also indicates the size of each country's net tax incentives.

This study provides evidence of a relationship between the size of the STR and the size of incentives over the period of 2006 to 2014. This finding reflects the efforts of the EU-15 member states to close the gap in effective tax burdens. This conclusion differs from the conclusions reached by Buijink et al. (2002), who reported that for the period of 1990 to 1996, the relationship between the STR and incentives was erratic and did not reduce the gap in the tax burden across EU member states.

Tax policy	EU member state	Mean STR	Mean DISAB	Exception
Highest net incentives	France	0.3517	−0.0478	
	Belgium	0.3400	−0.1094	
	Italy	0.3285	0.0113	
	Germany	0.3217	−0.0352	Italy
	Spain	0.3089	−0.0703	
	Luxembourg	0.2911	−0.0314	
	Portugal	0.2873	−0.0562	
Mean (EU-15)		**0.2870**		
Lowest net incentives/disincentives	UK	0.2668	−0.0138	
	Sweden	0.2587	−0.0031	
	Netherlands	0.2575	−0.0403	
	Denmark	0.2530	0.0073	Netherlands
	Finland	0.2504	−0.0197	
	Austria	0.2500	−0.0162	
	Greece	0.2451	0.0083	
	Ireland	0.1250	0.0653	

Table 15 Incentives and country ETR with respect to EU mean (2006–2014).

Despite our findings, we are aware than the use of incentives and disincentives as mechanisms to achieve tax harmonization is insufficient if the EU member states do not agree to align the incentives that are offered under their tax policies. If each country sets its own incentives, firms will continue to flock to countries that offer the most favorable incentives for their specific activity or investment. Therefore, in our opinion, the EU member states should consider closing the gap in the tax burden by harmonizing their STRs and their incentives. Failing this harmonization of STRs, they should align their STRs with the incentives that they offer in order to achieve a common ETR.

Accordingly, we believe that this study will be of interest for the governments of the EU member states. Our findings provide governments with additional insight to help design tax policies that contribute to harmonization and the elimination of tax havens and tax avoidance.

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