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Effect of Anti-Base Erosion and Profit Shifting Rules on International Income-Shifting

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Dissertation

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Biographic Note

Jorge Manuel Brás Pereira was born in 1996 in Póvoa de Varzim, Portugal. His academic run started in 2014 when he initiated a bachelor's course in Economics at the University of Minho. That time was fulfilled with many extracurricular activities which contributed to its passion for many fields of work, before he remarkably concluded its degree in 2017.

In September of the same year, at the same time of its first professional experience, he enrolled in the Master in Finance and Taxation at the School of Economics and Management of the University of Porto, motivated by the desire to extend knowledge in areas such as Finance, Taxation, Accounting or Auditing.

The following dissertation thesis represents the finalization of his Master's degree in Finance and Taxation.

Abstract

Multinational groups have used instruments like intra-debt financing and transfer-mispricing to shift their profits by locating their subsidiaries in countries with lower corporate income tax rates. Many countries have introduced stricter legislation to reduce BEPS. The purpose of this investigation is to study whether stricter rules regarding transfer-pricing and interests' deductibility have been successful in battling international profit shifting. In order to develop our research, we use a sample of 21 018 foreign subsidiaries located in EU-28 and in Switzerland for the period 2008-2016. We then conduct a panel-data analysis with control for both cross-section and time fixed-effects. Our estimated results show that firms reallocate income in function of tax rate differences and that the implemented legislation led to a reduction of international income shifting. We also show that firms with higher shares of intangible assets can escape easier to tighter transfer-pricing rules. We contribute to a scarce but growing literature on a matter of great interest for international tax experts.

Keywords: Corporate Taxation; Profit shifting; BEPS; Transfer-Pricing; Thin-capitalization;

Resumo

As empresas multinacionais fazem uso de diversos instrumentos, designadamente através de empréstimos entre subsidiárias do mesmo grupo ou da manipulação preços de transferência, para transferir os seus lucros para países com taxas de tributação mais baixas, entre outros benefícios. Muitos países introduziram legislação mais rigorosa de maneira a reduzir a erosão da base tributável e transferência de rendimentos. O objetivo desta investigação passa por verificar se a implementação de regras mais apertadas relativamente, quer aos preços de transferência, quer às regras de subcapitalização resultou, de facto, numa diminuição da transferência de lucros internacional. Para tal, recorreu-se a uma amostra constituída por 21 018 subsidiárias localizadas na EU-28 e na Suíça para o período 2008-2016. Foi então conduzida uma análise de dados em painel com controlo de efeitos fixos temporais e seccionais. Os resultados estimados mostram que as empresas alocam os lucros em função das diferenças de taxas de imposto e que o fortalecimento e implementação de nova legislação levou a uma redução da transferência de rendimentos transfronteiriça. Ficou também provado que empresas com maior peso de ativos intangíveis conseguem escapar melhor a regras mais apertadas relativamente aos preços de transferência. Contribuímos, assim, para uma literatura escassa, mas crescente numa matéria de grande interesse a nível de fiscalidade internacional.

Palavras-chave: Tributação das Empresas; Transferência de Lucros; Transferência de Rendimentos e Erosão da Base Tributável; Preços de Transferência; Regras de Subcapitalização

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Article Abbreviations

APA - Advance Pricing Agreements

ALP – Arm’s Length Principle

BEPS – Base Erosion and Profit shifting

CBCR – Country by Country Reporting

CITR – Corporate Income Tax Rate

EBIT – Earnings Before Interests and Taxes

EBITDA – Earnings Before Interests, Taxes, Depreciation and Amortization

EU – European Union

EY – Ernst & Young

FDI – Foreign Direct Investment

GDP – Gross Domestic Product

GDP_{PCPT} - Gross Domestic Product per capita

IP – Intangible Property

MNCs – Multinational Companies

MNE – Multinational Enterprise

OECD – Organization for Economic Co-operation and Development

R&D – Research and Development

TCP – Thin-capitalization

TP – Transfer-Pricing

UNCTAD – United Nations Conference on Trade and Development

U.S. – United States¹

USD – United States Dollar

VAT - Value-added Tax

¹ United States (U.S) is perceived as United States of America

1. Introduction

The integration of national economies and markets has expanded substantially in recent years. Globalisation meant a growing weight of Multinational Enterprises (MNEs) in global production. These organizations typically explore weaknesses and loopholes in the current rules that generate tax savings, which gives opportunities for base erosion and profit shifting activities - BEPS. Many MNEs are now paying small percentages of taxes in proportion of generated cash-flow streams, motivating some countries to redefine its tax policies in order to guarantee more fairness and equity among taxpayers, either as citizens and as corporations. Habu (2017) found that in the UK, for the period between 2000 and 2011, taxable profits relative to total assets reported by foreign multinational subsidiaries are 12.8 percentage points lower than those of comparable domestic standalone companies. Similarly, Huizinga & Laeven (2008) estimated the ratio of profit shifting to the tax base to be 13.6% in Germany and about 4.8% in Portugal.

Home countries acknowledge they may be losing from profit shifting activities both under an economic perspective and under a fiscal view. They can suffer due to factors dislocation, with MNCs deciding to increase investments on their subsidiaries, neglecting the operations in the home-country, leading to the potential loss of economic opportunities if foreign countries offer corporations better conditions for investment. Johansson et al. (2017) estimated that net tax revenue loss from international tax planning ranged from 4-10 percent of corporate income tax revenues, corresponding to a global loss of about USD 0.9-2.1 trillion from 2005 to 2014. Large MNEs used international tax planning to lower their effective tax rate by 4-8^{1/2} percentage points while smaller MNEs reduced tax rates by 1^{1/2}-3^{1/2} percentage points during this same period.²

Our goal is to tell if BEPS activities have been reduced thanks to the implementation of both stricter transfer-pricing and thin-capitalization legislation in EU-28 and in Switzerland. First, we intend to show lower corporate tax rates result in higher reported results. We then construct the variables regarding either transfer-pricing and thin-capitalization legislation so we can show whether or not the implemented stricter rules on

² In the World Investment Report 2015, UNCTAD estimates the revenue losses for developing countries due to BEPS range from USD 66 billion to USD 122 billion in 2012.

some countries resulted in lower reported results by foreign subsidiaries. We also aim to show that firms with higher shares of intangible assets recorded in their accounts tend to escape easier to the stricter rules implemented in order to battle for BEPS than firms with lower proportions of intangible assets.

The need to enforce taxation on multinationals is part of OECD's plans, after presenting many studies that presented the problems derived from BEPS activities engaged by Multinational firms. Base Erosion and profit shifting (BEPS) refers to tax avoidance strategies that exploit gaps and mismatches in tax rules, to artificially shift profits to low or no-tax locations. OECD presented an "Action plan on base erosion and profit shifting", which contained some directives and suggestions regarding the fight on profit shifting channels. Most Administrations have been following this plan, so they can tackle the mechanisms mentioned above. The European Commission has recently published the Anti-Tax Avoidance Directive³. This directive contains legally-binding anti-abuse measures. It creates a minimum level of protection against corporate tax avoidance throughout the EU, while ensuring a fairer and more stable environment for internal market. Some member states felt harmed not only by outside countries but also by fellow member states so we hope our data sample, comprising European countries relative to a fresh period, can prove some effectiveness on policies implemented by governments.

Opportunities to shift profits abroad arise from some loopholes on tax legislation that companies detect and use them to engage in tax savings and guarantee the report of more profitable results of affiliates placed in countries associated with lower corporate taxes. MNC can be defined as an enterprise operating in several countries but managed from one home country. They typically employ many people worldwide and have the ability to transfer the production of some products from one country to another, taking advantage of its dimension and from certain conditions that host-countries can offer. The instruments used may vary from transfer pricing manipulations, debt-contracting between affiliates within the same group or through deduction of payments royalties due to the use of patents on intangible property (IP). Although both manipulations can be played simultaneously,

³See Council Directive (EU) 2016/1164 of 12 July 2016 "*Laying down rules against tax avoidance practices that directly affect the functioning of the internal market*". Available at <http://data.europa.eu/eli/dir/2016/1164/oj> [Accessed on January 2019].

Saunders-Scott (2015) provides evidence that the channels of income shifting, transfer pricing and internal financing, are substitutes of each other.

In fact, more rigid legislation has been put forward to make sure transfer-pricing methods obey to the arm's length principle. Recently efforts on transfer-pricing transparency resulted in both increases in the frequency of audit inspections and number of experts at the service of tax jurisdictions, document requirements and specific disclosures, as well as the possibility of entering into Advanced Price Agreements (APA) or the chance of charged penalties in case of failure to comply with norms. Since 2016, many countries made obligatory the disclosure of the Country-by-Country Reporting (CBCR), where companies are required to publicly report taxes paid and profits earned on a country by country basis, giving tax administration more concrete information on MNEs affiliates and related-party transactions.

During our sample period, thin-capitalization regulation has been introduced in the form of restrictions on the amount of interests by reference to the ratio of debt to equity. For example, the rules might allow interest payments on debt of up to two times⁴ the total amount of equity invested in the group affiliate (2:1), so any additional interest would not be deductible. This has resulted in shrinking debt within related parties (Blouin, 2014; Buettner, 2012). Recently, some countries have reformed existing thin capitalization legislation, employing a ratio approach that focuses on the amount of interest paid in relation to the amount of income out which that is interest is paid – “Earnings Striping” approach⁵.

Additionally, it is believed that corporations with greater intangible property may not be subjected to the stricter policies used to combat for BEPS, since profit shifting activities are larger in MNEs with high IP and high R&D intensities, according to a research made by Grubert, in 2013, about U.S parent corporations and their manufacturing subsidiaries The proliferation of the digital economy is also an urge theme for future tax strategies and the OECD has also shown interest in developing and reforming tax mechanisms that better fit the recent forms of business activities. Such companies benefit from the difficulty on the

⁴ Portugal allowed for interest deduction up to the amount of debt that corresponded up to two times the equity, until 2012.

⁵ Germany and Italy, for example, generally cap the deductibility of interest to 30% of EBITDA.

location of certain transactions, new payment's platforms and different ways of creating value that emerge with the rise of new technologies and from the collection and monitoring of consumer's data. Dischinger and Riedel (2011) showed the location of intangible assets within MNE is, indeed, distorted towards low-tax affiliates. We will conduct additional tests in order to test if companies with registered intangible assets have a fewer sensibility to tax-rate differences and if they respond less to stricter Transfer-pricing rules implemented, compared to companies with relatively low or no intangible assets.

The results of the regressions performed display that stricter transfer-pricing legislation are effective in reducing international income-shifting made from Multinational groups using a sample constituted by foreign subsidiaries located in European countries for the period between 2008 and 2016. We started by showing that firms reallocate income in response of tax differences. This response is relatively higher for firms with substantially higher shares of intangible assets.

The main contributions of our study to the existing literature on BEPS are both theoretical and empirical. First, our study does both a cross-country and cross-sectional analysis on multinationals enterprises located in Europe-28 and in Switzerland, using a more recent period once we consider a timeframe between 2008 and 2016. Second, we add to the scarce but growing literature on international profit shifting, which is known by its difficulty in constructing variables that represent accurately existing rules. Auerbach (2002) and Graham (2003) have both claimed about measurement problems they found in their studies about effects of tax incentives in capital structures. Third, by analysing Transfer-pricing regulations through a dummy variable and Thin-capitalizations rules, according to a categorization from Lohse et al. (2012) into three categoric variables, we provide results that may help policymakers in understanding the effectiveness of its policies. A fifth contribution of our case is related with the additional analysis made to corporations with intangible assets, which is a field with a lot of potential for future investigations. Following recent studies made by Lohse & Riedel (2013), Buettner et al. (2018) and Marques & Pinho (2016), we will conduct a panel-data analysis with control for fixed effects that allows for investigate whether tighter rules, that have been implemented in recent years regarding Transfer-pricing and interest's deductibility, have made its impact on combating international income shifting, an issue that really concerns governmental organizations.

The remaining paper is organized as follows: section 2 examines the background literature, section 3 presents the sample selection criteria, the variables definition and methodology used. Section 4 reports the empirical results and additional regression analysis. Finally, section 6 discusses the concluding remarks of this study, as well as limitations and perspectives for future possible researches.

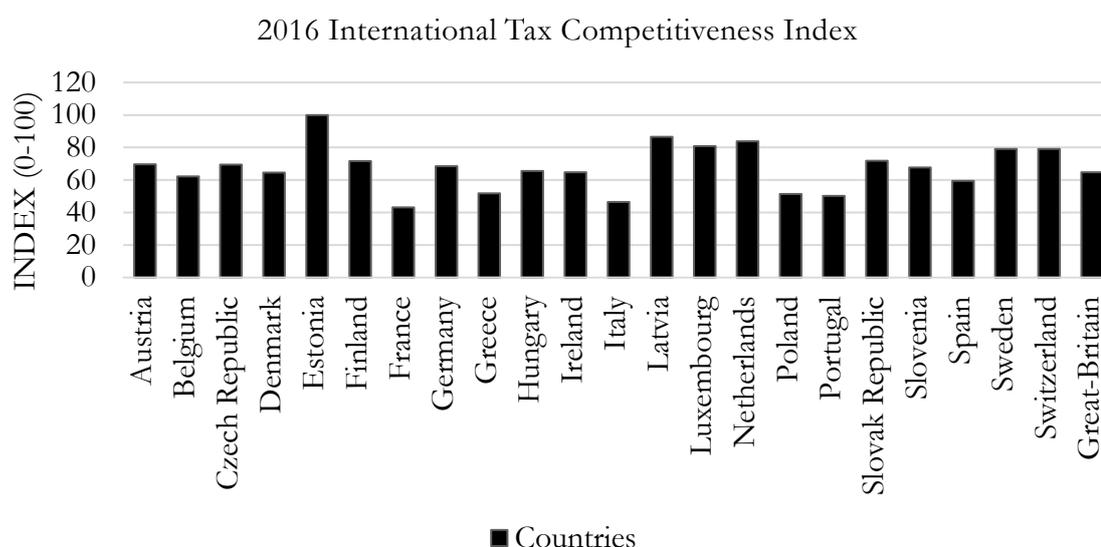
2. Literature Review and Hypothesis Development

2.1 Brief Intro

Multinational companies locate its subsidiaries in many countries through Foreign Direct Investment when they want to get favoured from lower labour costs, capital mobility or when they want to enter into new markets. They reallocate income to low-tax affiliates in order to shrink their overall tax bill (Devereux, 2007).

Companies also pay attention to the structure of a country's tax code, measuring if it grants opportunities and benefits for investment and if it is easy for taxpayers to comply with. In fact, poorly tax systems can be costly for countries, while distorting economic decision-making and harming domestic economy. Some countries have perceived it, reforming their tax codes and implementing policies that boosts the state's competitiveness while maintaining neutrality. Nations raise streams of revenue from payroll taxes, VAT, individual taxes and from corporate income taxation. When implementing its reforms, policymakers aim to attract FDI, which can be achieved with better conditions than other countries. Below, we present the International Tax Competitiveness Index for 2016, regarding OECD countries, built and then presented by Tax Foundation⁶:

Table 1. 2016 International Tax Competitiveness Index from 0 to 100.



Source: The Tax Foundation

⁶ The Tax Foundation is a U.S leading independent tax policy research organization with countless contributions, since 1937.

The computed index above looks at countries' corporate taxes, individual income taxes, consumption taxes, property taxes and the treatment of profits earned overseas. Eastern Europe nations present higher competitiveness indicators, comparing with countries from the south or central Europe. This is consistent with the data collected regarding both thin-capitalization and transfer-pricing rules' strictness. Those same countries where are characterized by lenient legislation regarding legislation either about transfer-pricing rule, either about interest's deductibility from related party loans, as we may see further. However, we need to account for country aspects to fully understand fiscal systems, such as population size, production, firm's size or labour characteristics. Haufler and Runkel (2012) argument smaller countries may not have incentives to increase its nominal tax rate. Over the past few decades, marginal tax rates on corporate income have declined for most OECD's countries, with exemption for France, as we can see in Annex 1

2.2 Corporate Tax Rate

It is known that tax rate differential⁷ exerts a significant influence over profit-shifting activities (Weichenrieder, 2009). On a meta-analysis investigation conducted by Heckemeyer and Overesch (2017), they found that a one percentage point smaller tax rate differential is associated with a raise in a subsidiary's pre-tax profit by approximately 0.8 percent.

The legislation in force in some countries is established in order to ensure a healthier economic conjuncture and to inspire either domestic investment and Foreign Direct Investment. As Pereira (2011) showed, an increase in corporate tax rate by one percentage point may lead to a decrease, in average, of about 3.22 percentage points on the weight of FDI on GDP in that year. There are a large variety of studies that show this negative relationship between corporate tax rates and Foreign Direct Investment, although they also vary in the conclusion's magnitude. That may be possible due to many possible measures of effective tax rates as explanatory variables and the use of different dependent variables and estimations' methods. Both Lohse (2013) and Marques & Pinho (2016) started its investigation by demonstrating that a raise in the corporate tax rate has a negative impact on

⁷ Both Tax Rates and Tax Bases vary widely among countries.

reported profits. We trust our research will continue to confirm that trend, which leads us to our first hypothesis:

H_1 : The tax rate difference has a negative relationship with EBIT.

2.3 Transfer-Pricing

The most varied literature sustains our premise that companies move profits abroad, in response to tax rates. However, the magnitude of that response may decrease in the presence of stricter legislation. Lohse (2013) and Buettner (2018), have proved that tax-rate sensitivity is greater in the presence of binding legislation regarding transfer-pricing and thin-capitalization rules, respectively.

The two authors differ in the way they analyse profit shifting. While Lohse first focus on an operational indicator, Earnings Before Interests and Taxes, and then, on a financial indicator, Profit Before Taxes, Buettner uses total Property, Plant and Equipment and its main dependent variable, withdrawn from balance sheets, in opposite to EBIT and profit before taxes, which are obtained from financial statements.

Transfer price is the price at which one division or subsidiary of a company transact with each other, such as the trade of supplies or intermediated goods between departments or between firms belonging to the same group⁸. Transfer-prices are used between related parties, which must be treated as separated entities, and must obey to the Arm's Length Principle (ALP), whose rule states that charged prices must be equal to those that were charges if both parties were unrelated. Suppose both firm A and firm B belong to the same multinational group M. A is located in a low-corporate tax rate country (10%) and B is based in a country whose tax rate is higher (15%) and they both sell product P at 200€. Firm B buys from supplier S at 100€ and makes 100€ of operating profits. However, if firm A buys from S at 100€ and then sells it to B for 150€, firm B only profits 50€ per unit. This transfer mispricing leads to tax avoidance and profit shifting from a high-tax country to a low-tax jurisdiction.

⁸ In 1998, the share of intra-firm exports in total manufacturing exports is 51% in Sweden. In 2009, such kind of trade accounted for 48% of U goods imports and about 30% of US goods exports (Lanz et al. 2011).

Transfer-Pricing regulations have been in constant developments since a few years ago. It can be seen in Annex 2 that, initially, some countries didn't have any formal written legislation over transfer-pricing issues but evolution has been gradually made on it. Using a measure of transfer-pricing risk developed by Mescal & Klasse (2014), De Mooji & Liu, 2018 concluded that the introduction of TP rules had a negative impact on multinational investment for the years between 2006 and 2014 in most OECD countries.

On the other way, following Lohse & Riedel (2013) there is also Marques and Pinho (2016), whose main goal of their paper was also to investigate whether the introduced more stringent transfer-pricing (TP) legislation resulted in a decrease of reported profits abroad. The last ones contributed by constructing an index for Transfer-pricing strictness, based both its regulation and enforcement weighted by factors that international experts considered relevant.

In 2012, Lohse presented a way to evaluate TP strictness into 6 categories, according to information contained in transfer-pricing guidelines elaborated by the Big Four International Audit Firms about tax audits, documentation requirements, penalties, among other things. The built evaluation was used in other papers, such as Lohse & Riedel (2013) and Buettner et al. (2018). In contrast, Marques and Pinho (2016) built an index, between 0 and 1, based on regulation and enforcement mechanisms and information withdrawn from Transfer-pricing reports elaborated by PwC, Deloitte, KPMG or EY and surveys sent to international experts.

Firms adjust prices for intrafirm trade to lower tax base in high-tax countries (Swenson, 2001 and Clausing, 2003). A company on a high-tax jurisdiction has incentive to undervalue prices charged to an affiliate in order to reduce its tax base while a subsidiary based in a low-tax jurisdiction has an incentive to overvalue prices charged to another affiliate or parent-firm located in a higher whose corporate tax rate is higher (Cristea & Nguyen, 2015). Marques & Pinho (2016) and Lohse & Riedel (2013) concluded that harsher legislation and the extension requirements for transfer-pricing decreased reported results. Therefore, the following hypothesis is tested:

H₂: Stricter Transfer-Pricing legislation reduces reported EBIT.

2.4 Thin-Capitalization

Similar to Transfer-prices, interest rates on loans celebrated between related parties must also obey to the ALP. Subsidiaries of multinational firms located in high-tax countries tend to borrow from entities based in low-tax countries (Desai et al. 2004, Huizinga et al. 2008 and Buettner & Wamser, 2013). MNCs make use of the financial structure of foreign activities in order to modify worldwide allocation of taxable profits. Intercompany debt financing is used to generate interest payments that are subject to tax in low-tax jurisdictions and deducted for tax purposes in countries with higher corporate rates. This leads to the hypothesis that tax-rate differentials give rise to thinly capitalized affiliates of MNEs (distorting equity and long-term debt distribution). Firms operating on foreign countries abroad can minimize its overall tax payments, in comparison with domestic firms, by lending from the affiliate facing the lowest tax rate compared to all other firms within the same group facing higher rates (Mintz & Smart, 2004). As a consequence, some countries, especially those with higher tax rates, imposed limits on deducted interests related with loans obtained from related parties. The implemented rules state that if a firm's debt in proportion to its equity is above a certain threshold level, deduction is not allowed after that level is met. This threshold limit is known as the safe haven debt-to-equity ratio. Tax mechanisms are very heterogeneous inside the European Union so rules implemented in each country are far away from converging. Considering this limit deduction, some countries specify it either in function of total debt over equity, long-term debt over equity or total debt in function of total assets, among many others, as Blouin's approach in its study in 2014. Recently, thin-capitalization rules in its main form have been abandoned and interest deductibility is now set in percentage of EBITDA⁹ or in absolute terms and there is the possibility to carry forward interest expenses.

Before testing our hypothesis, many difficulties arise from the interpretation of each country's tax legislation. Tax harmonization in European Union would mitigate the problems such as tax evasion and aggressive fiscal planning with the adoption of a common tax base, for example. Dourado & de la Feria (2008) discussed this problem in the context of the European Union. However, harmonization is not yet achievable due to several existing

⁹ In Portugal, interests are deductible up to one of the following amounts in 2018: a) 1M€ b) 30% of EBITDA.

differences. Nowadays, thin-capitalization rules and transfer-pricing restrictions are being differently evaluated and treated among countries. In what concerns to TCP rules, fiscal administrations may interpret related party debt from many views, going from long-term debt in proportion of equity, intra-firm debt over total assets, among many others. There is the need to restrict interests' deductibility and intracompany debt because it is known that Multinationals make use of intercompany loans so they can shift profits abroad (Buettner et al., 2007).

Peter Schwarz (2009), when examining tax-avoidance strategies of American Multinationals, reached to the conclusion that American MNEs benefit from globalization, allowing them to retain more income in tax havens and to finance their subsidiaries in high-tax jurisdictions by a larger extent with debt. This result suggest that the financial structure of foreign affiliates is implemented in a way to minimize tax bills. In 2014, Blouin examined the impact of Thin-capitalization (TCP) rules on the leverage of the foreign affiliates of US multinationals and he managed to show TCP regimes restrict the ratio of an affiliate's total debt to assets in about 43% of cases, which makes us believe that tighter TCP legislation diminishes reported profits in low-tax countries. Most recently, Buettner et al. (2018) conducted a panel-data analysis with fixed-effects showing that companies reacted to stricter thin-capitalization rules by decreasing its FDI, in the form of fixed assets.

Given this, we expect that harsher thin-capitalization policies decline reported profits sensibility to tax-rate differentials, which is the same as stating that more severe thin-capitalization rules are effective in reducing international income shifting. Thus, our third and last hypothesis is formally stated as follows:

H₃: Stricter Thin-Capitalization rules decreases reported EBIT.

In the next section, we will present the sample selection criteria, the variables definition and the methodology used to estimate the proposed models.

3. Variables, Sample Selection and Methodology

This section is developed with the goal of showing our data selection, the sample and variables specifications and the adopted estimation method. The section is presented as follows: first, we define the variables that are part of our estimations; second, we describe the sample and, lastly, we introduce you the adopted estimation method.

3.1 Variables Definition

3.1.1 Dependent Variables

The goal of this paper is to show whether reported results have been reduced or not due to the policies that were put into practice. Given that one of the main channels of income shifting is through transfer mispricing, we should consider an operational indicator, available on financial statements, as our dependent variable. Besides various methods used to capture and measure BEPS magnitude (Dharmapala & Riedel, 2013 and Dharmapala, 2014), the literature is consensual on which best indicator to use, so we will follow Lohse & Riedel (2013) and Marques & Pinho (2016) and adopt Earnings Before Interest and Taxes (EBIT) as our main dependent variable.

3.1.2 Independent Variables

I will use τ_{Diff} as the independent variable that explains motivations to move income that derive from tax rate differences. τ_{Diff} is given by subtracting from the host-country combined corporate income tax rate the corporate income tax rate in the country where the parent-company has its headquarters. Alternatively, there is the possibility to estimate a model using the host-country CITR (corporate income tax rate) (τ) instead of τ_{Diff} , as Buettner et al. (2018) did. However, using the CITR may potentially introduce endogeneity as the home-country tax rate is associated with subsidiary's reporting earnings (as a result of profit shifting) as well as with host country's level of investment (Becker & Riedel 2012 suggest that home country's corporate tax rate has a significant negative impact on the subsidiary's capital stock and location, respectively).

TP measures the strictness of transfer-pricing legislation in European countries. As it is the case for most of our variables, it is also difficult to compute a variable regarding TP

that is consensual to common literature and capable of representing with total accuracy the strictness level of existing legislation. Our TP variable is a dummy one, that assumes the value of 1 if a country is classified into category 4 or category 5 of Lohse et al. (2012) and 0 if it assumes the categories 0, 1, 2 or 3. We have to interpret information transfer-pricing guidelines made available from the Big 4 International audit firms. Its Transfer-Price Guidelines are made annually gives us information over determinant factors regarding each country, such as: potential for relief from penalties; Documentation requirements and deadlines; statute of limitations; required disclosures; transfer pricing-specific returns; frequency of tax audits and transfer pricing scrutiny by the tax authority and opportunities for Advance Pricing Agreements (APAs). Next, we show you the mentioned categories developed by Lohse et al. (2012) that we used to compute TP variable:

Table 2. Categorization of Transfer-Pricing Strictness.

Category	Description
Category 0	No general anti-avoidance rule/no transfer pricing regulations or documentation requirements exists
Category 1	Arm's length principle (through transfer pricing regulations or general anti-avoidance rule) introduced in national tax law, but no documentation requirement
Category 2	Arm's length principle (through transfer pricing regulations or general anti-avoidance rule) introduced in national tax law, documentation requirement is not introduced in national tax law, but required to exist in practice (audit)
Category 3	Arm's length principle (through transfer pricing regulations or general anti-avoidance rule) introduced in national tax law, documentation requirement is introduced in national tax law , but full documentation must only be available upon request
Category 4	Arm's length principle (through transfer pricing regulations or general anti-avoidance rule) introduced in national tax law, (documentation requirement is introduced in national tax law), a short disclosure of documentation is required
Category 5	Arm's length principle (through transfer pricing regulations or general anti-avoidance rule) introduced in national tax law, (documentation requirement is introduced in national tax law), a long disclosure of documentation is required

Source: Lohse et. al (2012)

Tax administrations usually allow for interests to be deducted until a certain amount of debt in proportion of its equity is met, whose limit is given by the safe-haven debt-to-equity ratio σ . Buettner et al. (2018) have built Thin-capitalization tightness (TCP) as an indicator between 0 and 1, that applies for a firm located in country i in a given year t :

$$TCR_{it} = \frac{1}{1 + \sigma_{it}} \quad (1)$$

Most recently, some countries, such as Germany, Spain or Portugal¹⁰, have left thin-capitalization rules and have imposed an interest deduction's limit in percentage of a companies' EBITDA. Also, some countries deny excess interest payments for deduction and reclassify them as dividend payments, implying additional withholding taxes are charged. Last, but not least, the safe-haven ratio refers to total debt in some jurisdictions while other states consider loans provided by the parent company or even borrowings granted from related parties (Blouin et al., 2014). To overcome this, we will abandon the previous idea and contribute to the existing literature with a new way of evaluating legislation's strictness regarding interest deductibility. Therefore, we will construct 3 categoric variables. Category 1 comprises either countries with no specific rules and countries which TCP ratio is above 3:1; category 2 includes countries with a TCP ratio equal to or below 3:1 and above 1:1. Lastly, category 3 comprises countries either whose TCP ratio is equal to 1:1 and, mainly, countries which limit the amount of expenses with interest that can be deducted from the tax base in function of Earnings Before Interest and Taxes and/or in function of absolute amounts.

3.1.3 Control Variables

Our estimation will include a set of time-varying control variables X_{it} , comprising both firm and country characteristics. Firm's total fixed assets and cost of employees will be taken as proxies for capital and labour inputs, respectively. Country characteristics like market size and productivity are measured by its proxies GDP and GDP per capita, respectively, both with natural logarithm.

3.2 Sample Selection

We collect data for the described variables from various sources. Gathering relevant information from international experts about many countries for a relatively broad period is one of the main challenges of our study. There is the need to conduct a careful research, so

¹⁰ Portugal has adopted this new kind of regulation since 2013.

we have to gather data that reflects the strictness of the implemented legislation, i.e., transforming information available on legislation into quantifiable accurate variables.

Our empirical analysis is based on annual subsidiary-level data constituted by European subsidiaries of multinationals located in Europe Union (28) and in Switzerland, during the 2008-2016 period. A subsidiary enters the sample if there is a European multinational placed in a different country that owns¹¹, at least, 50.01% of the subsidiary's capital. We then restrict our sample to firms with only positive EBIT and with available accounting information about its fixed assets and the cost of its employees. We have excluded subsidiaries whose industry classification, according to the NACE Rev. 2 main sections, fitted either categories A, B, K or L. The excluded firms are active in agriculture, fishing and forestry; mining and quarrying or who belong to the financial or insurance sectors as also companies who perform real estate activities, where specific tax conditions apply (Buettner et al., 2018).

Information about subsidiaries' financial statements, such as EBIT, Fixed Assets and Cost of Employees can be found on the Bureau van Dijk's Amadeus database, as well as the ownership details. Second, variables regarding Transfer-pricing and Thin-capitalization rules are built with information available on EY's Transfer-Pricing Global Reference Guide¹² and on EY's Worldwide Corporate Tax Guide¹³, respectively. Third, combined corporate income tax rates were obtained from OECD International Tax Database¹⁴ and from EY's Worldwide Corporate Tax Guide, for countries who are part OECD and for those who aren't, respectively. Lastly, host-country characteristics¹⁵ (GDP and GDP per capita) can be taken from the World Bank World Development Indicators Database and are presented in euros, at current prices, after merging it with information on Exchange Rates¹⁶ taken from OECD

¹¹ Ultimate Owner is the highest quoted Company in the path as owner, whatever its shareholders, that holds at least, 50.01% of the subsidiary's capital, direct or indirectly, according to Amadeus.

¹² <https://www.ey.com/gl/en/services/tax/global-tax-guide-archive> [Accessed on January 2019].

¹³ <https://www.ey.com/gl/en/services/tax/global-tax-guide-archive> [Accessed on January 2019].

¹⁴ https://stats.oecd.org/index.aspx?DataSetCode=TABLE_III [Accessed on November 2018]

¹⁵ Available at <http://databank.worldbank.org/data/reports.aspx?source=World-Development-Indicators#> [Accessed on November 2018].

¹⁶ Available at OECD National Accounts Statistics database <https://doi.org/10.1787/data-00004-en> [Accessed on November 2018].

database. This information is summarized in Table 4., along with variable definitions and its expected signs.

Table 3. Variables Definition, Expected Relationship and its Sources

Variable	Definition	Source	Expected Sign
EBIT	Earnings Before Interest and Taxes	Amadeus	
τ_{Diff}	Tax Rate Difference	OECD Tax Database and EY's WWCT Guide	-
TP	Transfer-Pricing Strictness	EY's Transfer-Pricing Global Reference Guide	-
TCP	Thin-capitalization Tightness	EY's Worldwide Corporate Tax Guide	-
Capital	Total Fixed Assets	Amadeus	+
Labour	Total Employees' Cost	Amadeus	+
GDP	Gross Domestic Product (current prices)	World Bank World Development Indicators Database	+/-
GDP per capita	Gross Domestic Product per capita (current prices)	World Bank World Development Indicators Database	+

The resulting dataset captures 21 018 foreign subsidiaries belonging to 8 282 different multinationals operating in European countries over 9 years (2008-2016), which means that, in average, each multinational owns 2.5 affiliates. The largest parent-company owns 112 subsidiaries; however, the median value of subsidiaries is 1. A country distribution of the affiliates and corresponding parent companies is presented in Table 4. The most represented countries are Romania, France, Spain and Italy while we couldn't manage to include in our observation any subsidiary located in Switzerland, Cyprus, Greece or Lithuania. This has to do with the specifications of our variables and corresponding availability of required data in AMADEUS, so we can't conclude that France is a country that hosts most of foreign subsidiaries in Europe, for example. We also present the distribution of industry classification of our subsidiaries, according to NACE code, in Annex 4.

The descriptive statistics are reported in Tables 5 and will be discussed in subsection 4.1.

Table 4. Distribution of subsidiaries

Country	Subsidiaries	Parent-Company	Country	Subsidiaries	Parent-Company
Austria	20	486	Ireland	198	137
Belgium	1 668	258	Italy	2 059	1 292
Bulgaria	348	27	Lithuania	0	15
Switzerland	0	399	Luxembourg	47	237
Cyprus	0	88	Latvia	3	25
Czech Republic	1 628	229	Malta	3	32
Germany	1 100	1 998	Netherlands	66	300
Denmark	0	213	Poland	1 483	72
Estonia	285	10	Portugal	822	95
Spain	2 040	347	Romania	2 473	31
Finland	408	162	Sweden	748	211
France	2 065	618	Slovenia	233	44
Greece	0	132	Slovak Republic	836	89
Croatia	322	21	Great-Britain	1681	543
Hungary	482	171	Total	21 018	8 282

Table 3. displays by host-country the distribution of subsidiaries (our observations) and the location of the corresponding parent companies.

Source: AMADEUS Bureau van Dijk

3.3 Methodology

The background literature on anti-BEPS legislation is still scarce. There are not many authors who have investigated the effect of tougher regulation on profit shifting channels on the amount of reported profits by multinational's affiliates. Lohse & Riedel (2013) and Marques & Pinho (2016) have both conducted a panel-data analysis with control for fixed effects in their investigation. They both incorporated: a set of control variables to control for firm and country characteristics; subsidiary fixed effects that allow to control for subsidiary time-constant unobserved heterogeneity and a full set of one-digit NACE industry-year fixed effects. The latest also included a full set of year dummies to pick up shocks over time that

are common to all affiliates. Most recently, Buettner et al. (2018) managed to prove that tighter thin-capitalization rules in OECD countries led to a reduction of FDI made by German multinational corporations, by developing a panel-data analysis for 1996-2007, with control for subsidiary-specific fixed effects and aggregate time effects and other characteristics.

In testing our hypotheses, we need variables that mirror the strictness of anti-BEPS implemented legislation so we can trust results derived from the regressions. However, there are also many other factors that may explain variations in reported results, besides Transfer-pricing or thin-capitalization rules. Therefore, control variables representing country and firm characteristics are also essential for this investigation. We estimate our models using Eviews software (Version 10).

Approaching a panel-data analysis with control for fixed effects allows us to elaborate our study in both cross-section and time series, according to both Lohse & Riedel (2013), Marques & Pinho (2016) and Buettner et al. (2018). The observational unit of our analysis is the multinational affiliate per year and the regressions assume the following form:

$$\begin{aligned} \ln EBIT_{it} = & \beta_0 + \beta_1 \tau_{it} + \beta_2 TP_{it} + \beta_3 (\tau_Diff_{it} \times TP_{it}) + \beta_4 TCP_{it} \\ & + \beta_5 (\tau_Diff_{it} \times TCP_{it}) + wX_{it} + \varphi_i + \rho_t + \varepsilon_{it} \end{aligned} \quad (2)$$

where $\ln EBIT_{it}$ is the natural logarithm of Earnings Before Interests and Taxes of affiliate i in country t , τ_Diff_{it} is the difference of combined corporate income tax rate between the affiliate's host-country and the country where the parent-company is located, for year t . TP_{it} represents transfer-pricing strictness in country i at time t , while TCP_{it} represents Thin-capitalization rule's strictness at time t in country i where the affiliate is located. Next, X_{it} is a vector of additional controls intended to account both for firm and country characteristics, φ_i accounts for subsidiary fixed effects, which will allow to control for subsidiary time-constant unobserved heterogeneity. On the other hand, ρ_t represents a full set of year dummies to pick up shocks over time that are common to all affiliates. Last, ε_{it} represents the error term.

We start by confirming our premises that increasing the tax rate difference shrinks reported profits, so our first model for **H1** is:

$$\ln EBIT = \beta_0 + \beta_1 \tau_Diff_{it} + wX_{it} + \varphi_i + \rho_t + \varepsilon_{it} \quad (2.1)$$

After confirming **H1**, we then proceed to test if tighter transfer-pricing legislation increases the elasticity of reported EBIT to the tax rate difference between host-country and home-country, so we will test **H2** with:

$$\begin{aligned} \ln EBIT = \beta_0 + \beta_1 \tau_Diff_{it} + \beta_2 TP_{it} + \beta_3 (\tau_Diff_{it} \times TP_{it}) + wX_{it} \\ + \varphi_i + \rho_t + \varepsilon_{it} \end{aligned} \quad (2.2)$$

Similarly, we will test if tighter thin-capitalization rules also increase the elasticity of reported EBIT to the tax rate difference between host-country and home-country, isolated from the effects of transfer-pricing rules, so for **H3** we have:

$$\begin{aligned} \ln EBIT = \beta_0 + \beta_1 \tau_Diff_{it} + \beta_2 TCP_{it} + \beta_3 (\tau_Diff_{it} \times TCP_{it}) \\ + wX_{it} + \varphi_i + \rho_t + \varepsilon_{it} \end{aligned} \quad (2.3)$$

These last two hypotheses may also be tested together, which leads us to the main model (A) presented above:

$$\begin{aligned} \ln EBIT_{it} = \beta_0 + \beta_1 \tau_Diff_{it} + \beta_2 TP_{it} + \beta_3 (\tau_Diff_{it} \times TP_{it}) \\ + \beta_4 TCP_{it} + \beta_5 (\tau_Diff_{it} \times TCP_{it}) + wX_{it} + \varphi_i + \rho_t \\ + \varepsilon_{it} \end{aligned} \quad (2)$$

Alternatively, we will also test these hypotheses by using the CITR (τ) at the host-country instead of the CITR difference between host and home countries (τ_Diff), following the same steps as previously, with only one change, so the model takes the following form:

$$\begin{aligned} \ln EBIT_{it} = \beta_0 + \beta_1 \tau_{it} + \beta_2 TP_{it} + \beta_3 (\tau_{it} \times TP_{it}) + \beta_4 TCP_{it} \\ + \beta_5 (\tau_{it} \times TCP_{it}) + wX_{it} + \varphi_i + \rho_t + \varepsilon_{it} \end{aligned} \quad (3)$$

4. Results

In this section, we present the main results of our estimation models. The section is presented as follows: first, we present the univariate results, with a brief analysis of the descriptive statistics, and second, the multivariate results, with the main findings related to our hypotheses.

4.1 Univariate Results

Table 5. presents the descriptive statistics of the variables chosen for the development of this study. As introduced in table 4. there are firms in our observation from 24 different countries and 8 different industry-classifications. This results in high standard-deviations for firm-level variables, such as EBIT, Fixed Assets and Cost of Employees. The difference between the maximum amounts verified and the median values, illustrate that well, appointing for differences in firm dimensions and performance. We can also find high variations for both country-level variables GDP and GDPPER CAPITA, with the highest GDPPER CAPITA being almost 94 thousand euros, while the least of it was around 5.45 thousand € per year, both at current prices.

The average corporate income tax rate in the countries where our observations are based in is about 24%, although there is a country that in a given year practised a tax rate of almost 38%, while the lenient country applied a tax rate of only 10%, when compared. This analysis can be further complemented with the one available in Annex 1, where we can see tax rates in charge in EU-28 countries and in Switzerland since 2008 to 2016. The average τ_{Diff} is about 1.30%, although there are countries with greater gaps, so it should be important to log some variables in order to study elasticity effects. In what concerns to the legislation's strictness indicators, we can see that a large part of our sample has strict transfer-pricing legislation during the 2008-2016 period since around 80% of our sample assumes the value 1 for dummy TP. However, we can't advance with the conclusion that increasing Transfer-Pricing legislation resulted in less profit shifting. Finally, regarding thin-capitalization rules, we can observe that almost 58% of the observed firms faced TCP rules that fall into Category 3, while around 31% of them were based in countries where TCP ratio was equal to or below 3:1 and above 1:1. Consequently, about 11% of our sample faced the least strict TCP rules since 2008 to 2016.

Table 5. Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
EBIT	3974.500	406.8653	3201185	-979108.7	28031.58	189162
FA	27379.00	746.4620	28641793	-124904.1	307244.9	189162
CEMP	8331.866	1343.846	3393383.7	-0.461000	41929.93	189162
GDP	444703842.3	148409119.7	3078444496	6917105.47	735740237	189162
GDP _{PCPT}	23.57456	24.72000	93.77000	5.450000	11.77411	189162
τ	0.240765	0.230000	0.379962	0.100000	0.069023	189162
τ_Diff	0.012999	0.020000	0.294962	-0.279962	0.103378	189162
TP	0.821571	1.000	1.000	0.000000	0.382875	189162
CAT. 2	0.312536	0.000000	1.000	0.000000	0.463528	189162
CAT. 3	0.575094	1.000	1.000	0.000000	0.494330	189162
INT	3417.492	2.191955	5892968.2	-471803.95	54924.44	177588

Table 5. summarizes univariate statistics for both firm-level and country-level variables. EBIT is Earnings Before Interests and Taxes, FA is Fixed Assets of a firm, CEMP is the cost of employees a given firm has in a given year and GDP is Gross Domestic Product at current prices and GDP_{PCPT} represents GDP per capita, also at current prices. All these values are represented in thousands of Euros. Next, τ is the combined corporate income tax rate applicable in the host-country of observable firm while τ_Diff is given by subtracting corporate income tax rate in the home-country of parent-firm from the corporate income tax rate in the host-country of the corresponding affiliate; TP is a dummy that takes the value of 1 if transfer-pricing strictness is categorized into 4 or 5 and assumes the value of 0 otherwise, according to Lohse et al. (2012). Cat.2 and Cat.3 are both categoric variables reflecting thin-capitalization rules tightness, where a firm enters into Cat.2 if it is located in a country whose TCP ratio is equal to or below 3:1 and above 1:1; it falls into Category 3 if countries limit the amount of interest deductible either in function of EBITDA and in absolute terms or whose TCP ratio is 1:1. INT refers to intangible assets reported by firms on their accounts.

Additionally, Table 6. shows Pearson's correlation between all variables, thus allowing us to study the relationship between the variables and to detect potential multicollinearity problems. Since Fixed Assets and Cost of Employees are introduced as proxies for capital and labour in the production function, we understand the relatively high and positive relationship between EBIT and FA (0.518) or CEMP (0.366). GDP and GDP_{PCPT} have also a positive correlation with our dependent variable. Surprisingly, corporate tax rate τ appears to be positive correlated with EBIT, which may indicate further problems in our estimations since we expect that higher corporate income rates result in a reduction of reported results by foreign subsidiaries. On the other hand, τ_Diff has a negative correlation either with EBIT, FA or CEMP, which may suggest more significant regressions using that variable. As expected, τ and τ_Diff are strong and positively correlated (0.62). Finally, variables representing both TP and TCP strictness have small correlations with all

the remaining variables. In general, the correlation coefficients have low values suggesting that there are no collinearity issues.

Table 6. Pearson's Correlation Matrix

	EBIT	FA	CEMP	GDP	GDP _{PCPT}	τ	τ_{Diff}	TP	CAT. 2	CAT. 3
EBIT	1.000	-	-	-	-	-	-	-	-	-
FA	0.518	1.000	-	-	-	-	-	-	-	-
CEMP	0.408	0.366	1.000	-	-	-	-	-	-	-
GDP	0.041	0.007	0.067	1.000	-	-	-	-	-	-
GDP _{PCPT}	0.057	0.042	0.105	0.274	1.000	-	-	-	-	-
τ	0.009	0.027	0.043	-0.147	0.551	1.000	-	-	-	-
τ_{Diff}	-0.005	-0.0001	0.021	-0.121	0.330	0.642	1.000	-	-	-
TP	0.017	0.009	0.029	0.196	-0.017	0.063	0.021	1.000	-	-
CAT. 2	-0.0199	0.007	-0.033	-0.204	0.052	0.123	0.043	-0.366	1.000	-
CAT. 3	0.033	0.004	0.056	0.234	-0.062	-0.018	0.013	0.369	-0.784	1.000

4.2 Multivariate Results

In this section, we analyse the results of equations (2) and (3), which are estimated in a panel data analysis with control either for cross-section and period fixed-effects.

Table 7. presents coefficient estimates from estimating our baseline Equation (2). Consistent with our prediction in Hypothesis 1, the results suggest that increasing the corporate income tax rate by 10 percentage points decreases reported results by 7.1%. Three of our four control variables (Fixed Assets, Cost of Employees and GDP) have a positive and significant impact on reported results by foreign subsidiaries. They are both statistically significant either at 10%, 5% and 1% levels. GDP_{PER CAPITA} has a negative sign and its variable isn't statistically significant at any level. These conclusions regarding the control variables are maintained when analysing all columns of Table 7.

In column (2), we add the TP variable to test whether reported results decrease with more rigorous transfer-pricing legislation. As we can see, the introduction of stricter TP rules resulted in a higher elasticity of EBIT to differences in corporate income tax rates between the host-country and the home-country. Both τ_{Diff} and TP are statistically significant at 1% level, although, the interaction term, $\tau_{Diff} * TP$ couldn't prove to be statically significant (t-statistic = 0.897698).

In column (3), we estimate the effect of stricter thin-capitalization rules, by ordering them into 3 categories, isolated from the effects of more severe TP rules. According to the

estimated results, if we move from Category 1 (almost no rules or very lenient rules) to Category 2, the tax rate difference semi-elasticity rises, compared with column (1), for example. However, the conclusion doesn't come up if we move from Category 2 to category 3, which may be due to incorrect variable specifications or due to a sample not illustrative of our problem. Either the interaction terms ($\tau_{Diff} * CAT. 2$ and $\tau_{Diff} * CAT. 3$) and the variables itself (Category 2 and Category 3) aren't statistically significant at 10, 5 or 1% level. The estimated results do not match with the ones found by Buettner et al. (2018) and by Lohse and Riedel (2013) in their additional analysis.

In column (4), we aggregate both effects in order to account for possible substitution effects between the two channels of profit shifting (debt financing and transfer-pricing). Just as in column (3), we couldn't find evidence that confirmed **H3** so we cannot say that stricter legislation regarding interest deductibility resulted in lower profit shifting. On the opposite, we can confirm **H2** by looking at the signs and magnitudes of both TP variable and its interaction term with τ_{Diff} , following the conclusions of Marques & Pinho (2016) and Lohse and Riedel (2013).

Table 7. Stricter TP and TCP legislation and BEPS (using CITR difference)

This table presents regression results on the effectiveness of stricter legislation measures to combat for BEPS in EU for the 2008–2016 period. We use Earnings Before Interests and Taxes as the dependent variable. Independent Variables are described in section 3. We additionally interact the variables representing the combined corporate income tax rate difference with the variables representing the legislation's strictness. The estimation includes firm and period fixed effects. We report t-statistic in parentheses. *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

Variable	EBIT (1)	EBIT (2)	EBIT (3)	EBIT (4)
C	-0.694570 (-0.885678)	-1.413515* (-1.709318)	-0.941566 (-1.069588)	-1.849887** (-1.962196)
τ_Diff	-0.711664*** (-6.653166)	-0.696862*** (-4.920326)	-0.701681*** (-4.194964)	-0.641817*** (-3.376974)
$\tau_Diff*TP$		0.078918 (0.897698)		0.072765 (0.806886)
TP		-0.041450*** (-3.468110)		-0.043478*** (-3.599429)
$\tau_Diff*CAT.2$			0.035514 (0.193131)	-0.003192 (-0.017319)
$\tau_Diff*CAT.3$			-0.032641 (-0.220629)	-0.073523 (-0.494291)
CATEGORY 2			-0.000173 (-0.008897)	-0.001565 (-0.080169)
CATEGORY 3			-0.005607 (-0.393632)	-0.012299 (-0.848163)
FA	0.056349*** (19.11975)	0.056319*** (19.10930)	0.056331*** (19.11215)	0.056287*** (19.09737)
CEMP	0.460811*** (72.89351)	0.460336*** (72.80133)	0.460866*** (72.89185)	0.460414*** (72.80713)
GDP	0.178606*** (4.004424)	0.223107*** (4.701597)	0.195390*** (3.753247)	0.252884*** (4.493033)
GDP _{PCPT}	-0.020795 (-0.435116)	-0.046345 (-0.942466)	-0.042083 (-0.711186)	-0.083493 (-1.345154)
R-squared	0.877423	0.877433	0.877423	0.877435
Adjusted R-squared	0.859844	0.859854	0.859841	0.859852
F-statistic	49.91273	49.91219	49.90206	49.90194
Prob (F-statistic)	0.000000	0.000000	0.000000	0.000000
Total panel (unbalanced) observations	166 371	166 371	166 371	166 371

Table 8. presents coefficients estimates from estimating regression (3), where we use the combined CITR (τ) at the host-country instead of the combined CITR (τ_Diff) difference between host and home countries. We start by estimating the elasticity response of reported EBIT to home country's corporate income tax rate and then estimate the effect of stricter implemented legislation regarding the two main channels of profit shifting.

Column (1) sustains our premises that companies shift income in response to higher tax rates in charge, with the coefficient associated with τ being negative and, in absolute

terms, higher than the coefficient estimated in column (1) of Table 7. The sensitivity of EBIT to the tax rate yields a coefficient of -1.715 with significance at the 1% level. This semi-elasticity means that an increase of one percentage point in the corporate income tax rate is associated with a reduction in the subsidiaries' reported EBIT of, around, 1.72%.

The second regression in Table 8. includes a dummy variable for transfer-pricing and its interaction term with τ . We found that subsidiaries placed in countries where stricter TP legislation has been implemented react less strongly to tax rate variations, so the sensitivity of EBIT to the tax rate is lower for foreign affiliates that face tighter transfer-pricing requirements. If evaluated at the tax elasticity for 2008, the results imply that shifting activities are reduced by around 26% ($=0.624/-2.356$).

Column (3) shows the tax rate sensitivity of reported Earnings Before Interests and Taxes when firms are confronted with changes in thin-capitalization rules. The sign of coefficients associated with the categoric variables and its interaction with τ follow Buettner et al. (2018). However, Category 3 variable isn't statistically significant and its magnitude is lower than the associated with Category 2, contradicting our expectations. This can be justified if the implemented rules that allowed countries to classify into Category 3 were put into practice during a short period or if. These same countries, traditionally, may have already strong and effective legislation regarding interest deductibility. Nevertheless, we can rely that thin-capitalization rules have made its positive impact in reducing international income shifting, especially when moving from Category 1 to Category 2.

The conclusion made for column (2) and column (3) remain the same when estimating regression presented in column (4).

In summary, our estimates indicate that the introduction of stricter transfer-pricing rules have been effective in decreasing international income-shifting made by multinational groups through their foreign subsidiaries. It is also proved that tax rate differences motivate companies to reallocate profits abroad. Thin-capitalization rules are also effective, although we couldn't prove association between declined reported results in function of the three categories of thin-capitalization rules.

Table 8. Stricter TP and TCP legislation and BEPS (using CITR)

This table presents regression results on the effectiveness of stricter legislation measures to combat for BEPS in EU for the 2008–2016 period. We use Earnings Before Interests and Taxes as the dependent variable. Independent Variables are described in section 3. We additionally interact the variables representing the combined corporate income tax rate with the variables representing the legislation's strictness. The estimation includes firm and period fixed effects. We report t-statistic in parentheses. *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

Variable	EBIT (1)	EBIT (2)	EBIT (3)	EBIT (4)
C	1.190741 (1.466926)	1.795803** (2.009627)	0.535457 (0.574078)	1.450730 (1.374051)
τ	-1.715266*** (-11.14209)	-2.355684*** (-10.29228)	-2.097742*** (-6.093840)	-2.663219*** (-6.850600)
τ *TP		0.623949*** (4.452859)		0.648248*** (4.482548)
TP		-0.197584*** (-4.667724)		-0.203956*** (-4.712811)
τ *CAT. 2			1.480987*** (3.047929)	1.399015*** (2.864780)
τ *CAT.3			0.137622 (0.385175)	0.008003 (0.022219)
CATEGORY 2			-0.417833*** (-3.160925)	-0.406626*** (-3.062255)
CATEGORY 3			-0.039659 (-0.447379)	-0.002119 (-0.023757)
FA	0.056631*** (19.22005)	0.056483*** (19.17009)	0.056516*** (19.17971)	0.056381*** (19.13406)
CEMP	0.460791*** (72.92055)	0.460736*** (72.89360)	0.461188*** (72.95877)	0.461166*** (72.94303)
GDP	0.101072** (2.224994)	0.074163 (1.486732)	0.147356*** (2.724755)	0.098721 (1.616477)
GDP _{PCPT}	-0.031568 (-0.660943)	-0.000995 (-0.020046)	-0.065967 (-1.081415)	-0.009646 (-0.147151)
R-squared	0.877490	0.877508	0.877504	0.877522
Adjusted R-squared	0.859921	0.859940	0.859932	0.859952
F-statistic	49.94396	49.94702	49.93933	49.94258
Prob (F-statistic)	0.000000	0.000000	0.000000	0.000000
Total panel (unbalanced) observations	166 371	166 371	166 371	166 371

4.3 Additional Analysis

In the additional analysis, we test if companies with greater value of registered intangible assets could escape easier to transfer-pricing legislation. In fact, profit shifting activities are larger in MNE's with high intellectual property holdings and high R&D (Grubert, 2003) and the level of taxation itself can influence many factors, such as the probability of patent applications (Karkinsky and Riedel, 2012).

We will restrict our sample to companies whose weight of intangible assets on total fixed assets is greater than 20%. Some of our firms haven't any intangible property recorded in their books, so our estimations have now 23 905 unbalanced observations. In subsection 4.2 we confirmed our hypotheses 1 and 2, but we couldn't prove that stricter interests' deductibility rules resulted in ever lesser income-shifting by the introduction of a categoric variable into 3 categories. We will run our regressions either using the CITR (τ) and the CITR difference (τ_Diff). Summing up, we will reestimate equations (2.1), (2.2), (3.1) and (3.2) for companies whose weight of intangible assets on total fixed assets is greater than 20% and compare with the estimations of columns 1-2 of both Table7. and Table8.

Columns (1) and (3) from Table 9 show coefficients associated with the τ and τ_Diff slightly higher than the ones shown by Column (1) of Table 7. and by column (1) of Table 8., respectively. These variables are statistically significant at 1% level.

By comparing with results of previous subsection, we can state that multinational groups with higher shares of intangible assets registered in their accounts can make use of various instruments in order to shift income related to intangible property.

Transfer-pricing methods aim at making sure transactions between related parties are treated as if it they were with independent parties. This difficulty arises with when we're dealing with transaction with intangible property, whose volume of activity has been increasing in Europe. This is confirmed by both Columns (3) and (4) of Table9., when comparing with results from the previous section. Firstly, the introduction of tougher transfer-pricing rules is more effective when battling firms whose weight of intangible assets on total fixed assets isn't greater than 20%. Second, for the firms with relatively higher shares of intangible assets, the difference between those who are based in countries with more severe legislation and those who are not, is substantially higher.

Table 9. Stricter TP and TCP legislation and BEPS for Intangible Assets

This table presents regression results on the effectiveness of stricter transfer-pricing legislation measures to combat BEPS in EU for the 2008–2016 period, for firms whose intangible assets represent more than 20% of their registered fixed assets. We use Earnings Before Interests and Taxes as the dependent variable. Independent Variables are described in section 3. We additionally interact the variables representing both the combined corporate income tax rate difference and combined corporate income tax rate with the variables representing the legislation's strictness. The estimation includes firm and period fixed effects. We report t-statistic in parentheses. *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

Variable	EBIT (1)	EBIT (2)	EBIT (3)	EBIT (4)
C	2.470176 (1.176525)	3.206439 (1.292614)	1.475263 (0.709930)	-0.059745 (-0.026189)
τ	-1.764787*** (-4.184500)	-3.100801*** (-4.050793)		
τ_Diff			-0.783564*** (-2.734528)	-0.990065** (-2.460856)
$\tau*TP$		1.323293*** (2.644401)		
$\tau_Diff*TP$				0.399666 (1.584514)
TP		-0.453411*** (-2.867461)		-0.097423*** (-2.779280)
FA	0.021327* (1.931637)	0.020659* (1.870928)	0.020278* (1.836783)	0.020196* (1.829003)
CEMP	0.437364*** (22.09461)	0.436433*** (22.03987)	0.439073*** (22.18239)	0.436971*** (22.06153)
GDP	-0.010937 (-0.091527)	-0.028195 (-0.205241)	0.002973 (0.024892)	0.096404 (0.730736)
GDP _{PCPT}	0.413502*** (2.653484)	0.426556*** (2.710942)	0.501304*** (3.267992)	0.465107*** (2.985093)
R-squared	0.903516	0.903564	0.903464	0.903504
Adjusted R-squared	0.873694	0.873742	0.873625	0.873665
F-statistic	30.29680	30.29919	30.27840	30.27855
Prob (F-statistic)	0.000000	0.000000	0.000000	0.000000
Total panel (unbalanced) observations	23 905	23 905	23 905	23 905

5. Conclusions

In this study, we investigate whether international income-shifting has been contracted thanks to the implementation of harsher legislation regarding the main channels for profit shifting, transfer-pricing and intra-debt financing. The main purposes are: to investigate how affiliates of multinational groups react to tax rate differences; investigate if either stricter transfer-pricing specifications and thin-capitalization rules led to a reduction of reported results by subsidiaries and, finally, to see if companies with higher intangible property avoid the stricter rules implemented.

In order to investigate what was mentioned above, we use a sample constituted by foreign affiliates of parent companies, both located in EU-28 plus Switzerland, over the period between 2008 and 2016. Our final sample has 21 018 foreign affiliates, distributed by different industries, according to a NACE code, and our data is organized in a panel data structure. Our results were presented after conducting a panel-data analysis with control for both cross-section and time fixed-effects, with EBIT being the dependent variable for all the regressions.

Before we run our regressions, we had to classify transfer-pricing strictness in all countries, according to Lohse et. al, (2012) and then create a dummy variable TP that takes the value of 1 if a country was classified into categories 4 or 5 (the strictest categories), and takes the value of 0 otherwise. We also construct a categoric variable, representing the strictness of thin-capitalization legislation, according to the existing rules in each country in order to classify them into three categories, each representing even more tightness.

We start to show that firms reallocate income in response to variations in tax rate differences between the host-country and the home-country. We then follow Marques et, al (2016) and Lohse and Riedel, (2013) by proving the effectiveness of increasing the tightness of transfer-pricing rules in the reduction of reported results by affiliates. However, we couldn't find stronger evidence that the implemented thin-capitalization rules had impact on combating BEPS. We then repeated the study by using the corporate income tax rate in the host-country as the motivation for profit shifting (instead of corporate income tax rate difference between the host-country and the home-country). Once again, we succeeded to show that firms located in countries with tighter transfer-pricing rules have decreased

income-shifting compared to those who are not so we can state that transfer-pricing measures implemented by OECD have been successful. After that, our estimations suggested that thin-capitalization rules resulted in less reported results by affiliates, although we couldn't prove that the reduction behaves as a sliding scale, when moving from the three categories.

In addition, we wanted to know if companies with higher parts of intangible assets could escape easier to transfer-pricing specifications. We, therefore, rerun our regressions only for firms whose weight of intangible assets on total fixed assets was greater than 20%, so we could compare with the magnitude of signs from the previous regressions. As expected, firms with higher shares of intangible property respond strongly to tax rate variations and that tighter transfer-pricing rules lead to a drop of reported EBIT, but in a smaller dimension, when compared to firms with low or no intangible assets reported in their accounts.

Our research adds new insights to the existing literature by exploring the effectiveness of implemented politics for a more recent period (2008-2016), giving lights for policymakers and advisors when studying and comprehending the evolution of BEPS. We also contribute by joining the two main channels of profit shifting into our study (transfer-pricing and intra-debt financing) presenting new perspectives for measuring and quantifying the strictness of rules in the context of the European Union.

This investigation has some limitations. First, the firms belonging to our sample aren't equally distributed among countries, for example, jurisdictions like Ireland and Switzerland, sometimes criticized by their fiscal politics, are not really representative in our sample. Second, it is always difficult to make comparisons with so many countries involved and it is complicated to interpret each fiscal code and compare them because every country has each specifications and rules are not harmonized. Third, and in consequence, representing TP and TCP tightness is always subject to interpretation and not that quantifiable sometimes. Fourth, there are book-tax differences that can skew some studies. Moreover, it would be interesting in future research to examine only parent-companies belonging to a specific country and that have foreign affiliates in other countries, but also the introduction of other ways of evaluating existing legislation or even the conduction of Difference-in-Differences analysis for firms with different shares of intangible assets.

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Annex 1. Combined Corporate Income Tax Rate in EU-28 and in Switzerland for the period 2008-

2016

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	25,0	25,0	25,0	25,0	25,0	25,0	25,0	25,0	25,0
Belgium	33,0	33,0	33,0	33,0	33,0	33,0	33,0	33,0	33,0
Bulgaria	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
Switzerland	8,5	8,5	8,5	8,5	8,5	8,5	8,5	8,5	8,5
Cyprus	10,0	10,0	10,0	10,0	10,0	10,0	12,5	12,5	12,5
Czech Republic	21,0	20,0	19,0	19,0	19,0	19,0	19,0	19,0	19,0
Germany	15,8	15,8	15,8	15,8	15,8	15,8	15,8	15,8	15,8
Denmark	25,0	25,0	25,0	25,0	25,0	25,0	24,5	23,5	22,0
Estonia	21,0	21,0	21,0	21,0	21,0	21,0	21,0	20,0	20,0
Greece	25,0	25,0	24,0	20,0	20,0	26,0	26,0	29,0	29,0
Spain	30,0	30,0	30,0	30,0	30,0	30,0	30,0	28,0	25,0
Finland	26,0	26,0	26,0	26,0	24,5	24,5	20,0	20,0	20,0
France	34,4	34,4	34,4	36,1	36,1	38,0	38,0	38,0	34,4
Croatia	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0
Hungary	20,0	20,0	19,0	19,0	19,0	19,0	19,0	19,0	19,0
Ireland	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
Italy	27,5	27,5	27,5	27,5	27,5	27,5	27,5	27,5	27,5
Lithuania	15,0	20,0	15,0	15,0	15,0	15,0	15,0	15,0	15,0
Luxembourg	22,9	21,8	21,8	22,1	22,1	22,5	22,5	22,5	22,5
Latvia	15,0	15,0	15,0	15,0	15,0	15,0	15,0	15,0	15,0
Malta	35,0	35,0	35,0	35,0	35,0	35,0	35,0	35,0	35,0
Netherlands	25,5	25,5	25,5	25,0	25,0	25,0	25,0	25,0	25,0
Poland	19,0	19,0	19,0	19,0	19,0	19,0	19,0	19,0	19,0
Portugal	25,0	25,0	25,0	27,0	30,0	30,0	30,0	28,0	28,0
Romania	16,0	16,0	16,0	16,0	16,0	16,0	16,0	16,0	16,0
Sweden	28,0	26,3	26,3	26,3	26,3	22,0	22,0	22,0	22,0
Slovenia	22,0	21,0	20,0	20,0	18,0	17,0	17,0	17,0	17,0
Slovak Republic	19,0	19,0	19,0	19,0	19,0	23,0	22,0	22,0	22,0
Great-Britain	28,0	28,0	28,0	26,0	24,0	23,0	21,0	20,0	20,0

Annex 2. Transfer-Pricing classification according to Lohse et al. (2012) in EU-28 and in Switzerland (2008-2016)

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	2	2	4	4	4	4	4	4	4
Belgium	2	2	4	4	4	4	4	4	4
Bulgaria	1	1	1	1	1	3	3	3	4
Switzerland	2	2	2	2	2	2	2	2	2
Cyprus	0	0	0	0	0	0	0	0	0
Czech Republic	2	2	2	2	2	2	2	3	3
Germany	4	4	4	4	4	4	4	5	5
Denmark	4	4	4	4	4	4	4	4	4
Estonia	0	3	4	4	4	4	4	4	4
Greece	3	4	4	4	4	4	4	4	4
Spain	3	4	4	4	4	4	4	5	5
Finland	3	4	4	4	4	4	4	4	4
France	2	2	2	4	4	4	4	5	5
Croatia	1	1	4	4	4	4	4	4	4
Hungary	4	4	4	4	4	4	5	5	5
Ireland	1	1	1	2	2	2	2	2	3
Italy	4	4	4	4	4	4	4	4	4
Lithuania	2	3	4	4	4	4	4	4	4
Luxembourg	2	2	2	2	2	2	2	3	3
Latvia	1	1	1	1	1	1	1	1	1
Malta	2	2	2	2	2	4	4	4	4
Netherlands	4	4	4	4	4	4	4	4	4
Poland	4	4	4	4	4	4	4	4	4
Portugal	4	4	4	4	4	4	4	4	4
Romania	4	4	4	4	4	4	4	4	4
Sweden	4	4	4	4	4	4	4	4	4
Slovenia	2	4	4	4	4	4	4	5	5
Slovak Republic	4	4	4	4	4	4	4	4	4
Great-Britain	3	3	3	3	3	3	3	3	4

Annex 3. Thin-Capitalization rules Classification in 28-EU and in Switzerland (2008-2016)

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1
Belgium	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1
Bulgaria	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1
Switzerland	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-
Czech Republic	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1
Germany	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA
Denmark	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1
Estonia	-	-	-	-	-	-	-	-	-
Greece	-	-	3:1	3:1	3:1	3:1	EBITDA	EBITDA	EBITDA
Spain	3:1	3:1	3:1	3:1	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA
Finland	-	-	-	-	-	-	EBITDA	EBITDA	EBITDA
France	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA	EBITDA
Croatia	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1
Hungary	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1
Ireland	-	-	-	-	-	-	-	-	-
Italy	4:1	EBITDA							
Lithuania	-	-	-	-	-	-	-	-	-
Luxembourg	85:15	85:15	85:15	85:15	85:15	85:15	85:15	85:15	85:15
Latvia	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1
Malta	-	-	-	-	-	-	-	-	-
Netherlands	4:1	4:1	4:1	4:1	4:1	2:1	2:1	2:1	2:1
Poland	3:1	3:1	3:1	3:1	3:1	3:1	3:1	1:1	1:1
Portugal	2:1	2:1	2:1	2:1	2:1	EBITDA	EBITDA	EBITDA	EBITDA
Romania	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1
Sweden	-	Interest Income							
Slovenia	6:1	6:1	6:1	5:1	4:1	4:1	4:1	4:1	4:1
Slovak Republic	-	-	-	-	-	-	-	EBITDA	EBITDA
Great-Britain	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1

Annex 4. Industry Classification Distribution

Industry Classification (NACE Code)	Number of Affiliates
C. Manufacturing	6444
D. Electricity, gas, steam and air conditioning supply	214
E. Water supply; sewerage, waste management and remediation activities	195
F. Construction	733
G. Wholesale and retail trade; repair of motor vehicles and motorcycles	7345
H. Transportation and storage	1255
I. Accommodation and food service activities	278
J. Information and communication	1205
M. Professional, scientific and technical activities	1715
N. Administrative and support service activities	1022
O. Public administration and defence; compulsory social security	7
P. Education	43
Q. Human health and social work activities	358
R. Arts, entertainment and recreation	89
S. Other service activities	115
Total	21 018

Annex 5. GDP, at current prices¹⁷, in EU-28 and in Switzerland for 2008-2016

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	353013,86	324574,15	315207,57	340041,40	322318,38	333210,36	339782,05	297752,77	304856,82
Belgium	425481,20	393013,99	388927,84	415672,12	391957,36	403604,72	408129,44	354622,80	364724,80
Bulgaria	44637,31	42082,78	40706,73	45288,14	42434,94	43200,99	43623,33	39121,32	41532,37
Switzerland	454800,36	439208,34	469548,91	551785,74	525914,66	533442,02	545316,71	529385,67	521677,49
Cyprus	22839,52	21041,70	20560,26	21632,87	19713,72	18660,34	17961,83	15334,09	15721,71
Czech Republic	193383,76	167229,70	166878,80	179791,75	163256,26	162241,66	159799,20	145600,87	152354,37
Germany	3078444,50	2772296,00	2748440,92	2963843,18	2789987,16	2907387,42	2991631,59	2630691,37	2712973,23
Denmark	289897,76	260554,40	258987,62	271328,75	257546,66	266203,68	271429,87	234808,82	239407,51
Estonia	19848,81	15939,86	15676,97	18275,27	18141,19	19475,86	20165,08	17586,95	18205,53
Greece	290800,00	267658,58	240782,80	226997,37	193403,25	185841,25	182260,81	152390,19	150315,02
Spain	1341368,25	1215898,82	1151479,42	1173696,68	1051775,57	1055142,85	1058757,67	933465,22	965162,84
Finland	232782,63	203987,34	199310,60	215857,54	202091,14	209176,27	209619,37	181165,19	186188,63
France	2394244,24	2182001,63	2125506,36	2256904,22	2112830,67	2177978,04	2193135,78	1900151,49	1923011,82
Croatia	57823,05	50857,64	48122,18	49197,63	44530,94	45003,99	44313,47	38518,44	40048,36
Hungary	129622,06	105922,93	105303,83	111040,30	100654,63	104762,96	107742,02	95762,46	98147,55
Ireland	225626,70	191668,82	178520,14	188523,24	177580,54	185475,03	198461,88	226484,52	237784,44
Italy	1961356,60	1772352,83	1709228,97	1795400,59	1631821,74	1650670,59	1654547,02	1428396,57	1450475,40
Lithuania	39256,64	30367,61	29856,81	34291,91	33732,07	35963,41	37306,03	32348,61	33366,56
Luxembourg	45819,14	41665,93	42799,91	47327,99	44619,50	47834,66	51001,55	45032,79	45737,36
Latvia	29203,01	21226,00	19108,55	22261,02	22137,35	23440,84	24094,65	21020,57	21508,10
Malta	7364,86	6917,11	7030,62	7499,05	7250,19	7860,27	8638,27	8240,58	8798,99
Netherlands	768082,56	695857,25	672725,99	704941,23	652585,06	671489,80	676383,96	590726,41	606302,77
Poland	437943,01	356712,51	385528,32	417110,57	393907,05	406168,37	419208,75	372014,21	367731,81
Portugal	214951,29	197698,76	191672,46	193158,32	170334,98	175158,13	176570,87	155412,79	160061,13
Romania	175241,81	140003,05	134046,79	145417,74	135142,30	148409,12	153397,93	138650,21	146504,40
Sweden	421657,93	348488,80	392812,43	444146,55	428167,86	448400,04	441229,68	388039,03	401321,99
Slovakia	82306,42	72142,55	71987,54	77439,39	73539,79	76299,45	77622,83	68191,87	70027,05
Slovenia	45605,97	40752,85	38618,35	40455,05	36491,06	37279,71	38373,75	33567,32	34876,46
Great-Britain	2371421,87	1932676,80	1963487,03	2066259,88	2095715,90	2122767,68	2324364,13	2248791,31	2067885,81

¹⁷ The values shown are in millions of euros.

Annex 6. GDP_{PER CAPITA}, at current prices¹⁸, in EU-28 and in Switzerland for 2008-2016

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	42,42	38,90	37,69	40,52	38,23	39,29	39,76	34,45	34,89
Belgium	39,73	36,40	35,70	37,63	35,22	36,09	36,41	31,45	32,19
Bulgaria	5,96	5,65	5,50	6,16	5,81	5,95	6,04	5,45	5,83
Switzerland	59,47	56,72	60,01	69,74	65,77	65,94	66,59	63,92	62,30
Cyprus	29,03	26,04	24,79	25,42	22,82	21,65	21,07	18,09	18,36
Czech Republic	18,62	16,01	15,93	17,13	15,53	15,43	15,18	13,81	14,42
Germany	37,49	33,85	33,61	36,92	34,69	36,05	36,94	32,20	32,94
Denmark	52,77	47,18	46,68	48,71	46,06	47,41	48,10	41,31	41,80
Estonia	14,84	11,94	11,77	13,77	13,72	14,78	15,34	13,37	13,84
Greece	26,25	24,10	21,65	20,44	17,51	16,95	16,73	14,08	13,95
Spain	29,19	26,23	24,72	25,11	22,49	22,63	22,78	20,10	20,76
Finland	43,81	38,21	37,16	40,06	37,33	38,46	38,38	33,06	33,88
France	37,19	33,72	32,69	34,54	32,18	33,00	33,07	28,53	28,76
Croatia	13,04	11,48	10,89	11,49	10,43	10,58	10,46	9,16	9,59
Hungary	12,91	10,57	10,53	11,14	10,15	10,59	10,92	9,73	10,00
Ireland	50,26	42,26	39,15	41,16	38,61	40,11	42,61	48,17	50,00
Italy	33,34	29,99	28,83	30,24	27,41	27,40	27,22	23,52	23,92
Lithuania	12,27	9,60	9,64	11,32	11,29	12,16	12,72	11,14	11,63
Luxembourg	93,77	83,70	84,43	91,31	84,04	88,03	91,68	79,06	78,58
Latvia	13,41	9,91	9,11	10,81	10,88	11,65	12,08	10,63	10,98
Malta	17,99	16,77	16,96	18,01	17,26	18,45	19,88	18,52	19,32
Netherlands	46,70	42,10	40,49	42,23	38,95	39,96	40,11	34,87	35,60
Poland	11,49	9,35	10,13	10,96	10,35	10,68	11,03	9,79	9,68
Portugal	20,36	18,71	18,13	18,30	16,20	16,75	16,98	15,00	15,50
Romania	8,53	6,87	6,62	7,22	6,74	7,43	7,70	7,00	7,44
Sweden	45,73	37,48	41,89	47,00	44,98	46,71	45,51	39,60	40,44
Slovak	15,30	13,39	13,35	14,34	13,60	14,09	14,33	12,57	12,89
Slovenia	22,56	19,98	18,85	19,71	17,74	18,10	18,61	16,27	16,89
Great-Britain	38,37	31,03	31,28	32,66	32,90	33,10	35,97	34,53	31,52

¹⁸ The values shown are in thousands of euros.

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