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BEFIT - Formulary Apportionment in the European Union

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Abstract

Markéta Mlčúchová: **BEFIT - Formulary Apportionment in the European Union**

This paper seeks to contribute to the current debate on EU wide corporate taxation, steered by the impending BEFIT Proposal. The objective of this paper is to verify whether the inclusion of intangible assets will enhance the ability of the current proposals for Formulary Apportionment (FA) to explain variability in profitability. The research question addressed is "What is the explanatory power of the FA, for factors such as tangible assets, intangible assets, labour and sales by destination, to describe the variability in the profitability of companies active within the EU internal market?". The research reveals that the inclusion of intangible assets fails to enhance the explanatory power of the FA and that factoring in intangible assets does not appear to have a statistically significant effect in the model.

Key words

Formulary Apportionment, BEFIT, Separate Accounting, EU corporate taxation

JEL: F23, H25, K34

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1 Introduction

This paper focuses on Formulary Apportionment (FA) to be used within the European Union (EU). The core concept of FA is that the consolidated profits of multinational corporations (MNCs) should be distributed across the EU Member States (MS), through a quantitative allocation mechanism. Traditionally, countries with subnational FA systems have relied on a combination of factors, based on immaterial sources, such as tangible assets, labour and third-party sales (Matheson et al., 2021). Intangibles and financial assets are generally excluded from the FA methodology due to their mobile nature and the risk of circumvention of the system (Roggeman et al., 2012; Mintz, 2008).

In this paper we respond to the publication: Communication from the European Commission (EC), which indicates a proposal for Business in Europe: Framework for Income Taxation (BEFIT Proposal). It is intended that it will be introduced in 2023 and will replace the pending Proposal for a Council Directive on a Common Consolidated Corporate Tax Base (CCCTB Proposal). As indicated, the BEFIT Proposal will be based on the key features of the CCCTB Proposal, such as a single corporate tax rulebook and FA.

Reflecting upon the announced BEFIT Proposal, in this paper we build on the theoretical conclusions reached by Martins and Taborda (2022), that discuss the recognition of intangible assets in the BEFIT FA. They concluded that intangible assets should, in principle, be included (ibid.). Based on the hypothesized significance of intangible assets in value creation, the main aim of this paper is to carry out an empirical analysis of the explanatory power of the FA methodology to explain the variability in profitability of companies who are active within the EU internal market. Based on these empirical results we seek to devise a suitable FA, thus making a further contribution to the discussion of whether intangible assets are a factor that is relevant and should be included in the upcoming BEFIT FA. To fulfil the main aim of the paper the following research question is addressed “What is the explanatory power of the FA, for factors such as tangible assets, intangible assets, labour and sales by destination, to describe the variability in the profitability of companies active within the EU internal market?”.

The structure of this paper is as follows: Section 2: literature review that outlines the status quo and anchors the theoretical framework of the subsequent empirical analysis; Section 3: description of the methodology applied; Section 4: presentation of the results; Section 5: discussion of results along with a list of the contributions and practical implications; Section 6: presentation of the conclusions.

2 Literature Review

Formulary Apportionment

The method of FA is a method using a formula, an "apportionment mechanism", to distribute the consolidated corporate tax base of an MNC across the tax jurisdictions where the MNC performs economic activity. The consolidated corporate tax base is distributed according to various selected variables, factors, that reflect the value creation of the MCN, hence explaining the variability in profitability (Mayer, 2009). Currently, this method is mainly used in federal economies, for example, in the United States of America (USA), Canada, Germany and Switzerland.

The first attempt by the EC to implement FA within the EU internal market was the CCCTB Proposal, based on a single set of rules to calculate the taxable profits of an MNC within the EU. Subsequently these taxable profits would be shared between the EU MS through the FA mechanism (CCCTB FA). The CCCTB Proposal has not yet been approved by the Council of the EU. Moreover, the EC has indicated that the pending CCCTB Proposal will be withdrawn and replaced by a new framework for the taxation of income of businesses in Europe (BEFIT). As indicated, BEFIT will be based on the key features of the CCCTB Proposal that preceded it. Firstly, we anchor the theoretical framework before any subsequent empirical analysis. Table 1 shows a comparison of the different forms of FA used in various federal economies and that within the pending, but expected to be withdrawn, CCCTB Proposal.

Table 1 Comparison of different forms of FA

	FA	Industry Specific FA	Theoretical Classification
The USA	Tangible fixed assets, Sales by destination, Cost of employees.	Yes	Supply - Demand
Canada	Cost of employees, Sales by destination.	Yes	Supply - Demand
Switzerland	Separate accounting results, Capital/cost of employees or sales by destination.	Yes	Supply
Germany	Cost of employees.	No	Supply
CCCTB Proposal	Tangible fixed assets, Sales by destination, Cost of employees, Number of employees.	No	Supply - Demand

Source: Own elaboration based on Mayer (2009)

The Theoretical Framework

The aim of this section is to anchor the theoretical framework and provide definitions of the factors further applied in the empirical analysis. As stated earlier, the core concept of the FA is a formula that attributes income to the place that the value was created. Hence, the FA includes various factors, which are hypothesized to create value; and the FA is expected to explain the variability in profitability. Taking into account the theoretical conclusions of Martins and Taborda (2022), the suggested composition of the BEFIT FA, and the implications of current digitalized context, in addition to the traditional factors used to describe value creation, we studied the effect of the extension of the CCCTB FA with the factor, intangible assets. It is hypothesized that these four are the essential profit-generating factors. The FA, as considered in this paper, is described by the following equitation.

$$Profit\ before\ tax_x^{FA} = Consolidated\ Tax\ Base_{group} \times \left[\frac{1}{4}\frac{Sales\ by\ Destination_x}{Sales\ by\ Destination_{group}} + \frac{1}{4}\left(\frac{1}{2}\frac{Cost\ of\ Employees_x}{Cost\ of\ Employees_{group}} + \frac{1}{2}\frac{Number\ of\ Employees_x}{Number\ of\ Employees_{group}}\right) + \frac{1}{4}\frac{Tangible\ Assets_x}{Tangible\ Assets_{group}} + \frac{1}{4}\frac{Intangible\ Assets_x}{Intangible\ Assets_{group}}\right] \quad (1)$$

Further, we anchor the definition of the factors within the FA and subsequently apply them in the empirical analysis. The factors, sales by destination, labour and tangible assets are defined in accordance with the CCCTB Proposal. Additionally, we provide a definition for the additional factor, intangible assets.

Firstly, “labour factor”, according to articles 32 and 33 of the CCCTB Proposal, is calculated from the total amount of the payroll and number of employees. To reflect differences in wage levels across the EU MS and allow for a fairer distribution of the consolidated tax base, the labour factor is divided into two components, payroll and the number of employees. Considering the profit shifting and tax base erosion strategies pursued by MNCs, Matheson et al. (2021) stated that payroll usually involves third-party transactions that increase robustness to manipulation of the labour factor. On the other hand, the authors argued that headcount is independent of wage levels but may be easier to manipulate for tax reporting purposes, since nominal positions can be created without any significant associated labour costs (ibid.). As did Krchnivá and Nerudová (2018 and 2015), Krchnivá (2015), Roggeman et al. (2012), Hines (2008), we calculate number and cost of employees, as a proxy variable, extracted from balance sheets.

Secondly, the “sales by destination” factor, according to article 37 of the CCCTB Proposal, the proceeds of all sales of goods and supplies of services after discounts and returns, excluding value added tax, and other taxes and duties. In the following empirical analysis, we, as did Krchnivá and Nerudová (2018 and 2015), Krchnivá (2015), Roggeman et al. (2012), Hines (2008), consider operating revenue turnover to be a proxy for the factor, sales by destination.

Thirdly, the factor “tangible assets”, according to article 34 of the CCCTB Proposal, is defined as the average value of all tangible fixed assets owned, rented or leased by the MNC. Matheson et al. (2021) claimed that even though the value of tangible assets is straightforward to calculate, it is however vulnerable to manipulation, particularly in accounting systems that give some leeway on the amount of depreciation. As did Krchnivá and Nerudová (2018 and 2015), Krchnivá (2015), Roggeman et al. (2012), Hines (2008), we calculate fixed tangible assets, as a proxy variable, extracted from balance sheets.

In addition, based on the theoretical conclusions of Martins and Taborda (2022), and the suggested inclusion of intangible assets in the BEFIT FA, we extend the CCCTB FA with an additional factor, “intangible assets”. Intangible were originally excluded from the CCCTB FA due to their mobile nature and the risk of circumvention of the system. For example, Roggeman et al. (2012) and Mintz (2008), when addressing the question of the inclusion of intangible assets, financial assets and assets that are leased by the company, concluded that, given the mobility of such factors, it is appropriate to omit them from the FA. In the same vein, the main concern regarding the inclusion of intangibles in the FA, according to Martins and Taborda (2022), is related to the fact that the location of the intellectual property can easily be manipulated and may not necessarily accurately represent the location of value creation. Matheson et al. (2021) agreed that the possibility of manipulation of intangible assets has excluded them from consideration as a factor suitable for use within the FA. The authors further claimed that as intangible assets are highly mobile, they are often employed by MNCs in their tax avoidance activities (ibid.).

Nevertheless, according to Martins and Taborda (2022), ignoring intangible assets in the FA could weaken the relationship between the FA and the growing relevance of intangibles in modern economies. The literature agrees that intangible assets are an important factor in the creation of value and represent an important and growing component of total capital stock (Corrado, Sichel and Hulten, 2009). Further, Martins and Taborda (2022) assume that intangible assets are the main source of competitiveness.

As stated earlier in the text, we build on the theoretical conclusions reached by Martins and Taborda (2022) who concluded that intangible assets should, in principle, be included in the FA (ibid.). The authors further considered that there are four categories of intangible assets and concluded that only intangible assets developed internally by group members, that meet the accounting recognition criteria, and intangible assets acquired from third (independent) parties should be reflected in the FA (ibid.). Due to database limitations, in the empirical analyses we uniformly employ tangible fixed assets, as did Roggeman et al. (2012). The proxy variable for intangible assets is extracted from the balance sheets, as was the proxy variable for tangible assets.

3 Methods

To analyse the ability of the FA to explain variability in profitability, we used a regression analysis. The estimation method used was a traditional Ordinary Least Squares regression (OLS), this should avoid future issues of interpretation and allow the widespread use of the data by other professionals. Firstly, we employed the Stepwise regression method as a step-by-step iterative construction of a regression model that involved the selection of independent variables to be used in the final model. Secondly, additional models were computed to cover all the theoretical concepts used within the FA. We followed the approach used by Krchnivá and Nerudová (2018 and 2015), Krchnivá (2015), Roggeman *et al.* (2012), and Hines (2008). The rationale for the selection of the chosen research methods was also based on papers published by Solilová and Nerudová (2018), Nerudová and Solilová (2016 and 2015) and Devereux and Loretz (2008).

Cross sectional microeconomic data, in particular information relating to profit before tax, operating revenue turnover, cost of employees, number of employees, tangible fixed assets and intangible fixed assets was obtained from the Orbis database, a global company database, produced by Bureau van Dijk. The data was exported from the database, software version 129.00, update number 182. The empirical analysis was performed using IBM SPSS Statistics software.

The observed subjects were identified in line with the selection criteria outlined in the CCCTB Proposal. The search strategy consisted of the following steps. Firstly, observed subjects are active companies operating in the EU internal market. In addition, only companies with a known pre-tax profit for 2018, the most up to date data available in the Orbis database, were selected. Moreover, similarly to Roggeman *et al.* (2012) we did not apply the consolidated balance statements as they do not link the profit of an entity with the factors used in the FA. It is hypothesized that the unconsolidated statements of a company that belongs to a consolidated group could be distorted by profit shifting.

Contrary to the article 2(c) of the CCCTB Proposal, we did not apply the qualifying threshold of 750 million EUR total consolidated revenue, for an MNC to fall within the scope. We do not aim to investigate the implications of the CCCTB Proposal, as they have already been addressed by a large volume of literature[1] and the CCCTB Proposal is expected to be withdrawn. The aim of this paper is to empirically test the ability of the FA to explain the variability in profitability of companies active within the EU internal market. Hence, the objective was to consider companies of different sizes and identify the factors for value creation and their explanatory powers. The preliminary data, collected through the application of the above criteria, generated a data set that included the required information for 43,625 companies.

The obtained data set contained missing or incorrect values, hence, in the next step, companies whose data contained incomplete, incorrect, or irrelevant information were removed from the data set. Only companies with information on all the factors required for the FA were selected. In contrary to, for instance Krchnivá and Nerudová (2018 and 2015), Krchnivá (2015), and Hines (2008), we did not exclude companies with a negative profit before tax. The above-mentioned authors examined the implications of the CCCTB FA on profit distribution. They built upon the theoretical hypothesis, that corporate income tax is dependent on having a financial surplus that can subsequently be distributed via the FA. In this paper, as did Roggeman *et al.* (2012), we retained companies with a negative profit before tax within the data set to enhance the financial interpretation of the empirical analysis. This sequential process of cleaning the data set resulted in data on a total number of 7,122 companies, containing complete information on the dependent and independent variables.

Following further examination of the data set, information sets that had the potential to skew the results, along with outliers were removed from the total data set to ensure consistent results. Similar to Roggeman *et al*. (2012), extreme values below the 1st and above the 99th percentiles were dropped. As a result, we were left with data for a total of 6,732 companies available for use in the empirical analysis.

Based on the previously described theoretical framework, the dependent variable in the regression analysis was profit before tax (pbt) and the explanatory variables (regressors) are the traditional factors used in the FA, that is, operating revenue turnover (*ort*), cost of employees (*coe*), number of employees (*noe*), tangible fixed assets (*tfa*) and intangible fixed assets (*ifa*). To obtain the best

[1] For example, by Nerudová and Solilová (2015), Solilová and Nerudová (2018).

possible estimates, the classical assumptions for a simple linear regression, should be met. The formal model specification, is shown below:

$$pbt_i^{FA} = \beta_0 + \beta_1 ort_i + \beta_2 coe_i + \beta_3 noe_i + \beta_4 tfa_i + \beta_5 ifa_i + \epsilon_i \quad (2)$$

the variables used are defined as follows (all related to company *i)*

pbt; profit before tax

ort; operating revenue turnover

coe; cost of employees

noe; number of employees

tfa; tangible fixed assets

ifa; intangible fixed assets

ε; error

i; is the company number

Before any elaboration of the results of the empirical analysis, Table 2 below, provides a list of the descriptive statistics related to the dependent and independent variables. The data is in thousands of EUR, with the exception of the number of employees.

Table 2 Descriptive statistics

	Average	Min.	Max.	Mean	Std. Deviation
pbt	2,045.14	-15,281.70	105,036.25	2,045.14	7,038.01
ort	35,702.74	30.65	1,167,062.01	35,702.74	81,705.82
coe	6,151.47	11.36	188,255.73	6,151.47	13,570.20
noe	126.64	1.00	3,939.00	126.64	287.60
tfa	4,874.70	0.00	203,901.09	4,874.70	15,699.51
ifa	1,503.73	0.00	130,591.81	1503.73	8,038.87

Source: Authors' own calculations

4 Results

In this paper we examine the explanatory power of the FA to explain the variability in profitability using the example of a sample of companies active within the EU internal market. We expect all the individual factors make a positive and significant contribution to the generation of profit and we assume we will be constrained due to multicollinearity. Therefore, first we analysed the correlations between our predictors and constructs for potential problems with multicollinearity. Table 3 shows the plot of the correlation matrix of all variables.

Table 3 Correlation analysis

Pearson correlation	*pbt*	*ort*	*coe*	*noe*	*tfa*	*ifa*
pbt	1					
ort	0.448*	1				
coe	0.397*	0.647*	1			
noe	0.288*	0.555*	0.789*	1		
tfa	0.222*	0.377*	0.359*	0.377*	1	
ifa	0.160*	0.272*	0.320*	0.264*	0.159*	1

** Correlation is significant at a level of 0.01 (2-tailed), $*$ p < 0.01
Source: Authors' own calculations

As expected, all the variables correlate both positively and significantly, however, none of the coefficients of correlation is above the suggested threshold of $r = 0.800$. The highest partial correlation, $r = 0.789$ was, as expected, found between the number of employees and the cost of employees. Furthermore, the second highest correlation was identified between the cost of employees and operating revenue turnover, $r = 0.647$. Based on the correlation analysis, we do not face an issue with multicollinearity, however, to ensure the interpretation of the results does not contain any bias, following the regression analysis, we also analysed the variance inflation factor (VIF) for each regression model to measure multicollinearity in the set of multiple regression variables (for the results see Table 5).

As stated earlier, in this paper, we analyse the extent to which the factors in the FA represent profit generating activities. We use regression techniques to analyse the relationship between the profit before tax (*pbt*) and the other factors used in the FA (*ort, coe, noe, tfa* and *ifa*). Firstly, the explanatory power of the FA under consideration was analysed, based on an examination of the adjusted coefficients of determination (adjusted R^2) of the proposed multivariate regression models. All the proposed regression models were tested with an F-test to verify their statistical significance. All of the regression models used proved to be statistically significant to a 1 per cent significance level, unless otherwise stated.

The Table 4 reveals the results of the regression analysis. We report the standardized regression coefficients for the independent regressor and unstandardized coefficients for the constants, standard errors, number of observations and the R^2 values as well as the adjusted R^2 values[2]. The histogram of standardized regression residuals and the partial regression plots are shown in Annex A.

[2] In addition, all the adjusted coefficients of determination obtained were tested for statistical significance. They were all statistically significant at the 1 per cent significance level, unless otherwise stated.

Table 4 Regression analysis

	(1)	(2)	(3)	(4)	(5)	(6)
cons	668.620***	446.456***	500.481***	466.614***	416.252***	464.706***
	(83.717)	(84.396)	(84.634)	(84.908)	(84.844)	(84,924)
ort	0.448***	0.328***	0.336***	0.324***	0.318***	0.323***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
coe		0.185***	0.264***	0.263***	0.177***	0.260***
		(0.007)	(0.010)	(0.010)	(0.007)	(0.010)
noe			-0.107***	-0.118***		-0.118***
			(0.430)	(0.434)		(0.434)
tfa				0.050***	0.038***	0.050***
				(0.005)	(0.005)	(0.005)
ifa						0.013
						(0.010)
R^2	0.200	0.220	0.225	0.227	0.221	0.227
Adj. R^2	0.200	0.220	0.224	0.226	0.221	0.226
Obs. N	6,732	6,732	6,732	6,732	6,732	6,732
AIC				136,662.6		136,663.4
SIC				136,696.7		136,704.3
HQIC				136,674.4		136,677.5

Standard errors in parentheses

The significance levels are indicated by stars: $*$ p < 0.05, $**$ p < 0.01, $***$ p < 0.001; two-tailed tests

Source: Authors' own calculations

The application of the Stepwise method, whose underlying goal is to find the best fit model, produced an output of models (1) to (4) (see Table 4). To make a brief reference to the theoretical framework, model (2) coincides with the FA used in Canada and model (4) with the CCCTB FA. Based on the Stepwise method model (4), omitting the intangible assets, was computed as the best fit model. Contrary to the hypothesis that intangible assets would have a significant effect in the value creation process, the Stepwise method produced the result that the intangible assets are not significant and thus irrelevant in the model. To verify this partial result, the calculations were also carried out on models (5) and (6), to cover all the theoretical concepts, and to verify the explanatory power of the FA that includes intangible assets. Model (5) corresponds to the Massachusetts FA and finally, model (6) corresponds to our theoretical FA with the addition of intangible assets, as per the hypothesis that they are a relevant factor in value creation.

Based on our empirical results, the best performing models, (4) and (6), provide an explanation for an equal degree of variability in profitability, 22.6 %. However, in model (6) the intangible assets are statistically insignificant, and their inclusion does not enhance the explanatory power of the FA. Based on the partial results the best performing FA is the CCCTB FA, nonetheless, as a cross-check on

the best performing models, (4) and (6), we used the Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan–Quinn Information Criterion (HQIC) as metrics to compare the fit of different regression models (see Table 4). Lower values of information criterion indicate a better fit, hence models that have lower values of information criteria are those that are predicted to better "fit" the observed data. Based on the results, lower values for the information criteria were reported by model (4), this confirms that the CCCTB FA performs well when applied to the studied data set.

Krchnivá and Nerudová (2018 and 2015), Krchnivá (2015) and Roggeman *et al.* (2012) further considered that restricted regression models[3] were better able to reflect the structure of the CCCTB FA where all the factors are equally weighted. Therefore, to additionally verify that the CCCTB FA was the best performing FA, we added the restriction that the independent variables would be equally weighted in regression models (4) and (6) and performed a restricted regression analysis. The results revealed that the restricted model (4) explains 18.0 % of the variability in profitability and the restricted model (6) explained 17.3 %. Hence the results of the restricted regression confirmed that the CCCTB FA is suitable.

To summarize, based on the results, the best fit model, i.e., the FA that is best able to explain variability in profitability, is model (4), this corresponds to the CCCTB FA. The results suggest that intangible assets only play a rather minor role in the profit generation process and are not a value creation factor that has a statistically significant effect. In addition, the results indicated that the demand factor, sales by destination is the dominant factor in the explanation of the generation of profit. The cost of employees produces a higher variance in profit than the number of employees, moreover the number of employees has an inverse relationship with profit before tax. This has considerable relevance, especially within Central and Eastern European countries with relatively lower wages.

Additionally, as indicated above, we analysed the VIF for each regression model to measure the multicollinearity in the set of multiple regression variables, especially considering the high correlation coefficients identified between the cost of employees and the number of employees (see Table 3). Table 5, below, presents a collinearity diagnosis of the VIF.

[3] Independent variables are restricted to be equal (restricted regressions).

Table 5 Multicollinearity diagnosis - VIF

	(1)	(2)	(3)	(4)	(5)	(6)
ort	1	1.719	1.734	1.801	1.793	1.812
coe		1.719	3.186	3.188	1.766	3.249
noe			2.677	2.737		2.737
tfa				1.225	1.198	1.226
ifa						1.124

Source: Authors' own calculations

The higher the value of VIF, the higher the correlation between a particular variable and the rest of the regressors. If the VIF value is higher than 10, it is considered to have a high correlation with the other independent variables and there is an issue with multicollinearity. However, the acceptance range is subject to requirements and constraints. The VIF ranges between 1.124 and 3.249 and thus, is below the recommended threshold. We conclude that the results suggest no multicollinearity constraints.

Robustness analysis

To verify the robustness of our results, the more extreme values, those below the 5th and above the 95th percentiles were also omitted (as was done by Roggeman *et al.,* 2012). This resulted in the elimination of data from an additional 1,309 companies, resulting in a final tally of 5,423 companies. Once again, we ran the Stepwise regression analysis and the overall results of the robustness check revealed that, by a narrow margin, the intangible assets were found to have a significant effect within the model, $p = 0.050$. Therefore, the best fit model, according to the Stepwise regression, is model (11), this corresponds to our theoretical FA that includes intangible assets. However, the inclusion of intangible assets in the model does not significantly enhance the explanatory power of the FA. When we compare the adjusted R^2 we see that model (10), which corresponds to the CCCTB FA, and model (11) are equally effective in providing an explanation for the variability in profitability, i.e., 28.7 %. Moreover, within the model the relationship between intangible assets and profit before tax was found to be an inverse correlation, even though it was expected to be positive. Table 6 shows the results of the robustness analysis.

Table 6 Robustness analysis

	(7)	(8)	(9)	(10)	(11)
cons	364.974***	235.957***	213.026***	233.527***	238.504***
	(30.784)	(31.999)	(32.312)	(32.539)	(32.629)
ort	0,510***	0.405***	0.396***	0.396***	0.398***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
coe		0.180***	0.166***	0.242***	0.248***
		(0.006)	(0.006)	(0.010)	(0.010)
noe				-0.099***	-0.100***
				(0.439)	(0.439)
tfa			0.058***	0.072***	0.073***
			(0.006)	(0.006)	(0.006)
ifa					-0.023*
					(0.025)
R^2	0.260	0.281	0.284	0.287	0.288
Adj. R^2	0.260	0.281	0.284	0.287	0.287
Obs. N	5,423	5,423	5,423	5,423	5,423
AIC				96,950.38	96,948.53
SIC				96,983.37	96,988.12
HQIC				96,961.90	96,962.35

Standard errors in parentheses

The stars flag levels of significance, $*$ p < 0.05, $**$ p < 0.01, $***$ p < 0.001; two-tailed tests

Source: Authors' own calculations

As a cross check of the best performing models, (10) and (11), we additionally report the AIC, SIC and HQIC. From the above results, we can see that model (10), which corresponds to the CCCTB FA, (without intangible assets), reports lower values for the additional metrics, thus it can be considered a better "fit" for the studied data. Furthermore, restricted regression models were also considered. Based on the results, the restricted regression version of model (10) explains 22.3 % of the variability in profitability and the restricted regression version of model (11) explains 20.4 % of the variability in profitability. With these results taken together, the robustness analysis confirmed the empirical results that the CCCTB FA is the most suitable formula, it is able to explain the highest percentage of variability in profitability, moreover, all the factors included in the model are statistically significant. In addition, the robustness analysis confirmed that the factor, sales by destination, is the dominant factor that explains the generation of profits and that cost of employees better explains variance in profit than the number of employees. Further, the inverse relationship between the number of employees and profitability was confirmed.

5 Discussion

In this paper the analysis of the explanatory power of the FA was based on a comparison of the adjusted R^2 that indicated the proportion to which the variability was explained in the regression models. Table 7 summarizes the results of the studies that, coincidentally, have applied the same methodological approach using microeconomic data obtained from the Amadeus database in the recent past. Most of the studies listed were triggered by the CCCTB Proposal, published in 2011, and the ensuing debate over a suitable composition of the FA. The degree to which the variability in profitability is explained by the various studies ranges from 22 % to 35 %. Coincidently, all of the mentioned studies, including ours, found that the most suitable FA was the CCCTB Proposal, the only exception being a study by Roggeman *et al.* (2012).

Table 7 Comparison of published results

Study	Data	Results
Krchnivá and Nerudová (2018)	Amadeus database, Year: 2013, Companies with a link to the CR[4].	The CCCTB FA explains 26.32 % of the variability in profitability.
Krchnivá and Nerudová (2015)	Amadeus database, Year: 2012.	The CCCTB FA explains to a statistically significant extent the variability in profitability in all 18 of the NACE sectors considered. The proportion of explained variability differs by up to 34 % with respect to the sector of economic activity.
Krchnivá (2015)	Amadeus database, Year: 2012, Companies registered in the CR.	The CCCTB FA is able to explain almost 35 % of the variability in profitability.
Roggeman *et al.* (2012)	Amadeus database, Year: 2008, European manufacturing and service sector.	The best performing formula[5] statistically significantly explains 28 % of the variability in profitability. Intangible assets do not significantly increase the explanatory power.
Hines (2008)	Amadeus database, Year: 2004.	The CCCTB FA explains less than 22 % of the variability in profitability.
Results of this study	Orbis database, Year: 2018.	The CCCTB FA is the best performing formula and is able to explain, to a statistically significant degree, 22.6 % of the variability in profitability.

Source: Own elaboration

Our results, similar to those of Roggeman *et al.* (2012), showed that the inclusion of intangible assets does not enhance the performance of the FA and that intangible assets have a statistically

[4] The Czech Republic.
[5] FA including the factors of tangible fixed assets, cost of employees and sales by destination.

insignificant effect in the model. These results contradict the hypothesised importance of intangible assets in value creation as per Corrado, Sichel and Hulten (2009) and do not confirm the theoretical results of Martins and Taborda (2022). Roggeman *et al.* (2012) further elaborated that the current accounting methods used under the International Financial Reporting Standards (IFRS) require most intangibles to be expensed and, as a consequence, capitalized intangibles do not reflect how valuable intangible assets are to many companies (*ibid*.). Dancaková *et al.* (2022) argued that due to the persistent conservatism of the IFRS the actual value of intangible assets cannot be fully recognized and disclosed in financial statements. Taking into consideration that various different definitions of intangible assets are employed in the field of taxation, accountancy, and transfer pricing of MNCs, it is hypothesised that intangible assets are undervalued in financial statements. This may, hypothetically, generate bias in the empirical results related to the significance of intangible assets as a factor of value creation. Additionally, we are of the opinion, as are Martins and Taborda (2022) and Corrado, Sichel and Hulten (2009) that intangible assets are principally value creation assets which have an increasing importance and their inclusion in the BEFIT FA should be considered. Moreover, we believe that omitting intangible assets would mean neglecting to consider a significant portion of total assets and one of the main sources of competitiveness of MNCs.

This paper seeks to contribute to the debate on EU wide corporate taxation, currently enlivened by the impending BEFIT Proposal, and the related question of whether intangible assets should be included in its scope. We provide a general analysis of all sizes and types of companies who are active within the EU internal market, to identify the factors of value creation and provide a springboard for further research in this field. In our analysis we employed data for individual companies for 2018, thus our results reflect, to some extent, changes in the economy since the original CCCTB Proposal of 2011 and follow on from studies such as Krchnivá and Nerudová (2018 and 2015), Krchnivá (2015), Roggeman *et al.* (2012) or Hines (2008). We believe that the usefulness of our paper lies in the revival of the discussion of the FA that should be applied within the EU and our results should be seen as a first attempt to provide a general empirical base for the upcoming discussion on BEFIT.

6 Conclusion

The main aim of this paper was to carry out an empirical analysis of the explanatory power of the FA to explain the variability in profitability of companies active within the EU internal market. It includes an additional factor, intangible assets, to further explain the variability in profitability and thus contributes to the debate around the impending BEFIT Proposal. We employed microeconomic data, for 2018, obtained from the Orbis database. Our final data set consisted of 6,732 companies active within the EU internal market. The empirical analysis of the explanatory power of the FA was, similar to Krchnivá and Nerudová (2018 and 2015), Krchnivá (2015), Roggeman *et al.* (2012) and Hines (2008), based on a comparison of the adjusted R^2 from the regression models.

Our results revealed that the FA, including the factor, intangible assets, explains 22.6 % of variability in profitability. However, the inclusion of intangible assets did not enhance the explanatory power of the FA. Moreover, the intangible assets were identified as statistically insignificant in the computed model. Based on the empirical results, it was concluded that the most suitable FA, that provides a statistically significant explanation for the variability in profitability, is the CCCTB FA, without the inclusion of intangible assets.

We must acknowledge that this paper has certain limitations. Firstly, we did not reflect the division of intangible assets as described by Martins and Taborda (2022). In this paper we uniformly applied a proxy for intangible assets, as reported in the financial statements of the companies – the fixed intangible assets. This potentially could have influenced the results obtained and the statistical significance of the impact revealed. Moreover, we extracted the most up to date data from the Orbis database, dating from 2018, hence the considerable changes caused by the COVID-19 pandemic that since 2020 has influenced the economies of the EU MS are not reflected in the data set used. Our findings suggest that future research might wish to follow these directions: i) an empirical analysis that investigates subgroups of intangible assets that might be included in the FA, as per the theoretical explanation of Martins and Taborda (2022), and ii) the possibility of having a specification for the FA that applies to specific economic sectors.

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